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Foreword

This monograph contains a number of the talks given at the 41st Annual Meeting of the Berkeley Linguistics Society, held in Berkeley, California, February 7-8, 2015. The conference included a General Session and the Special Session *Fieldwork Methodology*. The 41st Annual Meeting was planned and run by the second-year graduate students of the Department of Linguistics at the University of California, Berkeley: Kenny Baclawski, Anna Jurgensen, Spencer Lamoureux, Hannah Sande, and Alison Zerbe.

The original submissions of the papers in this volume were reviewed for style by Anna Jurgensen and Hannah Sande. Resubmitted papers were edited as necessary by Anna Jurgensen and Kenny Baclawski, and then compiled into the final monograph by Anna Jurgensen. The final monograph was reviewed by Spencer Lamoureux. The endeavor was supported by Alison Zerbe's management of the Berkeley Linguistic Society's funds for publications.

The BLS 41 Executive Committee
July 2015

The No Blur Principle Effects as an Emergent Property of Language Systems

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1 Introduction

In languages with multiple inflection classes, the formal variation associated with lexically conditioned allomorphy typically shows only a loose correlation with systematic phonological or semantic conditions (synchronically, at least) and often seems to serve no apparent communicative function. All natural languages show a certain degree of what Baerman *et al.* (2010:2) call "gratuitous" morphological complexity and Wurzel (1986:76) describes as "ballast" in the linguistic system. Many linguists have proposed universal constraints that place limits on the degree of additional complexity that inflection class systems can bring to a language (e.g., Carstairs 1987, Carstairs-McCarthy 1991, Plank 1991, Müller 2007).

In this paper, we compare two such proposals, the No Blur Principle (Carstairs-McCarthy 1994) and the Low Conditional Entropy Conjecture (Ackerman & Malouf 2013). The LCEC, it is claimed, reflects an emergent strategy of cross-linguistic morphological organization that permits language to solve the Paradigm Cell Filling Problem of Ackerman *et al.* (2009) and Ackerman & Malouf (2013). The PCFP is this: given exposure to a small number of surface word forms, speakers of morphologically complex languages must learn to reliably predict the full inflectional (or derivational) paradigms of novel words. Ackerman *et al.* (2009) argue that within the general framework of Word & Paradigm Morphology word relations in morphologically complex languages are structured in such a way as to facilitate the correct inferences involved in solving the PCFP. In particular, they posit that conditional entropy, the average uncertainty about the realization of one cell in the paradigm given another, is the relevant measure of morphological complexity.[1] Many languages have large paradigms with many inflectional classes, but, according to the LCEC a common property among them is that their organization will dependably reflect an average paradigm entropy that is fairly low.

In this paper, we aim to show that the NBP is not an independent and sufficient constraint on possible inflectional organization. Rather, it is a special case of the LCEC. While languages which obey the NBP will have low entropy, there are other, non-NBP strategies for maintaining low conditional entropy and the learnability benefits that accrue from it. Furthermore, the same evolutionary pressure(s) on language from which organization displaying low conditional entropy emerges, will often (but not always) lead to languages which fit the NBP.

In section 2 we define the NBP and in section 3 we describe conditional entropy and the LCEC. In section 4 we offer a simulation experiment designed to test the predictions of the NBP and LCEC. Finally in section 5 we present our conclusions.

[1] See Bonami & Beniamine (2015) for an analysis in terms of joint entropies for the frequent empirical situation where the words occupying multiple cells all provide information that reduces the uncertainty in predicting an unknown form of a known lexeme.

2 No Blur Principle

The **No Blur Principle** (Carstairs-McCarthy 1994, 2010, 2014) states that in languages with multiple inflection classes, the realization of each cell of the paradigm for each class must either uniquely identify the inflection class or be the default realization for that cell. For example, in the (hypothetical) paradigm in (1), every form uniquely identifies the inflection class:

(1)

CLASS	NOM.SG	ACC.SG	NOM.PL	ACC.PL
I	*-am*	*-as*	*-an*	*-ag*
II	*-om*	*-os*	*-on*	*-og*
III	*-im*	*-is*	*-in*	*-ig*
IV	*-um*	*-us*	*-un*	*-ug*

Once speakers see, for example, an accusative plural wordform for some lexeme in *-ag*, then they know that this lexeme must be a member of class I. In the following paradigm, in contrast, not all forms are similarly diagnostic:

(2)

CLASS	NOM.SG	ACC.SG	NOM.PL	ACC.PL
I	*-am*	*-ə*s	*-ə*n	*-ə*g
II	*-om*	*-os*	*-on*	*-ə*g
III	*-ə*m	*-is*	*-ə*n	*-ə*g
IV	*-ə*m	*-ə*s	*-un*	*-ug*

Here, forms in *-əC* fail to uniquely identify the class: a lexeme whose nominative singular ends in *-əm* could be in class III or in class IV. However, the *-əC* forms can be denominated as a default class, used whenever a paradigm cell has no diagnostic realization that uniquely identifies class membership. This result can be factored out in the following way:

(3)

CLASS	NOM.SG	ACC.SG	NOM.PL	ACC.PL
I	*-am*	—	—	—
II	*-om*	*-os*	*-on*	—
III	—	*-is*	—	—
IV	—	—	*-un*	*-ug*
def.	*-ə*m	*-ə*s	*-ə*n	*-ə*g

In (3), every form which is specific to some inflection class (i.e., every non-default form) is diagnostic: a nominative singular in *-əm* is an uninformative default, but one in *-om* unambiguously signals class II.

Finally, consider one more system:

(4)

CLASS	NOM.SG	ACC.SG	NOM.PL	ACC.PL
I	*-ɔm*	*-ə*s	—	—
II	*-ɔm*	*-ɔs*	*-on*	—
III	*-ə*m	*-ɔs*	—	—
IV	*-ə*m	*-ə*s	*-un*	*-ug*
def.	—	—	*-ə*n	*-ə*g

In this language, forms in *-ɔm* and *-ɔs* are neither defaults nor diagnostic of class membership. There are two nominative singular and accusative singular forms that exhaustively partition the paradigm, each associated with two of the four classes. Thus the nominative singular and accusative singular cells are 'blurred'. This is the type of cross-linguistic paradigm organization that the NBP rules out.

In this connection, Carstairs-McCarthy (1994) makes two claims, namely that (i) the NBP represents a universal property of language; and (ii) it follows from a fundamental learning bias. The first claim is an empirical one: either all languages follow the NBP or they do not. Evaluating this claim however is not entirely straightforward. Beyond the evidential issues that arise in evaluating any putative universal on the basis of a limited sample of languages (Cysouw 2005, Piantadosi & Gibson 2014), the interpretation of the NBP for a given language depends on the analysis of the data that one assumes. In particular, Carstairs-McCarthy argues that affixal inflection and stem alternations form two distinct systems, and that the NBP applies only to affixal morphology. Since many inflection class systems involve interactions between affixes and stems, evaluating the NBP requires understanding the nature of each of these two types of exponence and the consequences of their interdependencies for identifying the principles guiding paradigm structure.[2] At the present time, it appears that several languages do seem to follow the NBP, though the sample of languages that have been analyzed this way is somewhat small and not particularly diverse. In contrast, however the principle is interpreted, there do seem to be recalcitrant counter-examples from a wide distribution of languages that cannot be assimilated to the NBP.

Carstairs-McCarthy's (1994) second claim is that the origin of the NBP as a universal is motivated by Clark's (1987, 1990, 1993) **Principle of Contrast** for lexical learning. Clark argues that this principle is one of two pragmatic principles that guide vocabulary acquisition: this principle states that "Speakers take every difference in form to mark a difference in meaning" (Clark 1993:64). This operates in conjunction with her Conventionality Principle according to which learners reuse the lexical item used by adults to denote a particular semantic distinction. As a consequence, when a learner hears an unfamiliar term employed to convey a semantic distinction with an already established conventional word, the Principle of Contrast leads the learner to assume that the new form has a different meaning, however subtle, from the known one. Carstairs-McCarthy (2010) generalizes the link between the Principle of Contrast and the NBP by introducing the notion of **vocabular clarity**. Carstairs-McCarthy observes that children acquiring language in a bilingual environment seem to have no significant problem keeping the vocabularies of the two languages distinct. Children are (he argues) able to switch between alternate vocabularies as long as there are contextual cues that indicate which vocabulary should be active in a particular environment. He further points out that many languages have alternative vocabularies to be used in different social contexts (what he calls multivocabulism). In Guugu Yimidhirr (Pama-Nyungan), for example, a man would use the word *gadiilbaga* 'axe' with a brother-in-law, *guliirra* 'axe' with someone of the opposite sex, and *warrbi* 'axe' in informal speech (Carstairs-McCarthy

[2]Vigorous debate concerning these issues continues, with some pointing out languages which seem to violate the NBP (Blevins 2000, Stump 2005, Halle & Marantz 2000, Baerman 2012, Stump & Finkel 2013, Baerman 2014a,b) while others argue that, when analyzed properly, apparent counterexamples can be seen to fall into line with the NBP's predictions (Cameron-Faulkner & Carstairs-McCarthy 2000, Enger 2007, 2013, Carstairs-McCarthy 2010, 2014).

2010:94). What seem to be synonyms really are not, as the social context would determine in any particular situation which of the three words for 'axe' should be used.

Inflection class systems, by hypothesis, represent a particularly abstract form of multivocabulism. In the paradigm in (1), there are four different affixes that mean 'nominative singular', but the choice of which affix to use in any context is determined by the inflection class of the noun to be inflected. The paradigms in (1)–(3) all show vocabular clarity: each affix is associated with a unique context, either a specific inflection class or the default. The paradigm in (4) however does not. This nominative singular *-ɔm* and the accusative singular *-ɔs* are each associated with two inflection classes and therefore two 'meanings', in violation of the Principle of Contrast and the NBP.

This second claim, that the NBP is a consequence of the Principle of Contrast/vocabular clarity, is more difficult to evaluate than the first. In order for this claim to be true, two things must hold: acquisition of inflection class systems must be actually governed by the Principle of Contrast[3] and, that must then lead to the specific distribution of languages we find. We will focus in this paper on the second requirement. Suppose vocabular clarity does obtain. Would that actually lead to the NBP?

It is appealing to account for the NBP as a consequence of the way that language is learned or used, but any such account is faced with Epstein's (1999, 2006) **Generativist's Question**: "How could the decentralized local interactions of heterogeneous autonomous agents generate the given regularity?" Or:

> "To explain a macroscopic regularity x is to furnish a suitable microspecification that suffices to generate it. The core request is hardly outlandish: To explain a macro-x, please show how it could arise in a plausible society. Demonstrate how a set of recognizable — heterogeneous, autonomous, boundedly rational, locally interacting — agents could actually get there in reasonable time." (Epstein 2006:51)

In section 4, we will present a computational simulation that attempts to answer Epstein's challenge. But first, we consider an alternative constraint on morphological complexity, the Low Entropy Conjecture.

3 Low entropy conjecture

For speakers of languages with complex paradigms and multiple inflection classes, it is unlikely that every speaker will encounter and memorize every form of every lexeme. For example, in Tundra Nenets (Samoyedic branch of Uralic) each noun lexeme has 210 possible inflected forms for the morphosynactic feature property combinations for 7 cases, 3 numbers, and 3 persons and numbers for possessors: $(7 \times 3) + (7 \times 3 \times 3 \times 3) = 210$ distinct wordforms. So, if a speaker needs to produce a wordform that they have not previously learned, what strategies can they use to infer the correct form? This task receives a general formulation as the Paradigm Cell Filling Problem (PCFP) in Ackerman *et al.* (2009):

[3]We leave to another forum the (in)appropriateness of the analogy between lexical learning and inflectional learning that forms the basis of the NBP

> **Paradigm Cell Filling Problem**: Given exposure to an inflected wordform of a novel lexeme, what licenses reliable inferences about the other wordforms in its inflectional family?

In pedagogical practice, following Word-and-Paradigm models of morphology, an inflectional system is represented via a set of full exemplary paradigms reflecting the inflectional classes of a languages. Speakers may memorize complete paradigms for frequent lexemes, but for infrequent lexemes speakers must produce novel wordforms by analogy from known wordforms representative of patterns of forms constitutive paradigms. Morphological systems are structured by patterns of implicational relations among all wordforms within paradigms, which provide speakers with a means for carrying out these predictions on the basis of incomplete information. This is a pervasive type of example in language of a far broader task that humans constantly confront, namely, how to arrive at reasonable solutions to complex problems under evidently uncertain conditions.

In order to assess the strength of implicational relations among wordforms, we will use the information-theoretic notion **entropy** as the measure of uncertainty or predictability (Ackerman *et al.* 2009, Ackerman & Malouf 2013). Suppose we are given a random variable X which can take on one of a set of alternative values $x_1, x_2, \ldots, x_n$ with corresponding probability $p(x_1), p(x_2), \ldots, p(x_n)$. Then, the amount of uncertainty in X, or, alternatively, the degree of information conveyed on learning the value of X, is the entropy $H(X)$:

$$H(X) = -\sum_i p(x_i) \log_2 p(x_i)$$

The entropy $H(X)$ is the weighted average of the **surprisal** $-\log_2 p(x_i)$ for each possible outcome x_i. The surprisal is a measure of the amount of information expressed by a particular outcome measured in bits, where 1 bit is the information content of a choice between two equally probable outcomes. Outcomes which are less probable (and therefore harder to predict) have higher surprisal. Specifically, surprisal is 0 bits for outcomes which always occur ($p(x) = 1$) and approaches ∞ for very unlikely events (as $p(x)$ approaches 0). The more choices there are in a given domain and the more evenly distributed the probability of each particular alternative, the greater the uncertainty or surprise there is (on average) that a particular choice among competitors will be made and, hence, the greater the entropy. Conversely, choices with only a few possible outcomes or with one or two highly probable outcomes among many unlikely exceptions have a low entropy.

To solve a particular instance of the PCFP, a speaker needs to generate an unknown form on the basis of (at least) one other known form. To quantify the predictability of one form given the other, we can measure the size of the surprise associated with these forms using **conditional entropy** $H(Y|X)$, the uncertainty in the value of Y given that we already know the value of X:

$$\begin{aligned} H(Y|X) &= H(X,Y) - H(X) \\ &= \sum_{x \in X} \sum_{y \in Y} P(x,y) \log_2 P(y|x) \end{aligned}$$

The smaller $H(Y|X)$ is, the more predictable Y is on the basis of X, i.e., the less surprised one is that Y is selected given knowledge of X. In the case where X completely determines

Y, the conditional entropy $H(Y|X)$ is 0 bits: given the value of X, there is no question remaining as to what the value of Y is. On the other hand, if X gives us no information about Y at all, the conditional entropy $H(Y|X)$ is equal to $H(Y)$: given the value of X, we are just as uncertain about the value of Y as we would be without knowing X at all.

For any paradigm, the difficulty of the PCFP is the average conditional entropy across all possible pairs of wordforms:

$$H(P) = \sum_{c_1} \sum_{c_2} H(c_1|c_2)$$

If the PCFP as formulated here accurately describes something about the way language is structured, then in order for speakers to successfully produce forms in a morphologically complex language, the average conditional entropy must be low. Ackerman & Malouf (2013) computed the average conditional entropy for paradigms in a small sample of paradigms taken from typologically and genetically diverse languages, finding that the average conditional entropy ranged from 0 bits to 0.75 bits. The sample included languages with impressively complex-looking morphological systems that have been raised as violations of the NBP, such as Nuer and Chiquihuitlán Mazatec (a language with at least 109 different verbal conjugations). Despite the large range in the apparent complexities of these languages, as measured by the number of paradigm cells, allomorphs, and inflection classes, the average conditional entropy fell within a narrow range. The **Low Entropy Conjecture** is the prediction that all languages will show low average conditional entropy along the lines discovered for these languages. Ackerman & Malouf (2013) refer to this measure as calculating the **integrative complexity** or I-complexity of a morphological system.

With this as background, the NBP can be construed as a particular strategy for achieving low conditional entropy. If all cells in a paradigm indicate class membership, as in (1), then the average conditional entropy is 0 bits: every form predicts every other form perfectly. Moving away from that ideal increases the entropy, but adding default realizations for cells only increases the entropy by a small amount. Class-unique forms are highly predictive but hard to predict, while default forms are easily predicted but not very predictive. Together they yield low average entropy. As paradigms become more 'blurred', the average conditional entropy goes up as well. A paradigm in which every cell is blurred:

(5)

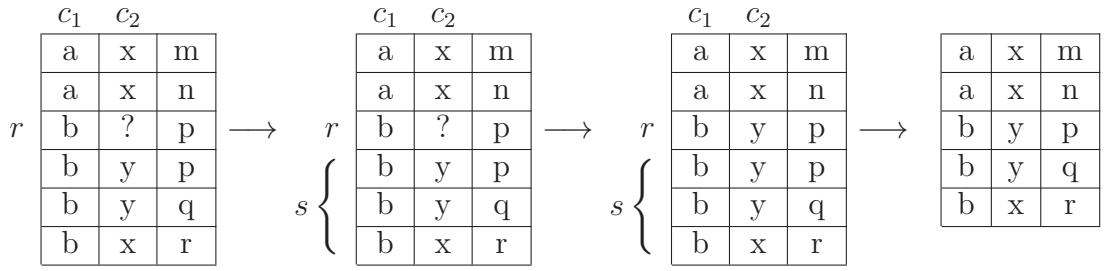
CLASS	NOM.SG	ACC.SG	NOM.PL	ACC.PL
I	*-am*	*-as*	*-on*	*-ag*
II	*-am*	*-os*	*-an*	*-og*
III	*-om*	*-as*	*-on*	*-ag*
IV	*-om*	*-os*	*-an*	*-og*

also has relatively high conditional entropy. No forms uniquely identify inflection class membership and no forms are any better represented than any others.

4 Simulation

Our hypothesis is that speakers' need to solve the PCFP serves as a strong evolutionary pressure on language, guiding development of morphological systems in the direction predicted by the LCEC. As a side effect, many languages will also reflect the NBP. To test this, we constructed a simple agent-based computational simulation, adapting the **iterated learning**

Figure 1: Predicting cell c_2 from cell c_1 for class r by analogy with s



model (Esper 1966, Kirby 2002, Kirby & Hurford 2002). In this framework, an artificial language is constructed and successive generations of simulated language learners acquire the language and pass it on to their offspring. This type of simulation is useful for exploring the effect of the **learning bottleneck**: during acquisition, children do not have direct access to their parents' grammars and have to infer its properties from limited linguistic input. This makes it a good choice for testing the consequences of the PCFP.

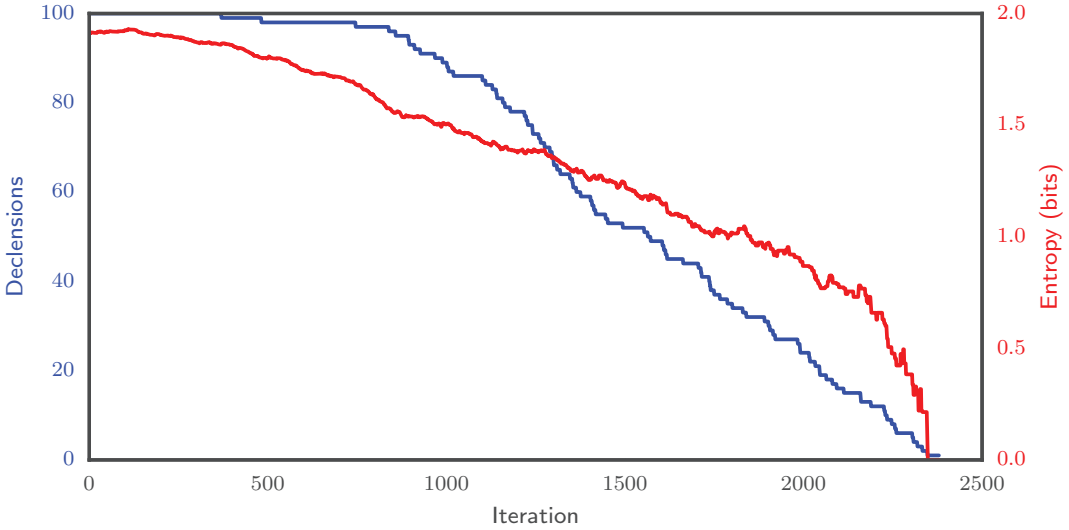
For this simulation, we start with a simple random language with eight paradigm cells and three allomorphs per cell. We generate an initial lexicon of 100 words by selecting randomly from the space of $3^8 = 6{,}561$ possible inflection classes. The result is a highly unrealistic language – virtually every word is in its own inflection class – but it perhaps reflects what might arise after a sound change obscures a previously predictable morphological system. By any measure, a random language of this type will show very high I-complexity. No paradigm cell will be a good predictor of inflection class, so the system is maximally blurred and also has high average conditional entropy.

For a language of this type, there will be no general way of solving the PCFP. Every lexeme will have to be memorized, as prediction is foreclosed owing to the way the system is organized. To investigate how a 'difficult' language like this might evolve, we simulate what might happen if a speaker were forced to predict an unknown form of a lexeme based on analogy with other known forms, as in Figure 1. Specifically, we select an inflection class r, a known predictor cell c_1, and an unknown predicted cell c_2. We then collect the inflection classes s with the same realization as r for cell c_1: these classes form the basis for the analogy. The realization for c_2 which is most common among the classes s is predicted as the realization of c_2 for r. This predicted realization now becomes the new correct realization for c_2 in r, and the inflection class inventory is reconfigured accordingly — if r is now the same as some other class, the two classes are merged into one. The simulation continues, repeating this process until the system stabilizes and 25 iterations pass without any changes.[4]

An example showing the evolutionary pathway followed by one simulated language is given in Figure 2. The language starts with 100 lexical items in 100 different inflection classes, and over the course of the simulation the class differences are completely leveled out and only one class remains. That the number of distinct classes is reduced over time is not surprising: since the starting state is unlearnable (with respect to the PCFP) our simulated speakers are not able to learn it, and the 'mistakes' they make will inevitably cause the

[4]Source code for the simulation is available at `http://github.com/rmalouf/bls15`.

Figure 2: The evolutionary course of one simulated language



language to evolve into one that is simple enough to be learnable.[5] What is interesting is the nature of the simplifications that happen and the types of inflectional systems that these simplifications lead to.

In each simulation run, the simplifications that occur and the final state that is reached depend heavily on many random choices. To explore the distribution of final states — which are common, which are unusual, and which are unattested — we can repeat the simulation many times and aggregate their results. In many cases, as in Figure 2, the final state has only a single inflection class, reflecting a complete leveling of the class differences in the starting state. By necessity these languages obey the NBP, as with only one class any form is trivially diagnostic of class membership, and similarly the average conditional entropy is 0 bits. Since we are primarily interested in the systems with more than one inflection class, these fully reduced systems will be ignored in the discussion that follows.

To gather a representative sample of languages, the complete simulation described above was repeated until 500 languages with more than one inflection class were collected. The distribution of inflection class inventory sizes is shown in Figure 3. Most systems are fairly small (the median number of classes is 12 and 69% have fewer than 20 classes), but there are handful of languages with very large inventories of inflection classes (the largest has 88 classes). The distribution of numbers of blurred cells is shown in Figure 4. The majority of simulated languages (283 in all) have no blurred cells and another 50 have only one blurred cell. In all, 56.7% of the simulation runs lead to a final state that obeys the NBP. But, that leaves 43.3% of the sample as languages that do not obey the NBP, and 36 languages in which all eight paradigm cells are blurred. Finally, Figure 5 shows the distribution of

[5]This effect is reminiscent of the Weak Anthropic Principle ("We must be prepared to take account of the fact that our location in the universe is necessarily privileged to the extent of being compatible with our existence as observers", Carter 1974) and Stein's Law ("If something cannot go on forever, it will stop", Stein 1989).

Figure 3: Number of declensions

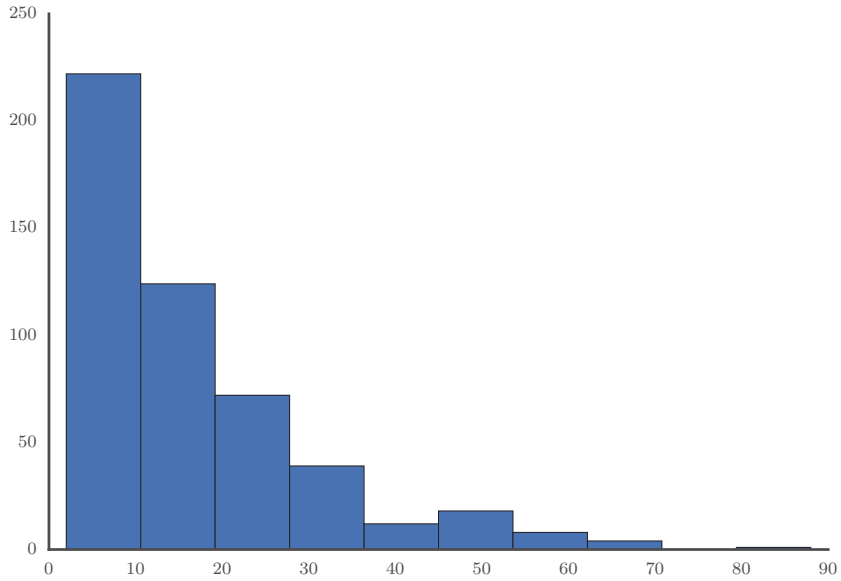


Figure 4: Number of blurred cells (out of 8)

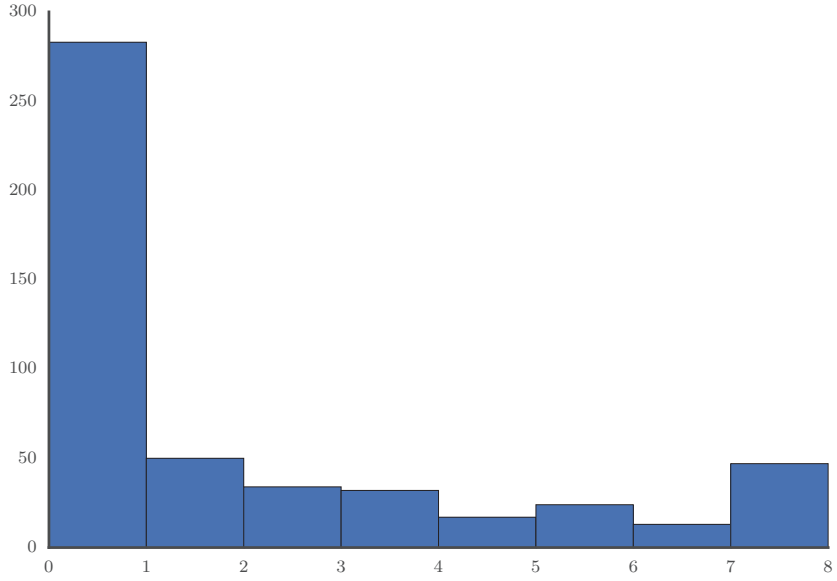
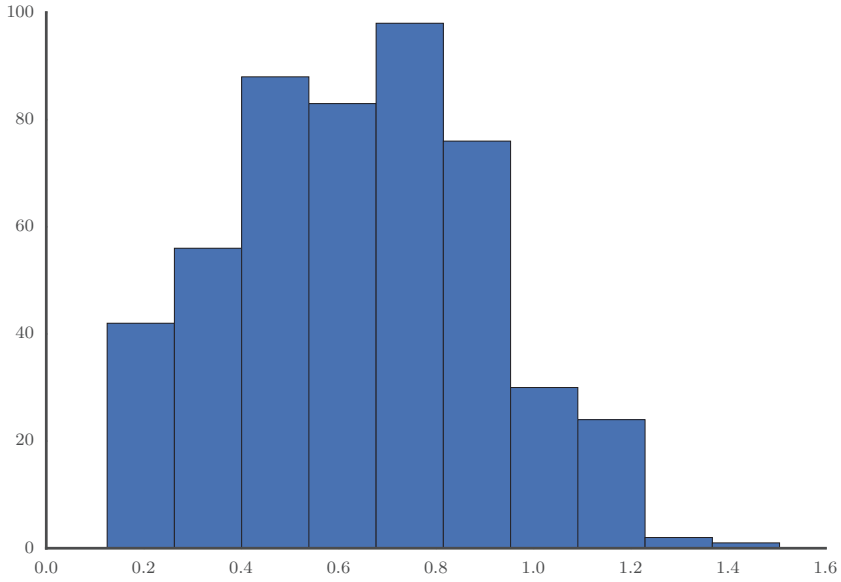


Figure 5: Average conditional entropy (in bits)



average conditional entropies for the simulated paradigms. The mean value is 0.64 bits. In each case, the simulated values fall broadly within the range of values that are observed for real language systems. Many languages obey the NBP, but a minority do not. Most languages with more than one inflection class have a dozen or so classes, but a few have many more than that. Instructively, the average conditional entropy of most paradigms is slightly more than 0.5 bits, but a few are more than 1 bit.[6]

The simulation shown in Figure 1 is a model of the PCFP, as the learner at each iteration must generate an unseen form from a seen form by analogy. Crucially, however, the simulation does not include anything like the Principle of Contrast or a requirement for vocabular clarity. On the other hand, it does reflect a general human inferencing capacity which applies in its own particular way to the Principle of Contrast as a pragmatically based assumption. The basic result, as evident in Figure 3, is that the majority of languages produced by this method do in fact obey the NBP. In this way the NBP can be appropriately interpreted as an **emergent** property of these morphological systems. It is not explicitly enforced by the model at any point, but its effect arises through the dynamics of language transmission. In addition, it becomes clear that in the absence of NBP effects there are still many ways to organize a complex system with acceptably low conditional entropy for solving the PCFP.

One advantage of simulation experiments is that it is easy to vary the details of the model in small ways and observe what consequences this has for the result. For example, in the simulation sketched in Figure 1, the realization chosen for the unknown cell is always the one

[6]Presumably these latter would be lowered if more veridical conditions commonly found in real languages were added to the simulations.

that is most common among the compatible classes s. This can be interpreted as a preference for a default realization (though not for vocabular clarity). We can remove that and repeat the simulation with an alternate random selection strategy, where the simulated language learner chooses a realization for an unknown cell randomly from among the alternatives in s. This is a small change in the model, but it leads to a large difference in the outcome. In this case, the languages undergo no simplification at all. The final states are just as complex (in number of declensions and conditional entropy) as the initial 'impossible' state, and in all of them every cell of the paradigm is blurred.

5 Conclusions

Starting with some assumptions about the PCFP, we have traced the evolution of (simulated) languages as they are transmitted through successive generations of speakers and learners until a stable system is reached. Beginning with a language which displays very high paradigm entropy and radically violates the NBP, much simpler systems develop quite quickly. These systems are simple in that they display multiple distinct inflectional classes like extant morphological systems. While neither the NBP nor the Principle of Choice is part of the learning model, many of simulated evolutionary trajectories lead to languages which accord with the NBP. However, many of them do not, achieving low entropy via different organizational strategies. Thus, the dynamics of language learning and use imposed by the PCFP coupled with language operating as a complex adaptive system, provide an indirect explanation for the NBP as a emergent typological regularity found across many but not all languages. In this way the NBP is construable as one type of effect attributable to a general process responsible for morphological organization.

In evaluating the NBP's empirical status in the face of apparent counterexamples, Carstairs-McCarthy concludes:

> "either (a) the Principle is simply wrong, and apparent compliance with it in some languages is purely accidental; or (b) the Principle deserves a place in an overall theory of how inflectional morphology operates, but its effects are obscured or overridden in some circumstances that are not yet well understood." (2014:61)

In this paper, we have offered a third answer. We propose that the NBP is not a design feature of language and need not be part of morphological theory. But, it is also not accidental that it describes an organization attested in many languages. Rather, as a special case of the LCEC, it is expected that some or even most languages will fit the NBP.

The NBP is not in fact a linguistic universal but rather an emergent property in those languages for which it holds true. This answers Epstein's challenge: we have shown how transmission of language through the learning bottleneck can lead to observed typological patterns. Recent work approaching language as a **complex adaptive system** (e.g., Blevins & Wedel 2009, Beckner *et al.* 2009) has developed alternate evolutionary explanations for typological universals or tendencies found across unrelated languages. This research emphasizes the role of patterns of language use and language change in the development of cross-linguistic regularities, rather than placing the burden of explanation on synchronic cognitive factors such as an innate Universal Grammar (Evans & Levinson 2009). This

systems approach to language (see also Ramscar & Yarlett 2007, Milin *et al.* 2009, Blevins in press, among others) links linguistic study to larger trends in the biological and social sciences (e.g., Epstein 2006, Miller & Page 2007, Capra & Luisi 2014).

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Intensification and sociolinguistic variation: a corpus study.

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1 Introduction

The phenomenon of intensification is pervasive in natural language. At an intuitive level, we can define intensifiers as "linguistic devices that boost the meaning of a property upwards from an assumed norm" (Quirk et al. 1985). Examples of such expressions in English include *very, really, awfully, extremely*, along with many others.

(1) Mark is very tall (→ more than just *tall*)
(2) He's really beautiful. (→ more than just *beautiful*)
(3) John is awfully good. (→ more than just *good*)

Linguists have addressed intensification from multiple perspectives, with two specific areas drawing the bulk of researchers' interests: intensifiers' semantics, and intensifiers' usage in the social landscape.

Concerning the former, linguists have been concerned with capturing the aforementioned "boosting" effect within a compositional, truth-conditional theory of meaning. In particular, recent findings (McCready and Kaufmann 2013, Bylinina 2011, Irwin 2014, Beltrama and Bochnak 2015, McNabb 2012) have revealed that the boosting effect can be achieved through a variety of different semantic operations, and that the environments where intensification is found extend well beyond the category of gradable expressions. Concerning the latter, studies within the variationist paradigm have shown that the use of almost any intensifier is not evenly distributed across the social space, but varies across macro-social categories such as gender and age (Macaulay 2006, Tagliamonte 2008, Tagliamonte and Roberts 2005) and textual genres (Biber 1988, Xiao and Tao 2007, Brown and Tagliamonte 2012, see Section 3 for further discussion).

Despite the abundance of work in either subfield, however, a successful integration between these two approaches is currently missing. On the one hand, studies in formal semantics looked at intensifiers as a crystallized and competence-based phenomenon, without much interest in how these expressions are perceived and used in actual language performance. On the other hand, sociolinguistic studies have treated intensifiers as a semantically monolithic category, showing little interest in the nuances lurking beneath the general boosting function performed by these morphemes.

[1] I would like to thank the audience of the Berkeley Linguistics Society conference for providing useful feedback upon the presentation of the current study. I would also like to thank Simon Todd for helpful advice and assistance on the data analysis part. All errors and oversights are my own.

The current paper constitutes a preliminary attempt towards the goal of exploring the relationship between the semantic and the sociolinguistic relevance of intensification. My leading hypothesis is that the particular kind of semantic scale targeted by an intensifier plays an important role in making the modifier suitable for certain communicative contexts as opposed to other.

2 Background: intensifiers between semantics and sociolinguistics

2.1 Two modes of semantic composition

Intensifiers such as *very, totally, so,* have been widely investigated by scholars engaged with providing formal models of meaning composition. Intuitively, these expressions are associated with the function of *boosting* the meaning of another expression (Quirk et al. 1985). Such a meaning comes with a straightforward requirement: the modified expression (i.e., the target of the intensifier) must be associated with a *scalar,* non-binary property (Eckardt, 2009). In (4a) and (4b) such a requirement is satisfied by the presence of a gradable adjective like *tall* or *big*. By contrast, an absolute property (e.g. *bipedal* or *1-bedroom*) violates the requirement, producing a sentence that is ill-formed and difficult to interpret.

(4a) Mark is **very** tall (scalar)
(4b) The house is **supe**r big (scalar)
(5a) ?? Mark is **very** bipedal. (non scalar)
(5b) ?? The house is **super** 1-bedroom (non scalar)

The mode of composition that has been invoked to account for these cases is known as *degree modification* (Rotstein and Winter 2004, Kennedy and McNally 2005, Kennedy 2007 among many others). In a nutshell, gradable predicates such as *tall* or *big* are modeled as functions which take an individual as input – e.g Mark, the house – and return a quantitative degree for this individual along a specific dimension (height for *tall,* size for *big*). The role of an intensifier is to combine with such a degree and impose that it counts as really high in a given context. *Very tall,* therefore, means that the individual Mark possesses a high degree of tallness. By contrast, whenever a predicate is not able to feed a degree to the intensifier – as is the case with discrete properties like *bipedal* and *one-bedroom* – intensification cannot go through due to a mismatch between the intensifier and the features of the targeted predicate.

The empirical picture, instead, is considerably more nuanced. Let us now consider *totally* below. In (6a), the scalarity requirement is satisfied by the meaning of the adjective: *full* refers to an inherently gradable property, whose degrees can be targeted by the intensifier. In the other two examples, though, the meaning of the following word does not supply a degree. Just as it is hard to imagine intermediate stages between going and not going fishing, it is hard to conceive

of something as being "more or less" San Francisco. Yet, in both cases the intensifier is perfectly interpretable, and hardly comes across as ungrammatical or ill-formed.

(6a) The tank is **totally** full (Scale: degree of fullness)
(6b) I **totally** didn't go fishing (≈ Scale: speaker's commitment towards the utterance).
(6c) This bar is **totally** San Francisco (Scale: stereotypical ranking)

More precisely, in (6b), the intensifier involves a scale associated with the speaker's degree of certainty in relation to the content of the sentence, along the lines of what adverbs like *definitely* and *absolutely* would do (Irwin 2014, McCready and Kaufmann 2013). In (6c), instead, *totally* targets a scale that aggregates the set of stereotypical features normally associated with the city San Francisco. Again, however, note that such a ranking does *not* directly come from the semantic meaning of "San Francisco" – which merely denotes a city in California - but is introduced via a complex reasoning that associates a set of scalar attributes to the city (Bylinina 2011). What these examples show is that, whatever the mechanism that one posits for accounting for them[2], intensification *can* also happen in the absence of a gradable predicate. We can conclude that at least two different modes of meaning composition exist for intensifiers: (i) a *lexical* one, where intensifiers boost the scales encoded by a gradable predicate; (ii) a *non-lexical* one, in which intensification operates over a scale that is introduced via pragmatic reasoning (in (6c)), or by shifting the focus on the speaker's commitment towards the sentence (in (6b)).

2.2 Intensifiers and sociolinguistic variation

Besides receiving large consideration in the domain of semantics and pragmatics, intensifiers have also long been a fruitful topic of investigation in sociolinguistic research. Authors engaged in this research program observed two facts. First, intensification systems are unstable and tend to change rapidly in any speech community (Macaulay, 2006; Rickford, 2007; Tagliamonte, 2008; Tagliamonte and Roberts 2005). Second, the use of intensifiers tends to vary across demographic categories, especially age and gender. Concerning the former, intensifiers across the board are generally more frequent among young speakers - adolescents in particular - and tend to decrease in the oldest generations (Labov 2001, Tagliamonte and D'Arcy 2009, Kwon 2012), although it is not always the case that the strength and direction of the correlation is always the same.. The correlation with age varies from intensifier to intensifier, and from speech community to speech community. Adverbs like *very* and *extremely*, for instance, have been found to be strongly associated with older speakers across communities, while adverbs like *well* in British English (Stenstrom et al., 2002) and *really* in Canadian English (Tagliamonte 2008) are overwhelmingly used by younger speakers. Moreover, gender has also been claimed to correlate with intensifiers distribution. Tagliamonte (2008) suggests that in Toronto currently spreading intensifiers like *so* and *pretty* are predominantly used by women, who are generally

assumed to be the forerunners of linguistic innovation. These patterns, interestingly, are also reflected in language use in the media. For instance, Tagliamonte (2005) observes that in the series *Friends*, "the once primary intensifier in North America, *really*, is being usurped by *so,* which is used more often by the female characters than by the males" (Tagliamonte 2005).

Besides being unequally distributed across different from different demographic categories, intensifiers also feature significant variation with respect to the particular context in which they are used. In groundbreaking work on the topic, Biber (1988) looked at the distribution of intensifiers across different textual types (e.g. press reports, academic writing, fiction, humor), observing that intensification is most commonly found in discourse contexts where the speaker/author's communicative intent is to display a high degree of personal involvement. Xiao and Tao (2007) performed a genre-analysis of 33 English intensifiers, looking at the distribution of the morphemes across a wide array of different types of texts, as well as the interaction of this factor with traditional sociological attributes of the speakers. Broadly speaking, their findings confirmed that spoken registers feature a much higher use of intensification than written ones, although the picture unveiled by the authors is not homogenous.[3] More recently, Brown and Tagliamonte (2012) have compared intensification rates of Canadian English in spontaneous narratives and sociolinguistic interviews, showing that intensification is overwhelmingly more common in the former. They explain the finding by arguing that in spontaneous narratives the focus is conventionally shifted from the referential content to the speaker's feelings and her construction of the self (see Schiffrin 1996 and Labov and Waletzky 1967 for extensive discussion of narratives as a genre), as part of the speaker's attempt to captivate the audience's attention. In sociolinguistic interviews, where this goal is not present, the number of these modifiers significantly dwindles. Finally, Lim and Hong (2012) tested commonly used intensifiers in Mandarin Chinese in terms of their distribution across typical genres, concluding that most intensifiers are predominantly found in spoken genres, although a few of them are actually more common in written ones. In sum, these results by and large mirror the findings discussed in the rest of the variationist work on intensifiers. On the one hand, they confirm the association between the use of intensifiers and a high degree of emotional involvement on the part of the speaker, showing that these morphemes are predominantly found in genres where emotional display is foregrounded or encouraged. On the other hand, they also unveil a certain amount of internal diversity in the category. While the general trends are consistent across the different studies, it is always the case that not all intensifiers display the same distributional patterns.

[3] While expressions such as *really, bloody, real, terribly, dead and damn* are indeed more common in oral genres, others (e.g. enormously and incredibly) show the opposite pattern, pointing to a considerable amount of inter-intensifier variability. As for the interaction between genre and gender, the association between intensifiers' use and women only emerged in writing, while spoken genres showed no particular preference for gender. Finally, concerning the interaction between genre and age, adolescents turn out to use a handful of intensifiers with very high frequency. Yet, they do not differ from other age categories for the majority of the morphemes investigated in the study.

The broad picture emerging from these investigations is one in which the intensifiers' distribution is strongly conditioned by social factors. At the same time, this body of sociolinguistic work on intensification also raises an issue which deserves further consideration. By treating *very, really, well, bloody, so* and the other intensifiers as if they were interchangeable morphemes and exclusively focusing on their occurrence with gradable predicates, most of the studies discussed above failed to take into account the amount of semantic variation within intensification discussed in Section 2. This methodological assumption is certainly reasonable in light of the methodological demands of a variationist study. In particular, as discussed by Ito and Tagliamonte (2003), the necessity to abide to Labov's a*ccountability principle* makes it necessary to limit the potential environments where intensification might occur to a manageable volume. Limiting the domain of investigation to intensifiers occurring with gradable predicates is the only possible way of accounting for both the cases in which intensification occurred and those in which it did not occur, but *could have* occurred. At the same time, however, the choice to exclude from the picture intensifiers with non-gradable predicates does not do justice to the empirical semantic complexity featured by intensifier. As a consequence, the question remains unanswered as to whether fine-grained distinctions at the semantic level – starting from the distinction between *lexical* and *non-lexical* intensifiers – play a role in how the use of intensification interacts with the social context. The current paper takes a preliminary step in this direction by looking at the use of *totally* in American English.

3 Totally: a case study

3.1 Totally: lexical and speaker-oriented usage

In American English, the intensifier *totally* features a well-attested pattern of semantic variation between lexical and non-lexical usages. In its lexical use, it combines with upper-bounded predicates (7a-b), it operates as a maximizer, ensuring that the property denoted by the predicate holds to a maximum degree (Paradis 2001, Kennedy and McNally 2005 a.o.). In its non-lexical use, it combines with entire propositions (8a-b), maximizing the degree of speaker's commitment (McCready and Kaufmann 2013, Irwin 2014) towards the utterance. I shall therefore refer to the non-lexical usage as *speaker-oriented,* following Irwin (2014)

(7a) The bus is **totally** full. (Bounded adjective)
(7b) I **totally** support this movement. (Bounded verb)

(8a) You should **totally** click on that link. (Unbounded verb)
(8b) Dude, this is a **totally** deep hole. (Unbounded adjective)

Interestingly, this difference is not merely a matter of intuition. There is systematic evidence that these two uses of *totally* are encoded by the grammar in different ways, as a series of diagnostics

can show. I now proceed to review the most important ones. First, as discussed by Irwin (2014) and McCready and Kaufmann (2013), *lexical totally* can be embedded under negation, while non lexical one cannot.

(9a) The bus was not totally full.
(9b) I don't totally support you

(10a) ?? The hole is not totally deep.
(10b) ?? You shouldn't totally click on that link

Moreover, only in its lexical usage can *totally* be replaced with *completely.* Whenever *totally* is used in a non-lexical fashion, replacement with *completely* is not possible.

(11a) The bus was completely/entirely full.
(11b) I completely/entirely support you.

(12a) ?? This hole is completely/entirely deep.
(12b) ?? You should completely/entirely clicked on that link.

By the same token, only lexical usages can combine with approximators like *almost.* Speaker-oriented *totally,* instead, cannot co-occur with *almost.*

(13a) The bus was almost totally full.
(13b) He almost totally support you.

(14a) ?? This hole is almost totally deep.
(14b) ?? You should almost totally click on that link.

A further diagnostic to distinguish the two usages is provided by denials to propositions in which the intensifier is used. If a proposition containing a lexical occurrence of *totally* is denied, it is possible for the denial to target the use of *totally* in isolation, independently from the rest of the proposition. However, this is not possible for speaker-oriented *totally,* which cannot be denied in isolation. A denial, here, would force us to reject the proposition altogether. This pattern of behavior has been first noted by McCready and Kauffman (2013).

(15a) A: The bus was totally full.
B: ✓ No, it was partly full, but not totally full.
(15b) A: I totally support you.
B: ✓ No, you only partially support me.

(16a) A: I should totally click on that link.
B: ?? No. You are not certain about the fact that I should click
B: ?? No, you should just partially click on that link.
(16b) A: This is a totally deep hole.
B: ?? No, you are not certain that the hole is deep!
B: ?? No, it's just partially deep, but not totally deep.

Other diagnostics are available to distinguish between the two uses. For reason of space, however, it is not possible to discuss them here. Yet, the tests shown above should be sufficient to show that the two usages of *totally* are differentially encoded in the grammar. The table below summarizes the results.

Table 1: Lexical vs Speaker-oriented *totally*

Type	Predicate	Example	Denial	Negation	Completely	Almost
Lexical	Bounded Adj	Full	✓	✓	✓	✓
Lexical	Bounded verb	Support	✓	✓	✓	✓
Speaker-oriented	Unbounded Adj	Deep	??	??	??	??
Speaker-oriented	Unbounded verb	Click	??	??	??	??

3.2 From semantic to sociolinguistic variation

Once we have a firm grasp on the pattern of semantic variation in which *totally* is embedded, it is possible to shift the focus on the use of *totally* in different social contexts. The question underlying the current paper, as formulated at the end of Section 2.2, is the following: is there a principled connection between the semantic flavor of the intensifier and its social distribution? In other words, do lexical and speaker-oriented usages of *totally* significantly differ in their patterns of use with respect to the social context? If this is indeed the case, then it would be possible to provide preliminary evidence supporting the idea that semantic variation *does* impact sociolinguistic variation, opening up a largely unexplored line of research in the domain of intensification. In the remainder of the paper, I aim to test this hypothesis by exploring the distribution of *totally* across different textual genres in the Corpus of Contemporary American English (Davis 2010-, henceforth COCA).

4 The corpus study

4.1 COCA and genres

As discussed above, intensifiers have been claimed to be embedded in two (largely orthogonal) axes of sociolinguistic variation: (a) demographic categories of the speakers and (b) different communicative context. While an exhaustive investigation would ideally consider both dimensions, the current paper focuses on the latter. The choice is motivated by the need to find a corpus with the following characteristics: (i) a large enough size to provide a high volume of occurrences of speaker-oriented (ii) a time period that includes contemporary English, (iii) a reliable annotation of either demographic features or different contexts of usage, so as to allow to test the sociolinguistic distribution of the variable. Requirement (i) is motivated by the fact that speaker-oriented *totally,* as I am going to show in the next section, is considerably more rare than lexical one, and therefore requires an extensive database to be found in large numbers; (ii) is motivated by the fact that its use considerably spread in the past years, requiring to focus on a time period that gets as close as possible to contemporary English. In light of these demands, I opted to rely on the Corpus of Contemporary English for the current study. Besides providing a large number of occurrences and containing texts that range until 2012, the corpus is balanced between the following textual genres, offering the possibility of testing the use of the variable across different communicative situations: Academic, Newspaper, Spoken, Magazine and Fiction. Following the idea that the reason for variation across contexts "lies not so much in the setting per se, but rather in the *communicative aims* of the situations. (Podesva 2011)", genre categories provide a promising window to look into whether – and how - different semantic flavors of *totally* can be used to serve different communicative purposes.

A crucial first step, in this regard, is to assess how the different genres in the corpus can indeed be associated with different communicative purposes, with particular attention to the aspects that have been claimed to be associated with the use of intensification. I will focus on two in particular here: one is the combination of "informality" and "expressivity"; the other one is the specific activity of "story-telling", which, according to Brown and Tagliamonte (2012), represents a particular suitable communicative setting for the use of intensification. How do the different genres differ with respect to these features? Concerning informality and affect sharing, Academic prose, by virtue of exclusively aiming at discussing data in a detached and objective fashion, is likely the lowest ranked genre along these parameters. Concerning more informal genres, it must be pointed out that the Spoken category, contrary to what is normally the case in other corpora, does not include spontaneous conversations in everyday settings. Rather, it features interactions in the media, mainly drawn from TV shows and news broadcasting, which feature a higher level of formality and a lower level of expressivity and affect-sharing than casual everyday interactions. In the absence of such interactions, the category with the highest levels of informality and expressivity appears to be Fiction, which, although in a scripted fashion, is likely to contain at least some of the informal settings where speakers are more

concerned with sharing emotions and performing identity work, as opposed to simply discuss – more or less formally - facts in the world. The predicted continuum, from less formal and expressive to more formal and expressive, is the following:

(17) Academic < Magazine – Newspaper – Spoken < Fiction

As a pilot to assess the reliability of this continuum, I tested the distribution of *dude* and *lame,* two markedly colloquial expressions which should be heavily biased towards informal and highly emotional contexts. A rough count of the occurrences is enough, for both words, to show that Fiction is indeed the contexts with the highest level of informality and expressivity, Academic is the one with the lowest level of the two, and the remaining genres pattern in between.

Table 2: *Dude and lame*: per million frequency across genres

Expression	Fiction	Magazine	Spoken	Newapaper	Academic
Dude	**21.40**	8.63	5.36	4.82	0.42
Lame	**6.85**	3.62	3.81	2.95	1.46

Concerning story-telling, the genre of Fiction also appears to be the one where this communicative aim is more likely to be foregrounded, and Academic the one where it is less likely to be relevant.

4.2 Extracting lexical and speaker-oriented *totally*

In order to extract occurrences of lexical vs speaker-oriented *totally,* the type of complement of *totally* was used as a clue to classify the semantic type of the intensifier. As discussed above, lexical *totally* combines with adjectives or verbs which encode a bounded scale as part of their meaning. The presence of such a scale can be easily diagnosed by relying on simple semantic tests such as modification with other degree modifiers (e.g. *partly, entirely, 100%*), which are predicted to felicitously combine with bounded predicates. For example, because combinations like *100% full, partially full, completely agree and 100% agree* are well-formed, it is possible to conclude that these two predicates indeed encode a bounded scale. Conversely, the observation that clusters like **100% tall, *partially hit, *completely will do* are *not* well formed suggests that, whenever *totally* occurs with these predicates, it must be of the speaker-oriented type. Following this procedure, occurrences of *totally* with the 10 most frequent bounded/unbounded adjectives and verbs were extracted from the corpus. In order to control for the effects induced by the frequency of the predicate, independent of *totally,* the frequency of each [totally X] combination was divided by the frequency of X, and then multiplied by 1000. Data from

adjectives and verbs were analyzed separately. The table below reports the predicates that were extracted.

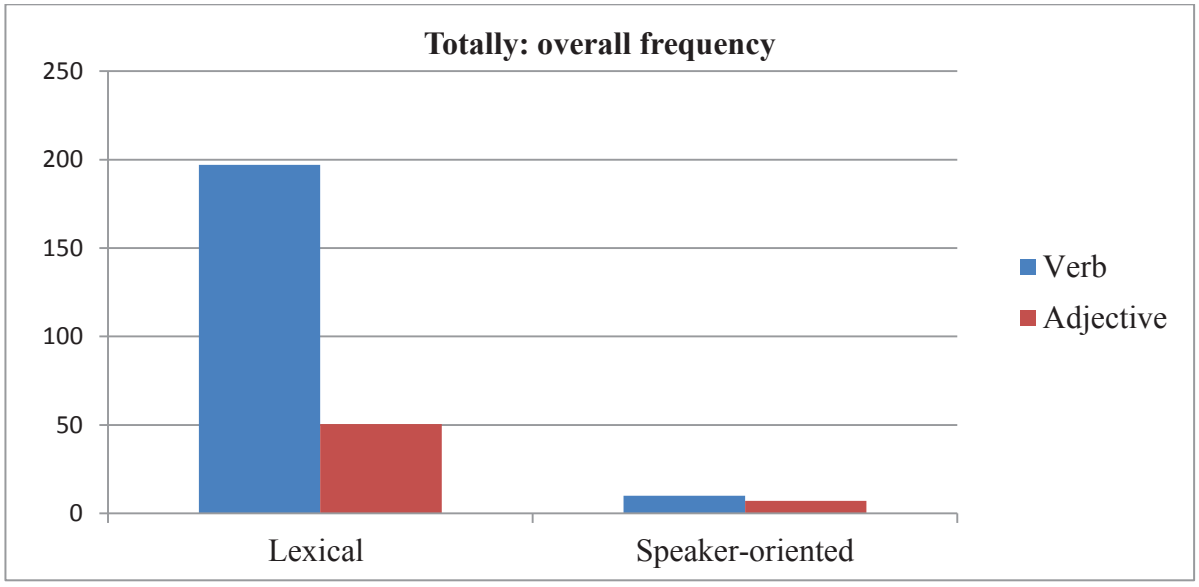
Table 3: Extracted predicates

Predicate type	*Totally* type	Predicate
Bounded Adj	Lexical	different, new, unacceptable, dependent, inappropriate, honest, free, unrelated, unknown
Unbounded Adj	Sp-oriented	cool, ridiculous, awesome, hot, great, fun, amazing, strange, weird, mad, strange
Bounded Verb	Lexical	understand, support, change, ignore, forget, agree, disagree, destroy, enjoy, accept
Unbounded verb	Sp-oriented	will, should, would, might, hit, win, have, find, think, say

4.3 Genres and *totally*

Before testing the actual distribution across genres, it is first important to consider the frequency of the two semantic types for each part of speech. Unsurprisingly, lexical *totally* is overwhelmingly more frequent than speaker-oriented one for both verbs and adjectives, regardless of the distribution across genres.

Figure 1 – Lexical vs speaker-oriented *totally* with Verbs and Adjectives



I then proceeded to inspect the distribution across genres for each type of the intensifier. Because the *ratio* across genres for each type of *totally* was considered, the difference in frequency, while

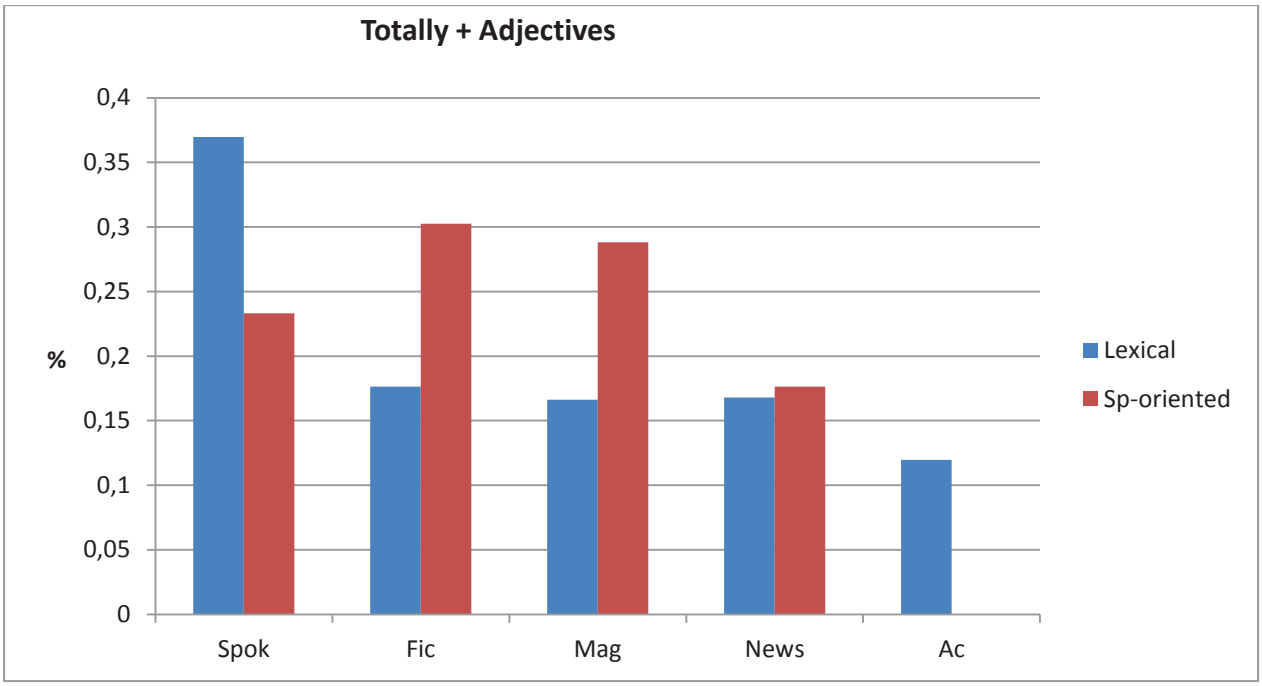
potentially revealing to understand other aspects of the sociolinguistic distribution of the two flavors of *totally,* is not predicted to be a factor in the analysis. Table 4 reports the ratio across genres for each type of *totally* for both adjectives and verbs.

Table 4: Percentage of occurrences of *totally* across genres

Part of speech	Type	Spoken %	Fiction %	Newspaper %	Magazine %	Academic %
Adjectives	Lexical	37	18	17	17	11
	Sp-oriented	23	30	18	29	00
Verbs	Lexical	40	15	17	15	13
	Sp-oriented	29	38	19	14	00

I now discuss the distribution for adjectival and verbal contexts separately. Starting from adjectives, a Chi-Square tests revealed a significant difference (Adj: n=2475, df=4, X^2=34, p < .0001) showing that different semantic types of *totally* differ in how their frequency is distributed across different communicative settings. Figure 2 below illustrates the distribution of the intensifier.

Figure 2: distribution across genres for *totally* with adjectives

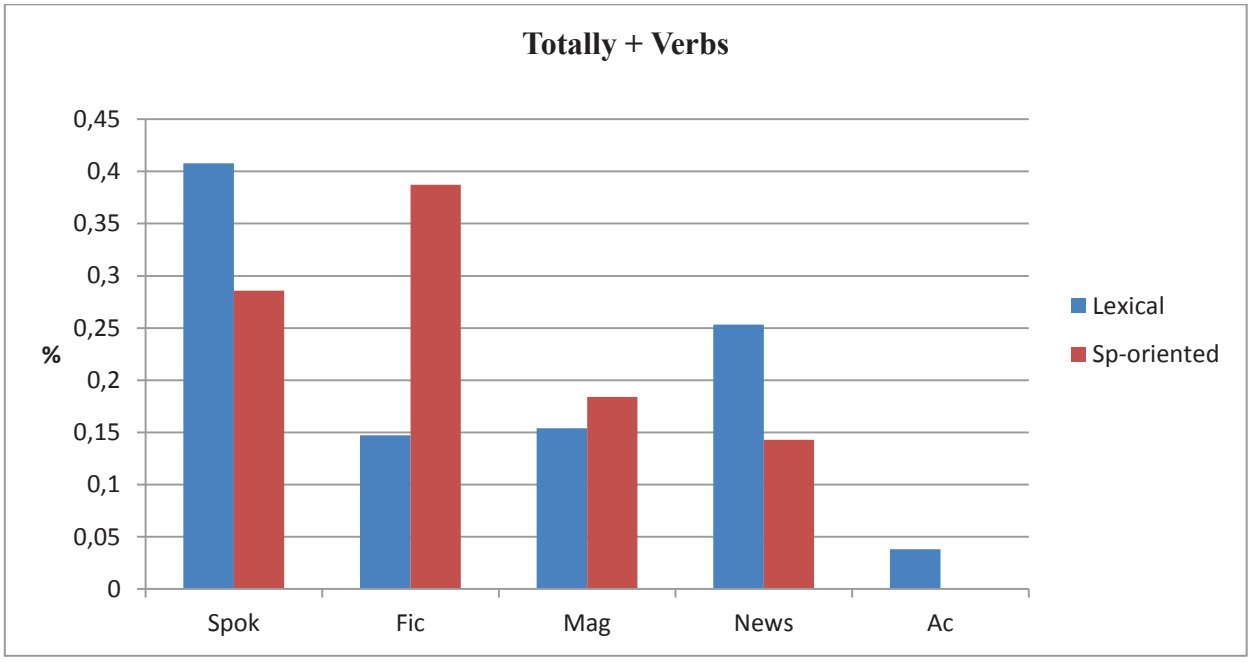


Lexical *totally* is overwhelmingly more frequent in Spoken, and less frequent in Academic prose. Despite the relatively low frequency in this genre, however, occurrences of *totally* amount to 14%, roughly 1/7 of the total. This contrasts with what we observe for speaker-oriented *totally,*

which is never attested in Academic prose and is predominantly featured in Fiction and Magazine. While largely attested in Spoken as well, its presence in this genre is smaller than the one of lexical *totally*.

Considering now *totally* with verbs, a similar pattern emerges. Figure 3 illustrates the distribution, which once again turns out to be significantly different for lexical and speaker-oriented *totally* (Verbs: n=751 df=4, X2=31, p < .0001.)

Figure 3: distribution across genres for *totally* with verbs



As observed for adjectives, lexical *totally* is overwhelmingly more common in Spoken, it is relatively common in Fiction, Magazine and Newspaper, and least frequent in Academic. Yet, despite the small fraction of occurrences of lexical *totally* in Academic, it is worth observing that, once again, speaker-oriented *totally* is completely absent in this genre. By contrast, speaker-oriented *totally* is considerably more frequent in Fiction, less frequent in Spoken and least frequent in Magazine and Newspaper.

5 Discussion

The present study provides evidence that the distribution of *totally* across different textual genres is different depending on the semantic type of the intensifier. We can now evaluate these observations in light of the continuum outlined in Section 2 and reproduced here, where genres are ranked in increasing order in terms of their level of informality/room for expressivity.

(19) Academic < Magazine – Newspaper – Spoken < Fiction

In both semantic flavors - and with both adjectives and verbs – *totally* is least common in Academic prose. In light of the claim that intensification is usually associated with communicative contexts which feature high levels of informality and expressivity (see Section 2), this result is rather predictable, confirming the idea that, across the board, intensifiers tend to be rare in settings where the emphasis is on conveying informational content in a detached and objective fashion. At the same time, it is remarkable that, while lexical *totally* is still used in this genre, speaker-oriented *totally* is never attested, either with verbs or with adjectives. This suggests that, despite the similar overall pattern, the two semantic types are not identical in terms of the communicative purposes that they serve. This is confirmed by the observation that their distribution peaks are found in different genres. Lexical *totally* is found most frequently in Spoken, which appears to be relatively unmarked in terms of expressivity/informality, as it collects conversations from TV broadcasts and shows. While this setting certainly ranks higher than Academic, it is not more informal than any of the other genres. By contrast, the frequency of speaker-oriented *totally* peaks in Fiction. This genre is rather heterogeneous, including texts ranging from movie scripts to TV series to novels. Yet, it is also the genre that is more likely to feature interactions resembling everyday colloquial interactions, which have been by and large claimed to represent a fruitful context of use for intensification. Moreover, it is the genre that most closely resembles the narratives discussed by Brown and Tagliamonte (2012). As it can be recalled, the authors argue that in this setting the focus of the speaker is focused on attention-grabbing and identity work, as opposed to mere communication of information. Due to their expressive charge and affective weight, intensifiers emerge as a suitable linguistic resource to be used in this context, and are considerably more frequent than in other settings. In light of this discussion, it is interesting to observe that speaker-oriented *totally* appears to fit this pattern better than lexical *totally.* While this does not invalidate the general point that intensification is a fruitful resource to be used in this setting, it also suggests that, once semantic differences are considered, a more nuanced picture emerge with respect to how intensifiers participate in sociolinguistic variation.

What remains to be seen, at this point, is *why* a speaker-oriented scale makes *totally* more suitable than a lexical scale for certain settings. Needless to say, further and more extensive evidence is required to provide an exhaustive answer to the question. Yet, at least two observations are worth making at this point. First, the strengthened connection between speaker-oriented intensifiers and informality/expressivity has already been observed, although not in a systematic manner, for a variety of morphemes. Non lexical uses of *so,* also dubbed "Generation *so"* (Zwicky 2011) have been claimed to be strongly associated with young white women (in the U.S.), "no doubt because of its prominence in the movies Heathers (1988) and Clueless (1994)" (Zwicky 2011: 4). Crucially, Zwicky also observes that the linguistic environment plays a crucial role in creating the stylistic effect, as he makes the point that "*So* has been around as a modifier of scalar adjectives and adverbs for a very long time; the innovation is its spread to other contexts". A similar pattern applies to *totally.* Multiple authors noted that speaker-oriented uses of the intensifier are markedly informal, common among younger speakers and more imbued

with emotive content than lexical ones (McCready and Kaufmann 2013, Irwin 2014). Anecdotal evidence supporting this observation comes from widely circulating media commentaries and stereotypes on the use of the intensifier, such as those found on the notorious website *Urban Dictionary*. Here, *totally* records nine entries[4], each of which provides a slightly different on the stereotypical users of the intensifiers. These include "Valley Girl", "young girls", "surfer", "little brats", as well as many others. Interestingly, in all these cases the examples reported in the entries are almost always of the speaker-oriented type, showing that the semantic flavor of *totally* is indeed relevant for its sociolinguistic properties.

Second, a natural connection emerges between the speaker-oriented nature of *totally* and the specific affect-oriented function of intensification. By modifying speaker's commitment and not having any effect on the truth conditions of the proposition, this usage of *totally* has the right semantics to make salient scales that are grounded in the speaker's attitude, and as such can fit particularly well in contexts where the interactional work between speaker and hearer is more important than the mere exchange of informational content. On the contrary, by merely describing a state of the world, lexical *totally* does not seem to be more effective in this respect than any other truth-conditional modifier. Hence, the lack of a prominent association with the genre of Fiction and the function of narration. Once again, the connection between the semantics and the sociolinguistics of attitude marking needs to be explored in a more systematic fashion. Yet, framing speaker-oriented intensifiers as semantically equipped devices for the encoding and sharing of attitude and stance appears to be a promising starting point in this direction.

7 Conclusion

The study outlined here presents a novel, though still preliminary, result, suggesting that the fine-grained semantic properties of an intensifier do have an effect on its sociolinguistic patterns. Not only does this finding invite further research to understand why semantic variation interacts with sociolinguistic patterns in the realm of intensification. It also aligns with several recent work at the socio-semantics interface (Acton and Potts 2014, Glass 2014) in calling for further exploration of how the semantic and pragmatic properties of a variable affect its use in the social landscape.

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Tagalog Sluicing Revisited

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Introduction

The aim of this paper is to investigate sluicing, a type of TP-ellipsis introduced by a wh-word, in Tagalog, an Austronesian language spoken in the Philippines. The paper reconsiders the approach to Tagalog sluicing developed in Kaufman & Paul (2006) and Kaufman (2006), and puts forward an alternative proposal. I propose that out of the three possible analyses for Tagalog sluicing considered in Kaufman & Paul (2006), the two most viable approaches constitute two subcases of a single analysis. Specifically, Tagalog has two distinct strategies for sluicing that follow the two wh-question formation strategies available in the language: pseudoclefts for argument wh-questions, and wh-movement for adjunct wh-questions. Additionally, the Tagalog data discussed here provides support for the Unconstrained Pseudosluicing Hypothesis as argued for in Barros (2014).

The structure of this paper is as follows. Section 1 provides some background on previous research on sluicing and sluicing-like phenomena. Section 2 introduces the relevant facts about Tagalog grammar and summarises the approach to Tagalog sluicing put forward in Kaufman & Paul (2006) and Kaufman (2006). Section 3 provides new data that allows to shed some light on the structural properties of Tagalog sluicing. Section 4 puts forward an analysis. Section 5 concludes.

1 Sluicing: Theoretical Background

The notion 'sluicing' goes back to the seminal paper by Ross (1969), and has since been used as a cover term for the type of TP-ellipsis with a wh-remnant in an embedded clause:

(1) *Somebody left the door open, but I don't know who.*

Since Ross (1969), sluicing has received a considerable amount of attention from syntacticians and semanticists alike. In this paper, I will follow Chung, Ladusaw, and McCloskey (1995), Fiengo and May (1994), Lasnik (2001), Merchant (2001, 2008), and others in assuming that there is silent structure following the wh-word in sluicing examples; cf. Culicover and Jackendoff (2005), Dalrymple, Sheiber, and Pereira (1991), Ginzburg and Sag (2000), and others for the opposite view.

The original analysis proposed by Ross (1969) and widely adopted afterwards states that in English sluicing formation parallels embedded wh-question formation. Namely, in both, the wh-word in the embedded clause is raised to Spec-CP; in slucing, it is followed by ellipsis of the embedded TP:

[1] I would like to thank Maria Polinsky, Bradley Larson, Adam Szczegielniak, and Daniel Kaufman for their advice on this project, as well as the audiences at Polinsky Lab, BLS 41 and AFLA 22 for their most helpful feedback. Special thanks are due to the Tagalog speakers who provided the data used in this paper: Beverly Ho, Henrison Hsieh, Jennifer Tan, and two other informants who chose to remain anonymous.

(2) [$_{TP}$ *Somebody* [$_{T'}$ *left the door open*], *but I don't know* [$_{CP}$ *who*$_i$ [$_{TP}$ t_i ~~*left the door open*~~]].

There are certain structural parts that all sluicing examples have in common: the correlate in the antecedent clause is matched by the wh-word remnant in the sluice, and the combination of remnant and ellipsis site, under Ross (1969) approach, is structurally parallel to the antecedent clause:

(3)

[*Someone*	*left the door open*	[*but I don't know*	*who*	[~~*left the door open*~~]]
correlate			remnant	ellipsis site
antecedent clause			sluice	

Sluicing is often contrasted with pseudosluicing, the notion introduced in Merchant (1998) to describe the sluicing-like construction such as the one in Japanese shown below. The main difference between the two phenomena lies in the fact that in pseudosluicing the ellipsis site contains a copular clause. In a copular clause, the predicate is a non-verbal category, such as a DP, and there may or may not be an overt copula introducing the predicate. In pseudosluicing, therefore, the ellipsis site is not syntactically parallel to the antecedent clause:

(4) *Dareka-ga sono hon-o yon-da ga*, [*watashi-wa* [pro *dare* ~~*datta*~~ *ka*] *wakaranai*]. [2]
someone-NOM that book-ACC read-PST but 1sg-TOP *pro* who be.PST Q know.NEG
Someone read that book, but I don't know who.

(from Merchant, 1998)

Instances of sluicing in which there is no overt correlate in the antecedent clause have been dubbed 'sprouting' (Chung, Ladusaw, and McCloskey, 1995). In English, sprouting is possible both with argument and adjunct sluices:

(5) *Mary* [$_{T'}$ *is eating*], *but I don't know* [$_{CP}$ *what* [$_{TP}$ t_i]].

(6) *John* [$_{T'}$ *plays tennis on Sundays*], *but he didn't say* [$_{CP}$ *where* [$_{TP}$ t_i]].

As you can see, *what* in (5) and *where* in (6) have no overt correlate in the antecedent clause. A salient property of sprouting is its island sensitivity - sprouting within an island leads to ungrammaticality:

(7) **Sandy is very anxious to see which students will be able to solve the homework problem, but she won't say how.*

(from Chung, Ladusaw, and McCloskey, 1995)

In the literature on sluicing, discussion revolves around three large issues: (i) sluicing-licensing conditions, (ii) interaction of sluicing with island constraints, and (iii) distinction between sluicing and pseudosluicing. In the remainder of this section, I will briefly introduce each of these questions.

[2] Abbreviations used in the glosses: 1pl - 1st person plural; 1sg - 1st person singular; 2sg - 2nd person singular; 3sg - 3rd person singular; ACC - accusative; APPL - applicative; AV - actor voice; CAUS - causative; COMP - complementiser; DAT - dative; DIR - directive; EXCL - exclusive; EXT - existential; GEN - genitive; INT - intensive; IPFV - imperfective; IRR - irrealis; LNK - linker; LV - locative voice; NEG - negation; NOM - nominative; PFV - perfective; PST - past; PV - patient voice; RED - reduplication; Q - question particle; TOP - topic.

As a type of ellipsis, sluicing should be licensed by some sort of identity between the antecedent clause and the ellipsis site (cf. Lasnik, 2001; Merchant, 2001, 2005). There is a debate in the literature as to whether sluicing is licensed by syntactic or semantic identity between the sluice and the antecedent clause. Under the syntactic view, advocated by Ross (1969), Chung, Ladusaw, and McCloskey (1995), Merchant (2008), and others, sluicing is licensed if the antecedent clause and the sluice have matching syntactic structure. Under the semantic approach, put forward in Baker and Brame (1972), Merchant (2001), Abels (2011), and others, it is mutual entailment between the antecedent clause and the sluice that licenses sluicing. There are also hybrid syntax-semantics proposals, like Barros (2014) and Chung (2014). Since the Tagalog data discussed in this paper suggests that there are two sluicing strategies in Tagalog, it also suggests that neither exclusively syntactic nor exclusively semantic sluicing-licensing condition is sufficient on its own, in line with the hybrid proposals (more on this below).

There have also been varying claims about the nature of interaction between sluicing and island constraints. Ross (1969) points out that sluicing has the property of ameliorating islands, based on examples like (8) and (9) below. While (8), a sluicing construction, is judged as acceptable, the non-elided version involving wh-movement from an island in (9) is not:

(8) *She kissed a man who bit one of my friends, but Tom doesn't realise* [$_{CP}$ *which one of my friends* [$_{TP}$ t_i]].

(9) **She kissed a man who bit one of my friends, but Tom doesn't realise* [$_{CP}$ *which one of my friends*]$_i$ [$_{TP}$ *she kissed a man who bit* t_i]].

In more recent work the hypothesis that sluicing ameliorates islands has been challenged. Specifically, it has been proposed (e.g., Abels, 2011; Barros, 2014) that sluicing evades islands instead of ameliorating them, by resorting to a non-isomorphic structure in the ellipsis site. The only exception to this is presented by cases of contrast sluicing (Abels, 2011), which will not be discussed here.

Finally, the relationship between sluicing and pseudosluicing has been a matter of debate. In Merchant's (1998) original proposal for Japanese the defining difference between sluicing and pseudosluicing is that pseudosluicing is taken to be an instance of copula drop combined with pronoun drop. Both of these phenomena are independently available in languages like Japanese, and a combination of the two on the surface produces a result similar to sluicing. However, since pseudosluicing, unlike sluicing, is not derived by TP-ellipsis, it has properties different from sluicing - for instance, Japanese pseudosluicing is sensitive to islands. Based on this and other facts, Merchant (1998) argues that pseudosluicing does not exist in English.

However, the notion of pseudosluicing has since evolved to apply to a broader set of structures, including cases when the ellipsis site in English sluicing is analysed as a copular clause, and not as ellipsis of a TP that is syntactically isomorphic to the antecedent clause (e.g., Rodrigues et al., 2009). Subsequently it has been argued that a non-isomorphic structure of the sluice is employed in cases where the isomorphic one incurs an island violation - as already discussed above in the context of interaction between sluicing and island constraints. Under this view, the underlying structure of (8) is not (9) but (10) below:

(10) *She kissed a man who bit one of my friends, but Tom doesn't realise* [$_{CP}$ *which one of my friends*]$_i$ [$_{TP}$ *that was*]].

Under this approach, pseudosluicing exists in English but has a rather restricted distribution - it is only employed in cases in which sluicing would yield an ungrammatical structure. Such an approach was dubbed Constrained Pseudosluicing Hypothesis by Barros (2014).

It is in contrast with Barros' own Unconstrained Pseudosluicing Hypothesis. As the name suggests, under this latter hypothesis, not only does pseudosluicing exist in languages like English, but it also has much broader distribution. Specifically, Barros (2014) argues that in cases where the ellipsis site in sluicing might legitimately contain a sluicing as well as a pseudosluicing structure, both are possible. According to the Unconstrained Pseudosluicing Hypothesis, both (12) and (13) are examples of possible underlying structures for (11):

(11) *Somebody* [$_{T'}$ *left the door open*], *but I don't know who.*

(12) *Somebody* [$_{T'}$ *left the door open*], *but I don't know* [$_{CP}$ *who*$_i$ [$_{TP}$ t$_i$ *left the door open*]].

(13) *Somebody* [$_{T'}$ *left the door open*], *but I don't know* [$_{CP}$ *who*$_i$ [$_{TP}$ t$_i$ *that was*]].

The Tagalog data presented in this paper lends additional support to the Unconstrained Pseudosluicing Hypothesis, due to the facts that: (i) Tagalog can have pseudosluicing even when there is no island in the antecedent clause, and (ii) there is substantial structural similarity between sluicing and pseudosluicing in Tagalog.

Note that in this paper, the term pseudosluicing is used in the Unconstrained Pseudosluicing Hypothesis sense rather than in Merchant's original sense: is taken to be a type of TP-ellipsis in a copular clause, not an instance of copula drop combined with pronoun drop.

More recently, sluicing-like phenomena in languages other than English have received increasing attention. Since it is generally agreed that sluicing in English relies on the embedded wh-question formation strategy, it raises the question of whether languages that do not have wh-movement of the English type have sluicing. Sluicing-like structures exist in most languages, and for many it is argued that the sluicing strategy relies on the wh-question formation strategy. Specifically, it has been proposed for Persian (Toosarvandani, 2008) and Georgian (Erschler, 2015), in which wh-movement targets the focus projection below CP, that sluicing is derived in the same way. For languages with wh-in-situ, like Japanese (Merchant, 1998) and Mandarin Chinese (Adams and Tomioka, 2012), a pseudosluicing analysis has been proposed. For languages that employ pseudoclefts to form wh-questions, like Malagasy (Potsdam, 2007), it is argued that the pseudocleft strategy is also used to form sluicing.

With this background in mind, let us turn to Tagalog data.

2 Tagalog

2.1 Basic Facts

Tagalog is an Austronesian language spoken in the Philippines. Like many Austronesian languages, Tagalog is predicate-initial (14), and allows non-verbal predicates (15-16). In the latter case, there is no overt copula.

(14) *B<um>a-basa ng diyaryo ang titser.*
<AV>IPFV-read GEN newspaper NOM teacher
The teacher is reading a newspaper. (from Schachter & Otanes, 1982:69)

(15) *Artista ang babae.*
actress NOM woman
The woman is an actress.

(16) *Maganda ang babae.*
beautiful NOM woman
The woman is beautiful. (from Schachter & Otanes, 1982:61)

Tagalog has a rich system of verbal voices: actor voice (AV), patient voice (PV), benefactive voice (BV), locative voice (LV) and causative voice (CAUS) (Schachter & Otanes, 1982). The choice of voice determines which argument of the verb is taken as the most salient one, the one the sentence is predicated about: the actor in AV, patient in PV, location in LV, etc. I will refer to the argument the verb selects in such a way as subject.[3] The status of the arguments of the verb is signaled by prenominal case markers: [4]

Table 1. Case markers in Tagalog

	Nominative (subject)	Genitive (non-subject)	Dative (oblique)
Common noun markers	*ang*	*ng*	*sa*
Personal noun markers	*si*	*ni*	*kay*

(from Kroeger, 1993:13)

Example (14) above shows the verb in AV, and (17) below is an example of PV. Note that the subject in Tagalog must be definite:

(17) *B<in>abasa ng titser ang diyaryo.*
<PV>read.IPFV GEN teacher NOM newspaper
The teacher is reading the newspaper. (from Schachter & Otanes, 1982:69)

The choice of verbal voice does not seem to directly interact with sluicing.[5]

2.2 Wh-question Formation in Tagalog

Tagalog has two distinct wh-question formation strategies: pseudoclefts for argument wh-questions, and wh-movement of the English type for adjunct wh-questions (Aldridge, 2002). Argument wh-questions therefore consist of a clause-initial wh-word that acts as a predicate

[3]Also called trigger, topic, focus or pivot in the Austronesian literature; nothing hinges on the terminological choice here.

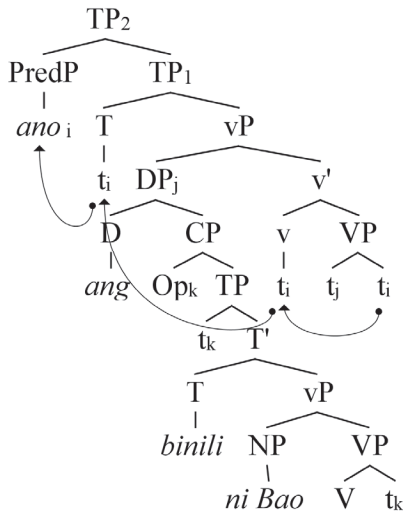
[4] Both nominative-accusative (Guilfoyle, Hung, and Travis (1992), Richards (1993), Kroeger (1993), and others) and ergative-absolutive (Gerdts (1988), De Guzman (1988), Aldridge (2004), and others) analyses for Tagalog have been proposed. I am adopting the nominative-accusative analysis here; nothing hinges on this choice.

[5] The event existentials in Tagalog obligatorily embed PV forms of the verb. However, this is a property of event existentials, not sluicing *per se*.

nominal, and a headless relative clause following it; as with other non-verbal predicates, there is no overt copula:

(18) a. [TP *Ano* [DP **(ang)* [CP *b<in>ili ni Bao?*]]]
what NOM <PV.PFV>buy GEN Bao
What did Bao buy?

b.

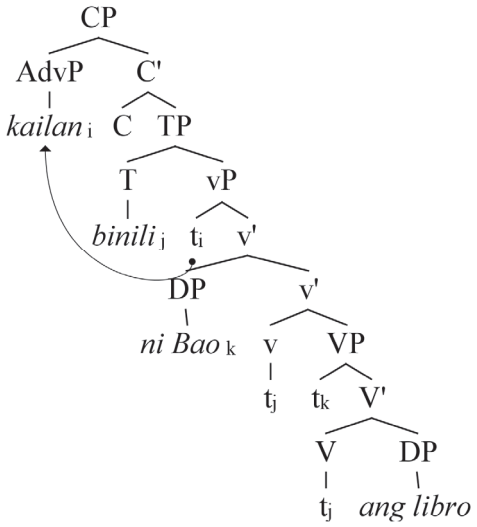


I take the topmost TP_2 in (18b) to be equivalent to the functional projection FP that Potsdam (2007) postulates for Malagasy sluicing. In contrast with Malagasy, however, Tagalog subjects stay in the vP; based on this, a simpler alternative to (18b) would have a single TP, TP_1, with *ano* sitting in its specifier. In that case, however, we would have to say that sluicing elides the vP. This contradicts what we know about ellipsis in general (the parts of the tree that can undergo ellipsis are TP, VP and NP), and about sluicing in particular (sluicing elides the TP). Therefore, I take there to be two TPs in (18b).

In contrast with argument wh-questions, adjunct wh-questions are formed by fronting to Spec-CP of the wh-word that does not act as a nominal predicate:

(19) a. [CP *Kailan (*ang) b<in>ili ni Bao ang libro?*]
when NOM <PV>buy GEN Bao NOM book?
When did Bao buy the book?

b.



One of the main pieces of evidence supporting this distinction comes from the distribution of the case marker *ang*, which is used to mark the subject in Tagalog. In the argument wh-question in (18) *ang* cannot be omitted, which signals that the headless relative CP that *ang* takes as a complement acts as the subject of the clause, whereas *ano* 'what' acts as the predicate. In contrast with (18), in the adjunct wh-question in (19) *ang* cannot appear.

These facts suggest that argument and adjunct wh-questions in Tagalog have different structures: argument wh-questions are biclausal, with the wh-word acting as a nominal predicate and taking a headless relative clause as a subject; adjunct wh-questions, on the other hand, are monoclausal structures involving wh-movement.

The distinction between the two structures is also confirmed by clitic placement. Aldridge (2002) notes that certain personal pronoun clitics (as well as some aspectual clitics - Richards, p.c.) can only attach to wh-words that undergo wh-movement. Since argument wh-words undergo head-raising, clitics are predicted to be housed only by adjunct wh-words. This is confirmed both for wh-questions (see Aldridge, 2002) and sluicing:

(20) [CP *P<um>unta=**ka** sa Maynila*], [CP *pero naka-limut-an ko*
<PFV.AV>go 2sg.NOM DAT Manila but PFV.BV-forget-DIR 1sg

[CP *kung kalian=**ka** p<um>unta*]][6]
COMP when 2sg.NOM <PFV.AV>go
You went to Manila, but I forgot when (you went).

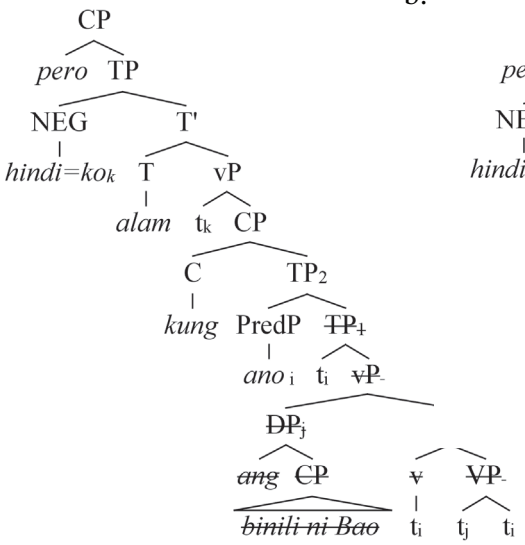
(21) [CP *May <g<in>a>gawa=**ka***, [CP *pero hindi ko alam*
EXT <RED<PV>>do 2sg.NOM but NEG 1sg know

[CP *kung ano (*=**mo**)* [TP *ang (*=**mo**) <g<in>a>gawa *(=**mo**)*]]][7]
COMP what 2sg.GEN NOM 2sg.GEN <RED<PV>>do 2sg.GEN
You did something, but I don't know what you did.

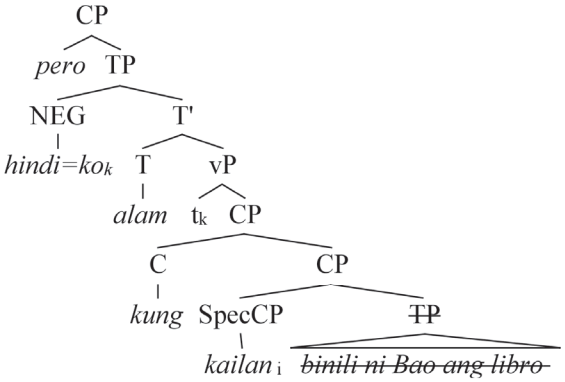
[6] The clitic cannot be final in a clause, so in cases of sluicing with clitics, the verb following the clitic needs to be spelled-out.
[7] *ka/mo* alternation is due to the voice change in the existential when embedded.

Based on these facts, I argue that Tagalog has two sluicing strategies too, corresponding to the argument-adjunct distinction found in wh-questions. The corresponding sluicing structures then look the following way: (22a) for arguments, (22b) for adjuncts.

(22) a.



b.



2.3 Sluicing in Tagalog: Kaufman & Paul (2006)

Sluicing in Tagalog has not received much attention in the literature so far. Some discussion of the sluicing facts, as well as some ideas about the possible analysis can be found in Kaufman & Paul (2006). Kaufman & Paul observe that sluicing in Tagalog has two cross-linguistically unusual properties: (i) ban on sprouting in argument sluices, and (ii) sensitivity to certain types of islands.

To illustrate the first fact, Kaufman & Paul provide examples showing that sprouting is banned in argument sluices:

(23) *[$_{CP}$ *K<um>akanta si Maria*] [$_{CP}$ *pero hindi ko alam kung ano*].
<AV>sing.IPFV NOM Maria but NEG 1sg know COMP what
**Maria was singing but I don't know what.*

In adjunct sluices, however, sprouting is allowed:

(24) [$_{CP}$ *K<um>akanta si Maria*] [$_{CP}$ *pero hindi ko alam kung saan*].
<AV>sing.IPFV NOM Maria but NEG 1sg know COMP where
Maria was singing but I don't know where. (from Kaufman & Paul, 2006)

Kaufman (2006) accounts for the lack of sprouting in argument sluicing by proposing that Tagalog verbs are ambitransitive: that is, unless the internal argument of the verb is introduced overtly, the verb is intransitive. Under this hypothesis, (23) is degraded because of the transitivity mismatch between the matrix verb and the verb within the elided part of the embedded clause, much like it is with certain English verbs:

(25) a. *He smells something, but I don't know what.*
b. **He smells, but I don't know what.*

Kaufman's (2006) approach also accounts for the fact that sprouting is allowed with adjuncts, since adjuncts do not interact with the transitivity of the verb.

To illustrate the second property, sensitivity to islands, the authors show that Tagalog sluicing is sensitive to complex NP islands. They claim that this holds for both argument and adjunct sluices:

(26) *[$_{CP}$ *Kilala ni Kim ang tao* [$_{TP}$ *-ng may b<in>abasa*]]
know GEN Kim NOM person-LNK EXT <PV>read.IPFV
[$_{CP}$ *pero hindi niya sasabih-in* [$_{CP}$ *kung ano.*]]
but NEG 3sg say.IRR-PV COMP what
Intended: *Kim knows the person who was reading (something) but she won't say what.*

(27) *[[$_{CP}$ *Kilala ni Kim ang tao* [$_{TP}$ *-ng may b<in>abasa*]]
know GEN Kim NOM person-LNK EXT <PV>read.IPFV
[$_{CP}$ *pero hindi niya sasabih-in* [$_{CP}$ *kung saan.*]]]
but NEG 3sg say.IRR<PV> COMP where
Intended: *Kim knows the person who was reading (something) but she won't say where.*

(from Kaufman & Paul, 2006)

A possible independent explanation for why (26) and (27) are unacceptable might have to do with the fact that there is no overt correlate in either antecedent clause. However, it can be shown that an example minimally different from (26) but containing an overt correlate, as in (28), is judged as bad too, so the point Kaufman & Paul make still holds:

(28) *[$_{CP}$ *Kilala ni Kim ang tao* [$_{TP}$ *-ng may b<in>abasa-ng libro*]]
know GEN Kim NOM person-LNK EXT <PV>read.IPFV-LNK book
[$_{CP}$ *pero hindi niya sasabih-in* [$_{CP}$ *kung alin.*]]
but NEG 3sg say.IRR-PV COMP which
Intended: *Kim knows the person who was reading a book but she won't say which.*

(from own data)

Kaufman & Paul further show that, unlike relative clauses, coordinate structure islands do not block sluicing:

(29) [$_{CP}$ *Nag-luto si Ben ng menudo at ng isa pa-ng putahe*]
<PFV.AV>cook NOM Ben GEN menudo and GEN one still-LNK dish
[$_{CP}$ *pero hindi ko alam* [$_{CP}$ *kung alin.*]]
but NEG 1sg know COMP which
Ben cooked menudo and another dish, but I don't know which.

(from Kaufman & Paul, 2006)

Another observation due to Kaufman & Paul is that an overt demonstrative pronoun, *iyon* 'that' can surface as the subject of the embedded clause in argument sluices. Such cases essentially constitute pseudosluicing structures with the ellipsis site spelled out in full:

(30) [CP *May binigy-an ng pera*], [CP *pero hindi namin alam* [CP *kung sino* [TP ***iyon***.]]]
EXT give.PFV-LV GEN money but NEG 1pl.EXCL.GEN know COMP who that
Someone was given money but we don't know who it was.

Iyon insertion is impossible in adjunct sluices:

(31) [CP *Na-i-pa-ayos niya ang kotse*] [CP *pero hindi ko alam* [CP *kung paano* (****iyon***).]]
PFV-PV-CAUS-fix 3sg.GEN NOM car but NEG 1sg.GEN know COMP how (that)
She fixed the car but I don't know how. (from Kaufman & Paul, 2006)

Kaufman & Paul (2006) put forward three possible analyses for Tagalog sluicing, noting their advantages and disadvantages, and concluding that at present there is not enough evidence to decide between them:

Table 2. Possible analyses of Tagalog sluicing (Kaufman & Paul, 2006)

	Sluicing strategy		**Advantages**	**Disadvantages**
	Arguments	**Adjuncts**		
1.	**Wh-movement**	**Wh-movement**	possibly explains island effects	not motivated language-internally; doesn't immediately capture lack of sprouting
2.	**Pseudosluicing**	**Wh-movement**	correctly predicts that *iyon* 'that' can appear following the wh-word in argument but not adjunct sluices	predicts no island effects for adjunct sluices
3.	**Pseudoclefts**	**Wh-movement**	null hypothesis (matches wh-question formation), cross-linguistic parallels	doesn't explain lack of sprouting without additional assumptions

As shown in section 4, options 2 and 3 from Table 2 are the most likely candidates for the analysis - and also a unified one, since in Tagalog pseudosluicing and pseudoclefting are two instances of the same syntactic structure.

3 Revisiting the Tagalog Facts

3.1 Sprouting

As pointed out above, Kaufman & Paul (2006) and Kaufman (2006) argue that sprouting is not possible with argument sluices. However, judgments are subtle and rather variable in such cases, which was noticed both by Kaufman (p.c.) and myself.

Specifically, there is a division among speakers when it comes to sluices with indefinite argument correlates, as in (23), repeated here:

(23) (*)[CP *K<um>akanta si Maria*] [CP *pero hindi ko alam* [CP *kung ano*]].
<AV>sing.IPFV NOM Maria but NEG 1sg know COMP what
(*)*Maria was singing but I don't know what.*

While it is marked as unacceptable in Kaufman & Paul (2006), and as marginal in Kaufman (2006), (23) is in fact accepted and even preferred by some Tagalog speakers. Specifically, out of the four informants I checked (23) with, two allow it, and one prefers it to the alternative (the fourth informant does not accept (23) in either Tagalog or English). The alternative to (23) introduces the indefinite argument correlate by means of the existential construction with *may*, an impersonal predicate used to introduce indefinite arguments (Keenan, 2009; Aldridge, 2012):

(32) [CP *May k<in>anta si Kim sa handaan*] [CP *pero hindi ko alam* [CP *kung ano.*]]
EXT <PV>sing NOM Kim DAT party but NEG 1sg know COMP what
Kim sang something at the party, but I don't know what.

Moreover, for the two speakers that allow both (23) and (32), the two variants are distinct in terms of their information structure. For these speakers, (23) bears broad focus - that is, it is a suitable reply to a question *What happened*?, while (32) is a structure with narrow focus on the object - i.e., it is a suitable reply to a question *What did Kim sing*?

The hypothesis that the existential construction brings the correlate in focus is supported by the speakers' intuition that (33) feels 'disjointed', similarly to its English counterpart:

(33) #[CP *May in-inom si Kim sa handaan*] [CP *pero hindi ko alam* [CP *kung saan.*]]
EXT PV-drink NOM Kim DAT party but NEG 1sg know COMP when
#There was something that Kim drank at the party, but I don't know when.

The focal properties of both Tagalog constructions require further investigation. The overall conclusion, however, is that, at least for some Tagalog speakers, sprouting with arguments does not pose any problems.

3.2 Sluicing and Island Constraints

Additional data from my consultants supports the idea that most types of islands do not block sluicing in Tagalog, thus bringing Tagalog sluicing in line with cross-linguistic evidence:

Adjunct islands:

(34) [CP *Um-uwi si Kim* [CP *dahil may kailangan siya-ng gaw-in*]],
AV-go.home NOM Kim because EXT must 3sg-LNK do-PV
[CP *pero hindi ko alam* [CP *kung ano*.]]
but NEG 1sg know COMP what
Kim went home because she needed to do something, but I don't know what.

Complex NP islands:

(35) [CP *Na-rinig ni Kim ang balita* [CP *na in-ayos ni Fred ang problema*]],
PFV.PV-hear GEN Kim NOM news LNK PV-sort.PFV GEN Fred NOM problem
[CP *pero hindi niya alam* [CP *kung alin*]].
but NEG 3sg know COMP which

Kim heard the news that Fred solved a problem, but she doesn't know which.

At first glance, these facts suggest that the only type of islands that interacts with sluicing in Tagalog is a relative clause island, as the examples from Kaufman & Paul (2006) in (26) and (27) show. However, it can easily be shown that a relative clause on its own is not an obstacle for sluicing:

(36) [CP *Alam ni Bao ang babae* [TP *-ng nag-susulat ng libro*],
know GEN Bao NOM woman-LNK INT-write.AV GEN book
[CP *pero hindi niya maalala* [CP *kung bakit.*]]
but NEG 3sg remember.PV COMP why
Bao knows a woman that was writing a book, but he doesn't remember why. [8]

Another plausible hypothesis is that it is the existential construction embedded in the relative clause that interferes with sluicing, but, surprisingly, other examples of the same structure (relative clause embedding the exsistential) do not block sluicing, as shown in (37). It should be noted though that, due to the overall complexity of (37), caused by multiple embeddings, the speakers find it easier to process when the ellipsis site is spelled out.

(37) [CP *Naka-salubong ko ang isa-ng babae* [CP *na* [TP *may h<in>ahanap*
PRF.AV-run_into 1sg NOM one-LNK girl LNK EXT <IPRF.PV>look_for

sa kanya-ng pitaka]]] [CP *pero hindi ko alam* [CP *kung ano (ang h<in>ahanap niya)*]]
DAT her-LNK purse but NEG 1sg know COMP what NOM <IPRF.PV>look_for 3sg
I ran into a girl that was looking for something in her purse, but I don't know what (she was looking for).

Overall, as we have seen, there is no compelling evidence that Tagalog sluicing is sensitive to island constraints. As for the unacceptable examples (26) and (27), which none of my consultants accepted either, it seems that the reason for degraded judgments has to do with the difficulty of establishing pronominal reference, and not sluicing as such.

A possible explanation for the lower acceptability of sluicing with the existential construction embedded within a relative clause is the cumulative effect that the two islands, one embedded within the other, have on processing. Ungrammaticality is a relative rather than absolute notion, as Ross (1987:310) points out: "losses in viability are cumulative, and only when there have been enough of them for a certain threshold value to be exceeded will the speakers of the language perceive that the sentence is less than perfect". If so, the lower acceptability of sluicing examples involving an existential construction within a relative clause may follow from a particularly heavy processing load, a proposal which has been offered for at least some apparent island violations (Kluender 1998, 2004). The properties of the existential construction embedded within an island need to be further investigated.

[8] It has been noted (Szczegielniak, p.c.) that (36) is an example of sprouting within an island, and as such, should be ungrammatical, as shown in (7). Manipulating the lexical items - specifically, introducing a different subject in the '*but…*' clause indeed degrades the acceptability both in English and Tagalog - cf. *Bao knows a woman that was writing a book, but Fred doesn't remember why.* For now, this matter is outside the scope of this work.

4 An Alternative Analysis

Let us now return to the three possible analyses for Tagalog sluicing that Kaufman & Paul consider: (i) wh-movement for both arguments and adjuncts; (ii) pseudosluicing for arguments, wh-movement for adjuncts; (iii) pseudoclefts for arguments, wh-movement for adjuncts.

Of these, option (i) is the least viable one, since it postulates wh-movement for arguments in sluicing, but not in wh-questions. This is not motivated language-internally, and also goes against the evidence from other languages that sluicing formation matches the language-specific wh-question formation strategy.

Turning to options (ii) and (iii), note that they assume the same underlying structure for adjunct sluices, wh-movement, and differ only in the analysis of argument sluices - pseudosluicing vs. pseudoclefting. In the remainder of this section I show that in Tagalog pseudosluicing and pseudoclefting are minimally different implementations of the same structure.

Let us recall the relevant examples, spelling out the ellipsis sites in full. An example of pseudosluicing - a copular clause headed by the wh-word - is (30), repeated below:

(30) a. [$_{CP}$ *May binigy-an ng pera*], [$_{CP}$ *pero hindi namin alam* [$_{CP}$ *kung sino* [$_{TP}$ ***iyon***.]]]
EXT give.PFV-LV GEN money but NEG 1pl.EXCL.GEN know COMP who that
Someone was given money but we don't know who it was.

As a pseudocleft, the ellipsis site of the same example looks the following way:

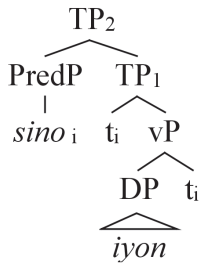
(38) a. [$_{CP}$ *May binigy-an ng pera*],
EXT give.PFV-LV GEN money
[$_{CP}$ *pero hindi namin alam* [$_{CP}$ *kung sino* [$_{TP}$ ***ang binigy-an ng pera***.]]] [9]
but NEG 1pl.EXCL.GEN know COMP who NOM give.PFV-LV GEN money
Someone was given money but we don't know who it was that was given the money.

Since I take pseudosluicing to be a type of TP-ellipsis in a copular clause, like Rodrigues et al. (2009) and Barros (2014), and unlike Merchant (1998), the structural difference between (30) and (38) boils down to the internal structure of the subject DP, embedded in the complement that the predicate *sino* takes.

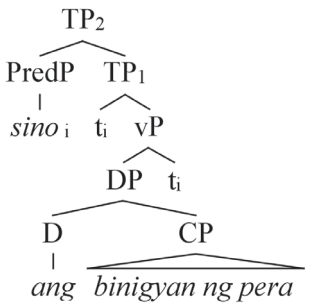
Specifically, in the pseudosluicing example in (30), the subject DP is represented by a single demonstrative pronoun, *iyon*. In contrast, in (38), the subject DP is a complex one, headed by the nominalising case marker *ang* and containing a nominalised clause *binigyan ng pera.* Nevertheless, in both cases the overall configuration is the same: the wh-predicate *sino* takes as its subject a DP; what varies is only the internal complexity of the subject DP. The two structures are shown in (30b) and (38b), respectively:

[9] Note that *may* does not surface in the embedded clause when the ellipsis site is spelled out in full. The reason for this is likely to be related to the properties of the existential construction when embedded (cf. also ft. 7 on the clitic case alternation when in an embedded existential). I intend to investigate the properties of embedded existentials in Tagalog in future work.

(30) b.



(38) b.



This is a cross-linguistically rare case of structural syncretism between sluicing and pseudoslucing. In Tagalog, it stems from the fact that argument wh-questions and sluices employ the pseudoclefting strategy, which is also what is used in copular clauses in pseudosluicing.

Adopting such an analysis and differentiating argument and adjunct sluices also allows to account for the fact that *iyon* can only appear in argument sluices: since adjunct wh-words do not act as nominal predicates, they cannot take *iyon* as the subject.

Furthermore, if (30) and (38) are interchangeable subtypes of the same predicate-subject structure, they lend support to the Unconstrained Pseudosluicing Hypothesis, as opposed to the Constrained Pseudosluicing Hypothesis. Recall that according to the latter, pseudosluicing can only be employed in cases where regular sluicing would run into an island constraint. The Tagalog data, however, shows that both sluicing and pseudosluicing employ a pseudocleft structure. Therefore, they can be used interchangeably, even in cases where no island is involved. This is predicted to be impossible by the Constrained Pseudosluicing Hypothesis, and therefore supports the Unconstrained Pseudosluicing Hypothesis.

Moreover, the very fact that the two structures in (30) and (38) are so similar structurally (much more so than the respective English sluicing and pseudosluicing counterparts) is consistent with the intuition that they should be treated as two instances of the same construction.

Let us now address the disadvantages of both the pseudosluicing and pseudoclefting analyses that Kaufman & Paul (2006) point out, as summarised in Table 2. To recapitulate, they are: (i) prediction that adjunct sluices are not island-sensitive, and (ii) no explanation for lack of sprouting in argument sluices.

As far as island-sensitivity with adjunct sluices goes, the prediction holds: adjunct (as well as argument) sluices in Tagalog are not island-sensitive - cf. (36), repeated here:

(36) [CP *Alam ni Bao ang babae-ng* [TP *nag-susulat ng libro*],
know GEN Bao NOM woman-LNK INT-write.AV GEN book
[CP *pero hindi niya maalala* [CP *kung bakit.*]]
but NEG 3sg remember.PV COMP why
Bao knows a woman that was writing a book, but he doesn't remember why.

As for the possibility of sprouting in argument sluices, as in (23) repeated below, at least for some speakers it poses no difficulty:

(23) [$_{CP}$ *K<um>akanta si Maria*] [$_{CP}$ *pero hindi ko alam* [$_{CP}$ *kung ano*]].
<AV>sing.IPFV NOM Maria but NEG 1sg know COMP what
Maria was singing but I don't know what.

5 Conclusion

To conclude, this paper argued that out of the three possible analyses for Tagalog sluicing that have been previously considered in the literature, the most promising one is that there are two sluicing strategies in Tagalog: wh-movement for adjunct sluices, and a pseudocleft structure for argument sluices. In this way, Tagalog evidence is in line with the cross-linguistic generalisation that sluicing formation utilises the language-specific wh-question formation strategy.

Also, I have shown that Tagalog is cross-linguistically unusual in that the sluicing and pseudosluicing constructions in the language are instances of the same underlying pseudocleft structure. The difference between sluicing and pseudosluicing lies only in the complexity of the subject DP. These facts also support the Unconstrained Pseudosluicing Hypothesis.

Like sluicing in other languages, Tagalog sluicing is not sensitive to island constraints. As for the sprouting asymmetry that has been reported before - sprouting being possible with adjunct but not argument sluices - there is some inter-speaker variation, but at least for some speakers sprouting with arguments is possible, along with introducing the indefinite correlate by means of the existential *may*. The hypothesis put forward in this paper is that sprouting in argument sluices is possible, and differs from the alternative construction headed by the existential *may* in terms of its discourse properties: the former has broad focus, and the latter bears narrow focus.

Since this paper proposes that there are two sluicing strategies in Tagalog, it also suggests that neither exclusively syntactic nor exclusively semantic sluicing-licensing condition is sufficient on its own. Because argument sluices have pseudocleft structure, there is no syntactic parallelism between the sluice and the antecedent clause. This is problematic for the syntactic condition. As for the semantic condition, it does not allow to incorporate the generalisation that argument and adjunct sluices in Tagalog have different structures, because the semantic condition does not take syntax into account. Therefore, the Tagalog sluicing data calls for a hybrid syntax-semantic condition. Determining its nature is a task for the future.

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Phonological Opacity in Pendau: a Local Constraint Conjunction Analysis

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1 Introduction

Phonological opacity (Kiparsky 1971, 1973) has been a challenge for Optimality Theory (henceforth, OT) in its original version (Prince & Smolensky 1993, McCarthy & Prince 1993a, b). Kiparsky (1971, 1973) defined phonological opacity as follows:

(1) Opacity
A phonological rule *P, A →B/C_D* is **opaque** if there are surface structures with any of the following characteristics:
a. instances of *A* in the environment in *C_D*.
b. instances of *B* derived by *P* that occur in environments other than *C_D*.
c. instances of *B* not derived by *P* that occur in environments in *C_D*.

In rule-based serialism, opacity is accounted for by rule orderings, with the application of a phonological rule *R* on an intermediate derived representation, rendering the effect of rule *P* not visible in the surface.

However, classical OT is a parallel theory of phonology. Possible output candidates generated by GEN are evaluated by CON, which has requirement on the identity of input and output forms (via faithfulness constraints) and the well-formedness of the output forms (via markedness constraints). That is, it is the pairing of input-output that is being evaluated, without making reference to intermediate derivations. As a result, while opacity is a direct product of rule ordering in rule-based approach, opacity finds no straightforward explanation in parallel OT.

This paper discusses the issue of opacity in Pendau, an Austronesian language spoken in central Sulawesi, Indonesia. Specifically, I investigate the alternations of NC[2] sequences observed at prefix-root boundaries. This language exhibits nasal substitution just as many other Austronesian languages do, but there is one specific case where the environment for nasal substitution is met but nasal substitution fails to apply (pattern 1a). I show that there is a synchronic chain shift in Pendau and argue that this is successfully accounted for by an Optimality Theoretic (OT) framework with Local Constraint Conjunction (Smolensky 1993, 1995, 1997).

The paper is organized as follows. Section 2 provides an overview and an analysis of nasal substitution in Pendau. Section 3 analyzes the opacity issue using Local Constraint Conjunction. Section 4 discusses the use of Local Constraint Conjunction in chain shift effect and the restrictiveness of the mechanism. Section 5 concludes the paper.

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[2] N stands for nasal and C stands for voiceless obstruent.

2 Nasal substitution in Pendau

Pendau is an endangered Austronesian language spoken in central Sulawesi, Indonesia, with about 4,000 native speakers (Lewis 2009). Similar to many languages in the Austronesian language family, Pendau also exhibits what is called "nasal substitution": a voiceless obstruent replaced by a homorganic nasal after prefixation:

(2) Nasal substitution in Pendau[3]

Root	Gloss	Prefixed with /moŋ-/
pareʂa	'to check'	mo**m**areʂa
ʈuda	'to plant'	mo**ɳ**ʈuda
keʈik	'to type'	mo**ŋ**eʈik

Although nasal substitution was traditionally analyzed as place assimilation followed by voiceless obstruent deletion, Pater (1996, 2001) analyzed nasal substitution as fusion of the voiceless obstruent and the nasal.

(3) Nasal substitution as fusion of N and C: a two-to-one correspondence

INPUT: N_1 C_2

[+son, nasal, α place] [-vl, -son, β place]

OUPUT: N_{12}

[nasal, β place]

This fusion account is supported by evidence from typology that post-nasal voiceless obstruent deletion accompanies place assimilation, which renders the deletion rule a "false step" (Pater 1996: 25), and the phonology of Indonesian that reduplication copies a nasal formed by coalescence (Cohn and McCarthy 1994). As shown below, Pendau offers another support for this fusion account.

In Pendau, when an consonant-final harmonic prefix is added before a vowel-initial root, there is vowel harmony, whereas when the same harmonic prefix is added before an obstruent-initial root, vowel harmony is blocked, regardless of the voicing feature of the obstruent. In fact, the coda of any consonant-final prefixes is the velar nasal /ŋ/.

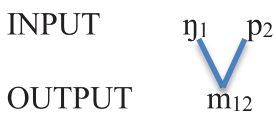
(4) /moŋ-inuŋ/ > [m**e**ŋiɳuŋ]
/moŋ- uraʂ/ > [m**o**ŋuras]
/moŋ- pareʂa/ > [m**o**mareʂa]
/moŋ- baʂa/ > [m**o**mbaʂa]

The blocking of vowel harmony in [mombaʂa] can be due to the coda consonant [m], and such a blocking effect is typologically valid and seen in languages such as Lango (Archangeli and Pulleybank 1994), Yucatec Maya (Krämer 2001) and Assamese (Mahanta 2008). The singleton nasal between the prefix vowel [o] and the root vowel [a] in [momareʂa] also blocks vowel

[3] All data presented in this paper is from Quick (2007), the only existing grammar of Pendau.

harmony. In this case, it acts like a cluster, just like [mb] in [mombas̪a]. On the contrary, the singleton nasal in [m**e**ŋiŋ̪uŋ] and [m**o**ŋuras] does not block vowel harmony. The only explanation for this contrast is that the singleton nasal in [momares̪a] is a result of fusion, and this nasal is ambisyllabic in nature[4]. Since it is the coda of the first syllable of [momares̪a], it blocks vowel harmony. Having established this, I will use fusion to account for nasal substitution in Pendau and the substituted nasal will have the following correspondence to its input.

(5)

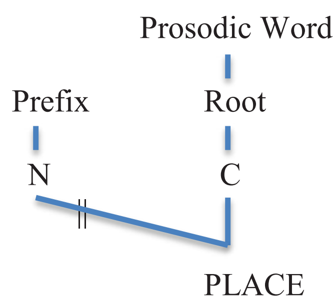


In correspondence-OT, fusion like (5) is violation of the faithfulness constraint Uniformity because of the many-to-one correspondence between input and output.

(6) Uniformity: No element of output has multiple correspondents in input.

This faithfulness constraint is violated in order to satisfy a higher-ranked markedness constraint. Pater (2001) argued that this markedness constraint is CrispEdge[prwd] (Itô & Mester 1999), that no element belonging to a Prosodic Word be linked to a prosodic category external to that Prosodic Word. The prerequisite for CrispEdge[prwd] is the alignment of a Prosodic Word and a root, which is demonstrated by Cohn and McCarthy (1994). The evidence is from the stress pattern in Indonesian that stress is never assigned to prefixes even if prefixation creates a disyllabic foot where the first (left) syllable can normally receive stress. This led Cohn and McCarthy to conclude that prefixes are not in the Prosodic Word domain projected by roots. CrispEdge[prwd] then disallows linkage across the Prosodic Word edge, and as a result, homorganic NC sequences do not surface.

(6)



(Indonesian)

While CrispEdge[prwd] explains the pattern in Indonesian, it faces a problem in Pendau, because the very premise that allows CrispEdge[prwd] to operate, that is, the alignment of a Prosodic Word and a root, is not supported by evidence from Pendau. The stress pattern in Pendau is simple, in the sense that stress only falls on the penultimate syllable and there is no secondary stress (Quick 2007). There is no other independent evidence suggesting that a root is a Prosodic

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[4] The representation of this proposed ambisyllabic consonant is beyond the scope of this paper. Reader is directed to Clements and Keyser (1983) and Borowsky *et al*. (1984) for analyses of the representations of ambisyllabic consonants.

Word and that prefixes are outside a Prosodic Word as in Indonesian. Therefore, instead of extending the application of CrispEdge[prwd] to Pendau, I appeal to *CC, which is more general than CrispEdge[prwd] in that it makes no reference to higher prosodic structure. *CC is also more general than *NC proposed by Pater (1996), as *CC is observed in many other languages and can cope with other NC alternation in Austronesian languages and Bantu languages (see Archangeli *et al*. 1998).

(7) *CC: Sequences of consonants are prohibited.

As a result, I propose the tableau in (9) for nasal substitution in Pendau. The crucial constraints, Uniformity and *CC, are shown here, along with the NasAssim constraint that forces place assimilation.

(8) NasAssim: A nasal must share place feature with its following consonant.

(9)

/moŋ$_1$-p$_2$areṣa/	NasAssim	*CC	Uniformity
a. moŋ$_1$p$_2$areṣa	*	*!	
b. mom$_1$p$_2$areṣa		*!	
☞c. mom$_{12}$areṣa			*

The constraint hierarchy for nasal substitution is NasAssim, *CC >> Uniformity[5]. (9a) is the most faithful candidate, but it violates NasAssim and *CC. (9b) is a little bit better than (9a) as it only violates *CC. (9c) is the optimal candidate. Although it violates Uniformity, it is better than both (9a) and (9b), since Uniformity is ranked lower than *CC and NasAssim. Although NasAssim does not seem to be crucial here, as will be seen in the next section, the relative ranking of NasAssim and *CC will become crucial.

3 Underapplication of Nasal Substitution in Pendau

Glottal stop is a phoneme in Pendau and it can be the initial consonant of a word, as shown in (10).

(10) [ʔapi] ‘wing’
[api] ‘fire’

[5] When the post-nasal obstruent is voiced, there is no nasal substitution, as seen in the last example in (4). There is only place assimilation but no fusion: /ŋb/ -> [mb]. The constraint hierarchy in (9) will rule out the optimal candidate [mb] because [mb] incurs a violation of *CC. However, as suggested in Pater (2001), a nasal and a voiced obstruent fail to be coalesced because they have incompatible voice feature: while nasals and voiceless stops are not pharyngeally expanded, voiced stops are. In terms of OT, this means that there is a constraint about the voice feature that outranks *CC. This is also beyond the scope of this paper, but for a detailed analysis of the blocking of fusion of a nasal and a voiced obstruent, reader is directed to Pater (2001), Trigo (1991) and Steriade (1995).

When a ŋ-final prefix is added to a ʔ-initial root, a different type of NC alternation takes place (11). This is different from the NC alternation involving the other voiceless obstruents in two ways: 1) place assimilation is progressive with /ʔ/, but regressive with the other voiceless obstruents; 2) there is no fusion of the nasal and the obstruent when the input contains /ʔ/.

(11)

Root	Gloss	Prefixed with /moŋ-/
ʔomuŋ	'to bring'	mo**ŋk**omuŋ
ʔai	'to call'	mo**ŋk**ai
ʔour	'to shave'	mo**ŋk**our
ʔaʔar	'to scratch'	mo**ŋk**aʔar

Regressive assimilation, as seen in [mom$_{12}$are$_{12}$a] < /moŋ$_1$-p$_2$are$_{12}$a/, suggests that there is a faithfulness constraint requiring the place feature of the root-initial segment be kept in the output. I formulate this constraint as IdentPlaceOnset, since the root-initial segment is a syllable onset in the input and its corresponding segment, the substituted nasal, is an onset in the output.

(12) IdentPlaceOnset: Output correspondent of an input [α place] onset is also [α place].

In order for [momare$_{12}$a] to be the optimal candidate, IdentPlaceOnset needs to outrank Uniformiaty. As seen in (13), (13b) with a substituted /ŋ/ loses to (13a), because /ŋ/ does not have the same place feature as /p/ in the input. (13c), which is the fully faithful candidate, loses because of either NasAssim or *CC.

(13)

/moŋ$_1$-p$_2$are$_{12}$a/	NasAssim	IdentPlaceOnset	*CC	Uniformity
☞a. mom$_{12}$are$_{12}$a				*
b. moŋ$_{12}$are$_{12}$a		*!		*
c. moŋ$_1$p$_2$are$_{12}$a	*!		*	

Unlike nasal substitution, where the place features of the onsets are preserved in the outputs, what is preserved in the output of /ŋʔ/ is the place feature of the nasal coda, and this is presumably a result of structure preservation (Kiparsky 1985). If there is regressive assimilation in /ŋʔ/, a placeless nasal surfaces as a result of the glottal stop being placeless. However, nowhere in the grammar of the language is this new segment motivated as an underlying phonological segment. Therefore, for the purpose of structure preservation, assimilation has to be progressive, forcing the glottal stop to change to a velar stop. The critical constraint motivated here is HavePlace[nasal] (see Padgett 1995), which penalizes the placeless nasal.

(14) HavePlace[nasal] : Every nasal must have some place.

This constraint should outrank IdentPlaceOnset in order to produce progressive assimilation. As can be seen in (15), candidate (15c) and (15d) both violate HavePlace[nasal], whereas (15a) and (15b) violate IdentPlaceOnset. The grammar now needs to choose between (15a) and (15b).

(15)

/moŋ$_1$-ʔ$_2$ai/	HavePlace[nasal]	IdentPlaceOnset
☞ a. moŋ$_1$k$_2$ai		*
☞ b. moŋ$_{12}$ai		*
c. moN$_{12}$ai	*!	
d. moN$_1$ʔ$_2$ai	*!	

Previously I showed that the output of an input /ŋk/ is a single nasal, and that this is due to the constraint *CC outranking Uniformity. However, the output of /ŋʔ/ is exactly the NC sequence [ŋk]. One might argue that this could be a prenasalized stop [^{ŋ}k], but the data from reduplication simply rules out this possibility. The reduplicant-initial onset is [k], but not [^{ŋ}k], which indicates that [ŋk] are heterosyllabic.

(16)

Root Input	Prefixed with /moŋ-/	Reduplication Output	Gloss
/ʔomuŋ/	[moŋkomuŋ]	[moŋkomuŋ-**k**omuŋ]	'carry and carry'

/ŋk/ and /ŋʔ/ alternations, when put together, form what is called a 'regular shift' (Lubowicz 2011): /ŋʔ/ → [ŋk], /ŋk/ → [ŋ]. Each mapping is motivated independently, not as a consequence of one another. *CC forces the change from /ŋk/ to [ŋ], but the same constraint does not have an effect on /ŋʔ/. It is blocked by some other high-ranked constraint.

Let's consider first the constraint violations incurred by the output [ŋ$_{12}$], shown in (17a). Fusion results in two faithfulness violations, namely, IdentPlaceOnset by the change of place from glottal to velar, and Uniformity by merging two input segments. The non-fusion candidate (17b), on the other hand, violates both IdentPlaceOnset and *CC. If the constraint hierarchy for ŋʔ- alternation is the one in (17), (17a) would be chosen as the optimal candidate. But this is not true in the language. In order for the real output (17b) to win, the ranking of Uniformity should be higher than *CC in ŋʔ-alternation, which is the opposite constraint ranking for nasal substitution. In an OT with strict constraint domination, we have two contradicting constraint rankings for NC effects across the prefix-root boundaries for a single language.

(17)

/moŋ-ʔai/	IdentPlaceOnset	*CC	Uniformity
☞a. mo**ŋ$_{12}$**ai	*		*
☹b. mo**ŋ$_1$k$_2$**ai	*	*!	

Another way of looking at this is that the combined violation of the faithfulness constraints IdentPlaceOnset and Uniformity is more severe, and that makes (17a) less harmonic than (17b). Smolensky (1993, 1995, 1997) propose that this scenario exists, by the interaction of two constraints in a local domain, known as Local Constraint Conjunction (henceforth LCC). The constraint is formulated as follows:

(18) *The Local Conjunction of C_1 and C_2 in domain D:*
C_1&C_2 is violated when there is some D in which both C_1 and C_2 are violated.

The assumption behind LCC is that the simultaneous violations of the constraints conjoined are more fatal than the violation of only one of them.

Now imagine there is a constraint hierarchy where constraint 1 (C1) outranks constraint 2 (C2), which in turns outranks constraint 3 (C3). Candidate 1 (Cand 1) violates C1 and C3, and Candidate 2 (Cand 2) violates C1 and C2. Given this constraint hierarchy, the optimal candidate is Cand 1:

(19)

/INPUT/	C1	C2	C3
☞ Cand 1	*		*
Cand 2	*	*!	

However, if there is a conjoined constraint of C1 and C3, which outranks all other constraints, the optimal candidate is Cand 2. This is because the simultaneous violation of C1 and C3 is more fatal than the violation of C1 and C2.

(20)

/INPUT/	C1&C3	C1	C2	C3
Cand 1	*!	*		*
☞ Cand 2		*	*	

The regular chain shift in Pendau can be obtained by the constraint hierarchy in (20), with C1 being the constraint IdentPlaceOnset, C2 being *CC, and C3 Uniformity. The conjoined constraint is then IdentPlaceOnset & Uniformity. The conjoined constraints are both faithfulness constraints and together they penalize multiple faithfulness violations.

(21) IdentPlaceOnset & UNIF:
IdentPlaceOnset & Uniformity is violated when there is some domain juncture in which both IdentPlaceOnset and Uniformity are violated.

The tableau in (22) incorporates the crucial constraints motivated so far, and in order to account for ŋʔ-alternation, the constraint NasAssim should outrank IdentPlaceOnset and *CC in order to rule out the most faithful candidate (22a). (22b) and (22c) both satisfy IdentPlaceOnset vacuously, and do not have a violation against the conjoined constraints. However, they have a fatal violation of HavePlace[nasal]. (22d) with a substituted [ŋ] violates both IdentPlaceOnset and Unifomity, and thus it violates the conjoined constraint. (22e) is the optimal candidate. It violates IdentPlaceOnset and *CC but does not violate the higher-ranked conjoined constraint. We see from the relative ranking of IdentPlaceOnset & Uniformity and *CC that the conjoined constraint serves to prevent multiple faithfulness violations within which the violation of Uniformity is a direct result of the markedness constraint *CC.

(22)

/moŋ$_1$-ʔ$_2$ai/	HavePlace[nasal] NasAssim	IdentPlaceOnset & Uniformity	IdentPlaceOnset	*CC	Uniformity
a. moŋ$_1$ʔ$_2$ai	*! (NasAssim)			*	
b. moN$_1$ʔ$_2$ai	*! (HacePlace[nasal])			*	
c. moN$_{12}$ai	*! (HacePlace[nasal])				*
d. moŋ$_{12}$ai		*!	*		*
☞e. moŋ$_1$k$_2$ai			*	*	

This constraint hierarchy also accounts for nasal substitution. Since the optimal candidates never violate IndentPlaceOnset, the conjoined constraint is also vacuously satisfied. I use ŋk-alternation as an example in the following tableau.

(23) Nasal Substitution and Vacuous Satisfaction of the Conjoined Constraint

/moŋ$_1$-k$_2$etik/	HavePlace[nasal] NasAssim	IdentPlaceOnset & Uniformity	IdentPlaceOnset	*CC	Uniformity
☞a. moŋ$_{12}$etik					*
b. moŋ$_1$k$_2$etik				*!	

By limiting the faithfulness violations of onsets, as seen in (22), the mapping of inputs and outputs is minimized. Although alternation takes place as forced by a markedness constraint, the contrasts of the root onsets are preserved as much as possible and transformed to the contrasts in the output onsets. It can be seen from the following table that while there are contrasts among all of the input NC sequences, there are also contrasts among their outputs. If there is no penalty on multiple faithfulness violations, a substituted [ŋ] will be the output of /ŋʔ/, and contrasts are neutralized as [ŋ] can also be the output of [ŋk].

(24) Contrast in Inputs and Outputs

	Contrastive Inputs	Contrastive Outputs	Neutralized
Nasal Substitution	ŋp ŋt̪ ŋk	m n̪ ŋ	
No Nasal substitution	ŋʔ	ŋk	*ŋ

One prediction following this contrast preservation and transformation is that the input onsets are highly recoverable. For example, if a speaker of this language hears a word [moŋetik], s/he will know the root verb must be [ketik]. However, if multiple faithfulness violations are possible in this language, the speaker will have a hard time deciding whether the verb root is

[ketik] or [ŋetik], as the substituted [ŋ] can be the output of either /ŋʔ/ or /ŋk/. Notice that the speaker will not posit the root verb as [ŋetik], either. That is, the speaker will not analyze the word as having a prefix /mo-/, which is also a valid harmonic prefix in Pendau. This is because if the prefix is /mo-/, there should be vowel harmony and the verb should be [meŋetik], which is not what the speaker hears. The above scenario (i.e. highly recoverable onsets) follows from Kaye (1974), that underlying representations could be recovered from the surface representations if the surface representations occur nowhere else. Since the inputs and outputs at the prefix-root boundaries in Pendau have one-to-one correspondence, there is unambiguous inversion between outputs and inputs.

4 Local Constraint Conjunction, Chain Shift, and Restrictiveness

The synchronic chain shift in Pendau (/ŋʔ/ -> [ŋk], /ŋk/ -> [ŋ]) is comparable to the chain shifts found in other languages, for example, Western Basque Hiatus Raising (/a/ -> [e], /e/ -> [i]) and Finnish vowel shift (/aa/ -> [a], /a/ -> [o]), to name a few. Kirchner (1996) proposed that only an enriched theory of faithfulness can account for the chain shift mappings in OT, and the mechanisms used to achieve the enriched theory of faithfulness is LCC. For instance, in Western Basque, a conjoined constraint of two faithfulness constraints outranks both of its component constraints, penalizing multiple faithfulness violations, and a markedness constraint, the satisfaction of which will incur a fatal violation of the conjoined constraints. As a result, while /a/ has an output [e] and /e/ has an output [i], /a/ cannot have an output correspondent [i].

(25) Western Basque Hiatus Raising (adapted from Kawahara 2002)

	Ident[low] & Ident[high]	Raising	Ident[low]	Ident[high]
/alaba-a/				
a. alabaa		**!		
☞b. alabea		*	*	
c. alabia	*!		*	*
/seme-e/				
a. semee		*!		
☞ b. semie				*

One criticism that LCC receives is that it implies that different constraints can be conjoined and it potentially increases the expressive power of the architecture of OT. Wolf (2007) argued that LCC exhausts the way constraints can interact with each other. Several proposals have been given to promote restrictiveness of LCC (Crowhurst and Hewitt 1997, Fukuzawa and Miglio 1998, Itô and Mester 1998, etc.). For example, Itô and Mester (1998) argued that faithfulness and markedness constraints cannot be conjoined, and similarly, Fukazawa and Miglio (1998) proposed that only constraints in the same family can be conjoined. The LCC used in accounting for Pendau chain shift and that of Western Basque is indeed restrictive, if we follow the restrictiveness proposals. First, the domain of LCC is restrictive, in that the domain for both constraints to operate is segment. Second, only constraints in the same family are conjoined. In both Pendau and Western Basque, only faithfulness constraints are conjoined, and markedness constraints do not participate in LCC. Moreton and Smolensky (2002) further shows that LCC derives a typology of impossible and possible chain shift. Again,

the LCC used in their proposal is restrictive: same family of constraints (faithfulness in this case) and the same domain (segment) for both constraints. To sum up, the chain shift in Pendau provides additional support for the use of LCC (in its restrictive form) for opacity issues such as the chain shift effect.

5 Conclusion

This paper examines a phonological opacity phenomenon at the prefix-root boundaries in Pendau, namely, the underapplication of nasal substitution. Nasal substitution is a major morpho-phonological process found in Pendau, and similar to languages like Indonesian, nasal substitution in Pendau is the fusion of the nasal and the voiceless obstruent. The blocking of vowel harmony in Pendau provides additional evidence for the fusion account, first proposed by Pater (1996). However, contrary to what Pater (2001) proposed, fusion in Pendau is forced by *CC, which prevents a two-consonant sequence. This constraint, as I have argued, is more general than Pater's (2001) CrispEdge[prwd], and there is no evidence in Pendau suggesting CrispEdge[prwd] is applicable. The underapplication of nasal substitution is accounted for by Local Constraint Conjunction. The conjunction of two faithfulness constraints, namely, IdentPlaceOnset and Uniformity, can successfully explain the chain shift /ŋʔ/ -> [ŋk], /ŋk/ -> [ŋ]. I have argued that this use of conjunction is restrictive, since the domain for the constraints is the same and only constraints in the same family are conjoined. The effect of this conjoined constraint is to prevent multiple faithfulness violations of the onset segments, and in so doing, the mapping of input onset and output onset is minimized, and the contrasts among inputs are preserved and transformed to outputs. Since neutralization is prevented, it is predicted that input onsets are highly recoverable because there is only one-to-one correspondence between inputs and outputs, and unambiguous inversion is possible in this language.

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Proximal Demonstratives in Predicate NPs

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Discussions of demonstratives have focused almost exclusively on examples in which demonstrative NPs are used to refer to specific entities. In this paper, however, we investigate a use of English demonstrative NPs in which the demonstrative NP receives a property-denoting interpretation and not a referential one, as shown in the naturally-occurring examples in (1):

(1) a. Megan bought me the scariest thing alive!! It's this hamster and it makes noise and is voice activated and its cheeks light up and it moves around and follows commands!!!! [corpus]
b. Look, the dealers are the popular kids, but they're not normal popular. They're these crunchy granola dudes that have convinced everyone that they're cool. [corpus]
c. She [Supreme Court Justine Elena Kagan] said "no" each time to a series of questions from Congress members that went something like: Have you ever hunted? Does anybody in your family hunt? Do any of your friends hunt? "It was pretty pathetic, really," Kagan joked. "I'm this Jewish girl from New York City, and this is really not what we did on the weekends." [corpus]

In (1a)-(1c), the demonstrative NPs are not used by the speaker to refer to any particular entities; rather, they are being used to predicate a property of the referent. We argue that in this use the demonstrative NP classifies the referent with respect to a discourse-new property and, moreover, that this use of the demonstrative indicates that the speaker is conveying additional information about the referent beyond mere category membership. We will first set out the features of this use, showing how it is distinct from other uses of demonstratives, and then turn to review the data that supports our analysis.

In the examples in (1), the speaker is attributing the properties of 'being-a-hamster', 'being-crunchy-granola-dudes...', and 'being-a-nice-Jewish-girl-from-NYC' to the respective referents and is not referring to any particular individuals with the demonstrative NPs. The property-denoting interpretation is, however, restricted only to the proximal demonstrative form and the distal form is disallowed on the intended interpretation, as shown in (2):

(2) a. Griselda is the wife of one of Kevin's law school classmates and she is awesome. She's {#that/this} amazing little spitfire, full of so much life and energy… [corpus]
b. I was on tour with the Red Hot Chili Peppers, and they brought along a vegan chef. Everyone thinks they're {#those/these} insane party animals. But after the show, we'd hang out, meditate a little and then have really great vegan food together. [corpus]

* This paper is an expanded and revised version of our previous work on this topic (Doran & Ward 2013, 2014). We are grateful to the audiences at LSA as well as at BLS for many useful comments and suggestions. A special note of thanks goes to Larry Horn, Craige Roberts, Alex Djalali, Line Mikkelsen, Chris Potts, and Jon Stevens. All errors remain our own.

Given that these proximal demonstrative NPs receive a property-denoting interpretation, the predicative use is distinct from other well-known uses of demonstratives. For example, consider the deictic use, the identificational use, and the degree modifier use of the demonstratives in (3)-(5):

(3) This hamster right here is the scariest thing alive.
(4) The dealers are these guys pictured here in the photograph.
(5) The hamster was this big.

In (3), the demonstrative is used by the speaker to refer to an entity in the immediate perceptual surroundings and it is possibly accompanied by an ostensive gesture. In (4), the demonstrative appears in post-verbal position, but it is nevertheless used referentially, with the speaker referring to the relevant individuals pointed out in the photograph. In (5), the demonstrative likewise appears in predicate position, but here it is used to specify a degree or an amount of a property that is in turn being predicated of the referent, i.e. the demonstrative is used to specify how big the relevant hamster was. Thus, each of these uses (along with other uses) are distinct from the property-denoting interpretation that we are concerned with here. Furthermore, note that in each of (3)-(5), the distal demonstrative form would be felicitous given an appropriate context, which is not the case for the property-denoting use, as was shown in (2). Similarly, the proximal demonstratives in (3)-(5) can receive a contrastive pitch accent when the speaker is distinguishing the referent from among a set of contrasting values; but such emphasis is not allowed on the property-denoting interpretations given in (1).

The property-denoting use of the proximal demonstrative is also distinct from the so-called 'indefinite *this*' interpretation, which is similarly restricted only to the proximal form (Prince 1981, Wald 1981, Maclaran 1980, 1982). With the indefinite-*this* use, the speaker uses the demonstrative to introduce a hearer-new, topical entity into the discourse, as shown in (6):

(6) I saw this scary hamster at the pet store.

The demonstrative here is used referentially, but it is distinct from other referential uses of the demonstrative in that the referent is presumed by the speaker to be unfamiliar to the hearer. While the referential use of indefinite-*this* use is distinct from the predicative proximal demonstrative, these uses do share the feature of being restricted to informal/colloquial contexts.

(7) a. [CNN] Yesterday, police identified a suspect in the Rolling Meadows murder-for-hire case, 43-year-old Jeremy Griffin. He's {#this/an} executive at Motorola.
b. Hey, do you know Jeremy Griffin? He's {this/an} executive at Motorola.

In the context of a news report, the property-denoting use of the demonstrative in (7a) is infelicitous; whereas in the informal context of (7b), such use is felicitous.

More generally, the property-denoting use of proximal demonstratives shares with the indefinite-*this* use the feature of being truth-conditionally equivalent to the use of the corresponding indefinite NP. However, in neither instance is the speaker's choice of the demonstrative pragmatically equivalent to use of the corresponding indefinite NP.

(8) a. Okay, so now everyone thinks I'm this great big lezzer, and all my lesbian mates think I'm one of the sisterhood now. [corpus]
b. Okay, so now everyone thinks I'm a great big lezzer…

In (8a), the truth-conditional contribution of the demonstrative NP does not differ from the truth-conditional contribution made by the indefinite NP in (8b). In general, whenever the predicative use of a proximal demonstrative NP is felicitous, the corresponding indefinite NP is also felicitous. It follows that the speaker's use of the demonstrative conveys additional pragmatic information.

Previous accounts of the pragmatic contribution conveyed by non-deictic uses of demonstratives have appealed to the notion of SPEAKER AFFECT (Lakoff 1974, Bowdle & Ward 1995, Wolter 2006, Davis & Potts 2010, Potts & Schwarz 2010, Acton & Potts 2014). According to this notion, certain uses of demonstratives have been shown to convey "complex multidimensional social meanings involving exclamativity" or "presumptions about shared attitudes and perspectives" (Acton & Potts 2014:3). Consider example (9) in which the speaker presumes a shared attitude – specifically one of contempt – with his addressee towards the referent:

(9) That asshole Cheney is trying to fuck over the Obamas. [corpus]

In analyzing our corpus of naturally-occurring data, we find that all predicative uses of proximal demonstrative NPs involve predicates that either license an exclamative interpretation or denote properties associated with social/cultural stereotypes.

However the notion of speaker affect is characterized, the felicitous use of predicative proximal demonstratives does not require that the speaker be expressing an emotional or evaluation disposition – either positively or negatively valenced (Doran & Ward 2013) – towards the referent or towards things of the relevant kind. As evidence, consider example (10), in which the predicative demonstrative NP is felicitous even in the absence of a positive or negative attitude expressed by the speaker:

(10) A: What's your hotel room like?
B: I don't know what to think about it. It's this square-shaped room with beige carpeting. [*gratia* Jon Stevens, p.c.]

In (10), the speaker explicitly denies having either a positive or negative attitude towards the property, and instead asserts his uncertainty towards the room in question. Thus, the relevant notion of speaker affect is not that of expressing a particular evaluative attitude; rather it appears to be limited to interpretations involving exclamative and stereotypical associations.

In addition to considerations of speaker affect, there are further pragmatic conditions that license the predicative use of a proximal demonstrative NP. We claim that the following conditions must be met for the predicative proximal demonstrative to be felicitous:

Conditions for felicitous use of predicative proximal demonstratives:

(i) there must be a salient open proposition (OP) in discourse of the form "*r* is an *x*" whose instantiated variable classifies the referent; and
(ii) the OP must be instantiated with a discourse-new property; and
(iii) the kind associated with this property must be presumed to be familiar to the hearer; and either:
(iv) (a) the classification of the referent must be sufficient to convey additional information beyond mere category membership; or
(b) the classification conveys additional information about the speaker's attitude towards the referent through the inclusion of expressive modifiers.

Under this analysis, the speaker conveys additional information about the referent, either through exclamative interpretations or through assumed mutual knowledge about the kind in question. We will take up each aspect of this analysis in turn.

First, the felicitous use of a predicative demonstrative NP requires a salient open proposition (OP) of the form "*r* is an *x*", where *r* is the referent and *x* is the category that classifies the referent, as shown in (11):

(11) A: Who's Joan? (What does Joan do?, What's Joan like?, etc.)
B: She's this lawyer.

Here, B's response instantiates the variable of the OP by classifying the referent, Joan, as being a member of the category of lawyers. In asking speaker B to provide a category that classifies the referent, Speaker A evokes the appropriate OP. When speaker A's question evokes a different OP – one in which the classification of the referent is not at issue – the proximal demonstrative is infelicitous:

(12) A: Who's a lawyer?
B: Joan's #this lawyer. [cp. Joan's a lawyer.]

In (12), speaker A's question does not evoke the appropriate OP: rather than asking speaker B to provide a category that classifies the referent, speaker A evokes a different OP. Here, the speaker is asking for a member of the category and the relevant OP is instantiated by the referent, rather than the category. Thus, the use of the proximal demonstrative is infelicitous in (12) because the discourse does not have a salient OP of the appropriate form.

Second, in addition to instantiating an appropriate OP, the property that classifies the referent must be discourse-new, in the sense of Prince 1992. When the relevant property has been previously evoked, infelicity results, as shown in (13a):

(13) a. A: My cousin Bob is coming over today. He's this fashion model.
B: What a coincidence! Have you met my cousin Sam? He's #this fashion model, too.

b. A: My cousin Bob is coming over today. He's this fashion model.
B: Have you met my cousin Sam? He's a fashion model, too.

c. A: My cousin Bob is coming over today. He's this fashion model.
B: Have you met my cousin Sam? He's this interior designer.

In (13a), speaker B's use of the demonstrative is infelicitous because the property of 'being-a-fashion-model' has already been evoked by speaker A. The discourse-old property can of course be repeated by speaker B, as in (13b), but only if the indefinite is used rather than the demonstrative. Furthermore, the infelicity of the demonstrative in (13a) must be due to the relevant property being discourse-old, rather than speaker A's previous use of the demonstrative. In (13c), speaker B can felicitously use the proximal demonstrative even after speaker A's previous use of the same construction, provided that the property speaker B predicates of the referent is discourse-new in her utterance. Thus, (13c) shows that the issue with speaker B's use of the demonstrative in (13a) is not that speaker A has already used the proximal demonstrative, but that the relevant property in B's utterance needs to be discourse-new.

There is, however, one kind of exception to the generalization that a discourse-new property is required. In cases in which the property has been previously evoked, the proximal demonstrative can nonetheless be felicitous, provided that is it interpretable as a continued reference to the evoked property of the same individual.

(14) A: My cousin Bob is cooking dinner tonight. He's this gourmet chef.
B: Well, if he's this gourmet chef, then we will be eating well tonight!

In (14), speaker B's use of the demonstrative is felicitous in her reply because she can be interpreted as continuing to attribute the property evoked by A – 'being a gourmet chef' – to Bob. In this sense, the property in question retains its discourse-new status.

Third, the property that instantiates the variable of the OP must also be (presumed to be) hearer-old (in the sense of Prince 1992). In the felicitous use of predicative proximal demonstrative NPs, the speaker assumes that the hearer is familiar with the relevant category and, moreover, assumes that the hearer is familiar with what is typical or expected for members of the category. In (15), below, the demonstrative is infelicitous without the assumption that the kind in question is familiar to both speaker and hearer.

(15) There's a rare bird hanging out in the Smith's backyard. It's #this piping plover.

The kind 'piping plover' is not, for us at least, sufficiently familiar to license the demonstrative here. While it may be known that the referent is a kind of bird, what the members of this kind are typically like is not sufficiently familiar for the demonstrative to be felicitous.

The final condition for the felicitous use of predicative proximal demonstrative NPs is that the speaker must provide additional information about the referent in one of two ways. The first way is for the speaker's classification of the referent to provide additional information with respect to stereotypes that are assumed to be familiar, thus licensing additional inferences about

the referent. The second way in which the final condition can be satisfied is for the speaker's classification of the referent to include a modifier that expresses an evaluative attitude. We take up these two ways in turn.

First, the classification of the referent with respect to familiar kinds can serve to convey additional information about the referent in virtue of familiar stereotypes about the relevant category and about what is typical for its members. Consider (16):

(16) a. Everyone thinks I'm this New Yorker.
b. Everyone thinks I'm #this South Dakotan.

In (16a), membership in the category 'New Yorkers' is sufficient to convey additional information about the referent (the speaker) because the kind is associated with various cultural stereotypes about what people from New York are like. Thus, classifying someone as a New Yorker conveys information beyond the mere fact that the person is from New York. In contrast, in (16b), the category 'South Dakotans', for us at least, does not convey any further information about the referent; classifying someone as a South Dakotan implies nothing more than the fact that the person is from South Dakota, thereby rendering the demonstrative in (16b) infelicitous.

The condition that the speaker conveys additional extra-classificatory information about the referent via stereotypes can be satisfied in various ways. In example (16a), it is satisfied by the stereotypes that attach to being from a certain geographical area. Stereotypes, such as this one, arise from the conventional associations attached to social and cultural categories, as shown further in (17):

(17) I only met her a few nights ago at a birthday bash, but holy fuck she is perfect. She's this hippy (sic), Buddhist, zen type. [corpus]

Here, the social identities of 'hippie', 'Buddhist', and 'zen-type' convey to the hearer information about the referent over and above simple membership in the category. That is, the hearer can infer more about the referent than simply the fact that she is a Buddhist.

In addition to social kinds, certain natural kinds can also have stereotypical associations regarding what the members are typically like.

(18) a. A: John just got a new pet. Do you know what it is?
B: It's this ferret.
b. A: John just got a new pet. Do you know what it is?
B: It's #this dog.
c. A: John just got a new pet. Do you know what it is?
B: It's this Chihuahua.

In (18a), the kind 'ferret' provides additional information about the referent in that members of the category are assumed to be sufficiently alike to make generalizations about members of the category (e.g. they are disgusting pets). The speaker's use of the demonstrative is thus felicitous here as the classification provides the hearer with information beyond mere membership in the

kind. In contrast, in (18b), the kind 'dog' is too heterogeneous to provide any extra-classificatory information about the referent; there are simply too many different breeds of dogs for (18b) to be conveying any additional relevant information. In (18c), however, where the pet is classified as a specific breed, the demonstrative is felicitous. Members of the kind 'Chihuahua' are assumed to be sufficiently alike and thus this classification does suffice to convey additional information about the referent, e.g. its mannerisms, size, and general behavior.

The second way in which the final condition can be satisfied is for the speaker's classification of the referent to include an expressive modifier. While conventionally associated stereotypes suffice to convey additional information about the referent that licenses the felicitous use of the proximal demonstrative, reference to kinds that do not in and of themselves have any stereotypical associations are also possible. Such kinds are felicitous when the speaker includes a modifier that expresses an evaluative attitude towards the referent through its classification. Consider, for example, artifact kinds. These kinds are typically infelicitous with the proximal demonstrative as they do not, on their own, provide a basis for extra-classificatory information. Consider (19):

(19) a. A: I heard your sister gave you something strange for your birthday. What was it?
B: It's #this pencil.
b. A: I heard your sister gave you something strange for your birthday. What was it?
B: It's this{amazing/fucking/stupid/awesome/wicked} pencil!

Kinds such as 'pencil' typically do not allow for the proximal demonstrative, as in (19a), because such a simple classification for an artifact does not license any further inferences; knowing that an object is a pencil does not put one in a position to know any additional information about the entity given the lack of conventional stereotypes about pencils. However, the inclusion of any of the affect-laden modifiers illustrated in (19b) allows the proximal demonstrative to be used felicitously.[1]

The additional information conveyed, either via conventional stereotypes or the inclusion of expressive modifiers, needs only to provide information about the referent beyond mere category membership; it does not need to make the referent uniquely identifiable. In example (20), the proximal demonstrative is felicitous, but the relevant cultural stereotypes do not in any way put the speaker in a position to distinguish the referent from other members of the relevant categories.

(20) The inspector himself was excellent. We used him for our current house, four years ago. He's this short guy with very little hair and a pronounced working-class English accent. It was like having Phil Collins inspect your house. [corpus]

The demonstrative here is felicitous because the kind 'short guy with very little hair and a pronounced working-class English accent' is rich with associations and thus the speaker is able to convey much more than simple kind membership with the classification provided. However,

[1] While the example cited in (19b) has the modifier pronominally, post-nominal modifiers are also possible, as in (1b) above, and subsequent discourse can provide additional information too, as in (1a) above.

as the second sentence indicates, the same classification is equally true of Phil Collins and so the description contained within the demonstrative does not make the referent uniquely identifiable.

The preceding examples have shown how the conditions enumerated above must be satisfied in order for a proximal demonstrative NP to be felicitous on the property-denoting interpretation. Our analysis has shown further that the expression of an evaluative attitude by the speaker may be present in many cases, but it is not the only way in which this use of the demonstrative is felicitous. For example, in (16a), the speaker may have either a positive or negative attitude towards New Yorkers, but the demonstrative is not felicitous here because the speaker is expressing an attitude. Rather, it is felicitous because of the extra-classificatory information provided by the stereotypes associated with the kind 'New Yorker'. Properties with conventional associations, such as social categories and cultural stereotypes, will generally be felicitous with the demonstrative and may additionally convey the speaker's attitude about the kind in question. But on the explanation offered here, speaker affect is the result of – but not necessarily a condition of – felicitous use.

Finally, note that the predicative use of proximal demonstratives may be accompanied by minimizers, e.g. *only*, *simply*, *just*, as evidenced in (21):

(21) a. Well, basically, I'm just this small town girl who lives in [a] not so perfect world. [corpus]
b. He was this muscular, tough looking kid, you would imagine him being a bully when he's only this sweet little boy. [corpus]

In these examples, the speaker is treating the relevant property as a value on a partially-ordered set (Hirschberg 1985) and denies that higher values obtain. So, in (21a), the speaker is asserting that, for the purposes of self-classification, she's only a small town girl – and denies the applicability of higher values with respect to the relevant property under discussion; that is, she's not well-traveled, complicated, sophisticated, urbane, etc. And in (21b), which features two tokens of the proximal demonstrative, we see that the first instance serves to classify the referent based on shared stereotypes, while the occurrence of the minimizer *only* before the second instance of the demonstrative denies higher values on the relevant partially-ordered set.

Further, we note that certain predicates that represent high values on a contextually salient partially-ordered set become infelicitous in the presence of a minimizer, as in (22):

(22) a. It's {just/simply/only} #this {amazing/awesome} pencil.
b. He's {just/simply/only} #this {rocket scientist/genius/Nobel Prize recipient}.

In (22a), the presence of the minimizer renders the utterance infelicitous given the exclamative interpretation of the adjectives *amazing* and *awesome*. With the pencil in question being assigned a high value on a contextually-relevant scale, the presence of the minimizer, whose function is to deny higher values, is infelicitous. Similarly, in (22b), we see that predicates which themselves correspond to high values on a contextually-relevant scale are infelicitous in the presence of minimizers.

More interestingly, we see that some predicates which, by themselves, would be infelicitous with the proximal demonstrative are nonetheless felicitous with a minimizer.

(23) a. If I see my child start to go very quickly for a dog, I say 'hold on'. [She might then say:] "It's #(just) this dog." [To which I would respond:] "Yeah, but we don't know anything about that dog right there for a second." [corpus]
b. "I think a lot of people in the artistic community have this misconception that it's #(just) this pen and ink," Csernak said. "I'm trying to reverse the impression of comics." [corpus]

In (23a), use of the minimizer *just* evokes a partially-ordered set of alternatives such that more specific values (i.e. Chihuahua, Poodle, etc.) are asserted not to hold. That is, the speaker is conveying that no further classification of the dog in question is relevant. Without the minimizer, such an interpretation is unavailable and infelicity results (cf. 18b). Similarly, in (23b), the minimizer evokes a set of alternatives that people in the artistic community fail to appreciate; thus, the speaker is rejecting the implication that pens and ink are limited to their use as writing implements.

In this paper, we've argued that the predicative use of proximal demonstrative NPs is distinct from other well-known uses of the proximal form, in that the demonstrative NP receives a property-denoting interpretation and not a referential one. Furthermore, we've shown that the conditions for this use require that the speaker provide a discourse-new classification of the referent that satisfies an OP of the form "*r* is an *x*" and, moreover, that the classification of the referent that satisfies the OP must be sufficient to convey additional information about the referent beyond simple category membership. We have surveyed different ways in which these conditions can be satisfied, e.g. by categories that are conventionally associated with stereotypical features and by the inclusion of modifiers that express the speaker's attitude towards the referent. The features of this use that we have identified indicate that the speaker's use of a proximal demonstrative with a property-denoting interpretation convey additional pragmatic information about the referent that would not be conveyed by corresponding use of an indefinite NP.

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Syntax of generic null objects revisited

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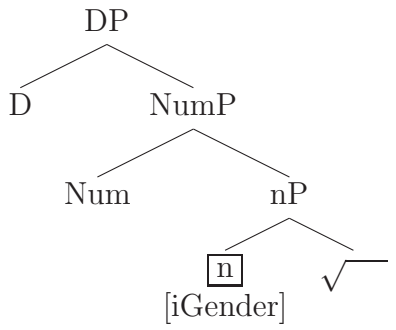
1 Introduction

Phonologically null arguments, and silent elements in general, have a stable place in the study of language.[1] This paper focuses on one specific type of null internal arguments, the so-called generic null objects (GNO), utilizing novel data from Czech and building on the minimalist program (Chomsky 1993, 1995). It has been argued in the literature that GNO are syntactically pronouns (Rizzi 1986; Authier 1992a,b), consisting of a D-feature and/or a set of ϕ-features (Landau 2010); it has been also assumed that they have a semantic feature [+human], which is why they denote only in the domain of people and personified entities. I show that even though the syntactic properties of Czech GNO are parallel to those of GNO in Italian and French, their syntactic structure is extremely limited, corresponding to a single syntactic node n, bearing an interpretable gender feature but no other ϕ-features, as captured in the tree on the left. Such a nominal head corresponds semantically to a property (determined by the value of the gender feature) introducing a variable that gets bound by a sentence-level generic operator (GEN), along the lines of Heim (1982) and Krifka *et al.* (1995). The advantage of the proposed analysis over the existing ones is that it can systematically account for both genericity and humannes of GNO without having to stipulate them.

(1) Nominal projection with a GNO-corresponding node (framed)



The paper is structured as follows: First, I briefly review the previous proposals regarding the syntax of GNO and I provide several tests showing that GNO in Czech are syntactically represented. After that, I revise Authier's semantic analysis of GNO, employing the dyadic generic operator (Krifka *et al.* 1995) rather than the non-selective adverbial operator (Lewis 1975). Subsequently, I give evidence for the presence of a gender feature in the structure of GNO and evidence against the presence of number, person and determiner features/categories in GNO. I also discuss the theoretical merit of replacing the semantic feature [+human] with the interpretable gender feature. Finally, I sum up the syntactic composition of GNO and compare it to the syntactic structure of regular pronouns.

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[1]The list of abbreviations used throughout the text: NOM = nominative, GEN = genitive, ACC = accusative, INST = instrumental, SG = singular, PL = plural, M = masculine, F = feminine, N = neuter, REFL = reflexive, PF = perfective, IMPF = imperfective, nP = nominal phrase, NumP = number phrase, DP = determiner phrase, GNO = generic null objects, GEN = generic quantifier.

2 Previous Accounts

2.1 Rizzi (1986): GNO as pro_{arb}

The existence of null generic objects was systematically acknowledged for the first time by Luigi Rizzi in an article from 1986. Rizzi showed that generic null direct objects in Italian can control into infinitival clauses (2-a), bind anaphors (3-a), and count as subjects of small clauses, both argumental (4-a) and adjoined (4-b) small clauses. The parallel episodic sentences do not allow non-overt objects, as (2-b) and (3-b) confirm.

(2) Null direct objects in Italian as controllers

a. Un generale può costringere___ a [PRO obbedire ai suoi ordini].
a general can force to obey to.the his orders
'A general can force one to obey his orders.'

b. *Alle cinque il generale ha costretto___ a [PRO obbedire].
at five the general has forced to obey
'At five the general forced to obey.' Rizzi 1986:(9-c),(10-b)

(3) Null direct objects in Italian as anaphor binders

a. La buona musica riconcilia___ con se stessi.
the good music reconciles with oneself
'Good music reconciles one with oneself.'

b. *Il concerto di ieri ha riconciliato___ con se stessi.
the concert of yesterday has reconciled with oneself
'Yesterday's concert has reconciled with oneself.' Rizzi 1986:(11-a),(38-b)

(4) Null direct objects in Italian as small clause subjects

a. Questa musica rende___ allegri.
this music renders happy.PL
'This music renders one happy.'

b. Un dottore serio visita___ nudi.
a doctor serious visits nude.PL
'A serious doctor visits one nude.' Rizzi 1986:(16-a),(14-a)

Working in the framework of Government and Binding (Chomsky 1981), Rizzi analyzed GNO as pro_{arb}, i.e. [+pronominal, –anaphoric] empty categories. The subscript 'arb' stands for the features [+human, +generic, ±plural, default gender, default person], where the number feature is subject to parametrization in different languages; it happens to be [+plural] in Italian. (Rizzi assumed that the same set of features defines PRO_{arb} as well.) In addition, pro_{arb} is Case-marked and θ-marked by its licensing head V.

GNO are analyzed by Rizzi as [–anaphoric] because they do not need an antecedent and they are [+pronominal] because they can be referentially linked to another NP outside of their governing category, in this case to PRO_{arb}. The whole argument for GNO being a pronoun is thus based on examples like (5), where arb′ can (but does not have to) be coreferential with arb″.

(5) È difficile [$\text{PRO}_{\text{arb}'}$ sperare [che il governo possa autorizzare ___$_{\text{arb}''}$, a [PRO
is difficult hope that the government can authorize to
vivere così]]].
live like that
'It is difficult to hope that the government can authorize one to live like that.'
Two readings possible: arb′ = arb″; arb′ ≠ arb″ Rizzi 1986:(25-b)

2.2 Authier (1989, 1992a,b): GNO as A′-bound pro

Shortly after Rizzi, Jean-Marc Authier contributed to the debate about GNO by arguing that French has GNO of the same sorts as Italian, and that they should be semantically treated as variables which are subject to unselective binding by an overt or null adverb of quantification in the sense of Lewis (1975).

(6) a. D'habitude$_{\text{i}}$/*Null Adverb*$_{\text{i}}$ trop de choucroute rend [e]$_{\text{i}}$ obèse.
usually/___ much of sauerkraut makes obese.
b. For most x's, x a person, too much sauerkraut makes x obese.
Authier 1989:(42)

Authier (1989:47-54) provided several argument in support of the view of GNO as base-generated variables that get A′-bound. However, he didn't add much to the debate about GNO's syntactic composition, simply stating that they are null pronouns identified by an unselective operator, in the same way as empty categories identified by object clitics are understood to be pro (Jaeggli 1986). In contrast to Rizzi, he argues that A′-bound pro is Case-less so it is allowed only in languages which have optional accusative Case-assignment. According to Authier, the setting of this parameter follows from Pollock's 1989 strong vs. weak AGR-parameter.

2.3 Landau (2010): GNO as DPs or ϕ-sets

Idan Landau is the author of the most recent article which touches on the issue of GNO and their syntax. He distinguishes two types of null arguments:

1. **Strong implicit arguments**, such as PRO, Italian pro_{arb} (Rizzi 1986), or Chinese Topic-bound variables (Huang 1984). These arguments allow secondary predication and anaphoric binding and as such, they have to have a D-feature, i.e. they have to project the category of determiner. The reasoning behind this goes back to Longobardi (1994) who maintains that without a D-head, an NP argument cannot be mapped to a syntactic argument, and thus saturate a syntactic predicate.

2. **Weak implicit arguments**, such as agents of passives or implicit experiencers. These arguments cannot be secondarily predicated about and do not bind reflexives, but they can act as controllers and trigger Conditions B and C effects. Landau analyzes these null arguments as not having a D-feature but as consisting of a set of ϕ-features. A hypothetical example of a weak implicit argument is given below.

(7) $[\![3rd, sg, F]\!]$ = a female x that is neither the speaker nor the addressee
Landau 2010:383

Even though Landau adopts Rizzi's analysis of GNO in Italian as pronouns, and therefore DPs, which could be interpreted along the lines of Authier (1989), he admits that non-D implicit arguments can be interpreted as bound by a sentence-level generic operator as well. Therefore, in Landau's system, the generic semantics of an implicit argument does not give any clue as to what such argument's syntax should be.

In what follows, I show that Landau's typology is a rather arbitrarily posited system which is unable to capture the syntactic properties of generic implicit arguments. I come to the conclusion that GNO in Czech are not represented by "sets of ϕ features", let alone DPs, even though they can function as reflexive binders or subjects of argument small clauses.

3 Arguments for Syntactic Representation

3.1 GNO as Obligatory Controllers

On a par with Italian and French, Czech has generic null objects which can control subjects of infinitival clauses. In (8-a), GNO controls the subjects of the non-finite clause 'to come to classes on time'; in (8-b), GNO's overt counterpart *člověk* shows the same behavior. Another example of GNO as a controller is in (9).

(8) a. Šikovný učitel přiměje___$_i$ [PRO$_i$ chodit na hodinu včas].
skilled teacher makes go to class on time
'A skilled teacher makes one come to classes on time.'
b. Šikovný učitel přiměje člověka$_i$ [PRO$_i$ chodit na hodinu včas].
skilled teacher makes human.ACC go to class on time
'A skilled teacher makes one come to classes on time.'

(9) Ošemetný vnitřní hlas někdy navádí___$_i$ [PRO$_i$ nepřiznat se k vině a
tricky inner voice sometimes incites not-admit.REFL to guilt and
PRO tiše čekat, jak vše dopadne].
quietly wait how everything falls
'A tricky inner voice sometimes incites one not to admit one's guilt but to quietly wait how everything turns out.'

Using the participation in control as a support for the syntactic representation goes back to Bach's generalization (Bach 1979), the term due to Bresnan (1982:418): "where the object of a verb is an obligatory controller, intransitivization is impossible." It should capture the fact that the direct cannot be omitted in the case of object control, as in (10-b), but it can be omitted under subject control, as in (10-a).

(10) a. Louise$_i$ promised (Tom) [PRO$_i$ to be on time].
b. Louise taught *(Tom$_i$) [PRO$_i$ to smoke].

The contrast between English and other languages in (11) then lead Rizzi and Authier to take it as evidence for the existence of null generic arguments in Italian and French, but their

non-existence in English. Notice that Czech behaves like Italian and French in this respect.

(11) a. English: *Ambition leads___ [PRO to make mistakes].
b. Italian: L'ambizione spinge___ a [PRO commettere errori].
c. French: L'ambition amène___ à [PRO commettre des erreurs].
d. Czech: Ambice nutí___ [PRO dělat chyby].

Nevertheless, it should be mentioned that the subsequent generative literature came up with arguments against using obligatory control as evidence for syntacticity, see especially Chierchia 1989 and Wurmbrand 2002 for analyzing obligatory control as a lexical/semantic relation; see Landau 2010 for arguing against such a view.

3.2 GNO as Binders for Condition A

Another syntacticity test used in the literature, probably more reliable than the one from obligatory control, is based on the null argument's ability to bind reflexives. Czech GNO can bind anaphoric elements both directly within the same clause, as in (12) and (13), or indirectly via controlled PRO, as in (14).[2] In the following examples, the grammatical gender of the finite clause subject is purposedly different from the gender value of the reflexive *sebou samým*, because it excludes the possibility of its subject orientation.

(12) Ani ta nejlepší ochranka neochrání___$_i$ před sebou$_i$ samým.
neither the best security.NOM.SG.F not-protects.PF before self alone.INST.SG.M
'Not even the best security guard protects one from oneself.'

(13) Naše centrum nabízí speciální seance, které usmiřují___$_i$
our center offers special sessions.NOM.PL.F which.NOM.PL.F reconcile.IMPF
se sebou$_i$ samým.
with self alone.INST.SG.M
'Our center offers special sessions which reconcile one with oneself.'

(14) Nepříznivé okolnosti mohou někdy svádět___$_i$ [PRO$_i$ nebrat ohled
unfavorable circs.NOM.PL.F can sometimes tempt.IMPF not-take regard
na ostatní a PRO$_i$ starat se jenom o sebe$_i$ (samého)].
for others and care.REFL only about self alone.ACC.SG.M
'Unfavorable circumstances sometimes tempt one not to consider others and care only about oneself.'

The need for a structural representation of a null antecedent follows from the ungrammaticality of a sentence which lacks such an antecedent, as in (43).

(15) *Ani ta nejlepší ochranka$_j$ neochrání sebe$_i$ samého.
neither the best security.NOM.SG.F not-protects.PF self alone.ACC.SG.M
'Not even the best security protects himself.'

[2]Note that if GNO can control and PRO can bind, the argument for the syntactic representation of GNO based on examples like (14) reduces to the argument from control presented in the previous section.

3.3 GNO as Small Clause Subjects

Another strong argument for the syntactic presence of Czech GNO is that they can serve as subjects of secondary predication in argumental small clauses, as exemplified below.

3.3.1 Argument Small Clauses

(16) Taková politická témata nemohou nechat ___ chladným.
such political topics.NOM not-can let.PF cold.INST
'Such political issues cannot leave one cold.'

(17) Pravidelné požívání marihuany dělá___ otupělým.
regular consumption.NOM marijuana.GEN makes.IMPF dull.INST
'Regular consumption of marijuana makes one dull.'

3.3.2 Adjunct Small Clauses

On the other hand, Czech GNO cannot become subjects of adjoined secondary predicates, which is something Italian GNO can do, as was shown in (4-b). The reason is that the surface form of such modification is analyzed as a substantivized adjective in Czech, and not as a modified null noun. As can be seen in (18), the adjective doesn't express the property that the internal argument has while undergoing the event expressed by the main clause but the property that it has regardless of the event it is involved in.

(18) Ten doktor vyšetřuje lidi nahé. × Ten doktor vyšetřuje nahé.
this doctor examines people naked.ACC.PL × this doctor examines naked.ACC.PL
'This doctor examines people naked, i.e. while they are naked.' × 'This doctor examines naked ones, i.e. people who are naked.'

Interestingly, GNO in French cannot function as subjects of adjunct small clauses either (Authier 1989:fn.1). In (19-a), *nu* can only modify the subject *un docteur*. The same is true for Czech, providing the adjective's case and ϕ-features agree with those of the subject.

(19) a. Un docteur sérieux examine nu.
'A serious doctor examines nude.'
b. Správný doktor vyšetřuje nahý.
right doctor.NOM.SG.M examines naked.NOM.SG.M
'A right doctor examines naked, i.e. while being himself naked.'

Regardless of this single difference between Italian on one side, and French and Czech on the other, the data exemplified so far provide already enough support for acknowledging the syntactic status of Czech GNO. What exactly constitutes GNO as syntactic creatures will be the matter of Section 5.

4 Towards the Semantic Analysis of GNO

Before discussing the details of the internal structure of GNO, I make a short detour into their semantics, because it has some important consequences for their syntax as well.

4.1 GNO as Variables

It was mentioned already in 2.2 that for Authier, GNO are generated as free variables which get bound by an unselective operator. He provides several tests (on French data) to show that GNO really behave like operator-bound variables. Perhaps the strongest one is that in sentences with multiple quantifiers, one of which is a generic adverb quantifying a null object, we can get scope-ambiguity. For example, a Czech equative sentence in (20) has the interpretation that there is something that always pushes one to break the rules (which can be schematically captured as ∃ scoping over ∀), but it has also the interpretation where the universal scopes over the existential: for one, there is always something that pushes him to break the rules. Since May (1977), such ambiguity is standardly treated as a result of Quantifier Raising at LF.

(20) a. Na téhle základně (pořád) něco nutí___ porušovat pravidla, i
at this base always something forces.IMPF break rules even
když uvnitř chce být člověk spořádaný.
if inside wants be human orderly
'At this base, something always pushes one to break the rules even if one wants to be orderly inside.'

b. ∃x [thing(x) ∧ ∀y [person(y) → x pushes y to break the rules even if y wants to be orderly]]

c. ∀y [person(y) → ∃x [thing(x) ∧ x pushes y to break the rules even if y wants to be orderly]].

Moreover, in the so-called equative sentences with two occurrences of GNO, the two objects have to have the same reference. So in (21), any given arbitrary person that is calmed by a therapy has to be the same arbitrary person who gets balanced by that therapy.

(21) Terapie, která uklidňuje___, je terapie, která dělá___ vyrovnaným.
therapy which calms is therapy which makes balanced
'A therapy which calms one is a therapy which makes one balanced.'

This restriction on the interpretation of empty elements in equative structures was first noticed by Lebeaux (1984) for arbitrary PROs. Lebeaux analyzes such PROs as "linked" by being bound by a single null quantifier. Authier concludes the same has to be true for GNO.

(22) Linked PRO reference

a. PRO to know him is PRO to love him. Lebeaux 1984:(17-d)

b. ∀x [[PRO_x to know him] is [PRO_x to love him]]

4.2 GNO as Variables Bound by GEN

Even though the main Authier's insight that GNO are variables bound by a sentence-level non-overt adverb-like operator holds, Krifka *et al.* (1995) concluded that the null generic operator cannot be really unselective, but it takes two formulas as arguments: a restrictive term and a nuclear scope (a.k.a. matrix). Stemming from the works of Kamp (1981) and Heim (1982), Krifka *et al.*'s original formula is as follows:

(23) Q[x_1, …, x_i; y_1, …, y_i] (Restrictor [x_1, …, x_i]; Matrix[{x_1}, …, {x_i}, y_1, …, y_i])
where Q is a quantifier, x_1, …, x_i are the variables to be bound by Q, and y_1, …, y_i are the variables to be bound existentially within the nuclear scope

One of the advantages of the dyadicity of the generic quantifier is that it allows one to capture the ambiguity of the famous hurricane-sentence from Carlson 1989:

(24) Hurricanes arise in this part of the Pacific.
Reading 1: GEN[x;y](x are hurricanes; y is this part of the Pacific & x arise in y)
Reading 2: GEN[x;y](x is this part of the Pacific; y are hurricanes & y arise in x)

Another important aspect of GEN-operator is that it can quantify not only over individual variables, but also over situation variables (modeled after Kratzer's 1995 spatiotemporal location). This essentially corresponds to a sentence being habitual, cf. "habitual sentences express generalizations over situations that are specified by the corresponding episodic verbal predicate" (Krifka *et al.* 1995:32). For example, a sentence in (25-a) has GEN quantifying over a situation variable s as captured in (25-b).

(25) a. Mary smokes when she comes home.
b. GEN[s,x;](x = Mary & x comes home in s; x smokes in s)
Krifka *et al.* 1995:(53)

In (25-a), the restricting situation is expressed by a *when*-clause, but very often, it is not specified overtly, as with the habitually interpreted verb *smoke* in (26-a):

(26) a. Mary smokes.
b. GEN[s,x;](x = Mary & s is a normal situation wrt. smoking & s contains x; x smokes in s) Krifka *et al.* 1995:(54)

Krifka *et al.* (1995) do not explicitly discuss GNO, but if we applied their generic operator to capture the meaning of a sentence with GNO, we'd get something like (27-b), where GNO is interpreted as a variable y bound by GEN, and restricted by the predicate "person" (I am using a more contemporary notation than Krifka *et al.*, taken from Dayal 2011:1091).

(27) a. Mozartova hudba rozveseluje___.
'Mozart's music cheers one up.'
b. GENx,y,s [R(x, Mozart's music$^{k}_{s}$), person$_s$(y), y is listening to x in s] [x cheers up y in s]
where s is the situation index, k is a kind, and R is the realization relation which relates kinds to their instances[3]

This analysis has at least two benefits. By systematically accounting for the generic interpretation of null objects, it eliminates the need for the feature [+generic], somewhat arbitrarily posited by Rizzi (1986). Note that the existence of a silent GEN-operator would

[3]I follow the neo-Carlsonian approach (Carlson 1989, Chierchia 1998, Dayal 2004), in treating bare plurals and mass terms (such as *Mozart's music*) as kind-denoting. When they combine with object-level predicates as in (27-a), the predicates access their instantiation sets via R.

have to be posited anyways, regardless of the existence of GNO, in order to account for the interpretation of overt generically interpreted expressions. And by generically quantifying over the situation variable s, it also explains why the sentences with GNO always have generic time reference, i.e. why they are always interpreted habitually. This is clearly visible in Czech, where imperfective verbs are in principle ambiguous between an ongoing, progressive-like interpretation, and a habitual interpretation. So a sentence like *Karel čte noviny* 'Charles reads.IMPF newspaper' can mean either 'Charles is reading a newspaper' or 'Charles habitually reads newspapers'. But the sentences with an imperfective verb and a null generic argument allow only the latter, habitual interpretation:

(28) a. Dobrý policajt chrání ___ / lidi před fyzickým i psychickým
good policeman protects.IMPF people from physical and psychical
terorem.
terror
'A good policeman protects one/people from both physical and psychical terror.'

b. Právě teď tam jeden policajt chrání (*___) / lidi před partou
right now there one policeman protects people from group
teroristů.
terrorists
'There is a policeman protecting *one/some people from a group of terrorists right now.'

5 Syntactic Features of GNO

After establishing the syntactic reality of GNO in Section 3, and the general semantic representation of sentences involving GNO in Section 4, we can now delve into the intricacies of their syntactic composition. I do not intentionally say "syntactic structure" because we shall see there is not much structure to them after all. A Slavic language with rich inflection such as Czech is particularly convenient for undergoing such a research task in the area of non-overt constituents because in Czech, ϕ-features are overtly morphologically marked not only on nouns and pronouns themselves but also on adjectives and verbs that agree with them.

5.1 Gender

5.1.1 Data and Generalization

In sentences where GNO function as controllers or A-binders, we can see GNO's gender reflected on regular adjectives predicated of GNO via PRO, as in (29), and on reflexive adjectives *sám, samý* bound by GNO within the same clause, as in (30), or outside of the embedded non-finite clause, as in (31).[4]

[4]Czech has a three-way gender system, with masculine, feminine and neuter gender values. I do not consider adjectives with neuter endings in the discussion to follow, but in a (highly uncommon) context where the generalization was meant to apply to a group of human-like entities whose names have neuter gender, typically some personified animal offsprings, neuter agreement would be allowed as well, next to the pragmatically unmarked masculine gender:

(29) Taková zkušenost naučí___$_i$ [PRO$_i$ zůstat klidn-ý/$^{C\#}$klidn-á].
such experience teaches stay calm-NOM.SG.M/calm-NOM.SG.F
'Such experience will teach one to stay calm.'

(30) Ani ti nejlepší bodyguardi neochrání___$_i$ před sebou$_i$ sam-ým /
neither the best bodyguards not-protect.PF from self alone-INST.SG.M /
$^{C\#}$sebou$_i$ sam-ou.
self alone-INST.SG.F
'Not even the best bodyguards protect one from oneself.'

(31) Kázání toho mnicha přimějí___$_i$ [PRO$_i$ uvidět sebe$_i$ sam-a /
preaching that monk urge see self alone-ACC.SG.M /
$^{C\#}$sebe$_i$ sam-u v pravém světle].
self alone-ACC.SG.F in right light
'Preaching of that monk urges one to see oneself truthfully.'

The adjectives bound by or predicated of GNO can always have masculine gender, which is semantically and pragmatically neutral in the sense that it refers to both male and female entities. However, feminine gender is not completely ruled out either. In the contexts where the generalization is meant to apply exclusively to women, GNO can be marked feminine – while masculine is also still possible. I mark this by the superscripted "C#" in the examples. If we set up the context and the content of the sentence such that the generalization applies to female beings only, as for example in (32), the semantic markedness of feminine gender goes away.

(32) Náš nový lak na nehty učí___$_i$ [PRO$_i$ vážit si sebe$_i$ sam-ého /
our new polish for nails teaches esteem self alone-GEN.SG.M /
sebe$_i$ sam-é].
self alone-GEN.SG.F
'Our new nail polish teaches one to respect oneself.'

GNO seem to exhibit what is usually called "natural gender", when the grammatical gender of an expression corresponds to the biological gender of its referent. Wechsler and Zlatić (2000:803) describe natural gender as the situation when the gender features "correlate directly with referential anchoring conditions". For example, any time a noun *boy* is used referentially, it must not only be anchored to a young male human, but its index has to have the feature [Gender:Masc], which forces all other elements that share its index, such as bound pronouns, to have the masculine form as well, cf. *The boy absented himself/*herself*; see also Percus (2011). However, the term natural gender covers a rather broad range of phenomena. In the following section, I explore to what extent natural gender is grammaticalized in Czech.

(i) Já jsem malé prasátk-o a říkám vám, že taková zkušenost naučí___$_i$ [PRO$_i$ zůstat za
I am little piglet-NOM.SG.N and say you that such experience teaches stay in
všech okolností klidn-ý / klidn-é].
all circumstances calm-NOM.SG.M / calm-NOM.SG.N
'I'm a little piglet and I'm telling you that such experience teaches one to stay calm under any circumstances.'

5.1.2 Gender Marking of Czech Overt Nouns

I assume that gender features are located on the categorizing head called "little n" (Ferrari 2005; Kihm 2005; Lowenstamm 2008; Kramer 2009, 2014; Hammerly this volume), which gives them an important role as markers of nominalization. This assumption stems from a highly influential view in morphosyntax that nouns start the derivation as category-neutral roots which combine with the nominal-category-assigning head n (and possibly some other categorizing heads before that), see esp. the works of Marantz (1997, 2001) and Arad (2003, 2005). Marantz (2001, 2007) contends that the first categorizing head that attaches to a root is a phase head and all phonological and semantic idiosyncrasies, previously deferred to the lexicon, are limited to this "first phase" of syntax. All other derivations above the first category-determining node should follow the regular principles of syntactic composition.

In order to understand how gender is valued in the case of Czech GNO, we need to make a quick detour into the typology of Czech nouns when it comes to their derivation. Typically, nouns consisting only of a root and an inflectional ending have idiosyncratic gender (I call such nouns "root nouns"). For example, a root noun with the inflectional ending *-e* can be either masculine or feminine or neuter, depending on the root itself.

(33) moř-e – růž-e – soudc-e
sea-NOM.SG.N – rose-NOM.SG.F – judge-NOM.SG.M
'a sea' – 'a rose' – 'a judge'

I am not concerned here with the exact mechanism of gender valuation of root nouns, but see Embick 2000 and Embick and Noyer 2007, where it is postulated that roots can be equipped with selectional features/class diacritics that ensure their insertion in the appropriate syntactic environment; see Acquaviva 2009 for an opposing view. My hypothesis is that the Vocabulary Items for these roots span both the root and the n-head with a valued gender feature, so they are in a sense idiomatized.

On the other hand, if a noun has an overt nominalizing suffix attaching to a root (or to another derivational suffix), its grammatical gender is determined by that particular suffix. For example, nouns with the suffix *-dlo* are always neuter, nouns with the suffix *-ost* are always (grammatically) feminine.

(34) mý-dl-o – hloup-ost-∅
wash-DL-NOM.SG.N – dull-OST-NOM.SG.F
'a soap' – 'dullness'

Within the latter group, of overtly derived nominals, there are nouns denoting in the human domain only, typically names of professions or names of people with certain characteristic property. They are based on neutral roots that can be embedded within a verbal or an adjectival structure as well and are formed by suffixes such as *-tel*, *-ař*, *-ák*, *-ant*, etc. They are grammatically masculine and can refer to both males and females. If the feminine suffix (esp. *-k-a*) is attached to them, they denote exclusively in the domain of female individuals.

(35) a. uči-tel-∅ – uči-tel-k-a
teach-er-NOM.SG.M – teach-er-K-NOM.SG.F
'a teacher' – 'a female teacher'

b. stav-ař-∅ – stav-ař-k-a
build-er-NOM.SG.M – build-er-K-NOM.SG.F
'a builder' – 'a female builder'
c. chytr-ák-∅ – chytr-ač-k-a
smart-AK-NOM.SG.M – smart-AK-K-NOM.SG.F
'a smart man/person' – 'a smart woman'
d. muzik-ant-∅ – muzik-ant-k-a
music-ian-NOM.SG.M – music-ian-K-NOM.SG.F
'a musician' – 'a female musician'

According to Alexiadou (2004), the distinction between nouns with inherently specified gender, which can denote both humans and non-humans, and nouns with gender reflecting the biological sex is present in every language. Alexiadou explicates it in more detail on the gender systems of Italian, Spanish, Greek and Hebrew; Wechsler and Zlatić (2003) draw attention to the parallel distinction in Serbo-Croatian where they describe it as the opposition of lexical (intrinsic) versus semantic (sex-based) gender.

My assumption is that the nominalizing suffixes of the nouns in (35) spell-out their n-node and that they bear an interpretable gender feature (iGender). If the value of this feature is specified as [Masc], the noun can refer to both masculine and feminine individuals; if it is specified as [Fem], the noun denotes feminine entities only (see Percus 2011:179 for suggesting a concrete syntactic and semantic mechanism in which the combination of the feminine suffix with the rest of the structure is achieved).

It is important to understand that the interpretable gender feature on the suffix, not the suffix itself, brings about the noun's denotation in the human domain. The suffixes above can be used to derive names of non-human entities as well. I assume that in those cases, they are associated with the uninterpretable version of gender (see Kramer 2009, 2014 for arguing that both types of gender features, interpretable and uninterpretable ones, can be present in a single language). As expected, such nouns do not allow the formation of a female-denoting counterpart, even if the femininizing suffix itself can be attached, as e.g. in (36-c):

(36) a. ukaza-tel-∅ – *ukaza-tel-k-a
show-TEL-NOM.SG.M – show-TEL-K-NOM.SG.F
'a sign'
b. podběr-ák-∅ – *podběr-ač-k-a
gather-AK-NOM.SG.M – gather-AK-K-NOM.SG.F
'a landing net'
c. na-běr-ák-∅ – naběr-ač-k-a
on-gather-AK-NOM.SG.M – on-gather-AK-K-NOM.SG.F
'a gathering tool' – 'a soup scoop'

5.1.3 Interpretability of Gender on GNO

The previous section revealed that GNO are not unique in their gender-related behavior and that there is in fact a group of overt nouns in Czech, namely nouns derived from category-neutral roots by nominalizing suffixes with an interpretable gender feature, which have exactly the same behavior: their unmarked form is masculine and it can refer to human-

like entities of both sexes, but they can be also marked as feminine, in which case they refer to women only. The only difference between these overt nouns and GNO is that GNO's n-head or "nominalizing suffix" is not overt, presumably because there is no (overt) root that it would attach to.

There are two formal ways to capture the interpretable gender feature on n. If we analyzed it as a binary feature, the semantically unmarked, masculine form would be [iGender:–Fem] and the marked form would be [iGender:+Fem]. In the hierarchical feature geometry system (Harley and Ritter 2002, a.o.), [iGender:Masc] could be viewed as the unmarked node with no dependent, receiving the default interpretation and morphologically expressed as masculine; [iGender:Fem] would be treated as its dependent, daughter node, as captured in (37).[5]

(37) iGender
|
(Fem)

The semantics of an n-node bearing one of the interpretable gender features but no other lexical semantics could be formalized as in (38). Note that this denotation fits into the generally accepted view of bare nPs as property-denoting. For simplicity, I label the interpretable gender values as [iMasc] and [iFem]. It allows me to remain neutral as to whether a binary or a privative feature system is theoretically superior. (In the privative system, [iMasc] would be restated as [iGender]; in the binary system, it would correspond to [iGender:–Fem].)

(38) a. $[\![\text{[iMasc]}]\!] = \lambda x \lambda s[\text{person}(x,s)]$
b. $[\![\text{[iFem]}]\!] = \lambda x \lambda s[\text{feminine}(x,s)]$

5.1.4 "Human-ness" of GNO

The approach to the syntax and semantics of GNO sketched so far has one important theoretical advantage over Rizzi's proposal: the fact that GNO denote human beings does not have to be stipulated because it follows from the interpretation of their gender feature.[6] In the semantic representation of a sentence with GNO, such as the one given in (27-b), the only semantic content contributed by the null object was the property "person", restricting the generically quantified object variable. This arbitrarily posited property can now be replaced with whatever is the meaning of an n-head with valued iGender. In (38), I suggested that, it is precisely the property of being "person" for [iGender:Masc], and the property of being "feminine" for [iGender:Fem].

That the interpretable gender feature on n reflects something else than the biological gender/sex is confirmed by the fact that names of animals are not productively derived by nominalizing gender-specific suffixes in Czech. Note that animals can be male or female, but they cannot be (masculine or feminine) personas. Names of animals in Czech are typically

[5]The semantic unmarkedness of masculine gender has to be distinguished from grammatical/morphological defaultness, cf. Sauerland (2008). Morphologically default gender in Czech is neuter, which arises if there is no gender specification at all, as e.g. in the case of impersonal passives or loanwords into Czech with uncommon endings which cannot fit into the Czech declension system.

[6]Both Authier (op.c.) and Landau (op.c.) gloss over GNO's humanness and simply take it as a fact so Rizzi (op.c.) is the only scholar having any proposal related to this issue in the literature on GNO.

root nominals whose grammatical gender is determined by their lexical properties. Even if there are sex-neutral animal names, denoting both male and female entities, they are attested with either a masculine or a feminine grammatical gender. This is quite different from the situation attested for GNO and for the nouns in (35), where only the masculine grammatical gender was associated with semantic neutrality.[7]

(39) lišk-a, opic-e vs. pes-∅, kůň-∅
fox-NOM.SG.F, monkey-NOM.SG.F dog-NOM.SG.M, horse-NOM.SG.M
'a fox (M or F), a monkey (M or F)' vs. 'a dog (M or F), a horse (M or F)'

Another advantage of deriving the "lexical semantics" of GNO from their interpretable gender feature is that it allows us to include in their denotation personified entities and other human-like creatures, which we also perceive as "personas" (with masculine or feminine characteristics), but which we hesitate to label as members of the human kind, i.e. as [+human]. For example, in the hypothetical context where someone is asked to make a report on the effects of Mozart's music on various creatures on different planets, the sentence such as (40) is perfectly acceptable. Interestingly, the parallel observation was made by Safir (2000:10) for generic *one* in English and it was extended by Moltmann (2006:259) to arbitrary PRO – even though both of these are traditionally associated with [+human] feature as well.

(40) Zjistili jsme, že Mozartova hudba dokáže rozveselit___ i na planetách, kam
found out that Mozart's music can cheer up.PF even on planets where
lidé dosud nevkročili a které obývají pouze mimozemšťané.
people so far not-entered and which inhabit only extraterrestrials
'We found out that Mozart's music can cheer one up also on the planets which people never entered and which are inhabited solely by extraterrestrials.'

The parallel sentence with no personifiable object in (41) is not felicitous, unless we add some extra assumptions about the context:

(41) #Zjistili jsme, že Mozartova hudba dokáže rozveselit___ i na planetách, kam
found out that Mozart's music can cheer up.PF even on planets where
lidé dosud nevkročili a kde jsou pouze kameny.
people so far not-entered and where are only stones
'We found out that Mozart's music can cheer one up also on the planets which people never entered and where there are only stones.'

In the same fashion, it is completely acceptable for Pooh to tell Eeyore who is sad:

(42) Poslechni si Mozartovu hudbu, ta rozveseluje___.
Listen Mozart's music it cheers up.IMPF
'Listen to Mozart's music, it cheers one up.'

[7]By saying this, I do not want to imply that there aren't any regularities in the domain of grammatical gender of animal names whatsoever. For example, it is well known that all nouns denoting exclusively male animate individuals are grammatically masculine, while all nouns denoting exclusively female animate individuals are grammatically feminine; for a formal analysis of this fact in terms of presuppositional semantics for gender features see Percus 2011.

5.2 Number

5.2.1 Data and Generalization

The data on number specification of GNO as reflected on agreement markers are much more blurred than the data on gender discussed in the previous section. Adjectives predicated of GNO as well as reflexives bound by GNO have usually a singular ending. However, plural endings are allowed to a limited extent as well, with varying degree of acceptability for different speakers and in different contexts.[8]

(43) Ani nejlepší ochrank-a neochrání___$_i$ před sebou$_i$ samý-m /
neither best security-NOM.SG.F not-protects before self alone-INST.SG.M /
??sebou$_i$ samým-i.
self alone-INST.PL
'Not even the best security guard protects one from oneself.'

(44) Tahle speciální meditac-e usmiřuje___$_i$ se sebou$_i$ samý-m /
this special meditation-NOM.SG.F reconciles with self alone-INST.SG.M /
??sebou$_i$ samý-mi.
self alone-INST.PL
'This special meditation reconciles one with oneself.'

(45) Každá přežitá nehoda dělá___ ostražitější-m / ??ostražitější-mi.
every survived accident makes more alert-INST.PL.M / more alert-INST.PL
'Each survived accident makes one more alert.'

The use of the singular versus plural form in the examples above is not associated with a major difference meaning, which is the case for overt generically quantified objects as well, as shown in (46).

(46) Současný systém student-a / student-y zotročuje.
current system student-ACC.SG.M / student-ACC.PL.M enslaves.
'Students are/the student is enslaved by the current system.'

I assume that the plural noun in (46) is interpreted as a generically quantified kind-denoting bare plural; the shift from kinds to properties is enabled by accessing the kind's instantiation set (Chierchia 1998; Dayal 2004). On the other hand, the singular noun ranges over entities in the taxonomic domain, which are not transparent with respect to their instantiation sets (Dayal 2004).

What is not explained is why the plural form is degraded for GNO when it is equally acceptable for overt generic objects. All of the examples in (43), (44), and (45) could take an

[8]Since plural adjectival forms are homophonous for masculine and feminine gender in all but nominative case in Czech, gender specification is omitted for plurals in the examples below because there is no way to determine it.

Also note that the reflexive pronoun *sebe* 'self' is not itself overtly marked for number – its forms are homophonous in singular and plural for all morphological cases. However, since the adjective *samý* 'alone' is in concord with this pronoun and it is overtly marked for number, I assume it gets its number value from the pronoun.

overt singular or an overt plural generic object with no difference in grammatical acceptability and with roughly the same meaning:

(47) Ani nejlepší ochrank-a neochrání člověk-a$_i$ před
neither best security-NOM.SG.F not-protects human-ACC.SG before
sebou$_i$ samý-m / lid-i$_i$ před sebou$_i$ samým-i.
self alone-INST.SG.M / people-ACC.PL before self alone-INST.PL
'Not even the best security guard protects one/people from oneself/themselves.'

(48) Tahle speciální meditac-e usmiřuje člověk-a$_i$ se
this special meditation-NOM.SG.F reconciles human-ACC.SG with
sebou$_i$ samý-m / lid-i$_i$ se sebou$_i$ samý-mi.
self alone-INST.SG.M / people-ACC.PL with self alone-INST.PL
'This special meditation reconciles one/people with oneself/themselves.'

(49) Každá přežitá nehoda dělá člověk-a ostražitější-m /
every survived accident makes human-ACC.SG more alert-INST.PL.M /
lid-i ostražitější-mi.
people-ACC.PL more alert-INST.PL
'Each survived accident makes one/people more alert.'

If the semantics of a verbs and/or the presence of a reciprocal requires a plural object, as in (50), the structure with GNO is slightly degraded, but not ungrammatical.

(50) ?Taková propaganda jenom znesvářuje___$_i$ mezi sebou$_i$ navzájem.
such propaganda just disunites between selves mutually
'Such propaganda just disunites people among themselves.'

Note that such structure would not be grammatical with an overt singular generic noun *člověk* and it would require a noun in plural.

(51) Taková propaganda jenom znesvářuje *člověk-a$_i$ / lid-i$_i$ mezi
such propaganda just disunites human-ACC.SG / people-ACC.PL between
sebou$_i$ navzájem.
selves mutually
'Such propaganda just disunites one/people among themselves.'

In general, verbs whose lexical semantics requires a plural or a collective theme can combine with GNO without problems.

(52) Společné nebezpečí dokáže spojit___ (dohromady).
collective danger can unite together
'A collective danger can unite people/population (together).'

Even though the data presented in this section are somewhat hard to grasp, they point towards the following conlusions: (1) GNO cannot be specified for singular and plural number values as overt nouns are. If they were, we would expect both number values to be equally acceptable in the contexts such as those in (43) through (45), where overt nouns can be either

singular or plural. (2) GNO cannot be assigned one number value as a default, as e.g. mass nouns in English, cf. Chierchia 2010:136 who assumes that mass nouns in English "receive a semantically void, 'default' singular morphological marking" since the semantic function associated with singular and plural number marking, checking the atomicity of a property denoted by nP, is not applicable to them. If GNO behaved like mass nouns in this respect, it would lead to the appearance of a default, presumably singular number on all elements agreeing with GNO, and to the ill-formedness of clauses which require grammatically plural objects, such as the one in (50). Moreover, we would expect plural endings on agreement markers to be completely ungrammatical in the contexts which allow direct objects in both singular or plural, which is not the case either.

For both of these reasons, I assume that GNO do not have the number category at all, i.e. they do not project NumP where number value is specified. (That number features are generated on a separate functional projections was proposed by many authors; see Ritter 1991, Carstens 1991, Panagiotidis 2000, Borer 2005.) This allows GNO to avoid the semantic distinction between singular and plural objects in generic statements, described in relation to (46), and to receive the generic interpretation from a direct GEN-quantification of a variable introduced by a property-denoting n, cf. (27-b). It also leads to ambivalence when it comes to number-marking on agreeing adjectives, since both values, singular as well as plural, are at play. While I do not have a principled account of how the number value is determined for the adjectives in the examples (43) through (45), I suppose that it is a result of some form of a partial pragmatic agreement, which can be employed for a feature even if grammatical (index-based) agreement cannot.

5.2.2 Missing NumP and GNO's Case-Assignment

Another, indirect support for the fact that GNO do not project the category of number is based on the examples with GNO as small clause subjects, cf. 3.3.1. In (53), there is a sharp contrast between GNO and its overt counterpart, a generically interpreted noun *člověk*, when it comes to case agreement. While GNO is compatible only with idiosyncratic instrumental case on the adjective that is predicated of it, the overt noun allows the predicate to agree with it in case.[9]

(53) a. Na tyhle prášky pozor, dělají__ otupěl-ým / *otupěl-ého
of these pills beware make dull-INST.SG.M/dull-ACC.SG.M
'Beware of these pills, they make one dull.'

b. Na tyhle prášky pozor, dělají člověk-a
of these pills beware make human-ACC.SG.M
otupěl-ým / %otupěl-ého
dull-INST.SG.M/dull-ACC.SG.M
'Beware of these pills, they make one dull.'

It is often assumed that case is a property of DPs (Danon 2006). The morphological support for this claim comes from the observation that case inflection is primarily visible

[9]The accusative form is marked with '%' because there are some Czech speakers who find it unacceptable. Most speakers perceive it as an acceptable, though a bit less preferred alternative to the instrumental form.

on D-elements, such as articles, pronouns or clitics (Landau 2010:381). However, such assumption is problematic in article-less languages like Czech where the presence of a DP-layer in nominals was disputed on syntactic grounds (Bošković 2008; Despić 2009; Despić 2011; Bošković 2012), and where possessives and demonstratives can be analyzed as modifiers of a lower functional projection than the DP. Moreover, the semantic reason for the presence of a DP in nominal projections, which saw D as a precondition for their argumenthood (Longobardi 1994), disappeared in the light of the research on kind terms (Chierchia 1998) and definitely interpreted bare nouns in article-less languages like Hindi or Russian (Dayal 2004).

On the other hand, there are still reasons to analyze case features as features that are visible at the level of the maximal extended projection of the nominal (Preminger 2011:159) and that cannot be assigned to a bare nP. Under the assumption that case features are located in a separate functional projection KaseP (Bittner and Hale 1996) and that overt nominals have at least the categorial heads Num and n, KaseP has to be the topmost nominal functional category which – if no DP is present – merges (at least) with NumP. For the idea from pre-DP-hypothesis time that arguments have to be specified as NumPs, see Rizzi 1986:543. Also note that even for Chierchia (1998) and Dayal (2004), who argue that bare nouns can function as arguments, the number of such nominal phrases has to be specified because the type-shifting operations are sensitive to its [Sg/Pl] value. Even though Chierchia and Dayal speak about determinerless argument NPs, what they actually mean are determinerless argument NumPs, once we work with a more articulated nominal functional structure where number is given its own functional projection.

That case-marking is sensitive to number-specification as well as to gender-specification of nouns follows from the existence of the functional sequence [KP [NumP [nP]]], accompanied by the assumption that K agrees in ϕ-features with Num and n, and morphological case is then spelled-out on the K-head. This can be formally achieved in the feature valuation system based on downward probing Agree (Chomsky 2000; Pesetsky and Torrego 2007), where different ϕ-features can probe independently of each other. That valued number is a precondition for case-assignment is clearly visible in Slavic languages like Czech where each grammatical number has its own case declension paradigm; moreover, case is expressed by inflectional endings which synthetically express number and gender as well. Simply put, there is no way for a noun to get case without having a number feature. (I suppose that this is a language-specific parameter rather than a universal principle, given the existence of number neutral nouns in languages like Japanese or Malagasy.) Importantly, if KaseP always selects (at least) NumP in Czech and GNO do not project NumP, as suggested above, GNO's inability to be assigned case follows.

An alternative view of case assignment, which nevertheless corroborates the dependency of case on number, is presented in Embick and Noyer 2007. These authors analyze case features as purely morphological features, inserted at PF and not contained in syntax proper. They focus on the declension system in Latin, which has six different cases for each number, pretty much on a par with the declension system in Czech, which has seven cases for each number. Since in Latin (as well as in Czech), case and number are realized in the same position, Embick and Noyer (2007:308) propose that case features are inserted directly to the Num node which also contains the feature [±Plural]. When a vocabulary items for a particular case marker is inserted, it spells-out the case features and the number feature

altogether. If the number feature was not present in Num, the vocabulary item for case marker could not be inserted since it cannot have more features than the node it is inserted to. In other words, the dependence of case on number in languages like Latin follows from the non-existence of Num-spelling vocabulary items that are underspecified for number value.

While it is in theory possible that there are null nouns which are marked for case, the opposite case, overt nouns without morphological case, is inconceivable in Czech. For all overt nouns, having a morphological form is inseparable from belonging to a certain declension paradigm and expressing morphological case, cf. Franks and Pereltsvaig (2004). So null nouns are presumably the only ones that can "afford" not to have case in Czech.

5.3 Person

Person features are standardly located in the D-head, but there is a controversy in the literature as to which specific features constitute what is traditionally called the grammatical category of "person". Some scholars maintain that only first and second person features, i.e. just the features [Author] and [Participant] can be present in D, with third person pronouns being truly underspecified for person, thus giving rise to the morphological default (Harley and Ritter 2002, Panagiotidis 2002, Adger and Harbour 2007, to name a few). On the other hand, Nevins (2007) argues that the view of third person as non-person cannot be maintained if we want to account for the morphological effects of the Person-Case Constraint. He concludes that a binary system of person features has to be used, rather than a privative one:

(54) 1st person = [+Author, +Participant]
2nd person = [–Author, +Participant]
3rd person = [–Author, –Participant]

While this debate pertains mainly to pronouns, it is assumed that nouns, i.e. nPs do not have any person features themselves. But they can take them on, presumably when they merge with person-specified D, cf. *I linguist*, *you linguists* (Panagiotidis 2002).

The interpretation of GNO suggests that they involve all three persons semantically. Not only that they range over person-like beings, usually restricted by the context in some way, but the speaker and the addressee are always implied to be among those beings. That's why GNO are especially common in headlines and advertisements which aim to (1) give an impression of a statement verified by its author, and (2) to appeal (and apply) to the reader/listener. The same sort of involvement of the semantic speaker and addressee is attested for English generic *one* and arbitrary PRO; Moltmann (2006, 2010) analyzes the special relation of *one* and PRO_{arb} to the first person in the philosophical sense within the Simulation Theory as "generalizing detached self-reference", roughly corresponding to "putting oneself into the shoes of anyone meeting relevant conditions".

One way to show that the first and second person referents are in the denotation of GNO is through the exceptions to generic statements. It is known that generic quantification allows for exceptions. If the speaker and the addressee can constitute such exceptions, they have to be among the entities that the generalization applies to in the first place. The data from Czech confirm that they are.

(55) Jógová cvičení sice uklidňují___, ale já jsem výjimka, mě neuklidňují.
yoga exercises indeed calm.IMPF but I am exception me not-calm
'Indeed, yoga exercises calm one, but I am an exception, they don't calm me.'

(56) Jógová cvičení sice uklidní___, ale ty jsi výjimka, tebe neuklidní.
yoga exercises indeed calm.PF but you are exception you not-calm
'Indeed, yoga exercises make one calm, but you are an exception, they don't make you calm.'

Note that if we replace GNO with another generic noun that does not range over the speaker/addressee, the same exception is infelicitous. For example, if the speaker is a female in her thirties, the following generalization does not make sense.

(57) #Jógová cvičení sice staré lidi / starého člověka uklidňují___, ale já jsem
yoga exercises indeed old people / old human calm.IMPF but I am
výjimka, mě neuklidňují.
exception me not-calm
'Indeed, yoga exercises calm old people / the old man, but I am an exception, they don't calm me.'

However, if the speaker/addressee have the property that makes them qualify for the set of entities that the generic quantifier ranges over, they can represent an exception from the general rule once again. For example, it is ok for the author of this article to say:

(58) Debaty o pravopise generativního lingvistu / generativní lingvisty
debates about orthography generative linguist / generative linguists
nezajímají, ale já jsem výjimka, mě zajímají.
not-interest but I am exception me interest
'Debates about orthography do not interest the generative linguist / generative linguists, but I am an exception, they interest me.'

These examples confirm that GNO behave much like other generically interpreted nouns when it comes to the first and second person semantics. The main difference is that GNO always range over the speaker and the hearer, while all other nouns range over them only if the speaker and the hearer belong to the set of entities with the property P, where P is determined by the lexical semantics of the generically interpreted noun and restricts the range of GEN. This is because GNO are based on the conceptually broadest nPs, bearing only the "person semantics" of [iGender] discussed in 5.1.3, and the speaker/hearer are always personas, while they are not always P.

I suppose that the parallelism between GNO and other generically interpreted nouns reflects the fact that neither the former nor the latter are specified for either of the three grammatical person features in (54), which is what allows these nouns to denote all three persons semantically. It is worth mentioning that according to Nevins (2007), something similar is true for impersonals: they can refer to any person specification, even though pragmatics usually prefers one.

(59) Interpretive possibilities for impersonal pronouns (Nevins 2007:307)
[+P, +A] ⋃ [+P, –A] ⋃ [–P, –A]

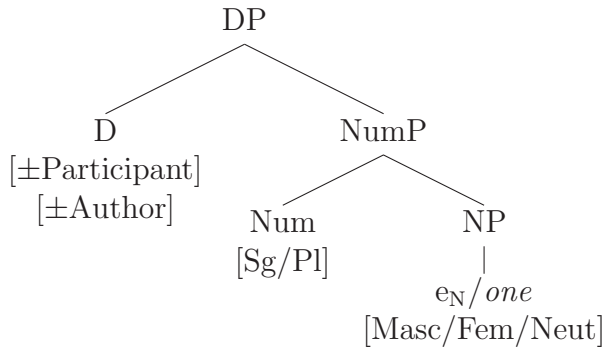
Although Nevins leaves the details of implementation of this insight for future research, he suggests that impersonals are truly underspecified for [±Participant, ±Author] person features since they are compatible with both [+] and [–] values for each of these features, i.e. they bear all feature specifications simultaneously. The same is true for GNO, modulo their interpretable gender, which forces them to denote in the human-like domain. We saw above that GNO can refer to any member from the union of the speaker, the addressee, and everyone else, i.e. none of the possible combinations of [±Participant, ±Author] is applicable to GNO in itself. This conclusion is independently supported by the missing evidence for the D-projection in GNO, where person features are assumed to be generated, cf. 5.2.2.

6 Conclusion: GNO as Pronominal Nominals

Examining one-by-one the syntactic features standardly associated with the extended nominal projection, I arrived at the following: GNO have an interpretable gender feature, on a par with human-denoting nouns productively derived by nominalizing suffixes, but there does not seem to be any evidence that GNO have number and person features and that they can get case. I explain this as a result of missing number and determiner projections in GNO's syntactic structure.

Getting back to the claim by Rizzi (1986) with which I started this paper, about GNO being syntactically pronouns, we can safely conclude that the only thing which GNO and regular pronouns have in common – and which regular nouns do not have – is their conceptual emptiness. Neither GNO, nor other pronouns have a concept-denoting, descriptive root.

(60) Structural template of pronouns
(following Postal 1969)



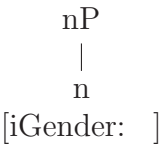
In the linguistic tradition following Postal (1969), and contra intransitive determiners of Abney (1987), pronouns are assumed to contain an abstract, null or overt noun in their structure, in addition to the determiner and possibly other functional projections. It is marked as e/*one* in (60). This noun is empty in the sense that it does not denote any concept, and it bears only the categorial N feature and one of the gender features. It is precisely this non-descriptiveness or non-predicativeness what makes a pronoun truly pro-nominal, being able to stand for other nominals whose N is descriptive and does denote some property (Panagiotidis 2002).

In the line of the morphosyntactic research that I am pursuing here, see esp. 5.1.2, categorial and gender features are separated from a concept-denoting root. Consequently, there is no more need for a "conceptually empty noun in the lexicon", postulated by Panagiotidis, op.c., bearing only an N feature and a gender feature. The function of such a categorizer and

a gender-bearer is fulfilled by an n-node with a valued gender feature; see also Panagiotidis 2011.

I argued in 5.1 that such a node is present inside GNO, and since I also determined that no other functional category merges with it, it is the only node that constitutes GNO.

(61) Shortage of structure in GNO
(Note that in the theory of bare phrase structure, there is no difference between nP and n in the tree on the right and they correspond to a single node.)



If we translated Postal's pronominal template in (60) into the current morphosyntactic theory based on acategorial roots, regular pronouns would be made up of D, Num and n heads. GNO thus have the status of conceptually empty "pronominal nouns" or "pro-nPs" present inside every pronoun, rather than being full-fledged pronouns. This conclusion gets an independent support from several other research projects; see especially the work of Déchaine and Wiltschko (2002, 2003) who argue that pronouns can be DPs, ϕPs or NPs.

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Non-canonical Noun Incorporation in Bzhedug Adyghe

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1 Introduction

Noun incorporation (NI), i.e. the formation of a new verbal form by combining a verb and a noun into a single phonological word, has been the focus of much discussion among linguists.[1] Some researchers argue that it is done in the lexicon (Mithun 1984), others have claimed that it must be treated as a syntactic process (Sadock 1980; Baker 1988 and subsequent work). This paper addresses NI in the Bzhedug dialect of Adyghe, a polysynthetic language from the Northwest Caucasian family. Unlike many well-known polysynthetic languages, Adyghe does not have productive verbal NI; however, arguments may be incorporated into the predicate if it is nominalized (1).

(1) a. hạče-me s-ja-že
guest-PL.OBL 1SG.ABS-3PL.IO+DAT-wait
'I'm waiting for guests'.

b. sjezeš'əʁ [**heč'e**-je-ženə-m]
1SG.ABS.tire.PST guest-DAT-wait-OBL
'I'm tired of waiting for guests (lit. guest-waiting)'.

One of the widely assumed properties of NI is that it targets only the Patient or Theme of the predicate, both in finite predication (Baker 2009:154) and nominalized constructions (Koptjevskaja-Tamm 1993:99–102). In this paper I present data that appears to challenge this generalization and show that it is in fact a phenomenon separate from what has been canonically understood to be argument incorporation. NI in Adyghe, while governed by the argument structure of the nominalized predication, is morphosyntactically a nominal process. The restrictions imposed on this process inform us on Adyghe clause structure and the size of the nominalized construction. Underlyingly, arguments are hierarchically arranged in accordance with their level of agentivity, with the more agentive argument positioned higher; this supports the widely established hypothesis that the agent is an argument external to the VP (Kratzer 1996), but is not readily obvious within Adyghe grammar. The incorporation

*The data was collected in Aul Neshukay (Teuchezhsky District, Republic of Adygea, Russia) in July 2014. Examples are in the Bzhedug dialect, unless otherwise noted. I am grateful to the speakers of Adyghe for their generous help, Greg Kobele, Maria Polinsky, Yuri Lander, the audience at BLS'41, and especially Karlos Arregi for discussion, comments and criticism. All mistakes are mine.

[1]Abbreviations: ABS – absolutive, ADV – adverbial, BEN – benefactive, CAUS – causative, COM – comitative, DAT – dative, DIR – directive, ERG – ergative, IMP – imperative, INF – infinitive, INTR – intransitive, IO – indirect object, IPF – imperfect, NEG – negation, NML – nominalizer, OBL – oblique, PL – plural, POSS – possessive, PR – possessor, PRS – past, REFL – reflexive.
Transcription notes: č = t͡ʃ, š = ʃ, ž = ʒ, ʒ = d͡z, ǯ = d͡ʒ, ŝ = laminal voiceless fricative, ẑ = laminal voiced fricative, Ç = glottalized consonant, C' = palatalized consonant.

data provides evidence for a "passive" structure of nominalizations, where the nominalizing morpheme cuts off the external argument.

The rest of the paper is organized as follows: section 2 provides a short overview of Adyghe clause structure and the polysynthetic verbal form, as well as general information on nominalizations; in section 3 I present the incorporation data; section 4 contains my analysis of nominalized constructions and NI in Adyghe; section 5 concludes.

2 Background on Adyghe

In this section I provide general information on Adyghe clausal and nominal structure, focusing on polysynthesis and case-marking patterns, as well as the basic morphosyntax of nominalized constructions.

2.1 Polysynthesis

A notable typological trait of Adyghe is prominent polysynthesis, i.e. radical head-marking of syntactic relations both in the verbal and nominal domain. All participants of a predication are indexed on the verb, and a single predicate constitutes a full clause; thus, in (2) we can see five participants: absolutive first person, ergative third person plural and three indirect objects introduced by their respective applicative heads.

(2) [sə]-qə-[t-de]-[p-fə]-[∅-r]-[a]-ʁa-ʒeš'təʁ
[1SG.ABS]-DIR-[1PL.IO-COM]-[2SG.IO-BEN]-[3SG.IO-DAT]-[3PL.ERG]-CAUS-read.IPF
'They were making me read it to you together with us' (Temirgoy; Letuchiy 2015)

Within a nominal phrase, the relation of possession is expressed on the nominal, and the full NP referring to the possessor is optional, analogous to NPs in a full clause:

(3) w-jə-wəne
2SG.PR-POSS-house
'your house' (Temirgoy; Gorbunova 2009:147)

Participants are marked with a set of personal markers which are uniform across syntactic roles and phonologically very similar to full pronominals (Table 1). Personal markers not associated with overt morphology are marked as ∅ in this section for illustrative purposes; they are left unmarked in the rest of the paper.

Indirect object markers are always associated with an overt applicative head; there is over a dozen of them in Adyghe. Some examples of these are the dative *(j)e-*, general locative *š'ə-*, the benefactive *fe-*, malefactive *ṣ̂ʷe-* and comitative *de-*. A predicate may have multiple applicative markers, example (2) contains three: the dative, comitative and benefactive.

Morphemes within the polysynthetic word are strictly ordered; a slightly simplified verbal template is shown in Table 2.

The nominal template is virtually identical; it contains all the same zones. In (4) we see the possessive marker, which belongs to the argument structure zone (A) preceding the marker of negation, a pre-base element (zone B), which in turn precedes all lexical roots (zone C).

	pronouns	ABS	IO / PR	ERG
1SG	se	sə-	s-	
1PL	te	tə-	t-	
2SG	we	wə-	w-//p-	
2PL	ŝʷe	ŝʷə-	ŝʷ-	
3SG	demonstratives	∅	∅	ə-//jə-
3PL		∅	a-	

Table 1: Cross-reference markers and pronouns (Arkadiev et al. 2009:45,56)

Argument structure zone (A)					**Pre-base elements (B)**
ABS	DIR	APPL	DAT	ERG	PRS / NEG
1	2	3	4	5	6

Base (C)				**Endings (D)**		
CAUS	root	APPL	TAM	PL	PRS	NEG, case
7	8	9	10	11	12	13

Table 2: Simplified verbal template (Arkadiev et al. 2009:42)

(4) [jə]$_A$-[mə]$_B$-[ʔeλəne-λaṗe]$_C$ aš' qəš'taʁ
POSS-NEG-ring-expensive he.OBL 3SG.ERG-take.PST
'He took someone else's expensive ring' (Lander 2014)

The strict morphological ordering is especially evident if a nominal is used predicatively. In (5) the causative morpheme is wedged in between the nominal possessive marker and the lexical root of the nominal, seemingly creating a contradiction between the ordering of morphological markers and their semantic and syntactic scope.

(5) [z-jə-z]$_A$-[ʁe]$_B$-[šə-nahəč̣'a-ʁ]$_C$
REFL.PR-POSS-1SG.ERG-CAUS-brother-younger-PST
'I made him my younger brother'. (Lander 2014)

While all participants of a predication are indexed on the verb, none of them may be incorporated into a finite predicate. Nominals, however, incorporate lexical roots: non-referential adjectives and nouns combine with the head noun into a complex word stem, as one can see in (4) and (5).

2.2 Ergativity

As can be seen in Table 2, the verbal personal markers are organized in accordance with ergative alignment: the direct object of a transitive verb, as well as the intransitive subject, is cross-referenced in the absolutive slot (slot 1 in Table 2), while the ergative is marked closer to the root, in slot 5.[2] Ergativity manifests itself in case-marking as well: the intransitive

[2]Personal markers in the polysynthetic verbal form display some traits which liken them to pronominal clitics, as proposed for such languages by Jelinek (1984). This is not directly relevant to the topic addressed in this paper; here I avoid the terms 'agreement' or 'cliticization' for the purposes of neutrality.

subject (6a) and the transitive direct object (6b) are marked with the absolutive case *-r*, while the transitive subject is marked with *-m* (6b).

(6) a. ç̣'ale-**r** ∅-qeŝe
boy-ABS 3SG.ABS-dance.PRS
'The boy is dancing'.

b. ẑʷaḳʷe-**m** qʷəbʁʷe-**r** ∅-ə-ẑʷaʁ
plowman-OBL field-ABS 3SG.ABS-3SG.ERG-plow.PST
'The plowman plowed the field'. (Temirgoy, Arkadiev et al. 2009:53)

The marker *-m* is glossed as oblique, rather than ergative, because it is not restricted to the ergative argument: it also marks all indirect objects introduced by applicatives (the comitative *ŝʷəzə* 'woman' in (7)), possessors (8) and complements of postpositions (9).[3]

(7) ƛ̣ə-**r** ŝʷəzə-**m** ∅-[∅-**d**]-eʔepəʔe
man-ABS woman-OBL 3SG.ABS-[3SG.IO-COM]-help.PRS
'The husband is helping the wife'.(Temirgoy; Arkadiev et al. 2009:53)

(8) ṣ̂enəʁe-**m** ∅-jə-mafe
knowledge-OBL 3SG.PR-POSS-day
'Knowledge Day (September 1)'

(9) haç̣'e-**me** apaje
guest-PL.OBL 3PL.for
'for the guests'

Both the absolutive and the oblique case markers may be dropped; overt case morphology correlates with definiteness/referentiality. Proper names, first and second person pronouns and possessed NPs are not marked with case (Arkadiev et al. 2009:51-52).

Several authors have argued that morphological ergativity correlates with syntactic ergativity, i.e. for a structure within which the ergative is lower than the absolutive (Lander to appear; Letuchiy 2010). The data presented in this paper does not directly challenge such claims, but presents evidence for a higher position of the ergative subject on the level of base-generation, supporting the underlying clause structure proposed by Caponigro and Polinsky (2011) for Adyghe.

2.3 Defining the word in Adyghe

Nominalization in Adyghe involves argument incorporation, i.e. the formation of a complex word by combining the nominalized verb and one of its arguments. To define incorporation in Adyghe one must first determine the markers of a word boundary. This section outlines the main diagnostics for defining the word in Adyghe, as provided in (Lander 2012).

There are two main parameters which allow to determine word boundaries:

1. Strict morphological organization of the word form (see section 2.1).

[3]The plural is marked by a separate morpheme *-xe*, but in the oblique the combination *-xe-m* 'PL-OBL' can be optionally replaced by a portmanteau morpheme *-me*, as in (9).

2. Phonological alternation in penultimate syllable of the stem, i.e. the full word, excluding endings (zone D in Table 2):

   (10) /e/ → /a/ | _Ce]$_C$
   If a foot contains two syllables of the form Ce, where C stands for one consonant or a two-consonant cluster, and is located at the right edge of the stem (zone C), the vowel in the first of the two syllables changes from /e/ to /a/ (Arkadiev et al. 2009:29)

This can be seen in the following examples. In (11a) the last (and only) two syllables of the stem (zone C) are of the form Ce, and thus the vowel in the penultimate syllable becomes /a/. In (11b), on the other hand, while the stem contains the sequence of the form CeCe, it is not located at the right edge of the stem, and thus no alternation takes place.

(11) a. [b**e**ǯe]$_C$-[r]$_D$ > b**a**ǯe-r
fox-ABS
'fox'

b. [b**e**ǯe-bə]$_C$ > b**e**ǯe-bə
fox-hole
'fox hole' (Temirgoy, Arkadiev et al. 2009:29)

In (11b) the root *beǯe* 'fox' is an incorporated modifier of the root *bə* 'hole'. Incorporation in nominalized constructions is largely analogous, as we will see in section 3.

In the following subsection I provide the basic information regarding the morphosyntax of nominalized constructions.

2.4 Nominalizations

This paper focuses on two types of nominalized constructions: the action nominal marked with the suffix *-n* (12) and the manner nominal marked with the suffix *-ç̌'e* (13). While semantically different, these constructions appear to exhibit identical morphosyntactic behavior, hence I use examples of both interchangeably and gloss both uniformly as 'NML'.

(12) [haç̌'e-xe-m ja-je-že-**n**] Zarine jəʔʷef
guest-PL-OBL 3PL.POSS-DAT-wait-NML Zarina POSS.work
'Waiting for guests is Zarina's task'.

(13) [w-jə-therqʷe-ʁeška-**ç̌'e**] səgʷə jeʁape
2SG.PR-POSS-pigeon-feed-NML 1SG.POSS.heart 3SG.ERG-worry.PRS
'Your manner of feeding pigeons irritates me'.

These constructions, while derived from predicates, have largely nominal morphosyntax. Absolutive and ergative personal markers are necessarily dropped, and indirect object markers are generally dropped as well. The nominalized verbs are modified by incorporated adjectives, as regular nominals, (14a) and, unlike regular predicates (14b), may not be modified by adverbs (14c).

(14) a. se sjəčʼ'as [**psənčʼ'e**-če-nə-r]
I 1SG.like.PRS fast-run-NML-ABS
'I like to run fast'.

b. se sjəčʼ'as [**psəčʼ'-ew** sə-čenew]
I 1SG.like.PRS fast-ADV 1SG.ABS-run.INF
'I like to run fast'.

c. * se s.jə.čʼ'as [**psəčʼ'-ew** če-nə-r]
I 1SG.like.PRS fast-ADV run-NML-ABS
Expected: 'I like to run fast'.

Nominalizations are not limited to sentential complement positions; they may surface in any nominal syntactic position, e.g. as the complement of a postposition:

(15) se stol t͡ʂə.ʁe [leʁe-ʁʷəš'əž'ə-nə-**m paj**]
I table 1SG.ERG.do.PST dish-dry-NML-OBL for
'I set the table for dish-drying'.

Like regular nominals, they may head a relative clause (16) and appear with demonstratives (17).

(16) [qeŝʷa-čʼ'-ew s-a-ʁeʂaʁe-m-re] se
dance-NML-ADV 1SG.ABS-3PL.ERG-teach.PST-OBL-and I
t͡ʂetəʁe-m-re λešew zetječ̣əx
1SG.ERG+know.IPF-OBL-and very differ.PL
'The manner of dancing which you were taught and the one I know are very different'.

(17) [**mə** w-jə-beʒe-wəčʼ'ə-n] zeč̣'erjə jezeš'əʁ
this 2SG.PR-POSS-fly-kill-NML all.ABS tire.PST
'Your killing of flies has annoyed everyone'.

The arguments of the nominalized predicates are remapped to positions appropriate for nominal modifiers: as incorporees or possessors. (18a) shows that the absolutive argument may be expressed as an incorporee, it may not retain absolutive case marking as in a finite clause (18b).

(18) a. [**leʁe**-thač̣'ə-nə-m] s-jezeš'əʁ
dish-wash-NML-OBL 1SG.ABS-tire.PST
'I'm tired of dish-washing'.

b. * [**laʁe-xe-r** thač̣'ə-nə-m] s-jezeš'əʁ
dish-PL-ABS wash-NML-OBL 1SG.ABS-tire.PST
Expected: 'I'm tired of dish-washing'.

A more detailed description of argument encoding, and particularly incorporation, is provided in the following section.

3 Noun incorporation

This section focuses on the morphosyntactic properties of argument incorporation in nominalized constructions. I show that this is indeed a case of incorporation, i.e. formation of a new word by combining a nominalized predicate with an argument, and continue to demonstrate that it is a nominal process, rather than verbal. I then offer data that shows that this phenomenon is nevertheless restricted by verbal argument structure.

3.1 Diagnostics for incorporation

In section 2.3 I outline the main diagnostics for determining word boundaries in Adyghe. This subsection is aimed to display that in nominalized constructions the incorporated argument forms a single word with the predicate based on these diagnostics.

Firstly, the incorporated nominal does not form its own stem for the phonological alternation presented in (10). (19a) shows that the penultimate syllable in the root *šekʷe* 'hunt' surfaces as /a/ in the right environment, i.e. when this root functions as an independent word; in (19b), where the corresponding nominal is incorporated into the nominalized predicate, the alternation no longer takes place.

(19) a. se səgʷə rjehə [š**a**ḳʷe] sə-ḳʷenew (< š**e**ḳʷe)
I 1SG.like.PRS hunt 1SG.ABS-go.INF
'I like to go hunting'.

b. se səgʷə rjehə [š**e**ḳʷe-ḳʷe-nə-r]
I 1SG.like.PRS hunt-go-NML-ABS
'I like to go hunting'.

Secondly, the incorporated root can be embedded in morphology relating to the full nominalized form. In (20) the second person possessive marker preceding the incorporated root *λeʁe* 'dish' refers to the full nominalized form, and not just to the nominal directly to the right; this is evident from the English translation.

(20) š'əʁetəž' [w-jə-[l**eʁe**-a-fe-thač'ə-č'e]]
stop.IMP 2SG.PR-POSS-dish-3PL.IO-BEN-wash-NML
'Stop washing other people's dishes!'

The morphosyntactic position of the root *leʁe* 'dish' indicates that it forms a single morphophonological unit with the nominalized predicate.

In the following subsection I show that NI in Adyghe, if treated as a case of argument incorporation in Baker's (1988) sense, challenges the generalization that this type of operation is only possible for the direct complement of the lexical verb, and consequently, existing accounts of this operation. In subsection 3.3 I proceed to show, however, that this phenomenon is not in fact the same, but can be explained as a nominal process.

3.2 Unrestricted noun incorporation

A widely documented cross-linguistic property of noun incorporation is that it only targets the Theme or direct object of the verb (Baker 2009:154). This has been claimed to be true for nominalized predicates as well (Koptjevskaja-Tamm 1993:99–102). Incorporation in Adyghe nominalizations appears to challenge this generalization.

In nominalized constructions, any argument may be incorporated: the direct object(20), the unaccusative (21) or unergative (28) subject, an applicative indirect object (22) and even the ergative subject (23), (24).[4]

(21) se stol t͡ʂəʁe [**leʁe**-ʁʷəš'əž'ə-nə-m paj]
I table 1SG.ERG.do.PST [dish]$_{SUBJ}$-dry.INTR-NML-OBL for
'I set the table for dish-drying'.

(22) se səgʷə rjehə [**ʔʷeŝhe**-tje-tə-nə-r]
I 1SG.like.PRS [hill]$_{IO}$-LOC-stand-NML-ABS
'I like standing on a hill'.

(23) [**beʒ'e**-zə-thač'ə-ç'e-r] ç'etəw-zə-thaç'e-m fed
[fox]$_{SUBJ}$-[REFL.ABS]$_{OBJ}$-wash-NML-ABS cat-REFL.ABS-wash-OBL like
'The fox's manner of washing itself is similar to the cat's'.

Furthemore, some speakers allow incorporation of more than one argument; in (24) the absolutive and ergative arguments are both expressed as incorporees.

(24) [**pŝeŝe-leʁe**-thaçə-ç'e-r] səgʷə rjehə
[girl]$_{SUBJ}$-[dish]$_{OBJ}$-wash-NML-ABS 1SG.like.PRS
'I like the girls' way of washing the dishes (as if there's a girls' type of dish-washing)'.

Some examples even seem to have a possessor and an incorporee referring to the same syntactic argument. Thus, in (25) and (26), both the incorporee and possessive phrase seem to represent the absolutive subject of the nominalized verb, and the ergative subject in (27).

(25) [**w-jə-beʒ'e**-š'xəpç̌ə-ç'e] s-jə-ʁe.rehatə.r.ep
[2SG.PR-POSS]$_{SUBJ}$-[fox]$_{SUBJ}$-smile-NML 1SG.ABS-3SG.ERG-calm.PRS.NEG
'Your fox-like grin disturbs me'.

(26) [**pšaše-m** **jə-ç'ele**-qe.ŝʷa-ç'e] ʁeŝeʁʷen
[girl-OBL]$_{SUBJ}$ POSS-[boy]$_{SUBJ}$-dance-NML interesting
'It's interesting when the girl does a male dance'.

[4]In this and following sections I label incorporated arguments and possessors with their corresponding syntactic roles in a finite clause, using the abbreviations SUBJ for intransitive subjects and transitive agents, IO for indirect objects and OBJ for direct objects. I use these terms for illustrative purposes solely, to distinguish these labels from morphological case in the nominalized constructions. The term 'subject' is particularly problematic for Adyghe, since it has been proposed that this language is syntactically ergative and the absolutive displays subjecthood properties (Letuchiy 2010; Lander to appear).

(27) [**a ç̣'ale-m jə-pŝeŝe-**ʒene-də-ç̣'e] šen zeç̣'jə
[that boy-OBL]$_{SUBJ}$ POSS-[girl]$_{SUBJ}$-[dress]$_{OBJ}$-sew-NML manner all
jeʁeš'zə
3SG.ERG-make.laugh.PRS
'That boy's girlish manner of sewing dresses makes everyone laugh'.

I claim that these peculiarly unrestricted patterns of incorporation do not necessarily constitute a counterexample to Baker (2009) and Koptjevskaja-Tamm's (1993) generalization. In the following section I argue that, while an argument is incorporated into the nominalized predicate in the sense that the two form a single morphophonological unit, this is not the same type of mechanism as described by Baker (1988), i.e. it does not involve Head Movement of the closest complement of the verb to its verbal head. The strange properties of this construction can be readily accounted for if it is addressed as a relation between a nominal and its syntactic dependents.

3.3 Noun incorporation is nominal

Several empirical facts appear to indicate that incorporation in nominalized constructions is a nominal, rather than verbal process.

One piece of evidence is the morphosyntactic position of the incorporated nominal: it attaches to the left of all verbal morphology, as opposed to next to the verbal stem or in the position where the corresponding personal marker would surface in a finite construction (Table 3).

POSS	incorporated argument(s)	verbal prefixes	verb root	verbal suffixes	nomin-alizer	nominal suffixes & endings

Table 3: Morphosyntactic position of incorporated noun

Thus, we can see in (28) that the nominal *adəɣe-pŝeŝe* 'Adyghe girl' appears to the left of the directive prefix, which, within the verbal template, can be preceded only by the absolutive personal marker.

(28) se səg^{w}ə rjehə [[adəɣe-pŝeŝe]-[qe]$_2$-ŝ^{w}e-nə-r]
I 1SG.like.PRS [Adyghe-girl]$_{ABS}$-DIR-dance-NML-ABS
'I like how Adyghe girls dance'.

Another argument for the nominal nature of argument incorporation in nominalizations is its striking similarities to incorporation of modifiers and nominal arguments into non-derived nouns. In (29) we can see that regular nominals may have several incorporees; for relational nouns the closest incorporee is interpreted as the argument or inherent possessor of that nominal (30), while the outer incorporee is interpreted freely. Multiple NI in nominalized constructions appears to follow the same pattern: in (24) the inner incorporee is interpreted as the patient, while the outer incorporee denotes a generic agent.

(29) [adəge-**heč'eḳʷeč'e**-swəret-xe-r] qjənəx
Adyghe-[**animal**]-picture-PL-ABS hard.PL
'Adyghe pictures of animals are hard' (Lander 2014)

(30) j-**ane**-š
POSS-[**mother**]-brother
'his uncle (mother's brother)' (Temirgoy; Lander 2015)

As expected for regular nominals, possessive phrases in nominalizations are interpreted freely, according to context: they can refer to any of the participants, including the direct object (31), or not an argument at all (32).

(31) [**laʁe-me** **ja**-thaǎə-n] se s-jezeš'əʁ
[dish-PL.OBL]$_{OBJ}$ 3PL.PR+POSS-wash-NML I 1SG.ABS-annoy.PST
'I'm tired of washing the dishes'.

(32) [**s-jə-č'ale-me** **ja**-pŝe-thaǎə-n] mafe-qes
[1SG-POSS-boy-PL.OBL]$_{POSS}$ 3PL.PR+POSS-[neck]$_{OBJ}$-wash-NML day-every
sə-ṗəλ
1SG.ABS-try
'Every day I wash the necks of my boys'.

In the following section I show that, as in relational nouns, the closest incorporee in nominalizations is structurally restricted, while any additional incorporees are freely interpreted nominal modifiers. Crucially, the data indicates that the choice of the closest incorporee is governed by underlying verbal structure, providing insights to how much verbal structure is encompassed by the nominalizer, and how much is omitted.

3.4 Incorporation driven by argument structure

While the previous sections might have created an illusion of chaos in the realm of argument incorporation, there is in fact a restriction regarding this process, which is summarized in (33).

(33) **Incorporation Hierarchy**: In a two-place predicate, the closest incorporee must be the less agentive argument.

This generalization holds for all types of two-place predicates: transitive with an ergative agent and absolutive patient (34), intransitive with an absolutive subject and indirect object introduced by an applicative (35) and so-called inverse verbs with the more agentive argument introduced by an applicative (36). Below I review each type of verb separately.

1. ERG > ABS: if a transitive predicate is nominalized, the absolutive must be incorporated first.

   The predicate *thaǎ'ə-* 'wash' is an example of a transitive two-place predicate: in (34a) it is used in a finite clause; the direct object *laʁexer* 'dishes' is in the absolutive, and the first person prefix on the predicate marks the ergative subject. In case this predicate is

nominalized, the absolutive argument must be the incorporee closer to the nominalized predicate. This can be seen in (34b), where the noun *leʁe* 'dish' is now incorporated into the predicate, and the ergative agent is expressed as a possessor; (34c) shows that the arguments may not be switched in position without a change in meaning, in this case rendering a nonsensical utterance.

(34) a. se deʁʷədedew laʁe-xe-r s-thaǯ'əʁe-x
I very good dish-PL-ABS 1SG.ERG-wash.PST-PL.ABS
'I washed the dishes thoroughly'.

b. [**pŝaŝe-m** **jə-leʁe**-thaǯ'ə-n] s-jezeš'əʁ
[girl-OBL]$_{SUBJ}$ POSS-[dish]$_{OBJ}$-wash-NML 1SG.ABS-tire.PST
'I'm tired of the girl's dish-washing'.

c. #[**laʁe-me** **ja-pŝeŝe**-thaǯ'ə-n] s-jezeš'əʁ
[dish-PL.OBL]$_{OBJ}$ 3PL.PR+POSS-[girl]$_{SUBJ}$-wash-NML 1SG.ABS-tire.PST
Expected: 'I'm tired of the girl's dish-washing'. ("Seems as if the dishes are washing the girl".)

2. ABS > APPL: if an intransitive predicate with an indirect object is nominalized, the indirect object must be incorporated first.

An example of such an intransitive two-place predicate is *feg*^{w}*əṩe-* 'congratulate'; in (35a) the one who carries out the action is marked in the absolutive and the addressee is marked with the oblique and introduced by the benefactive prefix on the predicate. In (35b) we can see that the incorporee that appears closer to the nominalized predicate is necessarily interpreted as the benefactive, i.e. the addressee.

(35) a. sabij-xe-r č'elejeʁaǯe-m fe-g^{w}əṩ^{w}aʁex
child-PL-ABS teacher-OBL BEN-congratulate.PST
'The children congratulated the teacher'.

b. [**pŝaŝe-me** **ja-č'ele**-fe-g^{w}ə.ŝ^{w}a-č'e] səg^{w}ə rjehə
[girl-OBL]$_{SUBJ}$ 3PL.PR+POSS-[boy]$_{IO}$-BEN-be.happy-NML 1SG.like.PRS
'I like how the girls congratulate the boys'.
*'I like how the boys congratulate the girls'.

3. APPL > ABS: if a two-place predicate that has an absolutive and applicative argument, where the applicative argument is more agentive, is nominalized, the absolutive argument must appear as the closest incorporee.

Inverse verbs in Adyghe constitute a small set of predicates, where the more agentive argument is introduced by an applicative prefix and carries oblique case, while the less agentive argument is marked as the absolutive (Arkadiev et al. 2009:64–65). One such predicate is *š'əʁ*^{w}*əpše-* 'forget': the experiencer is introduced by the locative applicative prefix and the stimulus is marked with the absolutive (36a). If this predicate

is nominalized, the closest incorporee is necessarily interpreted as the absolutive, i.e. the less agentive argument (36b).[5]

(36) a. ç̣'ale-m gʷəš'aʔe-xe-r zeç̣'e š'ə-ʁʷəpšaʁ
boy-OBL word-PL-ABS all LOC-forget.PST
'The boy forgot all the words'.

b. [**ç̣ale-me** **ja-nene**-š'ə-ʁʷəpša-ç̣'e]
[boy-PL.OBL]$_{EXP}$ 3PL.PR+POSS-[grandmother]$_{TH}$-LOC-forget-NML
səgʷə rjəhep
1SG.like.NEG
'I don't like how children forget their grandmothers'.
*'I don't like how grandmothers forget their children'.

The pattern of argument encoding displayed above for inverse predicates shows that the hierarchy in (33) is based on agentivity, and not surface argument encoding. Intransitive predicates with an indirect object, as in (35), and inverse predicates, as in (36), have identical argument structures on the surface: one absolutive and one applicative argument. However, we see that the restrictions on incorporation differ based on the agentivity of the participants. This means that the hierarchy is sensitive not to case-marking or surface positions, but to the semantic nature of the arguments.

When a two-place predicate is nominalized, one of the arguments can be dropped, including the less agentive one (37a). An additional structural restriction applies in these cases, however: the more agentive agrument is necessarily expressed as a possessor and cannot be incorporated; if incorporated, it coerces the interpretation of the less agentive argument (37b).

(37) a. λešew dejə [**nane-me** **ja**-š'ə-ʁʷəpše-n]
very bad [grandmother-PL.OBL]$_{EXP}$ 3PL.PR+POSS-LOC-forget-NML
'It's very bad, forgetfulness of grandmothers'.

b. λešew dejə [**nene**-š'ə-ʁʷəpše-nə-r]
very bad grandmother$_{TH}$-LOC-forget-NML-ABS
'It's very bad to forget grandmothers'.
*'It's very bad, forgetfulness of grandmothers'.

Along with the Incorporation Hierarchy summarized in (33), this data indicates that argument encoding in nominalizations is structurally constrained, and the constrains concern the closest incorporee, i.e. the less agentive argument. This can be accounted for in a straightforward way if we assume that the verbal argument structure is the driving force behind the restrictions. The following section outlines the analysis.

[5]Since it is particularly hard to assign the term 'subject' or 'object' to the arguments of this verb, I mark the applicative argument as EXP for Experiencer and the absolutive argument as TH for Theme.

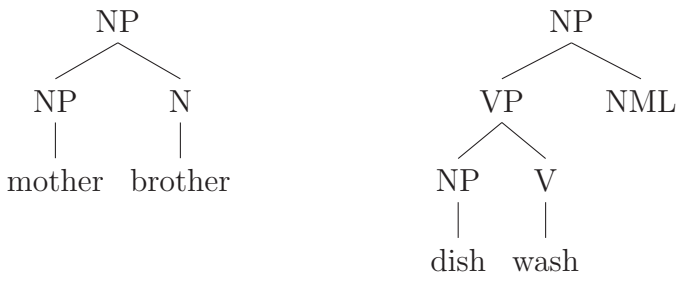

Figure 1: Parallel strutures of relational nouns and nominalizations

4 Analysis

This section aims to provide a unified analysis of the incorporation data presented in the previous section. As shown in section 3, NI in Adyghe nominalizations is, on the one hand, nominal, and on the other hand, restricted by verbal structure. In two-place predicates, the less agentive argument must appear as the closest incorporee, while the more agentive argument attaches as a possessor or outer incorporee. In such cases, the outer incorporee is interpreted as a generic agent (24) or an adjective of manner (27). The incorporee of unergative one-place predicates, such as *šʼxəpčə-* 'smile' and *qeŝʷe-* 'dance' receives an interpretation similar to the ergative incorporee: manner (25), (26) or generic agent (28).Thus, we see that the internal argument (direct object of transitive verbs and indirect object of intransitive verbs) is morphosyntactically restricted analogous to inherent possessors in underived nominals, while the external argument – ergative, absolutive or applicative in the case of inverse predicates – is interpreted analogous to general nominal modifiers. This asymmetry points toward a structure of nominalizations which contains only the internal argument and cuts off the external one, analogous to passive nominalizations described by Alexiadou (2001).

Figure 1 presents the simplified structure of the nominalized predicate from example (24) and parallels it to relational nouns which have an internal argument – the inherent possessor (30.[6]

The proposed structure provides evidence for the ergative and unergative agent, as well as the applicative in inverse predicates, being an argument external to VP. Furthermore, this argument must be structurally higher than indirect objects introduced by applicative prefixes, since, as we saw in section 3, these arguments are subject to the same structural restrictions as the absolutive direct object. This means that applicative arguments, unlike the agent, must be part of the nominalized structure. Figure 2 contains the basic clause structure for a transitive three-place predicate, where the part of the verbal structure excluded from the nominalization is colored gray.[7]

[6]I label the incorporated elements NP since they cannot include demonstratives, but may include adjectival modifiers or other incorporated elements.

[7]Working off the verbal template in Table 2, one might notice that morphology relating to the argument structure is prefixal, while temporal and aspectual morphemes attach as suffixes. Here, I assume that this correlates with the corresponding functional heads being left- or right- branching. The language has been

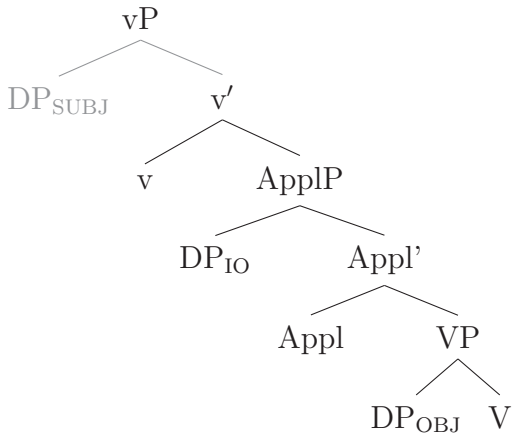

Figure 2: Basic transitive clause structure

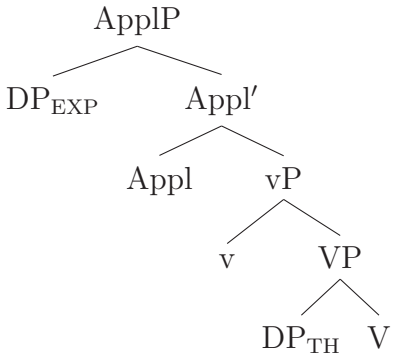

Figure 3: Structure of inverse predicates

In Figure 2 the only part of the tree that is shaded gray is the external argument. Since nominalized constructions can include overt realizations of *v*, such as the causative morpheme, I assume that the nominalizer behaves as a valency-reducing operator, rather than cutting *v* off completely.

The structure for two-place predicates with an absolutive subject and indirect object are virtually identical to Figure 2, except that V lacks a complement. Two-place inverse predicates include an applicative head above *v*, which strips the projection beneath it of its power to license the external argument, the same way as the nominalizer itself, and introduces an applicative (Figure 3).

Structurally, inverse predicates resemble passives, where a projection above *v*P strips the agentive head of its licensing power. In fact, a number of such verbs are the result of an agent-demoting operation. For example, the benefactive applicative prefix may carry habilitive semantics in a construction within which the ergative argument is deleted and replaced by an indirect object in the benefactive position. In (38a) the predicate *λeʁʷə-* 'see'

typologically labeled as left-branching, i.e. verb-final, so I assume a projection is right-headed, unless there is evidence to the contrary. Thus, in Figure 2, *v* and Appl appear to the left, since they are realized as prefixes, while VP is right-headed.

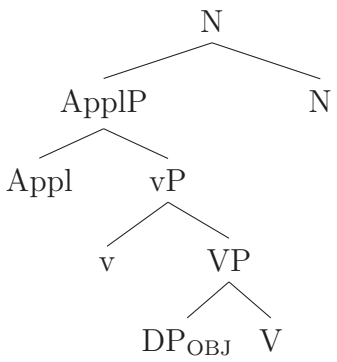

Figure 4: Nominalization of inverse predicate

has a third person plural ergative argument; in (38b), this marker is deleted and replaced by a benefactive, which in turn introduces the external argument.

(38) a. ҫ'ale-xe-m bukva-xe-r ∅-**a**-λeʁʷə-xe-r-ep
boy-PL-OBL letter-PL-ABS 3SG.ABS-3PL.ERG-see-PL.ABS-PRS-NEG
'The boys do not see the letters'.

b. ҫ'ale-xe-m bukva-xe-r ∅-[**a-fe**]-λeʁʷə-xe-r-ep
boy-PL-OBL letter-PL-ABS 3SG.ABS-[3PL.IO-BEN]-see-PL.ABS-PRS-NEG
'The boys cannot see the letters'. (Temirgoy; Letuchiy 2010)

When an inverse predicate is nominalized, the nominalizing projection selects for the higher ApplP, stripping Appl of the ability to license a specifier. The only argument that remains within the nominalization is the complement of V, which would have been marked as the absolutive in a finite clause (Figure 4). This is the argument that surfaces as the closest incorporee in the nominalization.[8]

The position of the nominalizing projection is further supported by restrictions on person marking in nominalized predicates: verbal indexing of the absolutive and ergative arguments is disallowed, while indirect object marking in front of the corresponding applicative is sometimes possible: for example, first person singular benefactive in (39) and third person plural dative in (40).

(39) səgʷə rjehə [w-jə-wered-qə-[**s-fe**]-ʔʷa-ҫ'e]
1SG.like.PRS 2SG.PR-POSS-song-DIR-[1SG.IO-BEN]-say-NML
'I like how you sing for me'.

(40) s-j-eʁegʷəmeҫ'ə qəweλeʔʷəre-m pepč
1SG.ABS-3SG.ERG-worry.PRS 2SG.IO.ask.PRS-OBL every
[w-jə-aχš'e-[**ja**]-tə-č'e]
2SG.PR-POSS-money-[3PL.IO+DAT]-give-NML
'I am worried about your manner of giving money to everyone who asks you'.

[8]The nominalizer attaches as a suffix and it thus mapped onto the tree as left-branching head.

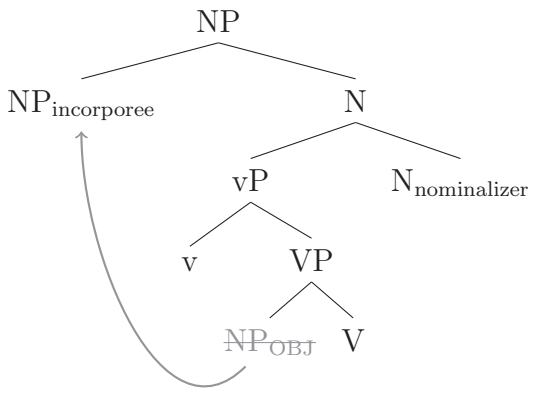

Figure 5: Movement analysis of incorporation

This can be accounted for if we assume an analysis within which the ergative and applicative arguments are licensed by their respective heads, and the absolutive is licensed by T. High licensing of the absolutive is supported by its linear position within the verbal form – on the leftmost edge. The nominalizing projection, as agent-demoting applicatives, strips *v* of its licensing power, and T is altogether cut off by the nominalizer, while the applicative head, on the other hand, remains within the nominalization.

The argument structure proposed here (with the ergative positioned higher than the absolutive) is supported by reflexive binding facts: the ergative binds the absolutive and not vice versa. In Adyghe, reflexivization is achieved by inserting a special reflexive morpheme in the morphological position of one of the coreferent arguments in the verb; in (41) we see that when the transitive predicate *λeʁʷə-* 'see' is reflexivized, the reflexive morpheme surfaces in the absolutive slot, while the ergative retains original personal marking.

(41) zeč̣'e c̣əf-xe-r **z-a**-λeʁʷə-ž'ə
all man-PL-ABS REFL.ABS-3PL.ERG-see-RE
'All the people see themselves'. **(ERG > ABS)** (Letuchiy 2010)

Thus, this analysis connects with other aspects of Adyghe morphosyntax.

Finally, we must address the nature of noun incorporation in Adyghe. Arguably, polysynthesis involves the spell-out of complex clause-level entities as a single morphophonological unit. Within the nominal domain, the requirement of single-word spell-out applies at the level of NP, and all lexical and non-lexical entities within this projection merge on the surface into a single word. Nominalizations, being a nominal structure, are subject to the same requirement.

A difficulty we need to account for is the position of the incorporated argument: it surfaces to the left of all verbal morphology, which means that it either moves out of its base-generated position within VP (Figure 5) or it merges outside of the nominalized projection and binds a null pronominal (PRO) within the verbal structure (Figure 6).

It is clear that the overt NP denoting the incorporated argument must be merged outside of the nominalized projection, but it is not clear which analysis is preferable. The analy-

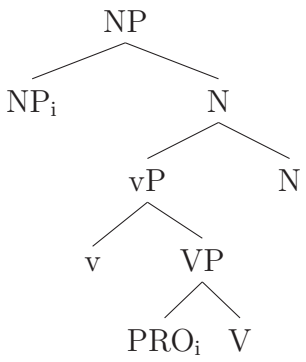

Figure 6: Analysis of incorporation with bound PRO

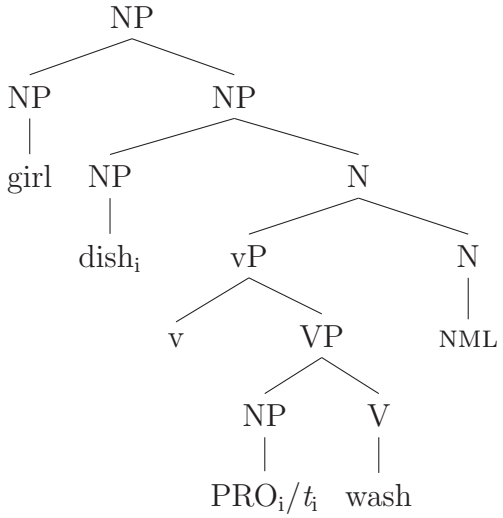

Figure 7: Structure of nominalized transitive predicate with outer incorporee

sis proposed in Figure 6 has been previously proposed for arguments within nominalized constructions (Yoon 1996; Coon 2010), but for subjects, rather than objects.

Within both analyses, outer incorporees and other modifiers attach as adjuncts to NP. Figure 7 reflects the structure of the nominalized predicate in (24), repeated in (42).

(42) pŝeŝe- leʁe- thaǰə -č̣'e
[girl]$_{\text{SUBJ}}$- [dish]$_{\text{OBJ}}$- wash -NML
'girls' way of washing dishes'

Possessive phrases attach to the NP and are assigned a loose possessive semantics ("free *R*" reading), which is then determined by context (Partee 1996). The most pragmatically salient interpretation of the possessor phrase is the unexpressed argument of the nominalized predicate; for example, in the nominalized construction from (34), repeated below in (43), the possessor is interpreted as the ergative subject. We know, however, that in the proper context, the possessor phrase need not denote the external argument (see (31) and (32)).

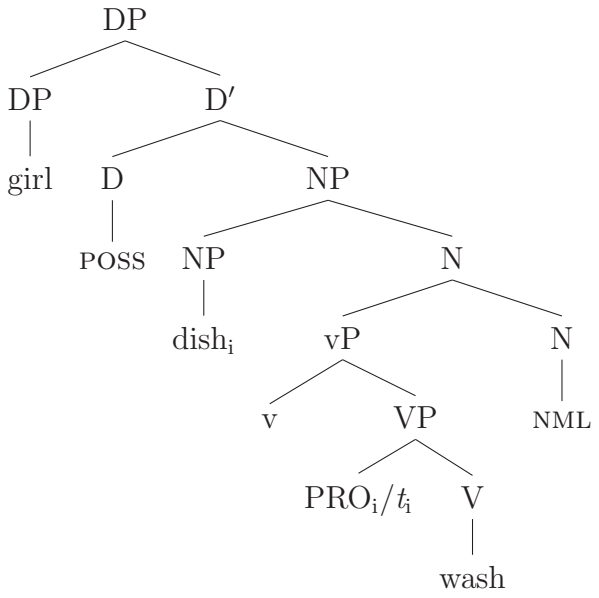

Figure 8: Structure of nominalized transitive predicate with possessor

(43) pŝaŝe-m jə- leʁe- thač'ə -n
[girl-OBL]$_{SUBJ}$ POSS- [dish]$_{OBJ}$- wash -NML
'the girl's dish-washing'

Figure 8 provides a rough structure for (43).[9]

The incorporee immediately adjacent to the nominalizer must be the internal argument; the external argument may not occupy this position (34c), (37b). Neither the movement, nor the binding analysis accounts for this restriction without extra machinery. To enforce this restriction, I propose that the internal argument (be it a movement trace or a null pronominal) must be bound by the closest c-commanding nominal phrase within a given domain, and the domain is NP. This means that in cases like (31), the NP denoting the internal argument moved out of its incorporated position to the Specifier of DP (Figure 9). This movement was driven by the restriction on referentiality: incorporated elements must be non-referential, i.e. no bigger than NP.

In a construction with no overt internal argument, such as (37a), repeated below in (44), the position of the closest incorporee is occupied by a null pronominal (Figure 10).

(44) nane-me ja- ∅- š'ə- ʁ^{w}əpše -n
[grandmother-PL.OBL]$_{EXP}$ 3PL.POSS- [*pro*]$_{TH}$ LOC- forget -NML
'forgetfulness of grandmothers'

Following this line of reasoning, the external argument interpretation of the incorporated nominal in (37b) is unavailable not for syntactic reason, since the external argument should be able to adjoin as a modifier above the incorporated *pro*, analogous to the agent in (24).

[9]For the purposes of this paper, I assume that the possessive morpheme on the nominalization is D; this might not be the correct analysis for Adyghe, considering that this morpheme has the same morphosyntactic properties as applicatives and may be present in predicates (5).

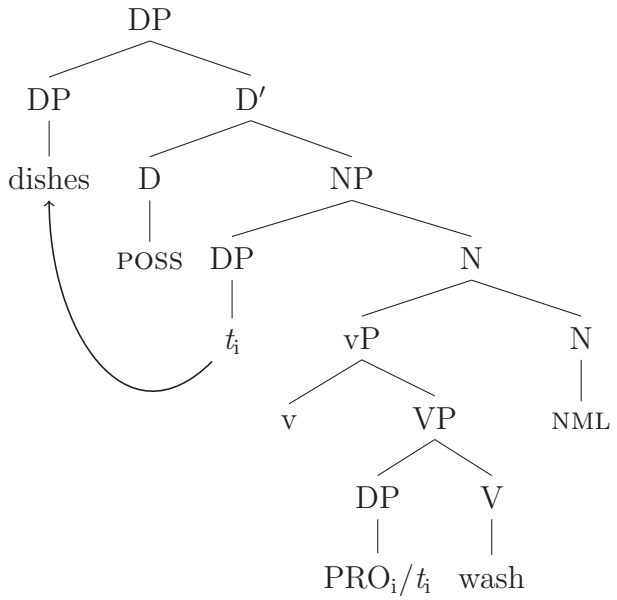

Figure 9: Movement of closest incorporee to possessor

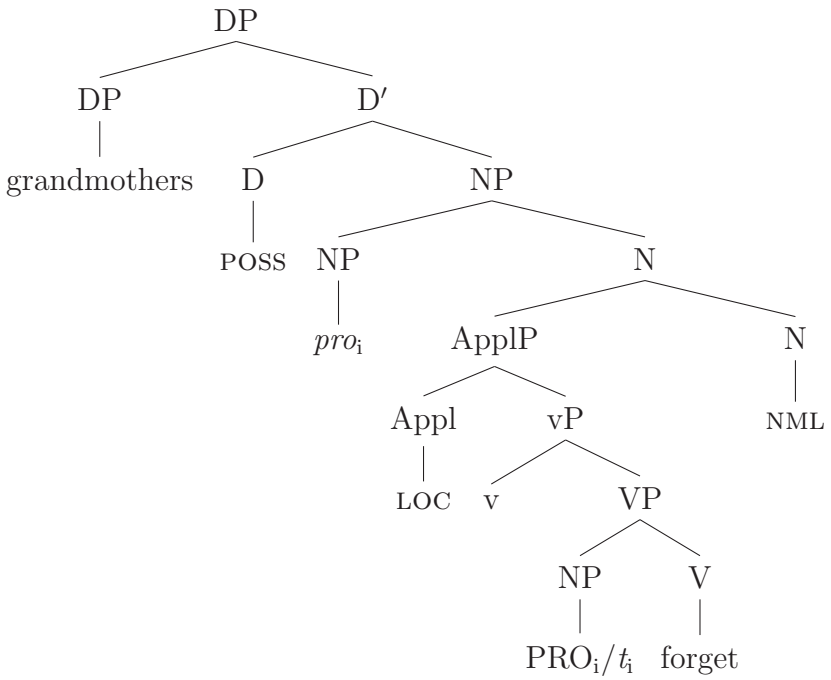

Figure 10: Structure of nominalized two-place predicate with no overt internal argument

I claim that this interpretation is unavailable due to a strong pragmatic bias to match the internal argument with an overt realization within the domain of NP.

I hope to have demonstrated how the patterns of NI in Adyghe nominalizations can be connected to the size of the nominalized construction (vP or ApplP in the case of inverse predicates) and general argument structure (the less agentive argument is internal to vP and thus included within the nominalization; the external argument is deleted).

5 Conclusion

Nominalizations in the Bzhedug dialect of Adyghe display a typologically unusual pattern of noun incorporation: in these constructions, any argument may be incorporated, including even the ergative subject. I show that this morphosyntactic process is not a direct challenge to existing theoretical accounts and is in fact driven by nominal, rather than verbal morphosyntax. Restrictions on argument incorporation in nominalized constructions point towards an argument structure within which the more agentive argument is introduced by an external head; the nominalizer selects for this head and strips it of its licensing power, acting as a valency-reducing operator.

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Perceptual distribution of merging phonemes

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1 Introduction

This study seeks to map the perceptual vowel space of front vowel phonemes undergoing merger before voiced velars in Pacific Northwest English (PNWE). In production, most speakers spectrally merge /ɛg, eg/ at a point between their non-prevelar counterparts /ɛ, e/, but the height of /æg/ is more variable. With variable production in the speech community, a question of perception arises: do Northwesterners maintain the same category boundaries for prevelar front vowels as non-prevelars, or are the prevelars merged in perception as they often are in production? This study addresses the question by mapping the perceptual space of front vowels in prevelar vs. precoronal contexts. Stimuli were created to synthesize an initial /b/ followed by 24 front-vowel formant value combinations (F1, F2) with no offglide or coda transitions. Twenty Northwestern subjects were told that each stimulus was the first part of a word that had been cut off in the middle, and they indicated which word they heard with a button press. In the first three blocks of randomized stimuli presentation, the word choices were in the shape /b_d/: *bad, bid, bayed, bed, bead*; the second three blocks used the same randomly-presented stimuli (unbeknownst to subjects), but the word choices were /b_g/: *bag, big, bagel, beg, beagle*. This design forces lexical access during the task, as subjects must imagine they are hearing words, not contextless phonemes.

The paper is organized as follows: Section 2 presents background information on the merger in production, followed by predictions for perception. Section 3 describes the experimental design, stimuli creation, and response procedures. Section 4 presents results, and Section 5 concludes with discussion and future work.

2 Motivation

2.1 Merger in Production

Recent sociophonetic studies of Pacific Northwest English (PNWE) (e.g., Freeman 2014, 2015; Riebold 2015; Wassink et al. 2009; Wassink 2015) have described "low-front pre-velar raising/merger," a sound change in progress involving the raising and upgliding of the low-front vowels /æ, ɛ/ and the lowering of mid-front /eɪ/ before voiced velars /ŋ, g/. Raising is advanced and stable before the velar nasal: /æŋ, ɛŋ/ are merged at a location in F1xF2 space between non-prevelar /ɛ, eɪ/ (e.g., *length, Lang* [lɛɪŋθ, lɛɪŋ]) (Freeman 2015). Before the voiced stop, /ɛg, eɪg/ are also merged at this intermediate location, so that words like *beg, vague* rhyme [bɛɪg, vɛɪg]. However, the height of /æg/ is more variable across speaker

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groups and speaking styles, with higher positions seen in middle-aged speakers, males, and casual styles. In studies of Washingtonians, for example, middle-aged speakers (late 30s to early 60s) show the highest positions across three generations, with some males showing near-complete overlap with the higher prevelars, so that words like *bag* rhyme with *beg, vague* [bɛɪg] (Freeman 2014; Riebold 2014, 2015). With lower and more variable positions for both /æg/ and /ɛg/ found in older generations (Reed 1961; Riebold 2015; Wassink and Riebold 2013), the advancement seen in middle-aged speakers suggests a change progressing over time, perhaps toward full merger of all three vowels /æ, ɛ, eɪ/ before voiced velars. This progression seems to have continued for /ɛg, eɪg/, which remain merged at [ɛɪg] in younger adults (currently 20s to mid-30s), but /æg/ again shows increased variation and lower positions, suggesting that the last prevelar to join the tide may also be more sensitive to social meaning (Freeman 2014).

2.2 Predictions for Perception

A thorough investigation of phonological merger must examine both production and perception; it cannot be assumed that the two are identical. For example, in cases of near-merger (cf. Di Paolo 1988), speakers produce different variants but judge them the same, and in cases where merger is sensitive to stigma and style-shifting (cf. e.g., Labov 1994), speakers produce merged variants but judge them as different. This study aims to determine whether some version of these situations hold in PNWE, or whether perception mirrors production. Since the two parts of the PNWE merger appear to be treated differently in production, they are examined separately in perception here, beginning with the following hypotheses:

H1: Perception of /ɛg, eɪg/ mirrors production. As /ɛg, eɪg/ show (near-)complete merger in production for nearly all PNWE speakers examined in previous studies, they are expected to be merged in the same location in perception as well. In this study, stimuli with F1xF2 values matching those of the merged /ɛg, eɪg/ in production will be judged as belonging to either class, with no clear bias toward either option.

H2: Perception of /æg/ is more varied, as in production. Given the wide variation in production of /æg/ present in the speech community, Northwesterners are expected to accept variation in perception as well. This could take the form of judging a wider variety of stimuli as acceptable realizations of /æg/, or there could be wider variation between subjects.

3 Experimental Design

Stimuli were created (Sec. 3.1) to synthesize 24 front-vowel formant combinations following an initial /b/. Subjects were told (Sec. 3.2) they were hearing words "cut off" in the middle, and they indicated which word with a button press in two test conditions. In the /b_d/ condition, all five options were lexical items of the form /b_d/: *bad, bid, bayed, bed, bead.* In the /b_g/ condition, all options are lexical items of the form /b_g/: *bag, big, bagel, beg, beagle.* Unbeknownst to subjects, the same stimuli were played in both conditions, each repeated randomly in three blocks.

The /b_d/ condition is intended to map listeners' percepts of unmerged front vowels in PNWE. The /b_g/ condition should map the acceptability of each F1xF2 production as a

candidate for membership in each phonemic vowel undergoing merger, or in other words, which phonemes listeners expect as possible intentions of PNWE speakers. Where there is overlap between phonemes in production, responses should show greater variation, and full merger should be indicated by equal or random assignment of stimuli to each of the merged phonemes. Because there is relatively less overlap in production of the front vowels before /d/, the /b_d/ condition should show more clearly delineated responses, while the greater overlap in production before /g/ is expected to cause greater variation, indicating competing options and lower confidence.

The task is designed to access listeners' lexicons by priming them to expect and respond with real words. Many studies have shown that listeners can distinguish vowel sounds in tasks designed to avoid lexical knowledge, but the merger in progress seems to be below the level of social awareness, meaning that speakers are generally not aware of the change (Freeman 2014). Without appealing to the lexicon, listeners may respond at a more abstract level, thinking of prototypical vowels rather than observed realizations. Including word-initial /b/ in the stimuli is intended to facilitate lexical access by making the stimuli more word-like, rather than asking subjects to imagine that the heard vowel has been extracted from a word, a situation that does not occur naturally.

3.1 Stimuli

Purely synthetic stimuli were created in order to be able to control all parameters of the signal. A male speaker of PNWE was selected to provide a model for the vowel space and F1xF2 values for the synthetic stimuli. The model speaker was a male Caucasian second-generation Seattleite in his mid-50s chosen from several recorded in a previous production study (cf. e.g., Freeman 2014; Wassink et al. 2009). The phonemes in his front vowel space show less overlap than other speakers', and their configuration is fairly linear, which simplifies a model of raising on an F1xF2 slope. For the model vowel space, shown in Figure 1, midpoint formant values of word list tokens in non-nasal, non-liquid contexts were measured in Praat (Boersma and Weenink 2013) and plotted in F1xF2 space using the R package PhonR (McCloy 2015). In addition, low-front pre-/g/ tokens (e.g., *egg, beg; bag*) were plotted separately to determine the locations for these contexts, which are raised for this speaker. Note that /eɪg/ tokens like *vague, bagel* were not available for this speaker when stimuli were created, but later analysis showed substantial overlap with /ɛg/ (Freeman 2014).

Ellipses of two standard deviations around the means of the model speaker's vowels were used as a guide for the areas to be represented in the synthetic stimuli. Figure 2 shows the F1xF2 values for the created stimuli (black dots) overlaid with the model speaker's ellipses. Stimuli were set at even intervals with 75 Hz between each value in F1 and 150 Hz between each in F2. These values approximate those separating stimuli in Johnson et al.'s (1993) method of adjustment task, which used step sizes of 0.37 Bark, "slightly larger than the just-noticeable-differences reported by Flanagan (1957)" (p. 57). Using Hertz rather than Bark was judged sufficient for this experiment because the Hertz-Bark relationship for the affected vowel space is roughly linear (cf. Ladefoged 1996). Some values that fit inside or very close to the model ellipses were not used (e.g., 400x1800, 475x1650); plots of the model speaker's entire vowel space showed overlap in these central areas with back or central vowels such as /ʊ/ and /ʌ/, and stimuli created with these values auditorily sounded too central, as well.

Figure 1: Model speaker's front vowel space. Word list token midpoints (F1xF2 in Hz) in non-liquid, non-nasal alveolar and pre-g contexts, with ellipses of 2 standard deviations around vowel means.

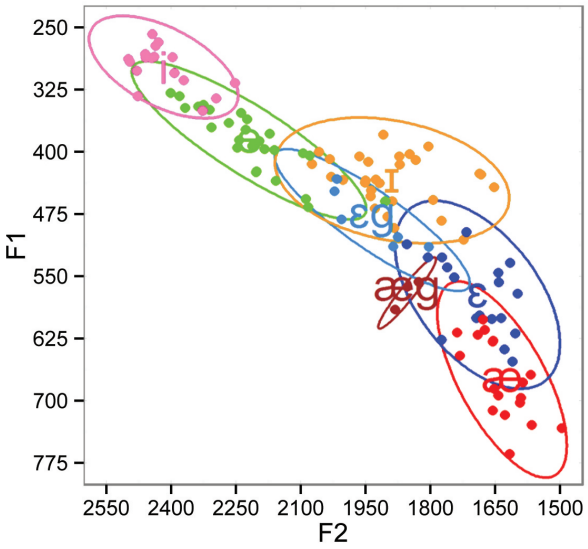
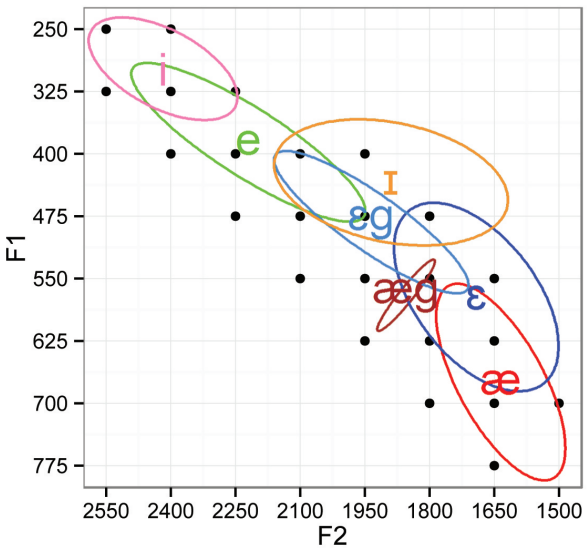


Figure 2: Stimulus grid. Black dots indicate F1xF2 values (Hz) of synthesized stimuli; ellipses follow the distributions of the model speaker's vowels, as in Figure 1.



Stimuli on the front edge of the model vowel space were included, even though the model speaker showed no tokens in this range, in order to allow for the possibility that raised vowels merge in more front locations than unaffected vowels, as suggested by the fronted locations of the prevelar model tokens.

Stimuli were created at a sampling rate of 11,025 Hz in SynthWorks (Scicon R&D Inc 2004), a Klatt-based synthesizer, on a Macintosh desktop computer. Each stimulus begins with a synthesized /b/ consisting of a 10-ms release and 40-ms voiced transition to the 120-ms steady-state vowel. (The 40-ms transition duration is in line with values reported by Walsh and Diehl (2007) for the percept of a bilabial stop release.) Thus, the total duration for each stimulus is 170 ms, which was judged to sound natural but short for words said in isolation, in line with the scenario to be given to subjects that they will hear a single word "cut off" in the middle. Duration is held constant across stimuli to avoid introducing any durational cues that may covary with underlying phonemic quality or merger application. Vowel formant values remain steady over their duration so as to avoid any cues toward gliding that could similarly bias subjects' lexical decisions. Pitch (f0) begins at 100 Hz and rises to 110 Hz linearly over the duration of each stimulus. This pattern matches that of the model speaker, whose pitch rose slightly as he read the target words with focus intonation in a carrier phrase. Flat and slightly falling pitch contours were also applied but rejected because they were judged to sound very unnatural. Falling contours are also undesirable because they often occur phrase-finally, potentially biasing subjects toward perceiving codas; with no formant transitions, the coda could be perceived as a glottal stop, often a component

or allophone of alveolars but not velars, which could bias or confuse lexical decisions.

F3 was calculated as in Johnson et al. (1993), following the formula given for front vowels in Nearey (1989:2095), with the output rounded to the nearest 10 Hz:

(1) F3 (Hz) = 0.522*F1 + 1.197*F2 + 57

Bandwidths for the first three formants (B1, B2, B3) were calculated following the formulas used by Johnson et al. (1993) to approximate the model values given in Klatt (1980), with the outputs rounded to the nearest 5 Hz:

(2) B1 (Hz) = 29.27 + 0.061*F1 0.027*F2 + 0.02*F3

(3) B2 (Hz) = -120.22 0.116*F1 + 0.107*F3

(4) B3 (Hz) = -432.1 + 0.053*F1 + 0.142*F2 + 0.151*F3

F4 and F5 were fixed at 3500 and 3700, respectively, both with bandwidths of 200 Hz, over the entire duration of each stimulus. For the first 10-ms frame corresponding to the /b/ release, values were set as recommended for /b/ in Klatt (1980): F1, F2, F3 at 200, 1100, 2150 Hz, respectively, with respective bandwidths of 60, 110, 130 Hz. Amplitude of voicing (AV) was fixed at 60 dB, as described by Klatt (1980) as typical for a full vowel, except in the first 10-ms frame, the /b/ release, which was set at 20 dB to create a release-burst percept. For the same purpose, the amplitudes of aspiration (AH) and frication (AF) were both set at 60 dB in the first frame, with AH fixed at 20 dB and AF at 0 dB thereafter. Amplitude of the bypass (AB) was set to 63 dB in the first frame, following the suggested values for /b/ in Klatt (1980), and 0 dB thereafter.

Formant transitions for the initial /b/ were created as follows. Just after release (in the second 10-ms frame), F1, F2, F3 were fixed at the lowest values used for each formant in the target vowels, 250, 1500, and 2150, respectively. Formant values in the next 10-ms frame were calculated as 80% of the distance in Hz to the formant values of the following steady-state vowel. The remaining two frames were interpolated linearly. Bandwidths for the first three formants remained at 60, 110, and 130, respectively, in the frame after the /b/ release, and were then interpolated linearly to the values calculated at the onset of the steady-state vowel. This method successfully gave the auditory percept of a /b/, whose formant values begin low and rise quickly after release before gradually reaching those of a following vowel. Values following the release were similar to those reported in Kewley-Port (1982) and those of the model speaker.

The open quotient (OQ) and spectral tilt (TL) were manipulated toward a slightly breathy voice quality to improve the overall auditory naturalness of the stimuli, which otherwise sounded rather robotic. Sample values were found by trial-and-error, relying on the experimenter's auditory percepts to increase the naturalness of the voice quality and to reduce variation between stimuli in auditory percepts of pitch. This resulted in a pattern that aligned with the diagonally-sloping shape of the sample vowel space; the pattern was then regularized to yield the following values. From the frame following the /b/ release, the open quotient was set to 55% for all stimuli except the three on the right edge of the F1xF2 diagonal slope seen in Figure 2 (i.e., 400x1950, 475x1800, 550x1650), which remained at an OQ of 50%. Spectral tilt remained at 0 dB for this edge and stimuli on the next diagonal line

(that connecting 250x2400 to 700x1500). TL for the next diagonal (connecting 250x2550 to 700x1650) was set at 10 dB, and TL for the left-most edge was set to 15 dB.

All other parameters remained at the defaults set in SynthWorks.

Finally, the files created in SynthWorks were exported as WAV files and imported into Praat, where any residual pops were removed from the end of the vowel by setting the waveform to zero after the last zero-crossing within the vowel waveform's final periodic cycle. The resulting stimuli sound reasonably natural over circumaural headphones, although some apparent pitch differences remain.

3.2 Response Procedures

Subjects were 20 native PNWE speakers with normal hearing who grew up in Washington, Oregon, or Idaho. Table 1 shows the distributions of subjects by gender and age group. Although reasonably balanced, there are relatively fewer middle-aged subjects and a slight over-representation of older females.

Table 1: Distribution of subjects by age and gender.

Ages	Female	Male	Total
$18-29$	4	3	7
$30-59$	2	3	5
$60-75$	6	2	8
Totals	12	8	20

After a brief demographic questionnaire and hearing screening, subjects were seated in a sound-attenuated booth at a computer screen with circumaural headphones and an ioLab Systems button response box, initially labeled with /b_d/ response options *bad, bid, bayed, bed, bead*, as pictured in Figure 3. PsychoPy (Peirce 2014) was used to present stimuli and instructions and collect responses. The experimenter was present in the booth during a short training phase used to familiarize subjects with the stimuli and response procedures. The following instructions appeared on the screen and were read aloud by the experimenter:

> You will hear a computerized voice saying words that have been cut off in the middle. After each one, press the button below the word you heard.
> We'll start with a few to practice. First get familiar with the word choices.
> When you're ready to start, press any lighted button. (The screen will be gray while you listen.)

The experimenter then asked subjects to read the response options on the button box aloud to ensure they were familiar words and to become comfortable with their locations. Once begun, the training phase consisted of three of the stimuli played in random order through the headphones, each beginning 600 ms after the previous button response. These stimuli were chosen for their ease of discriminability: the highest/most front vowel (250x2550 Hz), exemplary of /i/, the lowest (775x1650 Hz), exemplary of /æ/, and an intermediate node judged by the experimenter to sound exemplary of /ɛ/ (550x1950 Hz). For all subjects, this

Figure 3: Button box response options, /b_d/ condition.

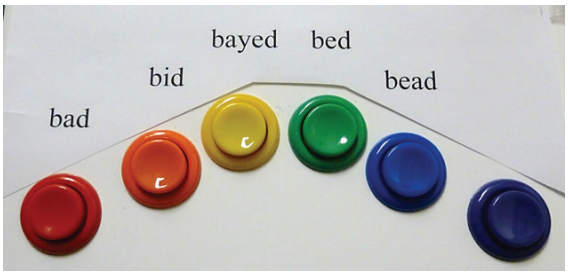
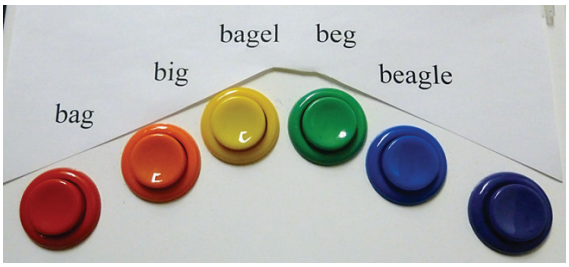


Figure 4: Button box response options, /b_g/ condition.



was sufficient training to become comfortable with response procedures. The experimenter reminded subjects to respond "as fast as possible while still being accurate" and to choose the "first word that came to mind" when unsure.

The testing phase began after the experimenter left the booth, following the same presentation procedures as in the training phase. Three stimulus blocks were presented, each including all 24 stimuli in independently-generated random orders, for a total of 72 presentations. Instructions then appeared on the screen asking subjects to pause, and the experimenter returned to the booth to exchange the response option labels on the button box for /b_g/ words *bag, big, bagel, beg, beagle*, as shown in Figure 4. The experimenter explained that the instructions for the next set were the same, "but now you have to choose which of *these* words you heard," and again asked subjects to read the options aloud. The experimenter then left the booth, and the second testing condition proceeded exactly as the first, with all 24 stimuli presented in three randomized blocks. Crucially, subjects were not told that the stimuli were the same in both conditions, and when asked open-ended questions about the experience, only one asked if they were. (Others' responses indicated they did not suspect this, e.g., by saying they heard many/not many of a certain /b_g/ word.)

4 Results

Responses in the /b_d/ control condition mirror production in PNWE, as expected. Figure 5 (left panel) shows the distributions of responses of all subjects pooled together; outlines mark stimuli (black dots) with at least 20% of responses given as the word representing the indicated vowel. (So, for example, at least 20% of responses to the stimuli with an F1 of 625 Hz were "bad" and at least 20% were "bed.")

In the /b_g/ test condition (Figure 5 right panel), the high vowels /i, ɪ/ show the same responses as in the /b_d/ condition, also as expected, since these vowels are unaffected before /g/ in production. As predicted, the mid-vowel responses differ between conditions. Figure 6 highlights these responses, also shown in Figure 5. The distribution of /ɛg/ responses (right, blue) is expanded upward and forward in F1xF2 space to include the entire distribution of /ed/ responses (left, green) as well as all /ɛd/ responses (left, blue). The distribution of /eg/ responses (right, green) is shifted downward and backward from that of /ed/ to fall entirely

within the distribution of /ɛg/. Unexpectedly, the distribution of /æg/ (red, Figure 5) does not differ substantially from /æd/ with all subjects pooled; however, as individuals, about a third of subjects show an upward expansion of /æg/ compared to /æd/.

Figure 5: Responses, /b_d/ condition (left), /b_g/ condition (right). Outlines mark stimuli with at least 20% of responses selecting words with the indicated vowels.

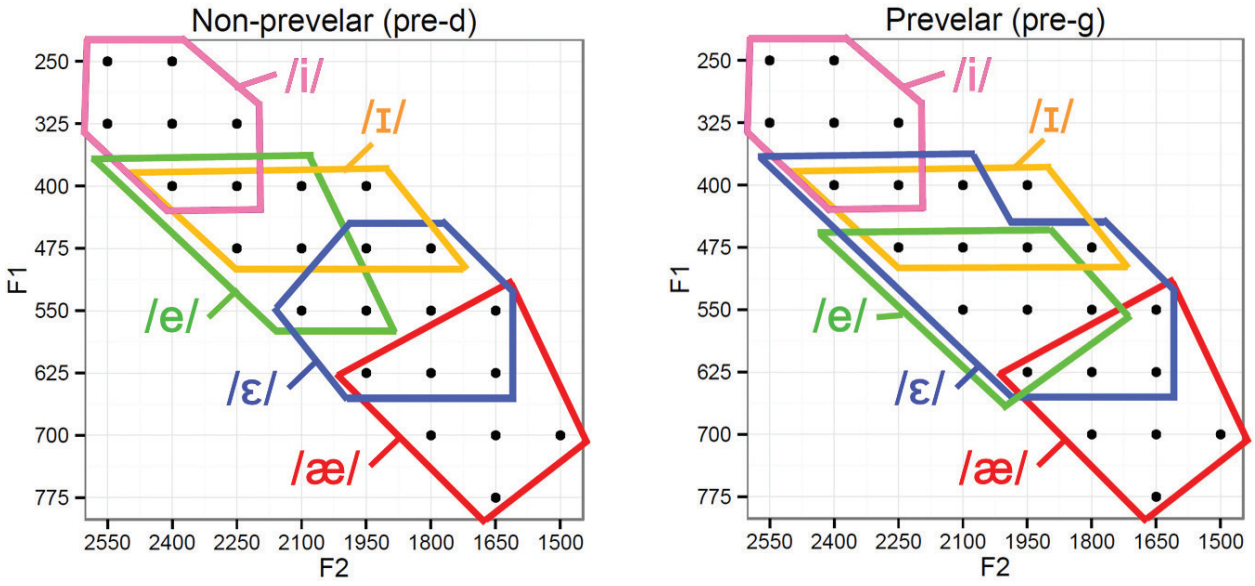
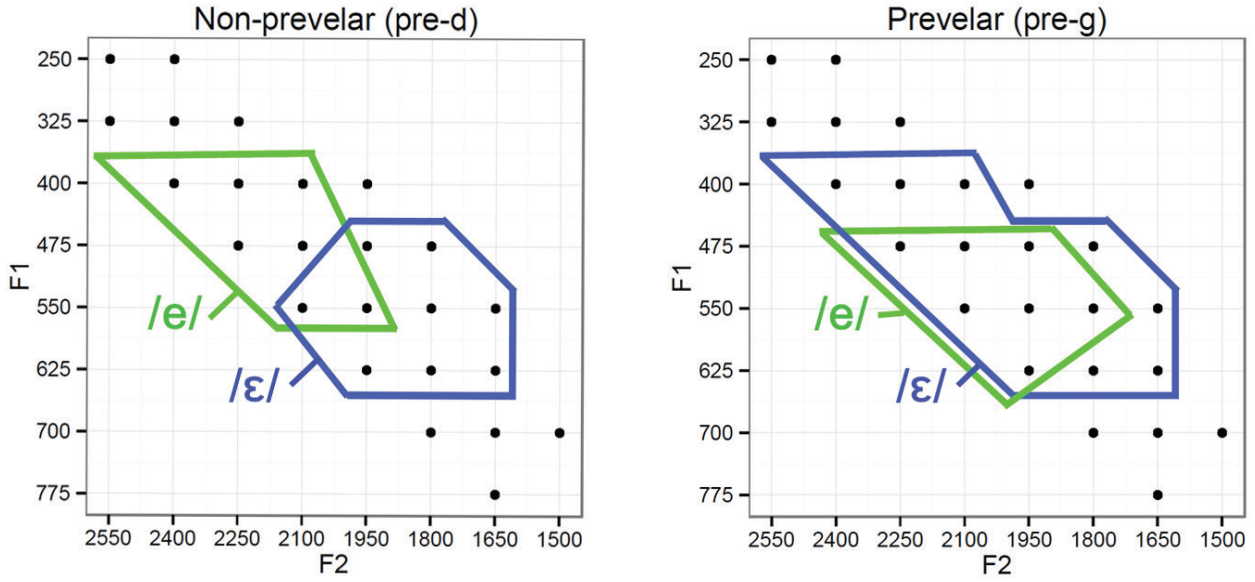


Figure 6: Mid-vowel responses, /b_d/ condition (left), /b_g/ condition (right). Outlines mark stimuli with at least 20% of responses selecting words with the indicated vowels.



5 Discussion

Both hypotheses were partially supported. For H1, responses for /ɛg, eg/ do overlap substantially, with /eg/ shifted downward, but responses for /ɛg/ expanded upward rather than shifting. Although this pattern was not precisely predicted, it is consistent with merger and collapse of the two small word classes. That is, there are only a handful of /eg/-class words (e.g., *vague, plague, bagel, pagan, vagrant, fragrant, flagrant*), some of which are uncommon, and none of them have minimal pairs with words in either /æg, ɛg/ class. While the /ɛg/-class is also small, it is larger and its members more common than /eg/, making it a better candidate to represent a collapsed /ɛg, eg/ class. In other words, when subjects were forced to choose between two members of a single category, they more often chose the more frequent member. However, these speculations should be confirmed with future work involving more members of each word class with word/phoneme frequency and familiarity considered.

Contrary to H2, results for all subjects pooled showed no shift in location or area for /æg/ compared to /æd/. However, there was increased variation in responses between subjects, with about a third showing an upward expansion of /æg/ responses. Thus, it may be that some subjects responded as predicted, accepting wide variation for /æg/. It is also possible that subjects responded as they themselves would pronounce the word choices. In anticipation of this hypothesis, subjects were recorded reading a word list which includes more than one word in each class; the relationship between subjects' own productions and judgments will be examined in a follow-up study.

In short, the reduction in perceptual distinctions among /æg, ɛg, eg/ further supports the characterization of these prevelar vowels as spectrally merged or merging in PNWE, and the variation between subjects is consistent with variable production in the speech community. The study design encouraged lexical access (rather than abstract phonemic representations as in many standard phonological perception designs) by creating "partial-word" stimuli and telling subjects they were hearing pieces of words.

In future work, natural stimuli will be used first to determine whether listeners distinguish prevelar words without external contextual cues, and then to examine the acoustic features in production that predict listener classifications. In other designs, various aspects of synthetic or edited natural stimuli will be manipulated: vowel duration to investigate whether the shorter duration of /ɛg/ reported in production (Freeman 2014) distinguishes it from the other prevelars, formant slopes to examine the contributions of upglides, and pitch and voice quality in simulation of different talkers, emotions, conversational contexts, etc. Reaction times for subjects' responses were also collected in this study and may be examined in future work as measures of confidence. In other designs, a sorting task will be used to allow subjects to repeat and compare stimuli before judging their class membership.

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Second Position and "Floating" Clitics in Wakhi

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1 Introduction

Second position clitics are well described in certain South Slavic languages, with analyses ranging from purely phonological to purely syntactic ones. The focus of this paper is a language with second position clitics that is much less well documented: Wakhi. As a non-European language, Wakhi clitics can offer fresh insight into the debate between syntactic and phonological approaches to second position clitics, especially because Wakhi clitics pose additional challenges to the standard approaches. Wakhi second position clitics appear to "float" – that is, they sometimes appear further to the right in the clause than second position.

Clitics in Wakhi are thus particularly problematic. Like all second position clitics, it is unclear whether phonology or syntax dictates their position within the clause. In addition, it is uncertain whether these clitics do indeed "float" – whether the clitics that appear in non-second position are the same as the second position clitics but are a result of movement, or whether they are independently derived clitics with the same form as the second position clitics, making the "floating" merely an illusion.

In this paper, I examine data from my own fieldwork, and argue for a split analysis of Wakhi clitics: I claim that the clitics that appear in second position are a different type of clitic than those that appear in non-second position. The crucial data in this analysis show evidence that the non-2P clitics have semantic selectional restrictions with respect to their hosts that the 2P clitics do not. Based on this data, I argue that the clitics that appear in second position clitics are true 2P clitics, and I provide a syntactic account of these, locating them in a fixed structural position in Spec, TP. This syntax is able to account for the linear order of clitics with respect to other arguments in information-neutral clauses, in relative clauses, and in clauses in which A'-movement has extracted material into the left periphery. An independent account of non-2P clitics as possessive clitics is able to capture the semantic selectional restrictions they demonstrate. Further, such an analysis readily addresses the fact that these two different clitics have the same form: They both receive their ϕ-features from the subject of the clause. 2P clitics via an Agree relation with the subject, possessive non-2P clitics via an A-movement relationship. These facts illustrate why the two different clitics have the same form and why this has previously created the illusion of "floating" 2P clitics.

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List of abbreviations: 2P= second position; ACC = accusative; CL = clitic; DET = determiner; GEN = genitive; LV = light verb; PL = plural; POSS = possessive; PST = past; SELF = reflexive pronoun; SG = singular.

2 Background

Second position (2P) clitics, first described by Wackernagel (1892), are those clitics (or clusters of clitics) that occur in second position in their clause. Clitics are phonologically weak elements that must have a phonologically strong element to serve as their host, but unlike affixes, clitics have a low degree of selection in terms of their host. Second position clitics, then, are those that can have as their host any XP (or X, depending on the language), as long as that host is the first within its clause. Consider, for illustration, the Slovenian clitic clusters in (1).

(1) a. Hvalil *se* *ji* *je*.
praised. SELF.ACC HER.DAT is
'He praised himself to her.'

b. da *se* *ji* *je* hvalil
that SELF.ACC HER.DAT is praised
'He praised himself to her.'

c. *da hvalil *se ji je* (Boškovič 2001)

Sentences (1a) and (1b), in which the clitic cluster follows the first word in the sentence, are grammatical. In (1c), however, the clitic cluster has no host, as it is sentence-initial, and the sentence is no longer grammatical. This phenomenon is not unique to Slovenian; it has been well described in several other languages, especially South Slavic languages such as Serbo-Croatian, Bulgarian, and Macedonian.

2.1 Approaches to second position clitics

These second position clitics have generated quite a large body of research in syntax, in phonology, and especially at the syntax-phonology interface. The crucial questions in this discussion have to do with whether second position clitics are base-generated or whether they are the result of movement. If they are the result of movement, what is the timing and motivation of this movement? The general approaches to second position clitics presented in the literature can be thought of as divided into four basic categories, as presented in Boškovič (2001): the strong syntactic approach, the weak syntactic approach, the strong phonological approach, and the weak phonological approach.

The strong syntactic approach claims that the syntax is solely responsible for the placement of clitics, with no movement occurring post-syntactically. Ungrammatical structures in which the clitic is sentence-initial or further to the right than second position must be ruled out by the syntax, not the phonology. One way to do this is proposed by Roberts (1994) for Serbo-Croatian: He claims the clitic is hosted in C, which has a strong feature that needs to be checked by some expression moving into its specifier, in front of the clitic. An alternative is to allow the syntax to know that the clitic is an enclitic and that it therefore cannot be stranded in sentence-initial position (Progovac 1996). The requirement for an element to be in front of the clitic can be satisfied by independently necessary syntactic operations such as wh-movement, but if none of these operations save the construction then some other element is allowed to move in front of the clitic. To prevent this movement from

occcurring arbitrarily, movement restricted by the Last Resort Condition, such that itcan only occur if no other operation has provided an appropriate host for the enclitic. This kind of analysis introduces a look-ahead problem, in which the syntax must have knowledge of whether certain phonological requirements are or are not being satisfied.

Putting aside the differences in ruling out ungrammatical structures discussed above, strong syntactic accounts of second position clitics generally have three important assumptions in common (Bošković 2001): (1) Clitics cluster together syntactically, i.e. clause-mate clitics are all located in the same position. (2) This position is structurally fixed for all constructions. (3) This position is located high in the tree, so that there is no space for more than one element to occur in front of the clitic cluster within its clause. Accounts that take this approach include, but are certainly not limited to Franks (1999), Roberts (1994), Tomić (1996), and Wilder and Ćavar (1994).

Weak syntactic accounts generally operate under the same assumptions and posit that clitic movement takes place in the syntax, but they delegate to post-syntactic operations a small amount of word-reordering that is needed to satisfy certain phonological conditions. In specific ungrammatical constructions in which the clitic is stranded in sentence-initial position, Halpern (1992) proposes a post-syntactic readjustment known as Prosodic Inversion (PI). Based on the well known observation that in some languages the clitic can occur in second position either after the first phrase (2a) or after the first word (2), Halpern argues that clitics that are left in sentence-initial position may undergo very local post-syntactic movement, lowering onto the first stressed word they encounter, allowing for their occurrence in second position after the first word in (2b). Opponents of this approach to second position clitics in Serbo-Croatian (Progovac 1996, Wilder and Ćavar 1994) point out that clitics that occur after the first word, seemingly cutting off a phrase, are restricted in their use, and often result in a special interpretation.

(2) a. Taj covjek *je* volio Milenu
that man is loved Milena
'That man loved Milena'

b. Taj *je* covjek volio Milenu.

On the other end of the spectrum, strong phonological approaches claim that second position clitics are a completely post-syntactic phenomenon, involving extensive word reordering at spell-out. Radanović-Kocić (1996) gives this kind of analysis for Serbo-Croatian second position clitics. Under her approach, clitics are indistinguishable from full forms in the syntax, but are set apart from other phonological material in the phonology by being assigned the feature [+clitic] (unless they carry phrasal stress). When prosodic mapping is applied, these elements are moved within their intonational phrase to the position immediately following the first phonological phrase of that intonational phrase. Because these phonological phrases and intonational phrases are not necessarily constituents in the syntax, this movement must be post-syntactic. Examples from Serbo-Croatian like (2) above pose challenges to this kind of account: In order to account for both (2a) and (2b) they must posit that the language can optionally form a phonological phrase from just a determiner.

Finally, weak phonological approaches argue that the phonology is responsible for second position clitics, but that all clitic movement occurs in the syntax. The phonology is instead

a filter, taking into consideration all syntactically well-formed outputs but filtering out those that violate certain phonological rules. More specifically, phonology rules out cases in which a second position clitic has no host within its intonational phrase (assuming cliticization cannot occur across intonational phrase boundaries), or has an unsuitable host, such as a phonologically weak element. The crucial element of this analysis is that Morphological Merger (Marantz 1989) takes place post-syntactically and only under phonological adjacency. Bošković (2001) develops such an account, but departs from Marantz (1989) in claiming that Morphological Merger cannot reorder elements, it can only take two adjacent elements and make them into a single word.

The analyses described above are for the most part based on Slavic second position clitics, especially Serbo-Croatian. Some work has also been done on Bulgarian (Pancheva 2005, Harizanov 2014) and Macedonian (Harizanov 2014). Many non-European and therefore less accessible languages (Bošković (2001) includes Walpiri, Pashto, Mayo, and others in this list) have much less of a presence in the literature on second position clitics (see Legate (2008) for an analysis of second position clitics in Walpiri). The purpose of this paper is to contribute to the literature on second position clitics by describing and providing a preliminary analysis for second position clitics in another less accessible language: Wakhi, an endangered East-Iranian language. All data in this paper comes from my own fieldwork.

2.2 Wakhi

Wakhi is an East-Iranian SOV language that can be broken up into four main dialects, corresponding to four primary geographic locations in which the Wakhi people live: Gojali Wakhi is spoken in the Hunza and Gojal valleys of Pakistan, Pamiri Wakhi is spoken in the Pamir region of Tajikistan, a separate dialect is spoken in the Wakhan corridor in Afghanistan, and a dialect is spoken in the Xinjiang province of China. Estimates of the number of Wakhi speakers vary between about 30,000 and 60,000, but the number is steadily declining, as Wakhi is a purely oral language, with no written form. Where Wakhi children attend school or work in larger cities, more dominant languages such as Russian, Urdu, and Tajik dominate academic and professional settings, and Wakhi is restricted to domestic life.

The dialect described in this paper is a Pamiri dialect. The Pamiri dialects are not a homogenous group, likely for geographical regions. The Pamirs of Tajikistan are a very isolated and mountainous region, with special permission required to enter the region and travel between villages being rather difficult. My informant is from Murghab, so I will refer to the variety of Wakhi she speaks as the Murghab dialect. Murghab is located in the far east of Tajikistan (for comparison, the capital and major city of Tajikistan – Dushanbe – is in the eastern half of the country), and is described by locals and other linguists who have been to the region as one of the more remote villages in the area.

As is expected in conditions of isolation from each other, the Wakhi dialects vary with respect to several aspects of the language. Wakhi is a split ergative language, but certain dialects appear to be losing the split ergativity. In the Murghab dialect, for instance, it appears that use of ergative pronouns is optional. My informant regularly produces two forms of transitive sentences in the perfect, reporting that the form with the ergative pronoun and the form with the nominative pronoun are equally acceptable. More immediately relevant to the current discussion is variation in clitic use. Two important variations come to mind.

First, the 3SG clitic is *=i*, and certain dialects appear to be losing this clitic, presumably fo phonological reasons. For instance, for my Gojali Wakhi informant the clitic is obligator whenever licensed by the syntax; my informant from Murghab, on the other hand, judge sentences with this clitic to be grammatical but often does not produce the clitic herself Second, the dialects show variation in the placement of the second position clitics. Gojal Wakhi appears to have strict second position pronominal clitics, whereas Murghab Wakh has been observed to have "floating" clitics – ones that do not necessarily adhere to th expected second position. I describe the facts of second position and "floating" clitics i Murghab Wakhi in the next section.

Although Wakhi is an SOV language, it does exhibit certain properties of a head-initia language. Wakhi sentences are all verb-final, as is expected, with the object directly pre ceding the verb. However, Wakhi regularly allows prepositions, rather than postpositions a one might expect. Head-final languages also have complementizers linearly following, rathe than preceding, embedded clauses. The status of complementizers in Wakhi is yet to be de termined. We find no overt complementizers following embedded clauses. The particle tha does resemble a complementizer – *ki* – is always clause-initial, but certain evidence point to this particle being a linker rather than a true complementizer (see the discussion below) In this paper I assume clause-final complementizers, but further work is needed to establis whether this is indeed the case in Wakhi.

3 Data

3.1 2P clitics

The Wakhi clitics discussed in this paper are doubled pronominal clitics. They express th agreement ϕ-features (in the case of Wakhi, these are person and number) of a full nomina phrase, which is referred to as the associate. In Wakhi, the associate is always the subject o the clause, thus the second position clitic covaries with the subject: In (3a), the subject is th 1SG.NOM *wuz* and the clitic is the 1SG *=(ə)m*, whereas in (3b) the subject is the 2SG.NOM *tu* and the corresponding clitic is the 2SG *=(ə)t*. A full paradigm, by person and number, o these pronominal clitics is provided in (4). The clitics occur only in the past tense – (3a) i in the past tense and has the second position clitic, while (3c) is in the present and canno have the second position clitic.

(3) a. wuz=m gefsti
1SG=1SG.CL run.PST
'I ran'

b. tu=t gefsti
2SG=2SG.CL run.PST
'You ran.'

c. wuz=əʂ gefs-əm
1SG=PROG run-1SG.PRS
'I am running.'

(4)

	SG	PL
1st	=əm	=ən
2nd	=ət	=iʃ
3rd	=i	=iʃ

These enclitics are observed to be second-position (2P) clitics, as they are hosted by the first phrasal constituent of the clause. In (3a) above, this first constituent is merely a word, but in fact the first constituent may be arbitrarily complex. In (5) the first constituent is composed of two words, and the corresponding clitic still occurs after the whole phrase rather than the first word (the determiner). The DP is even more complex in (6), in which *ja ðaj* 'the man' is modified by a relative clause. Still, the clitic occurs after this entire phrase. Further, we observe connectivity effects in (7a): The coordination of the 1SG *wuz* and the 3SG *Laura* results in the use of only one clitic, the 1PL clitic *=ən*, rather than separate clitics for each of the conjuncts, which would be ungrammatical as illustrated in (7b).

(5) [ja ʂelʐin]=i gefsti
det woman=3SG.CL run.PST
'That woman ran.'

(6) [ja badʒ ðaj [kumd ki ja ʂapik ptun jitk]]=i ruɕpetk
[DET fat man who COMP DET food all eat.PST]=3SG.CL sleep.PST
'The man who ate all the food slept.'

(7) a. [wuz=ət Laura]=ən droz
1SG=AND Laura=1PL.CL tall
'Me and Laura are tall.'

b. *[wuz=əm=ət Laura=i] droz
1SG=1SG.CL=AND Laura=3SG.CL tall
'Me and Laura are tall.'

While the above examples seem to suggest that the clitic must be hosted by the subject (which is also the associate), this is not necessarily the case. If in a given clause the subject is dropped, then the clitic is hosted by whatever the next constituent is. In (8a), the subject pronoun is overt and hosts the clitic, but in (8b), the overt subject has been omitted from the transitive clause, but the clitic still occurs in second position, hosted by the internal argument of the verb. Note, however, that while the subject associate can be omitted from the clause as in (8b), the doubled clitic cannot, as shown by the ungrammaticality of (8c).

(8) a. wuz=əm ja put-i litʃ diɕti
1SG=1SG.CL DET ball-ACC kick LV.PST
'I kicked the ball.'

b. ja put-i=m litʃ diɕti
DET ball-ACC=1SG.CL kick LV.PST
'I kicked the ball.'

c. *wuz ja put-i litʃ diɕti
1SG DET ball-ACC kick LV.PST
'I kicked the ball.'

The data discussed in this section illustrates the behavior of Wakhi second position clitics when they occur where they are expected to: in second position, immediately following the first XP in their clause. The following section presents data in which the clitics, rather than occurring in second position, appear further to the right in the clause.

3.2 Non-2P clitics

It has been observed that in certain dialects of Wakhi the 2P clitics can appear further to the right of expected second position, as if they moved to the right in their clause. This has sometimes been described as "floating" clitics. The data presented in Section 3.1 all showed clitics occurring in the second position in the clause, immediately following the first phrasal constituent. The data in this section presents sentences in which the clitic does not occur where we would expect it to based on what has been described so far, and compares judgments about these sentences to those seen previously.

Example (9a) is just like those seen in Section 3.1: The clitic occurs in second position. The informant judges this kind of sentence to be contextually neutral, possible to utter out of the blue without any special context. Examples (9b-9d) show the clitic to the right of second position. In (9b) the clitic is on the internal argument *bil* 'shovel'. The sentence is judged grammatical, as is (9d), in which the clitic is hosted by the sentence-final verb. My informant does report that both of these sentences are awkward, but nevertheless her intuition is that there is some emphasis on the speaker. (9c) is perfectly grammatical; in this example, the clitic is hosted by *tə çɨ znax* 'in my jaw'. There is an emphasis on the speaker and his jaw, as if there were a series of self-mutilation events performed by various people and the speaker wants to highlight what she has done to herself.

(9) a. wuz=əm bil pə ɕi znax dijt-i
1SG=1SG shovel in SELF.POSS jaw put-PST
'I put the shovel in my jaw.'

b. ?wuz bil=əm tə çɨ znax dəjt-əj

c. wuz bil [tə çɨ znax]=əm dəjt-əj

d. ?wuz bil tə çɨ znax dəjt=əm

Although (9) and the corresponding judgments may initially suggest a focus effect of the non-2P clitic, it is important to distinguish the effects in (9) from new information focus in Wakhi. New information focus in Wakhi is obligatorily marked by special pitch accent, indicated by boldface print in this paper. (10a) has no pitch accent as is considered information-neutral, possible to say without a special context, whereas (10b) has pitch accent on *ja puti* 'the ball' as is judged to have focus in 'the ball', as in a felicitous answer to the question *What did you kick?* (new information focus is also optionally marked by extraction into the left periphery, as will be discussed below, in Section 4.2). Consider now example (11), which demonstrates how clitic placement and new information focus in Wakhi interact: The two are independent, though not mutually exclusive.

(10) a. wuz=əm ja put-i litʃ diɕti
1SG=1SG.CL DET ball-ACC kick LV.PST
'I kicked the ball.' (information neutral)

b. wuz=əm **ja** **put-i** litʃ diɕti
1SG=1SG.CL DET ball-ACC kick LV.PST
'I kicked **the ball**.' (as an answer to the question *What did you kick?*)

(11) a. *Q: What did you break?*
wuz=əm jɛzi ɕi **ʂəw-i** ʂkendəvdi
1SG=1SG.CL yesterday SELF.POSS horns-ACC break.PST
'I broke my horns.'

b. *Q: What did you break?*
wuz jɛzi ɕi **ʂəw-i**=m ʂkendəvdi

c. *Q: When did you break your horns?*
wuz **jɛzi** ɕi ʂəw-i=m ʂkendəvdi

In (11a) the clitic is in regular second position, and the pitch accent is on the object *ɕi ʂəw-i* 'my horns', and this object is interpreted as new information, as in response to the question *What did you break?*. (11b) is the same except that 'my horns' not only has the new information pitch accent but also hosts the clitic (which is therefore not in second position). The interpretation is the same, except that the informant reports the intuition that there is an emphasis on the speaker. This example shows us that new information focus and the clitic are not incompatible. Example (11c) shows that they are independent notions though: The clitic not being in second position does not mean that the new information focus must be on the same constituent. In this example, the new information focus is on *jɛzi* 'yesterday' while the clitic is on 'my horns.' 'Yesterday' is the new information, as in the answer to the question *When did you break your horns?* but again the informant reports an emphasis on the speaker that is not present when the clitic appears in second position. This set of examples and their corresponding judgments therefore show that clitics in Wakhi, when they occur to the right of second position, have a special interpretation, but this interpretation is not focus: Clitics and new information focus are separate but not mutually exclusive notions in Wakhi.

In Section 3.1 the data demonstrated that pronominal past tense clitics in Wakhi appear in secondn position, but the data in this section seems to suggest they can float: Wakhi pronominal clitics can appear further to the right of second position and introduce a special interpretation. This raises several questions. First, in the basic cases, what is the syntax of the second position clitics? Where are they hosted, such that they occur in second position in the clause in information neutral sentences? In the next section, I will explore evidence from extraction of focused expressions and topics to show that the clitic is indeed in a structurally fixed position in the syntax, as posited in syntactic accounts of second position clitics in other languages, like Serbo-Croatian. The second question to ask, once the syntax of the second position clitics is established, regards the nature of "floating" clitics. Are they the same clitics as the 2P clitics but indeed "floating" to the right from their expected position, or are they independently derived? I will propose an analysis of these clitics in the next section as well.

4 Analysis

In this section I propose an analysis of Wakhi pronominal clitics, in an attempt to capture the data described in above. I claim that 2P clitics and "floating" non-2P clitics are different types of clitics. In Section 4.1 I discuss evidence from differences in the selectional restrictions in terms of possible hosts for 2P and non-2P clitics that motivate this split in analysis. In Section 4.2 I provide a syntactic account of the 2P clitics, arguing that they are hosted in a structurally fixed position, specifically in Spec,TP. This analysis is shown to account for the linear ordering of clitics with respect to the first phrase in information-neutral clauses, in relative clauses, and in clauses in which topicalization and/or focus have extracted material into the left periphery. In Section 4.3 I turn to the syntax of the non-2P clitics, which I claim are possessor clitics, related to the subject by A-movement. This captures the semantic selectional restrictions on the host of the possessor clitics. It also captures the fact that 2P clitics and non-2P clitics have the same form: the subject that is related to the possessor clitic through A-movement is also the associate of the 2P clitic. The two types of clitics get their ϕ-features from the same DP, so it is expected that they have the same form.

4.1 Two different clitics

While at first glance it may appear that the non-2P clitics are the same as the 2P clitics but in a different location as a result of some syntactic movement, a more thorough investigation of the arguments which may host 2P and non-2P clitics shows that this is not the case. In fact, semantic selectional restrictions on what arguments may host non-2P clitics show a much more limited use of the non-2P clitics, suggesting they are possessor clitics, independent from the 2P clitics.

Consider the following minimal pairs:

(12) a. wuz ɕi ʂəw-i=m ʂkendəvdi
1SG SELF.POSS horns-ACC=1SG.CL break.PST
'I broke my horns.'

b. *wuz ti ʂəw-vi=m ʂkendəvdi
1SG 2SG.POSS horns-ACC=1SG.CL break.PST
'I broke your horns.'

(13) a. ɕi ʂəw-i=m wuz ʂkendəvdi
SELF.POSS horns-ACC=1SG.CL 1SG break.PST
'It was my horns that I broke.'

b. ti ʂəw-vi=m wuz ʂkendəvdi
2SG.POSS horns-ACC=1SG.CL 1SG break.PST
'I broke your horns.'

The non-2P clitic is more restricted in its use. While it can occur on the internal argument of the verb in (12a), it cannot occur on the internal argument in (12b). These examples are identical, save for who the horns that underwent the breaking belong to. When the horns belong to the 1SG subject of the sentence, *horns* can host the non-2P 1SG clitic. However,

when the horns belong to the 2SG addressee of the clause rather than to the subject, this argument is no longer an available host for the non-2P 1SG clitic.

In contrast, consider examples (13a) and (13b). These are analogous to (12a) and (12b), respectively, but with the internal arguments from (12a) and (12b) fronted for new information focus. Unsurprisingly, *ɕi ʂəw-i* 'my horns' can host the clitic in (13a) just as it did in (12a), but the crucial data point is in (13b). Whereas *ti ʂəw-vi* 'your horns' in (12b) could not host the non-2P 1SG clitic that agrees with the 1SG subject of the clause, that same argument – when fronted – can host the 2P 1SG clitic, as in (13b).

In other words, the non-2P clitic must be hosted by an argument that can be somehow associated with the subject of the clause, while the 2P clitic is unselective in the relationship of its host to the subject of the clause. This suggests that the 2P and non-2P clitics are not related by movement but are rather two independet clitics. I argue that Wakhki 2P clitics are true second-position clitics, whose host is determined by the syntax, whereas the non-2P clitics are independently derived possessor clitics.

If the 2P and the non-2P clitics in Wakhi are indeed independent of each other, then one might predict that it is possible for both to occur in the same clause. This prediction is in fact borne out:

(14) wuz=əm ɕi ʂəw-i=m ʂkendəvdi
1SG=1SG SELF.POSS horns-ACC=1SG.CL break.PST
'I broke my horns.'

Example (14) shows that it is indeed possible for a 2P and non-2P clitic to cooccur in a clause, providing further evidence that the two are independent of each other. The remainder of this section will be dedicated to providing a syntax for the two different types of clitics.

4.2 The syntax of 2P clitics

Having demonstrated that the 2P pronominal clitics are different and independent from the non-2P pronominal clitics, I first tackle the syntax of the 2P clitics. I argue that these clitics are hosted in Spec,TP, which accounts for their second position after the subject of the clause in information-neutral sentences, and their second position after fronted material when information packaging extracts one or more arguments into the left periphery.

Data that shows how these 2P clitics interact with material that has been extracted into the left periphery is crucial in the analysis of Wakhi 2P clitics, as this data will demonstrate that these 2P clitics are in a structurally fixed position. Recall that in the case of the presence of an overt subject in an information neutral sentence, the clitic occurs in second position, hosted by the subject, as in (15a). In (15b), the subject is no longer the first constituent in the clause, as one of the internal arguments of the verb has been fronted. In this case, the clitic again occurs in second position, hosted by the fronted element *bil* 'shovel', rather than the subject *wuz* 'I'.

(15) a. wuz=əm bil pə ɕi znax dijt-i
1SG=1SG shovel in SELF.POSS jaw put-PST
'I put the shovel in my jaw.'

b. bil=əm wuz tə çɨ znax dəɟt-əj
shovel=1SG 1SG in SELF.POSS jaw put-PST
'I put the shovel in my jaw.'

Informant judgments show that (15b) has either a topic interpretation or a new information focus interpretation of the fronted material, depending on the pitch accent on the fronted element. If the fronted element is realized with a low-high pitch accent, then it is interpreted as new information focus, as when the sentence is an answer to the question *What did you put in your jaw?* If this fronted element is not given special pitch accent, it is interpreted as a topic, and the sentence is judged to be a felicitous answer to a question like *What did you do with the shovel?*

These judgments suggest that a fronted element like in (15b) may be fronted above the TP. Both topicalization and focus are associated with A'-movement, so we might test binding conditions on the fronted elements to test this hypothesis. A possessive pronoun like *his* must be bound in its binding domain according to Binding Condition A. We therefore expect the coindexation of the subject and *his* to be grammatical and obligatory in a sentence like *John$_i$ kicked$_{i/*j}$ his mother* (16a) but not allowed in *His$_{*i/j}$ mother kicked John$_i$* (16b), where the possessive pronoun *his* cannot be bound by something that it c-commands.

(16) a. John$_i$ ɕi$_{i/*j}$ nan-i litʃ diɕti
John=3SG SELF.POSS mother-ACC kick LV.PST
'John$_i$ kicked his$_{i/*j}$ mother.'

b. ɕi$_{*i/j}$ nan John-i$_i$ litʃ diɕti
SELF.POSS mother John-ACC kick LV.PST
'His$_{*i/j}$ mother kicked John$_i$.'

However, if fronting is indeed movement into an A' position, then this movement should preserve the binding relationships established in the original position of the extracted argument. That is, if *his mother* is A'-moved to the left periphery from its position as an internal argument of the verb, then it should still be bound by *John* as it was in its original position, and therefore *his* and *John* can be coindexed. That is indeed what we find in (17). Such evidence from binding demonstrates that the left extraction, judged to be topicalization or focus movement, is indeed A' extraction into the left periphery.

(17) ɕi$_{i/*j}$ nan-i John$_i$ litʃ diɕti
SELF.POSS mother-ACC John=3SG kick LV.PST
'John$_i$ kicked his$_{i/*j}$ mother.'

To further examine the interaction between 2P clitics and fronting in Wakhi, we might note that if an argument can be fronted for topicalization or focus, then presumably it is possible to extract into the left periphery one constituent for topicalization, and one for focus. The result should be two constituents before the subject. If the clitic is not bound to any syntactic position but rather free to cliticize onto whatever the first constituent of the clause is regardless of the syntax, then the clitic should be hosted by the first of the two extracted constituents. If, instead, the clitic is in a syntactically fixed position in the CP domain, then we expect it to surface after both left-extracted constituents, that is, in a sort of *third* position. Consider the examples in (18), with boldface indicating focus pitch accent.

(18) a. ar box çɨ **pɨd**=əm wuz ʂkendovdi
in forest SELF.POSS foot=1SG 1SG break.PST
'It was my foot that I broke in the forest'

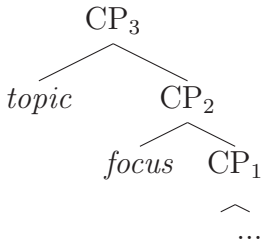
b. *ar box=əm çɨ pɨd wuz ʂkendovdi
in forest=1SG SELF.POSS foot 1SG break.PST
'It was my foot that I broke in the forest'

c. *ar **box** çɨ pɨd=əm wuz ʂkendovdi
in forest SELF.POSS foot=1SG 1SG break.PST
'It was my foot that I broke in the forest'

In (18a), two constituents have been fronted into the left periphery, and the 2P clitic occurs after the second one of them. In fact, (18b) shows that the clitic cannot occur after the first fronted constituent, which is evidence that the clitic is in a syntactically fixed position. Otherwise, we would expect (18b) to be grammatical.

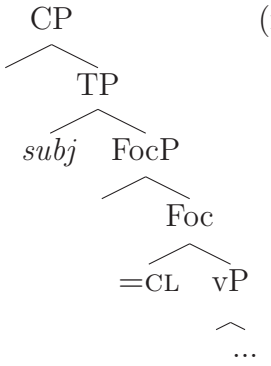
As a further examination of the left periphery, consider the contrast in (18a) and (18b). The boldface in these examples indicates pitch accent – recall from Section 3.2 that this pitch accent is associated with new information focus in Wakhi. In (18a), two constituents are fronted, with the second one receiving the new information focus pitch accent. This sentence is grammatical, unlike (18c), in which the pitch accent is on the first of the two fronted constituents. The fact that focus-associated pitch accent is incompatible with topics indicates that the first fronted constituent must the topic and the second must be the focused expression. More generally, the syntax of the left pheriphery appears to be as in (19), with multiple CPs, such that CP_2 takes a focused expression and CP_3 takes a topicalized expression.

(19)



In the Murghab dialect of Wakhi – the dialect presented in this paper –, the clitic itself is hosted in [Spec,TP]. Hughes (2014) proposes an analysis of second position clitics in the dialect of Wakhi spoken by his informants in which the second position clitic heads its own Focus Projection under the TP, as in (20). However, I cannot apply this analysis to the Murgab dialect, as the data shows that the clitics in this dialect are not directly tied to focus. The second position clitic can be hosted by a fronted topic, as in (21), and is still present an information neutral sentence, as in (22). This is not predicted by an account in which the clitic is the head of a focus phrase, because topics are incompatible with focus, which would rule out (21) because the topic *ja put* 'the ball' should not be able to host a focus clitic. Since focus projections are presumably absent from information neutral clauses, a focus analysis of Murghab 2P clitics would also rule out (22), in which the information neutral sentence still has a clitic.

(20)



(from Hughes (2014))

(21) *Q: What did you do with the ball?*

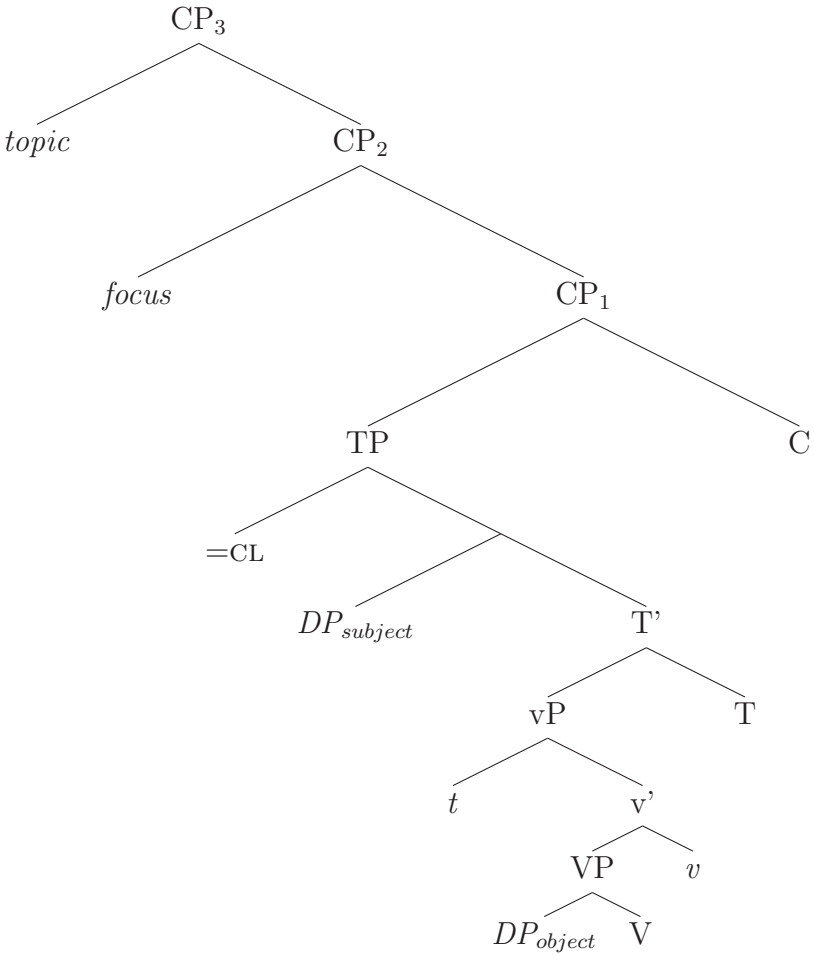
ja put-i=m wuz litʃ diȼti
DET ball-ACC=1SG.CL 1SG kick LV.PST

'I kicked the ball.'

(22) wuz=əm ja put-i litʃ diȼti
1SG=1SG.CL DET ball-ACC kick LV.PST
'I kicked the ball.'

Rather than heading their own focus projection, Murghab Wakhi 2P clitics are hosted in Spec,TP. This syntactic analysis of 2P clitics accounts for the second position of these clitics in information neutral clauses, in clauses in which focused and/or topicalized expressions are extracted into the left periphery, in embedded clauses, and in clauses in which the subject is not phonologically overt. The syntactic structure I am positing is illustrated for a transitive clause in (23). I follow Borer (1984) and Jaeggli (1986), among others, in positing that the doubled clitic is the result of agreement; in this approach, there is an AGREE relation between a functional head and a nominal phrase. For Wakhi pronominal double clitics, a probe on T searches in the Spec,vP for the ϕ features of a DP. These features are then spelled out in TP as a clitic rather than a full nominal phrase.

(23)



In information neutral clauses, there will be no topic or focused expression in the left periphery and therefore no phonologically overt material to the left of the clitic. The clitic, however, cannot be stranded sentence-initially; it must encliticize onto a phonologically strong expression. Therefore, the clitic undergoes prosodic inversion, a post-syntactic readjustment (Halpern 1992) that lowers the clitic onto the closest available phonologically overt expression. The structure in (23) shows that this expression will be the subject, if it is phonologically overt. The result of this readjustment will be a subject in first position, followed by the clitic, as in (24a). If, however, the subject is phonologically null, then the clitic will look further for a host. The next available host in a transitive clause is the object, and we have seen above (repeated in (24b)), that if the subject is missing, the object does indeed appear in first position, and the clitic appears in second position. Because Wakhi 2P clitics are enclitics, they lower onto the right edge of the DP. Therefore, if the DP is a coordinate structure or is modified by a relative clause, the clitic will appear at the right edge of the full phrase, as we saw above in (6) or (7a), respectively.

(24) a. wuz=əm ja put-i litʃ diɕti
1SG=1SG.CL DET ball-ACC kick LV.PST
'I kicked the ball.'

b. ja put-i=m litʃ diɕti
DET ball-ACC=1SG.CL kick LV.PST
'(I) kicked the ball.'

The same lowering of the clitic onto the DP should occur in relative clauses. 2P clitics are clause bounded – they cannot encliticize onto anything outside of their own clause. Thus, in a relative clause, despite the presence of the matrix clause, the clitics are still restricted to searching within their CP domain. Because there is nothing above the clitic and within the relative clause that can host the clitic, it is forced to lower onto the next available host, and therefore appears in second position, after the subject in (25). One might ask why it does not encliticize onto *ki*, which at first glance appears to be a complementizer. *Ki* is a borrowing from Persian, however, and has been analyzed in other related languages as a linker or coordinating conjunction rather than a complementizer (Megerdoomian 2001, Stilo 2004). Further support for this treatment of *ki* as a linker in Wakhi comes from examples like (26), in which the role of *ki* can be loosely translated as 'and then.' As a linker, *ki* is too far outside the clause for the clitic to be able to see it, so the clitic lowers onto the subject as expected.

(25) ja ðaj [ki [$_{CP}$wuz=əm litʃ diɕti]] nowdi
DET man LINK 1SG=1SG.CL kick LV.PST cry.PST
'The man who I kicked cried.'

(26) jan maks njeʃti də dərgo [ki [$_{CP}$swots ʃiʂk drevt]]
then fly go.PST in doorstep and.then jackdaw books sew.3SG
'Then the fly went outside and then the jackdaw sewed boots.'

I turn now to consider the predictions made by (23) for sentences with fronted material. If there is a focused expression extracted into the left periphery of the clause, then the clitic has a suitable phonologically overt host to its left, and it encliticizes onto this expression. The result are sentences in which the focused expression is sentence-initial, and the clitic occurs immediately after it, in second position (27) (pitch accent associated with focus is indicated by boldface print). When the sentence has a fronted topic, we follow the same logic: The clitic has a host to its left, so it encliticizes onto this topicalized expression and thus occurs in second position, immediately following the topic (28). If both a topic and a focused expression are extracted into the left periphery, the clitic will encliticize onto the closest host to its left: the focused expression. The focused expression is not sentence-initial in this case – it is preceded by the topic – the clitic does not occur in second position in this case. The topic is in first position, the focused expression in second, and the clitic does not occur until the third position in the phrase. We saw this above in (18a), repeated here in (29).

(27) *Q: What did you kick?*

ja **put**-i=m litʃ diʨti
DET ball-ACC=1SG.CL kick LV.PST

'I kicked the ball.'

(28) *Q: What did you do with the ball?*

ja put-i=m litʃ diʨti
DET ball-ACC=1SG.CL kick LV.PST

'I kicked the ball.'

(29) *Q: What did you break in the forest?*

[ar box] [ʂi **pɨd**]=əm wuz ʂkendovdi
in forest SELF.POSS foot=1SG 1SG break.PST

'It was my foot that I broke in the forest'

The approach to 2P clitics in Wakhi taken in this paper is a syntactic one: Following the discussion of weak syntactic analyses in Section 2.1, I claim that the 2P clitics are hosted in a structurally fixed position, specifically in Spec,TP, and that a post-syntactic lowering of the clitic onto the first available DP eliminates ungrammatical structures in which the clitic is stranded clause-initially. This analysis is able to account for the second position of clitics after the subject in information neutral clauses with a phonologically overt subject, and for the second position of clitics after other expressions when the the subject is phonologically null. It also accounts for the 2P clitics appearing in second position after topics or focused expressions, when these are fronted. In particular, it is able to predict that when both a topic and a focused expression have been extracted into the left periphery, the clitic appears in third position, after both fronted phrases. Having provided an account of the second position clitics, I now turn to sketch an account of the non-2P clitics.

4.3 Non-2P clitics and possessor raising

Recall the discussion in Section 4.1, in which I demonstrated that the non-2P clitics have different selection restrictions as to their host – ones that appear to be semantic rather than syntactic – that motivate an analysis of the non-2P clitics as different than the 2P clitics that were discussed in detail in Section 4.2. The crucial difference between (12a) and (12b), repeated here in (30) and (31), is between the possessor of the horns that are being broken. In (30) the 1SG subject breaks his own horns, while in (31) he breaks the horns of the addressee. The example (30) can therefore be compared to familiar examples with external possessors in French.

(30) wuz ʂi ʂəw-i=m ʂkendəvdi
1SG SELF.POSS horns-ACC=1SG.CL break.PST

'I broke my horns.'

(31) *wuz ti ʂəw-vi=m ʂkendəvdi
1SG 2SG.POSS horns-ACC=1SG.CL break.PST

'I broke your horns.'

The classic distinction between regular possessor and external possessors is made for pairs as in French in (32a) and (32b) (Deal 2014). In (32a), the possessor of 'the hand' is a regular possessive pronoun, which has no grammatical relation to the verb. This contrasts with the external possessor in example (32b): Here the dative 3SG *lui* is semantically the possessor of 'the hand', but syntactically it is an argument of the verb.

(32) a. J'ai pris sa main
1SG-HAVE taken 3SG.POSS hand
'I took his hand.'

b. Je lui ai pris la main
1SG 3SG.DAT have taken the hand
'I took his hand.'

External possessor constructions come with an additional inference that the external possessor must be somehow affected, usually physically, by the action that is being performed on the possessed element. In French, this translates to the external possessor construction being licit most often when the possessed element is a body part of the possessor or, more generally, in some part-whole relationship to the possessor, as the possessor cannot avoid being affected by an action that involves his own body. For example, (33) is only grammatical when the thing being washed is the possessor's arm, but not his son or his car.

(33) Je lui ai lave le bras / *le fils / *la voiture
1SG 3SG.DAT have washed the arm / *the son / *the car
'I washed his arm/*son/*car.'

The intuitions in Wakhi seem to be similar with regard to the affectedness of the possessor. Consider the contrast in (34a) and (34b). The possessed item in (34a) is the horns of the speaker – the breaking of these horns is something that undoubtedly affects the speaker physically, and the clitic attaching to 'the horns' is grammatical. On the other hand, the possessed item in (34b) is merely a pencil, and the sentence is thus marginal. A pencil is clearly not a body part, and it is easy to say how the breaking of the speaker's pencil would not physically affect him in the same way that the breaking of his horns would.

(34) a. wuz ċi ṣew-i=m ṣkəndevdi
1SG SELF.POSS horns-ACC=1SG.CL break.PST
'I broke my horns.'

b. ??wuz ċi qlam-i=m ṣkəndevdi
1SG SELF.POSS pencil-ACC=1SG.CL break.PST
'I broke my pencil.'

c. wuz=əm ċi qlam-i ṣkəndevdi
1SG=1SG.CL SELF.POSS pencil-ACC break.PST
'I broke my pencil.'

Based on the data presented here, the contrast between clauses with and without non-2P clitics in Wakhi is the contrast between clauses with and without external possessors. The possessor must be somehow affected by the action referred to in the clause, whereas a

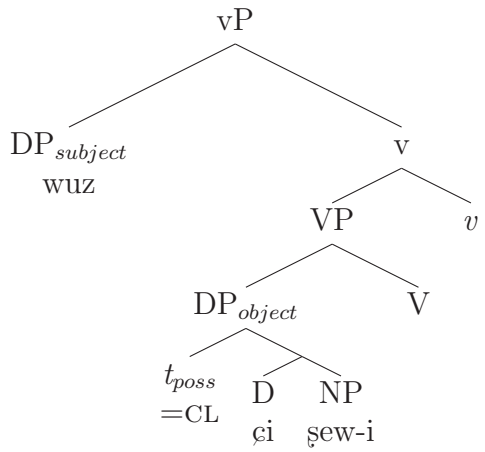
regular possessive pronoun has no such restriction – the possessive *ɕi* is grammatical when it possessives both a body part, as in (34a) and a pencil, as in (34c). The additional restriction in Wakhi clitics is that the external possessor must also be the subject of the clause. We have seen before that (35a) is ungrammatical because there is a mismatch between the clitic, which is 1SG and the possessive pronoun on 'the horns', which is 2SG *ti*. Based on (35b), the sentence in (35a) cannot be repaired by changing the clitic to match the possessor of 'the horns'. The only way for the non-2P pronoun to be grammatical is for the clitic to match both the possessor (overt or understood) and the subject of the clause, as in (30) above.

(35) a. *wuz ti ʂew-i=m ʂkəndevdi
1SG 2SG.GEN horns-ACC=1SG.CL break.PST
'I broke your horns.'

b. *wuz ti ʂew-i=t ʂkəndevdi
1SG 2SG.GEN horns-ACC=2SG.CL break.PST
'I broke your horns.'

External possessors are standardly analysed as movement, but the motivation for movement may be θ-related or case-related. Wakhi possessor raising appears to be of the hybrid type: The possessor must be the subject of the clause, associated with a θ position. The claim, then, is that the possessor is generated within the DP and moves into subject position in Spec,*vP* for θ-role assignment. The ϕ features of the subject are spelled out as a clitic within the DP, but spelled out as the full nominal in the subject position. Within the possessed DP, the clitic must be 2P as this is the relevant domain, so it encliticizes onto the right edge of the phrase *ɕi ʂew-i*. Following other hybrid external possessor analyses (Lee-Schoenfeld 2006, Rodrigues 2010), I propose the following movement of the possessor from within the DP into the subject θ position:

(36)



The additional benefit of this account is that we have the syncretism between the 2P and non-2P clitics for free. The possessor clitic gets its ϕ-features from the argument that is also the associate of the second position clitic, so it is expected that they have the same form.

Based on the data in this section, we can develop an analysis of non-2P clitics that accounts for the judgments reported by the speaker. Non-2P clitics in Wakhi are in fact possessor raising clitics, independent from 2P clitics. They are the remainder of the external

possessor, which moves from within the DP into Spec,vP for θ-role assignment. The crucial data in this analysis comes from semantic selectional restrictions of these clitics with respect to their hosts – the host must be in some part-whole relationship to the subject of the clause, which the pronominal clitic covaries with. Crucially, this analysis posits an A-movement relationship between the clitic and the subject of the clause that determines the ϕ-features of the possessor clitic. Recall from the previous section that 2P clitics in Wakhi also obtain their ϕ-features from the subject of the clause, explaining why 2P and non-2P clitics in Wakhi have the same form – this identity of form leads to the illusion of "floating" 2P clitics.

5 Discussion and conclusions

The combination of the analysis of the 2P clitics and the non-2P possessor clitics proposed in Section 4 leaves one outstanding question about the relationship between the types of the clitics and thus the two analyses. Recall from the discussion of the 2P clitic data in Section 3.1 that a clause can lack an overt subject, but it cannot lack a clitic. This extends to clauses which may have a possessor clitic and poses a challenge for the notion that these sets of clitics are completely independent from each other. Consider the data in (37).

(37) a. wuz=əm ʦi ʂew-i ʂkəndevdi
1SG=1SG.CL SELF.POSS horns-ACC break.PST
'I broke my horns.'

b. wuz=əm ʦi ʂew-i=m ʂkəndevdi

c. *wuz ʦi ʂew-i ʂkəndevdi

d. wuz ʦi ʂew-i=m ʂkəndevdi

Example (37a) only has a second position clitic. This is predicted by combining the two analyses put forth in Section 4, because the second position clitic is obligatory, while the possessor clitic is only present if the interpretation highlights that the speaker is affected by the event described by the clause. By this logic, (37b) is also predicted: It has both the second position clitic, which is required, and the possessor clitic, indicating a special interpretation. There is no clitic in (37c), and the fact that it is ungrammatical is predicted because the second position clitic is obligatory. The problem arises in (37d), which has a possessor clitic but not a second position clitic, but is nevertheless grammatical. This is unexpected – the second position clitic is obligatory, and we have seen previously that a clause without a second position clitic is ungrammatical. However, comparing (37c) to (37d) seems to suggest that the presence of the possessor clitic somehow ameliorates the ungrammaticality caused by the lack of the second position clitic, since (37d) is grammatical after all. This effect implies a potential dependency between the second position clitics and the possessor clitics that simply combining the analyses provided in Section 4 cannot account for. I leave the details of this dependency and how it is encoded in the syntax to future work.

As it stands, an analysis that considers 2P clitics and non-2P clitics to be two distinct types of clitics captures many of the challenges posed by the data. With the second position clitic hosted in Spec,TP, the syntax readily accounts for the position in which the clitic occurs in information neutral clauses, in relative clauses, and in clauses with material in the

left periphery. It even predicts that the second position clitic will appear in third position when multiple expressions are fronted. Further, analyzing non-2P clitics as possessor clitics accounts for the interpretations associated with the placement of non-2P clitics. It also explains the selectional restrictions of the non-2P clitics, in contrast with the 2P clitics, which have no semantic restrictions on their host.

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Some causative alternations in K'iche', and a unified syntactic derivation

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1 Introduction

This paper is an investigation of the so-called Causative morpheme *-isa* in K'iche', a Mayan language spoken in Guatemala.[1] I focus on three contexts in which *-isa* can appear.

1. Causative
   -isa productively attaches to some intransitive verbs to form a transitive counterpart

2. Dative Alternation
   -isa participates in an alternation resembling the Double Object/Complement distinction in English

3. Psych-verbs
   A small set of psychological predicates can appear with or without *-isa*, with no (apparent) semantic difference.

There are two goals to this paper. First, I aim for descriptive adequacy, correctly laying out where *-isa* occurs, and the various morphological, syntactic, and semantic properties associated with each use. After laying out the distribution, I will propose how we can account for the disparate set of uses above. Specifically, I will propose the generalization in (1).

(1) *-isa* only attaches to telic predicates which are Internally Caused.

The claim in (1) follows on much recent work on the syntax and semantics of (anti-)causatives. In particular, it has been shown that the appearance of valency-marking morphology is sensitive to (lexical) aspect as well as the lexical semantic properties of the root (Folli 2002; Folli and Harley 2007; Alexiadou et al. 2006; Alexiadou and Anagnostopoulou 2006; Alexiadou and Schäfer 2006; Schäfer 2008) among others.

Importantly, the syntactic/semantic conditions in (1) can be met in a few different ways. Specifically, the notion of telicity is known to be sensitive not just to verb class, but also to

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[1]

A/B = Set A/B	DEF = definite determiner	FEM = feminine	RN = relational noun
1/2/3 = 1/2/3 person	DET = determiner	INCMP = incompletive	sg/pl = singular/plural
CMP = completive		MASC = masculine	

properties of the object (Tenny 1987). I'll suggest that in *all* contexts which the conditions in (1) are met, *-isa* appears to introduce the external argument. The implication is that *-isa* does not mark causativity *per se*, rather its appearance reflects a specific syntactic configuration. The analysis here is in the spirit of Embick (2004), who argues that valency morphology is sensitive to syntactic configuration.

2 Background on K'iche'

K'iche' (also, Quiche, Kiche, K'ichee) is a Mayan language spoken in Guatemala by a relatively stable speech community.[2] It displays ergative-absolutive alignment in its verbal agreement system, and does not have case-marking. Canonical word order is VOS.[3]

The verbal template is given in (2). *-isa* always appears following the root, usually root-attached.[4]

(2) ASPECT – Set B – (Set A) – $\sqrt{\text{ROOT}}$ – $\boxed{\text{isa}}$ – STATUS MARKER
Set A = ergative
Set B = absolutive

The K'iche' dialect reported here is from the town of Momostenango. All examples in this paper are from a single, middle-aged male speaker, elicited in Los Angeles using Spanish and English. The patterns were confirmed by a second middle-aged female speaker, as well as a speaker of the Cantel dialect in his late thirties.

3 Causatives

The literature on K'iche' treats *-isa* as a causative morpheme which attaches to one-place predicates, deriving two-place predicates (Larson 1988; López Ixcoy 1997; Campbell 2000). Table 1 displays a non-exhaustive list of verbs which form transitives using *-isa*.

[2] 2,330,000 speakers, with 300,000 monolinguals (http://www.ethnologue.com/language/quc)

[3] In the data collected, we've found considerable variation in word order. We suspect some is due to Spanish/English influence, particularly since English and Spanish were the languages used for elicitation. I will return briefly to subject of word order later.

[4] The Status Marker is a characteristic of Mayan languages, reflecting the valency of the verb, and position in a syntactic domain (Henderson 2012).

intransitive		**transitive**	
kam	'die'	*kamisa*	'kill'
num	'be/get hungry'	*numisa*	'make hungry'
k'iy	'grow (intrans)'	*kiyisa*	'grow/raise'
k'at	'burn'	*k'atisa*	'burn'
q'ay	'rot'	*q'ayisa*	'rot'
b'ison	'be/get sad	*b'isonisa*	'sadden'
sa'	'be lost'	*satisa*	'confuse'
kix	'feel ashamed'	*kixisa*	'make feel ashamed'
kub'	'sit'	*kub'isa*	'make sit'
k'aman	'be/get used to'	*k'amanisa*	'make used to'
war	'be/fall asleep'	*wartisa*	'put to sleep'
...		...	

Table 1: Verbs forming intransitive-transitive pairs with *-isa*

As seen in examples (3a) and (3b), the appearance of *-isa* naturally requires the appearance of ergative agreement morphology on the verb; *-isa* always creates a two-place predicate.

(3) a. xkam ri tz'i'

x-∅-kam ri tz'i'
CMP-3sgB-die DEF dog

'The dog died'

b. xukamisaj ri tz'i' la a Xwan

x-∅-u-kam-isa-j ri tz'i' la a Xwan
CMP-3sgB-3sgA-die-ISA-SM DEF dog DET MASC John

'John killed the dog'

While this use of *-isa* appears to be entirely productive, there is a large class of verbs which does not use *-isa* to mark the transitive pair. A non-exhaustive list is given in Table 2.

intransitive		**transitive**	
tas	'separate'	*tas*	'separate'
b'us	'fold'	*b'us*	'fold'
jek'	'slide'	*jek'*	'slide'
sut	'spin'	*sut*	'spin'
ch'opin	'bounce'	*ch'opin*	'bounce'
miq'	'boil/melt'	*miq'*	'boil/melt'
pax	'break'	*pax*	'break'
b'irb'it	'shake'	*b'irb'it*	'shake'
paq'	'crush'	*paq'*	'crush'
...		...	

Table 2: Verbs forming intransitive-transitive pairs without *-isa*

As the examples in (4a) and (4b) show, the transitive form of the verb, while still triggering ergative agreement, does not appear with *-isa*.

(4) a. xpax la laq

x-∅-pax la laq
CMP-3sgB-break DET bowl

'The bowl broke'

b. xupaxij la laq la a Xwan

x-∅-u-pax-ij la laq la a Xwan
CMP-3sgB-3sgA-break-SM DET bowl DET MASC John

'John broke the bowl'

The distinction between the classes of verbs in Table 1 and Table 2 is cross-linguistically quite well attested, and I'll assume that what distinguishes the two classes of verbs has to do with how likely an event is conceptualized as occurring "spontaneously", that is, without some external force to bring it about (Smith 1970; Haspelmath 1993; Schäfer 2008; Alexiadou et al. 2015). An event like "fold" (Table 2) is more likely to require an external effort to make the event come about, and thus, it is less likely to occur spontaneously. In contrast, an event like "grow" (Table 1) is more likely to happen without an external effort, and so is more likely to occur spontaneously.

Terminologically, I'll call the verbs in Table 1 "Internally Caused" – although the reader should be advised that I'm using a slightly different notion of internal causation than Levin and Rappaport-Hovav (1995), who treat the distinction as categorical. I'll assume that internal causation is a gradient notion, and is dependent on other factors that we might loosely call "context".[5]

Given this terminological distinction, I make the following generalization.

[5]These factors include the type of object, the pragmatic conditions, and even the type of agent. I will return to this later.

(5) **Internal Causation Restriction (ICR)**
Only verbs which are Internally Caused form transitive counterparts with *-isa*

The validity of the ICR will be show to be correct in the later sections of the paper, where will we see that the ICR holds for all appearances of *-isa*. Before we proceed, I'll note some further properties associated with the causative use of *-isa*.

First, *-isa* does not restrict the θ-role of the subject to an Agent/Causer, as might be expected by a "true" causative. In (6), Agents, Causers, and Instruments are all acceptable as subjects of a causative verb.[6]

(6) ri Xwan/kab'raqan/ch'ich' xukamisaj ri ali Maria

ri Xwan/kab'raqan/ch'ich' x-∅-u-kam-isa-j ri ali Maria
DEF John/earthquake/knife CMP-3sgB-3sgA-die-ISA-SM DEF FEM Maria

'John/the earthquake/the knife killed Maria'

Second, the verbs in Table 1 (and Table 2, where applicable) are ambiguous in their intransitive form between a stative and inchoative reading.

(7) xnum ri tz'i'

x-∅-num ri tz'i'
CMP-3sgB-be/get.hungry DEF dog

a. 'The dog is hungry'
b. 'The dog got hungry'

The importance here is that it is actually ambiguous whether *-isa* is attaching to the inchoative or the stative version. If it's the latter, then we would conclude that *-isa* "comes with" the causative event. However, in §6, I show that *-isa* actually attaches to the inchoative form, which involves null morphology, and further, that *-isa* does not itself introduce an additional event. The significance, then, is that *-isa* merely functions to add an argument that is interpreted as the subject of that event. For now though, it is sufficient to observe that from the data seen so far, there is an ambiguity as to which stem *-isa* attaches to.

To review the properties discussed in this section: 1) *-isa* is used to form transitive forms of Internally Caused verbs. 2) *-isa* does not specify the θ-role of its argument. 3) *-isa* ambiguously attaches to an inchoative (change-of-state) or result-state base.

4 Dative Goal Alternation

Outside of the causative use, *-isa* can also appear in what superficially resembles the Double Object/Double Complement alternation in English. In (8a) and (9a), the Goal thematic argument is licensed with a RELATIONAL NOUN – essentially an inflected preposition – and the verb is intransitive.

[6]There are however, restrictions on word order here, which I ignore for expositional purposes.

(8) a. xwun la tz'i' chwij

x-∅-wun la tz'i' chwij
CMP-3sgA-howl DET dog RN.1sg

'The dog howled at me'

b. xinuwunisaj la tz'i' (*chwij)

x-in-u-wun-isa-j la tz'i' (*chwij)
CMP-1sgB-3sgA-howl-ISA-SM DET dog (RN.1sg)

'The dog howled at me'

(9) a. xxoj chirij ri mesa

x-∅-xoj chirij ri mesa
CMP-3sgB-vomit RN.3sg DET table

'He threw up on the table'

b. xuxojisaj (*chirij) ri mesa

x-∅-u-xoj-isa-j (*chirij) ri mesa
CMP-3sgB-3sgA-vomit-ISA-SM (RN.3sg) DET table

'He threw up on the table'

In (8b) and (9b) the verb takes *-isa* and expresses the Goal argument in the absolutive agreement on the verb. In these contexts, adding the relational noun back into the phrase results in ungrammaticality.

Not just any Goal argument can be promoted. For instance, a phrase like *xripip chwij*, "he flew at me", cannot be transformed into **xinuripipisaj*, "(he) flew at me". A list of verbs I've identified as being able to appear in this alternation is given in Table 3.

with RN Goal		**with object Goal**	
xoj	'vomit'	*xojisa*	'vomit on X'
tix(nam)	'sneeze'	*tixisa*	'sneeze on X'
wun	'howl'	*wunisa*	'howl at X'
kik'	'bleed'	*kik'isa*	'bleed on X'
xub'xut	'(bird) whistle'	*xub'xutisa*	'(bird) whistle to X'
koq'	'(baby) cry'	*koq'isa*	'(baby) cry for/at'

Table 3: Verbs appearing in the Dative Alternation with *-isa*

What unifies the verbs in Table 3 is that they are all Verbs of Emission, involving "[n]on-voluntary emission of stimuli that impinge on the sense" (Levin and Rappaport-Hovav 1995:91, citing Perlmutter).[7] Verbs of Emission are in fact categorized as Internally Caused, since they are conceived of as being more likely to occur without an outside force

[7]Given this distribution, I hypothesize that there is a further distinction between Verbs of Manner of Emission (sound, smell) and Verbs of Substance of Emission (bodily function, sound) (Fábregas and Varela 2006). Apparently, only the latter can participate in this alternation.

bringing them about. That is, *xoj*, 'vomit', does not typically require some outside Agent to make the event of vomiting come about. Thus, the ICR in (5) holds here as well.

Importantly, neither (8b) nor (9b) can mean anything like "The dog caused me to howl" or "the table caused me to vomit". That is, there is no obvious causative meaning here. This is confirmed in speaker intuition: consultants do not readily see any difference in meaning between the forms (8a) versus (8b) and (9a) versus (9b). It is also seen with modification that targets Agents/Causers. For instance, the adverbial *chub'anik*, 'on purpose',[8] is infelicitous with either form of the verb.[9]

(10) a. # chub'anik xkik' chwij
#chub'anik x-∅-kik' chwij
on.purpose CMP-3sgB-bleed- RN.1sg
'#He bled on me on purpose'

b. # chub'anik xinukik'isaj
#chub'anik x-in-u-kik'-isa-j
on.purpose CMP-1sgB-3sgA-bleed-ISA-SM
'#He bled on me on purpose'

Thus, it appears that the subject of the ISA-form retains its Experiencer θ-role, and moreover, the promoted object is not construed as being an Agent/Causer either; it too retains its Goal θ-role.

The promoted object is a true syntactic object in all senses. For instance, it triggers Set B absolutive agreement and it can be passivized, (11), a process which is restricted in K'iche' to true verbal objects.

(11) xxojisax la mesa (rumaal la a Xwan)
x-∅-xoj-isa-x la mesa (rumaal la a Xwan)
CMP-3sgB-vomit-ISA-PASS DET table (RN.3sg DET MASC John)
'The table was thrown up on (by John)'

Lastly, there is a restriction on the type of object for the ISA-form: only definite objects are allowed. With the relational noun, both definite and indefinite objects are permitted.[10]

(12) a. xinxoj chirij (ri) me's
x-in-xoj chirij (ri) me's
CMP-1sgB-vomit RN.3sg DET cat
'I threw up on the/a cat

[8]This form is probably technically a Purpose clause, meaning something like "in order to do it".

[9]Note that these phrases are not ungrammatical. They have the pragmatically odd reading in which 'he purposely bled on me'. Importantly, this reading is equally available independently of the ISA-form, and there is no additional reading invoked in the ISA-form that is compatible with the causative morpheme.

[10]I understand the lack of a determiner to signal indefiniteness, although in all fairness, definiteness is poorly understood in K'iche'. It may be that the relevant property is more accurately described as "specificity".

b. xinxojisaj *(ri) me's
x-∅-in-xoj-isa-j *(ri) me's
CMP-3sg.B-1sg.A-vomit-ISA-SM DET cat
'I threw up on the cat'

(13) a. xun la tz'i' chikij (ri) ixoq'ib'
x-∅-wun la tz'i' chikij (ri) ixoq'ib'
CMP-3sgB-howl DET dog RN.3pl DEF women
'The dog howled at (the) women'

b. xu'wunisaj *(ri) ixoq'ib' la tz'i'
x-ee-u-wun-isa-j *(ri) ixoq'ib' la tz'i'
CMP-3plB-3sgA-howl-ISA-SM DEF women DET dog
'The dog howled at the women'

With the relational noun in (12a) and (13a), the definite determiner *ri* can be present or omitted, and give rise to the reading 'I threw up on the cat' or 'I threw up on a (unspecified) cat', respectively. With the ISA-form, however, only the definite form is permitted, and the ISA-form can only be used to express 'I threw up on the cat'.

To summarize the Dative Alternation: 1) An oblique Goal can be promoted to the status of core object. 2) Only Verbs of Emission, which are internally caused, are able to undergo this alternation. 3) There is no causative meaning diagnosable with the ISA-form; all arguments retain their θ-roles. 4) Promoted objects must be definite.

5 Psych-verbs

Finally, a small set of psychological predicates alternate between a causative and non-causative form. The complete list of verbs is given in Table 4, and examples of each are given in (14)-(16).

plain-form		**isa-form**	
na'	'remember, sense'	*na'tisa*	'remember'
achik'	'dream'	*achik'isa*	'dream'
loq'	'love'	*loq'isa*	'love'

Table 4: Three psych-verbs which can occur with *-isa*

(14) a. kuloq'aj la ali Maria la a Xwan
k-∅-u-loq'-aj la ali Maria la a Xwan
INCMP-3sgB-3sgA-love-SM DET FEM Maria DET MASC John
'John loves Maria'

b. kuloq'isaj la ali Maria la a Xwan
k-∅-u-loq'-isa-aj la ali Maria la a Xwan
INCMP-3sgB-3sgA-love-ISA-SM DET FEM Maria DET MASC John
'John loves Maria'

(15) a. xatinwachik'aj
x-at-inw-achik'-aj
CMP-2sgB-1sgA-dream-SM
'I dreamed about you'

b. xatinwachik'isaj
x-at-inw-achik'-isa-j
CMP-2sgB-1sgA-dream-ISA-SM
'I dreamed about you'

(16) a. xna'tal ri ab'i chwee
x-∅-na't-al ri ab'i chwee
CMP-3sgB-remember-PART DET your.name RN.1sg
'I remembered your name'

b. xinna'tisaj ri ab'i
x-∅-in-na't-isa-j ri a-b'i
CMP-3sgB-1sgA-remember-ISA-SM DET 2sgA-name
'I remembered your name'

Before getting to the differences between the alternations above, I first note that psych-verbs are also classified as Internally Caused, as they are not brought about not by means of an external force. As such, they too fall under the ICR in (5).

Observe also that two of the three verbs above, *loq'*, 'love'[11] and *achik'*, 'dream', are actually transitive, triggering ergative agreement in both the plain and ISA-form. On its surface this straightforwardly contradicts the generalization that *-isa* can only attach to intransitive verbs.

Speakers report no clear distinction between the (a) and (b) forms above, although *loq'isa*, 'love.ISA' can sometimes have a more emphatic meaning. Speakers will sometimes report that (17b) means "John *really* loves Maria". This emphatic reading is not always present/salient with *loq'*, and it is apparently never present with 'dream' and 'remember'.[12]

Like with the Dative Alternation, the subject retains its Experiencer θ-role in both the plain and ISA-form. Here, the addition of the adverbial *chub'anik*, 'on purpose', results in ungrammaticality.[13]

[11] *Loq'* is homophonous with the verb for 'buy'.

[12] It's unclear to me yet what triggers this emphatic reading. While emphatic readings for causatives are cross-linguistically well-attested (cf Aikhenvald (2011)), an emphatic reading for *-isa* is actually generally not available in any context except those just discussed. But see also the iterative use discussed in the conclusion to this paper.

[13] In contrast to this test with the Dative Alternations, speakers uniformly reject these sentences. That is, there is nothing that can pragmatically save these here.

(17) a. * chub'anik kuloq'aj la ali Maria la a Xwan
chub'anik k-∅-u-loq'-aj la ali Maria la a Xwan
on.purpose INCMP-3sgB-3sgA-love-SM DET FEM Maria DET MASC John

b. * chub'anik kuloq'isaj la ali Maria la a Xwan
chub'anik k-∅-u-loq'-isa-aj la ali Maria la a Xwan
on.purpose INCMP-3sgB-3sgA-love-ISA-SM DET FEM Maria DET MASC John

Na', 'sense, remember' is slightly different in that it alternates between an intransitive, stative form, and the transitive eventive ISA-form. A literal translation of (16a) is something like 'Your name was being remembered to me'.

An important factor discussed in many analyses of psych-verbs is the argument structure. It has been proposed that for certain verbs, the surface object is actually the logical subject, e.g., "please"-class verbs (Belletti and Rizzi 1988; Pesetsky 1995). In such an analysis, the surface object is the cause or source of the surface subject's mental state, and so is merged as the "deep" subject, and then subsequent movement derives the surface word order. Under this hypothesis, we might derive the difference between the plain and ISA-form as similar to the difference between "fear" and "scare", e.g., 'John fears snakes' and 'Snakes scare John', where "scare" means 'cause to fear'.

This analysis is difficult to extend to K'iche'. In both cases, the surface subject can bind a reflexive anaphor, suggesting that the surface grammatical relations are the underlying grammatical relations.[14] (Note that reflexive anaphors are Relational Nouns. Thus the verb will remain transitive, as it still has a nominal object.)

(18) a. kinloq'aj wib'
k-∅-in-loq'-aj wib'
CMP-3sgB-1sgA-love-SM RN.1sg
'I love myself'

b. kinloq'isaj wib'
k-∅-in-loq'-isa-j wib'
CMP-3sgB-1sgA-love-ISA-SM RN.1sg
'I love myself'

Furthermore, the surface object can be passivized for both the underlyingly transitive verbs.[15]

(19) a. xlooq' la ali Maria (rumaal la a Xwan)
x-∅-looq' la ali Maria (rumaal la a Xwan)
CMP-3sgB-love.PASS DET FEM Maria RN.3sgB DET MASC John
'Maria was loved'

[14] In fact, the oblique subject of *na'*, 'sense, remember', can bind a reflexive object as well. Munro (2008) details further subject properties of oblique subjects in K'iche'.

[15] Passives in K'iche' are formed in one of two ways: if the verb stem consists of two or more syllables, then a suffix *-x* is affixed. Otherwise, the vowel of the verb root is lengthened.

b. xloq'isax la ali Maria (rumaal la a Xwan)
x-∅-loq'-isa-x la ali Maria (rumaal la a Xwan)
CMP-3sgB-love-ISA-PASS DET FEM Maria RN.3sgB DET MASC John
'Maria was loved'

If *Maria* were actually a subject in (19b), it would be surprising that passivization could promote it to a subject position on the surface.

Moreover, it's notable that we do not see a change in grammatical relations between plain and ISA-form. That is, the grammatical roles of each argument remain constant, regardless of whether *-isa* is employed. If this were parallel to the "fear/scare" alternation, then we might expect to see a reversal of grammatical roles here. Thus, I find it implausible that there is a distinct causative difference resulting from differences in argument structure between the plain and ISA-forms.

And as a final descriptive comment, like the Dative Alternation, the ISA-form requires the object to be definite.

(20) a. xinwachik'aj (ri) ixoq'ib'
x-ee-inw-achik'-aj (ri) ixoq'ib'
CMP-3plB-1sgA-dream-SM DET women
'I dreamed about (the) women'

b. xinwachik'isaj *(ri) ixoq'ib'
x-ee-inw-achik'-isa-j *(ri) ixoq'ib'
CMP-3plB-1sgA-dream-ISA-SM DET women
'I dreamed about the women'

The phrase in (20b) cannot have an indefinite object, while (20a) can.

To review the properties of psych-verbs: 1) *-isa* attaches to three psych-verbs, two of which are transitive in both forms. 2) There is no obvious causative semantics, and no Agent/Causer introduced. 3) *-isa* imposes definiteness restrictions on the object.

6 Analysis: the sensitivity to syntax

A proper account of *-isa* must explain at least these three things.

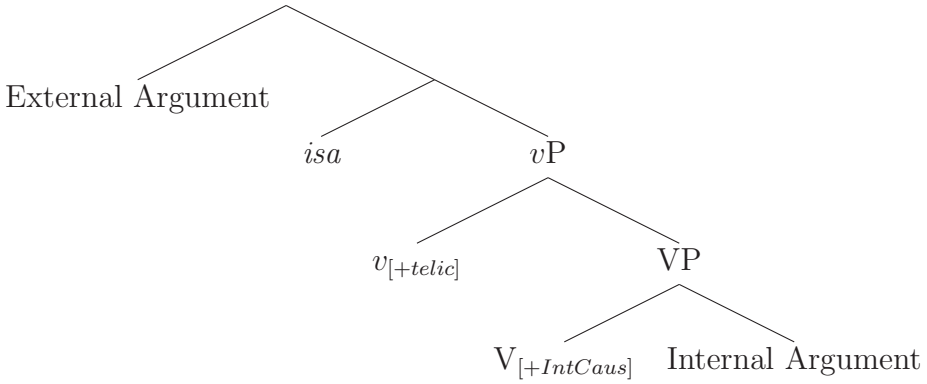
1. Why *-isa* is restricted to verbs of Internal Causation.
2. Why *-isa* does not appear to restrict the θ-role of its argument? (Or why doesn't *-isa* always entail a causative reading?)
3. Why does *-isa* impose definiteness restrictions on certain objects.

I propose that the disparate properties discussed above can be unified in the generalization in (1), repeated here in (21).

(21) *-isa* only attaches to telic predicates which are Internally Caused.

I further propose that the descriptive properties of (21) are translatable into the syntactic configuration sketched in (22).

(22)



The idea is that *-isa* spells out the head that introduces the external argument only when the relevant properties of its *v*P complement have been met. The two relevant properties are, 1) the root must have the semantics of Internal Causation, defined earlier; and 2) the predicate must be telic. I address each of these properties in turn.

First, the need for the Internal Causation clause in (21) is empirically justified in the three classes of predicate examples above: the Causatives, the Dative Alternation, and the Psych-verbs are all Internally Caused. Moreover, we saw that verbs which are not internally caused, like *pax*, 'break', or *ripip ch-X-e*, 'fly at X', cannot take *-isa* to introduce their external argument, as these predicates don't qualify as being able to arise "spontaneously", i.e., without external effort.

Furthermore, we can test this restriction by adjusting the context to make an otherwise Internally Caused verb into an Externally Caused verb. For instance, the verb *xub'xut*, '(bird) to whistle' participates in the Dative Alternation. However, *xub'xut* can also be used to mean '(human) whistle', as if to get someone's attention. In this context, the Dative Alternation is not permitted; only the version with the Relational Noun is allowed.

(23) [Context: Maria sees me walking down the street and wants to get my attention.]

a. kaxub'xut la ali Maria chwij

k(a)-∅-xub'xut la ali Maria chwij
INCMP-3sgB-sing DET FEM Maria RN.1sg

'Maria is whistling at/to me'

b. * kinuxub'xutisaj la ali Maria

k-in-u-xub'xut-isa-j la ali Maria
INCMP-1sgA-3sgB-sing-ISA-SM DET FEM Maria

Because whistling to get someone's attention is an agentive act that cannot arise without external effort, *-isa* cannot be used to introduce the external argument.

The telicity requirement is more subtle and requires a more formal explanation. First, recall that the verbs in Table 1 are ambiguous between stative and inchoative readings. *Num* can mean either 'be hungry' or 'get hungry'. I propose that *-isa* attaches onto the inchoative form of this verb, thus ensuring that these are bounded events. Normally, inchoative morphology is silent, but K'iche' contains a limited number of "pure" adjectives. These

adjectives can be verbalized to form inchoatives. The adjective *chom*, 'fat' forms a verb *chomar*, 'to become fat', and the adjective *chaq'*, 'ripe', forms an inchoative verb *chaq'ij*, 'to get ripe'.[16] Crucially, the transitive forms of these verbs include this verbalizing element.[17]

(24) a. xuchomarisaj la ak'
x-∅-u-chom-ar-isa-j la ak'
CPM-3sgB-3sgA-fat-INCH-ISA-SM DET pig
'He fattened the pig'

b. xu'chaq'ijisaj la ooj la q'ij
x-ee-u-chaq'-ij-isa-j la ooj la q'ij
CMP-3plB-3sgA-ripe-INCH-ISA-SM DET avocado DET sun
'The sun ripened the avocado.

Thus, we have evidence that the causative use of *-isa* attaches to inchoative verbs.

However, we would still like to know how many events there are. That is, there is the possibility that *-isa* comes with an additional event on top of the inchoative event (cf Levin and Rappaport-Hovav (1995), among others). That is, how do we know that the causative form of the verbs are not "cause to become X"? Event modification tests suggests that both the inchoative and causative forms have the same number of events. Under the hypothesis that *-isa* introduces a causative event on top of the inchoative event, then we predict that there should be two targets for modification by adverbials: the causative and the inchoative event. I provide two tests showing that there is only one event.

First, (25) reveals that attempts to directly modify both events results in ungrammaticality.[18]

(25) * no'jim xuk'atisaj la ja la a Xwan chanim
no'jim x-∅-u-k'at-isa-j la ja la a Xwan chanim
slow CPM-3sgB-3sgA-burn-ISA-SM DET house DET MASC John fast
'[intended: 'John slowly caused the house to burn to quickly']

Note that no amount of contextualization can save (25); it is unambiguously bad. A second test for two events is given in (26), which has a continuation.

(26) no'jim xuk'atisaj la ja la a Xwan (#i chanim xk'atik)
no'jim x-∅-u-k'at-isa-j la ja la a Xwan (#i chanim
slow CPM-3sgB-3sgA-burn-ISA-SM DET house DET MASC John (and fast
x-∅k'at-ik)
CMP-3sgB-burn-SM)

[16] According to Larson (1988) the morphemes used to form the inchoatives are idiosyncratic and lexically determined. (Thanks to Jessica Coon for suggesting that I investigate this.)

[17] Note further that *tz'il*, 'dirty', with inchoative *tz'iloj*, 'get dirty' does not form a causative with *-isa*. The transitive form is homophonous with the inchoative: *tz'iloj*, 'make dirty'. This is predicted by the fact that *-isa* only attaches to Internally Caused predicates, and 'get dirty' is not Internally Caused. Moreover, this undermines an "elsewhere" condition story for *-isa* (suggested by Heidi Harley, p.c.), where *-isa* spells out a v that is not directly root-attached.

[18] A sentence final adverb is generally degraded, but not ungrammatical. The canonical place for adverbs is preverbally.

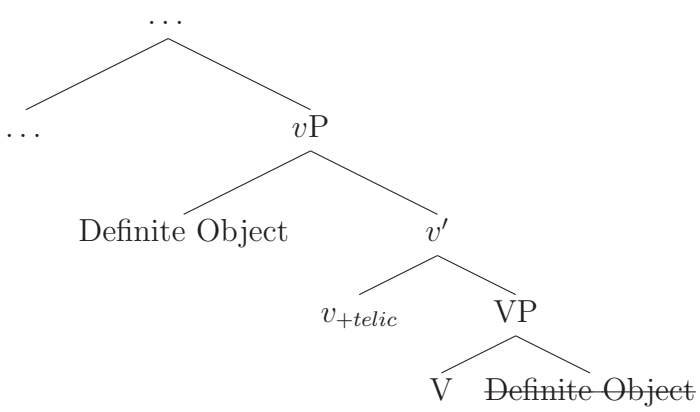
'John burned the house slowly (#and it burned quickly)'

If the adverb *no'jim*, 'slow' can modify the causation event, we should expect a felicitous reading of this phrase, where John sets the house on fire quickly, but the house burns slowly. Speakers uniformly reject this phrase as a contradiction, indicating that the adverb in both cases is modifying the same (inchoative) event.

For both of these tests, if there are two events – a causation event and an inchoative event – then we expect to be able to pick out both of them. While I do not think that these tests are conclusive, they are at least highly suggestive that there is only event even with the causative, and that *-isa* attaches to an already eventive – inchoative – predicate, thus satisfying the restriction in (21) that *-isa* only attaches to telic vPs.

The question now arises of how the telicity restriction manifests in the other predicates, that is, the Dative Alternation and the Psych-verbs. I suggest that the definiteness of the object ensures the telicity here. It is well-known that there is an interaction between the definiteness of the object and the (lexical) aspect of the predicate (Tenny 1987). A great deal of recent work has shown that there is a low projection, around vP, that mitigates this event structure (Borer 2005; MacDonald 2006; Travis 2010). I'll assume for ease of exposition that v is the projection that controls the aspectual information. I propose that definite objects are required to move to spec-vP, and this movement sets the telicity of the vP.[19]

(27)



[19]See Coon (2010) for arguments from Chol, a related Mayan language, that definite objects necessarily move out of the verb phrase. She shows that VOS order is contingent on the object not being definite, while VSO order requires the object to be definite. The facts in K'iche' appear to be more complicated than Chol's, as VOS order is permitted with definite objects, but the basic analysis should be similar, I expect.

There are two pieces of evidence supporting this movement. The first piece of evidence comes from word order. While K'iche' is canonically VOS, it does permit VSO word order under certain circumstances. One prerequisite for VSO order is that the object must be definite.[20]

(28) xu'kamisaj la a Xwan *(ri) me's

x-ee-u-kam-isa-j la a Xwan *(ri) me's
CMP-3plB-3sgA-die-ISA-SM DET MASC John DEF cat

'John killed the cats'

Assuming that verb-initial order results from VP-fronting in Mayan, then the VSO order results from the object moving out of VP prior to remnant movement of the verb phrase. Crucially, definite objects are required to undergo this movement (although further movements may obscure this at the surface). (See Coon (2010) for precisely such a proposal in Chol.)

Second, modification with adverbials that target events shows that with the Dative Alternation, the event structure is more localized. The addition of *laj*, 'almost' results in two readings when the Relational Noun is used, but only one when the ISA-form is used.

(29) a. laj xwun la tz'i' chwij

laj x-∅-wun la tz'i' chwij
almost CMP-3sgB-howl DET dog RN.1sg

a. 'The dog almost howled at me.' (The dog didn't howl.)
b. 'The dog almost howled at me.' (It howled at someone else.)

b. laj xinuwunisaj la tz'i'

laj x-in-u-wun-isa-j la tz'i'
almost CMP-1sgB-3sgA-howl-ISA-SM DET dog

a. 'The dog almost howled at me.' (The dog didn't howl)
b. ~~'The dog almost howled at me.' (It howled at someone else.)~~

In (29a), we can get both a counterfactual reading ('the dog didn't howl') and a negated end-state ('the dog missed it's howling target'). Presumably this is because the end of the event is located on the Relational Noun in (29a) (MacDonald 2006). In contrast, in (29b), only the counterfactual reading is available. Under the account proposed here, this is because the end of the event is a function of the interaction between the object and v, and so is not an adequate target for modification. The start of the event, though, merges as normal, and so can be targeted by *laj*.

Thus, we can account for the telicity restriction with the Dative Alternation and the Psych-verbs: it is a consequence of an interaction between the object and the event structure. However, we are not left with the puzzle of what *-isa* is actually doing in the structure. If it's not a causative, and doesn't introduce a specified θ-role, then what is its purpose?

[20]There are other restrictions as well, including something like an animacy hierarchy restriction. Furthermore, while I claim that this is a definiteness effect, in actuality, it may be specificity rather than definiteness. I leave these issues for further research.

Following Kratzer (1996) and much subsequent work, we might call *-isa* the realization of Voice, which introduces an external argument. This is acceptable so long as we bleach the semantics of Voice to allow any type of θ-role, not just Agents, Causers, but even Instruments and Experiencers. Given this general acceptance of any θ-role, I think it's more appropriate to call this an Applicative merged above the verbal domain (Schäfer 2008; Kim 2011; Alexiadou et al. 2015). Appl gets spelled-out as null in most cases, but given the precise syntactic conditions, i.e., telicity and Internal Causation, the spell-out of Appl is *-isa*.

To summarize the analysis, *-isa* is not a "causative" morpheme. Rather, it appears to introduce an external argument when a specific syntactic/semantic configuration is achieved. Namely, when the semantics of the verb are those of Internal Causation, and also when v bears something like a [+telic] feature. The latter requirement can be the result of the inherent boundedness of the event, or from an interaction with event structure and a definite object. In either case, *-isa* is the result of deterministic properties of the syntax/semantics.

7 Discussion

Can we reduce (21) to a more specific syntactic configuration? In particular, could we say that *-isa* appears to introduce the external argument whenever v contains a specifier? This is a tempting alternative, as we could adopt the arguments in Levin and Rappaport-Hovav (1995), who claim that Internally Caused verbs are actually unergative. Under such an assumption, we might plausibly merge the subjects of the intransitive verbs in Table 1 in spec-vP (as opposed to comp-VP for Table 2). Thus, we could reduce the descriptive generalization to "*-isa* spells out the head that introduces the external argument whenever spec-vP is filled". This proposal would actually make the morphological operation here fall more in line with Embick (2004)'s proposal for Greek. He argues that non-active verbal morphology appears whenever there is "unaccusative syntax", which for him is whenever spec-vP is empty. Thus, K'iche' could be argued to be the converse of Greek, in that a special morphological form is required only when spec-vP is occupied.

The difficulty here would be to keep the system from over-generating. We would have to explain why definite objects of the verbs in Table 2 don't trigger *-isa*. That is, we would have to stipulate that these objects don't pass through spec-vP on their way out of the verb phrase. We would be trading one stipulation concerning a feature like [+Internal Causation] with a stipulation concerning object movement. This is partly an empirical concern, but it may also just be one of theoretical preference.

Still, there are reasons to believe that (21) is on oversimplification, particularly with respect to Internal Causation. There is one last use of *-isa* that appears to undermine the need for an Internally Caused root. Attaching *-isa* to some verbs yields an Iterative reading, that it is, a sequence of repeated events. A non-exhaustive list is given in Table 5, and an example is given in (30).

(30) a. xuq'at la kexu
x-∅-u-q'at la kexu
CMP-3sgB-3sgA-cut DET cheese
'He cut the cheese'

non-iterative		**iterative**	
kach'	'bite'	*kach'isa*	'bite repeatedly'
ch'ey	'hit'	*ch'eyisa*	'hit repeatedly'
pax	'break'	*paxisa*	'break repeatedly'
q'at	'cut'	*q'atisa*	'cut repeatedly'
pach'	'squash'	*pach'isa*	'squash repeatedly'
...		...	

Table 5: Verbs that get an iterative reading with *-isa*

b. xuq'atisaj la kexu

x-∅-u-q'at-isa-j la kexu
CMP-3sgB-3sgA-cut-ISA-SM DET cheese

'He cut the cheese many times'

The telicity requirement is clearly satisfied by the types of predicates here. However, it is less clear how the Internal Causation requirement is satisfied. If we could find a structural connection between iterativity and Internal Causation, then an overall structural analysis might be preferable over a [+Internal Causation] feature, suggested above. It is not obvious to me that such a connection exists, though, and so further work on the syntax and semantics of iterativity will be needed to decide if this is the right solution. Furthermore, it is not clear to me how productive the iterative use of *-isa* is. Iterative uses always appear to compete with a reduplicated form of the verb, which is generally judged as "better" (i.e., prescriptively more correct K'iche') than the *-isa* form. So speakers prefer (30b) with the verb form *xuq'atatej*, 'he cut (repeatedly)', although will readily accept and offer (30b) as an alternative "slang" use. An investigation into the historical development of causativity in Mayan, and the uses of the cognate causative marker in related Mayan languages should be informative towards this point.

Nonetheless, I have provided here a unified analysis of three disparate uses of the morpheme *-isa* in K'iche'. Empirically, it seems clear that *-isa* cannot be purely a causative morpheme: it does not always have causative semantics. Such "non-causative causatives" have been noted (Aikhenvald 2011), but an analysis that can capture such uses is not trivially implemented. I have suggested here that the appearance of *-isa* is determined as a function of the syntax. Specifically, *-isa* appears whenever the verb is Internally Caused and the event is telic. If such an analysis is on the right track, then other appearances of non-causative causatives might be given a similar syntactico-semantic analysis.

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The 'Whole' Story of Partitive Quantification

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1 Introduction

This paper defends a new theory of the Logical Form (LF) of quantity-denoting expressions that appear in and define the structure of the determiner phrase in English (henceforth, DP quantifiers). This class of expressions includes, but is not limited to, those in (1), which are the DP quantifiers on which I focus my attention in this paper.

(1) **DP Quantifiers**
every, *each*, *both*, *many*, *few*, *some*, *several*, *a* (*one*), *two*/*three*/etc., *no* (*none*), *all*, *most*[1]

As is well known, these expressions have three distinct surface structures, appearing alternately with (a) a nominal complement (Q+NP), (b) a nominal complement embedded in a partitive PP (Q+PP), or (c) no apparent nominal complement at all (the so-called 'bare' uses) as shown in (2).

(2) a. Q+NP: {Every/Each/Both/Many/Few/Some/Several/A/Two/No/All/Most} {man/men} walked to the store.
b. Q+PP: {Every one/Each (one)/Both/Many/Few/Some/Several/One/Two/None/All/Most} of the men walked to the store.
c. Bare: {Every one/Each (one)/Many/Few/Some/Several/One/Two/None/All/Most} walked to the store.

Since early work in Generalized Quantifier Theory (GQT), the traditional approach to DP quantifiers has assumed that their LF mirrors the Q+NP surface structure (cf., among many others, Barwise and Cooper 1981 and Keenan and Stavi 1986). Under this approach, quantifiers behave syntactically as determiners taking NP complements and semantically as relations between sets, as shown in Figure 1 on the following page.

Recent literature suggests instead that the LF of DP quantifiers mirrors the Q+PP surface structure such that these expressions c-command an NP embedded in a partitive PP. After briefly reviewing this existing work, the present paper advances two novel arguments in support of this partitive structure. Importantly, where previous proposals limit (to varying degrees) the scope of the partitive structure to only a subset of the expressions in (1), the evidence I contribute suggests that *all* of these expressions are necessarily partitive at LF. I then advance a novel analysis of the syntax and semantics of the partitive structure, one that

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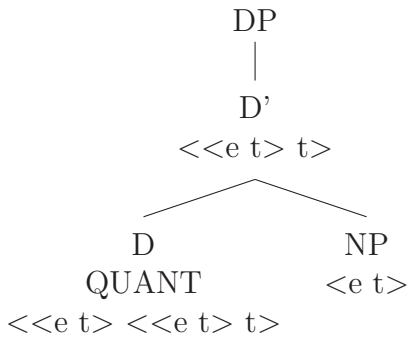
[1]I assume unproblematically that *one* and *none* are variants of *a* and *no*, respectively, that appear when these quantifiers take overt partitive PP complements or when they appear bare at surface structure.

Figure 1: DP Quantifiers under GQT



takes into consideration the fact that not all DP quantifiers combine with the partitive PP in the same way at surface structure. Finally, I review some of the independent benefits of the analysis, noting in particular how it accounts for the behavior of quantifiers with group- and individual-denoting predicates.

2 Arguments for the partitive structure

This section surveys the reasons for stipulating an underlying partitive structure for DP quantifiers, reviewing existing work before advancing two novel arguments.

2.1 Existing arguments

2.1.1 Crosslinguistic evidence (Matthewson 2001)

Matthewson (2001) makes a case for the partitive structure of quantification on the basis of crosslinguistic evidence from St'át'imcets (Lillooet Salish). In St'át'imcets, quantifiers necessarily take DP, and not NP, complements at surface structure, as the data in (3) show (from Matthewson 2001:150-1, her examples 7 and 8).

(3) a. léxlex tákem i smelhmúlhats-a.
intelligent all DET.PL woman.PL-DET
'All (of the) women are intelligent.'

b. *léxlex tákem smelhmúlhats.
intelligent all woman.PL
'All women are intelligent.'

c. cw7it i smelhmúlhats-a léxlex.
many DET.PL woman.PL-DET intelligent
'Many (of the) women are intelligent.'

d. *cw7it smelhmúlhats léxlex.
many woman.PL intelligent
'Many women are intelligent.'

Matthewson observes that English quantifiers also indirectly take DP complements when they combine with a partitive PP: given the Partitive Constraint (cf., among others, Jackendoff 1977, Selkirk 1977, Ladusaw 1982, and Barker 1998), the complement of the partitive PP is a definite DP. She therefore concludes that the best proposal for the universal structure of DP quantifiers stipulates that their complement at LF is not a bare NP but a partitive PP. She further argues that the head of the partitive PP, *of*, is semantically vacuous, which in turn explains the surface facts of Q+DP structures in St'át'imcets and Q+NP structures in English.

2.1.2 Evidence from anaphora (Gagnon 2013)

Gagnon (2013) also argues for a partitive quantifier structure on the basis of evidence from anaphora in English. He argues that bare uses of quantifiers cannot be analyzed as cases of nominal ellipsis (as the Q+NP structure obliges) and must instead be analyzed as cases of partitive ellipsis, offering the scenario in (4) as an example (2013:317, his example 4).

(4) I arrived at class ten minutes before the start. There were boyscouts (X) and girlscouts (Y) standing at their desks. Then, ten young boys (Z) walked in whistling. Many sat down.

Many in the final sentence of (4) may refer to the set of boys who just walked in (Z) or to the entire set of students in the class ($X \cup Y \cup Z$) but not to the total set of boys ($X \cup Z$). Gagnon notes that this is at odds with what we would expect if the elided constituent were just the noun *boys* and instead mimics an elided partitive pronominal.

(5) Many sat down. (Z; $X \cup Z$)
   a. $\neq$ Many boys sat down. ($X \cup Y \cup Z$)
   b. $=$ Many of them sat down. (Z; $X \cup Z$).

While Gagnon is on the right track with this argument, I will argue that scenarios such as these are more complicated than they need to be to prove the general point that anaphoric uses of DP quantifiers often, if not always, require DP antecedents; more on this in §2.2.1.

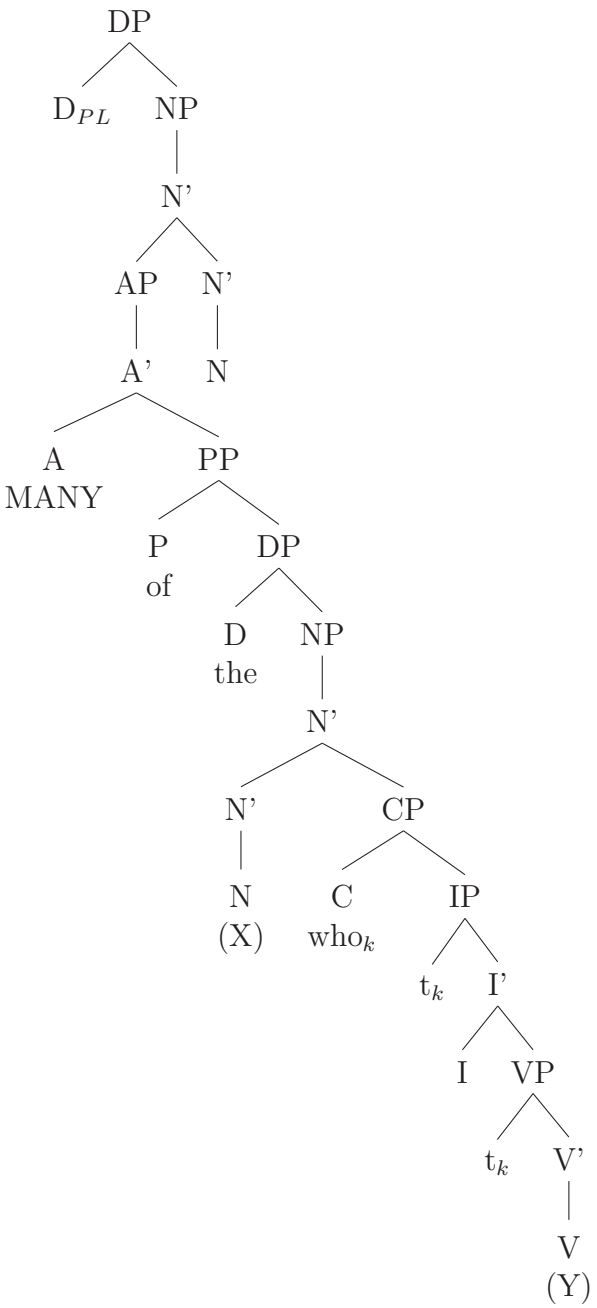
2.1.3 Quantifier ambiguity (Greer 2014b)

My account of the ambiguity of *many* and *few* in Greer (2014b) also indirectly supports a partitive structure for DP quantifiers. As Westerståhl (1985) originally noted, *many* and *few* allow an interpretation wherein the semantic arguments 'reverse' the ordering of the sentential predicates: where the set denoted by the noun normally represents the restrictor of the quantifier and that denoted by the verb its scope (the proportional reading), the set denoted by the verb represents the restrictor and that denoted by the noun the scope in the so-called 'reverse' reading. The possibility of this latter reading is especially evident in Westerståhl's original example, given in (6).

(6) Many Scandinavians have won the Nobel Prize.
   a. Proportional: Many *of the Scandinavians* have won the Nobel Prize.
   b. Reverse: Many *of the people who have won the Nobel Prize* are Scandinavian.

In Greer (2014b), I attribute this ambiguity to a variable, contextually-determined domain (represented as a variable at LF per arguments for Hidden Indexicality in, e.g., Stanley 2000 and Stanley and Szabó 2000). If we assume, as is standard, that the syntactic complement of the quantifier maps into its first semantic argument (the syntax-semantics mapping hypothesis advocated in, e.g., Diesing 1992), then a Q+NP LF is too rigid to accommodate the variable domain of quantifiers like *many* and *few*. Instead, I argue that this position is occupied by a PP dominating variable, contextually-resolved content. This PP then effec-

Figure 2: The structure of *many* and *few*



tively displaces the overt N from the c-command domain of the quantifier at LF, obliging the quantifier to combine with this noun as an adjunct. This structure is sketched in Figure 2 on the previous page (from Greer 2014b:333; D', C', and P' levels have been omitted for reasons of space).

2.2 Further arguments

Extant arguments for the partitive structure of DP quantifiers are, in one way or another, limited in their scope. Matthewson is in favor of adopting the partitive structure for all DP quantification in all natural languages, but she admits that her analysis of the structure of the PP encounters difficulty with *every* (more on this below). Gagnon, on the other hand, argues that only some quantifiers (those that may appear bare) have a partitive structure, and then only some of the time, hence advocating a kind of structural ambiguity (cf. Gagnon 2013:326), and Greer (2014b) makes a case only for the partitive structure of *many* and *few.*

In what follows I present arguments in support of the much stronger claim that *all* the DP quantifiers of (1), including the problematic *every*, have a Q+PP structure at LF *all the time*. These arguments are of two types: the first is fundamentally syntactic, citing evidence from Wh-questions and anaphora, and the second is pragmatic, citing evidence from quantifier presuppositions.

2.2.1 A syntactic argument: Evidence from Wh-questions and anaphora

Facts from Wh-extraction suggest that all DP quantifiers are necessarily associated with *of* at some level of structure. It is impossible to extract out of a quantified object, even one with an antecedent Q+NP structure, without a residual *of* in the extraction site, as the examples in (7) show (the $^{+}$ annotations on the indices signal a caveat that I explain immediately below).

(7) a. I sold {every/each} $[_{NP}$ book$]_{k^+}$.
What$_k$ did you sell {every/each} *(one of) t$_k$?

b. I sold {both/many/few/some/several/a (one)/two/no/all/most} $[_{NP}$ book(s)$]_{k^+}$.
What$_k$ did you sell {both/many/few/some/several/one/two/none/all/most} *(of) t$_k$?

If we assign quantifiers the traditional Q+NP LF, it is unclear how we should handle *of* in the examples in (7), but if we instead assign them a Q+PP structure, this *of* is simply an overt manifestation of this underlying structure that, while optional in declaratives, is obligatory in Wh-extraction contexts.

One might suggest that we can retain the underlying Q+NP structure and posit a rule of *of*-insertion to account for the data in (7). This will not do, however, as this preposition is not the only curious feature of the questions in (7). The simple NP *book*(*s*) does not suffice as an appropriate response to these questions, hence the annotations on the indices in the declaratives of (7). Instead, appropriate responses to these questions would be full DPs like *the books*, *those books*, *my books*, or *the books that I was trying to sell*. If we assume that the declarative on which these questions are based contains a Q+NP structure, the origin of these DP responses is entirely mysterious. Given a Q+PP structure, however, a full DP such as this *does* form part of the underlying structure of the declarative, as shown in (8).

(8) I sold {every one/each (one)/both/many/few/some/several/one/two/none/all/most} $[_{PP}$ of $[_{DP}$ the $[_{NP}$ books (that I was trying to sell)]]$_k$].

Because it can account for both the appearance of the preposition and the structure of the anticipated response, an account of the Wh-question data in terms of syntactic ellipsis is preferable to an alternative, *of*-insertion account of the kind that must inevitably accompany the Q+NP structure.

In fact, when we consider the Wh-question data in combination with the bare quantifier data of Gagnon (2013), what emerges is that anaphoric uses of quantifiers *in general* require DP antecedents. As I mentioned in the discussion of Gagnon's data, it is not actually necessary to set up scenarios wherein there are multiple possible sets that an anaphoric quantifier could refer to to prove this point. Even in scenarios with only one salient antecedent set, an anaphoric quantifier is most naturally reconstructed with a definite DP of some kind. In (9), for instance, reconstructing the sentence with a bare NP sounds odd with the desired interpretation that the sets sold were the ones the speaker owned.

(9) I used to own all of the Star Wars Lego sets. I played with them all the time.
   a. But, {many/most} got sold last year at our garage sale.
   b. {Many/Most} {?Star Wars Lego sets/of them/of the sets I owned} got sold last year.
   c. But, {every (single) one/each one} got sold last year at our garage sale.
   d. {Every (single)/Each} {?Star Wars lego set/one of them/one of the sets I owned} got sold last year.

That anaphoric uses of quantifiers should ever require DP antecedents is a desirable result as it shows that DP quantification in English operates just like what Matthewson has observed for St'át'imcets.[2] Independently of Matthewson's crosslinguistic argument, then, evidence from anaphoric quantifiers in English shows that the Q+PP structure is the best representation of the underlying form of these expressions.

2.2.2 A pragmatic argument: Evidence from quantifier presuppositions

A different kind of argument for the Q+PP structure of DP quantifiers follows from their pragmatic structure. In Greer (2014b), I propose that context has two distinct truth-conditional effects on the interpretation of DP quantifiers: one is in determining the domain of quantification (given that some quantifiers are ambiguous between nominal- and verbal-domain readings, as reviewed in §2.1.3 above), and the other is in restricting that domain to a relevant subset of the universe. I conclude that these two effects must be represented as variables at LF given Stanley's claim that "all truth-conditional effects of extra-linguistic context can be traced to LF" (Stanley 2000:391; cf. also Stanley and Szabó 2000:229). I further argue that the contents of these variables correspond to the contents of existential presuppositions that are salient in the context. In essence, this means that the contextual variables correspond to sets whose existence is presupposed in the discourse (or simply 'presupposed sets'): the content of the domain variable corresponds to the set denoted by either

[2]It is important to notice that this discussion has shown that *every*, too, obliges DP antecedents, and this is in contrast to Matthewson's suggestion that *every* may never operate over DPs (cf. Matthewson 2001:176).

the nominal or the verbal predicate, and that of the domain restriction variable corresponds to a superset of the non-domain predicate (cf. Greer 2014b:323-8 for details). Importantly, this amounts to the claim that DP quantifiers presuppose the existence of two sets: one representing the domain and one representing the domain restriction.[3]

The definite article *the* can also be understood as presupposing two sets. Under the Strawsonian view (cf. Strawson 1950), *the* presupposes the existence and uniqueness of the denotation of its complement noun.[4] To accomplish this latter presupposition, we need a domain that the noun can be unique *in*, and this is often not reflected in the overt syntactic structure. For instance, if we utter,

(10) The door is open.

we do not presuppose (or, much less, assert) that there is only one (=unique) door in the entire universe but rather that there is only one door in *some salient domain*. This is often referred to as the problem of "incomplete description": the description of the intended referent in (10) is lacking information to specify it uniquely. One promising solution to this problem is to propose that there is a variable that associates with the nominal complement of the definite article as a modifier (syntactic adjunct) such that the structure of (10), for instance, is actually something like that in (11).

(11) $[_{DP}\,[_{D}\,\text{The}]\,[_{NP}\,[_{N'}\,[_{N}\,\text{door}]\,]\,[_{CP}\,X]\,]\,]\,]$ is open.

As with the variables in the structure of DP quantifiers, the value of this variable corresponds to the content of a salient existential presupposition of the discourse. This content represents a presupposed set that, intersected with the nominal, provides a limited domain in which the noun can be unique, thus satisfying the presupposition of uniqueness.[5]

Viewed in this way, the definite article bears presuppositions that are almost exact parallels of the presuppositions of DP quantifiers: the existence presupposition corresponds to the presupposition of the existence of the domain of DP quantifiers, and the uniqueness

[3]Of course, certain DP quantifiers may bear cardinal (or 'weak') interpretations that are fundamentally *non*-presuppositional. These interpretations can be derived from the basic DP quantifier structure I am proposing. Under it, a quantifier's first semantic argument represents material that is presupposed, so if nothing is presupposed, there is simply no material in this first argument. This provides a principled explanation for the derivation of the unary quantifier structure from its fundamentally binary structure. Further discussion of the cardinal reading can be found in Greer (2014a), which updates features of the discussion in Greer (2014b:345).

[4]Typically, these presuppositions are ascribed to the singular variant of the definite article, but I see no problem in stipulating that these apply straightforwardly to the plural definite article. Instead of presupposing the existence and uniqueness of an *individual* entity, the plural definite article makes these presuppositions of a plural entity, which I generally assume means a set of entities. There are, of course, other theories about what plural entities might be (i.e., sum entities, as in Link (1983) and much subsequent work). For the sake of space, I avoid a detailed discussion of what an adequate representation of plurals must be and generally take the liberty of referring only to sets.

[5]In the example in (10), for instance, if the speaker is standing in a room, there is a salient extra-linguistic presupposition that there are things in that room, $\exists x[\textit{in-this-room}'(x)]$. The property of being in the room may then be assigned to the domain restriction, and the meaning paraphrased below will result.

(1) The door (*that is*) *in this room* is open.

presupposition corresponds to the domain restriction of DP quantifiers. If DP quantifiers c-command a partitive PP, they will always c-command a definite determiner (per the Partitive Constraint), and if this is the case, we can stipulate that the presuppositions of the quantifier are simply projections of the presuppositions of the embedded definite determiner. The partitive structure of quantification thus provides a structural account of the *source* of the presuppositions of quantification, something which previous theories have been unable to explain (cf. the admonition in Szabolcsi 2010: 75-6).[6]

The above has shown that what we accomplish by assuming a partitive structure is (a) an explanation of crosslinguistic data, (b) a principled account of the DP antecedents of anaphoric quantifiers, and (c) a structural account of the presuppositions of quantification. And conveniently, we accomplish all of this without proposing any obscure syntactic entities that may not themselves appear in the overt syntax of DP quantifiers.

3 The structure of the partitive PP

With the presence of the partitive PP in the LF of DP quantifiers justified, I turn now to a theory of its formal structure. The syntactic structure I propose is relatively uncontroversial, so I describe this first. The semantics that this syntax supports is far more complicated; in pursuit of this, I review the analyses advanced by Matthewson (2001) and Ladusaw (1982), pointing out the empirical and theoretical challenges facing each. I then propose that, by blending key features from these two accounts, we arrive at an alternative analysis that avoids these challenges while providing some additional explanatory benefits.

3.1 Syntax

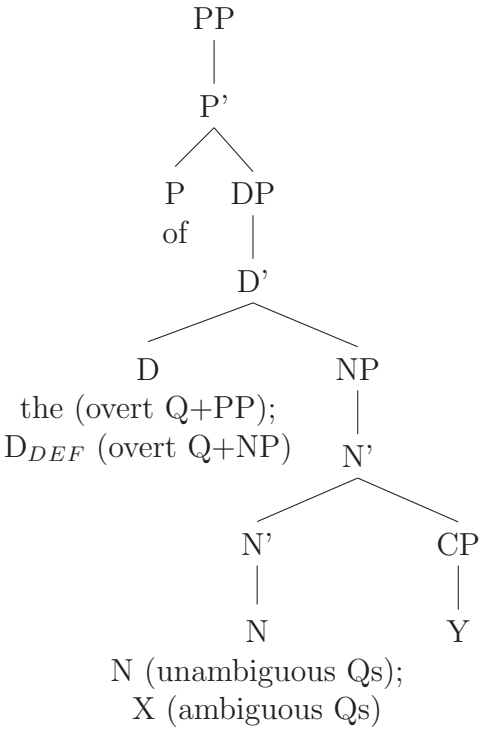
The syntax I propose for the partitive PP is fairly straightforward. It is projected by the preposition *of*, which takes a definite DP as its complement per the Partitive Constraint. The head of this DP may be either the overt definite article *the* or a null variant of this article, D_{DEF}, with the choice between these correlating with whether the PP is overt or not (more on this in §5). The complement of the definite determiner is an NP, the head N of which represents the domain of the quantifier. This domain may either be the set denoted by the nominal predicate from the overt syntax (for unambgiuous quantifiers that bear only proportional readings), N, or, as Greer (2014b) argues, it may vary between the sets denoted by the nominal and verbal predicates (for ambiguous quantifiers that bear proportional, reverse, focus-affected, or cardinal readings), in which case it must be represented as a variable (X in Figure 3 below). Regardless of the content of the domain, a restrictive clause modifier, represented as a tensed CP, adjoins to the head of the NP.[7] This CP contains the

[6] Matthewson (2001) also alludes to the ability to derive the domain restriction of quantification from the function of the definite article in the partitive PP (pp. 159-60).

[7] The restrictive clause modifier may in some cases be a reduced relative PP or AP, which are best analyzed as DPs along the lines presented in Farrell (2005). However, because it is possible to reconstruct these reduced relatives as CPs with covert content, I refer to this modifier uniformly as a CP. In fact, the entire CP is often covert (though it need not be), so we are not proposing any *additional* unpronounced structure when we analyze these reduced relatives as CPs.

domain restriction variable, Y, the content of which is also resolved pragmatically. This syntactic structure is schematized in Figure 3 below.

Figure 3: The syntax of the partitive PP



Ultimately, the quantifier c-commands this PP in one of two ways: if it is ambiguous, it c-commands this phrase directly, but if it is unambiguous, it does so indirectly by way of an intervening *one*-NP. More on this immediately below.

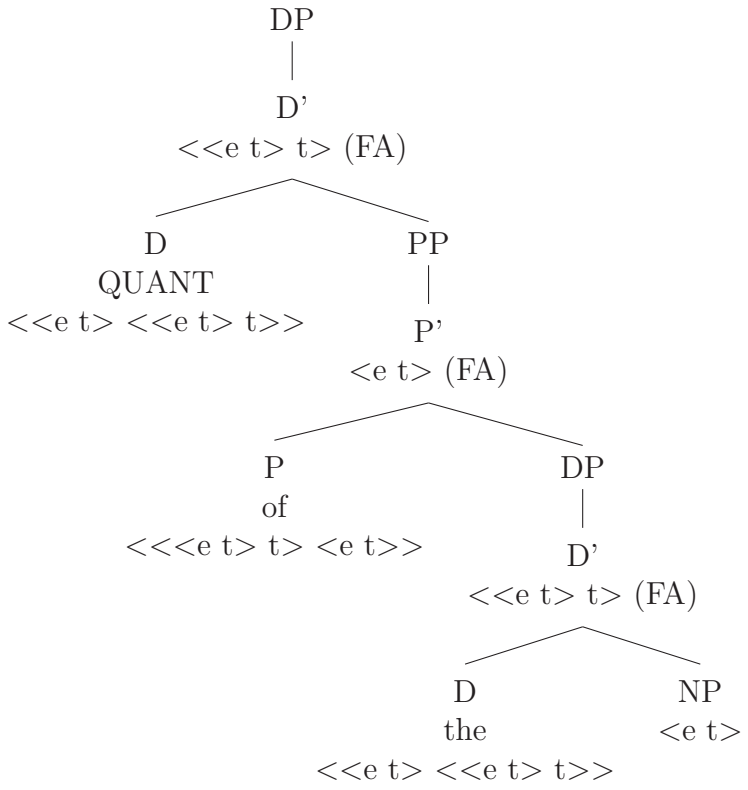
3.2 Semantics

The partitive PP poses a significant challenge to the semantics of DP quantifiers. Under GQT, DP quantifiers are determiners denoting relations between sets (type $<< e,t >$, $<< e,t >,t >>$). The partitive PP, however, dominates a definite DP that is itself a set of sets (a GQ of type $<< e,t >,t >$). It is therefore unclear how the quantifier should be adjusted to take a GQ, and not a set, as its first semantic argument.

There have been two systematic attempts to resolve this type incompatibility. In the first, Ladusaw (1982) suggests that the head of the partitive PP, *of*, is a 'down-stepping' function of type $<< e,t >,t >,< e,t >>$ that type-shifts the embedded GQ. Being definite, the embedded GQ is itself a principal filter (a set of sets containing a common core set), and the down-stepping function returns the generator (the common core) of this principal filter. The result of this process is a semantic object that is of the same type as the denotation of the common noun embedded in the partitive, but instead of denoting all the members of this set, it is restricted to a contextually salient domain. This down-stepping analysis of the

partitive PP appears in Figure 4.[8]

Figure 4: Ladusaw's (1982) analysis of the semantics of the partitive PP



Matthewson (2001) takes a different tack, suggesting that certain determiners (specifically, quantifiers) form GQs by operating not on sets but on individuals, being thus of type $< e, < e, t >, t >$. The definite article embedded in the partitive PP represents a choice function that selects one (singular or plural) individual from the set denoted by its complement NP. She further assumes that the preposition *of* is semantically vacuous, so the individual denoted by the embedded DP is passed on as the first argument of the higher quantifier, which then quantifies over atomic parts of the individual (Matthewson 2001: 151-5), as shown in Figure 5 on the following page.

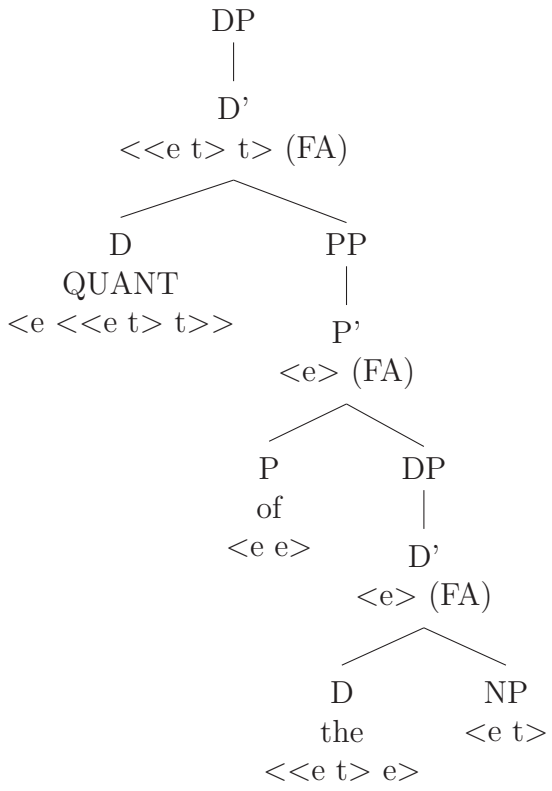
These analyses face theoretical and empirical challenges. In the case of Ladusaw's proposal, the down-stepping function somehow restricts the generator of its input GQ to a contextually relevant subset. But since this function doesn't contribute any new semantic

[8]The abbreviations FA and PM in this and all subsequent figures refer to the compositional semantic operations Function Application and Predicate Modification, which have the standard definitions given below.

(1) a. **Function Application (FA)**: If f is an expression of type $< \alpha, \beta >$ and a is an expression of type $< \alpha >$, then the concatenation of f and a, *f(a)*, is an expression of type $< \beta >$.

b. **Predicate modification (PM)**: If f is an expression of type $< \alpha, \beta >$ and g is an expression of the same type, then the concatenation of f and g is an expression of type $< \alpha, \beta >$.

Figure 5: Matthewson's (2001) analysis of the semantics of the partitive PP



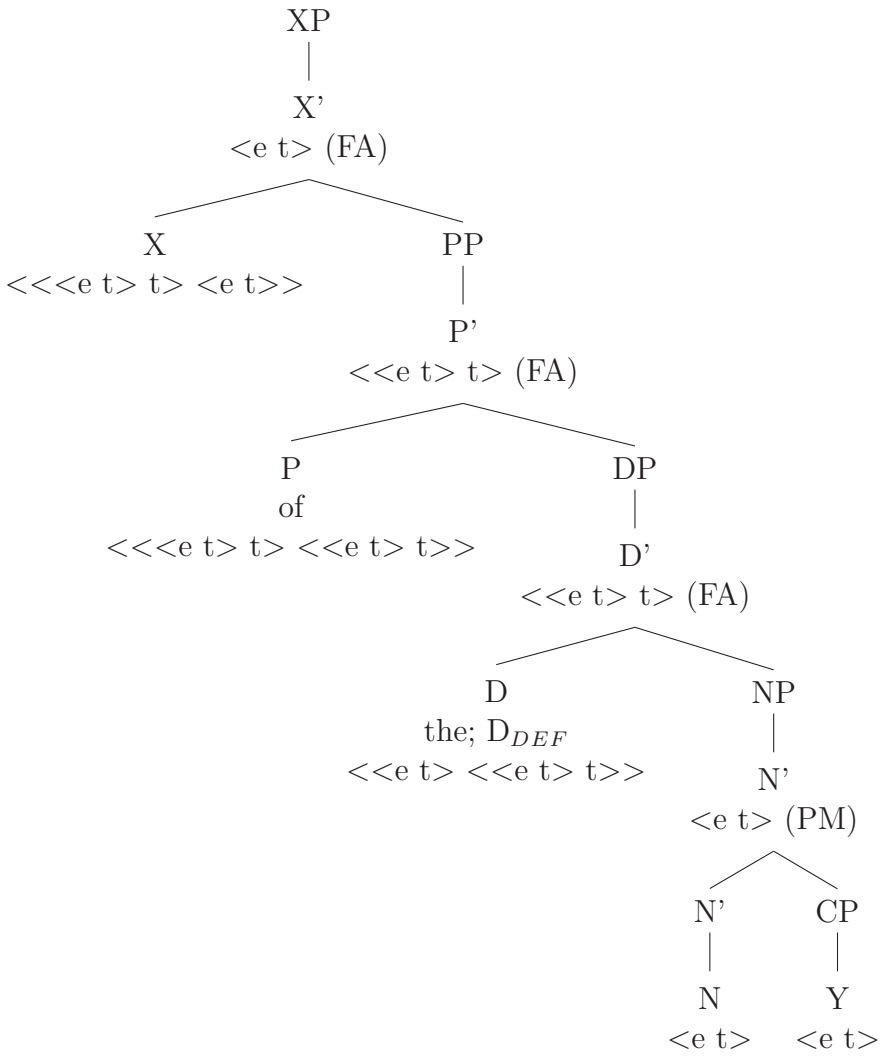
material to the generator NP, it is unclear how this restriction is accomplished. Under the present account, the burden of the restriction is shifted to the relative clause modifier of the domain, so the down-stepping function need only be a type-shifter, reducing the GQ to a set. In Matthewson's analysis, the claim that quantifying determiners take individuals as their first argument amounts to abandoning the GQT claim that determiners are relations between *sets*. While QNPs still ultimately denote GQs under her analysis, these GQs aren't sets of sets but sets of atomic parts of individuals. What is especially concerning about this is that it rests on treating DPs as having different semantic types: DPs headed by the definite article denote individuals while those headed by quantifiers denote GQs.[9]

Beyond these theoretical issues, both analyses confront a significant empirical challenge in the quantifier *every*: neither can explain why *every* requires (and *each* allows) an NP headed by *one* when it appears with an overt partitive PP. I propose that the best treatment of *every* takes its surface structure at face value: if *every* requires an intervening *one* at surface structure, *one* must likewise be present in its LF. Assuming this, we can arrive at an appropriate semantics for the partitive PP by blending features of Ladusaw (1982) and Matthewson (2001). First, I want to retain the GQT insight that determiners are relations between sets (and not relations between individuals and their atomic parts as in Matthewson

[9]Matthewson's discussion suggests that quantifiers are members of a distinct lexical category Q and as such project QPs instead of DPs. And while this sidesteps the worry mentioned here, it is nevertheless undesirable to propose an additional lexical category when it is possible to reconcile quantifiers to existing categories (namely, determiners and adjectives) in a way that accommodates all of the empirical facts.

2001), so I follow Ladusaw in stipulating a down-stepping function over the partitive PP. But instead of attributing this function to *of* (which, following Matthewson, I assume is semantically vacuous), I attribute it to the head of the phrase immediately dominating the PP. And given that some quantifiers combine directly with the partitive PP at surface structure while others require an intervening *one*-NP (cf. the data in (2)), there are two possibilities for the phrase immediately dominating the PP at LF: the quantifier itself or the N *one*. This semantic structure is schematized in Figure 6 below (where X represents a variable over the lexical categories represented by the two possible down-stepping functions).

Figure 6: A revised analysis of the semantics of the partitive PP



3.3 Two types of DP quantifiers

The above discussion of the formal structure of the partitive PP has alluded to the fact that there are two fundamentally distinct structures for the DP quantifiers in (1). I review these two structures in more detail in this section.

3.3.1 Direct partitive quantifiers: Quantifying adjectives

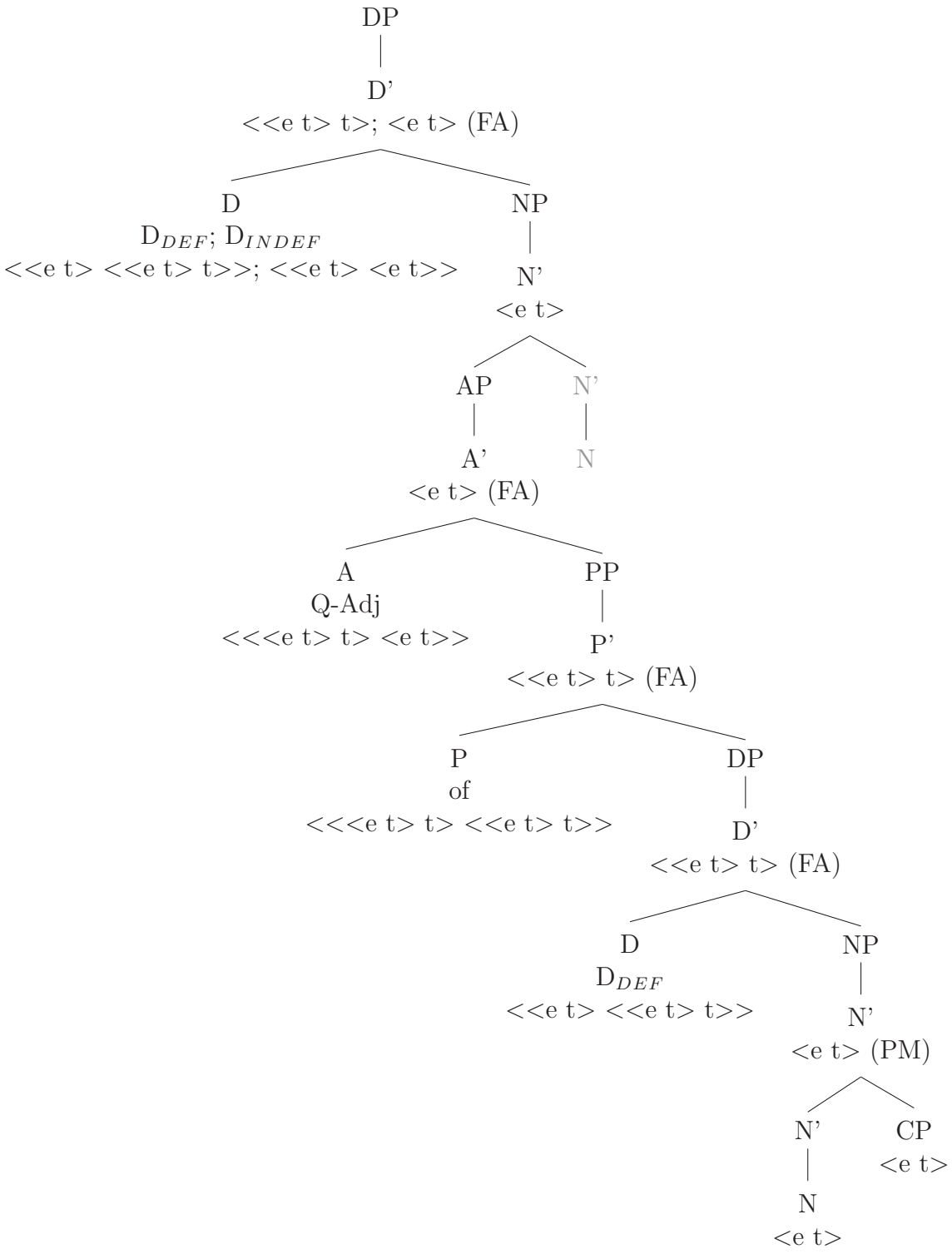
Quantifiers that combine directly with the PP at surface structure take this phrase as their immediate syntactic complement at LF, having as their semantic value the down-stepping function discussed above. Given that their complement position is filled by the PP, these quantifiers combine with the noun from the overt syntax as modifiers, for which reason I refer to them as quantifying adjectives (Q-Adjs). The syntactico-semantic structure of these direct partitive Q-Adjs is schematized in Figure 7 on the following page (note that this figure ignores the contribution of the nominal modificand, which appears grayed-out, for reasons of space; for details, see Greer 2014a).

Being adjectives, Q-Adjs do not c-command the noun from the overt syntax at LF. As a result, they allow variable domain interpretations as discussed in Greer (2014b) (cf. the summary in §2.1.3 above). Quantifiers that combine directly with the partitive PP therefore coincide with those that are ambiguous between various presuppositional interpretations (proportional, reverse, and focus-affected). This is not immediately obvious, as the data in (2) indicate that quantifiers like *some*, *no*, and, even more problematically, *all* and *most* combine directly with the partitive PP and as such must be ambiguous. In Greer (2014a), however, I argue that this is the right result: quantifiers like *some*, *several*, *a* (*one*), *two*/*three*/etc., and *no* (*none*) are *non-essentially* ambiguous, having logically equivalent presuppositional interpretations, while the more contentious quantifiers *all* and *most* are surface variants of ambiguous quantifier lexemes ALL and MOST that bear proportional (*all* and *most*) and reverse (*only* and *mostly*) allolexes.

Because the quantifier itself is not a determiner, QNPs containing Q-Adjs must be headed by a null determiner. This determiner bears definite or indefinite semantics according to what is presupposed: if the set denoted by the nominal predicate is presupposed (as in a proportional interpretation, where the set denoted by the noun values the domain variable), this determiner is definite, and if the set denoted by the verbal predicate is presupposed (as in a reverse interpretation, where the set denoted by the verb values the domain variable), this determiner is indefinite. When indefinite, the DP must be bound by a higher operator or by a default operation of existential closure over the VP (cf. Heim 1982; Diesing 1992). For its part, the nominal modificand is also interpreted differently according to whether the DP is definite or indefinite (for details, see Greer, 2014a:63-8; 72-6).

Finally, notice that, in effect, Q-Adjs function like two-step GQ modifiers on their definite (= proportional) interpretations, operating first on a GQ and then combining with a determiner whose output is a GQ. By function composition (which states that if one function, f, is of type $< a, b >$ and another, g, is of type $< b, c >$, they may combine to form a syllogistic function, $f \circ g$, of type $< a, c >$), the effect of a definite Q-Adj is essentially $<<< e, t >, t >, << e, t >, t >>$, which is exactly the kind of semantic operation we would expect from an adjective.

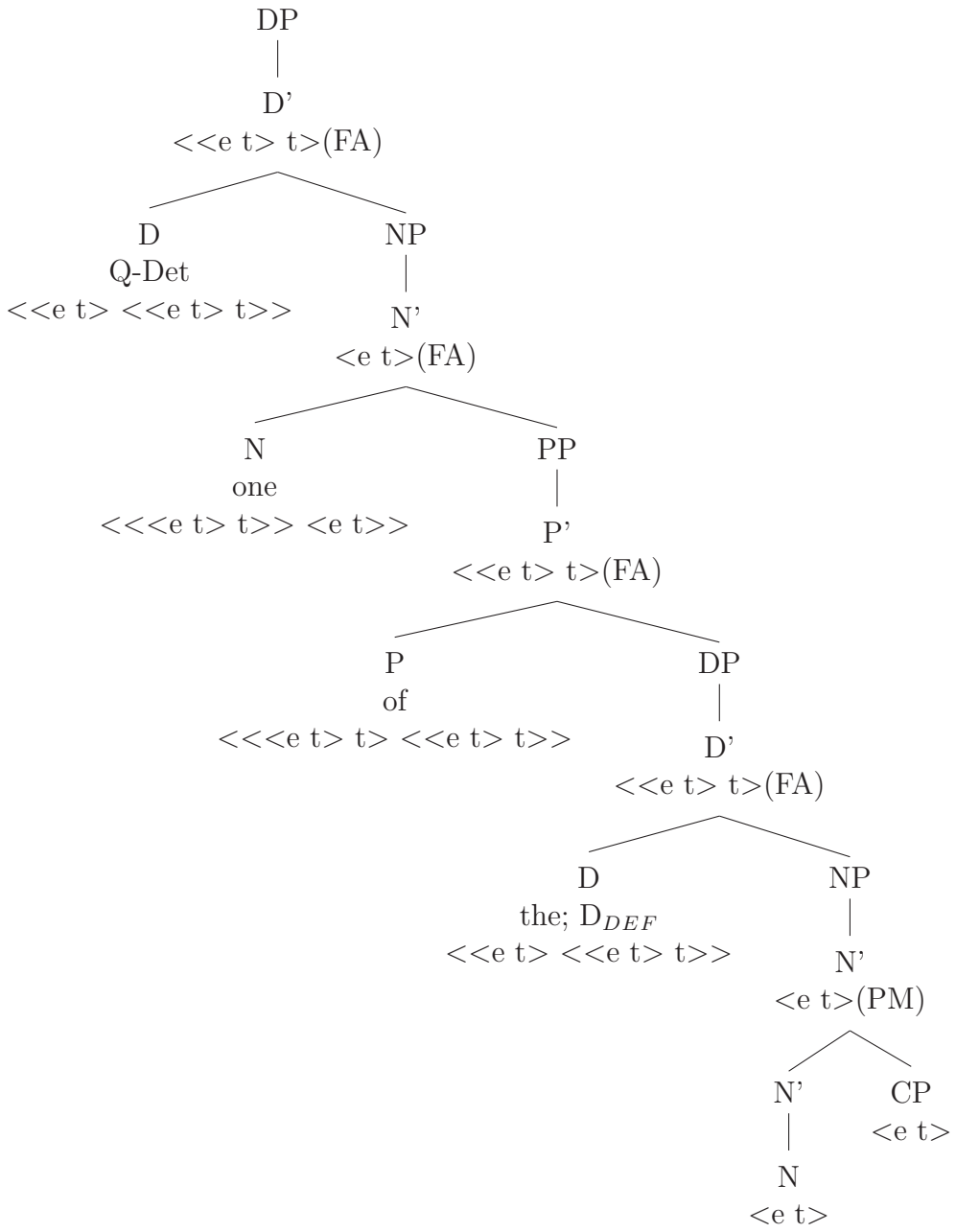
Figure 7: The structure of Q-Adjs



3.3.2 Indirect partitive quantifiers: Quantifying determiners

Quantifiers that combine indirectly with the partitive PP at surface structure take this phrase as their indirect complement at LF. Mediating the combination of the quantifier with the PP is an NP headed by *one*, the denotation of which is the down-stepping function. Because they take a traditional NP complement, these indirect partitive quantifiers occupy the standard determiner position defended in GQT, as shown in Figure 8.

Figure 8: The structure of Q-Dets



As Figure 8 shows, the noun from the overt syntax appears embedded in the partitive PP

such that these quantifying determiners (Q-Dets) c-command the noun from the overt syntax at LF. As a result, Q-Dets do not allow variable domain interpretations (given the standard syntax-semantics mapping hypothesis). Quantifiers that appear with *one* in overt Q+PP structures therefore correspond almost exactly to quantifiers that bear only proportional (nominal-domain) interpretations (*every* and *each*). I say "almost exactly" because there is one errant quantifier, *both*, that never appears with *one* at surface structure (cf. the data in 2) but which is nevertheless unambiguous and which must, therefore, c-command the noun at LF as a Q-Det. I provide further evidence to corroborate the Q-Det analysis of *both* in §4.2.

4 Further advantages of the partitive structure

Having defended a theory of the structure of partitive quantification, I now consider some of the benefits that emerge from this analysis. These include solutions to some puzzling cases of partitive PPs and an explanation of why certain DP quantifiers prohibit group-denoting predicates.

4.1 Puzzles in the analysis of partitivity

The present analysis of the partitive PP sheds new light on some puzzling variants of this structure. First, because it is not the *of* itself that does the obligatory down-stepping, the fact that the definite determiners *the* and *every* in (12) are incompatible on top of an overt partitive PP follows from the fact that there is no intervening down-stepping phrase.

(12) a. *The of the men came to the party.
b. *Every of the men came to the party.

The vacuity of *of* also neatly explains its optional appearance in certain QNPs with embedded DPs, as Matthewson likewise observes (2001:162).

(13) a. All (of) the men came to the party.
b. Both (of) the men came to the party.

Under the present proposal, the QNPs in (13) represent cases where the underlying partitive structure is overt, but the head of the partitive PP, being semantically vacuous, is elided (though why it is only these quantifiers that exploit the vacuity of *of* in this way is still an open question).

Second, my account provides some insight into apparent exceptions to the Partitive Constraint, which stipulates that a partitive PP requires a definite DP complement. These exceptions include both definite quantifiers that are ungrammatical as the head of the embedded DP (14a) and ostensibly indefinite quantifiers that are acceptable in this position (14b)-(14d).

(14) a. *Three of* {**every/*each*} man went to the party. (from Ladusaw 1982:234)
b. Oregon [is] *one of many* states seeking tougher vaccine laws.[10]

[10] Authentic example from a headline on StatesmanJournal.com.

c. The prisoner swap (was) *one of several* tough moments for Obama in recent weeks.[11]

d. The room was in *one of some* separate buildings behind the public house.[12]

For all of these examples, my account associates the embedded quantifier with a partitive PP of its own.[13] The ungrammaticality of the definite quantifiers in (14a) can then be attributed to a semantic redundancy. The partitive PP that the definite DP immediately dominates provides the domain for the higher quantifier *three*. Given the lexical semantics of *every* and *each*, this embedded DP does nothing to limit this original domain to a subset of some specific size: having universal quantificational force, all these quantifiers do is say that the *whole* domain is the domain of the higher quantifier *three*. As a result, they make no new semantic contribution to the sentence; the examples in (14a) don't say anything beyond what the comparable sentence in (15) says.

(15) *Three of the men* went to the party.

More formally, the problem with these definite quantifiers is that they denote improper subsets of the domain.[14]

As for the embedded indefinites in (14), my account treats these quantifiers as appearing beneath a null determiner that may be either indefinite *or* definite. As they appear in (14), then, these quantifiers must combine with the definite determiner, in which case they do not represent exceptions to the Partitive Constraint after all.

4.2 Individual- and group-denoting predicates

Positing the N *one* in the underlying structure of some (but importantly not all) quantifiers allows a principled explanation of why certain quantifiers prohibit group-denoting predicates. Beyond the down-stepping function, *one* makes an additional semantic contribution to the QNP: it specifies that supersets formed on the output of the down-step must be individual-denoting. This predicts that those quantifiers that have *one* at LF will reject group-denoting

[11] Authentic example from a headline on npr.com.

[12] Authentic example from a user review on TripAdvisor.com.

[13] This results in paraphrases like the following.

(1) a. *Three of every one of the men went to the party.
*Three of each (one) of the men went to the party.

b. Oregon is one of many of the states seeking tougher vaccine laws.

c. Prisoner swap is one of several of the tough moments for Obama in recent weeks.

d. The room was in one of some of the separate buildings behind the public house.

While this partitive PP need not be overt (my account only suggests that it exists at LF), it is interesting that making this structure transparent for the indefinite quantifiers in (14) renders the sentences slightly odd. When they appear embedded under other quantifiers, these quantifiers seem to prefer an overt Q+NP structure.

[14] Denoting an improper subset of the domain is also what prevents *all* (which is not obligatorily definite under the present analysis because I treat it as a Q-Adj) from appearing as the downstairs quantifier in overt partitive constructions such as these (i.e., **Three of all (of the) men went to the party*).

predicates like *surround* or *be similar* (an individual cannot non-figuratively surround something and can only be similar to another, syntactically overt argument); this is illustrated in (16) for the Q-Dets *every* and *each*.

(16) a. *{Every one/Each (one)} of the men is similar.
b. *{Every one/Each (one)} of the men surrounded the building.
c. *{Every/Each} man is similar.
d. *{Every/Each} man surrounded the building.

The data in (16c) and (16d) show furthermore that the individualizing effect of *one* is evident even when this noun is covert. In these Q+NP structures, the nominal complement must bear singular morphology. We can account for this by proposing that, because of its additional, individualizing semantic contribution, the morphological features of *one* survive at surface structure independently of its phonological features. Because extraneous morphological features would cause the derivation to crash, these features combine with the semantic features of the embedded nominal, resulting in the singular nominal in Q+NP surface structures.

Finally, I suggested earlier (§3.3.2) that *both* also appears at LF with *one* despite never co-occurring with this noun at surface structure. Evidence from group-denoting predicates corroborates this analysis: like *every* and *each*, *both* rejects these predicates.

(17) a. *Both (of the) men are similar.
b. *Both (of the) men surrounded the building.

Both must appear with *one* at LF if this morpheme is what causes a quantifier to be individual-denoting. It just so happens that, in agreement with the morphology of *both*, *one* appears as the dual *ones* (not to be confused with the homophonous plural *ones*) with this quantifier. This idiosyncratic morphology is perhaps what ultimately prevents *ones* from appearing with *both* at surface structure.

As a final point, note that this analysis correctly predicts the distribution of quantifiers with respect to the constraint against group-denoting predicates: all and only those quantifiers that appear with *one*(*s*) at LF (the Q-Dets) are subject to this constraint; the rest of the DP quantifiers listed in (1) are perfectly felicitous with group-denoting predicates, as shown in (18).[15]

(18) a. {Many/Few/Some/Several/Two/No/All/Most} men are similar.
b. {Many/Few/Some/Several/Two/No/All/Most} men surrounded the building.

5 Resurfacing: Deriving quantifier surface structure from the partitive LF

What remains now is to show how the partitive quantifier structure can derive the three distinct surface structures shown in (2) (Q+NP, Q+PP, and bare). For Q-Dets, this is straightforward. In Q+PP structures with Q-Dets, the functional material in the PP (the

[15]One important exception to this is, of course, the Q-Adj *a* (*one*). This quantifier rejects group-denoting predicates because of its lexical semantics and so differs from Q-Dets, which reject such predicates for *compositional* reasons (specifically, the presence of the N *one* at LF).

head P *of* and the definite determiner) is overt, and the noun *one* may or may not be overt (for *every*, it must be overt; for *each*, it may be overt; and for *both*, it cannot be overt). In Q+NP structures, the head P is covert (recall that *of* is semantically vacuous, anyway), the embedded DP is headed by a null variant of the definite determiner, D_{DEF}, and the morphological features of *one* combine with the semantic features of the embedded nominal (producing a singular nominal for *every* and *each* but a plural–or more likely, dual–nominal for *both*). And in bare uses, the entire PP and, depending on the quantifier, the N *one*(*s*) are elided (for *every*, *one* cannot be elided; for *each*, it may be elided; and for *both*, it must be elided).

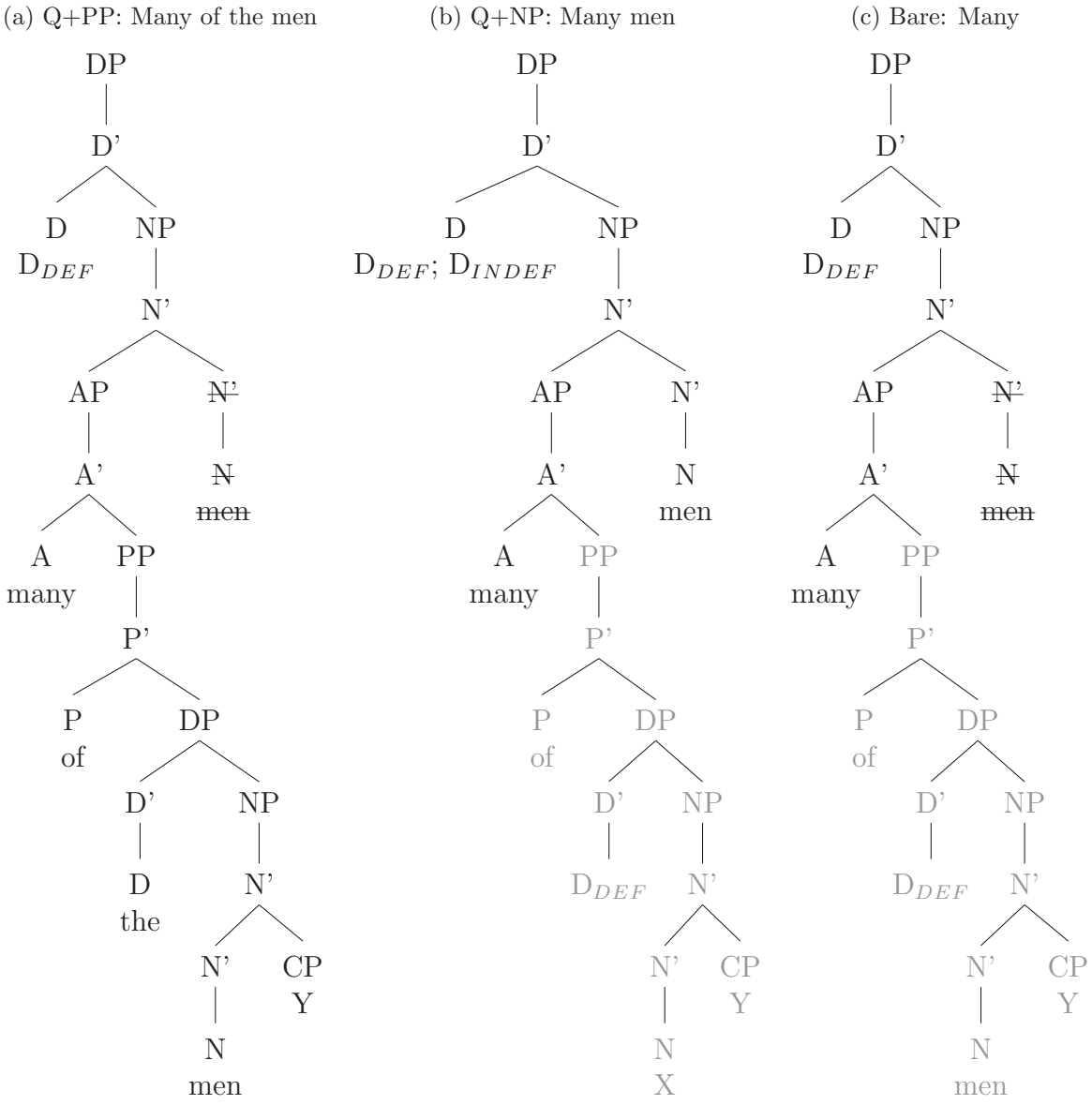
QNPs containing Q-Adjs are slightly more complicated, involving syntactic ellipsis, covert pragmatic material, or a combination thereof. In Q+PP structures, the head noun of the QNP is elided under identity with overt pragmatic material in the PP (a pragmatic copy of the nominal predicate appears in the domain variable position of the PP). In Q+NP structures, the partitive PP is unpronounced. This means that the null variant of the definite determiner appears in place of *the*, the preposition *of* is simply not pronounced, and the contents of the domain and domain restriction variables are also covert; being pragmatically determined, these contents need not be made explicit because they can be recovered from context. In bare uses of the quantifier, the partitive PP is unpronounced and the head noun is syntactically elided. In fact, my account explains why it is that only the proportional interpretation is available in these bare structures: *many* in (19), for instance, can only mean that a large proportion of the men at the conference had a good time. The reverse interpretation, where the existence of people who had a good time is presupposed, would be incoherent.

(19) There were 30 men at the conference. Many had a good time.
   a. Proportional: Many *of the men who were at the conference* had a good time.
   b. Reverse: *Many *of the people who had a good time* had a good time.

Under the present account, ellipsis of the nominal in the surface structure of *Many had a good time* is licensed by the presence of identical content in the partitive PP at LF. Bare quantifiers can therefore only be interpreted with a nominal domain, resulting in the obligatory proportional interpretation.

The Q+PP, Q+NP, and bare surface structures of Q-Adjs are schematized in Figure 9 on the following page (where gray-out corresponds to unpronounced pragmatic material and strike-through indicates syntactic ellipsis).

Figure 9: Deriving the surface structures of Q-Adjs



6 Concluding remarks: The overall picture

The present paper has advanced novel arguments in support of treating DP quantifiers as fundamentally partitive. What distinguishes these arguments from extant arguments for this structure is that they show that *all* DP quantifiers in English, even the tricky *every*, are partitive at LF *all the time*: all DP quantifiers require a partitive PP to accommodate (a) their anaphoric behavior (anaphoric quantifiers generally take DP, and not NP, antecedents) and (b) their presuppositions (strong uses of quantifiers bear presuppositions identical to those of the definite article). Once we accept this, we are driven to stipulate two basic structures of DP quantifiers given that, at surface structure, not all DP quantifiers combine

with the obligatory PP in the same way: some take the PP as their immediate syntactic complement at LF, while others embed this PP in an NP complement headed by *one*(*s*). This structural difference then corresponds to the semantic distinction between group- and individual-denoting quantifiers. The overall proposal for quantifier partitivity presented here therefore presents compelling evidence for stipulating two fundamentally distinct kinds of quantification in the English DP.

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A Field Method to Describe Spontaneous Motion Events in Japanese*

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1. Introduction

Studies of spatial expression have much developed through investigation from the cross-linguistic perspective. These studies have demonstrated that languages vary both in their inventory of morphosyntactic elements which structure the spatial expression and in the way in which they organize spatial information. Despite such cross-linguistic diversity, Talmy (1985, 2000) noticed that languages exhibit some similarities in their organization of spatial information at the verb level. This led him to develop a typology, classifying languages into a small set of typological types.

In cross-linguistic studies, the comparability of data (or corpora) across languages is crucial; therefore, methods used for constructing an appropriate cross-linguistic database ought to be a priority for researchers. To this end, the use of a new method of data elicitation, a **field method** consisting of the use of visual stimuli, has been on the increase. There have been, for instance, the *topological relations picture series* (Bowerman and Pederson 1992) for the cross-linguistic study of static locations, and the *Put and Take* video stimulus (Bowerman *et al.* 2004) for the cross-linguistic study of caused motion events (*infra*). The stimulus-based method is more advantageous than traditional methods, such as relying on **introspective examples** produced by linguists themselves (Vinay and Darbelnet 1977[1958], Talmy 1985, 2000, *inter alia*) or on sentences extracted from **parallel texts** (Slobin 1997, *inter alia*), in that it excludes interference from other languages (Lehmann 2004, Majid 2012). Moreover, while these traditional methods which are limited to the study of standardized languages and/or languages with a written tradition, a stimulus-based method allows for consideration of under-described languages, which are generally oral tradition languages.

The expression of motion events in Japanese has been investigated by native Japanese-speaking linguists, using mainly the traditional methods mentioned above (Miyajima 1984, Matsumoto 1996a, 1997, *inter alia*), where data collection through fieldwork, which is costlier in time, is not considered necessary. The present study, however, is based on a field method eliciting spoken data with a new video stimulus. This video stimulus, which is known as the *Trajectoire* video, was developed for a cross-linguistic project of the same name, and was used here to investigate current spatial

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expression in the Japanese language in a more elaborate way than previous studies, specifically regarding the **use** of the available spatial elements.

This paper is organized as follows: Section 2 reviews previous studies inspired by Talmy's typological model of motion events, including those of Japanese. Section 3 presents the *Trajectoire* video stimulus, with a brief description of the fieldwork performed with it and the data collected for Japanese. Section 4 presents the findings obtained with the *Trajectoire* data in this language, and shows in particular the use of deictic verbs revealed by the use of the video stimulus.

2. Spontaneous Motion Events: Studies Inspired by the Typological Model

This section outlines previous studies of motion events (§2.1.) including those of Japanese (§2.2.) and raises the limitations of the current typological model (§2.3.).

2.1. Overview of the Expression of Motion Events

Spontaneous motion events refer to a kind of event in which an (in)animate entity (**Figure**) moves by itself with respect to reference objects (**Ground**). These events are all involved in a change of location[1], and they naturally imply a **Path** (the route travelled by a Figure) which logically consists of three spatio-temporal portions (Lakoff 1987): a starting point (**Source**), intermediate points (**Medians**), and an endpoint (**Goal**). Other dimensions of motion, such as a **Manner-of-motion** (henceforth Manner), may also be concerned (Tesnière 1969).

Linguistically, however, these spatial concepts are organized differently between and throughout languages. For instance, examples (1a-1b), which describe the same event in English and French, show that the verb in these languages conveys different spatial information (Vinay and Darbelnet 1977[1958]): in the English version, the verb expresses **Manner** (e.g., *ride*), as in example (1a), while in the French version it expresses **Path** (e.g., *entrer* 'move.in'), as in example (1b). Moreover, unlike English which expresses Manner **overtly**, French does it **covertly** (i.e., linguistically unrealized) when this information can be inferred from another element (or elements) of the sentence, such as *the horsemen* for *riding* in example (1b) (Braun 1976, see also Papafragou *et al.* 2006 for a similar case in Modern Greek).

(1) a. English

The horsemen	**rode**	into	the yard.
[FIGURE]	[MANNER]	[PATH]	[GROUND]

[1] In this study, the expression of movement without a change of location (e.g., *walking in the park*, *dancing on the beach*) are not considered.

b. French

Les cavaliers	sont **entrés**	dans	la cour.
the horsemen	moved.in	in(to)	the yard
[FIGURE]	[PATH]	[PATH]	[GROUND]

'The horsemen moved into the yard.' (Vinay and Darbelnet 1977[1958]: 106)

Talmy's insightful investigations (1985, 2000) revealed that linguistic contrasts such as these could be observed in a broad range of languages, and he proposed a classification of these languages according to two major types of typological strategy (see Table 1); some languages prefer a 'Manner verb strategy' (as in English), while other languages prefer a 'Path verb strategy' (as in French).

Table 1. Typology of motion events (Talmy 2000: 60)[2]

Typological Strategy	Languages
Manner verb (e.g., *ride*)	Germanic, Slavic, Finno-Ugric, Chinese, Ojibwa, Warlpiri
Path verb (e.g., *entrer* 'move.in')	Romance, Semitic, Polynesian, Nez Perce, Caddo, Korean, Japanese

This typological model was adopted by many researchers, and many languages were described from this typological perspective. A closer look at each language, however, raised some issues with this model. For instance, Aske (1989) reported that both typological strategies coexist in Spanish, and their distribution would depend on the **telicity** of the event description: the 'Path verb strategy' is required when a scene is regarded as **telic** (e.g., *moving out*), as in example (2a), whereas the 'Manner verb strategy' is also possible, when a scene is regarded as **atelic** (e.g., *moving towards*), as in example (2b)[3].

(2) Spanish

a. Path verb strategy (= telic)

Juan	**salió**	de la habitación	flotando.
Juan	moved.out	from the room	floating

'Juan exited the room floating.' (Aske 1989: 2)

b. Manner verb strategy (= atelic)

La botella	**flotó**	hacia	la cueva.
the bottle	floated	toward	the cave

'The bottle floated towards the cave.' (Aske 1989: 3)

[2] Talmy also mentioned a third type of language ('Figure verb strategy'), but there are few languages which use this strategy (e.g., Atsugewi, Navaho).

[3] For further discussion, see Slobin (1997).

Another issue with Talmy's model was reported in studies dealing with languages which have **complex verbs** (Tai 2003, Zlatev and Peerapat 2004, Ameka and Essegbey 2013, *inter alia*). Complex verbs typically consist of two (or more) verbal stems, and they can express both Manner and Path in a verb (e.g., *fei guo* 'fly-pass'), as in example (3).

(3) Chinese
John **fei** **guo** Yingjili Haixia.
John fly pass English Channel
'John passes the English Channel by flying.' (Tai 2003: 309)

These 'complex verb' languages are typologically characterized only with respect to the nature of the main verb: for instance, if the main verb corresponds to a Path verb, the language is considered as a 'Path verb language'. However, the model cannot fully satisfy the characterization of these languages because of possible disagreement in the identification of the main verb. For example, Chinese is treated as a 'Manner verb language' by Talmy (2000) who assumes that the first constituent (V1), denoting a Manner, is the main verb. Conversely, Tai (2003) argued that this language behaves as a 'Path verb language', because the argument structure of the sentence with a complex verb is inherited from the Path verb, as in example (4a), but not from the Manner verb, as in example (4b).

(4) a. John **guo** le Yingjili Haixia.
John pass ASP English Channel
'John passed the English Channel.' (Tai 2003: 310)[4]

b. *John **fei** le Yingjili Haixia.
John fly ASP English Channel
'John flew (over) the English Channel.' (Tai 2003: *ibid*.)

These examples raised a major problem with the current typological model: its partiality to characterize a language. The next section presents the case of Japanese, a language which exhibits issues similar to those observed in both Spanish and Chinese.

2.2. The Case of Japanese

Japanese is a canonical SOV language, and the syntactic (or discursive) function of each noun is marked by a case particle (e.g., *ga* for the nominative, *ni* for the dative), as in example (5), or other types of particle (e.g., *wa* for the topic). Japanese verbal morphology is characteristically agglutinative, including morphemes related to TAM (e.g., *ta* for past tense), voice, politeness, and so on.

[4] Abbreviations: ABL: ablative; ACC: accusative; ASP: aspect; CONN: connective; DAT: dative; DIR: directional; GEN: genitive; NOM: nominative; NUM.CL: numeral classifier; POLI: politeness; PROG: progressive; PST: past; RES: resultative; TOP: topic

(5) Japanese

Bin-ga	(tadayoi-nagara)	dookutu-ni	hait-ta.
bottle-NOM	(floating)	cave-DAT	move.in-PST
[FIGURE]	[MANNER]	[GROUND]-[PATH]	[PATH]

'lit. The bottle moved into the cave (floating).' (adapted from Inagaki 2002: 189)

Example (5) is a 'typical' expression of motion events in Japanese, as considered in previous studies. By characteristically expressing Path information in the verb (e.g., *hait-* 'move.in') Japanese is classified among 'Path verb languages', as with Romance languages (Talmy 2000, Miyajima 1984, Matsumoto 1996a, 1997, *inter alia*). Manner information can be optionally specified but outside of the main verb: for example, in a subordinate clause (e.g., *tadayoi-nagara* 'floating'). These expressions, representing a telic feature of an event, require the 'Path verb strategy', while the 'Manner verb strategy' is also allowed in describing an atelic feature of an event (e.g., *moving down*), as in example (6). The choice of a typological strategy according to telicity is quite similar to the case of Spanish (and other Romance languages). Example (6) also illustrates that Manner information can be expressed in an ideophone (e.g., *gorogoro* '(roll) rumblingly').

(6) Manner verb strategy (= atelic)

Taru-wa	gorogoro-to	saka-o	**korogat**-ta.
keg-TOP	rumblingly	slope-ACC	roll-PST
[FIGURE]	[MANNER]	[GROUND]-[PATH]	[MANNER]

'The keg rumblingly rolled (down) the slope.' (Ueno and Kageyama 2001: 59)

Unlike Romance languages, however, Japanese has complex verbs (as with Chinese). Morphologically, three types of complex verbs are identifiable (*infra*), and two of these are formed by combining two (or more) verbal stems. The first is a **compound verb**, which directly combines two constituents, as in example (7a), and the second is here called a **verb-te verb construction** (henceforth V-te V), which combines at most three constituents by using the connective *-te*, as in example (7b).

(7) a. Compound verb

Yasinomi-ga	hamabe-ni	**nagare-tui**-ta.
coconut-NOM	beach-DAT	float-arrive-PST

'lit. A coconut arrived at the beach floating.' (Kageyama 1996: 112)

b. V-te V

Kare-wa	ie-ni	**hasit-te**	**hait**-ta.
he-TOP	house-DAT	run-CONN	move.in-PST

'lit. He moved into the house running.' (adapted from Sugiyama 2005: 300)

These complex verbs, combining a Manner and a Path verb, are commonly recognized as falling under the 'Path verb strategy' following a criterion for determinating the main verb (Matsumoto 1996b): for instance, in the V-te V of example (7b), the Path verb (V2) is the main verb because the argument structure of V-te V is inherited from it (e.g., *hait-* 'move.in'), as illustrated in example (8a), and not from the Manner verb (e.g., *hasit-* 'run'), as shown in example (8b).

(8) a. Kare-wa ie-ni **hait**-ta.
he-TOP house-DAT move.in-PST
'He moved into the house.'

b. *Kare-wa ie-ni **hasit**-ta.
he-TOP house-DAT run-PST
'(intended) He ran to the house.'

Although the 'Path verb strategy' is not actually consistent, the classification of Japanese as a 'Path verb language' has been adopted by many native Japanese-speaking linguists. At the same time, some authors consider Japanese as an **atypical** Path verb language because of its readily available possibilities for expressing Manner, by using complex verbs (e.g. *nagare-tui* 'arrive floating'), subordinate clauses (e.g., *tadayoi-nagara* 'floating'), or ideophones (e.g., *gorogoro* '(roll) rumblingly') (Sugiyama 2005).

2.3. Limitations of the Current Typological Model

These 'post-Talmian' observations on different languages suggest that the current typological model is restrictive. Although this model could account for the general cross-linguistic contrast at the verb level ('Manner verb strategy' *vs*. 'Path verb strategy'), it appears insufficient to fully apprehend the ways in which a language organizes spatial information; several typological strategies can coexist within a language, as in Romance languages or Japanese[5], and the typological characterization demands accommodation for languages having complex verbs, as in Chinese.

Moreover, these studies only focused on the semantic organization of the (main) verb, while spatial expressions are constructed around and beyond the verb. Indeed, different spatial elements (e.g., adpositions, cases, ideophones) also participate in the elaboration of spatial expression, and these non-verbal elements ought to be taken into consideration for a more accurate analysis.

Furthermore, the current typological studies were mainly interested in the organization of the expression of Manner and/or Path, while other spatial information, such as spatial **Deixis**, can participate in marking the speaker's perspective of a scene[6] (Fillmore 1975, Wilkins and Hill 1995, Grinevald 2011, *inter alia*). Regarding this topic,

[5] See Fortis and Vittrant (2011) for further discussion on this topic.

[6] In typological studies, the Deictic verbs were often treated as **a kind of Path verb** without further discussion (Matsumoto 1997, Talmy 2000, Zlatev and Peerapat 2004, *inter alia*). Their status is not discussed here, but I intend to investigate this topic further in a separate article.

Miyajima's (1984) study of biblical texts in five languages that all have elements to mark spatial Deixis (e.g., verbs, verbal prefixes) has shown how the languages varied in the frequency of deictic elements in the texts: the occurrence of deictic elements being much more frequent in three of the languages (English, German and Japanese) than in the others (French and Russian). Shibatani (2003) also noted that in colloquial spoken Japanese the use of Deictic verbs is highly frequent. These remarks suggest that Japanese would also be sensitive to the speaker's subjective perspective, although this finding relied only on the author's intuition. In contrast to these earlier studies, this study will explore this topic from an empirical perspective, namely considering data of Japanese elicited through fieldwork.

3. A New Method for Describing Motion Events in Japanese

Previous studies of Japanese were based on traditional methods: **introspective examples** (Matsumoto 1996a, 1997, Kageyama 1996, Inagaki 2002, *inter alia*), or sentences taken from **written texts** (Miyajima 1984, Ohara 2002, Sugiyama 2005, *inter alia*). The examples used are characterized by their being independent of discourse context (or decontextualized), and therefore did not integrate the expression of the speaker's perspective into the discussion[7]. In contrast, this study is based on contextualized spoken data of Japanese, elicited with a video stimulus called *Trajectoire*. This section will describe first the elicitation stimulus used for this language (§3.1.), and then how data was collected in the field in Japan using the video stimulus (§3.2.).

3.1. The *Trajectoire* Video Stimulus

The *Trajectoire* video was developed by Ishibashi, Kopecka and Vuillermet (2006) for the *Trajectoire* project (*Fédération de Recherche en Typologie et Universaux Linguistiques*, CRNS, France)[8]. The project aimed to investigate the cross-linguistic diversity found in the expression of spontaneous motion events, using fieldwork data of over 30 languages, including written tradition, oral tradition and signed languages.

Our stimulus was directly inspired by elicitation methods developed at the Max Planck Institute of Nijmegen, in particular the *Put and Take* video stimulus, which was developed by Bowerman *et al.* in 2004 for exploring the cross-linguistic expression of caused motion events (e.g., *putting cup on table*, *taking orange out of box*)[9], in which both Kopecka and Ishibashi (two of the developers of the *Trajectoire* video) had participated. Another elicitation tool, the pioneering *Pear stories* designed by Chafe in 1975 at the

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[7] Examples taken from written texts can include sentences with a deictic verb, as in example (i), but the authors had not discussed it.

(i) (...) yuuyuu-to kuboti-o nuke-te oka-o nobot-te **iku**-no de aru.
placidly hollow-ACC move.beyond-CONN hill-ACC move.up-CONN **go**-it is that
'It is that (he) placidly moves beyond the hollow and moves up climbing up the hill (**away from me**).' (adapted from Ohara 2002: 133)

[8] http://www.ddl.ish-lyon.cnrs.fr/trajectoire/ProjetGP.html

[9] See Kopecka & Narashimhan eds. (2012).

University of California at Berkeley (Chafe ed. 1980)[10], was also a source of inspiration, particularly in its care to vary the camera angle so as to give the scenes different speaker perspectives (e.g. *going down pear tree towards camera*, *leaving pear tree away from camera*).

As with the *Put and Take* video, our *Trajectoire* stimulus includes a series of video clips (76 clips total) of which 55 are target clips representing various events of spontaneous motion (e.g. *walk into bush*, *run away from tree*), 19 are filler clips (e.g. *feed ducks*), and 2 are training clips. Target clips were created for controlling five types of variables, presented in Table 2 below.

Table 2. Variables controlled in the *Trajectoire* video

Concepts		Variables
Figure	[F]	man; woman; child; group of people
Manner	[M]	walking; running; jumping
Path	[P]	Source (e.g., *from*); Median (e.g., *along*); Goal (e.g., *to*) [with ± Boundary-crossing]
Ground	[G]	place (e.g., *cave*); object (e.g., *tree*); human (e.g., *boy*)
Deixis	[D]	centripetal direction (=*toward*) or centrifugal direction (=*away from*) with regard to the camera-observer

As the focus of this project was specifically to explore the expression of the Path, the type of Manner is less varied, including only 3 types: *walking*, *running* and *jumping*. On the other hand, Ground information, more closely related to Path, is present in more diverse situations; contrary to previous studies, which mainly considered motions taking place with respect to functional places (e.g., *station*, *school*, *house*), our stimulus includes natural sites (e.g., *forest*, *cave*), objects (e.g., *tree*, *rock*), and humans. In addition, some Grounds are bounded (e.g., *bush*, *cave*) and the rest unbounded (e.g., *tree*, *rock*). To elicit Deictic information, some scenes were deliberately conceived from a speaker perspective (e.g., Figures 1 and 2), while others were neutral with respect to the speaker perspective (e.g., Figure 3).

Figure 1: traj026

man[F] walks[M] into[P] bush[G] away from me[D]

Figure 2: traj076

boy[F] walks[M] down[P] rock[G] towards me[D]

Figure 3: traj030

boy[F] walks[M] out of[P] cave[G] towards[P] boy[G]

[10] Initially, this stimulus was not designed to explore the expression of motion events. The stimulus, however, included many scenes related to motions, and can be used to investigate the spatial domain (see Ishibashi 2010).

The description of each scene (e.g., *walking into forest away from me*) corresponds to the type of sentence that we initially expected to elicit. In practice, a subject can freely interpret any given scene. As has been noted in previous studies, scenes understood as telic (e.g., Figure 1) are consistently described using the 'Path verb strategy', as in example (9), whereas, those understood as atelic (e.g., Figure 2) can be depicted using either the 'Path verb strategy' or 'Manner verb strategy', as in examples (10a-10b).

(9) Sigemi-ni **hait**-ta.
bush-DAT move.in-PST
'(He) went into a bush.' (traj026_jp11)

(10) a. Path verb strategy
Etto hadaka-no syoonen-ga iwaba-o **ori**-te-i-masu.
uh nakedness-GEN boy-NOM rocky spot-ACC move.down-CONN-PROG-POLI
'Uh a naked boy is moving down a rocky spot.' (traj076_jp10)

b. Manner verb strategy
Iwaba-o otokonoko-ga **arui**-te-i-masu.
rocky spot-ACC boy-NOM walk-CONN-PROG-POLI
'A boy is walking (along) a rocky spot.' (traj076_jp06)

Moreover, traj030 (Figure 3) for instance can be interpreted and described as a Source-oriented motion (e.g., *out of cave*), as in example (11a), or as a Goal-oriented one (e.g., *towards boy*), as in example (11b).

(11) a. Scene interpreted as a Source-oriented motion
Otokonoko-ga iwa-no sukima-kara de-te ki-masi-ta.
boy-NOM rock-GEN gap-ABL move.out-CONN come-POLI-PST
'A boy moved out of the gap in the rock.' (traj030_jp04)

b. Scene interpreted as a Goal-oriented motion
Ee okkii otokonoko-no tokoro-e iki-masi-ta.
uh big boy-GEN place-DIR go-POLI-PST
'Uh (he) went to the place of the boy.' (traj030_jp08)

The *Trajectoire* video was used to elicit spoken data from 15 languages, and data from the project (and other resources) have been the subject of descriptive chapters on the expression of Path in five Ph.D. dissertations from the Dynamique du Langage Laboratory of Lyon (Cáceres 2011, Vuillermet 2012, Kondic 2012, Bon 2014, Ishibashi in prep.), as well as three collective publications (Fortis *et al.* eds. 2011, and two others in preparation).

3.2. Field Work in Japan and Data

Data elicitation was carried out in 2007 with twenty students of Kobe University (Kobe, Japan). They were all native speakers of Japanese, including ten males and ten females aged between 19 and 39 (average age = 23). The data were individually elicited: after having watched each clip, subjects were asked to describe what the person (or the group of people) did. Their responses were audio recorded and then transcribed by myself in one of the conventional romanization systems of Japanese (called the *kunrei* system).

After having transcribed all twenty versions of these 55 target clips, 1254 clauses[11] were extracted for this study. These clauses describe spontaneous motion events, as in example (12a), as well as relative clauses denoting static locations for the initial location of the Figure (= Source), as indicated in bold in example (12b).

(12) a. Spontaneous motion
Ee onnanohito-ga dookutu-no naka-kara de-te iki-masi-ta.
uh woman-NOM cave-GEN inside-ABL move.out-CONN go-POLI-PST
'Uh a woman moved out the inside of the cave away from me.' (traj025_jp10)

b. Static location (=Source)
[Ki-no tokoro-ni i-ta] zyosei-ga kotira-ni arui-te ki-masi-ta.
tree-GEN place-DAT be-PST woman-NOM towards.here-DAT walk-CONN come-POLI-PST
'A woman **[(who) was at the place of the tree]** came towards here walking.' (traj032_jp07)

This set of spatial clauses is called here the *Trajectoire data*, and each of them can be identified thanks to a unique code (e.g., *traj025_jp10*), which includes first information about the scene number (e.g., *traj025*) followed by subject identification (e.g., *jp10*).

As the examples (9-12) illustrate, the *Trajectoire* data appear more elaborate than the examples considered in previous studies (e.g., examples 5-7). They include a **richer array** of spatial elements (e.g., relational noun, such as *naka* 'inside' in example (12a); demonstratives, such as *kotira* 'towards.here' in example (12b)), and **more complex** structures (e.g., relative clause, as in example (12b)). Moreover, the description of a scene is much more **variable** from one speaker to another, reflecting the speaker's construal: for instance, a scene could be interpreted as a Source-oriented motion, as in example (11a), or as a Goal-oriented motion, as in example (11b). The intra-linguistic variation is also observable at the morphosyntactic level: for example, the literature has habitually described the Source as being marked by the ablative case particle *kara*, as in example (12a), while the new data show that this information can be also expressed by a relative clause (as a location before motion), as in example (12b).

[11] According to Berman and Slobin (1994: 660), the term 'clause' refers to a predicate including a finite (e.g., *he **goes** in the water*) or nonfinite matrix verb (e.g., ***taken** by surprise*).

As for the verb, the *Trajectoire* data include four different types: the **simplex verb** consisting of a single verbal stem, as in example (13a); the **compound verb** typically combining two verbs, as in example (13b); the **verb-te verb construction** combining two (or more) verbs by using the connective *-te*, as in example (13c); and the **light verb construction** consisting of a noun and a light verb *si-* (< *suru*) 'do', as in example (13d).

(13) a. Simplex verb (simplex V)
Sigemi-ni **hait**-ta.
bush-DAT move.in-PST
'(He) went into a bush.' (traj026_jp11) [= 9]

b. Compound verb (V-V)
Syoonen-ga umi-ni **tobi-kon**-da.
boy-NOM sea-DAT jump-move.in-PST
'A boy moved into the sea jumping.' (traj031_jp11)

c. Verb-te verb construction (V-te V)
Ee zyosei-ga ookii ki-no soba-made **arui-te** **iki**-masi-ta.
uh woman-NOM big tree-GEN side-up.to walk-CONN go-POLI-PST
'Uh a woman went up to the side of the big tree walking.' (traj061_jp08)

d. Light verb construction (N *suru*)
Nnn go-nin-no danzyo-ga **sanpo** **si**-te-iru.
uh five-NUM.CL-GEN man and woman-NOM stroll do-CONN-PROG
'Uh five men and women are taking a stroll.' (traj066_jp18)

The token distribution of these four types of verbs in the data is presented in Table 3. The table shows that the use of complex verbs (V-V, V-te V and N *suru*) is by far the most frequent, representing a total of 77.8% of the clauses, demonstrating therefore how the new data exhibit common morphosyntactic complexity at the verb level.

Table 3. Token distribution of the four types of verbs in the *Trajectoire* data

Simplex V	Complex V **77.8%** (976)			Total
	V-V	V-te V	N *suru*	
22.2% (278)	10.3% (129)	65.6% (823)	1.9% (24)	100% (1254)

Among these four types of verb, the use of the V-te V is the most prominent, representing 65.6% of the clauses in the data. Moreover, in the majority of cases (97.5%; 802 out of 823 V-te V examples), these V-te V complex verbs are formed with a Deictic verb, as shown in example (14a), while others lacking Deictic verbs, as in example (14b) are rare in the data, corresponding to only 2.5% (21 examples) of the data. In the data collected, therefore, the use of the V-te V seems strongly related to the expression of Deictic relation.

(14) a. V-te V with a Deictic verb (97.5% of V-te V examples)
Ee zyosei-ga ookii ki-no soba-made [arui-te **iki**-masi-ta].
uh woman-NOM big tree-GEN side-up.to walk-CONN go-POLI-PST
'Uh a woman went up to the side of the big tree walking.' (traj061_jp08) [=13c]

b. V-te V without a Deictic verb (2.5%)
Zyosei-ga [hasit-te] ki-no soba-o [hanare-ta].
woman-NOM run-CONN tree-GEN side-ACC leave-PST
'A woman, running, left the side of the tree.' (traj033_jp17)

3.3. Summary: Characteristics of the *Trajectoire* Data

The *Trajectoire* data, elicited from 20 subjects who were native speakers of Japanese, appear richer than previous datasets in the variety of non verbal spatial elements used (e.g., case particles, relational nouns, demonstratives, ideophones) and in the greater complexity of the morphosyntactic structure (e.g., from complex verbs to various types of complex phrases, such as relative clauses and subordinate clauses). Moreover, the data attest the presence of further information, i.e. that of the Deixis. This information, which has been little explored in previous studies, is actually widely attested in the data. Deictic elements occur in more than 60% of the clauses, mainly using V-te V complex verbs. The use of non-verbal elements will be described in Ishibashi (in prep.), while the present paper focuses specifically on the use of Deictic verbs.

4. Deictic Verbs in Japanese: Overview and their Use in the *Trajectoire* Data

Section 3.2. demonstrated that the use of the Deictic verb is prominent in the data. This section describes in more detail the Deictic verbs in Japanese: their semantic, pragmatic and morphosyntactic features (§4.1.), before going into detail about their distribution in the *Trajectoire* data (§4.2.).

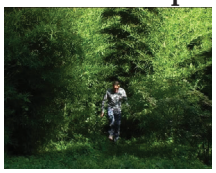
4.1. Overview of Deictic Verbs in Japanese

It is commonly assumed that the Deictic verbs of Japanese, *kuru* 'come' and *iku* 'go', denote a motion oriented with respect to the camera-observer: *kuru* is characterized as motion towards the camera, while *iku* as motion oriented away from the camera (Shibatani 2003)[12].

[12] The *Trajectoire* data also attest two more deictic verbs: the first is *yatteki-* 'come', as in example (i), which is formed with the verb *kuru* (> *ki-*) 'come', and the second is *yuku* 'go', as in example (ii), which is a literal variant of *iku* 'go'.
(i) Tto danzyo san-nin-ga mukoo-kara **yatteki**-masi-ta.
uh man and woman three-NUM.CL-NOM over.there-ABL come-POLI-PST
'Uh three men and women came from over there.' (traj041_jp13)
(ii) Onnanohito-ga ki-no tikaku-o kake-te **yuku**.
woman-NOM tree-GEN proximity-ACC sprint-CONN go
'A woman goes (by) the proximity of the tree sprinting.' (traj044_jp19)

As for their use, the *Trajectoire* data show that these verbs occur in larger contexts, not only for motions involved in the **centripetal** or **centrifugal direction**, as in the left column of Table 4 below, but also for motions **neutral with respect to the speaker's perspective**, as in the right column of Table 4. In the latter case, the verb *kuru* 'come' expresses a Figure's appearance onto the scene and the verb *iku* 'go' a Figure's disappearance out of the scene[13]. For the first type of motion (with centripetal or centrifugal direction), the use of verbs *kuru* 'come' or *iku* 'go' is obviously deictic. On the other hand, with the second type of motion (neutral in speaker perspective), the use of these verbs is not deictic. The **deictic** or **non deictic uses** of these verbs are illustrated in examples (15-16).

Table 4. Examples of scenes which can be described with Deictic verbs

	Deictic use		Non deictic use	
coming verb	**centripetal orientation**		**appearance**	
				
	traj055: out of woods	traj076: down rock	traj030: out of cave to boy	
going verb	**centrifugal orientation**		**disappearance**	
				
	traj053: into cave	traj061: to tree	traj069: into field	traj039: pass behind tree

(15) Deictic use

a. Ee otokonoko-ga ee... iwaba-o kotira-ni **ki**-masi-ta.
uh boy-NOM uh rocky spot-ACC towards.here-DAT come-POLI-PST
'Uh a boy came towards here uh... (along) a rocky spot.' (traj076_jp08)

b. Zyosei-ga dookutu-kara de-te **iki**-masi-ta.
woman-NOM cave-ABL move.out-CONN go-POLI-PST
'A woman moved out of the cave away from me.' (traj025_jp03)

(16) Non deictic use

a. Otokonoko-ga iwa-no sukima-kara de-te **ki**-masi-ta.
boy-NOM rock-GEN gap-ABL move.out-CONN come-POLI-PST
'A boy moved out of the gap in the rock.' (traj030_jp04) [= 11a]

b. Otokonohito-ga ki-no usiro-o toot-te **iki**-masi-ta.
man-NOM tree-GEN behind-ACC pass-CONN go-POLI-PST
'A man passed the behind the tree.' (traj039_jp01)

[13] Interestingly, non deictic uses of an element denoting 'going' have also been reported by Wilkins and Hill (1995) in Mparntwe Arrernte (Arandic language spoken in Australia) and Longgu (Austronesian language spoken in Solomon Islands).

The Deictic verb can occur alone, as in (15a), but its use as a simplex verb is rare in the data (*infra*). Table 5 represents three types of V-te V with a Deictic verb according to their semantic structure.

Table 5. Semantic schemas of V-te V complex verbs

	Type	Slot 1 (Manner)	Slot 2 (Path)	Slot 3 (Deixis)	Meaning
2 constituents	I	*hasit-te* 'run'		*iku* 'go'	'go running'
	II		*de-te* 'move.out'	*iku* 'go'	'move out (away from me)'
3 constituents	III	*hasit-te* 'run'	*de-te* 'move.out'	*iku* 'go'	'move out running (away from me)'

In these V-te V constructions, the Deictic verb is consistently assigned to the final position (= Slot 3). Except for type I, which lacks a Path verb, types II and III exhibit a 'Path verb strategy', according to the regular criterion for identifying a Path verb (= Slot 2) as the main verb. For instance, the argument structure of these complex verbs, as in example (17a), is inherited from that of the Path verb (e.g., *de-* 'move.out'), as in example (17b), but not from that of the Deictic verb (e.g. *iki-* 'go'), as in example (17c).

(17) a. Zyosei-ga dookutu-kara **de-te** **iki**-masi-ta.
woman-NOM cave-ABL move.out-CONN go-POLI-PST
'A woman moved out of the cave away from me.' (traj025_jp03) [=15b]

b. Zyosei-ga dookutu-kara **de**-masi-ta.
woman-NOM cave-ABL move.out-POLI-PST
'A woman moved out of the cave.'

c. *Zyosei-ga dookutu-kara **iki**-masi-ta.
woman-NOM cave-ABL go-POLI-PST
'(intended) A woman went from the cave.'

Notice that the order of the verb constituents (Manner-Path-Deixis) is crucial for the V-te V to be interpreted as a complex verb (Nakatani 2001). When realized in other order combinations, such as Path-Manner-Deixis as in example (18a), the V-te V construction is habitually interpreted as a coordination of two (or more) clauses. Moreover, a small set of verbs, occurring in the final position of V-te V constructions, can be grammaticalized to mark aspects. For instance, the V2 *i-* 'be' in example (18b) is interpreted here as the progressive aspect (*infra*).

(18) a. Coordination of two clauses

[Onnanohito-ga	horaana-kara	**de**-te]	[kotira-ni	**arui-te**
woman-NOM	cave-ABL	move.out-CONN	towards.here-DAT	walk-CONN

ki-masi-ta].
come-POLI-PST
'[A woman moved out of the cave] and [(she) came towards here walking].' (traj023_jp02)

b. Simplex verb with grammaticalized V2

Kodomo-ga	yamamiti-o	arui-te-**i**-masu.
child-NOM	mountain trail-ACC	walk-CONN-**PROG**(< 'be')-POLI

'A child is walking (along) a mountain trail.' (traj065_jp01)

4.2. Use of Deictic Verbs in the *Trajectoire* Data

As was noted by Miyajima (1984) and Shibatani (2003) in their research, the use of Deictic verbs is highly frequent in the *Trajectoire* data in Japanese, occurring in **68%** of clauses (853 out of 1254). Table 6 shows that the Deictic verbs in the data are much more frequently realized as V-te V combining with another verb denoting Manner and/or Path (94%; 802 out of 853 examples including a Deictic verb), rather than a simplex verb (6%; 51 examples).

Table 6. Token distribution of Deictic verbs between simplex and complex verb constructions[14]

Simplex V	V-te V	Total
6%	94%	100%
(51)	(802)	(853)

A closer look at the data shows that the distribution of the Deictic verbs is actually **heterogeneous**. For instance, as shown in Table 7 below, which combines eight selected scenes, three relevant to a particular speaker's perspective (traj055, traj061, traj076) and five neutral with respect to the speaker's perspective (traj030, traj039, traj064, traj065, traj075). Although all of these scenes could potentially be described using Deictic verbs (see §4.1.), its use actually decreases for the last four scenes (0% ~ 45%), without regard to the orientation (deictic or not) of motion.

One might suppose that such a pattern of distribution would be accidental, depending on an arbitrary choice made by a speaker to encode (or not) Deictic information (see du Bois 2003). However, if one takes characteristics of each scene into account, one can identify several possible factors that might underlie the use (or lack of use) of a Deictic verb, such as the orientation of the motion, the distance travelled, and the verb telicity.

[14] The deictic verbs, having been quite commonly used in Classical Japanese (Inoue 1962, Suzuki 1999, *inter alia*), no longer participate in V-V compounding as motion verbs (Matsumoto 1997: 146).

The first two factors, the **orientation** and the **distance travelled**, are concerned in cases in which none of their descriptions include Deictic verbs. For the scene traj064 (*jumping from cliff into water*), characterized as a **vertical motion without deictic orientation**, the use of the Deictic verbs is presumably irrelevant. For the scene traj075 (*jumping from rock to rock*), representing a **motion of a short-distance**, the use of these verbs is irrelevant as well, because of the incompatibility of the type of motion with the Deictic verbs which naturally imply a long-distance motion (Matsumoto 1997).

Table 7. Use of Deictic verbs in the description of eight scenes

Scene		Deictic verb
traj055	walk out of forest (towards camera)	**100** % (20/20)
traj030	walk out of cave towards boy	**90** % (18/20)
traj061	walk to tree (away from camera)	**85** % (17/20)
traj039	walk behind tree	**70** % (14/20)
traj076	walk down rock (towards camera)	**45** % (9/20)
traj065	walk up path	**30** % (6/20)
traj064	jump from cliff into water	**0** % (0/20)
traj075	jump from rock to rock	**0** % (0/20)

Now looking at the first six cases in Table 7 which exhibit variation in the Token frequency of the Deictic verb. Their use is highly frequent for the first three scenes (traj055, traj030 and traj061) constructed to elicit a **telic** phase of motion (*moving out*, *moving to*), while it decreases for the three next scenes (traj039, traj076 and traj065) constructed to elicit an **atelic** one (*passing behind*, *moving down*, *moving up*). For instance, two scenes, traj055 and traj076 (see Table 4 for their pictures), illustrate an obvious example: these scenes, both representing centripetal motions, would be expected to be similar in the distribution pattern of the Deictic verb. However, their Token distribution greatly differs: 100% of descriptions for the former are involved with a telic phase of motion (*moving out*), and, conversely, only 45% for the latter are involved with an atelic motion (*moving down*).

This would suggest, at first sight, that the telicity related to the scene plays an important role in the distribution of the Deictic verbs. However, scene traj039 representing an atelic phase of motion (*passing behind tree*), seems to be a counter example as 70% of its descriptions include a Deictic verb. Looking at these descriptions more closely, however, it seems that this scene is preferentially structured according to a 'Path verb strategy', as illustrated in example (19). This example includes a V-te V

complex verb in which the main verb *sugi-* 'move.past' is a Path verb (see Table 5). This Path verb is assumed to be telic in the literature (Yoshikawa 1976[1971]). This makes us think that its use would eventually be correlated with the nature of main verb, namely its **lexical telicity**: the use of a Deictic verb increases when the main verb is itself telic, and conversely decreases when the main verb is atelic.

(19) Ookina ki-no mukoo-gawa-o dansei-ga toori-**sugi**-te
big tree-GEN over.there-side-ACC man-NOM move.through-**move.past**-CONN
iki-masi-ta.
go-POLI-PST
'A man moved past the other side of a big tree.' (traj039_jp03)

In Japanese, the identification of the lexical telicity of verbs can be carried out by using linguistic tests, namely the ***V-te-iru* construction** test (Fujii 1976[1966], Yoshikawa 1976[1971], Matsumoto 1997, Mihara 1997, *inter alia*). As shown in section 4.1., this construction is a particular case of V-te V construction in which the V2 (e.g. *iru* 'be') is grammaticalized, and the authors have assumed that it is the telicity of the V1 that triggers different aspectual interpretation of the *V-te-iru* construction: a **resultative** interpretation with a telic V1 (e.g., *ki-* 'come'), as in example (20a), *vs*. a **progressive** interpretation with an atelic V1 (e.g., *arui-* 'walk'), as in example (20b). Table 8 below lists several telic and atelic motion verbs as accounted for in these previous studies.

(20) a. Resultative interpretation (V1 = telic verb)
Takusii-ga **ki-te-iru**.
Taxi-NOM **come-CONN-RES**
The taxi has arrived.' (Mihara 1997: 110)

b. Progressive interpretation (V1 = atelic verb)
Kodomo-ga yamamiti-o **arui-te-i**-masu.
child-NOM mountain trail-ACC **walk-CONN-PROG**-POLI
'A child is walking (along) a mountain trail.' (traj065_jp01) [=18b]

Table 8. List of telic and atelic motion verbs in Japanese (non exhaustive)

Telic motion verbs		Atelic motion verbs	
hairu	'move.in'	*aruku*	'walk'
deru	'move.out'	*hasiru*	'run'
sugiru	'move.past'	*oyogu*	'swim'
koeru	'move.over'	*tooru*	'move.through'
kuru	'come'	*oriru*	'move.down' (+ ACC)
iku	'go' (+ DAT)[15]	*noboru*	'move.up' (+ ACC)

[15] As Comrie (1976: 45) has stated the telicity can be marked by non verbal elements as well. Indeed, Matsumoto (1997) noted that in Japanese the interpretation of the *it-te-iru* (i.e., with the V1 *it-* (< *iku*) 'go') varies according to the nature of the Path in the Ground expression (e.g., Goal ground *vs*. Median ground): the construction is interpreted as the **resultative** aspect with a Goal ground (marked by the dative *ni*), as in example (i), but as the **progressive** aspect with a Median ground (marked by the accusative *o*), as in example (ii).

In the *Trajectoire* data, the *V-te-iru construction* is mainly attested as the marker of progressive aspect in describing the atelic phase of motions (e.g., traj076, traj065), as illustrated in Table 9.

Table 9. Distribution of the progressive aspect (and the Deictic verbs)

Scene		Deictic verb	Progressive
traj055	walk out of forest (towards camera)	**100** % (20/20)	**0**% (0/20)
traj030	walk out of cave towards boy	**90** % (18/20)	**0**% (0/20)
traj061	walk to tree (away from camera)	**85** % (17/20)	**0**% (0/20)
traj039	walk behind tree	**70** % (14/20)	**15**% (3/20)
traj076	walk down rock (towards camera)	**45** % (9/20)	**50**% (10/20)
traj065	walk up path	**30** % (6/20)	**70**% (14/20)

As shown in Table 9, the progressive marker hardly co-occurs with the Deictic verbs. Indeed, as examples (21a-21b) demonstrate, these two types of morphosyntactic elements exhibit a somewhat complementary distribution: for instance, the scene traj076 (*moving down*) is described either with the progressive *V-te-iru* construction, when the focus is on the ongoing action, as in example (21a), or with the Deictic verb, specifying the speaker's perspective, as in example (21b), but not both.

(21) a. Progressive (ongoing action)
Etto hadaka-no syoonen-ga iwaba-o **ori-te-i**-masu.
uh nakedness-GEN boy-NOM rocky spot-ACC **move.down-CONN-PROG**-POLI
'Uh a naked boy **is moving down** a rocky spot.' (traj076_jp10) [=10a]

b. Deictic verb (speaker perspective)
Otokonoko-ga iwaba-o yotiyoti **ori-te** **ki**-masi-ta.
boy-NOM rocky spot-ACC totteringly **move.down-CONN come**-POLI-PST
'A boy **moved** totteringly **down** a rocky spot **towards me**.' (traj076_jp12)

(i) Resultative (+DAT)
Kare-wa ima **eki-ni** it-te-iru.
he-TOP now station-DAT go-CONN-RES
'Now he has gone to the station.' (Matsumoto 1997: 186)

(ii) Progressive (+ACC)
Kare-wa ima **miti-o** it-te-iru.
he-TOP now path-ACC go-CONN-PROG
'Now he is going (along) the path.' (Matsumoto 1997: *ibid*.)

Similarly, the V1 *ori-* (< *oriru*) 'move.down' or *nobot-* (< *noboru*) 'move.up' receive a progressive interpretation with the Median ground (+ACC), which is a less marked collocation, but also a resultative interpretation with the Goal ground (+DAT).

Competition between the progressive and the Deictic verb might well be one of possible causes for the decrease in use of the Deictic verb in describing these atelic scenes.

4.3. Summary: Motivation for the Use of the Deictic Verbs

The *Trajectoire* data supported what Miyajima (1984) and Shibatani (2003) had perceived of the high frequency of the use of the Deictic verb in describing spontaneous motion events in Japanese. This suggests that the Deictic information would be as fundamental as Path and Manner information in the expression of these type of events in the language. The data further showed that the distribution of the Deictic verbs is heterogeneous and their realization seems to be motivated by **characteristics of the scenes** (orientation of motion for vertical axis motions, distance of motion), the **lexical telicity** of the verb (more frequent use of the Deictic verbs with telic verbs than with atelic verbs), or the **competition** with another non spatial element (e.g., the progressive aspect).

5. Conclusion

The previous studies investigating the expression of motion events in Japanese have been much inspired by the Talmian typological model, a model consisting of the characterization of the language according to its preferential strategy to organize spatial information, namely, Path or Manner, at the verb stem level. These analyses only allowed an overall appreciation of cross-linguistic diversity but without apprehending intra-linguistic diversity in the way a particular language actually structures spatial expression. This study was based on spoken data in Japanese and proposes a more accurate description of the spatial expression in this language than previous studies had done.

The spoken data considered in this study were elicited from twenty native speakers of Japanese using the *Trajectoire* video stimulus. The data, including more than one thousand spatial clauses which describe 55 different spontaneous motion events, were more elaborate in their morphosyntactic structure and more dynamic in their intra-linguistic variability than the introspective examples of the previous studies. Moreover, by being contextualized the data allowed for exploration of phenomena which have been not been considered in previous studies, such as the distribution of the Deictic verbs. Observing twenty versions of eight selected scenes, this study has contributed to identifying three factors which would underlie their distribution pattern. One of these, the **telicity**, seems to be a key component, inducing intra-linguistic variations in the organization of spatial information: for instance, the choice between the 'Path verb' and 'Manner verb' strategy in Romance languages and Japanese, and the use of Deictic verbs in Japanese.

Although it was initially created for a cross-linguistic project, the *Trajectoire* video stimulus used in collecting the present data was also very beneficial for intra-linguistic investigation. On the other hand, as the stimulus was not created for the specific study of Deictic expression, further analyses will be carried out with more appropriate field methods to examine this topic, which will be developed within the *Deixis* project (2015-2018), the next stage of the *Trajectoire* project (*Fédération de Recherche en Typologie et Universaux Linguistiques*, CRNS, France)[16] to be conducted by Alice Vittrant, Anetta Kopecka and Benjamin Fagard.

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On the Derivation of Relative Clauses in Teotitlán del Valle Zapotec

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1 Introduction

The syntax of externally headed relative clauses, such as that in (1), has received a number of analyses.[1]

(1) the [$_{\text{head}}$ skateboard] [$_{\text{RC}}$ that I bought]

On the traditional **head-external** analysis, pursued by Chomsky (1973, 1977), among others, the formation of the relative clause involves the movement of an overt or null relative pronoun, which in English can be *which*, *who*, or a null element. The head of the relative clause is base-generated outside the relative clause, and the relative clause adjoins to it. This analysis is schematized in (2).

(2) the [$_{\text{NP}}$ [$_{\text{NP}}$ skateboard] [$_{\text{CP}}$ $\varnothing_{\text{i}}$ that I bought t_{i}]]

On the **raising** or **head-raising** analysis, by contrast, the head originates inside the relative clause and raises out of it, or to its edge (Åfarli 1994, Kayne 1994, Bianchi 1999, Bhatt 2002). One implementation of this analysis is shown below.

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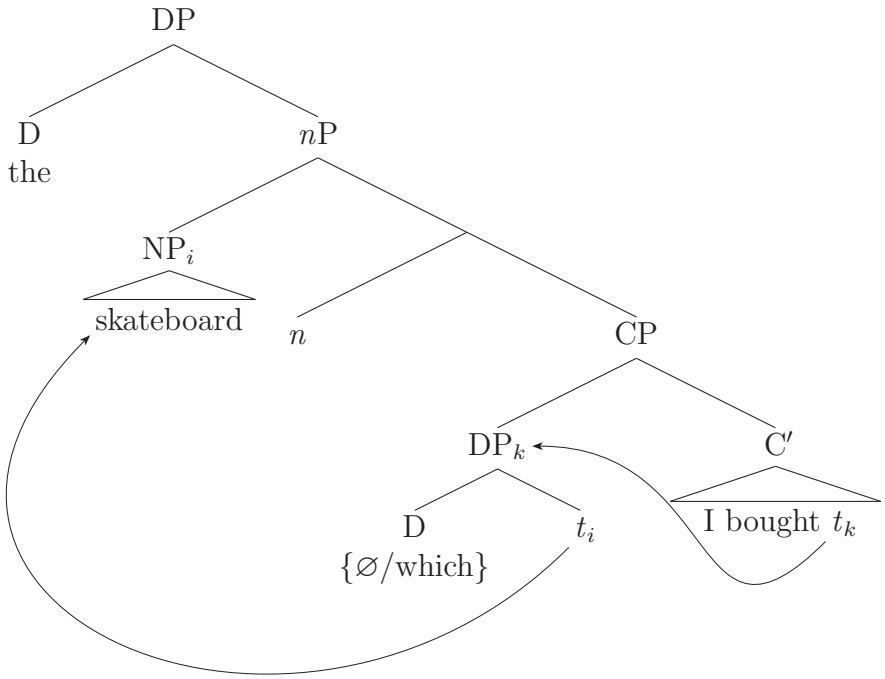
[1]Abbreviations used: A = animal; ADJ = adjectivalizer; COMPAR = comparative; COMP = complementizer; COMPL = completive; COP = copula; EMPH = emphatic; H = human; HAB = habitual; INAN = inanimate; IRR = irrealis; LOC = locative; NEUT = neutral aspect; PL = plural; PROG = progressive; REL = relativizer. The orthography used here is very close to that used by Lillehaugen et al. (2015).

(3)



Finally, the **matching** analysis holds that the overt head of the relative clause is generated outside the relative clause, but what moves inside the relative clause is not a relative pronoun but (a nominal phrase containing) an NP similar or identical to the visible "external" head, and this "internal head" is elided under identity or near-identity with the external head (Lees 1960, 1961, Chomsky 1965, Sauerland 1998, 2003).

Much recent work (Åfarli 1994, Kayne 1994, Bianchi 1999, Bhatt 2002) argues that some or all externally headed relative clauses are derived by head-raising. Here, we present novel data from our own fieldwork that yield insights into the structure and derivation of relative clauses in Teotitlán del Valle Zapotec (TdVZ), an Oto-Manguean language spoken in the town of Teotitlán del Valle, which is approximately 30 kilometers east of the city of Oaxaca in Oaxaca State, Mexico. These data show that relative clauses in TdVZ lack the head-raising derivation entirely, indicating that the derivation of externally headed relative clauses is subject to cross-linguistic variation which is not obvious on the surface.

The paper is organized as follows. §2 lays out the basic facts of relativization in TdVZ. §3 presents evidence that TdVZ relatives cannot be formed by head-raising; this evidence comes from reciprocal binding and bound variable anaphora. §4 presents apparent evidence **for** a head-raising derivation for TdVZ relatives, which comes from diagnostics developed by Bhatt (2002) in his investigation of English relatives. We argue that, despite appearances, the only analysis of TdVZ relatives that allows us to make sense of all the data is one on which they are never derived by head-raising. The various effects that seem to tell in favor of head-raising are in fact all, in one way or another, due not to head-raising but to semantic reconstruction. §5 presents our non-head-raising analysis of TdVZ relatives and extends it to account for an interesting property of these structures—namely, that a PP that seems to be modifying the head of a TdVZ relative clause can sometimes unexpectedly appear **inside** the relative clause. §6 concludes.

2 Background: Basic Properties of TdVZ Relatives

TdVZ relative clauses are postnominal and externally headed (at least on the surface). In relative clauses and matrix declaratives, both SVO and VSO are possible and common word orders. The language allows relativization of (at least) subjects, direct objects, indirect objects, and locative and temporal adjuncts. Examples of argument relativization are given in (4–6) (we return to adjunct relativization in §5).

(4) *Subject relativization*

benih ni kayul

benih ni kay-ul
person REL PROG-read
'the person who's reading'

(5) *Direct object relativization*

libr ni bato'o Mari

libr ni ba-to'o Mari
book REL COMPL-sell Mari
'the book that Mari sold'

(6) *Indirect object relativization*

benih ni baded Roos te libr

benih ni ba-ded Roos te libr
person REL COMPL-give Roos a book
'the person Roos gave a book to'

As these examples show, when a nominal phrase is relativized, the relative clause is introduced by a left-peripheral element *ni*. We analyze this element as a relative complementizer rather than a relative pronoun, in part because it cannot cooccur with a pied-piped preposition:

(7) a. Sofie zuban lo te bangu.
Sofie zub-an **lo** te bangu.
Sofie is.sitting-3H on a chair
'Sofie is sitting on a chair.'

b. bangu ⟨*__lo__⟩ ni ⟨*__lo__⟩ zub Sofie
bangu ⟨*__lo__⟩ ni ⟨*__lo__⟩ zub Sofie
chair ⟨*on⟩ REL ⟨*on⟩ is.sitting Sofie
'the chair that Sofie is sitting on'

In TdVZ, when an overt interrogative *wh*-phrase which is the object of a preposition is moved, the preposition is pied-piped (and typically inverts with the *wh*-phrase; see Nee 2012:37-38). Therefore, the unacceptability of (7b) with *lo* 'on' would be unexpected if *ni* were a relative pronoun (i.e., a relative operator bearing a [WH] feature). Furthermore, *ni* can be used as a non-relative complementizer as well, as in (8) (adapted slightly from Gutiérrez Lorenzo 2014:61, (226)).

(8) Luis bain ni gudinya lam.

Luis ba-in ni gu-diny-a lam.
Luis COMPL-make COMP COMPL-kill-1.SG 3.A
'Luis made me kill it (the animal).'

Finally, it is worth noting that *ni* does not resemble any of the demonstratives in TdVZ (*kin* 'that (distal)', *kan* 'that (distal)', *re* 'that (medial)', *rè'* 'this', *nde* 'this'), or any of the interrogative *wh*-words (e.g., *tu* 'who, which', *xi* 'what, which').

But although we are analyzing *ni* as a complementizer base-generated in the left periphery of relative clauses, TdVZ relatives can be shown to be formed by movement—specifically, of a phonologically null relative operator, as in the English example (1). To see this, consider first the fact that TdVZ relative clauses are themselves islands:

(9) *TdVZ relative clauses are islands*

a. Markuh rumbee gunaa ni guzi dguzhar.
Markuh ru-mbee gunaa ni gu-zi d-guzhar.
Markuh HAB-know woman REL COMPL-buy PL-spoon
'Markuh knows the woman who bought the spoons.'

b. *Xi rumbee Markuh gunaa ni guzi?
*Xi ru-mbee Markuh gunaa ni gu-zi?
what HAB-know Markuh woman REL COMPL-buy
lit. '*What$_i$ does Markuh know the woman who bought ___$_i$?'
int. 'What is such that Markuh knows the woman who bought it?'

The unacceptability of (9b) shows that TdVZ forbids *wh*-extraction from a relative clause (even when the *wh*-phrase is a complement). Given that TdVZ relative clauses are islands, we can determine whether relativization is island-sensitive by attempting to relativize out of a relative. This produces unacceptable results:

(10) *No relativization out of subject relatives*

a. *Na bayee dibuj ni Els rumbee benih ni bain.
*Na ba-yee dibuj ni Els ru-mbee benih ni ba-in.
I COMPL-see.1.SG drawing REL Els HAB-know person REL COMPL-make
lit. '*I saw the drawing$_i$ that Els knows the person who made ___$_i$.'
int. 'I saw the drawing such that Els knows the person who made it.'

b. *Markuh rap juget ni bayee gule'en ni bazhiel.
*Markuh ra-p juget ni ba-yee gule'en ni ba-zhiel.
Markuh HAB-have toy REL COMPL-see.1.SG boy REL COMPL-find
lit. '*Markuh has the toy$_i$ that I saw the boy who found ___$_i$.'
int. 'Markuh has the toy such that I saw the boy who found it.'

(11) *No relativization out of object relatives*

a. *Na rumbee gunaa ni rizhulaaza kamion ni bain pintar.

*Na ru-mbee gunaa ni ri-zhulaaz-a kamion ni ba-in pintar.
I HAB-know woman REL HAB-like-1.SG car REL COMPL-do paint
lit. '*I know the woman who$_i$ I like the car that ___$_i$ painted.'
int. 'I know the woman such that I like the car she painted.'

b. *Na bayee ngiu ni kua'a zhape'en kafee ni guniab.

*Na ba-yee ngiu ni ku-a'a zhape'en kafee ni gu-niab.
I COMPL-see.1.SG man REL COMPL-take girl coffee REL COMPL-order
lit. '*I saw the man who$_i$ the girl took the coffee that ___$_i$ ordered.'
int. 'I saw the man such that the girl took the coffee he ordered.'

We conclude, then, that relative clauses are formed by movement in TdVZ. But this conclusion is compatible with every major analysis of relativization, and does not bear directly on the question of whether TdVZ relatives can be formed by head-raising. We now turn to facts which can help us adjudicate between head-raising and non-head-raising analyses of TdVZ relatives.

3 Evidence Against Head-Raising

3.1 Reciprocal Binding

In English, the head of a relative clause can contain an anaphor such as the reciprocal *each other*, as in (12).[2]

(12) Elsa and Benito$_i$ saw the [cars of each other$_i$'s] that are blue.

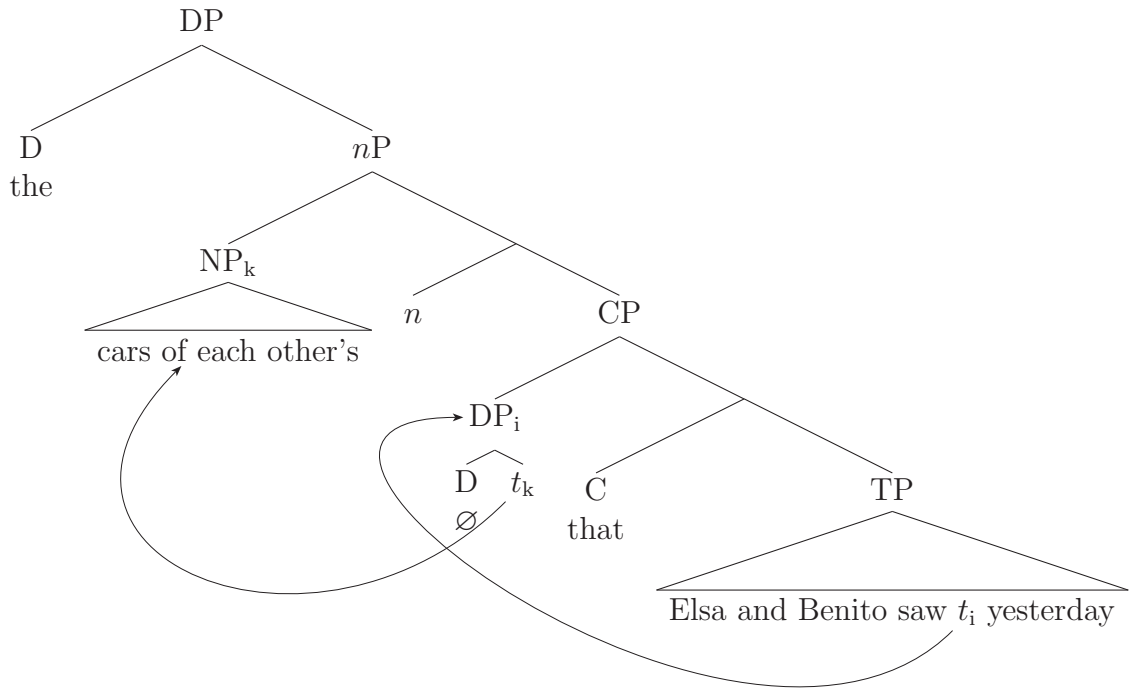
In (12), *each other* is bound by a DP that c-commands it in surface syntax. But an instance of *each other* in an RC-head can also take as its antecedent a DP inside the relative clause:

(13) The [cars of each other$_i$'s] [that Elsa and Benito$_i$ saw yesterday] are blue.

On the standard assumption that *each other* is subject to (some version of) Condition A (Chomsky 1981, 1986), sentences like (13) strongly suggest that English relativization structures can be formed by head-raising, allowing *each other* in (13) to be bound by its RC-internal antecedent in its base position. A derivation of this type for (13) is shown in (14).

[2]All English judgments are our own. Some of the English phenomena discussed in this section are subject to interspeaker variation. This variation, though very interesting in its own right, is not directly relevant here.

(14)



The question, then, is whether binding data from TdVZ support the hypothesis that TdVZ relatives can also be derived along the lines shown in (14). To begin answering this question, let us first consider the baseline examples in (15), which establish that a reciprocal in an RC-head may be bound by a **matrix** antecedent in TdVZ.

(15) a. Sofie kun Markuh rizhulaaz dmaset xten sa'adan ni bain Oliib.
Sofie kun Markuh$_i$ ri-zhulaaz d-maset xten **sa'a-d-an**$_i$ ni ba-in
Sofie and Markuh HAB-like PL-pot of SA'A-PL-3H REL COMPL-make
Oliib.
Oliib
'Sofie and Markuh like the pots of each other's that Oliib made.'

b. Marie kun Luk gula'a dkomputador xten sa'adan ni bain sru Mart.
Marie kun Luk$_i$ gu-la'a d-komputador xten **sa'a-d-an**$_i$ ni
Marie and Luk COMPL-break PL-computer of SA'A-PL-3H REL
ba-in sru Mart.
COMPL-make good Mart
'Marie and Luk broke the computers of each other's that Mart fixed.'

c. Dbekuh gudo djuget xten sa'adum ni guzi Serjih.
D-bekuh$_i$ gu-do d-juget xten **sa'a-d-um**$_i$ ni gu-zi Serjih.
PL-dog COMPL-eat PL-toy of SA'A-PL-3A REL COMPL-buy Serjih
'The dogs ate the toys of each other's that Serjih bought.'

These examples show that an RC-head can host a reciprocal in TdVZ. This being so, we can now ask whether this language permits a reciprocal in an RC-head to take as its antecedent a nominal phrase inside the relative clause. The answer is no, as shown by the sentences in (16), which are fully unacceptable.

(16) a. *Nga'a naa dkamion xten sa'adan ni bayee Els kun Beniit nai.

*Nga'a naa d-kamion xten **sa'a-d-an** ni ba-yee **Els kun Beniit**
blue COP PL-car of SA'A-PL-3H REL COMPL-see Els and Beniit
nai.
yesterday
int. 'The cars of each other's that Els and Beniit saw yesterday are blue.'

b. *Gura'au naa dkubet xten sa'adan ni gudee Sofie kun Luk.

*Gura'au naa d-kubet xten **sa'a-d-an** ni gu-dee **Sofie kun Luk**.
big COP PL-bucket of SA'A-PL-3H REL COMPL-carry Sofie and Luk
int. 'The buckets of each other's that Sofie and Luk carried are big.'

Interestingly, the way to express the intended meanings of sentences like these is to place the PP *xten sa'adan* 'of each other's' **inside** the relative clause. For example, the well-formed counterparts of (16a-b) are (17a-b), respectively.

(17) a. Nga'a naa dkamion ni bayee Els kun Beniit xten sa'adan nai.

Nga'a naa d-kamion ni ba-yee Els kun Beniit **xten sa'a-d-an**
blue COP PL-car REL COMPL-see Els with Beniit of SA'A-PL-3H
nai.
yesterday
'The cars of each other's that Els and Beniit saw yesterday are blue.'

b. Gura'au naa dkubet ni gudee Sofie kun Luk xten sa'adan.

Gura'au naa d-kubet ni gu-dee Sofie kun Luk **xten sa'a-d-an**.
big COP PL-bucket REL COMPL-carry Sofie and Luk of SA'A-PL-3H
'The buckets of each other's that Sofie and Luk carried are big.'

The relative positions of *xten sa'adan* 'of each other's' and *nai* 'yesterday' in (17a) show us that the PP *xten sa'adan* is truly RC-internal in these examples, and not RC-external but extraposed. In (17a), *nai* 'yesterday' is interpreted as modifying the relative clause predicate *bayee* 'saw', not the matrix predicate *nga'a* 'blue'. Therefore, *nai* 'yesterday' must be inside the relative clause, and hence so must *xten sa'adan* 'of each other's', which precedes it. Inverting *xten sa'adan* 'of each other's' and *nai* 'yesterday' in (17a) produces unacceptability:

(18) *Nga'a naa dkamion ni bayee Els kun Beniit nai xten sa'adan.

*Nga'a naa d-kamion ni ba-yee Els kun Beniit nai **xten sa'a-d-an**.
blue COP PL-car REL COMPL-see Els with Beniit yesterday of SA'A-PL-3H
int. 'The cars of each other's that Els and Beniit saw yesterday are blue.'

This shows that an instance of *sa'adan* 'each other' is illicit outside a relative clause—whether it precedes or follows the relative clause—when its would-be antecedent is **inside** the relative clause.

We see, then, that *sa'adan* 'each other' does not display binding connectivity in relativization structures: an instance of *sa'adan* in an RC-head cannot take as its antecedent

a nominal phrase inside the relative clause. If one wanted to square this fact with a head-raising analysis of TdVZ relatives, one might suggest that perhaps *sa'adan* 'each other' **never** reconstructs for binding. But this is not the case: *sa'adan* regularly reconstructs for binding under other types of Ā-movement, such as *wh*-question formation and topicalization, as shown in (19-20).[3]

(19) Xi dmaset xten sa'adan gudee Juan kun Marie?

Xi d-maset xten **sa'a-d-an**$_i$ gu-dee **Juan kun Marie**$_i$?
what PL-pot of SA'A-PL-3H COMPL-carry Juan and Marie
'Which pots of each other's did Juan and Marie carry?'

(20) Dmaset xten sa'adan gudee Juan kun Marie.

D-maset xten **sa'a-d-an**$_i$ gu-dee **Juan kun Marie**$_i$.
PL-pot of SA'A-PL-3H COMPL-carry Juan and Marie.
'Each other's pots, Juan and Marie carried.'

In (19), *sa'adan* 'each other' is embedded in a *wh*-nominal which has undergone interrogative *wh*-movement; as a result, the reciprocal has crossed its antecedent (the plural subject). Sentence (20) shows an analogous case of Condition A binding connectivity involving topicalization. These examples show that the binding **non**-connectivity displayed by *sa'adan* 'each other' in relativization structures is an effect specific to relativization. If TdVZ relatives could be formed by head-raising, the instance of *sa'adan* 'each other' in the head of an object relative like those in (16) would have a copy c-commanded by its RC-internal potential antecedent. Therefore, we would expect that its binding needs would be met in its base position and that the sentences would be acceptable.

These data constitute our first piece of evidence that TdVZ relativization structures are head-external: the (visible) head of a relative clause in this language is never inside the relative clause at any stage of the derivation. This analysis explains why an instance of *sa'adan* 'each other' in an RC-head can never take as its antecedent a nominal phrase inside the relative clause.

3.2 Bound Variable Anaphora

A second strand of evidence that TdVZ relatives are not formed by head-raising comes from bound variable anaphora. Consider the following sentence, which features a bound variable that is not c-commanded by its binder in surface syntax:

(21) Idee de ke sru'inte naam bain kadga bekuh feliis.

Idee de ke sru'in-te naa-**m**$_i$ ba-in **kadga bekuh**$_i$ feliis.
idea of that pretty-EMPH COP-3A COMPL-make each dog happy
'The idea that it$_i$ was really pretty made each dog$_i$ happy.'

[3]These examples also show that *sa'adan* 'each other' can precede its antecedent, and hence the unacceptable relativization structures we have seen cannot be unacceptable because they feature the linear configuration [... *sa'adan*$_i$ ... ANTECEDENT$_i$ ...].

In (21), the third-person singular animal clitic *-m* 'it', which is the subject of the clausal complement to the noun *idee* 'idea', can be interpreted as a variable bound by the quantified nominal *kadga bekuh* 'each dog'. We analyze this as the result of Quantifier Raising: *kadga bekuh* raises covertly to the root of the tree and from that position binds the variable *-m* 'it', as well as its own lowest copy, as shown in (22).

(22) [**kadga bekuh**]$_1$ [idee de ke sru'in-te naa-**m**$_1$ ba-in t_1 feliis]
[each dog]$_1$ idea of that pretty-EMPH COP-3A$_1$ COMPL-make t_1 happy

This Quantifier Raising operation apparently does not induce a weak crossover violation in TdVZ—or, for that matter, in (our) English—plausibly because the pronominal being crossed over is embedded in the clausal complement to a noun, and/or because of the causative nature of the main-clause predicate (cf. Moulton 2013:2).

In our English, the complex DP containing the bound pronoun in a sentence like (21) can be "relativized out" and the bound variable reading preserved:

(23) We talked about the idea that it$_i$ was really pretty that made each dog$_i$ happy.

This constitutes more evidence that English relativization structures can be formed by head-raising. If (23) can be formed by head-raising, then the bound variable reading can come about as follows. At LF, the structure is something like the following:

(24) the [idea that it was really pretty]$_k$ ...
that **[each dog]**$_1$ [$_{DP}$ [$_D$ ∅] [idea that it$_1$ was really pretty]$_k$] made t_1 happy

Because there is a copy of [*idea that it was really pretty*] inside the relative clause, *each dog* can covertly QR past it, reach a position near the left edge of the relative clause, and from that position bind *it*, as well as its own lowest copy, as shown in (24).

If, as we contend, TdVZ relativization structures cannot be formed by head-raising, then the TdVZ counterpart of (23) should not have the bound variable reading. This prediction is correct:

(25) *Bayuyun xten idee de ke sru'inte naam$_i$ ni bain kadga bekuh$_i$ feliis.
*Ba-yuy-un xten idee de ke sru'in-te naa-**m**$_i$ ni ba-in
COMPL-talk-1.PL of idea of that pretty-EMPH COP-3A REL COMPL-make
kadga bekuh$_i$ feliis.
each dog happy
int. 'We talked about the idea that it$_i$ was really pretty that made each dog$_i$ happy.'

This follows from our head-external analysis of TdVZ relatives. The pronominal inside the RC-head cannot be bound inside the relative clause, because there is no copy of the RC-head inside the relative clause. Nor can the pronominal be bound in its surface position. This would require *kadga bekuh* 'each dog' to QR out of the relative clause, to a position from which it could bind the pronominal, but this movement is impossible because TdVZ relatives are islands.

Further support for the claim that a pronominal in an RC-head cannot be bound by an RC-internal quantifier in TdVZ comes from the following contrasts, which are precisely analogous to the one we have just seen:

(26) [Context: There are a bunch of boys, and each one has been claimed by someone or other to be really smart. Each boy is happy about the claim that he's really smart.]

a. Dizh de ke nasinte naan$_i$ bain kadga gule'en$_i$ feliis.
Dizh de ke nasin-te naa-**n**$_i$ ba-in **kadga gule'en**$_i$ feliis.
word of that smart-EMPH COP-3H COMPL-make each boy happy
'The claim that he$_i$ was really smart made each boy$_i$ happy.'

b. *Bayuyun dizh de ke nasinte naan$_i$ ni bain kadga gule'en$_i$ feliis.
*Ba-yuy-un dizh de ke nasin-te naa-**n**$_i$ ni ba-in **kadga**
COMPL-talk-1.PL word of that smart-EMPH COP-3H REL COMPL-make each
gule'en$_i$ feliis.
boy happy
int. 'We made the claim that he$_i$ was really smart that made each boy$_i$ happy.'

(27) a. Dizh-gizhih de ke debilte naan$_i$ bain kadga ngiu$_i$ nazhichih.
Dizh-gizhih de ke debil-te naa-**n**$_i$ ba-in **kadga ngiu**$_i$
word-trash of that weak-EMPH COP-3H COMPL-make each man
na-zhichih.
ADJ-angry
'The rumor that he$_i$ was really weak made each man$_i$ angry.'

b. *Bayuyun dizh-gizhih de ke debilte naan$_i$ ni bain kadga ngiu$_i$ nazhichih.
*Ba-yuy-un dizh-gizhih de ke debil-te naa-**n**$_i$ ni ba-in
COMPL-talk-1.PL word-trash of that weak-EMPH COP-3H REL COMPL-make
kadga ngiu$_i$ na-zhichih.
each man ADJ-angry.
int. 'We spread the rumor that he$_i$ was really weak that made each man$_i$ angry.'

The fact that pronominals in RC-heads, like reciprocals in RC-heads, fail to display connectivity for bound variable anaphora in TdVZ would be unexpected on a head-raising analysis of TdVZ relatives, but receives a straightforward explanation on our head-external analysis.

4 Apparent Evidence for Head-Raising

Although the lack of binding connectivity across relative clause boundaries suggests that TdVZ relatives cannot be derived by head-raising, there are two strands of evidence that initially seem to suggest that TdVZ does have head-raising after all. In this section, we discuss the relevant facts and argue that, despite appearances, they do not in fact constitute counterevidence to our non-head-raising analysis of TdVZ relatives.

4.1 Relativization of a VP-Idiom Chunk

Bhatt (2002) (following Brame 1968 and Schachter 1973, a.o.), argues that, when a VP-idiom is "split up" by relativization and the idiomatic reading is preserved, this is evidence that the relativization structure has been formed by head-raising.

TdVZ has at least one VP-idiom, illustrated in (28):

(28) Nai gudawan ru'u Marie.
Nai gu-**daw**-an **ru'u** Marie.
yesterday COMPL-**eat**-3H **mouth** Marie
lit. 'Yesterday he ate Marie's mouth.'
id. 'Yesterday he kissed Marie.'[4]

The idiom is *-daw- ru'u* (*X*), which literally means 'eat (X's) mouth', but is interpreted as meaning 'kiss (X) (on the mouth or anywhere on his/her face)'. When *ru'u* 'mouth' is used as the head of an object relative and the relative clause predicate is a form of *-daw-* 'eat', the relativization structure can be interpreted idiomatically, as shown in (29a-b). In these sentences, a form of *-daw-* 'eat' is used, but this verb is interpreted idiomatically as meaning 'kiss'.

(29) a. Zhnia naa ru'u ni gudo Marie.
Zhnia naa **ru'u** ni gu-**do** Marie.
red COP mouth REL COMPL-eat Marie
'The mouth that Marie kissed is red.'

b. Gura'au naa ru'u ni gudo Beed.
Gura'au naa **ru'u** ni gu-**do** Beed.
big COP mouth REL COMPL-eat Beed
'The mouth that Beed kissed is big.'

On the standard assumption that two constituents that could serve as the chunks of an idiom must be highly local to one another at LF for the idiomatic interpretation to be available, (29a-b) would seem to suggest that TdVZ relatives can be derived by head-raising after all. On such an analysis, (29a-b) have idiomatic readings because their RC-heads (*ru'u* 'mouth') have raised from the object position of *-daw-* 'eat', and hence form an underlying constituent with it.

However, these facts can be given an alternative analysis which is compatible with our head-external analysis of TdVZ relatives. The relativization structures we have just seen involving the idiom *-daw- ru'u* (*X*) 'kiss (X)' are different in an important respect from English relativization structures such as the following:

(30) a. the headway we made
b. the umbrage she took at those remarks
c. the advantage he took of them

The head nouns in (30) are truly unusable without their licensing verbs:

(31) We discussed the {*headway / *umbrage / #advantage}.[5]

[4]This sentence is felicitous if the referent of the subject kissed Marie on the mouth or anywhere on her face.
[5]The version of this sentence with *advantage* is well formed, but does not have anything like the idiomatic reading available in (30c).

The noun *ru'u* 'mouth', on the other hand, is meaningful independently of the idiom *-daw- ru'u* (X) 'kiss (X)'. We can capture the interpretation of sentences like (29a-b) by positing that they involve a special meaning of the verb *-daw-* 'eat' (cf. Kratzer 1996:114-115):

(32) a. $[\![\textbf{-daw-}_1]\!] = \lambda$x . λy . y ate x
b. $[\![\textbf{-daw-}_2]\!] = \lambda$x : x is a mouth . λy . y kissed x

On this analysis, a relativization structure like *ru'u ni gudo Marie* (lit. 'the mouth that Marie ate') in (29a)—even on a head-external analysis of TdVZ relatives—will have available to it, by Predicate Modification, the desired idiomatic interpretation, shown below.

(33) ιx [x is a mouth and Marie kissed x]

Therefore, the fact that the idiom *-daw- ru'u* (X) 'kiss (X)' can be broken up by relativization and the idiomatic reading preserved does not force a head-raising analysis, but rather is fully compatible with our head-external analysis of TdVZ relatives.

4.2 Low Readings of RC-Head Modifiers

Another phenomenon that initially appears to provide evidence for head-raising in TdVZ has to do with low (RC-internal) readings of RC-head modifiers (Bhatt 2002). The phenomenon can be illustrated using English examples, such as (34), which is ambiguous:

(34) the first book that John said Tolstoy had written
a. **High reading:**
'the book that John said Tolstoy had written before he said Tolstoy had written any other book'
(Order of saying matters; order of writing is irrelevant.) $\boxed{\textit{first} \gg \textit{said}}$
b. **Low reading:**
'the book that John said Tolstoy wrote before he wrote any other book'
(Order of writing matters; order of saying is irrelevant.) $\boxed{\textit{said} \gg \textit{first}}$

[adapted from Bhatt 2002:57, (20)]

It appears that, on the "low" reading of *first* in (34), *first* is interpreted within the scope of the RC-internal verb *said*. An analogous ambiguity is observed when *first* is replaced with *only* ((35)) or with an ordinary superlative such as *longest*.

(35) the only book that John said Tolstoy had written
a. **High reading:**
'the only book about which John said that Tolstoy had written it' $\boxed{\textit{only} \gg \textit{said}}$
b. **Low reading:**
'the book about which John said that Tolstoy had written it and no other book' $\boxed{\textit{said} \gg \textit{only}}$

[adapted from Bhatt 2002:57, (21a)]

Bhatt (2002) argues that the low readings of these English RC-head modifiers come about through head-raising. When head-raising occurs, there is a copy of the RC-head modifier in the (RC-internal) base position of the head, below the RC-internal verb (e.g., *said*). The interpretation at LF of this low copy of the modifier rather than its highest copy produces the low reading of the modifier. Low readings of RC-head modifiers are robustly available in TdVZ, which may initially seem to indicate that this language allows head-raising. We argue, however, that the relevant data from TdVZ are equally compatible with a non-head-raising analysis, and that such an analysis allows us to make much better sense of **all** the facts of TdVZ relativization. We begin by considering the behavior in RC-heads of the ordinal *primer* 'first', and then proceed to examine that of *-zi* 'only'.

4.2.1 Low Readings of *Primer* 'First'

Consider the following example:

(36) [Context: Juan said that Marie wrote the book *Dbaalih* [*The Stars*]. Then he said, "She also wrote the book *Dmàín* [*Animals*], and that's the first book she wrote."]

Dmàín naa primer libr ni guni Juan bakaa Marie.

D-màín naa **primer** libr ni **gu-ni** Juan ba-kaa Marie.
PL-animal COP first book REL COMPL-say Juan COMPL-write Marie
'*The Animals* is the first book Juan said Marie wrote.' $\boxed{\textit{said} \gg \textit{first}}$

On a surface scope reading (*first* ≫ *said*), (36) would be false, because *The Animals* was not the **first** book about which Juan **said** that Marie had written it. On an inverse scope reading (*said* ≫ *first*), however, (36) would be true, because Juan did **say** at one point that *The Animals* was the **first** book Marie had written. The fact that (36) is felicitous in the context given indicates that *primer* 'first' in this sentence can be interpreted low, within the scope of the RC-internal verb *guni* 'said'.

Two more examples of low readings of *primer* 'first' follow. In (37) and (38), we see that an instance of *primer* 'first' in an RC-head can be interpreted within the scope of an RC-internal *bain desidir* 'decided' or *baziru'an* 'admitted'.[6]

(37) [Context: Sofie decided to drink some coffee. Then she decided to drink some hibiscus tea first.]

Jamaik naa primer bebiid ni bain desidir Sofie ge'en.

Jamaik naa **primer** bebiid ni ba-in **desidir** Sofie g-e'e-n.
hibiscus.tea COP first drink REL COMPL-do decide Sofie IRR-drink-3H
semilit. '#Hibiscus tea is the first drink that Sofie decided to drink.'
id. 'Hibiscus tea is the drink that Sofie decided to [drink first].' $\boxed{\textit{decide} \gg \textit{first}}$

(38) [Context: Juain admitted that he had made a mistake when painting the house. Then he admitted that he had made another mistake when fixing the car, and he said that he had done that first.]

Erroor ni bain Juain kamion naa primer erroor ni baziru'an banian.

[6]Interestingly, the English counterparts of both these verbs block the low reading for *first* (Heycock 2005).

Erroor ni ba-in Juain kamion naa **primer** erroor ni
mistake REL COMPL-make Juain car COP first mistake REL
ba-ziru'-an ba-ni-an.
COMPL-admit-3H COMPL-make-3H

semilit. 'The mistake that Juain made to the car is the first mistake that he admitted that he made.'

id. 'The mistake that Juain made when fixing the car is the mistake that he admitted [he had made first].' $\boxed{\textit{admit} \gg \textit{first}}$

The robust availability of low readings for *primer* 'first' initially appears to pose a considerable challenge to our head-external analysis of TdVZ relatives. But appearances can be deceiving. Consider the following relativization structure in English:

(39) the second mammal that we know emerged from the water (Heycock 2005:379, (77))

This phrase does not have a classical Bhatt-style low reading, with *second* interpreted within the scope of *know*. That is, it cannot be paraphrased as follows:[7]

(40) the x (*or:* the mammal) such that we **know** that it was the **second** mammal to emerge from the water

But although straightforward reconstruction of the RC-head into its base position does not give the right reading for (39), its most salient reading is nonetheless one on which the scale associated with the ordinal *second* is a timeline of **emergences**, not states of **knowing**:

> [I]n a scenario where there are 3 mammals, A, B, and C, about which we are sure that A and B emerged from the water, and in that order, while we do not know whether or not C emerged from the water at all, B can accurately be described by [(39)].
> Heycock (2005:380)

This shows that, in English, the scale associated with an ordinal in an RC-head can be constructed with the help of RC-internal material without reconstruction of the head into the relative clause. Therefore, low readings of ordinals in English RC-heads do not necessarily tell us anything about whether said RC-heads arrived at their surface position by head-raising.

It turns out that Heycock's "mammal" observation can be replicated in TdVZ:

(41) [Context: We're talking about the development of three species of animals: A, B, and C. We know that at some point a long time ago, A emerged from the water, and we know that B emerged from the water at some point after that. As for C, we have no idea if it emerged from the water, let alone when, if it did. For all we know, it could have emerged from the water before A, or between A and B, or after B, or not at all.]

B naa rarup màín ni nanoon zaa lo nis.

[7] This is because, in English, factive predicates like *know* block low readings of Bhatt-type RC-head modifiers generally (Heycock 2005).

B naa **rarup** màín ni **na-n-oon** zaa lo nis.
B COP second animal REL NEUT-know-1.PL NEUT.come P_{LOC} water
'B is the second animal we know came from the water.'[8]

The felicity of (41) in the context given shows that, in TdVZ too, the scale associated with an ordinal in an RC-head can be built using RC-internal material without reconstruction of the head into the relative clause.[9] Therefore, TdVZ is like English here: low readings of ordinals modifying RC-heads do not necessarily indicate that head-raising has occurred.

4.2.2 Low Readings of *-zi* 'Only'

Low readings are also robustly available for another modifier of RC-heads: the clitic *-zi* 'only'. An example of this is shown in (42).

(42) [Context: Mart said, "Felip saw the movie *Dbel* [*The Snakes*]. Oh wait, no—the only movie he saw was *Dbedund* [*The Hummingbirds*]."]

Dbedund naa teezi pelikuh ni guni Mart bayee Felip.

D-bedund naa tee-**zi** pelikuh ni **gu-ni** Mart ba-yee Felip.
PL-hummingbird COP one-only movie REL COMPL-say Mart COMPL-see Felip
'*The Hummingbirds* is the only movie Mart said Felip saw.' $\boxed{\textit{said} \gg \textit{only}}$

This sentence would be false on a high reading of *-zi* (*only* ≫ *said*), because *The Hummingbirds* was not the **only** movie about which Mart **said** that Felip had seen it. But it would be true on a low reading of *-zi*, since Mart did **say** at one point that Felip had seen **only** *The Hummingbirds*. The felicity of (42) in the context given shows that an instance of *-zi* in an RC-head can be interpreted low, within the scope of an RC-internal predicate (here *guni* 'said').

Like *primer* 'first', *-zi* 'only', when in an RC-head, can be interpreted within the scope of an RC-internal *bain desidir* 'decided' ((43-44)).[10]

(43) [Context: Marie decided to eat a banana. Then she changed her mind and decided to eat only an apple.]

Mansan naa teezi frut ni bain desidir Marie gaguan.

Mansan naa tee-**zi** frut ni ba-in **desidir** Marie g-agu-an.
apple COP one-only fruit REL COMPL-do decide Marie IRR-eat-3H

[8]The name of the letter B is pronounced *be* [be] in TdVZ.

[9]This suggests that the scales associated with ordinals in TdVZ may be constructed largely on the basis of what properties are most contextually salient. If this is so, *rarup* 'second' in (41) may have the (type ⟨e,t⟩) denotation in (1) and be interpreted in situ.

(1) $[\![\textbf{rarup}]\!] = \lambda x\ .\ \exists!y\ [y <_s x]$
where $<_s$ = 'precedes (on some contextually salient scale s)'

[10]TdVZ differs from English here: in English, *decide* blocks low readings of Bhatt-type modifiers (Heycock 2005).

semilit. '#The apple is the only fruit that Marie decided to eat.' *decided ≫ only*

id. 'The apple is the fruit such that Marie decided to eat only it.'

(44) [Context: Beniit decided to buy a coat. Then he changed his mind and decided to buy only a shirt.]

Kamset naa teezi laadih ni bain desidir Beniit sien. *decided ≫ only*

Kamset naa tee-**zi** laadih ni ba-in **desidir** Beniit ∅-si-en.
shirt COP one-only cloth.garment REL COMPL-do decide Beniit IRR-buy-3H
semilit. '#The shirt is the only article of clothing that Beniit decided to buy.'

id. 'The shirt is the article of clothing such that Beniit decided to buy only it.'

The fact that a *-zi* 'only' in an RC-head can be interpreted below an RC-internal predicate seems to pose another challenge to our head-external analysis of TdVZ relatives, on which an RC-head never raises from within its relative clause. However, this property of *-zi* does not in fact **force** the conclusion that TdVZ relatives can be derived by head-raising after all. Whenever an instance of inverse scope is discovered (i.e., a situation in which A asymmetrically c-commands B in surface syntax, but is interpreted semantically as falling within the scope of B), there are in principle two broad kinds of analyses one can give for it (see Fox 1999, Fox & Nissenbaum 2004 for discussion):

(45) a. **Syntactic reconstruction:** Inverse scope is available because A, although it c-commands B on the surface, has moved from a position below B, and can be interpreted in this lower position at LF.

b. **Semantic reconstruction:** Inverse scope is available not because A has moved from below B, but because some element has a denotation whose effect is to place the denotation of A within the scope of B in the process of semantic composition.

A priori, these two approaches seem equally reasonable. But adopting a syntactic reconstruction analysis of low readings of *-zi* 'only'—which would require positing head-raising in TdVZ—would make it very difficult to understand the reciprocal binding and bound variable anaphora facts laid out in §3, which suggest that TdVZ relatives lack the head-raising derivation. This tells in favor of a semantic reconstruction analysis of low readings of *-zi*. Our proposal can be illustrated using the relativization structure in (42), repeated here:

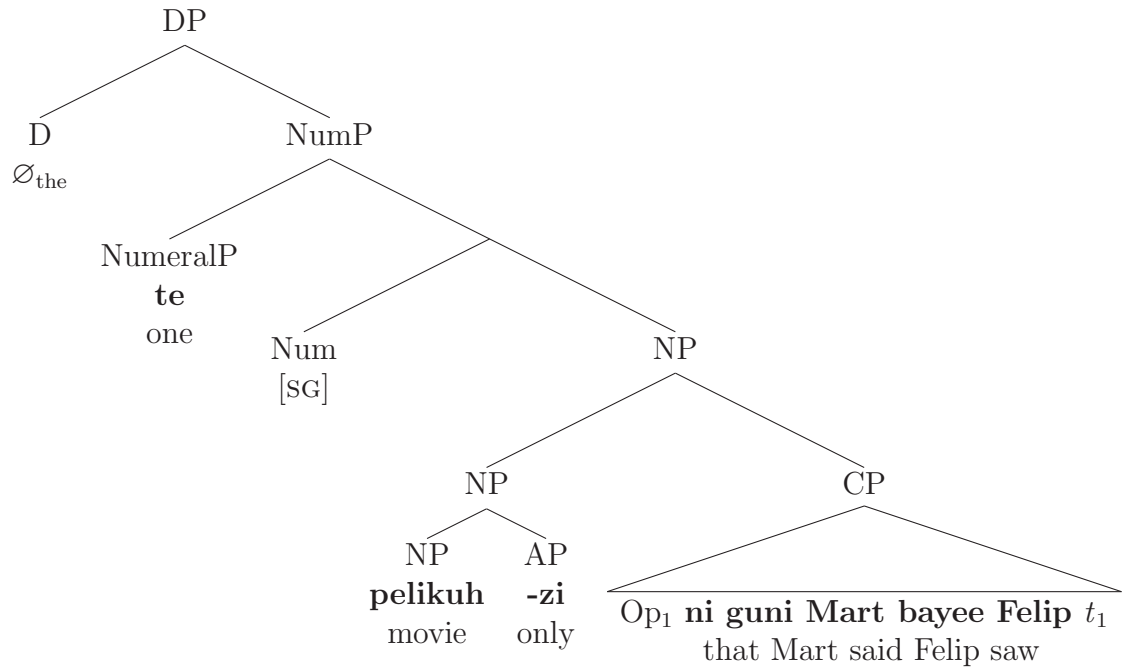
(46) *Dbedund* naa teezi pelikuh ni guni Mart bayee Felip.

D-bedund naa **tee-zi pelikuh ni gu-ni Mart ba-yee Felip**.
PL-hummingbird COP one-only movie REL COMPL-say Mart COMPL-see Felip
'*The Hummingbirds* is the only movie Mart said Felip saw.' *said ≫ only*

On our analysis, the phrase boldfaced in (46) has the following syntactic structure:[11]

[11] We posit that *-zi* 'only' is generated as an adjunct to the NP head because it needs to be able to access the denotation of this head. If this analysis of the underlying syntax of *-zi* 'only' is correct, then the fact that the clitic is pronounced immediately after *te* 'one' in (42-44) must be due to a morphophonological clitic placement rule.

(47)



The denotation of *-zi* 'only' is the following:

(48) $[\![\ [_{\text{AP}}\ \textbf{-zi}]\ ]\!] = \lambda f_{e,st}\ .\ \lambda Q_{\langle\langle e,st\rangle,st\rangle,st\rangle}\ .\ \lambda z\ .\ \lambda w\ .\ f(z)(w) = 1 = Q(\lambda g_{e,st}\ .\ \lambda w''\ .\ g(z)(w'')$ and $\neg\exists v\ [v \neq z$ and $f(v)(w'') = g(v)(w'') = 1])(w)$

This yields the denotation in (49) for the underlying NP pelikuh -zi $\textbf{Op}_1$ ni Mart guni $\boldsymbol{t}_1$ C Felip bayee $\boldsymbol{t}_1$ 'only movie that Mart said Felip saw' (see the Appendix for details).

(49) $[\![\ [_{\text{NP}}\ \textbf{pelikuh -zi Op}_1\ \textbf{ni Mart guni}\ \boldsymbol{t}_1\ \textbf{C Felip bayee}\ \boldsymbol{t}_1]\ ]\!] =$
$\lambda z\ .\ \lambda w\ .$ z is a movie in w and Mart said something in w and $\forall w'$: w′ is compatible with what Mart said in w [Felip saw z in w′ and $\neg\exists v$ [v ≠ z and v is a movie in w′ and Felip saw v in w′]]

Adopting this semantic reconstruction analysis allows us to understand the low readings of *-zi* 'only' we have seen without becoming unable to account for the reciprocal binding and bound variable anaphora facts presented in §3.

5 A Head-External Analysis of TdVZ Relatives

Having surveyed the empirical landscape, we can now proceed to our analysis of the structure and derivation of relative clauses in TdVZ. We do not yet have evidence bearing on whether TdVZ has only head-external relatives, only matching relatives, or both; but we contend that TdVZ relatives are never derived by head-raising. Here, we will implement our analysis using a traditional head-external derivation, with operator movement inside the relative clause.

5.1 The Basics

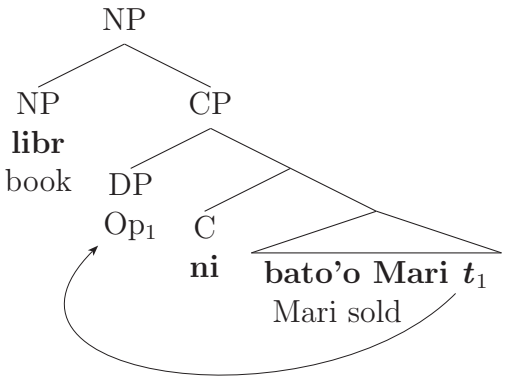
On our analysis, the simple relativization structure in (50) has the derivation shown in (51).

(50) *Direct object relativization* (= (5))

libr ni bato'o Mari

libr ni ba-to'o Mari
book REL COMPL-sell Mari
'the book that Mari sold'

(51)



In this derivation, a null relative operator—a silent counterpart of relative pronouns such as English *which*—is base-generated in the "core" of the clause. It then internally merges with the C-projection *ni bato'o Mari* $\boldsymbol{t}_1$ 'that Mari sold t_1' (or, in more traditional terms, moves to [Spec,CP]). The resulting CP adjoins to the head NP, which is never inside the CP at any point in the derivation. The structure in (51) can be semantically interpreted by the composition principles familiar from Heim and Kratzer (1998)—most importantly Predicate Abstraction (for the CP) and Predicate Modification (for the higher NP).

5.2 A Puzzle: Apparent RC-Internal "Stranding" of *Xten Sa'adan* 'of Each Other's'

With this much established, we can now proceed to consider a TdVZ-internal puzzle: why is it that the PP *xten sa'adan* 'of each other's' seems to be able to be "stranded" inside a relative clause? This possibility is shown in (17a-b) ((17a) is repeated below).

(52) *Apparent RC-internal "stranding" of the PP <u>xten sa'adan</u> 'of each other's'*

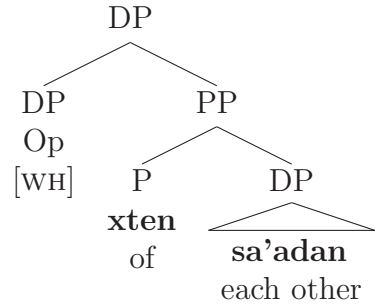
Nga'a naa dkamion ni bayee Els kun Beniit xten sa'adan nai.

Nga'a naa d-kamion [$_{\text{CP}}$ ni ba-yee Els kun Beniit **xten sa'a-d-an**
blue COP PL-car REL COMPL-see Els with Beniit of SA'A-PL-3H
nai].
yesterday
'The cars of each other's that Els and Beniit saw yesterday are blue.'

Intuitively, *xten sa'adan* 'of each other's' in (52) seems to be modifying the NP head *kamion* 'car'. This apparent "split constituency" would be relatively straightforward to understand if the NP head could raise out of the relative clause, stranding the PP inside the relative clause. But we have argued that in fact the NP head **never** raises out of the relative clause in TdVZ. What, then, should we make of *xten sa'adan*–stranding?

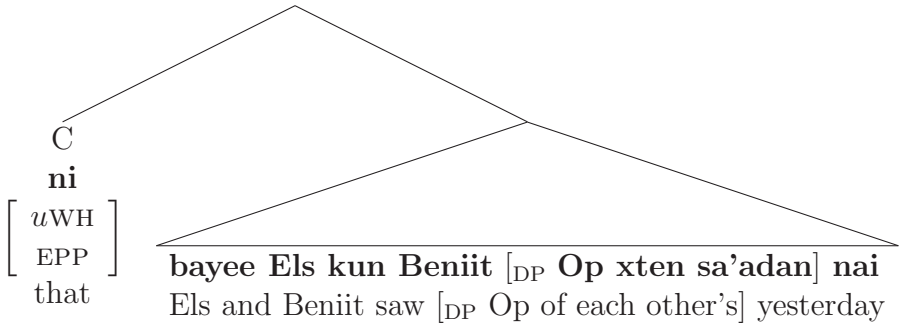
We propose that, in sentences like (52), *xten sa'adan* 'of each other's' is an adjunct not to the NP head (which is never inside the relative clause at any point) but rather to its "proxy" inside the relative clause, the null operator, as shown in (53).[12]

(53)



In the derivation of (52), the DP in (53) is merged as the direct object of the verb *bayee* 'saw', and further structure building produces the following subtree:

(54)



The relative complementizer *ni* inherently bears an unvalued WH-feature. It therefore probes its c-command domain for a goal bearing a valued WH-feature, finds one, and enters into an Agree relation with it (Chomsky 2000, 2001), thereby valuing its own [*u*WH] feature. *Ni* also inherently bears an EPP feature, which is satisfied by internally merging the goal of Agree with the root of the tree (i.e., moving it to [Spec,CP]).

However, there is a problem. What exactly is the goal that *ni* finds and agrees with in a derivation like the one snapshotted in (54)? If it is the null operator, then we apparently have exactly what we want:

[12]One might consider the alternative possibility that *xten sa'adan* 'of each other's' in sentences like (52) is an adjunct to some verbal or clausal projection (e.g., VP or *v*P), perhaps with an interpretation like 'in such a way as for each to affect the other'. But two types of evidence tell against such an analysis. First, *xten sa'adan* cannot be coordinated with clear verbal modifiers ((1)). Secondly, *xten sa'adan* cannot follow a pronominal direct object. This is unsurprising if it is an adnominal modifier, but would be unexpected if it were an adjunct to a clausal projection.

(1) *Gule'en kun zhape'en kua'a dguzhar nageelihte chikru xten sa'adan.

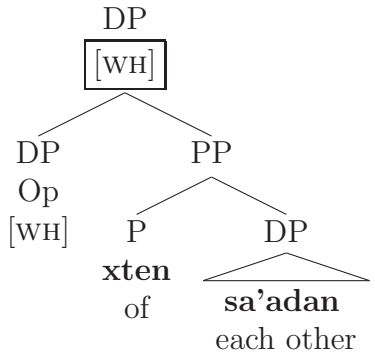
*Gule'en kun zhape'en ku-a'a d-guzhar **na-geelih-te** **chikru** **xten** **sa'a-d-an**.
boy and girl COMPL-take PL-spoon ADJ-fast-EMPH and of SA'A-PL-3H
lit. '*The boys and the girls took the spoons really fast and of each other's.'

[Equally unacceptable with the boldfaced conjuncts reversed. Either conjunct *alone* is fine in this linear position.]

(55) [$_{CP}$ Op$_i$ ni$_{[\text{~~uWH~~}, \text{~~EPP~~}]}$ [bayee Els kun Beniit [$_{DP}$ t_i xten sa'adan] nai]]
Op$_i$ REL saw Els and Beniit t_i of each.other yesterday

But if [$_{PP}$ *xten sa'adan*] 'of each other's' is **adjoined** to the null operator ((53)), the WH-feature on the lower segment of the DP will project to its higher segment ((56)), on the standard assumption that all the segments of a single category have identical featural content.

(56)



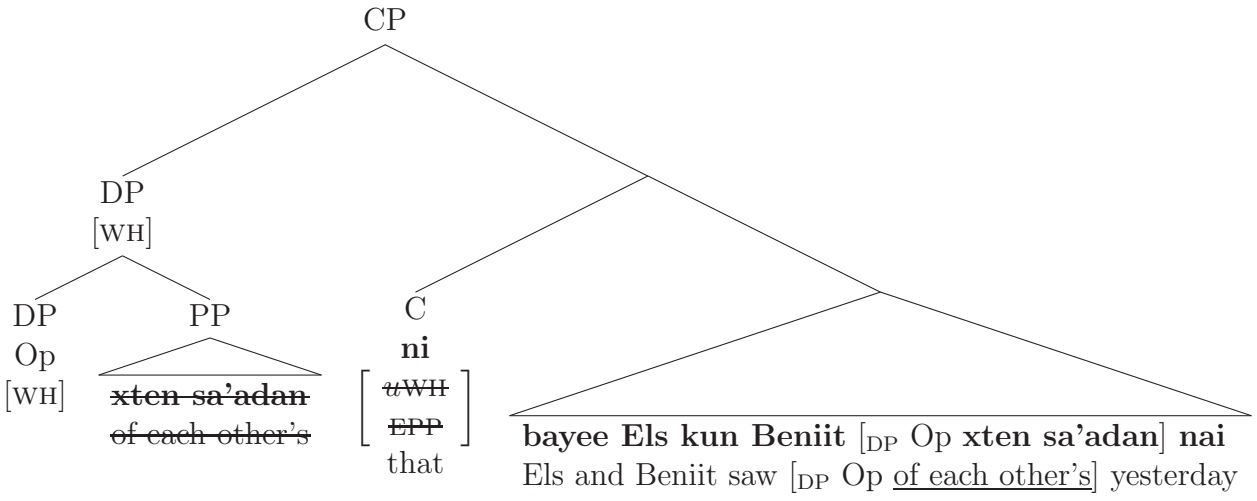
Therefore, the Agree search conducted by the complementizer *ni* in a derivation like (55) should find the **maximal** DP in (56), and this entire constituent should be attracted to [Spec,CP]—or, at the very least, this should be possible. Why, then, is *xten sa'adan* pronounced in its base position in sentences like (52)?

A clue comes from the fact that, apparently, overt material can **never** be pronounced in the specifier of the relative complementizer *ni*. We can explain this fact by making the following two independently motivated assumptions:

(57) a. TdVZ has a **Doubly-Filled Comp Filter**.
b. TdVZ has no silent relative complementizer.

These properties of TdVZ make it impossible to spell out the WH-DP [$_{DP}$ Op *xten sa'adan*] in [Spec,CP], forcing an unconventional spellout option: pronunciation of the lower copy of *xten sa'adan*, shown in (58).

(58) *Low pronunciation of PP adjoined to Op*



This analysis of *xten sa'adan* 'of each other's'–stranding makes at least two predictions. The first of these is the following:

(59) *Prediction A*
TdVZ relative clauses should not allow pied-piping of an overt preposition to [Spec,CP].

This prediction is borne out. In (60a), the nominal phrase *te bangu* serves as the object of the preposition *lo* 'on'. When this nominal is relativized out, *lo* 'on' can appear in situ with a resumptive pronoun ((60b)), or it can fail to be realized overtly ((60c)), but it cannot be pied-piped to the left periphery of the relative clause ((60d)).

(60) a. Sofie zuban lo te bangu.
Sofie zub-an **lo** te bangu.
Sofie is.sitting-3H on a chair
'Sofie is sitting on a chair.'

b. bangu ni zub Sofie la'aguen
bangu **ni** zub Sofie **la'agu-en**
chair REL is.sitting Sofie on/face-3INAN
semilit. 'the chair that Sofie is sitting on it'
id. 'the chair that Sofie is sitting on'

c. bangu ni zub Sofie
bangu **ni** zub Sofie
chair REL is.sitting Sofie
semilit. 'the chair that Sofie is sitting'
id. 'the chair that Sofie is sitting on'

d. bangu ⟨***lo**⟩ ni ⟨***lo**⟩ zub Sofie
chair ⟨*on⟩ REL ⟨*on⟩ is.sitting Sofie
'the chair that Sofie is sitting on'

A second prediction of our analysis of *xten sa'adan* 'of each other's'–stranding is the following:

(61) *Prediction B*
Locative and temporal relatives should not begin with a sequence "X *ni*," with X an overt locative or temporal (*wh*-)adverbial.

This prediction too is correct. The locative and temporal relativizers *kud* 'where' and *chi* 'when' cannot cooccur with the relative complementizer *ni*, as shown in (62) and (63), respectively.

(62) Rizhulaaza ye'e ⟨*ni⟩ kud ⟨*ni⟩ guzi Mart yexih.
Ri-zhulaaz-a ye'e ⟨***ni**⟩ kud ⟨***ni**⟩ gu-zi Mart yexih.
HAB-like-1.SG market ⟨*REL⟩ where ⟨*REL⟩ COMPL-buy Mart avocado
'I like the market where Mart bought avocados.'

(63) zhman ⟨*ni⟩ chi ⟨*ni⟩ bazub Juan te yu'u
zhman ⟨***ni**⟩ <u>chi</u> ⟨***ni**⟩ ba-zub Juan te yu'u
week ⟨*REL⟩ when ⟨*REL⟩ COMPL-build Juan a house
'the week when Juan built a house'

On our analysis, *kud* 'where' and *chi* 'when' cannot be in the highest [Spec,CP] in the relative clauses they introduce. If they were, they would have to be cooccurring with a null relative complementizer, but we have argued that TdVZ has no such lexical item ((57b)). Therefore, we analyze *kud* 'where' and *chi* 'when' as relative complementizers in their own right, occupying the C position rather than [Spec,CP].

6 Conclusion

We have argued that relative clauses in Teotitlán del Valle Zapotec do not have a head-raising derivation available to them. The evidence for this non-head-raising analysis comes from the failure of reciprocals and would-be bound variables in RC-heads to display binding connectivity. The non-connectivity effects observed would be unexpected if RC-heads could raise from inside their relative clauses in TdVZ.

In TdVZ, a reciprocal in an RC-head cannot take as its antecedent an RC-internal nominal phrase, even though TdVZ reciprocals reconstruct for binding under Ā-movement generally. On our analysis, this is because the head of a TdVZ relative clause is never inside the relative clause at any stage of the derivation.

Analogously, a would-be bound variable inside a TdVZ RC-head cannot be interpreted as bound by an RC-internal quantifier. This too is explained if the head is not RC-internal at any point (on the reasonable assumption that the quantifier cannot covertly QR out of the relative clause and bind the would-be bound variable in its surface position).

Two strands of evidence initially seemed to suggest that TdVZ relatives could be formed by head-raising after all. If this conclusion were forced, then it would be very difficult to understand the binding non-connectivity effects just discussed. However, the conclusion that TdVZ allows head-raising is not forced: the evidence that appears to suggest this (which involves idiom chunk relativization and "low" readings of RC-head modifiers) turns out on closer examination to be fully compatible with a non-head-raising analysis.

Finally, the curious phenomenon of "stranding" of *xten sa'adan* 'of each other's' inside certain relative clauses comes about when this PP is adjoined to the null relative operator. The resulting adjunction structure, a WH-DP, is attracted to [Spec,CP] but spelled out in its base position owing to the Doubly-Filled Comp Filter, which can be shown on independent grounds to be active in TdVZ.

The facts of TdVZ relativization, then, provide strong support for the conclusion that externally headed relative clauses are a cross-linguistically heterogeneous category. Garden-variety relative clauses in Teotitlán del Valle Zapotec and English look quite similar on the surface, but have very different derivational histories.

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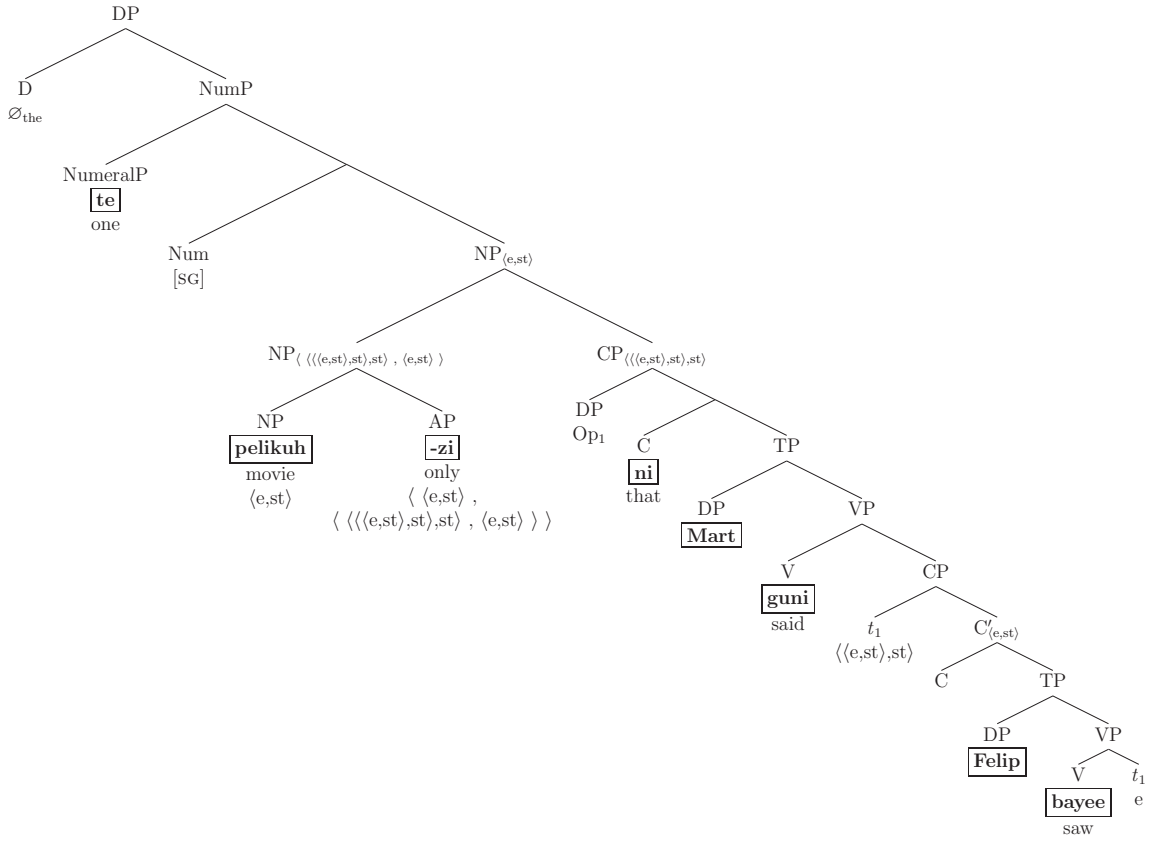
Appendix: A Sketch of Our Semantic Reconstruction Analysis of Low Readings of *-zi* 'Only'

(64) *Structure of the postcopular nominal in (42) (irrelevant projections omitted)*



A sketch of the semantic composition yielding the denotation of the maximal NP in (64)

(65) *Workspace 1*

a. $[\![\ [_{C'}\ \textbf{C Felip bayee}\ \boldsymbol{t}_1]\ ]\!] = \lambda x\ .\ \lambda w\ .$ Felip saw x in w

b. $[\![\ \textbf{[guni]}\ ]\!] = \lambda p_{st}\ .\ \lambda x\ .\ \lambda w\ .$ x said something in w and $\forall w'$: w′ is compatible with what x said in w [$p(w') = 1$]

c. $[\![\ [_{CP}\ \textbf{Op}_1\ \textbf{ni Mart guni}\ \boldsymbol{t}_1\ \textbf{C Felip bayee}\ \boldsymbol{t}_1]\ ]\!] = \lambda P_{\langle\langle e,st\rangle,st\rangle}\ .\ \lambda w\ .$ Mart said something in w and $\forall w'$: w′ is compatible with what Mart said in w [$P(\lambda x\ .\ \lambda w\ .$ Felip saw x in w$)(w') = 1$]

(66) *Workspace 2*

a. $[\![\ [_{NP}\ \textbf{pelikuh}]\ ]\!] = \lambda y\ .\ \lambda w\ .$ y is a movie in w

b. $[\![\ [_{AP}\ \textbf{-zi}]\ ]\!] = \lambda f_{e,st}\ .\ \lambda Q_{\langle\langle\langle e,st\rangle,st\rangle,st\rangle}\ .\ \lambda z\ .\ \lambda w\ .\ f(z)(w) = 1 = Q(\lambda g_{e,st}\ .\ \lambda w''\ .\ g(z)(w'')$ and $\neg\exists v$ [$v \neq z$ and $f(v)(w'') = g(v)(w'') = 1$]$)(w)$

c. $[\![\ [_{NP}\ \textbf{pelikuh -zi}]\ ]\!] =$
$\lambda Q_{\langle\langle\langle e,st\rangle,st\rangle,st\rangle}\ .\ \lambda z\ .\ \lambda w\ .$ z is a movie in w and $1 = Q(\lambda g_{e,st}\ .\ \lambda w''\ .\ g(z)(w'')$ and $\neg\exists v$ [$v \neq z$ and v is a movie in w″ and $g(v)(w'') = 1$]$)(w)$

d. $[\![\ [_{NP}\ \textbf{pelikuh -zi Op}_1\ \textbf{ni Mart guni}\ \boldsymbol{t}_1\ \textbf{C Felip bayee}\ \boldsymbol{t}_1]\ ]\!] =$
$\lambda z\ .\ \lambda w\ .$ z is a movie in w and Mart said something in w and $\forall w'$: w′ is compatible with what Mart said in w [Felip saw z in w′ and $\neg\exists v$ [$v \neq z$ and v is a movie in w′ and Felip saw v in w′]]

Gradability and Mimetic Verbs in Japanese: A Frame-Semantic Account

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1 Introduction

Mimetics (also known as ideophones and expressives) have highly specific meanings.[1] This paper demonstrates that this semantic specificity gives rise to seemingly unpredictable "exceptions" in the gradability of the verbal uses of Japanese mimetics. This observation will enable us to formulate fine-grained generalizations regarding the gradability of mimetic verbs that are consistent with a version of Construction Grammar that foregrounds the role of specific situation types or "(semantic) frames" (Fillmore and Atkins 1992, 1994; Nemoto 1998; Boas 2003; Croft 2003, 2009; Iwata 2008; inter alia)

This paper is organized as follows. In Section 2, we outline the semantic specificity and complexity of Japanese mimetics in favor of Frame Semantics (Fillmore 1982). In Section 3, we cite previous generalizations about the gradability of Japanese verbs and about the semantic types of Japanese mimetic verbs. In Section 4, the gradability of mimetic verbs is examined by means of degree adverbs and compound verbs. In Section 5, we propose a frame-semantic account for the observed peculiar behavior of mimetic verbs. Section 6 presents the conclusion.

2 The Frame Semantics of Mimetics

Japanese is among the languages that abound in sound-symbolic words, which are termed "mimetics" (Kakehi et al. 1996; Hamano 1998; see also Hinton et al. 1994; Voeltz and Kilian-Hatz 2001). Japanese mimetics cover both auditory (e.g., *kokekokkoo* 'cock-a-doodle-doo', *batan* 'slamming') and non-auditory eventualities (e.g., *kirari* 'glistening', *sarasara* 'dry and smooth', *tiku?* 'prickling', *wakuwaku* 'excited'), and they are characterized by holistic, fine-grained event depiction (Kita 1997; Dingemanse 2011; Akita 2012; Toratani 2012; Yu 2014). The "holisticity" of mimetics manifests itself as detailed semantic specifications that can be attested through their (in)compatibility with phrases with particular meanings. For example, although both the mimetic adverbial *sutasuta-to* 'walking briskly' and the non-mimetic adverbial *asi-baya-ni* (foot-quick-COP) 'with quick steps' represent human quick walking, as shown in (1a–c), the mimetic has more detailed semantic specifications, as shown in (1d–g) (Akita, to appear). Here, the (i)- and (ii)-examples illustrate the mimetic and non-mimetic adverbials, respectively. (Note that, as Akita (2012) argues, the potential limitations

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[1]The abbreviations used in this paper are as follows: ACC = accusative; CONJ = conjunctive; COP = copula; MIM = mimetic; NEG = negative; NOM = nominative; PASS = passive; PST = past; QUOT = quotative; TOP = topic.

of semantic compatibility tests are that they say nothing about the features that they do not test.)

(1) a. Self_mover:

i. {Ken/?Inu}ga sutasutato aruite ita.

{Ken/inu} -ga sutasuta -to arui -te i -ta
Ken/dog -NOM MIM -QUOT walk -CONJ be -PST

'{Ken/?The dog} was walking briskly.'

ii. {Ken/?Inu}ga asibayani aruite ita.

{Ken/inu} -ga asi -baya -ni arui -te i -ta
Ken/dog -NOM foot -quick -COP walk -CONJ be -PST

'{Ken/?The dog} was walking with quick steps.'

b. Motor_pattern:

i. Kenga sutasutato {arui/??hasit}te ita.

Ken -ga sutasuta -to {arui/hasit} -te i -ta
Ken -NOM MIM -QUOT walk/run -CONJ be -PST

'Ken was {walking/??running} briskly.'

ii. Kenga asibayani {arui/??hasit}te ita.

Ken -ga asi -baya -ni {arui/hasit} -te i -ta
Ken -NOM foot -quick -COP walk/run -CONJ be -PST

'Ken was {walking/??running} with quick steps.'

c. Speed:

i. Kenga sutasutato {isoide/??yukkuri} aruite ita.

Ken -ga sutasuta -to {isoi -de/yukkuri} arui -te i -ta
Ken -NOM MIM -QUOT hurry -CONJ/slowly walk -CONJ be -PST

'Ken was walking {in a hurry/??slowly}.'

ii. Kenga asibayani {isoide/??yukkuri} aruite ita

Ken -ga asi -baya -ni {isoi -de/yukkuri} arui -te i -ta
Ken -NOM foot -quick -COP hurry -CONJ/slowly walk -CONJ be -PST

'Ken was walking {in a hurry/??slowly}.'

d. Stability_of_path:

i. Kenga sutasutato {rikkyoo/?turibasi}o aruite ita.

Ken -ga sutasuta -to {rikkyoo/turibasi} -o arui -te i -ta
Ken -NOM MIM -QUOT overpass/rope.bridge -ACC walk -CONJ be -PST

'Ken was walking briskly on {an overpass/?a rope bridge}.'

ii. Kenga asibayani {rikkyoo/turibasi}o aruite ita.

Ken -ga asi -baya -ni {rikkyoo/turibasi} -o arui -te i -ta
Ken -NOM foot -quick -COP overpass/rope.bridge -ACC walk -CONJ be -PST

'Ken was walking with quick steps on {an overpass/a rope bridge}.'

e. Inner_state:

i. Kenga zisin{arige/?nasage}ni sutasutato aruite ita.

Ken -ga zisin -{arige/nasage} -ni sutasuta -to arui -te
Ken -NOM confidence -with/without -COP MIM -QUOT walk -CONJ
i -ta
be -PST

'Ken was walking briskly {confidently/?timidly}.'

ii. Kenga zisin{arige/nasage}ni asibayani aruite ita.

Ken -ga zisin -{arige/nasage} -ni asi -baya -ni arui -te
Ken -NOM confidence -with/without -COP foot -quick -COP walk -CONJ
i -ta
be -PST

'Ken was walking with quick steps {confidently/timidly}.'

f. Sound:

i. Kenga {sizukani/?urusaku} sutasutato aruite ita.

Ken -ga {sizuka -ni/urusaku} sutasuta -to arui -te i -ta
Ken -NOM quiet -COP/noisily MIM -QUOT walk -CONJ be -PST

'Ken was walking briskly {quietly/?noisily}.'

ii. Kenga {sizukani/urusaku} asibayani aruite ita.

Ken -ga {sizuka -ni/urusaku} asi -baya -ni arui -te i -ta
Ken -NOM quiet -COP/noisily foot -quick -COP walk -CONJ be -PST

'Ken was walking with quick steps {quietly/noisily}.'

g. Shoes:

i. Kenga {suniikaa/*geta}de sutasutato aruite ita.

Ken -ga {suniikaa/geta} -de sutasuta -to arui -te i -ta
Ken -NOM sneaker/geta -in MIM -QUOT walk -CONJ be -PST

'Ken was walking briskly in {sneakers/*Japanese clogs}.'

ii. Kenga {suniikaa/geta}de asibayani aruite ita.

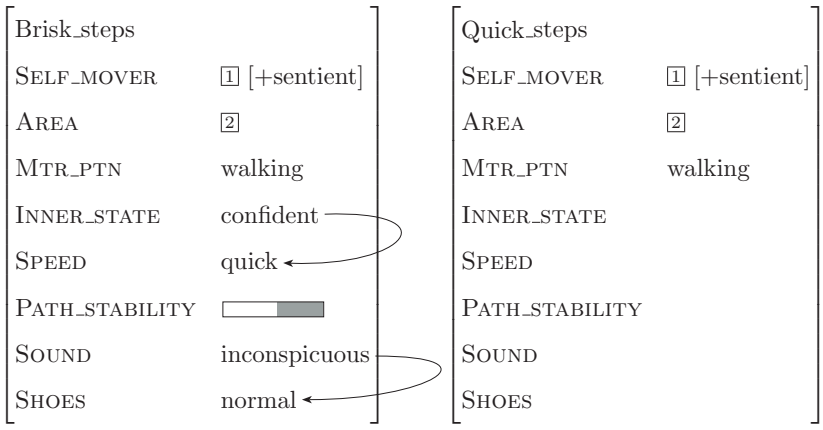
Ken -ga {suniikaa/geta} -de asi -baya -ni arui -te i -ta
Ken -NOM sneaker/geta -in foot -quick -COP walk -CONJ be -PST

'Ken was walking with quick steps in {sneakers/Japanese clogs}.'

Note that certain of these semantic features are causally related to each other within the mimetic (Akita 2012). Specifically, the inner state specification as "confident" is the reason for the quick speed, and the sound specification as "quiet" is the reason why noisy shoes, such as Japanese clogs, cannot be involved. This is why we take a frame-semantic view of mimetics, which allows us to discuss the internal structure of finely specified eventuality representations. Following the recent explorations by Osswald and Van Valin (2014), we use AVM-based notations for frames. Frames consist of frame-specific semantic roles called "frame elements", which serve as features that participate in (part of) event structure. The

following AVMs clearly represent the semantic difference between the above mimetic vs. non-mimetic pair.

Figure 1: *Sutasuta-to* 'walking briskly' vs. *asi-baya-ni* 'with quick steps'



In Section 5, we will use AVM-based frame representations to identify gradable features in mimetic verbs. It should be stressed that all of these featural specifications have empirical grounds in the sense that, as illustrated above, they are testable in terms of semantic compatibility. We assume that this method guarantees the minimum reliability of the present frame-semantic study that would otherwise remain interpretive and impressionistic.

3 Previous Studies

3.1 The Gradability of Japanese Verbs

The gradability of Japanese verbs has been discussed with special focus on their cooccurrence with the degree modifier *totemo* 'very' and on their compoundability with the verb *sugi-* 'pass'. Tsujimura (2001) identifies the following three conditions for the *totemo* modification of Japanese verbs.[2]

(2) a. A verb must have a STATE component in its event structure.
b. The STATE component must refer to a gradable property.
c. The gradable property defined over scalar structure must be with nontrivial standard.

(Tsujimura 2001:47)

Among the three, only the first condition crucially concerns the present study (see also Kennedy and McNally (2005) for the relevance of "nontrivial standard" in scale semantics). This condition is based on the event-structural (or Aktionsart) classification of verbs. Tsujimura assumes the following division of verbs with respect to the presence/absence of STATE in the event structure. The condition in (2a) says that *totemo* can intensify a degree

[2]One important question regarding these conditions is whether they are applicable to other degree adverbials, including informal ones (e.g., *metyakutya* 'absolutely', *sugoku* 'terribly'). Due to its slightly formal tone, *totemo* appears to be subject to additional usage restrictions that may blur our judgments on gradability.

in [+STATE] verbs in (3a) but not in [–STATE] verbs in (3b). (Sentence examples will be presented in contrast with mimetic verbs in Section 4.)

(3) a. [+STATE]:
   i. Psych-verbs (e.g., *totemo kurusim-* 'suffer very much')
   ii. Emission verbs (e.g., *totemo hikar-* 'shine very much')
   iii. Change-of-state verbs (e.g., *totemo atatamar-* 'get warmed very much')

b. [–STATE]:
   i. Activity verbs (e.g., ♯*totemo waraw-* 'laugh very much')
   ii. Semelfactive verbs (e.g., ♯*totemo tatak-* 'hit very much')
   iii. Change-of-location verbs (e.g., ♯*totemo sizum-* 'sink very much')

As Tsujimura notes, *totemo* modification itself is also available to the [–STATE] verbs in (3b). However, in this case, the only possible interpretation is what Bolinger (1972:160–162) calls "extensibility intensification". Extensibility intensification is the emphasis of event-general dimensions, such as quantity, distance, frequency, and duration. For example, the possible readings of *totemo waraw-* 'laugh very much', *totemo tatak-* 'hit very much', and *totemo sizum-* 'sink very much' in (3b) are 'laugh for a long time' (duration), 'hit many times' (frequency), and 'sink a long distance' (distance), respectively. These types of interpretations are available to virtually all verbs, including the [+STATE] verbs in (3a) (e.g., *totemo kurusim-* 'suffer for a long time' [duration], *totemo hikar-* 'shine many times' [frequency], *totemo atatamar-* '(many things) get warmed' [quantity]). Therefore, our observation of mimetic verbs will also focus on the availability of degree intensification reading.

A parallel generalization has been found applicable to the compoundability of verbs and *sugi-* 'pass' to form complex verbs whose meanings considerably overlap those of English *over-* verbs, such as *overeat*, *overrun*, and *oversleep* (Yumoto 2005:Chapter 5). As illustrated in (4a), *sugi-* can express the excessiveness of a gradable property in [+STATE] verbs. However, as illustrated in (4b), only extensibility intensification readings are available to [–STATE] verbs followed by *sugi-*.

(4) a. [+STATE]:
   i. Psych-verbs (e.g., *kurusimi-sugi-* 'suffer too much')
   ii. Emission verbs (e.g., *hikari-sugi-* 'shine too much')
   iii. Change-of-state verbs (e.g., *atatamari-sugi-* 'get warmed too much')

b. [–STATE]:
   i. Activity verbs (e.g., ♯*warai-sugi-* 'laugh too much')
   ii. Semelfactive verbs (e.g., ♯*tataki-sugi-* 'hit too much')
   iii. Change-of-location verbs (e.g., ♯*sizumi-sugi-* 'sink too much')

Based on the distributional facts described here, we will use *totemo* modification and *sugi*-compounding in our assessment of the gradability of mimetic verbs in Section 4.

3.2 Event-Structural Types of Mimetic Verbs

Although the primary category of Japanese mimetics is the adverb, many of them can also be realized as part of complex verbs, most notably in the [MIM + *su-* 'do'] construction (Tsujimura 2005, 2014; Kageyama 2007; Akita 2009; Toratani 2015; Akita and Usuki, to appear). Mimetic verbs are also classified by their event-structural types. By reinterpreting Kageyama's (2007) lexico-semantic analysis of mimetic verbs in light of Tsujimura's (2001) verb classification in Section 3.1, it appears that a [± STATE]-based classification of mimetic verbs will look like (5).[3]

(5) a. [+STATE]
   i. Psych-verbs (e.g., *gakkari-su-* 'get disappointed')
   ii. Emission verbs (e.g., *kirakira-su-* 'glitter')
   iii. Change-of-state verbs (e.g., *assari-su-* 'get light (of taste)')
   iv. Physiological verbs (e.g., *zukizuki-su-* 'throb (of head or teeth)')
   v. Physical perception verbs (e.g., *guragura-su-* 'wobble')

b. [–STATE]
   i. Activity verbs (e.g., *akuseku-su-* 'work busily')
   ii. Motion verbs (e.g., *urouro-su-* 'wander around')
   iii. Semelfactive verbs (e.g., ?*tonton-su-* 'tap')
   iv. Change-of-location verbs (n/a)

In the next section, we will show that the event-structural generalization of the gradability of Japanese verbs does not hold for all mimetic verbs.

4 Gradability of Mimetic Verbs

In this section, we examine the gradability of each event-structural type of mimetic verb by means of the two criteria outlined in Section 3.1. First, in accord with Tsujimura's (2001) observation of non-mimetic verbs, degree intensification is available to *totemo* 'very' that cooccurs with mimetic verbs with a STATE component, as in (6).[4] Hereafter, we contrast mimetic verbs and non-mimetic verbs with similar meanings to highlight what is (not) shared between the two groups of verbs.

(6) [+STATE]:
   a. Psych-verbs:

[3]Kageyama's original classification includes (light) emission verbs in "physical perception verbs", and his "(manner-of-)motion verbs" correspond to a subset of Tsujimura's "activity verbs". A few minor terminological modifications were also made for (5aiii) and (5biii). As the question mark in (5biii) indicates, mimetic verbs for semelfactive impact have a babytalk flavor (Kageyama 2007; Akita 2009). Moreover, Japanese does have mimetics for change of location, but they cannot form verbs, perhaps due to their high iconicity (e.g., **suton-to-su-* 'fall flat') (Akita 2009; Toratani 2015).

[4]As Tsujimura (2001:40–41) notes, the stative construction *-te i-* (CONJ be) makes *totemo* modification available to telic verbs that are otherwise resistant to it. Therefore, throughout this paper, we test the gradability of verbs in their simple past tense form.

Kodomowa totemo {kuyokuyosita/nayanda}.

Kodomo -wa totemo {kuyokuyo -si -ta/nayan -da}
child -TOP very MIM -do -PST/worry -PST

'The child worried and regretted/worried very much.'

b. Emission verbs:

Hosiga totemo {kirakirasi/hikat}ta.

Hosi -ga totemo {kirakira -si/hikat} -ta
star -NOM very MIM -do/shine -PST

'The star {glittered/shone} very much.'

c. Change-of-state verbs:

Suupuga totemo {assarisi/atatamat}ta.

Suupu -ga totemo {assari -si/atatamat} -ta
soup -NOM very MIM -do/get.warmed -PST

'The soup got {very light/warmed very much}.'

d. Physiological verbs:

Atamaga totemo {zukizukisita/itanda}.

Atama -ga totemo {zukizuki -si -ta/itan -da}
head -NOM very MIM -do -PST/hurt -PST

'[My] head {throbbed/hurt} very much.'

e. Physical perception verbs:

Isuga totemo guragurasi/yureta.[5]

Isu -ga totemo {guragura -si/yure} -ta
chair -NOM very MIM -do/shake -PST

'The chair {wobbled/shook} very much.'

Conversely, mimetic verbs without a STATE component exhibit unexpected behaviors. Some of them do allow *totemo* modification in degree intensification reading, as illustrated in (7).

(7) [–STATE]:

a. Activity verbs:

Kodomowa totemo {nikonikosi/♯warat}ta.

Kodomo -wa totemo {nikoniko -si/warat} -ta
child -TOP very MIM -do/laugh -PST

'The child {smiled/♯laughed} very much.'

b. Motion:

Kodomowa totemo {tyokomakasi/♯hasit}ta.

[5]As Hideki Kishimoto correctly pointed out, the verb *yure-* 'shake' is normally conceived of as a semelfactive verb, which does not have an evident STATE component. However, we assume a STATE semantics for this verb, as the shaking movement of an object appears to be considered its property (see Tsujimura 2001:36–37 for a similar justification of the STATE semantics of emission verbs).

Kodomo -wa totemo {tyokomaka -si/hasit} -ta
child -TOP very MIM -do/run -PST

'The child {ran around/♯ran} very much.'

c. Semelfactive:

Kodomowa doao totemo {?dondonsi/♯tatai}ta.

Kodomo -wa doa -o totemo {dondon -si/tatai} -ta
child -TOP door -ACC very MIM -do/hit -PST

'The child {?banged/♯hit} the door very much.'

Totemo cooccurring with these mimetic verbs are interpreted to intensify a type of degree: the cheerfulness of the child's smile in (7a), the child's speed in (7b), and the forcefulness or volume of banging in (7c).

Second, a similar unexpected distribution is found for *sugi*-compounding. As shown in (8), *sugi*-compounding is possible in degree intensification reading for [+STATE] mimetic verbs.

(8) [+STATE]

a. Psych-verbs:

Kodomowa {kuyokuyosi/nayami}sugita.

Kodomo -wa {kuyokuyo -si/nayami} -sugi -ta
child -TOP MIM -do/worry -pass -PST

'The child {worried and regretted/worried} too much.'

b. Emission verbs:

Hosiga {kirakirasi/hikari}sugi(te mega kuranda).

Hosi -ga {kirakira -si/hikari} -sugi -te me -ga kuran -da
star -NOM MIM -do/shine -pass -CONJ eye -NOM be.dazzled -PST

'The star {glittered/shone} too much (and [I] was dazzled).'

c. Change-of-state verbs:

Suupuga {assarisi/atatamari}sugita.

Suupu -ga {assari -si/atatamari} -sugi -ta
soup -NOM MIM -do/get.warmed -pass -PST

'The soup got {too light/warmed too much}.'

d. Physiological verbs:

Atamaga {zukizukisi/itami}sugi(te sissinsita).

Atama -ga {zukizuki -si/itami} -sugi -te sissin -si -ta
head -NOM MIM -do/hurt -pass -CONJ faint -do -PST

'[My] head {throbbed/hurt} too much (and [I] lost consciousness).'

e. Physical perception verbs:

Isuga {guragurasi/yure}sugi(te kikendatta).

Isu -ga {guragura -si/yure} -sugi -te kiken -dat -ta
chair -NOM MIM -do/shake -pass -CONJ danger -COP -PST

'The chair {wobbled/shook} too much (and [it] was dangerous).'

As was the case for *totemo* modification, some [–STATE] mimetic verbs show unexpected gradability, as illustrated in (9).

(9) [–STATE]:

a. Activity verbs:

Kodomowa {nikonikosi/♯warai}sugi(te gyakuni kirawareta).

Kodomo -wa {nikoniko -si/warai} -sugi -te gyaku -ni kiraw -are
child -TOP MIM -do/laugh -pass -CONJ contrary -COP hate -PASS
-ta
-PST

'The child {smiled/♯laughed} too much (and, contrary to [his] intention, was hated).'

b. Motion:

Kodomowa {tyokomakasi/♯hasiri}sugi(te tukamaranakatta).

Kodomo -wa {tyokomaka -si/hasiri} -sugi -te tukamara -nakat -ta
child -TOP MIM -do/run -pass -CONJ be.caught -NEG -PST

'The child {ran around/♯ran} too much (and was not caught).'

c. Semelfactive:

Kodomowa doao {?dondonsi/♯tataki}sugita.

Kodomo -wa doa -o {dondon -si/tataki} -sugi -ta
child -TOP door -ACC MIM -do/hit -pass -PST

'The child {?banged/♯hit} the door too much.'

It should be noted that not every mimetic verb can be intensified by means of *totemo* modification and *sugi*-compounding. For example, in parallel with the non-mimetic cases, the following [–STATE] mimetic verbs behave as non-gradable (i.e., only compatible with extensibility intensification).

(10) a. Motion:

i. ♯Kodomowa matio totemo {buraburasi/arui}ta.

Kodomo -wa mati -o totemo {burabura -si/arui} -ta
child -TOP town -ACC very MIM -do/walk -PST

"♯The child {strolled/walked} very much in the town."

ii. ♯Kodomowa matio {buraburasi/aruki}sugita.

Kodomo -wa mati -o {burabura -si/aruki} -sugi -ta
child -TOP town -ACC MIM -do/walk -pass -PST

"♯The child {strolled/walked} too much in the town."

b. Semelfactive:

i. ♯Kodomowa doao totemo {tontonsi/tatai}ta.

Kodomo -wa doa -o totemo {tonton -si/tatai} -ta
child -TOP door -ACC very MIM -do/hit -PST
"♯The child {tapped/hit} the door very much."

ii. ♯Kodomowa doao {tontonsi/tataki}sugita.
Kodomo -wa doa -o {tonton -si/tataki} -sugi -ta
child -TOP door -ACC MIM -do/hit -pass -PST
"♯The child {tapped/hit} the door too much."

The judged gradability of some other [–STATE] mimetic verbs is shown in (11).

(11) a. Activity verbs (all [+gradable]):
akuseku-su- 'work busily', *batabata-su-* 'scurry', *daradara-su-* 'laze around', *gorogoro-su-* 'lie around', *motamota-su-* 'act slowly', *utouto-su-* 'doze off'

b. Motion verbs:
i. [+gradable]:
noronoro-su- 'walk/act slowly', *nosonoso-su-* 'move sluggishly', *tyokotyoko-su-* 'walk with short steps', *tyorotyoro-su-* 'move around quickly', *urouro-su-* 'wander around'
ii. [–gradable]:
hurahura-su- 'walk aimlessly', *hyokohyoko-su-* 'jump along weakly', *nyoronyoro-su-* 'wriggle', *pukapuka-su-* 'float', *yotiyoti-su-* 'toddle'

c. Semelfactive verbs:
i. [+gradable]:
bokoboko-su- 'beat violently', *gosigosi-su-* 'scrub', *guriguri-su-* 'press and rub with one's elbow or fist'
ii. [–gradable]:
kotukotu-su- 'rap', *kotyokotyo-su-* 'tickle', *kusyakusya-su-* 'tousle', *pokopoko-su-* 'hit lightly', *pokupoku-su-* 'beat (a Buddhist wooden drum)'

Two striking facts can be noted for the lists in (11). First, all mimetic activity verbs in (11a) escape the event-structural generalization, behaving as gradable. This distribution forms a sharp contrast with the utter non-gradability of non-mimetic activity verbs. Second, the gradability contrast in (11c) appears to be correlated with the voicing contrast at the initial consonant (i.e., [+voiced] = [+gradable]; [–voiced] = [–gradable]), and this is a local phenomenon that is not observed in such a systematic fashion in other semantic categories. The voicing of obstruents is arguably the most important feature in Japanese mimetics, which is sound-symbolically paired with a set of semantic features, such as heaviness and intensity (Hamano 1998). In the present case, mimetics with voiced initials (e.g., *dondon* 'banging', *bokoboko* 'beating violently') represent loud and strong impacts, whereas those with voiceless initials (e.g., *tonton* 'tapping', *kotukotu* 'rapping') represent quiet and weak impacts.

In this section, we have observed that the event-structural generalization of the gradability of verbs does not perfectly hold for mimetic verbs. Although the generalization does

account for the gradability of [+STATE] mimetic verbs, [–STATE] mimetic verbs were found to behave in a complicated fashion with respect to gradability. Nevertheless, the lists of [–STATE] mimetic verbs in (11) suggested partial systematicity in their gradability. In the next section, we demonstrate how fine-grained semantic descriptions in Frame Semantics can capture these seemingly not-fully-predictable "exceptions" in the gradability of mimetic verbs.

5 A Frame-Semantic Account

In this section, we search for a gradable dimension in the meaning of each type of [–STATE] mimetic verb that exhibits gradability. The frame-semantic approach that we employ in this study enables us to delve into the specifics of the meanings of mimetic verbs, particularly those that would be jumbled up as "MANNER" in the event-structural representations in a traditional lexical-semantic approach to argument realization (Pinker 1989; Levin 1993; Levin and Rappaport Hovav 1995, see Kageyama 2007 for such an approach to mimetic verbs). In this regard, the present study on scale semantics shares the basic tenet with frame-semantically (or more broadly, "encyclopedically") informed Construction Grammar, which values the significance of subclass-level generalizations in the discussion of the syntax-semantics interface (Langacker 1988; Fillmore and Atkins 1992, 1994; Taylor 1996; Croft 2001, 2003, 2009, 2012; Boas 2003; Iwata 2008).

In what follows, we show the frame-semantic representations of the three relevant types of [–STATE] mimetic verbs (i.e., activity, motion, and semelfactive) and reinforce them with semantic compatibility tests (see Section 2). Based on the representations, we extend the [±STATE]-based generalization of the gradability of Japanese verbs to cover that of mimetic verbs, proposing the following generalization.

(12) Japanese verbs behave as gradable when the frames they evoke involve prominent gradable dimensions (or frame elements).

The "gradable dimensions" are frame elements that constitute the frames evoked, ranging over Volume, Force, Size, Length, Duration, Speed, Color, Value, etc. (see Berkeley FrameNet). Note that these frame elements include, but are notably broader than, "STATE components" in the original event-structural generalization.

5.1 Mimetic Activity Verbs

The mimetic verbs that correspond to the activity class in non-mimetic verbs were all found to be gradable. This part of the data can be accounted for in terms of Hamano's (2014:117) remark that mimetic activity verbs tend to have evaluative meaning. Put differently, mimetic activity verbs are thought to evoke frames for evaluated activities. For example, *nikoniko-su-* 'smile' involves a positive evaluation, informally called "cheerfulness". The presence of this feature in the meaning of this mimetic verb is confirmed by its incompatibility with the adverbial *human-ge-ni* 'with a dissatisfied look', as shown in (13).

(13) Cheerfulness:

Kodomoga {manzoku/*human}geni nikonikosita.

kodomo -ga {manzoku/human} -ge -ni nikoniko -si -ta
child -NOM satisfaction/dissatisfaction -look -COP MIM -do -PST

'The child smiled with a {satisfied/*dissatisfied} look.'

Note that the cheerfulness expressed by *nikoniko-su-* has a range, as shown by its compatibility with different degrees of satisfaction in (14).

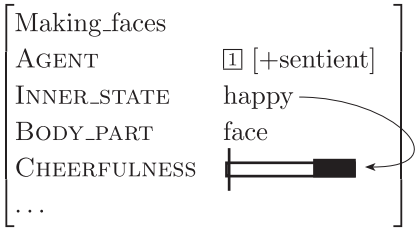
(14) Kodomoga {amarinimo/kanari/?yaya} manzokugeni nikonikosita.

kodomo -ga {amarinimo/kanari/yaya} manzoku -ge -ni nikoniko -si
child -NOM too.much/pretty/a.little.bit satisfaction -look -COP MIM -do
-ta
-PST

'The child smiled with a(n) {excessively/pretty/?slightly} satisfied look.'

The frame-semantics of *nikoniko-su-*, incorporating the observations here, is represented in Figure 2. The diagrammed scale in the figure indicates that this mimetic verb highlights the upper (i.e., right) range of the cheerfulness dimension, with the rest kept backgrounded.

Figure 2: *Nikoniko-su-* 'smile'

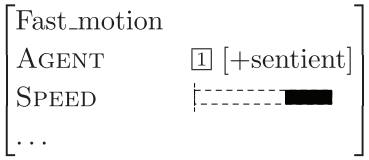


Meanwhile, many mimetic activity verbs have negative connotations. For example, *daradara-su-* 'laze around', *gorogoro-su-* 'lie around', and *motamota-su-* 'act slowly' in (11c) involve similar negative evaluations of slow or lazy movement. These evaluated activities provide gradable dimensions that may be further specified as better or worse by degree words.

5.2 Mimetic Motion Verbs

The non-uniform behavior of mimetic motion verbs observed in Section 4 receives a straightforward account when we apply a fine-grained classification to them. However, mimetic verbs for fast motion, such as *tyokomaka-su-* 'run around', *tyokotyoko-su-* 'walk with short steps', and *tyorotyoro-su-* 'move around quickly', are gradable because they specify the speed of motion as high with the degree of highness left unspecified, as shown in Figure 3.

Figure 3: *Tyokomaka-su-* 'run around'



A compatibility test again confirms the gradable speed specification of these mimetic verbs, as illustrated in (15).

(15) Speed:

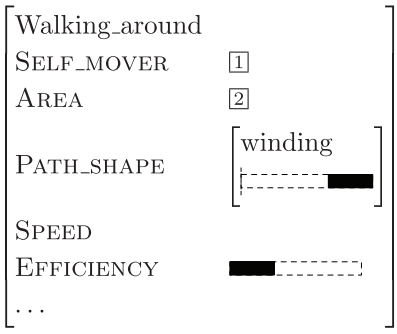
a. Kodomoga {subayaku/*yukkuri} tyokomakasita.
Kodomo -ga {subayaku/yukkuri} tyokomaka -si -ta
child -NOM quickly/slowly MIM -do -PST
'The child ran around {quickly/*slowly}.'

b. Kodomoga {amarinimo/kanari/?yaya} subayaku tyokomakasita.
Kodomo -ga {amarinimo/kanari/yaya} subayaku tyokomaka -si -ta
child -NOM too.much/pretty/a.little.bit quickly MIM -do -PST
'The child ran around {too/pretty/?a little bit} quickly.'

A parallel account is applicable to mimetic verbs for slow motion, such as *noronoro-su-* 'walk/act slowly' and *nosonoso-su-* 'move sluggishly'.

SPEED is not the only criterial attribute for gradable mimetic motion verbs. For example, as shown in Figure 4, PATH_SHAPE and EFFICIENCY serve as gradable dimensions in the mimetic motion verb *urouro-su-* 'wander around'.

Figure 4: *Urouro-su-* 'wander around'



The following semantic compatibility tests confirm the relevance of these semantic features to this mimetic verb and their gradable nature.

(16) a. Path_shape:
Kodomowa matio {(amarinimo/kanari) irikunda keirode/*massugu} urourosita.
kodomo -wa mati -o {(amarinimo/kanari) irikunda keiro
child -TOP town -ACC too.much/pretty complicated route
-de/massugu} urouro -si -ta
-in/straight MIM -do -PST
'The child wandered around the town with a {(too/pretty) complicated/*straight} way.'

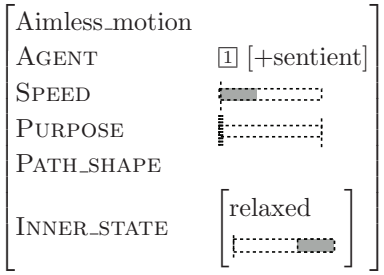
b. Efficiency:
Kodomowa matio {(amarinimo/kanari) hikooritutekini/*koorituyoku} urourosita.

kodomo -wa mati -o {(amarinimo/kanari) hikoorituteki -ni/koorituyoku}
child -TOP town -ACC too.much/pretty inefficient -COP/efficiently
urouro -si -ta
MIM -do -PST

'The child wandered around the town {(too/pretty) inefficiently/*efficiently}.'

Conversely, mimetic verbs for aimless motion, such as *burabura-su-* 'stroll' and *hurahura-su-* 'walk aimlessly', are non-gradable because they highlight aimlessness, which does not appear to have a range, as shown in Figure 5.

Figure 5: *Burabura-su-* 'stroll'



The presence of the aimlessness specification and its non-gradable nature is confirmed in (17). (Orienteering is an exploring activity with a clear purpose.)

(17) Aimlessness:

a. Kodomowa {atedonaku/*orienteeringude} buraburasita.
kodomo -wa {atedonaku/orienteeringu -de} burabura -si -ta
child -TOP aimlessly/orienteering -in MIM -do -PST
'The child strolled {aimlessly/*in orienteering}.'

b. Kodomowa {??amarinimo/*kanari/*yaya} atedonaku buraburasita.
kodomo -wa {amarinimo/kanari/yaya} atedonaku burabura -si -ta
child -TOP too.much/pretty/a.little.bit aimlessly MIM -do -PST
'The child strolled {??too/*pretty/*a little bit} aimlessly.'

What is worth noting here is the fact that, according to semantic compatibility tests, these mimetic verbs for aimless motion do have gradable specifications, such as speed and inner state, as shown in (18).

(18) a. Speed:
Kodomowa {(amarinimo/kanari) yukkuri/??hayaaside} matio buraburasita.
kodomo -wa {(amarinimo/kanari) yukkuri/haya -asi -de} mati -o
child -TOP too.much/pretty slowly/quick -foot -with town -ACC
burabura -si -ta
MIM -do -PST
'The child strolled {(too/pretty) slowly/??at a quick pace} in the town.'

b. Inner_state:

Kodomowa {(amarinimo/kanari) nonbirito/*aserinagara} matio buraburasita.
kodomo -wa {(amarinimo/kanari) nonbiri -to/aseri -nagara} mati -o
child -TOP too.much/pretty leisure -QUOT/hurry -while town -ACC
burabura -si -ta
MIM -do -PST

'The child strolled {(too/pretty) leisurely/*hurriedly} in the town.'

The unexpected non-gradability of these mimetic motion verbs indicates that not all semantic specifications have equal status. It appears that aimlessness is a prominent or critical part of the meanings of these mimetic verbs, but slowness and leisureliness are not. This information is represented by suppressing the backgrounded attributes in gray in Figure 5. It is hoped that future research will make clear, in a non-ad-hoc manner, what is prominent and what is not (see Boas 2008 for a related frame-semantic investigation of English motion verbs).

5.3 Mimetic Semelfactive Verbs

The voicing-based gradability contrast observed for mimetic semelfactive verbs can be ascribed to the unidirectional nature of the relevant attributes in their meanings, which is visualized in Figures 6 and 7.

Figure 6: *Dondon-su-* 'bang'

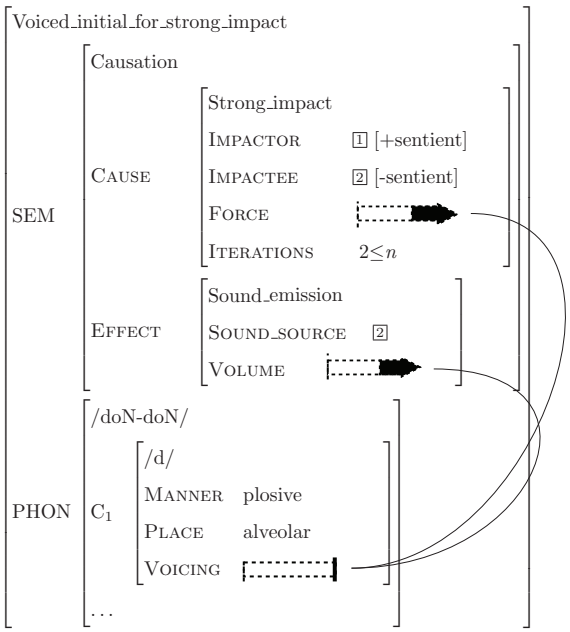
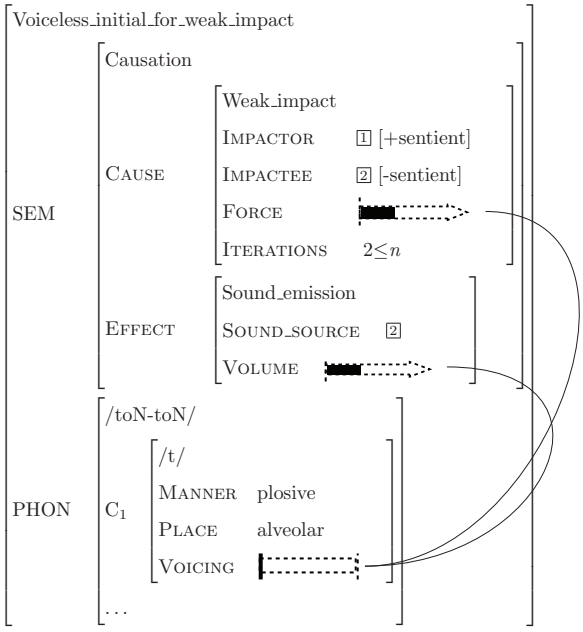


Figure 7: *Tonton-su-* 'tap'



As tested in (19), mimetic semelfactive verbs with voiced initials (e.g., *dondon-su-* 'bang') and those with voiceless initials (e.g., *tonton-su-* 'tap') represent forceful/loud and weak/quiet impact events, respectively. The successful occurrence of adverbs for different degrees (i.e., *amarinimo* 'too much', *kanari* 'pretty') indicates the gradability of these attributes. (Recall

that, as indicated by single question marks, the babytalkish nature of these verbs prevents them from obtaining full naturalness.)

(19) a. [+voiced]:

i. Force:

Kodomowa doao {?(amarinimo/kanari) hagesiku/??karuku} dondonsita.

kodomo -wa doa -o {(amarinimo/kanari) hagesiku/karuku} dondon
child -TOP door -ACC too.much/pretty forcefully/lightly MIM
-si -ta
-do -PST

'The child banged the door {?(too/pretty) forcefully/??lightly}.'

ii. Volume: doao {?(amarinimo/kanari) urusaku/*sizukani} dondonsita.

kodomo -wa doa -o {(amarinimo/kanari) urusaku/sizukani} dondon
child -TOP door -ACC too.much/pretty noisily/quietly MIM
-si -ta
-do -PST

'The child banged the door {?(too/pretty) noisily/*quietly}.'

b. [–voiced]:

i. Force:

Kodomowa doao {*hagesiku/?(amarinimo/kanari) karuku} tontonsita.

kodomo -wa doa -o {hagesiku/(amarinimo/kanari) karuku} tonton
child -TOP door -ACC forcefully/too.much/pretty lightly MIM
-si -ta
-do -PST

'The child tapped the door {*forcefully/?(too/pretty) lightly}.'

ii. Volume:

Kodomowa doao {*urusaku/?(amarinimo/kanari) sizukani} tontonsita.

kodomo -wa doa -o {urusaku/(amarinimo/kanari) sizukani} tonton
child -TOP door -ACC noisily/too.much/pretty quietly MIM
-si -ta
-do -PST

'The child tapped the door {*noisily/?(too/pretty) quietly}.'

The attributes FORCE and VOLUME are assumed to range from low to high, but not vice versa. This assumption accounts for the fact that degree intensification is possible for mimetic semelfactive verbs with initial voicing (e.g., *dondon-su-* 'bang'). The forcefulness and loudness expressed by these impact verbs can be intensified because the directionality of this intensification is consistent with that of the two scales. In contrast, mimetic semelfactive verbs with voiceless initials (e.g., *tonton-su-* 'tap') are incompatible with degree intensification because the intensification of the weakness and quietness involved in these verbs would

result in a "countercurrent" in the relevant scales.[6]

The unidirectionality account gains additional support from non-mimetic semelfactive verbs. As illustrated in (20), degree intensification appears to be more acceptable for "strong" impact verbs than for "weak" impact verbs.

(20) a. Battaawa sutoreetoo totemo {kyooda/♯keida}sita.
battaa -wa sutoreeto -o totemo {kyooda/keida} -si -ta.
batter -TOP straight.fastball -ACC very hard.drive/light.hit -do -PST
'The batter hit a very {hard drive/♯light hit}.'

b. Kodomowa nekoo {?dotuki/♯kozuki}sugita.
kodomo -wa neko -o {dotuki/kozuki} -sugi -ta
child -TOP cat -ACC beat/poke -pass -PST
'The child {?beat/♯poked} the cat too much.'

To recapitulate, the present fine-grained semantic descriptions of mimetic verbs in favor of Frame Semantics straightforwardly account for the seemingly unpredictable gradability of the three sets of [–STATE] mimetic verbs. We have demonstrated that gradability is not solely attributed to STATE components of coarse-grained event-structural representations but may reside in specific prominent frame elements (e.g., CHEERFULNESS, SPEED, PATH_SHAPE, EFFICIENCY, FORCE, VOLUME that belong to the broad, ill-defined traditional conceptual category called "MANNER". These findings are consistent with the fine-grained categorizations of verbs in frame-semantically informed Construction Grammar. The observed linguistic relevance of the fine-grained semantics of mimetic verbs is also significant in the context of mimetic typology, in which verbal uses of mimetics are generally believed to exhibit reduced semantic specificity compared to their adverbial counterparts (Dingemanse 2011; Akita and Usuki, to appear).

6 Conclusion

In this paper, we have argued that the detailed frame-semantics of mimetic verbs accounts for their "exceptional" behaviors with respect to gradability (i.e., the availability of degree intensification readings in *totemo* modification and *sugi*-compounding). We would like to conclude the paper by stressing its empirical and theoretical implications.

First, the present study serves as an informative case study that systematically compares mimetic and non-mimetic items using a well-defined set of objective criteria. Primarily due

[6]Two alternative accounts, which may not contradict the present proposal, remain to be examined. One alternative assumes the neutral nature of mimetics with voiceless initials and the intensified nature of those with voiced initials. If this assumption is valid, then the two types of mimetics may be viewed as lexically related in a unidirectional manner: from voiceless to voiced. The other alternative instead assumes asymmetry in the phonological pole. In Japanese, voiced obstruents have "marked" status with respect to orthography (i.e., they are marked with a diacritic called "dakuten") and distribution (i.e., they cannot stand word-initially in native non-mimetic lexemes). Given that this marked-unmarked contrast between voiced and voiceless obstruents gives rise to unidirectionality in the two-point closed scale of voicing (i.e., from voiceless to voiced), this phonological unidirectionality might sound-symbolically constrain the directionality of the relevant scales in the semantic poles as low to high. See Oseki (2013) and Akita (2014) for two semantic phenomena correlated with mimetic voicing.

to their imbalanced attention to mimetics, many previous studies have not elucidated what is really unique to mimetics. As this is among the most debated issues in recent explorations in the syntax and semantics of mimetics (Kita 1997, 2001; Tsujimura 2001, 2005, 2014; Kageyama 2007; Akita 2012, the present methodological demonstration will help to refine the empirical side of the study of mimetics.

Second, the semantic complexity of mimetics has generally been regarded as a peculiarity found in the periphery of the lexicon. However, as we have demonstrated, this "peculiarity" provides a rare fertile ground for the discussion of the grammatical relevance of encyclopedic semantics, which is of great concern for lexical semanticists and construction grammarians (see Akita 2012 for a related discussion). Another theoretical implication of this study resides in the "cognitive" nature of its approach to scale semantics, which has belonged almost exclusively to formal semantics (see Paradis 1997, 2001 for a notable exception). We expect that a similar investigation into the far richer semantics of mimetic adverbs will lead to a more substantive contribution to the discussion of what determines the scalar structure of words. The significance of these lines of research is doubled by the near absence of theoretical contributions from the century-long history of the study of mimetics.

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Exhaustivity, Predication and the Semantics of Movement

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1 Introduction

The narrow goal of this paper is to provide a uniform accounting of two seemingly unrelated phenomena in Wolof – predication and exhaustive identification – which both involve A′-movement of a nominal to Spec,CP. In doing so, we provide a compositional semantics for movement which may be extended well beyond Wolof.

In Wolof, exhaustive identification of a DP involves moving it to Spec,CP, as in (1). The unmarked way of doing nominal predication involves moving the predicative NP to the same position, in (2). In both cases, the complementizer that hosts the moved nominal in its specifier is the A′-movement complementizer *(l)a*.

(1) *Exhaustive Identification*
Musaa **l-a** ñu gis.
Moussa *l*-C_{WH} they see
"It's Moussa who they saw."[1]

(2) *Nominal predication*
Jangalëkat **l-a** ñu.
teacher *l*-C_{WH} 3PL
"They are teachers."

In this paper, we propose a unified analysis which explains why there is a semantic effect (exhaustivity) when some nominals move to the specifier of *(l)a*, but no such effect when some other nominals move. Note that, crucially, we assume that exhaustive identification is separate from the focus phenomenon (see Horvath 2007).

We analyze *(l)a* as having a semantics whereby the unique individual satisfying the property denoted by its complement (the TP containing the trace of movement) has the property denoted by its specifier (the moved nominal). This analysis essentially translates (1) and (2) as (3) and (4), respectively.

(3) The unique individual they saw has the property of being Moussa.

(4) The unique individual identical to them has the property of being a teacher.

Thus the exhaustivity imparted in (1) is neutralized in (2) because the property being exhaustified (the property of being a plurality identical to them) is already a singleton.

In order to say this, we must allow for *(l)a* to bind the trace within TP, which is not allowed under a Heim & Kratzer (1998)-style analysis of movement. The broader goal of this

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[1]Wolof exhaustive identification sentences are equivalent in meaning to English clefts, and we are therefore translating them as such. They are, however, not syntactic clefts, but monoclausal structures in which the exhaustively identified nominal moves to Spec,CP. See §2 for details.

paper is to show that this move is not only needed to account for this data, but desirable for any theory of movement.

The rule of Predicate Abstraction creates a disconnect between the syntax and the semantics of movement. Syntactically, movement is triggered by an attracting head, for feature-checking purposes. But semantically, the head that triggers movement does no work; strictly following Heim & Kratzer, it doesn't even take the moved element as its semantic argument.

Our proposal is for a more closely aligned syntax and semantics of movement. Attracting heads agree with their attractee. This process also transmits a binding index to the attracting head. The semantics of each attracting head determines how the trace of movement is bound. This eliminates the need for the Predicate Abstraction rule posited by Heim & Kratzer.

What this requires is that assignment functions be acknowledged as part of the model. This move has been made in the past to account for issues relating to binding (Sternefeld 2001), inverse linking (Kobele 2010), and ellipsis (Kennedy 2014). By acknowledging the role of assignment functions in the grammar, a compositional analysis of movement in general can be given, which in turn allows for an elegant accounting of discourse configurationality in Wolof.

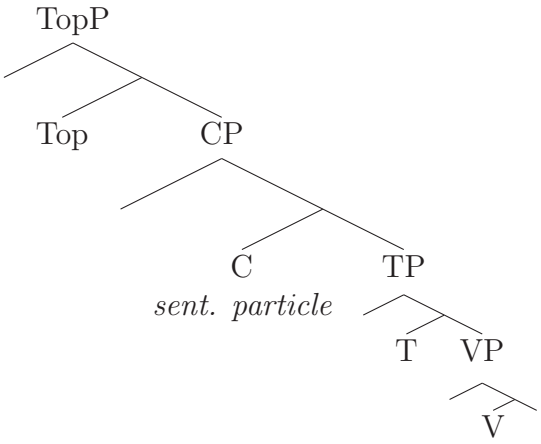
The paper is organized as follows. §2 gives a background of exhaustivity marking and nominal predication in Wolof. §3 gives a background on the dominant semantic theory of movement, explains why it is insufficient for present cases, and presents our alternative proposal of *binding by attractor*. §4 provides an analysis for $(l)a$ and shows how it derives the essential data discussed above. §5 shows how this analysis extends to two other copular constructions in Wolof, equatives and specificational sentences. §6 concludes.

2 Background

Wolof is a Niger-Congo language of the West Atlantic branch, most widely spoken in Senegal. It is a typical *discourse-configurational* language, meaning that particular information-structural properties (or discourse-semantic functions) such as topic and focus seem to be realized through a specific structural relation (Kiss 1995). In Wolof, the information-structural property of utterances seem to be closely tied to the type of *sentence particle* used. Sentence particles are complementizer-like elements, in complementary distribution with one another, which occupy the head taking TP as its complement. We follow Dunigan (1994) in assuming that all particles occupy the same position in the clause; for our purposes, it is sufficient to label this position as a C head.[2] In this paper, we assume that Wolof clauses have the structure in (5).

[2]Wolof also has a higher embedding complementizer, which can occur with all of the sentence particles.

(5) *Wolof clause structure*



Different particles induce different syntactic processes in the clause. In a neutral sentence,[3] for example, a verb or an auxiliary move to C, whereas in a V/VP-focus sentence, a dummy verb *def* 'do' occurs in C (Dunigan 1994; Church 1981; Torrence 2005, 2012), illustrated in (6). The lexical subject in such clauses is in a left-dislocated position, and a subject pronoun occupies a position to the right of C.

(6) a. *Neutral clause*
Xale yi gis-na-ñu golo.
child DEF.PL see-C-3PL monkey
"The children saw a monkey."

b. *VP/V-focus clause*
Xale yi d(ef)-a-ñu (>dañu) gis golo.
child DEF.PL do-C-3SG see monkey
"The children SAW a monkey."/"It's that the children saw a monkey."

In exhaustive identification of a DP, the sentence particle *(l)a* occurs, and the exhaustively identified DP A′-moves to Spec,CP (Dunigan 1994; Martinović 2013; Torrence 2005, 2012 etc). *(L)a* has all the properties of an A′-movement complementizer: it is obligatory in long-distance extraction, it occurs in every C position in successive-cyclic movement (as the Irish *aL*; McCloskey 2000, 2001), and it exhibits a subject/non-subject asymmetry, akin to the *that*-trace effect: it surfaces as *a* in case of subject extraction, and as *la* in case of non-subject extraction (Martinović 2013).[4]

(7) a. *Exhaustive Identification of a non-subject*
Golo$_i$ **l-a** xale yi gis t_i.
monkey *l*-C$_{WH}$ child DEF.PL see
"It's a monkey that the children saw."

[3]By 'neutral', we mean a sentence felicitous in an out-of-the-blue or a broad sentence focus context.
[4]The analysis of the subject/non-subject asymmetry is not relevant for the present purposes. For different proposals, see Torrence (2005, 2013) and Martinović (2013).

b. *Exhaustive Identification of a subject*

Xale yi-**a** (>yee) gis golo.
child DEF.PL-C_{WH} see monkey

"It's the children that saw the monkey."

Exhaustive identification marking is usually related to a specialized syntactic position (e.g. É. Kiss 1998; Torrence 2013) and a syntactic feature on a head which triggers movement of the exhaustively identified constituent (such as a focus feature in Horvath 1986, 1995; Brody 1990, 1995 or the Exhaustive Identification operator in Horvath 2007). What throws a wrench in such an analysis are cases of DP movement to the 'exhaustifying' position which are not accompanied by exhaustive interpretation. For example, in Hungarian, a textbook case of a *discourse-configurational* language, the position where exhaustively identified constituents are found is to the left of a tensed verb (e.g. Szabolcsi 1981; examples from Onea 2009, p.53):

(8) *Exhaustive identification in Hungarian*

a. Péter $[\text{Marit}]_F$ szereti.
Peter Mary.ACC loves
"Peter loves Mary (and no one else)."

b. Péter szereti $[\text{Marit}]_F$.
Peter loves Mary.ACC
"Peter loves Mary (and possibly someone else as well)."

However, elements other than exhaustively focused nominals are found in this position as well (for an exhaustive overview, see Wedgwood 2003), most notably non-verbal predicates (example from Hegedűs 2013, p.61):

(9) *Hungarian nominal predicates*

János *orvos* lesz.
John doctor will.be

"John will be a doctor."

The same thing happens in Wolof, where this pattern is even more puzzling, since sentences with nominal predicates in their most neutral form contain the A′-movement complementizer, and not, for example, the particle *na*, which usually occurs in such contexts, as in (6a). The predicate NP is in the EI-position, but there is no apparent exhaustivity:

(10) *Wolof nominal predicates*

Xale yi *ndongo* l-a-ñu.
child DEF.PL student *l*-C_{WH}-3PL

"The children are students."

A few proposals in the literature have discussed a link between predication and exhaustivity,[5] specifically concerning Hungarian. É. Kiss (2005, 2006) offers an informal discussion, proposing that exhaustivity is not encoded in the grammar, but is the result of *specificational predication* – the exhaustive reading arises when a constituent raised to the predicate position (Spec,PredP in her proposal) is a definite or a specific indefinite noun phrase.[6] Wedgwood (2003) terms the position immediately preceding the tensed verb the position of *main predication* and offers an analysis in the framework of dynamic syntax, proposing that exhaustivity is a pragmatic effect. In this paper, we propose that the exhaustive meaning is encoded by the attracting head *(l)a* itself, in the form of an iota operator which binds the trace of movement. This exhaustivity is essentially neutralized in cases like predication, because the remnant of movement already denotes a singleton; thus the exhaustive effect is not informative.

2.1 Copular sentences with nominal predicates

Copular sentences with nominal predicates involve the A′-movement complementizer *(l)a* (Martinović 2013, to appear, 2015). We assume that copular sentences with nominal predicates have an underlying asymmetrical small clause (PredP) (e.g. den Dikken 2006), with the predicate nominal (N2) as a complement, and the subject nominal (N1) a specifier of a Pred head. In an information-structurally neutral predicational sentence, N2 moves to Spec,CP, as in (11a). There are two consequences of this structural move. First, N1 in such structures is obligatorily pronominal, as it is in clauses in which a verb moves to C, in (6)). If a lexical subject is present, it must be left-dislocated (see (11b)). Second, only in this case is the verbal copula that occurs in copular sentences with nominal predicates, *di*, not overt. Since verbs in Wolof seem to raise to T (Torrence 2003, 2005; Russell 2006; Torrence 2012), we assume that the copula is the Pred head that raises to T.

(11) *N2 moves to Spec,CP*

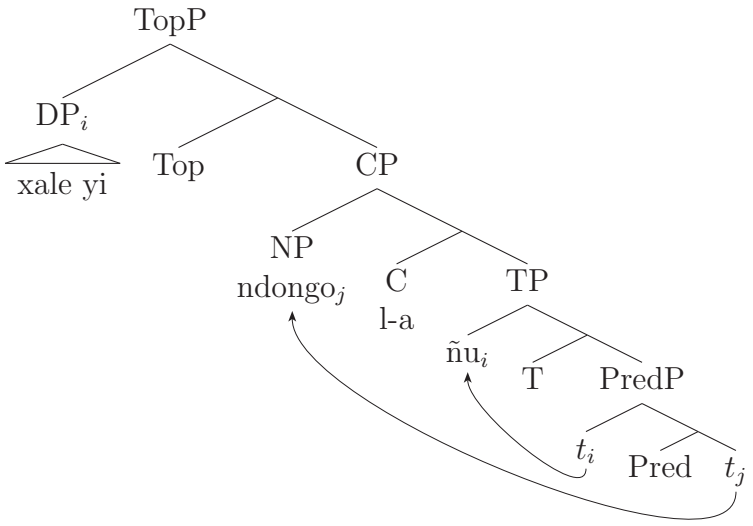
a. Xale yi ndongo l-a-ñu.
child DEF.PL student *l*-C_{WH}-3PL
"The children are students."

b. *Ndongo **la** xale yi.
student C_{WH} child DEF.PL

[5] A link has also been proposed to exist between focusing and predication. Since the notion of *focus* is not universally defined, we do not discuss this literature.

[6] She follows reasoning expressed by Huber (2000), who argues that in specificational sentences the predicate implies that its specification of the individuals that make up the set denoted by the subject is exhaustive. Kiss does not formalize this proposal.

c.

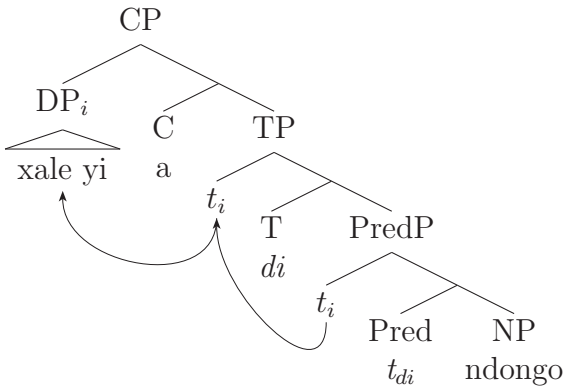


Crucially, there is no exhaustivity in such structures; (11) is the most neutral way to construct a predicational clause with a nominal predicate in Wolof. It is also possible for the subject nominal to be located in Spec,CP. In that case, however, the subject **is** exhaustively identified. Furthermore, whenever N2 is in situ, the copula *di* occurs.[7]

(12) *N1 moves to Spec,CP*

a. Xale yi-a di (>yeey) ndongo.
child DEF.PL-C$_{WH}$ COP student
"It's the children who are students."

b.

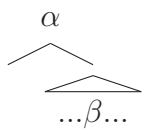


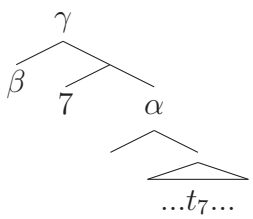
To sum up the discussion so far: It appears that, when certain nominals move to Spec,CP of a particular head, there is a semantic effect, namely exhaustive identification; when other nominals move to the same position, there does not seem to be such an effect. We therefore propose that exhaustivity is a byproduct of binding by an ι-operator, contributed by $(l)a$, the effect of which is made trivial in cases of predication. However, this requires $(l)a$ to bind the trace of movement to its specifier, which standard theories of movement do not allow; we address this directly.

[7] We do not have anything to say about the absence of the copula when the predicate NP moves to Spec,CP. It could be a surface phenomenon, by which the copula is deleted when its complement moves, or be syntactically motivated. Crucially, we assume it is not relevant for the semantic computation.

3 The semantics of movement

Heim & Kratzer (1998) posit two rules for movement. First, syntactically, they argue that, however movement may proceed in the syntax, the result of applying the operation Move to a structure like (13) is an LF that looks like (14), where "7" is a binding index.

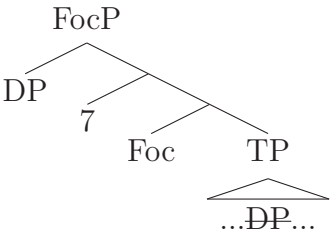
(13)


(14)


Given this, they posit the Predicate Abstraction Rule for interpreting trees like (14).

(15) *Predicate Abstraction Rule* (Heim & Kratzer 1998)
Let α be a branching node with daughters β and γ, where β dominates only a numerical index i. Then, for any variable assignment a, $[\![\alpha]\!]^a = \lambda x[[\![\gamma]\!]^{a^{x/i}}]$.

The problem with this, if one follows the letter of Heim & Kratzer, is that the semantic effects of movement are highly constrained, being limited to scope-taking and binding. Moreover, such a system is not even sufficient to capture certain cases of scope-taking (Kobele 2010) and binding (Sternefeld 2001). This is clearly problematic for discourse configurational languages. Consider a structure like (16).

(16)


In (16), there is a left-peripheral focus head which attracts a DP to its Spec. By the Predicate Abstraction Rule in (15), the lambda-binder is inserted between the focus head and its specifier, intercepting the DP before the focus head can get at it. The meaning of the DP is plugged back in to the gap it vacated, as if movement never happened, unless the DP is of a higher type and takes the new abstract as an argument. In either case, the attracting heads can never take the DP that they attract as semantic arguments.

There are various ways one can get around this. One is that after movement of the DP to Spec,Foc, the attracting head Foc^0 *itself* moves countercyclically to a position between its specifier and the newly generated binding index; this would be a case of what Barker (2007) calls parasitic scope. One obvious problem with this is that the movement of Foc will itself generate a new binding index. Another is that this movement will have no syntactic motivation or explanation, not being driven by feature-checking.

Another way to allow for attracting heads to interact meaningfully with their attractees is to weaken Heim & Kratzer's syntactic stipulation and allow for the binding index to be inserted in other locations besides immediately below the moved DP. So in the case of (16),

the binding index could perhaps be inserted below the attracting the head in addition to the usual position. The question then becomes: What constraints are there on the insertion of such binding indices?

What's more, both of these ideas represent a disconnect between the syntax of movement—where we attribute movement to features of a head—and the semantics of movement—where such a head then seems to play no role in the computation of meaning. To address this, we propose an account by which attracting heads themselves bind the traces of the DPs that they attract.

We follow Montague (1970), who argues for treating expressions which are classically analyzed as being of type $\langle\alpha\rangle$ as being instead of type $\langle a, \alpha\rangle$, where a is the type of assignment functions. To avoid complicating composition rules, we modify this approach slightly: For every atomic type α, let α be replaced with $\langle a, \alpha\rangle$. Thus, whereas Montague would have classic predicates go from $\langle et\rangle$ to $\langle a, et\rangle$, we take them to be $\langle ae, at\rangle$. To simplify the notation, abbreviate $\langle a, t\rangle$ as $\langle t\rangle$ and $\langle a, e\rangle$ as $\langle e\rangle$.

(17) *Semantic Domains*

a. Let A be the set of assignments and E be the set of individuals.

b. $D_{\langle e\rangle}$ is the set of functions from A into E.

c. $D_{\langle t\rangle}$ is the set of functions from A into $\{0, 1\}$.

d. If α and β are types, then $D_{\langle\alpha,\beta\rangle}$ is the set of functions from $D_{\langle\alpha\rangle}$ into $D_{\langle\beta\rangle}$.

To see how this works, consider a simple inventory of English expressions in (19), which relies on the notational devices given in (18).

(18) a. $\hat{n} := \lambda g[g(n)]$

b. $*\phi := \lambda g[\phi]$ (used only if ϕ contains no instances of g or any other variable ranging over assignments)

(19) *A Simple Inventory of English*

a. $[\![\text{John}]\!] = *j$

b. $[\![\text{him}_n]\!] = \hat{n}$ (For all g, defined iff $g(n)$ is male)

c. $[\![t_n]\!] = \hat{n}$

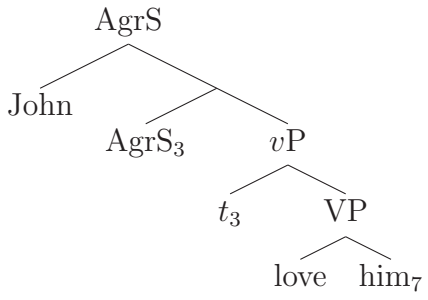
d. $[\![\text{love}]\!] = \lambda x_e \lambda y_e \lambda g[\text{love}(x(g))(y(g))]$

Add to this inventory the functional head AgrS, with denotation given in (20). Assume (21) has the LF in (22). Assuming the inventory above and Function Application, its derivation is given in (23).

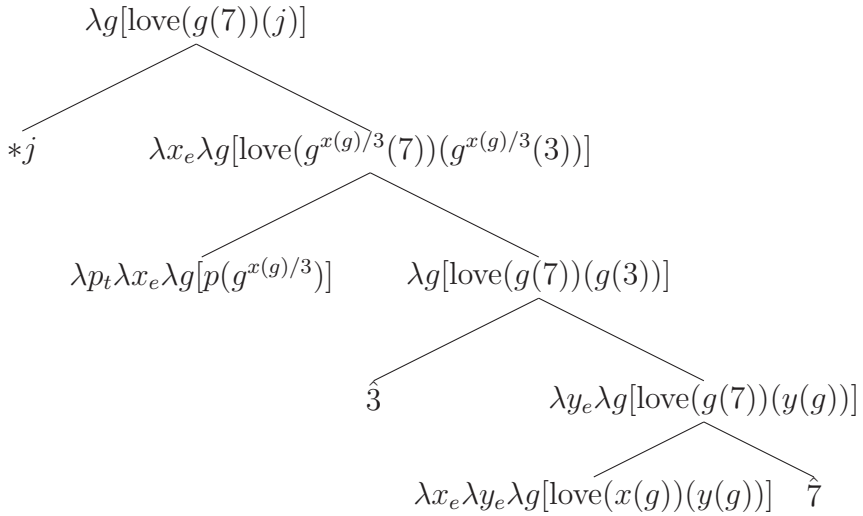
(20) $[\![\text{AgrS}_n]\!] = \lambda p_t \lambda x_\alpha \lambda g[p(g^{x(g)/n})]$

(21) John loves him.

(22)



(23)



By giving AgrS the semantics in (20), the effect of Predicate Abstraction is duplicated: The meaning is as if the thing had never moved. Thus AgrS has the meaning that any otherwise vacuous attracting head should have.

Note that this requires an important assumption about the syntax: That the attracting head is valued with the binding index. But no burdensome stipulation is required to explain this: It is already a part of Minimalist syntactic frameworks that movement is driven by agreement between the attracting head and its attractee. Thus the binding index may be transmitted by the same operation that transmits phi-features. In fact, if we adopt the claim that phi-features *are* indices (Sudo 2012), no stipulation is required at all; the binding index is simply the interpretation of $-s$.

QR can also be accounted for easily in this system, whether or not it is driven by attracting heads. On a theory where QR is not agreement-driven, quantifiers need only have denotations like (24), of type $\langle et, tt \rangle$ as in Kennedy (2014).

(24) $[\![\text{every}_n]\!] = \lambda P_{\langle e,t \rangle} \lambda p_t \lambda g[\forall g'[\exists x[g' = g^{x/n}]\ \&\ P(\hat{n})(g') \rightarrow p(g')]]$

(25) *Extension to the Inventory*

a. $[\![\text{boy}]\!] = \lambda x_e \lambda g[\text{boy}(x(g))]$

b. $[\![\text{his}_n]\!] = \lambda R_{\langle e,et \rangle} \lambda g[\iota x[R(\hat{n})(*x)(g)]]$

c. $[\![\text{mother}]\!] = \lambda x_e \lambda y_e \lambda g[\text{mother}(g(x))(g(y))]$

(26) [Every$_2$ boy [$_{\text{AgrSP}}$ t$_2$ AgrS [$_{v\text{P}}$ t$_2$ loves his$_2$ mother]]]

(27) *Derivation*

a. $[\![\text{his}_2\ \text{mother}]\!] = \lambda g[\iota x[\text{mother}(g(2))(x)]]$

b. $[\![\text{love his}_2 \text{ mother}]\!] = \lambda y_e \lambda g[\text{love}(\iota x[\text{mother}(g(2))(x)])(y(g)]$
c. $[\![t_2 \text{ love his}_2 \text{ mother}]\!] = \lambda g[\text{love}(\iota x[\text{mother}(g(2))(x)])(g(2))]$
d. $[\![\emptyset_{AgrS} t_2 \text{ his}_2 \text{ mother}]\!] = \lambda y_e \lambda g[\text{love}(\iota x[\text{mother}(y)(x)])(y)]$
e. $[\![t_2 \emptyset_{AgrS} t_2 \text{ his}_2 \text{ mother}]\!] = \lambda g[\text{love}(\iota x[\text{mother}(g(2))(x)])(g(2))]$
f. $[\![\text{every}_2 \text{ boy}]\!] = \lambda p_t \lambda g[\forall g'[\exists x[g' = g^{x/2}] \ \& \ \text{boy}(g'(2)) \rightarrow p(g')]]$
g. $[\![\text{every}_2 \text{ boy } t_2 \emptyset_{AgrS} t_2 \text{ his}_2 \text{ mother}]\!]$
$= \lambda g[\forall g'[\exists x[g' = g^{x/2}] \ \& \ \text{boy}(g'(2)) \rightarrow \text{love}(\iota x[\text{mother}(g'(2))(x)])(g'(2))]$

This brings two significant advantages; the first is that syntactic and semantic theorie of movement are brought in line. Movement is triggered by agreement, which results in th transmission of morphosyntactic features and and a binding index, which are possibly on and the same. No rule of Predicate Abstraction is needed to interpret such structures, an no rule of binding-index-insertion is needed to feed Predicate Abstraction.

The second advantage is that it allows us to give a meaning to Wolof *la* which binds th trace of movement to its specifier.

4 Analysis

Central to the analysis is the following denotation for $(l)a$.

(28) $[\![(\text{l})\text{a}_n]\!] = \lambda p \lambda Q \lambda g[Q(*\iota x[p(g^{x/n})])(g)]$

$(l)a$ binds the trace of movement to its specifier, but unlike AgrS, which binds it to λ-abstract, $(l)a$ binds to an iota operator. Note that this semantics requires that the specifie of $(l)a$ be a property; in the case of predicative NPs, this works. In the case of referentia DPs, as in cases of exhaustive identification, a typeshifter is needed. Call this typeshifter II – it is the lexical reification of Partee's IDENT.

(29) $[\![\text{ID}]\!] = \lambda x \lambda y \lambda g[x(g) = y(g)]$

DPs attracted by $(l)a$ must have first combined with ID.

As discussed above, movement must be driven by agreement and feature-checking. W argue that $(l)a$ attracts the nearest NP to its specifier. By assuming that ID selects categor DP but is itself category N, we account for the fact that the only things that can appea in Spec,$(l)a$ are NPs of type $\langle e, t \rangle$. These proposals are summarized by the full lexica specifications for $(l)a$ and ID.

(30) *Wolof Inventory*

a. $\begin{bmatrix} \text{PHON} & (l)a \\ \text{CAT} & C \\ \text{SEL} & \begin{bmatrix} \text{COMP} & TP \\ \text{SPEC} & NP \end{bmatrix} \\ \text{SEM}_n & \lambda p \lambda Q \lambda g[Q(*\iota x[p(g^{x/n})])(g)] \end{bmatrix}$

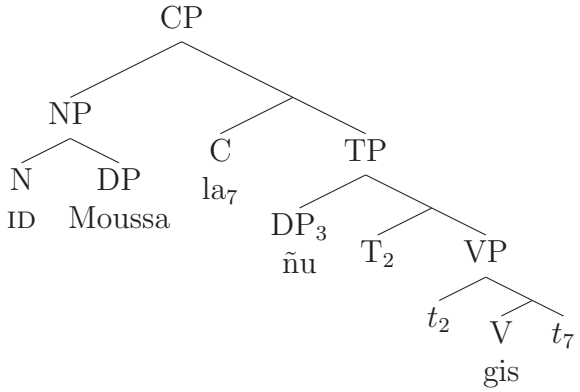
b. $\begin{bmatrix} \text{PHON} & \emptyset \\ \text{CAT} & N \\ \text{SEL} & [DP] \\ \text{SEM} & \lambda x \lambda y[x = y] \end{bmatrix}$

4.1 Deriving Exhaustivity

Consider (31), which has the structure as in (32).

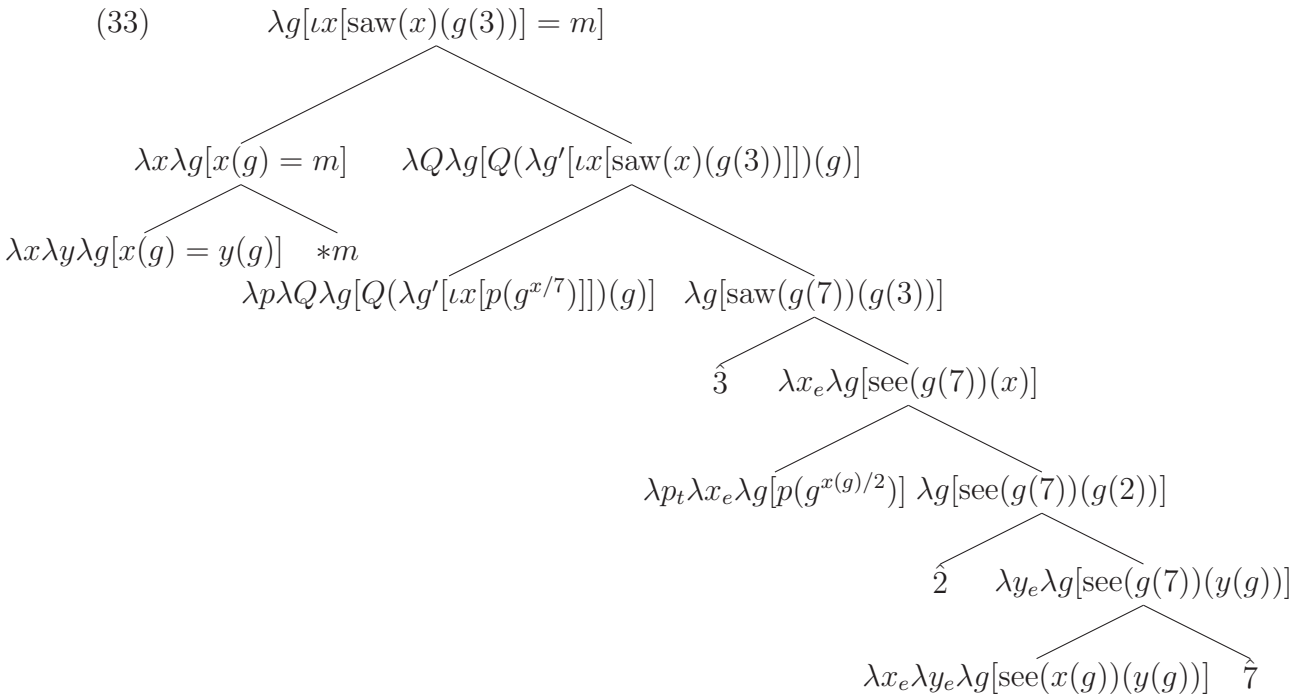
(31) Musaa l-a-ñu gis.
Moussa *l*-C_{WH}-3PL see
"It's Moussa who they saw."

(32)



We derive the interpretation of (31) in (33). (31) is true for assignment g iff the unique individual who was seen by the third individual identified by g is identical to Mary. Ignoring the contribution of tense, we give Wolof T the same denotation as English AgrS in (20).

(33)



In (33), TP has the interpretation $\lambda g[\text{saw}(g(7))(g(3))]$, i.e., a function from an assignment to true iff the third individual identified by the assignment saw the seventh such individual. The complementizer (*l*)*a* combines with this proposition, a property, and an assignment to return true iff that property holds of the unique individual x such that when altering the assignment so that its third individual is x, the proposition is true of the altered assignment.

The property supplied is simply the property of being Moussa, and the result is something which essentially means: Moussa is identical to the one who they saw.

4.2 Deriving Predication

In cases of simple predication, the predicative NP has both the necessary properties for movement to Spec of $(l)a$: It is an NP and it is of type $\langle e,t\rangle$. A normal predicative structure contains just the predicative NP and a simple referential DP, so the remnant of movement will be a singleton. The upshot of this is that binding by the ι-operator induced by $(l)a$ has a trivial effect; this is why the usual exhaustifying contribution of $(l)a$ is not detected in cases of simple predication.

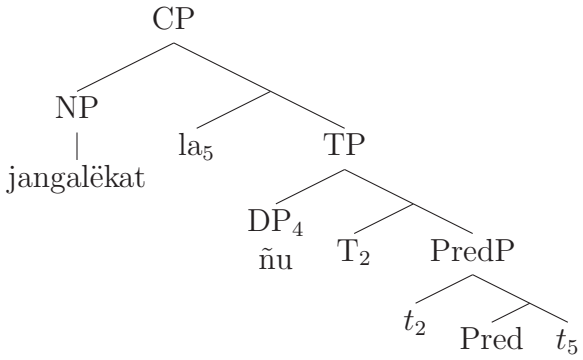
One caveat must be made, however. When the predicative NP moves, as with NPs derived by ID as in the exhaustivity case, its trace is of type $\langle e\rangle$. This should derive a type mismatch if the other DP in the predicative small clause is also type $\langle e\rangle$. To account for this we stipulate that pronouns, unlike full DPs, can in principle have any type, including $\langle e,t\rangle$. As long as there is an individual salient in the discourse, a DP may refer to the property of being that individual as easily as it can refer to the individual itself. This predicts that predicative sentences with a fronted predicative NP are only possible with pronominal subjects; and in fact, this is the case.

(34) Jangalëkat l-a-ñu.
teacher *l*-C$_{WH}$-3PL
"They are teachers."

(35) *Jangalëkat l-a Musaa.
teacher *l*-C$_{WH}$ Moussa

The LF for (34) is in (36).

(36)

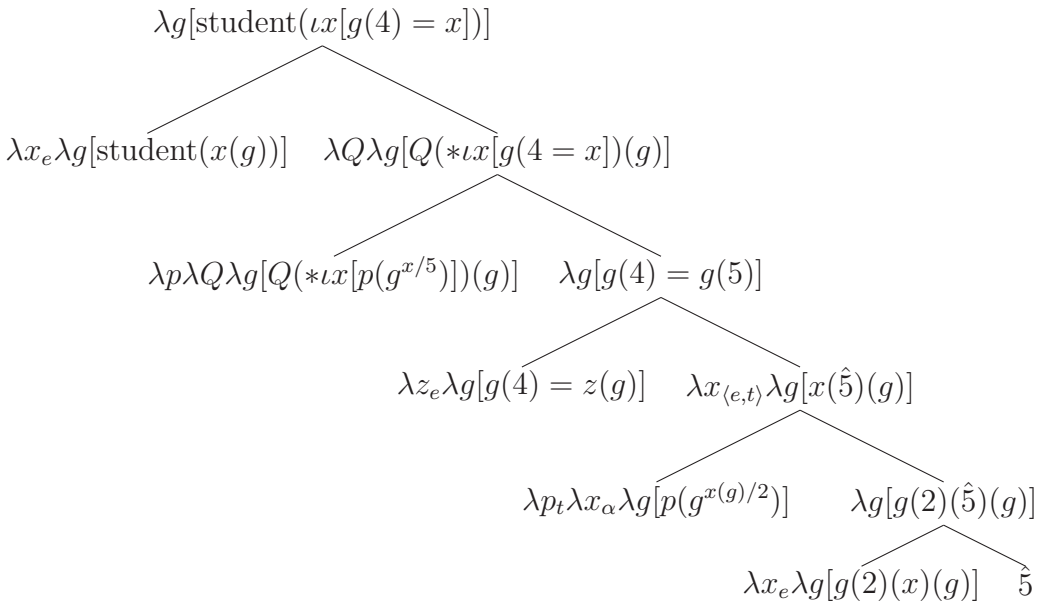


Incorporating the assumption about pronouns laid out above, take (37a) to be the denotation of the pronoun in (34). Assume also that when XPs of type $\langle e,t\rangle$ move, they may leave traces of type $\langle e\rangle$, or of type $\langle e,t\rangle$. Such traces have the meaning given in (37b). Given these preliminaries, the derivation of the interpretation of (34) is shown in (38); assume also that the predicative head Pred is vacuous.

(37) *Property Pronouns and Traces*
a. $[\![\text{pro}_n^{prop}]\!] = \lambda x_e \lambda g[g(n) = x(g)]$

b. $[\![\mathrm{t}_n^{prop}]\!] = \lambda x_e \lambda g[g(n)(x)(g)]$

(38)

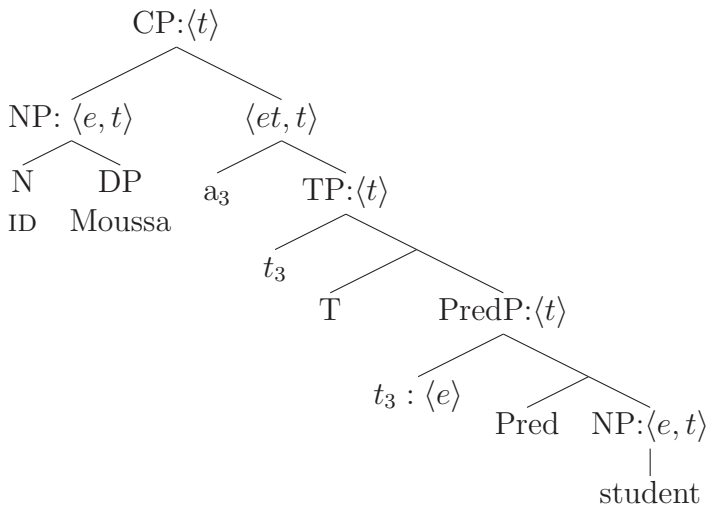


The LF in (36) is generated when $(l)a$ attracts the nearest NP – in this case, the predicative NP *jangalëkat*. The trace of this movement is of type e. The pronoun denotes a the property of being the relevant individual, and leaves a property-typed trace (doing otherwise would cause a type-mismatch and crash). The result is that the TP denotes a proposition which is essentially equative in nature. Binding this with an iota results in the following individual description: $\lambda g[\iota x[g(2) = x]]$. This can be reduced simply to $\lambda g[g(2)]$; this is the trivialization of the exhaustivity of $(l)a$. Likewise the final denotation, $\lambda g[\text{student}(\iota x[g(2) = x])]$ can be reduced to $\lambda g[\text{student}(g(2))]$, i.e., simple predication.

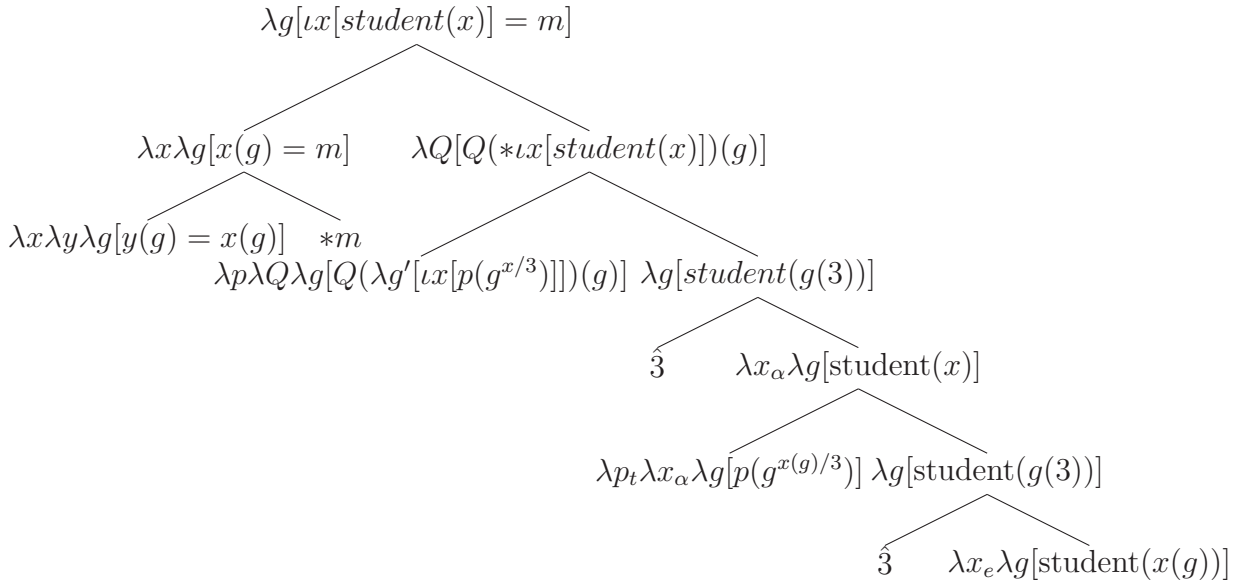
Recall that full DPs cannot be in subject position in predicative structures like (34), because they do not denote type $\langle e, t\rangle$. But the theory presented here does allow a mechanism for shifting referential DPs into type $\langle e, t\rangle$ – namely, ID. So what if such a shifted DP were put in subject position in a predicative construction?

What we predict is that because $(l)a$ attracts the nearest NP, the subject itself will raise to Spec of $(l)a$, leaving the predicative NP *in situ*. In fact, if the traces that the subject DP/NP leaves are both type $\langle e\rangle$, we predict this to be interpretable.

(39)



(40)



The meaning we predict for an LF like (39) is something like: Moussa is the one who is a student. And in fact, this is the correct prediction. Not only is (41) grammatical, it has exactly this meaning.

(41) *Exhaustive identification in a predicational copular sentence*

Musaa-a	di (>Mussaay)	ndongo.
Moussa-C_{WH}	COP	student

"It's Moussa who's a student."

5 Extending to Other Copular Constructions

Derivation of exhaustivity and predication both involve an equative semantics; in the case of the former, it is contributed by the typeshifting head ID, in the case of the latter by the pronominal subject. This raises the question of whether equatives themselves involve $(l)a$, and in fact they do (42).

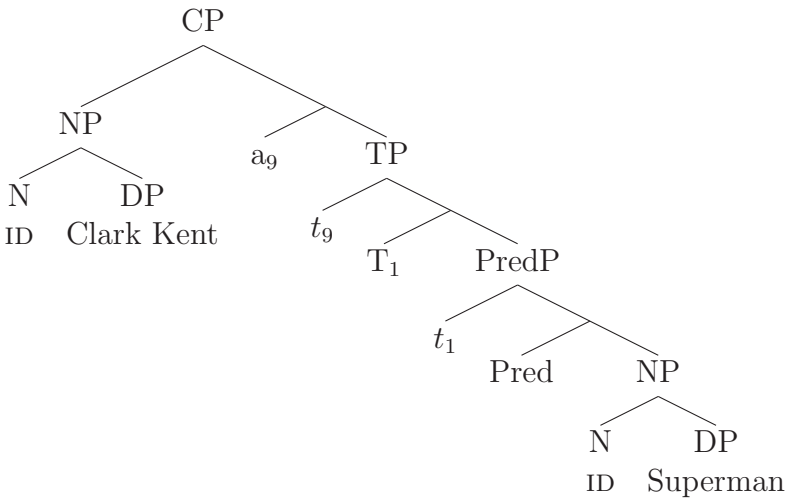
(42) *Equative copular sentence in Wolof*

Clark Kent-a di (>Kentay) Superman.
Clark Kent-C_{WH} COP Superman

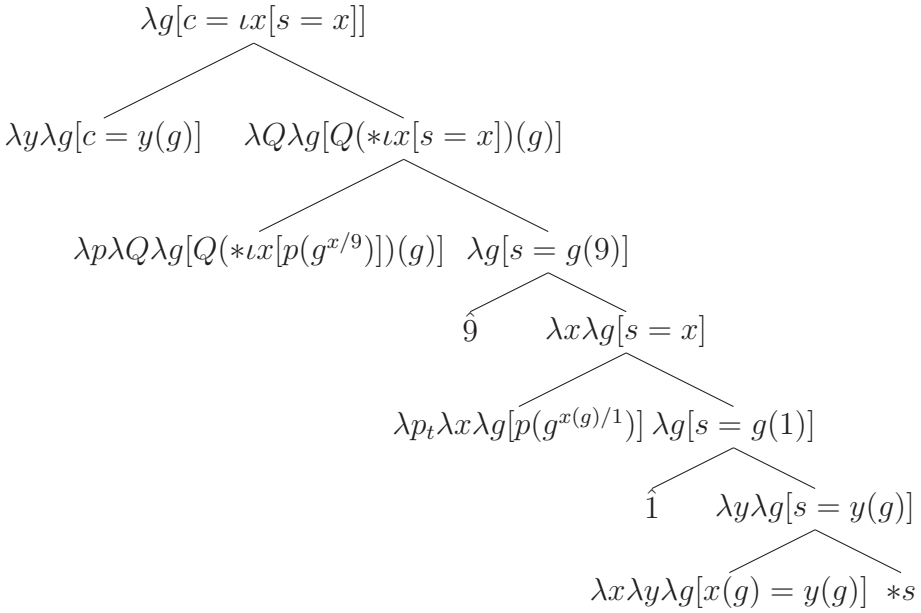
"Clark Kent is Superman."

These sentences are captured by our theory. If both DPs are typeshifted by the ID, the higher one will be attracted by $(l)a$ and provide the correct interpretation – again, the exhaustifying effect is neutralized.

(43)



(44)



Again, $\lambda g[c = \iota x[s = x]]$ can be reduced to $\lambda g[c = s]$.

Two relevant predictions are made by this proposal. The first is that equatives where the complement of Pred is raised to Spec of $(l)a$ rather than the subject should be bad when the subject is a full DP; this is borne out by the data, as (45) shows.

(45) *Superman l-a Clark Kent.
Superman *l*-C_{WH} Clark Kent

The second prediction is that equatives where the complement of Pred is raised to Spec of (*l*)*a are* permitted when the subject is pronominal. This prediction is not born out: (46) cannot mean that the individual Clark Kent is identical to the individual Superman.

(46) *Clark Kent Superman l-a-∅.
Clark Kent Superman *l*-C_{WH}-3SG
intended: *"Clark Kent is Superman."*

We follow Martinović (to appear) and propose this to be the result of a pragmatic constraint. In particular, sentences such as those in (46) have a topic-comment structure, which has the purpose of attributing some property (comment) of an already established discourse referent (topic) (Lambrecht 1994). This syntactic configuration forces the two DPs in copular sentences to be asymmetric in a broader sense: N2 must in some way contribute information about N1. Specifically, it is argued that N1 in such sentences must be higher on the familiarity/givenness hierarchy (Gundel *et al.* 1993; Mulkern 1996) compared to N2.[8]

So-called specificational sentences also involve (*l*)*a*, and are also accounted for on this proposal. Their syntax is identical to the syntax of predicational sentences:

(47) *Specificational copular sentence in Wolof*
Bindëkat bi Musaa l-a-∅.
writer DEF.SG Moussa *l*-C_{WH}-3SG

"The writer is Moussa."

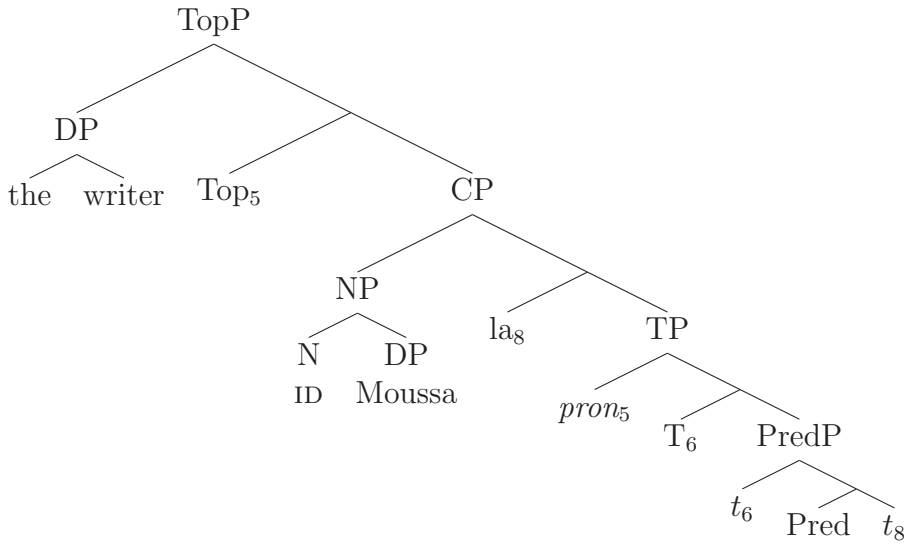
In the case of specificational sentences, a topicalized definite binds the subject pronoun, while a referring object DP is moved to Spec of (*l*)*a*. Following, e.g., Coppock & Beaver (2012) who argue that definite DPs are of type $\langle e, t\rangle$, and assuming that pronouns can, like traces, refer directly to properties (in addition to being able to have functional-pronoun-like denotations as in predicatives and marked equatives), these are neatly derived. The LF for (47) is given in (48).[9]

[8]It is possible to have structures such as N1 N2 *la* in which both nominals appear to be referential. On closer inspection, however, they seem to actually be predicational structures: (1) is true iff, for example, Moussa sings like/as well as Youssou N'Dour. In this case, N2 is actually interpreted as the most salient property of the individual picked out by the referential expression.

(1) Musaa Yusu Nduur l-a-∅.
Moussa Youssou N'Dour *l*-C_{WH}-3SG
"Moussa is Youssu N'Dour (in some relevant way)."

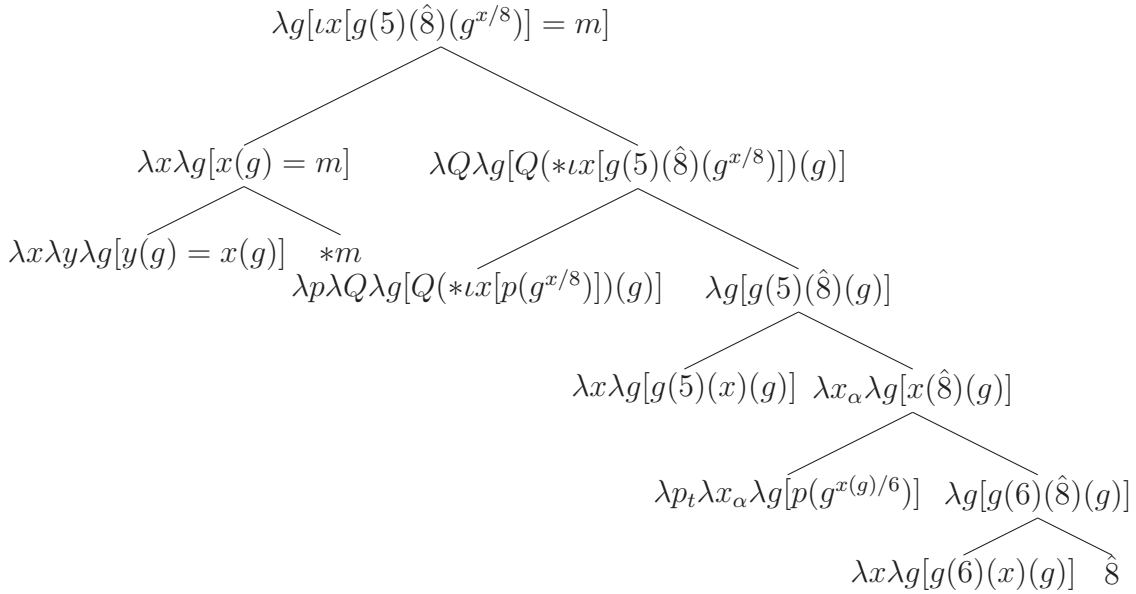
[9]Note that we assume that N1 (*the writer*) is co-indexed with the subject pronoun, generated in Spec,PredP, and N2 (*Moussa*) as the complement of Pred. The underlying structure of specificational sentences is a matter of much debate and disagreement (see, for example, Mikkelsen (2005) for a discussion on different types of analyses of specificational copular sentences). We are here assuming a non-inversion-style analysis of specificational copular sentences.

(48)



Derivation of (48) is provided up to CP, given a property-denotation for the subject pronoun which is identical to the property denotation for traces provided in (37b).

(49)



Adding denotations for *the* and Top allow for the derivation to be completed. We assume an analysis of *the* a la Coppock & Beaver (2012). We assume that Top is synonymous with English AgrS as given in (20). Note that this requires Top to be assigned an index by agreement, but that this agreement is not of the movement-triggering variety.

(50) a. $[\![\text{the}]\!] = \lambda Q\lambda x\lambda g[Q(x)(g)\ \&\ \neg\exists y[x(g) \neq y(g)\ \&\ Q(y)(g)]]$
b. $[\![\text{Top}_5]\!] = \lambda p_t\lambda y_\alpha\lambda g[p(g^{y(g)/5})]$
c. $[\![\text{CP}]\!] = \lambda g[\iota x[g(5)(\hat{8})(g^{x/8})] = m]$
d. $[\![\text{Top}_5\ \text{CP}]\!] = \lambda y_\alpha\lambda g[\iota x[y(\hat{8})(g^{x/8}) = m]]$
e. $[\![\text{the writer}]\!] = \lambda x\lambda g[\text{writer}(x(g))\ \&\ \neg\exists z[x(g) \neq z(g)\ \&\ \text{writer}(z(g))]]$
f. $[\![\text{the writer Top}_5\ \text{CP}]\!] = \lambda g[\iota x[\text{writer}(x)] = m]$

6 Conclusion

This analysis provides two major benefits. The first is that it captures the use of Wolof $(l)a$ across a disparate range of copular sentences, including predicational, equative, and specificational sentences, as well as non-copular sentences, namely in exhaustively interpreted expressions. The crucial point here is that $(l)a$ does have an exhaustifying semantics, and targets bare nouns to move its specifier; but this happens to also target predicative nouns (in predicative constructions) and typeshifted DPs (in equatives and specificational sentences). In these three copular cases, however, the exhaustifying effect is neutralized.

The second major benefit of this analysis is that it provides a framework for interpreting overt movement compositionally. Following Kennedy's (2014) move to do the same for QR, we reinterpret attracting heads as binding the traces of movement to their specifiers. This eliminates the need for rules like Predicate Abstraction and unifies the syntax and semantics of movement by making agreement a requirement not only for the syntactic operation of movement, but also for its interpretation. This could potentially be extended to improve the account of many phenomena, especially discourse configurationality, by which movement to a peripheral head creates a semantic interaction between the head and its attractee.

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Reevaluating the Diphthong Mergers in Japono-Ryukyuan

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1 Introduction

Great strides have been made in the field of historical Japono-Ryukyuan studies in the past half century with the shift in the perception of the Ryukyuan languages as mere dialects of Japanese to cousin languages that preserve various phonological and morphological features that have been lost in the Japanese subfamily. In particular, the Ryukyuan data has both secured and contributed to reconstructions of Proto-Japono-Ryukyuan vowel system that had been previously based purely on internal reconstruction via Old Japanese and scant examples from Ryukyuan and/or dialect data.

One area of the vowel system reconstruction that has been particularly advanced by Ryukyuan data is that of the Proto-Japono-Ryukyuan diphthongs, which have preserved reflexes in various ways in the different Ryukyuan languages. In this paper, I explore the reflexes of the Proto-Japono-Ryukyuan diphthongs ending in *i in Southern Ryukyuan (henceforth referred to as Sakishima) languages. The evidence in these languages not only provides further evidence for the diphthongs that have been proposed in the literature, but also throws into question the diphthong mergers that have been proposed for Proto-Ryukyuan. Furthermore, I adduce evidence from these languages for the preservation of the proto-diphthongs not only after labial and velar stops, as the Old Japanese data has suggested, but also after coronal obstruents.

I first provide a background of the Ryukyuan languages in § 2, followed by a brief discussion of the work that has been done in the reconstruction of the Proto-Japono-Ryukyuan diphthongs in § 3. § 4 introduces the data from Sakishima languages and discusses the implications for reconstruction. Finally, § 5 concludes.[1]

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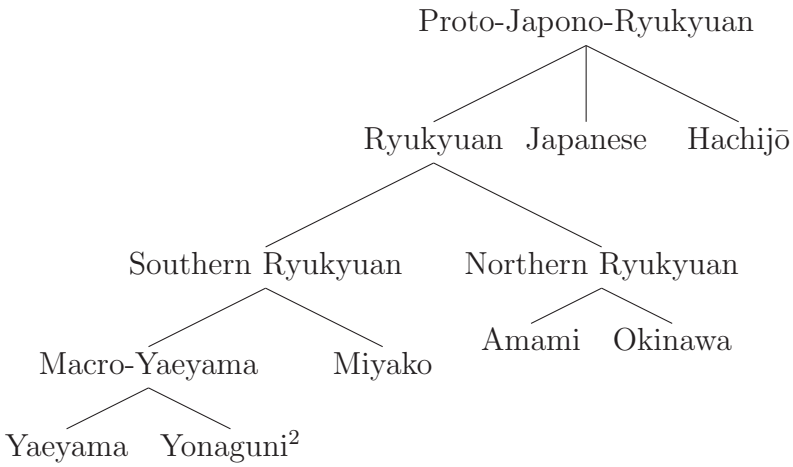
[1]The following orthography is used in place of IPA: c = [tɕ], sj = [ɕ], zj = [dʑ], f = [ɸ], ï = [ɨ]. In Yonaguni, apostrophes are used to represent a fortis consonant. In all Japono-Ryukyuan languages, *s* and *z* are palatalized before *i* and coda *n* is a placeless or uvular nasal (generally represented in Japanese phonology as ɴ), so *si* and *zi* uniformly represent phonetic [ɕi] and [ʑi], respectively, and *n* will be assumed to represent phonetic [ɴ] in coda position.

The abbreviations are as follows: ModJ = Modern Japanese, NR = Northern Ryukyuan, PJR = Proto-Japono-Ryukyuan, PR = Proto-Ryukyuan, SR = Southern Ryukyuan/Sakishima, WOJ = Western Old Japanese.

2 The Ryukyuan Languages

The Ryukyuan languages may be divided into five or six dialect continua, depending upon the classification (Serafim 2008:80). One such classification, provided by (Pellard 2015:15) is given in Figure 1. Those considering Kunigami to be a separate language group from Amami and Okinawa would place Kunigami as a sister branch to them under Northern Ryukyuan.

Figure 1: The Japono-Ryukyuan Language Family



These languages are spoken in the Ryukyuan islands, which comprise the entire modern day Okinawa Prefecture and the southern Amami islands of Kagoshima Prefecture, all of which stretch for about 900 kilometers south of Kyushu, the southernmost island of the Japanese mainland. The Proto-Ryukyuan language likely developed during the first centuries of the common era, coinciding with the migration of the Ryukyuans into the Ryukyuan islands (Pellard 2015:30). The languages subsequently spread throughout the Ryukyuan islands and were spoken ubiquitously into the unification of the Ryukyu Kingdom in 1406 and until the dissolution of the Ryukyu Kingdom in 1879, at which point Japanese imperialism led to policies suppressing the usage of the languages.

It is difficult to estimate the current number of speakers due to the lack of census data, but one can estimate given the fact that the population of the Ryukyu Islands is approximately 1.5 million and that virtually all speakers are at least fifty years of age (and many of the languages have even higher lower bounds) (Karimata 2015:114), that the number must be very low. The Ryukyuan languages stopped being transmitted intergenerationally by the 1950s and subsequently, speakers shifted to being monolingual in Japanese (Anderson 2015:481). Thus, UNESCO has classified all the Ryukyuan languages as either "definitely endangered" or "severely endangered" (Karimata 2015:115).

[2]Pellard refers to this language as "Dunan", which is the Yonaguni word for "Yonaguni".

3 Proto-Japono-Ryukyuan Diphthongs

Much of the reconstruction of the proto-vowel system has relied on internal reconstruction using Old Japanese, but the picture has been recently revised with careful attention to comparative data from Ryukyuan languages. § 3.1 discusses the Japanese data and § 3.2 brings the reader up to speed on the current view of the vowel system utilizing Ryukyuan data.

3.1 Initial Observations in Old Japanese

The reconstruction of Proto-Japono-Ryukyuan diphthongs began with the investigation of the Chinese characters that were used to represent vowels in Western Old Japanese, the language of the Nara Court in the eighth century in western Japan. It was noted as far back as 1764 by Motoori Norinaga that three of the five modern Japanese vowels *i, e, a, o, u*, namely *i*, *e*, and *o* were each the reflex of two different vowels (Lange 1973:21-23). These findings were partially synthesized in 1785 by Ishizuka Tatsumaro and then left untouched until Hashimoto (1917). The two sets of vowels are known as *koo* ("A") and *otsu* ("B") vowels. For the purposes of this paper, only the *i* vowels will be discussed and henceforth the vowels shall be referred to as i_1 and i_2.

The initial evidence for the vowel differentiation was the complementary distribution of the Chinese characters used for each CV syllable in the *Manyōshū*, a collection of Old Japanese poems from the 8th century. Each syllable could be written with any one of multiple Chinese characters; however, the characters used for a consonant with a *koo* vowel *never* overlapped with the characters used for a consonant with an *otsu* vowel. Thus, for example, ki_1 and ki_2 were written with complementary sets of Chinese characters.

While it was well-known that there were certain Japanese nouns whose final root vowel changed when in compounds and verbs whose final root vowel changed when derivational morphemes were added, the connection to the *koo/otsu* distinction was not remarked upon until the twentieth century (Yoshitake 1930). These words categorically end in the *otsu* vowels.

Figure 2: Apophonic Vowels

$tuki_2$	'moon'	→	tuku-jo	'moonlit night'
ki_2	'tree'	→	ko-dati	'grove of trees'

These alternating vowels, later termed apophonic vowels, were further evidence that the *koo* and *otsu* sets were phonemically distinct. While the exact phonetic values of i_1 and i_2 has been extensively debated, it is generally agreed upon that i_1 was the pure vowel [i] and i_2 was a diphthong with a [j] offglide (Lange 1973; Matsumoto 1974). One view, defended by Miyake (1999), reconstructs i_2 as [ij]. The exact phonetic value of the vowels is irrelevant to this paper; rather, the diphthongal nature of i_2 will be focused upon. In observing the vowel correspondences, Whitman (1985) reconstructs i_2 as being the reflex of two different diphthongs in Proto-Japanese, *ui and *oi (generally reconstructed as *əi to keep the vowel space balanced), based off the alternations in (2). The words that alternate i_2 with *u* are reconstructed with *ui, while those that alternate with *o* are reconstructed with *əi under

the then-accepted four vowel hypothesis (see Whitman (1985) for more). An important observation was that the *koo/otsu* distinction was only made following labials and velars Lange (1973). This fact will be relevant to the discussion in § 4.3.

3.2 Revisions with Ryukyuan Data

Early observations of Ryukyuan data accorded with the reconstructions of *ui and *əi. In particular, Arisaka (1934) and Hattori (1932) first noted that unlike Japanese, the sequences *kui and *kəi were kept distinct, and discovered that *kui merged with *ki (which became ki_1 in Old Japanese) while *kəi remained distinct. The treatment of *kui and *ki against that of *kəi differed by individual language. However, it may be generalized that the Northern Ryukyuan reflexes of *kui and *ki are kept distinct from those of *kəi via the consonant quality, whereas Southern Ryukyuan maintained the distinction via vowel quality.

Figure 3: Reflexes of *kui and *kəi in Ryukyuan (Modified from Pellard 2013:85)

Subgroup	Language	'moon'	'tree'
Japanese	WOJ	tu**ki**$_2$ (∼ tuku-)	**ki**$_2$ (∼ ko$_2$-)
Okinawan (NR)	Nakijin	si**ci:**	**ki:**
Yaeyaman (SR)	Ishigaki	tsï**kï**	**ki:**
Ryukyuan	PR	*tuki	*ke
Japono-Ryukyuan	PJR	*tukui	*kəi

The examples above show the most common identifier of *kui and *ki in each subgroup– palatalization in Northern Ryukyuan and vowel centralization in Southern Ryukyuan. However, some Northern Ryukyuan languages maintain the distinction from *kəi as a lenis/fortis distinction and some Southern Ryukyuan languages reflect *kui and *ki with fricativization of the vowel (> i > ï > s). The generalization appears to be that *kui and *ki underwent greater lenition than *kəi did. Due to this pattern, PJR *kəi was hypothesized to have monophthongized to *ke in Proto-Ryukyuan while PJR *kui and *ki merged to *ki. Vowel raising of the mid-vowels *e and *o to high vowels *i* and *u* then occurred individually across the Ryukyuan languages *after* palatalization in Northern Ryukyuan and centralization in Southern Ryukyuan, leading to greater opacity in seeing the difference.

Pellard (2013) finds evidence to argue for another diphthong *oi in Ryukyuan. The following table illustrates the cognates of Old Japanese ki_2- 'yellow' and a compound formed from it: *kugane* 'gold' (literally 'yellow-money'). As the root-final vowel shows an $i_2 \sim u$ alternation, we would expect the PJR form to be reconstructed as *kui. However, the Ryukyuan data contradicts this view.

The non-apophonic form 'yellow' operates as expected: palatalization in Northern Ryukyuan and vowel centralization in Southern Ryukyuan. However, the reflexes of 'gold' notably differ from the reflexes of other words that begin with *ku*. The word for 'cloud' retains *k in Northern Ryukyuan, but lenites *k to *f* in Southern Ryukyuan, whereas 'gold' shows the opposite pattern and so cannot derive from *kui. It is on this basis that Pellard reconstructs the apophonic alternation as an original *ki ∼ *ko and consequently the proto-diphthong as *koi. The hypothesis is bolstered by the fact that the modern Japanese form for 'gold'

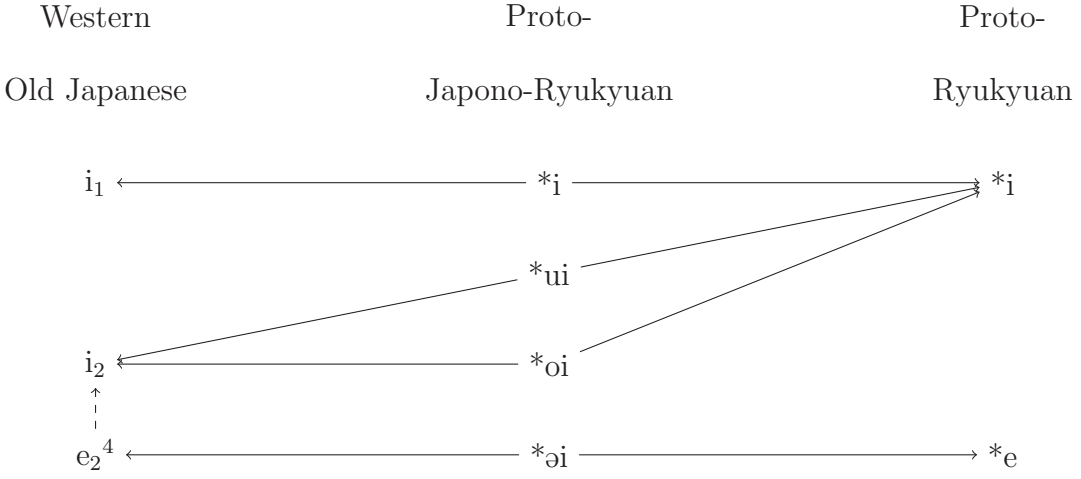
Figure 4: Evidence for *oi (Modified from Pellard 2013:86)

Subgroup	Language	'yellow'	'gold'	'cloud'
Japanese	WOJ	**ki**$_2$ (∼ ku)	**ku**-gane	**ku**mo$_1$
Okinawan (NR)	Nakijin	**ci:**-ru:	**fu**-gani	**ku**mu
Yaeyaman (SR)	Ishigaki	**kï:**	**ku**-gani	**fu**mu
Japono-Ryukyuan	PJR	*koi	*koi-kane	*kumo

is *ko-gane*, a borrowing from Eastern Old Japanese.[3] Another example that supports Pellard's reconstruction is the Ishigaki word *tsïkus-ïn* 'to exhaust', which would be expected have become *tsïfus-ïn* had the diphthong been *ui. Ishigaki *pïs-un* 'to dry' also supports Pellard's hypothesis as the *ï* tells us the proto-form could not have been *pəi as is usually reconstructed. The apophonic alternation with the transitive form *pus-un* (WOJ *pos-u*) informs that the first segment of the diphthong was *o (PJR *pu > Sakishima *fu, while *po > *pu). These words should be *tukos- and *poi-, respectively. For further evidence of *oi, see Pellard (2013).

To summarize, the dipthong proposal and mergers in the respective primary branches (Japanese and Ryukyuan) are presented below:

Figure 5: Diphthong Mergers in Japanese and Ryukyuan



While this diagram paints a clean picture of the diphthong mergers, it will become apparent given data from the Sakishima languages that the mergers cannot be so clearly dated to the time of Proto-Ryukyuan.

[3]While Western Old Japanese raised most of its mid-vowels *e and *o to *i* and *u*, respectively, Eastern Old Japanese retained most of them.

[4]Most of the *əi diphthongs had become i_2 by the time of Old Japanese, but some of them remained as e_2 and failed to undergo raising. The exact environments in which vowel raising occurred are not yet worked out, but see Frellesvig and Whitman (2008:22-23) for some discussion.

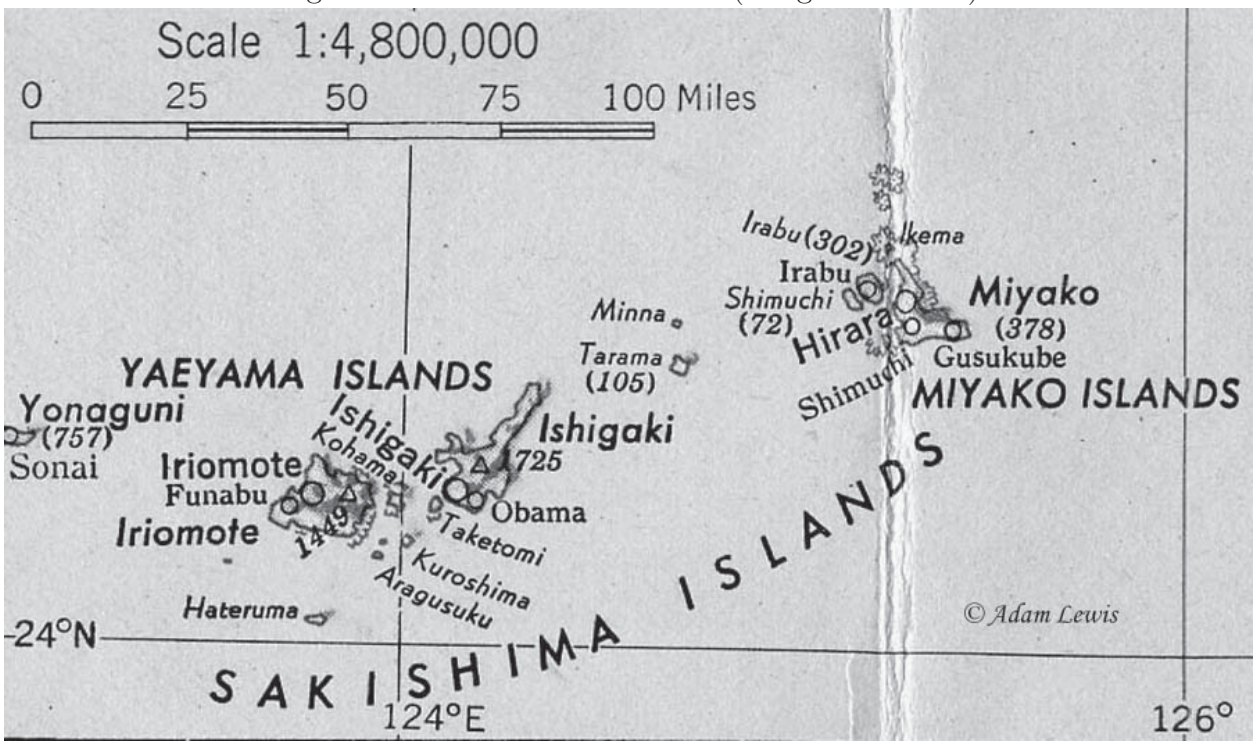
4 Reconciling the Sakishima Data

The reader will first be familiarized with the Sakishima languages, in particular, Yaeyaman, in § 4.1. § 4.2 presents exceptions to the diphthong mergers summarized in § 3.2. This section ends with a speculation on the implications of the exceptions in § 4.3.

4.1 Background of Sakishima

The Sakishima languages are spoken on two groups of islands separated from Okinawa mainland, the southernmost point where the Northern Ryukyuan languages are spoken, by approximately 120 miles of ocean. The eastern Miyako islands are where the Miyako languages are spoken, while the western Yaeyaman islands are where the Yaeyaman and Yonaguni languages are spoken. Yonaguni is spoken on the isolated westernmost Yaeyaman island, approximately 100 miles east of the eastern coast of Taiwan.

Figure 6: The Sakishima Islands (Image from here)



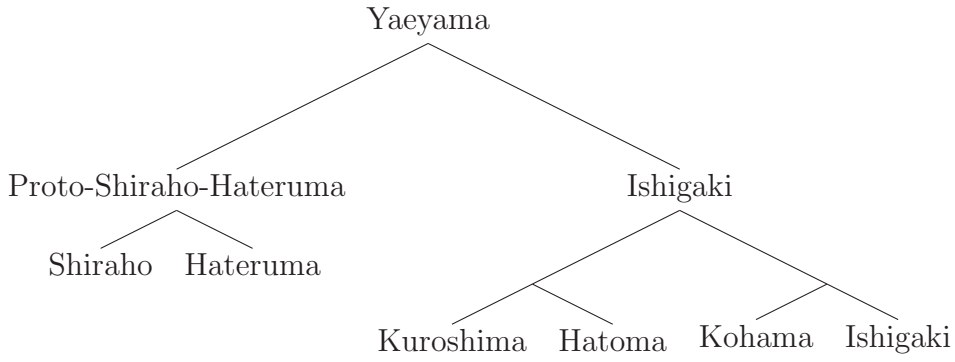
The Sakishima varieties from which examples are pulled may all be found on this map, except for Ōura, which is slightly north of Hirara in the Miyako Islands, Kabira, which is on the northwest part of Ishigaki Island, and Shiraho, which is just east of "Obama"[5] on the island of Ishigaki. The following dictionaries are used for each language: Ōno et al. (1974) for WOJ, Sakihara (2006) for Shuri Okinawan, Hirayama (1967) and Nakamatsu (1987) for all the Miyako and Yaeyama languages, Miyagi (2003) for Ishigaki, Maeara (2011) for Taketomi,

[5]This is an error and the Japanese characters should actually be read as "Ōhama".

and Ikema (2003) for Yonaguni. My fieldnotes from 2012-2014 are used for Shiraho and are crossreferenced for Taketomi and Yonaguni.

Because the islands on which Yaeyaman languages are spoken are relatively distant from one another, the Yaeyaman subgroup shows greater diversity than do any of the other Ryukyuan subgroups. The diagram in Figure 7 offers a tentative subgrouping, modified from Kajiku (1984:300) in order to include Shiraho.

Figure 7: Yaeyama subgrouping



The subgrouping of Yaeyaman is still a matter of heavy contention; however, it is patent from phonological, morphological, and lexical evidence that Hateruma and Shiraho are particularly divergent and thus likely branched off early. Kajiku does not discuss the position of Taketomi in his classification. It seems to be different enough from the "Ishigaki" subgroup varieties, however, to merit its own branch, but it remains unclear currently whether there is any relation to Hateruma/Shiraho.

With the exception of Hateruma/Shiraho and Taketomi, the Yaeyaman languages appear to undergo the expected diphthong mergers that are proposed for Proto-Ryukyuan. Shuri Okinawan, descended from the *lingua franca* of the Ryukyu Kingdom, will be cited as an example of Northern Ryukyuan and Ishigaki, which was spoken on the main Yaeyaman island of Ishigaki, will be cited as an example of Southern Ryukyuan. The Shuri examples are pulled from Pappalardo (2014), whose comparison of these forms with the Hateruma forms will be discussed in § 4.2. The relevant segment of each word is bolded.

Figure 8: WOJ *ki* syllables in Shuri

WOJ ki_1		WOJ ki_2	
'dress'	**ci**n	'tree'	**ki:**
'heart'[6]	**ci**mu	'to get up'	u**ki**-jun
'hear'	**ci**c-un	'moon'	ci**ci**
'breath'	i:**ci**	'fog'	**ci**ri
'to cut'	**ci**:-jun	'stem'	gu**ci**

Figure 9: WOJ *ki* syllables in Ishigaki

WOJ ki_1		WOJ ki_2	
'dress'	**kï**n	'tree'	**ki:**
'heart'	**kï**mu	'to get up'	u**ki**-run
'to hear'	**sï**k-un[7]	'moon'	tsï**kï**
'breath'	i**kï**	'fog'	**kï**ru
'to cut'	**kï**s-un	'stem'	fu**kï**

[6]The PJR word was *kimo, whose meaning seems to have been 'liver'. Japanese dialects take this meaning while in Ryukyuan languages the meaning has undergone metonymy, shifting to 'heart'.

[7]In Proto-Yaeyaman, this verb was *kïkun. There appeared to have been a rule that fricativized *k to *s

As can be seen in Figures 8 and 9, a subset of words that correspond to words with ki_2 in Western Old Japanese palatalized in Northern Ryukyuan and centralized in Southern Ryukyuan as those corresponding to ki_1 did, whereas the other subset did not. The palatalized/centralized subset is reconstructed with *kui while the other subset is reconstructed as *kəi. While the pattern for almost all Yaeyaman languages matches with that of the remaining Ryukyuan languages, we find exceptions in Hateruma/Shiraho and Taketomi.

4.2 Exceptions to the Diphthong Mergers

Pappalardo (2014) provides evidence that is counter to the current picture of the diphthong mergers in Proto-Ryukyuan. The forms he cites are in Figure 10.

Figure 10: WOJ *ki* syllables in Hateruma

WOJ ki_1		WOJ ki_2	
'dress'	**sï**nu	'tree'	**ki:**
'liver(/heart)'	**sï**mu	'to get up'	u**gi**-run[8]
'to hear'	**sï**k-un	'moon'	sï**kï**n
'breath'	ï**sï**	'fog'	**kï**sï
'promontory'	sa**sï**	'stem'	fu**kï**
'side'	ba**sï**	'time'	sï**kï**pïntsï

Unlike in Ishigaki and Shuri, Hateruma has not merged *ki and *kui. The three-way distinction is preserved faithfully as shown in the three different reflexes, each shaded with a different color in Figure 10. If we observe these words in Taketomi, another Yaeyaman language, we see yet another pattern. The data below is taken from a recent Taketomi dictionary by Maeara (2011) and corroborated with my fieldwork notes.[9]

Figure 11: WOJ *ki* syllables in Taketomi

WOJ ki_1		WOJ ki_2	
'dress'	**si**nu	'tree'	**ki:**
'heart'	**sj**ũ:	'to get up'	fu**i**-run
'to hear'	**hi**k-un	'moon'	hi**ki**
'breath'	i**si**	'fog'	**sj**u:ri/u
'promontory'	sə**si**	'stem'	fu**ki**
'side'	bə**si**[10]	'time'	hi**ki**pinici

when followed by *ïk. This potentially could be generalized to any high vowel followed by any voiceless stop; however, all *ku sequences became *fu and I have not found any *kiT examples so this claim cannot be made for certain.

[8]Proto-Yaeyaman *ki > *gi* in some intervocalic environments.

[9]However, I did not have the word for 'time' and my speaker does not have /ə/ in her phonology–both these words have /a/ instead. Both /ə/ and /a/ correspond to /a/ in other Japono-Ryukyuan languages. For further discussion on /ə/ in Taketomi, refer to Lawrence (1998) and Nishioka (2009).

Before analyzing the sound correspondences, a discussion of Taketomi sound change is in order, due to the seeming irregularity in the shaded forms in the table.

First, in Proto-Yaeyaman, *k palatalized to *s preceding *ïk. Taketomi has applied a rule in a similar environment to lenite *s to *h* preceding *ik. The same rule applies to two other words in the chart above–*hiki* 'moon' and *hiki-pi-nici* 'time' (literally 'moon-day-day'). As such, *hikun* 'to hear' may be reconstructed as *sikun in Pre-Taketomi.

Second, *fuirun* 'to get up' looks quite different from the corresponding Ishigaki and Hateruma forms, *ukirun* and *ugirun*, respectively. However, it appears that this word has undergone two sound changes in Taketomi. First, word-initial high vowels received a prothetic *h* when followed by a voiceless consonant, which synchronically became *f* before *u*, a in most Japono-Ryukyuan languages. The same rule applied to another Yaeyaman language, Kabira, which added *h* to all word-initial vowels followed by a voiceless consonant (cf. PJR *ukəi- : Kabira *fuki-* 'get up' and PJR *akai- : Kabira *haki-* 'open').

Subsequently, Taketomi appears to have undergone an innovation alongside Hateruma and Shiraho, in which some intervocalic voiceless stops became voiced.[11] As seen in Figure 10, Hateruma has *ugirun for 'to get up.' We may posit as well that Taketomi underwent the same change, forming *fugirun. The evidence for the same change comes from the fact that Taketomi subsequently elided voiced stops intervocalically if they preceded *i*. The evidence is shown, for example, by Taketomi *fui* 'neck' corresponds to PJR *kubi[12]. A synchronic example is the noun *nui-sasi* 'taking out and putting in', whose *nui-* component is derived from attaching the infinitive stem *-i* to the root of the verb *nug-un* 'to extract, take out'. Due to this elision, the path from *ukirun > *fukirun > *fugirun > *fuirun* can be seen.

Third, nasality on vowels in Taketomi are derived from an original intervocalic nasal consonant. As we know that the proto-form of *sjũ:* 'heart' was *kimo, the Pre-Taketomi form should be *simu. The palatalization occurs due to the illegality of the sequence *iu* and the loss of the *i* causes compensatory lengthening in the subsequent nasal vowel.

Fourth, an alternate form for *sju:ri* (or *sju:ru* in Maeara (2011)) 'fog' is recorded in Maeara (2011) as *kiruri*[13]. It is notable that this form is the only one that exists in the oldest source, Hirayama (1967).

Finally, Taketomi merged *ï to *i. Thus, extrapolating from the Hateruma and Ishigaki forms, the *i and *ui reflexes should both be reconstructed with *ï and the reconstructed Pre-Taketomi forms should be as in 12.

[10]Hirayama 1967 records this word as *pasi*. My field notes show *basi-nta*, which accords with Maeara (2011) (with a suffix that means 'side') and *basi* is the expected form as the proto-form was *waki (*w > *b in Sakishima), so the speaker could have had a rule that devoiced initial *b (and maybe other voiceless consonants) before a Vs environment. *wata 'cotton' in Taketomi is *bata* so the rule could not have applied before all voiceless obstruents. More likely is that *pasi* is a typographical error, due to the similar shapes of *p* and *b*.

[11]The details are not yet worked out for the environment in which intervocalic voicing occurs.

[12]Sakishima languages appear to mostly show a form beginning with *n* (ex. Ishigaki *nubi*), but a few languages, such as Taketomi, Kuroshima, and Ōura (a Miyako language) have forms corresponding to *kubi.

[13]While this form is certainly derived from the PJR word *kuiri 'fog', it appears there is extra material that I am currently unable to explain, as none of the other Yaeyaman languages show such a long word for 'fog'.

Figure 12: WOJ *ki* syllables in Pre-Taketomi

WOJ ki_1		WOJ ki_2	
'dress'	*s**ï**nu	'tree'	***ki:**
'heart'	*s**ï**mu	'to get up'	*u**ki**run
'to hear'	*s**ï**kun	'moon'	*sï**kï**
'breath'	*i**sï**	'fog'	***kï**ruri
'promontory'	*sa**sï**	'stem'	*fu**kï**
'side'	*ba**sï**[14]	'time'	*sï**kï**pïnicï[15]

Now, the Taketomi reflexes correspond neatly to the Hateruma ones. Crucially, the bottom four words in the *ki* column, which are reflexes of PJR *kui did not merge with the words in the first column, which are reflexes of PJR *ki, supplementing the Hateruma evidence that PJR *kui and *ki did not merge in Proto-Sakishima.

In looking at the Hateruma and Taketomi reflexes of Pellard's proposed *koi-gane, we see further evidence for *oi, due to the lack of the *ku > *hu* change for the words for 'gold'.

Figure 13: *oi in Taketomi and Hateruma

Gloss	PJR	WOJ	Hateruma	Taketomi	Ishigaki
cloth	***ki**nu	**ki**$_1$nu	**sï**n	**si**nu	**kï**nu
yellow	***koi**	**ki**$_2$	**kï**-nkï:	**si**-iru-san	**kï**-nsa:n
gold	***ko**-gane	**ku**-gane	**ku**-gani[16]	**ku**-ngani	**ku**gani
moon	*tu**kui**	tu**ki**$_2$	sï**kï**n	hi**ki**	tsi**kï**
tree	***kəi**	**ki**$_2$	**ki:**	**ki:**	**ki:**

Notably, the Taketomi word for 'yellow' and for 'moon' have different reflexes in the relevant syllables and furthermore, the Taketomi and Hateruma forms for 'yellow' cannot be derived from the same proto-form, suggesting that *oi has undergone different developments in the two languages.

I now return to the form for 'fog' in Taketomi, which is recorded in Hirayama (1967) only as *kiruri*, in my fieldwork notes as *sju:ri*, and in Maeara (2011) as *sju:ru*. In Proto-Sakishima *r appears to have become *s when following *TV$_{[+hi]}$, where T stands for a voiceless obstruent, as can be seen in the correspondences in Figure 14. This change will henceforth be called "r-fricativization". Once again, WOJ will be the model for Japanese, Shuri Okinawan will be the model for Northern Ryukyuan, and the remaining languages will stand in for in the Sakishima subgroup:

[14] I am unsure whether Taketomi *ə* should be reflective of a different proto-phoneme or whether this was an internal development. Due to lack of evidence for the former hypothesis, I proceed with the null hypothesis that there are no implications for the proto-language.

[15] *ï* is not allowed after nasals in any Sakishima language.

[16] This form is actually from Shiraho, a close sister language to Hateruma. The Hateruma form should be the same.

[17] My fieldwork notes have the form *tsu-mi*. The *da:ri* form recorded in Hirayama (1967) is a copular form used with adjectives, formed from the focus particle *=du* and the copula *a-*. *ts'u-mi* appears to be a dialectial variant. My consultant uses *ts'u-mi* with the existential verb *bu-*.

Figure 14: The Southern Ryukyuan Innovation of r-fricativization

Subgroup	Language	'to cut'	'to wear'	'white'
Japanese	WOJ	**ki**$_1$**r**-u	**ki**$_1$**r**u	**si**ro$_1$si
Okinawan	Shuri	**ci**-in	**ci**in	**si**ru-san
Miyako	Ōura	**kïs**-ï	**kïs**-ï	**ss**u-kan
Yaeyama	Ishigaki	**kïs**-ïn	**kïs**-ïn	**sïs**u-sa:n
	Taketomi	**ssj**-un	**ssj**-un	**ssj**u-san
	Hateruma	**ss**-un	**ss**-un	**ss**o-han
Yonaguni	Yonaguni	**ts'**-un	**ts'**-un	**ts**'u-da:ri[17]

Figure 14 demonstrates that all Southern Ryukyuan languages share this innovation. Furthermore, both Taketomi and Hateruma have syncopated *ï in between two instances of *s*, leaving a geminate that is palatalized in Taketomi but not in Hateruma. In Yonaguni, *s fortified to *c'*[18]. With regard to this change, we find a particular irregularity in the word for 'fog', whose forms are shown in Figure 15.

Figure 15: 'fog' in various JR languages

Subgroup	Language	'fog'
Japanese	WOJ	**ki**$_2$**r**i
Okinawan	Shuri	**cir**i
Miyako	Ōura	**kïs**ï
Yaeyama	Ishigaki	**kïr**u
	Taketomi	**kir**uri
	Hateruma	**kïs**ï
Yonaguni	Yonaguni	**c'ir**i

Except for in Ōura and Hateruma, the innovation of r-fricativization has failed to take place. Furthermore, while Hateruma *does* show *s*, it is notable that *kïs has *not* syncopated and geminated to *ss* as in the words in Figure 14. The reason becomes clear if we look to the original PJR reconstruction of 'fog' versus that of 'to cut' and 'to wear.' As discussed above, the word for 'fog' is reconstructed as *kuiri. If *ui and *i had merged by the time of Proto-Ryukyuan, the first three segments of 'to cut,' 'to wear,' and 'fog,' all of which begin with *k(u)ir- should have yielded the same outcome. It appears then that Hateruma and Ōura re-applied the rule of r-fricativization independently after the breakup of the subfamilies.

Crucially, because r-fricativization occurred across Sakishima only to reflexes of *ki and *not* to *kui, the diphthongs could not have merged at the time of Proto-Ryukyuan. Thus, we see that Taketomi and Hateruma are *not* the only Sakishima languages that demonstrate the lack of the *ui > *i merger proposed for Proto-Ryukyuan. Combining all the sound changes discussed, we may hypothesize that the changes occurred in the order in Figure 16. I use the term "Outer Yaeyaman" not to suggest a genetic grouping, but to point out sound changes that occurred in Taketomi and Hateruma and potentially as well in Yonaguni (although the same change in Yonaguni can be brought about by syncopating high vowels

[18] *c'* is an allophone of *ts'* that appears before *i*

between voiceless obstruents and subsequently assimilating the first consonant to the second and fortifying it, a process that is known to have occurred in Yonaguni).

Figure 16: Relevant sound changes in Sakishima

PJR	Proto-Sakishima		Outer Yaeyaman			
	*i > ï	*Tir > *Tis	Fricativization	*ks > s	*ui > *i	Vowel Raising
*kir-	*kïs-	*kïs-	*ksïs-	*sïs-		
*kuir(ur)i	*kuïr(ur)ï				*kïr(ur)ï	
*uke-						*uki-
*siru-	*sïsu-	*sïsu-				

	Taketomi					
	h-prothesis	Voicing	D Syncope	*ï > i	Palatalization	SiS Syncope
*sïs-				*sis-	*sisj-	ssj-
*kï(ru)rï				*kiruri		
*uki-	*huki-	*hugi-	hui-			
*sïsu-				*sisu-	*sisju-	ssju-

	Hateruma		
	Voicing	*Tïr > Tïs	SïS Syncope
*sïs-			ss-
*kï(ru)rï		kïsï	
*uki-	ugi-		
*sïsu-			ssu-

	Yonaguni				
	Voicing	SïS Syncope	*ï > i	Palatalization	Fortition
*sïs-		ss-			ts'-
*kï(ru)rï			kiri	ciri	c'iri
*uki-	ugi-				
*sïsu-		ssu-			ts'u-

*ui > *i must have happened *after* the split of Proto-Sakishima for had it occurred before, it would have bled the environment that fricativizes *ki but not *kui to *sï in "Outer Yaeyaman". Vowel raising must also have occured after the split, as it would have fed both the centralization and r-fricativization environments and *ukerun 'to get up' would end up as *ukïsun*. Moreover, raising also must occur after the *ui to *i merger; otherwise, we would expect PJR *kowe 'voice' to have become *kuwi > *kui > *ki*. However, 'voice' is consistently *kui* across the Ryukyuan languages. While it is unparsimonious to posit both monophthongization *and* vowel raising independently in the languages, they can both be considered areal features. First, there is a considerable dearth of diphthongs in Ryukyuan languages. Specifically in Sakishima, *ai*, *au*, and *aï* appear to be the only diphthongs allowed in Miyako, while only the former two are allowed in Yaeyama (and many have simplified *ai and *au to *e:* and *o:*, respectively, leaving no diphthongs), and only *ai* is allowed in

Yonaguni. Considering this paucity, it is not unfathomable that *ui could have merged with *i independently among the languages due to pressures to monophthongize. As the Ryukyuan islands were in relatively close contact with one another, vowel raising is also a feature that could have spread. The main empirical piece of evidence that points to monophthongization and vowel raising occuring late is the different reflexes of *kIr (where I can stand for *i, *ui, or *oi) environments in Sakishima languages.

4.3 Support for a Coronal Distinction?

As mentioned in § 3, i_1 and i_2 were only differentiated following labial and velar stops, providing little evidence for diphthongs following coronal stops from Old Japanese alone.[19] However, Sakishima languages may provide further hints for such diphthongs. Three words that correspond to WOJ words beginning in *ti* are provided below, using forms that are recorded in Hirayama (1967).

Figure 17: WOJ *ti-* words in Yaeyaman

Gloss	WOJ	Hateruma	Taketomi	Ishigaki
nipple	**ti**	**tsï**	**ci:**	**tsï:**
near	**ti**ka-	**sï**ka-	**ci**ka-	**tsï**ka-
power	**ti**kara	**sï**kara	**si**kara	**tsï**kara

If we consider that *ï > *i* in Taketomi (and subsequently led to palatalization of *ts > *c*), the comparison to the different reflexes of WOJ ki_1 and ki_2 becomes noticeably parallel. Following the same pattern as the *k(V)i examples, we might reconstruct these words with *ti, *toi, and *tui.

Figure 18: Comparing reflexes of WOJ *ki* and WOJ *ti*

PJR	Hateruma	Taketomi	Ishigaki
*ki	sï	si	kï
*koi	kï		
*kui		ki	

PJR	Hateruma	Taketomi	Ishigaki
*ti?	tsï	ci	tsï
*toi?	sï		
*tui?		si	

Later sources on Taketomi, including Nakamatsu (1987), Maeara (2011), and my own field notes record 'power' not as *sikara* but as *hikara*, 'near' not as *cika-* but as *ikka-*, and 'nipple' not as *cï:* but as *sï*. The first example can be explained as being at the tail end of the change outlined in § 4.2 of *sik > *hik*. The second example is more difficult to account for. *cika-* may be derived by regular sound change in Taketomi as outlined in the previous paragraph, though it may also be borrowed from Japanese, due to the perfect phonological match. As *ikka-* co-exists in the language, these two words may be an example of a doublet of a borrowing from a prestige language alongside a native word. How the first consonant is lost

[19] One hint, however, was apophonic vowel alternations in intransitive/transitive verb pairs, such as *otiru* 'to fall' ∼ *otosu* 'to drop'.

and where the gemination comes from remains puzzling. The third example will be discussed in more detail below. However, even with the revised correspondence, the Taketomi data still points to three different reflexes.

Figure 19: Revised Taketomi Correspondences

PJR	Hateruma	Taketomi	Ishigaki
*ti?	tsï	si	tsï
*toi?	sï	i	
*tui?		hi	

Unfortunately, these words may simply be irregularities that must be explained by another means as I have not yet been able to find other examples of WOJ *ti* corresponding with Taketomi *i* or *si/hi*. However, there are examples of WOJ *ti* also corresponding with both Taketomi and Hateruma/Shiraho *(d)zï*. In Figure 20, the left variants of 'nipple' in Hateruma and Taketomi are recorded by Hirayama (1967) while the right ones are recorded by Nakamatsu (1987) and Maeara (2011), respectively, and accord with my fieldwork notes. The Shiraho tokens are from my fieldwork notes.

Figure 20: Voiced Correspondences of *ti*

Gloss	WOJ	Hateruma	Shiraho	Taketomi	Ishigaki
blood	ti	dzï	zi[20]	si	tsḯ
nipple	ti[21]	tsḯ/dzḯ	sí/zí-ci	cí/sí	tsï

The atonic words show the voiced *(d)z* consonant in Hateruma/Shiraho whereas the tonic words appear to have variations. The voicing that occurs in 'blood' may be explained by the atonic root's having been perceived as a low tone, whereas 'nipple', which is tonic, was perceived as a high tone. This association would have triggered tonogenesis (see Haudricort 1954), a process which is hypothesized to be the source of the different tone classes of Hateruma (see Shinji and Aso 2012). Why the word for 'nipple' has become voiced more recently is a little unclear, but there may be analogy with the word for 'blood', due to the almost identical phonological shape apart from the tone and due to heavy bilingualism with Japanese, in which the two are still homophones apart from the tone ('blood' is *ci* whereas 'nipple' is *ci*). Unfortunately, this hypothesis is rather tenuous. Nevertheless, the development of the voicing in 'blood' via tonogenesis appears to be fairly certain.

Why 'blood' in Taketomi begins with *s* is less clear, but it is possible that the pitch accent plays a role. The lack of an accent on the word may have led to lenition from an affricate to a fricative. Another example of initial *s* corresponding to *ts* in Ishigaki and *t* in WOJ is *sja* 'tea', which also happens to be unaccented. However, whether lenition in atonic words beginning with the affricate *c* is a productive rule is unclear. Once again, similarly to Hateruma and Shiraho, it is possible that the more modern token for 'nipple' *sí* is also derived from analogy with 'blood'.

[20]Shiraho is on the way to merging *ï* to *i*, as Taketomi has already done.

[21]Accent was not marked in Old Japanese. However, modern standard Japanese has 'blood' as a tonic word and 'nipple' as an atonic word, corresponding with the Yaeyama distribution.

Another coronal distinction that is possibly revealed by Sakishima languages is the environment following PJR *s. Just like *t*, *s* is also a coronal consonant and so there was no *koo/otsu* distinction for a following *i* in Old Japanese. If we look at Sakishima words that correspond to words beginning with *sir* in WOJ, we see two different correspondences, as laid out in Figure 21.

Figure 21: WOJ *sir* syllables in Ryukyuan

Subgroup	Language	'white'	'louse'	'soup, sap'	'sign, omen'
Japanese	WOJ	**si**ro$_1$-si	**si**rami	**si**ru	**si**rusi
Okinawan	Shuri	**si**ru-san	**si**ran	**si**ru	**si**rusi
Miyako	Gusukube	**ss**u:-ssu	**sï**sam	**sï**ru	**sï**rusï
Yaeyama	Ishigaki	**sïs**u-sa:n	**sï**san	**su**ru	**si**rusï
	Taketomi	**ssj**u-san	**ssj**an	**si**ru	**si**rusi
	Hateruma	**ss**o-han	**s**an[22]	**s**u:[23]	**sï**rusï
Yonaguni	Yonaguni	**ts'u**-da:ri	**ts'**an	**c'i**ru	**c'i**ruc'i

The latter two words, like 'fog', have *not* undergone r-fricativization unlike the first two. By the same logic, then, we might posit that the second two words began with *sui rather than *si, just as 'fog' was known to begin with *kui instead of *ki.

We can also observe the behavior of Sakishima *pIr (where I stands for *i, *ui, or *oi) sequences. The corresponding forms are presented in Figure 22.

Figure 22: *pIr sequences in various JR languages

Subgroup	Language	'wide'	'afternoon'	'flat'	'to pick up'	'to dry'
Japanese	WOJ	**pi$_1$r**o$_2$-si	**pi$_1$r**u	**pi$_1$r**ata-	(ModJ: **hi**ro-u)	**pi$_2$r**u
Okinawan	Shuri	**hir**u-san	**hir**u-ma	**hir**a-san	-	**hi**-in
Miyako	Hirara	**pïs**u:-pïsu	**pis**u-ma	-	-	-
Yaeyama	Ishigaki	**pïr**u-saan	**pïr**o:-ma	**pïs**a-sa:n	**pïs**a-un/**pï**so:-n	**pïs**-un
	Taketomi	**hir**u-san	**pir**õ:	**pisj**a-san	**ssj**-un	**ssj**-un
	Shiraho	**pis**o-han	**pir**o:-ma	**pis**a-han	**pis**-un	-[24]
Yonaguni	Yonaguni	**c'**-an	**ts'**u-ma	**ts'**a-nda	-	-

Unfortunately, there does not quite seem to be systematicity in the patterning of where we see r-fricativization and where we do not. We would expect *poi to avoid r-fricativization by the same pattern as *kui and our proposed *sui syllables, but it seems that the *opposite* of what we expect occurs; namely, that there are actually some *pi syllables that avoid r-fricativization. Furthermore, why 'wide' undergoes r-fricativization in Shiraho, but 'afternoon' does not is also unclear. There may be interactions with accent, but due to the work on Ryukyuan accent still being young, I leave this question to further research.

[22]The Shiraho word is *ssan*, so the Hateruma word should also be the same. It is possible that the recorder did not hear the gemination.

[23]I cannot explain why the *r has dropped out, but the crucial fact is that the initial *s* is not geminated. More internal reconstruction on Hateruma/Shiraho must be carried out to solve this question.

[24]The word for drought, *pe:ri*, is likely related to the expected cognate.

Before concluding, I draw the reader's attention to the Taketomi words for 'to pick up' and 'to dry', both *ssj-un*. These forms are exactly identical to the words for 'to cut' and 'to wear' and very similar to 'white' (*ssju-san*). It should also be mentioned that Maeara (2011) cites *ssju-san* as also meaning 'wide'. It seems then that there was a process by which Taketomi turned Proto-Sakishima *TIrV$_{[+back]}$ sequences into *ssju-*. The modern form of 'fog', *sju:ri* then falls into this sound change as well, although it is unclear why the *s* is ungeminated.

Figure 23: Fricativization in Taketomi

	'to cut'	'to wear'	'fog'	'white'	'to pick up'	'wide'	'to dry'
PJR	*kir-	*kir-	*kuiri	*siro	*pirap-	*piro	*poi-
Taketomi (1967)	ssj-un	ssj-un	kiruri	ssju-san	?	hiru-san	?
Taketomi (2011)	ssj-un	ssj-un	sju:ri/u	ssju-san	ssj-un	ssju-san	ssju-n

The fricativization process here tells us that *kui and *p(u)i were both initially resistant to fricativization. We are unfortunately missing the 1967 data points for 'to pick up' and 'to dry', but we may surmise based off 'wide' that they are *hira-un (or *hiro-on if crasis already occurred) and *pir-un (or *pis-un if there was already r-fricativization as in the word for 'flat'). Still, there is no explanation for why 'afternoon' has resisted fricativization. I leave this as a puzzle to be resolved with future reconstruction work.

5 Conclusion

The data presented here provides supporting evidence for Pellard's proposed *oi diphthong and also adds evidence to Pappalardo's claim that the merger of *ui and *i could not have happened at the time of Proto-Ryukyuan. The data from Taketomi matches that of the Hateruma data presented by Pappalardo once sound changes are undone, suggesting that the two languages underwent parallel development and could suggest a possible genetic relationship. At the very least, the two languages appear to share similar innovations with each other and even with Yonaguni, a language that forms a clade with Yaeyaman. The implications are at the very least heavy contact at some point between the varieties.

Due to shared innovations in both Proto-Sakishima and Proto-Yaeyaman (see Pellard 2015 for details), it would be implausible to suggest that Taketomi and Hateruma branched off from Proto-Ryukyuan early before *ui and *i merged. Furthermore, I have demonstrated as well that sequences corresponding to Old Japanese *Ti$_{(2)}$r* show different reflexes in Sakishima, which had a rule of r-fricativization to *s*, revealing that most, if not all, Sakishima languages provide vestiges of a lack of merger between *ui and *i even as late as the separation of the Sakishima subfamilies into separate languages. I suggest, then, that the monophthongization of *ui to *i* is the result not of an innovation by Proto-Ryukyuan or even by Proto-Sakishima, but rather of a conspiracy in Ryukyuan languages to rid of diphthongs, as suggested by the poor diphthong inventories (ranging between 0 and 3) of most, if not all, Sakishima (and potentially Ryukyuan) languages.

The lack of merger is particularly revealing in potential implications for the reconstruction of Proto-Japono-Ryukyuan, particularly of words for which the Old Japanese forms do not

provide information as to whether they should be reconstructed with a diphthong or not. Namely, because i_1 and i_2 were undifferentiated following coronal consonants by the time of Old Japanese, Sakishima languages provide clues for *tVV and *sVV (where VV stands for a diphthong) via the failure of r-fricativization to apply. It is, of course, not implausible that there may be an interaction with accent that determines whether r-fricativization takes place. However, as Ryukyuan accentual reconstruction remains in a relatively nascent state (see Matsumori 2008 and Shimabukuro 2007 for the current work), I leave the investigation of the interaction with accent to future work.

Further work must be carried out to find more examples of phonological processes failing to take place and to discover the implications for Proto-Japono-Ryukyuan. As Old Japanese lost the distinction between i_1 and i_2 following coronal consonants, it is particularly difficult to reconstruct diphthongs for nouns in which WOJ *Ci* (where C is a coronal consonant) was either not the initial syllable (and so could not trigger apophony) or did not form compounds. Future attempts should be made to search for potential evidence of correspondences to o_1 and o_2 after labial consonants as they were not differentiated in these environments in Old Japanese.

Ryukyuan languages provide a wealth of data preserving features that have been lost in Japanese and I have shown that Sakishima provides evidence of these features, which happen to have also been lost in Northern Ryukyuan. In the process of internal reconstruction of the individual languages, many of which remain to be described in sufficient detail, more light will be shed on the puzzles of Ryukyuan subgrouping and reconstruction of the proto-languages.

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Pluractionality and the stative vs. eventive contrast in Ranmo

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1 Introduction

The goal of this paper is two-fold: (i) to provide an in-depth look at the phenomenon of root alternation in Ranmo, which will be shown to be an instance of verbal plurality driven by properties of aspect and (ii) to use the morphology of root alternation of as a probe into the syntax of eventive and stative predicates in Ranmo.

In particular, I argue that alternating roots indicate the presence of [-b(ounded)] and [+b(ounded)] features on a low aspectual head that is sandwiched between VP and vP. It is essentially an instance of Travis (2010)'s Inner Aspect. Stative predicates, in contrast to eventive predicates, are characterized by the absence of this aspectual head.

Root alternation will remind the reader of what has been referred to as "pluractionality" or "verbal number" in the literature—the phenomenon in which verbs are morphologically marked for plurality, where "plurality" covers a range of meanings, whether in connection to multiple participants, times or locations.

Crosslinguistically, pluractional verbs are often formed via derivational processes such as reduplication, as in Niuean and Chechen (1)-(2), and vowel alternation, as in Chechen (3). Note that these verbs may signal the plurality of participants (2) or of events ((1), (3)).

(1) NIUEAN (Haji-Abdolhosseini et al. 2002:483)

a. Ne **noko** e ia e gutuhala.
PAST **knock** ERG 3SG ABS door
'She knocked on the door (probably once but not necessarily).'

b. Ne **nokonoko** e ia e gutuhala.
PAST **knock.REDUP** ERG 3SG ABS door
'She knocked on the door (many times).'

(2) HAUSA (Součková and Buba 2008:94)

a. Mùtumìn yaa **fitoo**.
man.the 3M.SG.PF **come.out**
'Audu came out.'

b. Mutàanênsun sun **fĩ̀-fitoo**.
people.the 3PL.PF **RED-come.out**

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[†]Abbreviations used: ABL = Ablative, APPL = Applicative, DEG = Degree, DI = Derived Intransitive, EXT = Extended, M = Middle, NON.FUT = Non-future, nsg = Non-singular, IPFV.RPST = Imperfective Recent Past, RST = Restricted, sgm/f = Singular masculine/feminine.

'The people have come out.'

(3) CHECHEN (Yu 2003:294)

a. as q'iigashna twop-**qwessira**.
1SG crow.PL.DAT gun-**throw.WP**
'I shot crows.'

b. as q'iigashna twop-**qissira**.
1SG crow.PL.DAT gun-**throw.PLR.WP**
'I shot crows many times.'

According to Newman (1990), "the essential semantic characterization of [pluractional] verbs is almost always plurality or multiplicity of the verb's actions" (p. 53). In other words, there is crosslinguistic variation as to whether so-called pluractional verbs signal a *large* number of events/participants or any plural number of events/participants (including just two or three). This issue does not bear directly on the topic of this paper, but I do return to it again briefly in section 5, as it helps to clarify what we mean by "pluractional" (also see Lee to appear a).

In any case, pluractional verbs (whether denoting plural events or more specifically, a large number of events) must be distinguished from verbs that are marked for plural *agreement*. Pluractional morphology is often derivational in nature, while agreement is inflectional. Moreover, pluractional verbs show an absolutive pattern, occurring only with transitive objects and intransitive subjects. This is the case irrespective of the agreement alignment of the language, ergative or accusative. For example, Huichol (Uto-Aztecan) has an accusative system of person/number agreement, which nevertheless interacts with an absolutive pattern of root suppletion, as shown in (4).

(4) HUICHOL (Comrie 1982)

a. ne-**nua**
1sgS-**arrive:sg**
'I arrived.'

b. tɨiri yɨ huuta-tɨ me-**niu?azɨani**
children two-SUBJ 3nonsgS-**arrive:nonsg**
'Two children have arrived.'

c. Wan Maria maa-tɨ me-neci-**mieni**
Juan Maria and-SUBJ 3nonsgS-1sgO-**kill:sg**
'Juan and Maria are killing me.'

d. nee Wan Maria maa-me ne-wa-**qiini**
I Juan Maria and-OBJ 1sgS-3nonsgO-**kill:nonsg**
'I am killing Juan and Maria.'

The independence of verbal plurality and number agreement is especially clear in languages like Ranmo, in which plural agreement inflection is present *alongside* root forms denoting plural events, as shown in (5).

(5) RANMO[1]

[1]The Greek symbols in the glosses (α, β, γ) refer to distinct object agreement series in Ranmo, showing allomorphy for "low" TAM features. See section 2.2.

a. Fi **s**-a-**lèfèr**. (>salfèr)
3ABS **3sgmO.γ**-APPL-**jump.RST**
'He jumped.'

b. Fi **th**-f-a-**lèfèn**. (>thwalfèn)
3ABS **3nsgO.β**-NON.FUT-APPL-APPL-**jump.EXT**
'They(3+) jumped.'

The paper is structured as follows. Section 2 discusses some basic properties of Ranmo morphosyntax. Section 3 presents the phenomenon of root alternation and what it reveals about the the nature of eventive vs. stative predicates in Ranmo. Section 4 provides an analysis of the eventive/stative contrast. Section 5 discusses one prediction made by the analysis with regard to the distribution of the degree suffix *-an*, which contributes a large quantity interpretation. Finally, section 6 concludes.

2 Ranmo basics

Ranmo is a Papuan (i.e., non-Austronesian) language belonging to the Tonda subgroup of the Morehead-Upper Maro family[2], which consists of about seventeen languages spoken throughout a region known as the Trans Fly in Western Province, Papua New Guinea.

It is an endangered and undocumented language, spoken by fewer than 300 people in two villages, Yenthoroto and Menggeti. The vast majority of Ranmo speakers reside in Yenthoroto. All the data presented in this paper are from my fieldwork conducted in this village.

Ranmo is an agglutinative, pro-drop, morphologically ergative flexible SOV language with productive morphological voice/valency alternation between transitive verbs and so-called middle intransitive verbs. Some of its major typological features, which are shared by other languages in the Morehead-Maro family, are as follows. I discuss each in turn below.

(6) SOME MAJOR TYPOLOGICAL FEATURES OF RANMO
   a. An (apparent) split-intransitive ("split-S") system of verbal agreement paralleling the active/middle voice contrast (§**2.1**)
   b. Multiple encoding of TAM distinctions in the verbal complex (§**2.2**)
   c. A phonologically and semantically complex system of root alternation (§**3**) (the focus of this paper)

2.1 "Split-S" agreement

The Ranmo verb consists of (i) the verb stem (which contains the root, plus any directional and/or valency/voice-related morphology such as the applicative (APPL) and the derived intransitive (DI) marker), (ii) TAM-related material (for which there are two slots, one on either side of the stem), and most peripherally, (iii) agreement affixes.

The transitive verb is inflected for agreement with both the subject and object. The ergative-marked subject (the external argument) is cross-referenced as a suffix and the absolutive case-marked internal argument is cross-referenced by a prefix, as exemplified in (7).

[2]More recently, an alternative name has been suggested by Evans and colleagues: the "Yam" family. See Evans (2012).

Inflectional prefixes		Stem			Suffixes	
Object agreement	TAM	Valency	(Directional)	Root	TAM	Subject agreement

Table 1: Ranmo verbal template

(7) TRANSITIVE

Kèn ndótar **s**-rèfunt-**∅**. (>sèrfunt)
1sg.ERG door **3sgmO.γ**-open.RST-**sgS**

'I opened the door.'

Intransitive verbs are divided into two classes on the basis of their agreement morphology. They show either "subject" agreement or "object" agreement, depending on whether they are inherent intransitives or derived from transitive verbs.

Verbs belonging to the *unaccusative* class are inherent intransitives (failing to undergo transitivity alternation) and pattern with the objects of transitive verbs in showing an absolutive alignment of agreement (hence "object" agreement) and case marking, as shown in (8a).

On the other hand, intransitive verbs belonging to the so-called *middle* class pattern with the subjects of transitive verbs in showing what appears to be a nominative alignment of agreement, as in (8b). In addition, they take a "middle" marker which always co-occurs with a "derived intransitive" marker. This sequence of morphemes indicates the status of middle verbs as being derived from their transitive counterparts via valency reduction, specifically, antipassivization. Compare (8b) with (7).

In this way, Ranmo is, descriptively, a "split-S" language[3].

(8) a. UNACCUSATIVE

Fi **s**-lor.
3ABS **3sgmO.γ**-arrive.RST
'He arrived.'

b. MIDDLE

Ndótar t-a-rfunt-**∅**.
door M.γ-DI-open.RST-**sgS**
'A/the door opened.'

[3]But see Lee (to appear b) for an analysis: It is in fact not accurate to characterize this division in agreement as reflecting a split-S system. First, the split is not conditioned by either aspect or person (some of the major factors conditioning split ergativity crosslinguistically; see Dixon 1979, 1994). Rather, the morphological split underlies a *structural* distinction between unaccusative predicates whose sole argument is an underlying direct object and those predicates which are *derivationally* transitive (i.e., in all respects transitive) but express unergative semantics. Under this analysis, middle verbs do not show a "nominative" alignment of agreement as such, but rather a full ergative-absolutive alignment *with default/failed object agreement*, which gets morphologically instantiated as the middle marker.

2.2 Multiple encoding of TAM

Another notable feature of Ranmo is that it makes TAM distinctions in multiple morphological slots in the verbal complex. Consider the examples below.

(9) a. Ngaf y-a-lilar-**ndar**.
father 3sgmO.α-APPL-die.EXT-**IPFV.RPST**
'Father was dying (recently).'

b. Yekal th-**f**-a-lirar. (>thwalirar)
man 3nsgO.β-**NON.FUT**-APPL-die.EXT
'The men died (recently).'

c. Fi nèmaiuè s-**f**-a-lèfèn-**ente**. (>swalfènente)
3ABS always 3sgmO.β-**NON.FUT**-APPL-jump.EXT-**IRR**
'He kept jumping (long ago).'

In (9a), the imperfective recent past is indicated by a suffix (*-ndar*), while in (9b), a prefix (*f-*) is used to give rise to the perfective recent past interpretation. It is also possible to have both slots filled in a given clause: in (9c), for example, the non-future prefix can co-occur with the irrealis mood marker *-ente* to create other TAM values such as distant past. Since one is a prefix and the other a suffix, they are on opposite sides of the stem, as the verbal template in Table 1 shows.

Moreover, object agreement[4] shows allomorphy for the features of *prefixal* TAM markers. That is, the particular phonological exponent chosen to realize the object agreement morpheme is determined (in part) by these features. The co-variance is indicated by the Greek symbols α, β, and γ, and the conditioning environment associated with each object agreement series is represented in the rules of allomorphy shown in (10).

(10) CONTEXTUAL ALLOMORPHY OF OBJECT AGREEMENT

a. v ↔ β-series / ___ [unbounded, non-future]

b. v ↔ γ-series/ ___ [bounded, perfective past]

c. v ↔ α-series elsewhere

Table 2 contains the phonological exponents of each object agreement series in Ranmo.

Subject agreement affixes, on the other hand, are invariant across TAM, as in Table 3.

[4]By "object" agreement, I mean agreement shown by both the objects of transitive verbs and the subjects of unaccusative verbs.

	α	β	γ
1SG	w-	b-	tw-
1NSG	n-	ngg-	ntèn-
2SG	n-	ngg-	ntèn-
2NSG	th-	th-	th-
3SG.MASC	y-	s-	s-
3SG.FEM	ng-	k-	tè-
3NSG	th-	th-	th-

Table 2: Object agreement prefix series

1/2/3SG	-∅
1NSG	-e
2/3NSG	-ai

Table 3: Subject agreement suffix series

3 Root alternation in Ranmo

In this section, I discuss the phonological and semantic properties of root alternation in Ranmo. The crucial take-home message of this section is that extended roots in Ranmo show properties which characterize pluractional verbs crosslinguistically[5].

3.1 Phonology of root alternation

Table 4 shows a representative sample of Ranmo verbs which undergo (or do not undergo) alternation between what I will call, following Döhler (in prep), '**extended**' ($\sqrt{\text{EXT}}$) and '**restricted**' ($\sqrt{\text{RST}}$) roots[6]. In the table, the verbs are grouped according to the informal **phonological rule**[7] relating the two variants of each pair. I will refer to each row (subject to the same phonological rule) as a 'root class.'

The assignment of a given verb into one of the root classes seems to be mostly idiosyncratic. That is, neither the phonological nor semantic properties of a verb can be used to predict which root class it will belong to (i.e., which rule of alternation it will be subject to).

[5]However, see Lee (to appear a) for a discussion of important ways in which the behavior of Ranmo extended roots diverges from that of so-called pluractional verbs found crosslinguistically. In particular, Ranmo extended roots, unlike most pluractionals in other languages, are not built on the basis of their restricted counterparts and are compatible with numeric modifiers like *six times*. These generalizations lead me to propose that extended roots merely encode an *aspectual* property, namely, unboundedness, and what has been described as instances of "pluractionality" additionally require a *degree* component which contributes the meaning "a lot".

[6]These terms are purely descriptive and do not relate to any theoretical concepts. Their distribution will be described below. The extended vs. restricted contrast is also evident in Kómnzo, another language belonging to the Morehead-Upper Maro family (Döhler in prep).

[7]These rules do not reflect any deep derivational processes in the phonology; they are just descriptive statements capturing the formal relationships we see on the surface.

Rule	Infinitive form	Translation	$\sqrt{\text{EXT}}$	$\sqrt{\text{RST}}$
$\sqrt{\text{EXT ONLY}}$	fiyakanse/yèfiyankanse	push/crawl	fiyakan	-
	mayukse	wash/bathe	mayuk	-
	mirase	swim	mirar	-
	yibarkase	dance	yibrek	-
$\sqrt{\text{RST+ar}}$	fitase	clean/wash	**fitar**	**fit**
	kolase	agree with	kolar	kol
	lorase	arrive	lorar	lor
	metrase	graduate	metrar	metar
$\sqrt{\text{EXT+t}}$	mbèrse	play/laugh	mbèr	mbrèt
	nangguser?	catch/fork	nanngu	nanngut
	nggarse	break	nggar	nggarat
	yilèngguse	lose/disappear	yilènggu	yilènggut
$\sqrt{\text{EXT+S}}$	–	turn into/tell	ba	bar
	bise	bark	**bi**	**bint**
	lèrse	tear	lèr	lèrant
	mituase	seesaw	mitua	mituel
k-m	fakalkase	be/put on top	**faklèk**	**faklèm**
	manggalkase	feed	mangglèk	mangglèm
	rikèlkase	hide	riklèk	rikèm
	yibalkase	steal and hide	yiblak	yiblam
SUPPLETE	luarse	go inside	luar	lèmb
	yikanse	carry/bring	yikan	yiramb
	rinse	give	**lèn**	**fèk**
	rurse	shine on/shoot	rur	mèngg

Table 4: The formal relationship between extended and restricted roots

Furthermore, note that with the exception of the roots in the √EXT ONLY and SUPPLETE root classes (the top and bottom rows of Table 4), √EXT and √RST differ in shape only at the right edge of the roots. The two forms share a common base, as in ***fit**ar* vs. ***fit*** and ***fakl**èk* vs. ***fakl**èm*. In summary, root classes may be defined on the basis of the interaction between the following two parameters:

(11) PARAMETERS FOR THE CLASSIFICATION OF RANMO ROOTS

a. Does the verb alternate? (alternating or non-alternating)

b. If alternating, what is the nature of alternation? (augmentation, truncation, mutation, or suppletion)

The parameter in (11a) concerns whether the verb alternates at all. As shown in Table 4, verbs in all but the √EXT ONLY root classes alternate between extended and restricted forms. If the verb is non-alternating, the extended form is used, suggesting that the extended rather than the restricted form is "default" in some sense[8]. It also raises the question what properties set apart those verbs which only appear in the extended form from those that can appear in both forms. This will be taken up in section 4.2.

The second parameter (11b) is used to further categorize the class of alternating verbs into subtypes according to their phonological shape. Four subtypes are distinguished by this parameter. First, √EXT may be an **augmented** version of √RST, as in *fitar* vs. *fit* (belonging to the √RST+ar root class). Second, √EXT may also a **truncated** version of √RST as in *bi* vs. *bint* (belonging to the √EXT+Sonorant root class). Third, the two forms may be identical in syllable structure, but differ by the choice of final consonant, i.e., they may represent a case of **mutation**), as in *faklèk* vs. *faklèm*. Finally, the relationship can also be **suppletive**, as in *fèk* vs. *lèn*).

The classification of Ranmo verbs according to whether/how they alternate is schematized in (12).

[8]Strictly speaking, this is only *virtually* true. That is, there *is* at least one verb—*leave*—for which only the restricted form is available. The restricted form is compatible with either a singular or dual participant reading, as in (1a-b). In order to express the plural meaning ('they(3+) left'), a different verb (lexical item) must be used altogether, as in (1d). There is no extended counterpart of *laf* 'leave.RST' in the lexicon of Ranmo (1c).

(1) a. Fi t-a-**laf**-∅.
3ABS M.γ-DI-**leave.RST**-sgS
'S/he went/left.'

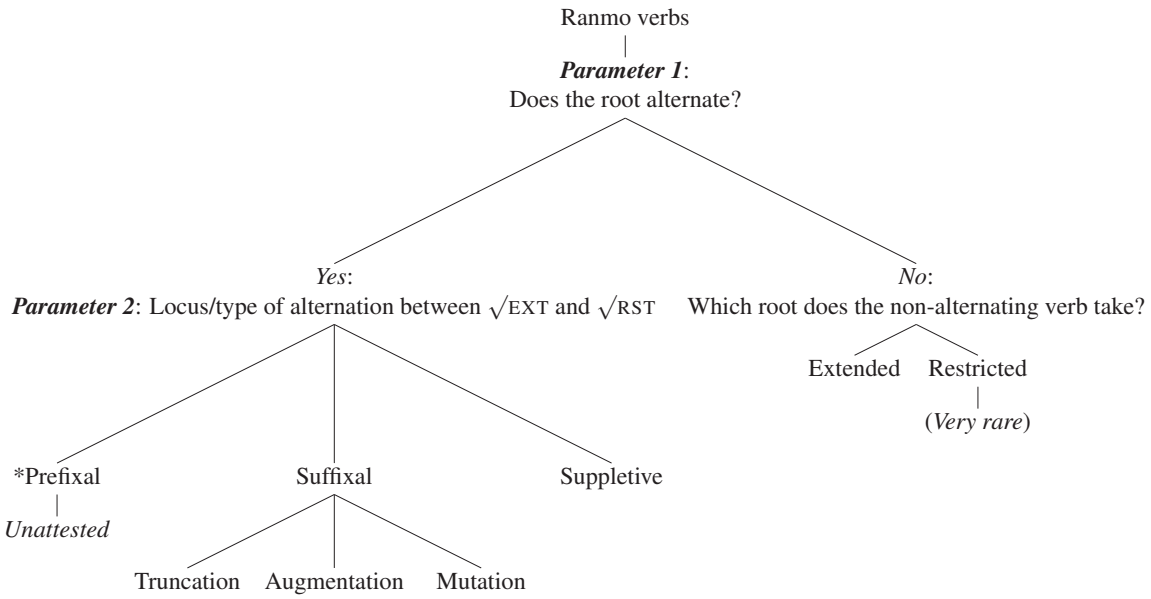
b. Fi t-a-**laf**-ai.
3ABS M.γ-DI-**leave.RST**-2/3nsgS
'They(2) went/left.'

c. *Fi k-f-a-**(??)**-ai.
3ABS M.β-NON.FUT-DI-**leave.EXT**-2/3/nsgS
'They(3+) went/left.'

d. Fi th-f-**ia**.
3ABS 2/3nsgO.β-NON.FUT-go
'They went/left.'

√RST-only verbs in Ranmo are probably rare for the same reasons that *singularia tantum*—lexical items that are mostly or exclusively used in the singular form, e.g., *third estate*—are rare. I do not discuss √RST-only cases in this paper, but I do want to mention that they are in principle possible and are in fact attested.

(12)



3.2 Semantics of root alternation

In this section, I address the semantics and distribution of extended and restricted roots in Ranmo.

Consider first (13a-c). Argument number is determined by the interaction between **(i)** the type of root and **(ii)** agreement inflection.

(13) a. Fi s-a-**lèfèr**. (>salfèr)
3ABS 3sgmO.γ-APPL-**jump.RST**
'He jumped.'

b. Fi th-a-**lèfèr**. (>thalfèr)
3ABS 3nsg.γ-APPL-**jump.RST**
'They(2) jumped.'

c. Fi th-f-a-**lèfèn**. (>thwalfèn)
3ABS 3nsgO.β-NON.FUT-APPL-**jump.EXT**
'They(3+) jumped.'

d. Fi s-f-a-**lèfèn**. (>swalfèn)
3ABS 3sgmO.β-NON.FUT-APPL-**jump.EXT**
'He jumped repeatedly.'

The **restricted** root is compatible with either a **singular or dual** subject (13a-b). If subject agreement is singular, it gives rise to an overall singular reading, as in (13a); if subject agreement is non-singular, then a dual reading results, as in (13b). The **extended** root, when combined with non-singular subject agreement, gives rise to a **plural (i.e., 3+)** participant reading, as in (13c).

Based on (13a-c) alone, the root alternation appears to mark argument number distinctions, opposing plural to non-plural, while agreement morphology marks the singular/non-singular opposition.

However, take a look at (13d). The same extended form associated with the plural participant reading in (13c) is now used to signal plurality on the axis of *time* (i.e., repetition): there were

multiple events of one person jumping[9].

The full range of possible interpretations conveyed by "crossing" agreement morphology and root type is shown in Table 5[10].

	$\sqrt{}$RST	$\sqrt{}$EXT
Singular	**Singular**	**Singular-Iterative**
Non-singular	**Dual**	**Plural**

Table 5: Semantic interpretations determined by crossing root type and agreement

The two semantic interpretations (plural participant and iterative) are associated with what has been referred to as pluractional verbs crosslinguistically; this gives us the generalization in (14).

(14) THE RELATIONSHIP BETWEEN EXTENDED AND RESTRICTED ROOTS
The extended root is the "pluractional" counterpart of the restricted root.

3.3 Not all eventive verbs alternate

Before proceeding to the analysis, I would like to consider the class of eventive verbs which do not show root alternation, but only occur in extended form (this class corresponds to the $\sqrt{}$EXT-only root class in Table 4). Consider, for example, *mirar* 'swim' in (15). This is an extended root. We know this because of its distribution: it occurs in exactly those contexts in which the extended variants of alternating verbs occur, e.g., in the presence of the non-future marker *f-*. Even when an adverbial phrase like *one time* is introduced to coerce a bounded, singular reading, the extended root occurs. There simply isn't a restricted root counterpart for this verb.

(15) a. Ke k-f-a-**mirar**-∅.
1sg.ABS M.β-NON.FUT-DI-**swim**-sgS
'I swam.'

b. Ni k-f-a-**mirar**-e.
1nsg.ABS M.β-NON.FUT-DI-**swim**-1nsgS
'We(2+) swam.'

c. Ke ngambi num k-f-a-**mirar**-∅.
1sg.ABS one time M.β-NON.FUT-DI-**swim**-sgS
'I swam once.'

Other verbs belonging to the non-alternating class are shown in Table 6, alongside those belonging to the alternating class. What is it about the verbs in the right column that that they

[9]Also note that the non-future prefix *f-* only occurs in the environment of the extended root. I assume that some kind of checking relation is required between the root and the relevant TAM morpheme such that the latter must have its uninterpretable unbounded feature checked and valued by agreeing with an extended root which has a valued instance of the unbounded feature. *f-* gets spelled out (only) when the non-future TAM morpheme agrees with the extended root.

[10]The "Plural" cell also allows Plural-Iterative (and Dual-Iterative) given the right context. Iterativity, therefore, is always associated with extended roots, regardless of the number of the subject/object.

should lack restricted variants? The classification into either the alternating or non-alternating class seems to be determined in part by the lexical semantics of the verb. For example, no verbs that are inherently punctual/telic (e.g., *wake up, jump, arrive*) belong to the non-alternating class. However, the converse is not true. That is, a large number of verbs which are considered *not* to be punctuale/telic—i.e., those classified as activity verbs—in many languages (e.g., *bark, drink, laugh*) also belong to the alternating class in Ranmo. Therefore, while lexical semantics plays an initial role in the classification of verbs into the alternating and non-alternating classes, it is also to a large degree idiosyncratic.

Alternating	**Non-alternating**
wake up, jump, arrive, bark, drink, cross, win, fill, laugh	*swim, scrape, chase, give birth to, dance, build, make*

Table 6: Alternating and non-alternating (eventive) verbs in Ranmo and their examples

3.4 Stative verbs do not alternate

Finally, it must be made explicit that root alternation is a property of only *eventive* predicates. Stative predicates—the majority of which denote positional or postural states—do not root show alternation according to either argument number or aspect. Stative roots are identified by a special stative suffix, *-l*, as exemplified in (16).

(16) EXAMPLES OF POSITIONAL ROOTS IN RANMO
- a. *mi**l*** 'be hanging'
- b. *mo**l*** 'be leaning'
- c. *manggа**l*** 'be in the mouth'
- d. *faka**l*** 'be on top'
- e. *yina**l*** 'be horizontal/lying down'

Stative predicates, by nature, cannot express iterativity, which is a property of events. Moreover, they also do not show alternation for the number of the subject, as shown in (17). The form *mil* remains constant across all person/number combinations.

(17) STATIVE PREDICATES DO NOT SHOW ROOT ALTERNATION
- a. Mbumbu s-f-**mil**. (>soumil)
  fruit 3sgmO.β:STAT-NON.FUT-**hang.POS**
  'A fruit was hanging.'
- b. Mbumbu l-f-**mil**. (>loumil)
  fruit 2/3dlO.β:STAT-NON.FUT-**hang.POS**
  'Fruits(2) were hanging.'
- c. Mbumbu bw-f-**mil**. (>bwemil)
  fruit plO.β:STAT-NON.FUT-**hang.POS**
  'Fruits(3+) were hanging.'

Compare this paradigm with its eventive counterpart *hang*. The latter does show alternation between extended or restricted, as in (18).

(18) a. Nafo wanaku th-f-**ming**-∅. (>thoumingg)
3sg.ERG clothing 3nsgO.α-NON.FUT-**hang.EXT**-sgS
'He was hanging the clothes.'

b. Kèn fari s-**mir**-∅ yere-ka. (>sèmir)
1sg.ERG rope 3sgmO.γ-**hang.RST**-sgS basket-LOC
'I hung a/the rope over the basket.'

Summarizing, there are three distinct root forms in Ranmo—extended, restricted, and positional—which share a common base (e.g., *mi* in the case of *hang/be hanging*). These roots are complex and differ in the suffix they take, as shown in (19).

(19) a. $\sqrt{\text{EXT}}$ = mi + -ng
b. $\sqrt{\text{RST}}$ = mi + -r
c. $\sqrt{\text{POS}}$ = mi + -l

Moreover, each root type is associated with a distinct set of agreement prefixes. Crucially for our purposes, positional (and other stative) verbs occur with with a stative agreement series (indicated by 'STAT' in the glossing in (17)).

This raises questions about the locus of agreement. That (intransitive) eventive predicates and stative predicates would show distinct realizations of agreement suggests that different kinds of functional heads may be involved in agreement. I will take up this issue in the next section, which will address the following two main questions:

(20) How should the alternation between extended and restricted roots be represented?

(21) What does the distribution of root alternation tell us about the nature of eventive and stative positional predicates in Ranmo?

4 Analysis

4.1 Inner Aspect

We first consider roots used to build eventive predicates in Ranmo. We have already seen that these roots are complex and decomposable, as shown in (22).

(22) COMPLEX ROOTS IN RANMO
a. $\sqrt{\text{EXT}}$ = root core + extended suffix
b. $\sqrt{\text{RST}}$ = root core + restricted suffix

The morphological decomposability of roots can be related to Travis (2010)'s proposal about Inner Aspect. Specifically, drawing on the notion that the VP has shells (cf. Larson 1988), she proposes that there is a functional projection sandwiched within these shells, i.e., between VP and vP. This is the inflectional element that is closest to the VP and houses a morpheme that encodes situation aspect—hence the name "Inner Aspect." This, of course, is distinct from the

part of the inflectional TAM morphology that is above vP, which has commonly been referred to as "grammatical" or "viewpoint" aspect (often concerned with the perfective/imperfective distinction) (cf. Smith 1997).

Travis provides extensive empirical evidence for the existence of this functional projection, showing that its specifier serves as the landing site of certain derived objects and its head serves as the host of reduplication material.

I propose that the extended and restricted suffixes are instances of Inner Aspect. As such, it is driven by properties of situations such as (un)boundedness. Here I additionally draw on Jackendoff (1991)'s proposal that verbs that denote processes and iterated events are unbounded, endowed with the feature ([-b]) (23). They are comparable to mass nouns and count plurals in the nominal domain in this respect (24).

(23) UNBOUNDED EVENTS

a. John is swimming. (process)

b. The light was flashing. (iterated completed event)

(24) UNBOUNDED ENTITIES

a. There was water all over the table. (mass)

b. There were books all over the table. (count plural)

In contrast, verbs which denote completed events are said to be [+b] (25). These are analogous to count singular nouns in the nominal domain, as in (26).

(25) BOUNDED EVENTS

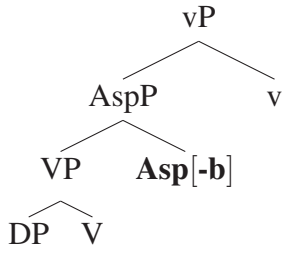
a. John ate an apple.

b. John woke up an hour ago.

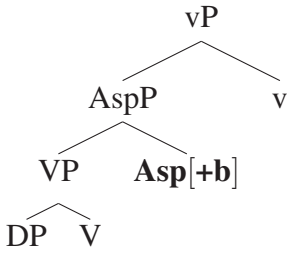
(26) BOUNDED ENTITIES
There was a book on the table. (count singular)

Returning to Ranmo, I propose that extended roots denote unbounded events; thus they encode [-b]. Restricted roots denote bounded, punctual events; they encode [+b]. Crucially, these features have syntactic realization on the Asp head sandwiched between V and v, Inner Aspect. The relevant structures are shown in (27).

(27) a. EXTENDED (EVENTIVE)



b. RESTRICTED (EVENTIVE)



The proposed analysis also provides a way to capture the nature of non-alternating verbs discussed above, i.e., those verbs which only occur in extended form. Such verbs differ from alternating ones only in that they lack the option to encode [+b], i.e., they are *inherently unbounded*. I elaborate on this in the next section.

4.2 Some cross-categorial semantic generalizations (an aside)

At this point, there is an important cross-categorial parallel to be drawn, namely, that between the alternating/non-alternating root distinction in the Ranmo verbal domain and the mass/plural distinction in the nominal domain.

Semantic accounts of the count/mass distinction in the nominal domain invoke notions like 'cumulativity' and 'quantization'—properties of predicates of eventualities. These can be used to distinguish mass nouns (*water*) and count plurals (*apples*) from count singulars (*apple*). Mass nouns and plurals are cumulative and non-quantized, whereas count singulars are non-cumulative and quantized. The formal definitions of the two properties are given below (cf. Krifka 1992, 1998).

(28) A predicate P is **cumulative** iff $\forall$x,y[P(x) & P(y) $\rightarrow$ P(x $\wedge$ y)]
(A predicate P is cumulative iff, whenever it applies to x and y, it also applies to the sum of x and y.)

(29) A predicate P is **quantized** iff $\forall$x,y[P(x) $\wedge$ P(y) $\rightarrow$ $\neg$y $<_{\mathrm{p}}$x]
(A predicate P is quantized iff, whenever it applies to x and y, y cannot be a proper part of x, i.e., iff no entity that is P can be a subpart of another entity that is P.)

Mass nouns and count plurals have cumulative reference because, for example, any sum of parts which are water is water, and any two sums of apples add up to a sum of apples. On the other hand, singular count nouns like *apple* have quantized reference: there is no proper part of an apple which itself qualifies as an apple.

On the issue of what distinguishes mass nouns and plural nouns, two opposing views have been proposed. According to Link (1983), Bunt (1985), and Landman (1989), mass nouns differ from count plurals in not specifying minimal parts. That is, they belong to a "non-atomic" domain in the universe of the discourse. In other words, mass nouns are said to not have atomic reference, defined in (30) (cf. Krifka 1992).

(30) a. $\forall$x,P[ATOM(x,P) $\leftrightarrow$ P(x) $\wedge$ $\neg\exists$y[y $<$ x & P(y)]]
(x is a P-atom.)

b. $\forall P[ATM(P) \leftrightarrow \forall x[P(x) \rightarrow \exists y[y \geq x \ \& \ ATOM(y,P)]]]$
(A predicate P is **atomic** iff, given P(x), there is a proper part of x which is a P-atom.)

According to this definition, a mass noun such as *change* is not atomic because there is no set of atoms representing its smallest entities within its extension. The non-atomic view of mass nouns basically articulates Bunt (1985)'s *homogeneity reference hypothesis*: "Mass-nouns refer to entities as having a part-whole structure without singling out any particular parts and without making any commitments concerning the existence of minimal parts" (p. 46).

An alternative view has been defended by Chierchia (1998), who argues that no non-atomic domain need be separately posited for mass nouns. He offers an atomic, plural semantics for mass nouns, arguing that the extension of mass nouns is fundamentally no different from that of count plural nouns. In his view, both consist of minimal (atomic) parts. Thus, the extension of the mass noun *change* is essentially identical to that of a plural noun like *coins* (so there *is* a set of atoms corresponding to the smallest entities which fall into the extension of *change*, namely, singularities of coins). A mass noun simply denotes a set of singularities (atoms) *plus* all the pluralities of such entities.

Under this approach, count plurals and mass nouns differ only in the following respect: "while count nouns single out in the lexicon the relevant atoms or minimal parts (by making them the exclusive components of their extension), mass nouns do not" (p. 54). In other words, mass nouns are inherently plural (or lexical plurals). This is the *inherent plurality hypothesis*. It unites count plurals, count singulars and mass nouns under the rubric of atomic predicates.

Returning to Ranmo, I propose that Chierchia (1998)'s "atomistic" view of mass nouns can be naturally extended to the event domain to characterize non-alternating verbs in Ranmo. In other words, just as mass nouns are no different from plurals in consisting of atomic parts, non-alternating verbs are no different from alternating verbs in consisting of atomic parts. The only difference between the two is that alternating verbs single out in the lexicon their atoms, i.e., their restricted counterparts denoting singular, bounded events. Non-alternating roots, on the other hand, do not single out their restricted counterparts in the lexicon. They are, like mass nouns, inherently plural.

In this section, I have made some descriptive generalizations concerning the status of extended vs. restricted roots as they relate to the count/mass distinction in the nominal domain. In particular, I have generalized Chierchia (1998)'s "atomistic" view of mass predicates to the domain of events, arguing that what differentiates non-alternating extended roots from alternating extended roots is essentially the same as what differentiates mass nouns from count plural nouns. The discussion in this section is summarized in Table 7.

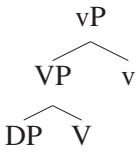
	Non-alternating extended	**Alternating extended**	**Restricted**
Cumulativity	Cumulative	Cumulative	Quantized
Boundedness	Unbounded	Unbounded	Bounded
Nominal parallel	Mass noun	Count plural	Count singular

Table 7: Semantic properties of Ranmo roots

4.3 Stative predicates lack Inner Aspect

Returning to the main focus of this paper—the eventive/stative contrast in Ranmo—I further propose that in contrast to eventive predicates, stative predicates lack Inner Aspect. This immediately accounts for why the latter do not show root alternation—they simply lack the syntactic projection which is the locus of alternation between [+b] and [-b]. The tentative structure for stative predicates is shown in (31)[11]. Here, v directly selects for VP, whereas in the structure for eventive predicates in (27), v selected for AspP.

(31) STATIVE (tentative)



On the proposed analysis, a verb is eventive *by virtue of projecting Inner Aspect*. That is, Inner Aspect functions as a kind of "eventivizer," which takes a predicate of individuals and turns it into a predicate of events. This will be discussed further in the next section.

In summary, Ranmo predicates can be classified into the following aspectual classes based on their interaction with Inner Aspect.

(32) RANMO ASPECTUAL CLASSES

a. Alternating eventive predicates may be unbounded or bounded, depending on the syntactic feature merged ([-b] or [+b]) on Inner Aspect.

b. Non-alternating eventive predicates are inherently unbounded (lexically specified to project only [-b] on Inner Aspect).

c. Stative positional predicates are inner aspectually unspecified.

4.3.1 Positional suffix *-l*

As mentioned above, the stative class in Ranmo consists largely of positional verbs which denote spatial positions and postures, e.g., *be on top, be in the mouth, be horizontal*, etc. Such verbs are expressed using adpositions in many other languages, including English, as exemplified in (33).

(33) English "formulaic" PPs (Coon and Preminger 2009:12)

a. The car is [out front]$_{\mathrm{PP}}$.

b. The bat is [upside-down]$_{\mathrm{PP}}$.

Coon and Preminger (2009) suggest that positionals can in fact be seen as "a surrogate method to achieve the expressive richness that other languages achieve by varying the head of PP or AP" (p. 12). In particular, they point out that Chols's (Mayan) rich lexicon of positional verbs is correlated with its extremely impoverished prepositional system (amounting to just one preposition). Ranmo is the same way: its large number of positional verbs is juxtaposed by a very small class of adpositions (e.g., *banènbanem* 'underneath,' *warfa* 'above').

[11]Therefore, contrary to some previous claims, statives are not inherently atelic on a par with activity verbs; rather, they must be aspectually unspecified.

However, the authors observe an important contrast between positional verb phrases on the one hand and adpositional phrases on the other. Consider the English examples below. The contrast between (34b) and (35b) shows that VPs can be integrated into the clause structure directly while PPs cannot; the latter require a copula, as in (35a).

(34) a. The jar is [$_{\mathrm{VP}}$ sitting on the table].
b. The jar [$_{\mathrm{VP}}$ sat on the table].

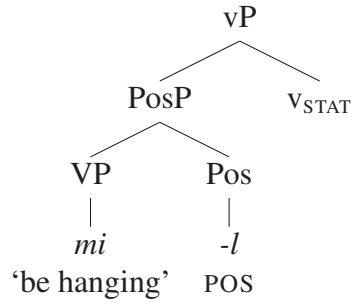
(35) a. The jar is [$_{\mathrm{PP}}$ on the table].
b. *The jar [$_{\mathrm{PP}}$ on the table].

The authors attribute this difference between VPs and PPs to the fact that the latter are predicates of *individuals*, i.e., they lack an event argument slot in their neo-Davidsonian semantic representation. VPs, on the other hand, are inherently predicates of *events* (they have an event argument slot in their semantics). They propose the following semantics for the copula required in the case of PPs.

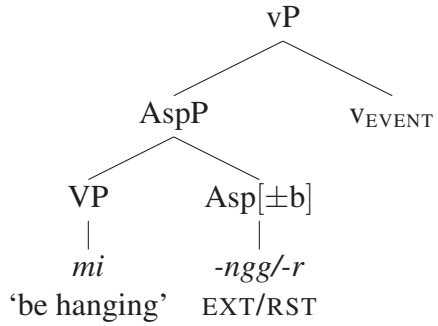
(36) PUTATIVE SEMANTICS FOR EVENTIVIZER/COPULA (Coon and Preminger 2009:12)
$[[\textit{copula}(\mathrm{e.g.}, \textit{is})]] = \lambda Q_{<e,t>}.\lambda x_{e}.\lambda e_{d}$.e is a (minimal) event in which Q(x)

I argue that the same can be said of positionals in Ranmo: they are non-eventive predicates of individuals (just like PPs in English and positional verbs in Chol). In order to eventivize a positional predicate, a copula-like element is required. I suggest that the copula-like element is the positional suffix *-l*, which performs the eventivizing function, on a par with the obligatory copula found with PPs in English. The updated structure of stative predicates is shown in (37a).

(37) a. STATIVE (REVISED)



b. EVENTIVE



Note that the projection responsible for introducing the *l-* suffix (the Positional Phrase, PoP) is in the same position in the clause structure as Inner Aspect in eventive verbs, repeated in (37b). Thus, where Inner Aspect introduces an event argument (creating extended and restricted verbal roots), the positional root suffix *-l* eventivizes predicates of individuals (creating positional roots).

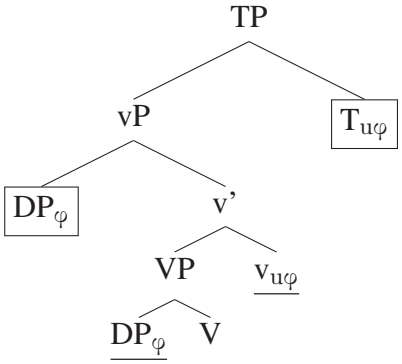
The two structures also differ in the flavor of v they project (stative vs. eventive). This will have consequences for the spellout of agreement morphemes, which is the topic of the next section.

4.4 v as the locus of agreement

In this section, I argue that v is the locus of subject agreement in unaccusative predicates (of both the eventive type and the stative/positional type) in Ranmo. This is interesting in light of the

robust tendency of finite *Tense* to show agreement with the subject in languages that have verbal agreement (cf. Chomsky 2000, 2001). This is not to say that Tense does not ever agree in Ranmo—it does, in *transitive* clauses (where v also agrees with the object). The two agreement relations in transitive clauses are shown in (38).

(38) AGREEMENT IN TRANSITIVE CLAUSES[12]



I propose that in the case of unaccusative clauses, T does not agree with the sole argument because of the combination of the following two facts:

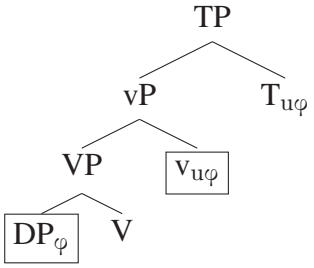
(39) a. Agreement in Ranmo is (parameterized to be) downward, as per the negative setting of (40).

b. Unaccusative v[13] (as well as transitive v) is a phase.

(40) THE DIRECTION OF AGREEMENT PARAMETER (DAP) (cf. Baker 2008)
F agrees with DP/NP only if DP/NP asymmetrically c-commands F (i.e., F must agree upward).

In the unaccusative structure in (41), both v and T are probes, bearing unvalued instances of φ-features. However, v, being the first to merge, will probe first, searching its c-command for a goal to agree with. It will probe downward due to (39a), and agree with the first (and only) DP target that it locates, namely, the DP in the complement position of VP. This is the same derivation as object agreement in transitive clauses. Therefore, unaccusative verbs will show "object" agreement, i.e., the same agreement prefixes used to reference the objects of transitive verbs.

(41) AGREEMENT IN UNACCUSATIVE CLAUSES



Moreover, by (39b), T will not *also* be able to agree with this DP goal; it is inaccessible for agree by T by the Phase Impenetrability Condition. Crucially, this implies that T will be unable

[12] I have omitted the Inner Aspect projection from this structure as well as from all subsequent structures for simplicity.
[13] Unaccusative v comes in two flavors, as stated above, stative or eventive

to value its *u*φ-features, which are "illicit" elements under Chomsky's (2000, 2001) view and therefore should result in ungrammaticality.

Nevertheless, unaccusative verbs (which do not show agreement on T) are perfectly grammatical in Ranmo. I suggest that this is not surprising under—and therefore provides support for—Preminger (2011, 2014)'s "obligatory-operations" approach to agreement. On this view, the obligatory nature of agreement is "best handled in terms of an *operation*—one whose *invocation* is obligatory, but whose successful *culmination* is not enforced by the grammar" (Preminger 2011:175) (emphasis mine).

The proposal that v is the only locus of agreement in unaccusative clauses in Ranmo would explain a number of related facts. First, it would explain why the subjects of (unaccusative) eventive verbs and stative verbs use different sets of agreement prefixes (compare the agreement exponents in (17) and (18), for instance). If the locus of agreement is v rather than T, we may expect the shape of agreement to vary depending on the lexical semantics of the verb, i.e., depending on the particular flavor of v merged (stative vs. eventive). Second, it would explain why agreement is realized as a prefix on the verb, whereas (outer) TAM is a suffix in Ranmo (see, for example, (9a,c). Third, and relatedly, it would explain why agreement is not morphologically related to (outer) TAM in Ranmo in contrast to many other languages, i.e., why variations in (outer) Tense do not condition allomorphy of the agreement prefixes in this language.

5 Explaining the distribution of the degree suffix *-an*

Before closing the paper, I would like to briefly mention how it interacts, in particular, with the degree quantifying morpheme *-an*. This morpheme is of special interest in the general discussion of verbal pluralization in Ranmo because its presence adds another more nuanced layer of pluralized meaning, namely, a large number of events/large quantity reading. This immediately raises the question of how it relates to each of the root types (extended and restricted) in Ranmo, and also has the potential to shed light on the nature of pluractionality more broadly.

In Lee (to appear a), I analyze the *-an* morpheme as the degree quantifier corresponding to the adverbial *a lot* in English and other languages. Now, it is well-known that the degree expression *a lot* can only combine with unbounded predicates. This is the case in both the nominal and verbal domains, as shown in (42)-(44).

(42) FRENCH (Doetjes 2004:90)

a. beaucoup de soupe
'a lot of soup'

b. beaucoup de théières
'a lot of teapots'

c. #beaucoup de théière
#'a lot of teapot'

(43) a. John ran a lot.

b. John woke up a lot.

c. ??John woke up a few hours ago a lot.

(44) FRENCH (Doetjes 2007:698)

a. Il a plu beaucoup.
   it has rained a lot

b. Jean va beaucoup au Louvre.
   J goes a lot to the Louvre

c. #Jeanne a beaucoup écrit la lettre.
   J has a lot written the letter

Turning to the contrast between the (b) and (c) examples in (43) and (44), we see that *a lot* is licensed only when the predicate is iterative (i.e., unbounded). When the predicate describes an eventuality that is bounded and singular, it cannot be modified by *a lot*.

If *-an* is no different from *a lot* in languages like English and French, then the analysis proposed for extended and restricted roots above makes the following predictions with regard to its distribution, namely:

(45) PREDICTIONS FOR THE DISTRIBUTION OF *-an*

a. *-an* should only occur with extended roots (since only they are [-b]).

b. *-an* should not be able to take stative predicates since they lack an inner aspectual specification altogether (at least not directly[14]).

Indeed, both predictions are borne out, as shown in (46).

(46) a. EVENTIVE

Fi s-f-a-**lèfèn/***lèfèr-**an**. (>swalfèn)
3ABS 3sgmO.β-NON.FUT-APPL-**jump.EXT/***jump.RST-**DEG**
'He jumped many times.'

b. STATIVE

*Mbumbu s-f-**mil**-**an**.
fruit 3sgO.β:STAT-NON.FUT-**hang.POS-DEG**
'A lot of fruits were hanging.'

What this section is intended to illustrate is that predicates which denote a large number of events consist of an aspectual component (±b) and a degree component contributing the meaning 'a lot.' Crucially, there is a selectional restriction on the degree morpheme: it can only select for extended roots. This is precisely the prediction we make under the analysis that extended roots are [-b].

[14] The use of *-an* with stative predicates becomes grammatical only with the additional suffix *-war*, which introduces [-b] to stative predicates.

(1) Ngatha fur b-f-a-rikal-***(war)**-an. (>bwarikèlwaran)
dog baby plO.β:stat-NON.FUT-APPL-hide.POS-WAR-DEG
'A lot of puppies were hidden on me.'

6 Conclusion

This paper investigated the phenomenon of morphological root alternation in Ranmo. The alternation between extended and restricted roots was shown to correlate with distinct semantic interpretations: plural participant and iterative readings on the one hand and singular, bounded readings on the other.

Extended and restricted suffixes were shown to be internally complex, consisting of the core base and a low aspectual head which encodes [±b(ounded)] feature, Asp. This functional category is located inside the lexical domain of the VP (i.e., below little vP), and thus, I have identified another instance of Inner Aspect, in support of Travis (2010).

Crucially, the distribution of root alternation serves as a probe into the nature of stative vs. eventive predicates in Ranmo. Specifically, I proposed that stative predicates differ from eventive predicates in lacking Inner Aspect. This account explains (i) why they do not show root alternation and (ii) why they cannot (directly) combine with the degree suffix *-an*. Since low Asp is absent in Ranmo positional verbs, they require a copula-like element (the *-l* suffix) in order to eventivize the predicate—the same way English PPs require the copula *be*.

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Labial Harmonic Shift in Kazakh: Mapping the Pathways and Motivations for Decay

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1 Introduction

Despite the amount of ink spilt on vowel harmony there is surprisingly little written about the decay of harmony systems (Greenberg 1990; Binnick 1991; Nevins & Vaux 2003; Svantesson 2005; Kavitskaya 2013; see also McPherson & Hayes forthcoming).[1] While a number of authors have suggested possible pathways for harmonogenesis (Ohala 1994; Harrison et al. 2002) the motivations for harmonic decomposition remain largely unclear. Using data collected during recent fieldwork, this paper addresses the nature of harmonic decay through an acoustic analysis of labial harmony in Kazakh. In contemporary Kazakh, the domain for labial harmony is typically the root, and post-initially rounding has largely been neutralized, in contrast to previous descriptions of the language. The drastic reduction in labial harmony between previous studies and the present work is used to conceptualize harmonic decay along two lines: domain contraction, and neutralization.[2] Additionally, the role of markedness is addressed as it relates to the specific trajectory of change in the language.

2 Labial Harmony in Kazakh

2.1 Vowel Inventory

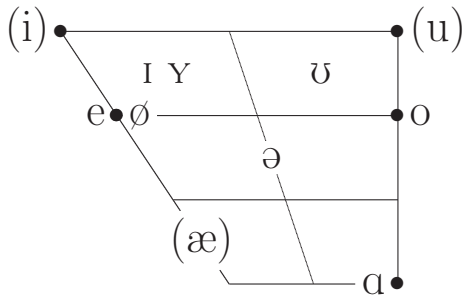
Kazakh scholars have debated the number of underlying vowels in the language generally arguing for nine, or ten underling vowels (Dzhunisbekov 1972:10-11; Sharipbay 2013; Yessenbayev et al. 2012 and citations therein). I will work on the assumption that there are actually eleven underlying vowels in the language, eight harmonic vowels plus three additional vowels. The details of the three additional vowels, /i/, /u/, and /æ/ are of less importance, and consequently, their role in harmony will not be addressed. The other eight vowels are

*Thank you, first of all, to the gracious Kazakhs who worked with me on this project, especially to Bakhit, Shinar and Nazym. Thank you to the audience at the 2015 CUNY Conference on Multilingual Phonology for comments, and to Juliette Blevins, Dasha Kavitskaya, and Sharon Rose for their invaluable questions and suggestions.

[1]The following abbreviations are used throughout the paper: 2- second person, 3- third person, ACC- accusative, CAB- converb, GER- gerundial, LOC-locative, NPST- non-past, PASS- passive, PL- plural, PST- past, PTCP- participle, and REFL- reflexive.

[2]The assimilatory force of active harmony is often describe as neutralizing in nature because the quality of harmonic vowels becomes predictable and constrained by the harmonic feature of the root. In a Turkic language with a fully functioning harmony system, like Kyrgyz, eight post-initial vowels may surface, but in a language with reduced labial harmony, like Kazakh, the number of post-initial vowels that may surface is reduced to 6, with restrictions on 2 of those 6. In this way post-initial vowel quality is constrained by the loss of harmony. For this reason, I use the term neutralization throughout the paper.

distinguished by the features: [high], [back], and [round]. Of note, [ə] is treated as a [+high] vowel in Kazakh (Johanson 1998:93-94).



2.2 Labial Harmony

Kazakh exhibits two types of harmony: palatal (backness), and labial (rounding) harmony. These two interacting harmonies determine the quality of vowels post-initially, whether root-internal or suffixal.[3] Palatal harmony is pervasive in the language. However, rounding harmony is far more restricted, affecting only a subset of potential targets. Menges (1947:59-62) and Korn (1969:101-102) note that front vowels condition the rounding of all subsequent harmonic vowels, and back vowels trigger rounding only if the target is high. These same generalizations persist throughout much of the Soviet and post-Soviet literature on Kazakh (e.g. Abuov 1994), as shown below.

(1)

tøbø-lør	'hill-PL'	*ʒebe-ler*	'arrow-PL'
øt-tʏ-ŋ-dør	'pass-PST 2-PL'	*jet-tɪ-ŋ-der*	'do-PST-2-PL'
kʏn-dør	'day-PL'	*dɪn-der*	'religion-PL'
kʏl-dʏ	'laugh-PST.3'	*ɪl-dɪ*	'hang-PST.3'
qʊs-ta **qʊs-to*	'bird-LOC'	*qəs-ta*	'winter-LOC'
qʊs-tʊ	'bird-ACC'	*qəs-tə*	'winter-ACC'
qozʊ-ɬar-də **qozʊ-ɬor-dʊ*	'lamb-PL-ACC'	*qazə-ɬar-də*	'horse sausages-PL-ACC'

More recent works have adopted the same general analysis with several important restrictions on harmony: one, harmony affects high vowels more significantly than non-high vowels,

[3]Following Vajda (1994) and Harrison & Kaun (2000), I will assume throughout this paper that root-internal vowels are potential targets for harmony and not lexicalized to their current forms.

and two, harmonic effect diminishes as distance from the root increases. Kirchner observes that while both high and non-high targets are affected by rounding harmony the general strength of rounding is lesser in syllables further from the root. Additionally, he observes that this reduction in rounding is more acute for non-high vowels (1998:320-321). Vajda argues similarly, adding that root-internal vowels are more likely targets for harmony than suffix vowels (1994:634). Even more recently, Kara writes that in western Kazakh dialects labialization affects only the second vowel of a word while in eastern Kazakh dialects all subsequent vowels are affected (2002:12). Contraction of the harmonic domain has been noted for dialects of Crimean Tatar (Kavitskaya 2010:26-27, 2013), Karakalpak (Menges 1947:60), and outside the Turkic family, as well (McPherson and Hayes forthcoming).

Previous studies of Kazakh, if viewed longitudinally, display a diminution in labialization post-initially. While these writers note thatfirst-syllable vowels demonstrate the full range of vowel qualities present in the Kazakh inventory, neutralization to [-round] vowels post-initially is suggested, but not specifically analyzed. This paper examines the acoustic correlates of post-initial rounding, arguing for the continued decay of labial harmony in the language.

3 Methods

3.1 Participants

Eleven native Kazakh speakers (8 females, 3 males; age range = 19-46 years, mean age = 33.5 years) living in or around Taldykorgan (the capital of the Almaty Oblast in southeastern Kazakhstan) participated in conversational elicitation of nominal and verbal paradigms. Most speakers were from the Almaty Oblast, but speakers from South Kazakhstan and Aqmola Oblasts, as well as from western Mongolia participated in the study. Speakers ranged in educational background from partial high school education to multiple graduate degrees, with most speakers having attained a high school diploma as their highest degree earned. All speakers were fluent in Russian as well as Kazakh, and some speakers were additionally conversant in Mongolian, Chinese, and English. All elicitation was conducted in Kazakh.

3.2 Protocol

Speakers were asked to identify target words from pictures to avoid the influence of Kazakh orthography, which does not indicate post-initial rounding, as well as the influence of literary register. Many Kazakhs comment that Kazakh is rarely used for writing, and languages like Russian and English are more appropriate for such endeavors. This likely stems from the Soviet characterization of indigenous languages as backwards. Those whose primary language was an autochthonous language (i.e. not Russian) were deemed uncultured during the Soviet era (see Grenoble 2003:193-197). Speakers constructed sentences using the following nouns (2) and verbs (3) in a variety of derivational and inflectional forms.

(2) Nouns

øt	'gall bladder'	*jet*	'meat'
tøbe	'hill'	*ʒebe*	'arrow'
kømʏr	'coal'	*temɪr*	'iron'
kʏn	'day/sun'	*dɪn*	'religion'
ʒʏzʏm	'grape'	*tɪzɪm*	'list'
qoj	'sheep'	*saj*	'ravine'
qozʊ	'lamb'	*qazə*	'horse sausage'
qʊs	'bird'	*qəs*	'winter'
qʊɬʊp	'lock'	*aɬəp*	'giant'

(3) Verbs

øl-	'die (of animals)'	*kel-*	'come'
kʏl-	'laugh'	*ɪl-*	'hang (something)'
qʊs-	'vomit'	*qəs-*	'press'
qos-	'add'	*qʊr-*	'build'
søjle-	'speak'	*qʊj-*	'pour'
qasə-	'scratch'		

To control for any foreigner talk or generally unnatural speech, speakers completed a map task derived from the University of Edinburgh's HCRC map corpus (Anderson et al. 1991) where one speaker gave directions to another native speaker. The placement of the landmarks on the map was not uniform, triggering dialogue concerning the route described. These dialogues provided a control scenario to compare with the elicitation scenarios. On the basis of the similarity of labial harmony in the two scenarios, elicited data was deemed representative of colloquial Kazakh speech. Colloquial, as opposed to literary, Kazakh was the intended speech register for elicitation. Kazakh is diglossic, with a literary register that is used in news reporting, poetry and literary recitations and other similar contexts. These differences in register also correspond to differences in harmony, where higher register speech correlates with higher application of vowel harmony in general (McCollum 2015b; see also Abuov 1994). Kazakh speakers report being instructed to produce words with a

literary pronunciation in school, and this tendency is evident in prescriptivist approaches to Kazakh grammar (e.g. Userbayeva 2005). The intent of this study was not to collect higher register speech, but to collect colloquial speech, which prompted the above noted choices in elicitation. All sessions were video and audio recorded. Audio was recorded at a 44.1kHz sampling rate with 24-bit depth.

4 Results

Audio files were analyzed using a modified version of Katherine Crosswhite's formant logger script[4] in PRAAT (Boersma & Weenink 2014). F1-F3 were obtained from three points during post-initial vowel production, 25%, 50%, and 75%. Measurements from the midpoint of each vowel were then normalized (Lobanov 1971) for across-speaker comparison. Normalized vowel data (N= 3,608) was used to assess the amount of post-initial lip rounding in two ways in R (version 3.1.1, R Core Team 2014). First, a quadratic discriminant analysis was performed (using the MASS package, version 7.3-33), where post-initial vowel qualities were discriminated using normalized F1-F2.[5] Second, a mixed effects model (using the lme4 package, version 1.1-7) was used to predict normalized F2 with speaker as a random effect and the following fixed effects: height, root backness, root rounding, distance from root, intervening consonants, and and intervening vowels.

4.1 Discriminant Analysis

A quadratic discriminant analysis was performed on root, as well as target vowels, under the assumption that if rounding persists post-initially, then vowel discrimination in roots and targets should generally be equal. If, however, rounding is diminished post-initially, then accurate vowel discrimination among the eight root vowels analyzed should exceed vowel discrimination among target vowels. The model was resampled using the jack-knife method and F1-F2 were set as the parameters for classification.

Tokens (N=2,490)[6] of the eight root vowels /ɑ o ə ʊ e ø ɪ ʏ/[7] were correctly discriminated 59.4% of the time.[8] In the analysis of monopthongal targets (N=3,259), all vowels after the low back vowel, [ɑ] were excluded because [ɑ] is reported to block harmony in all descriptions of the language. When rounding was assumed to affect every post-initial vowel, resulting in eight potential post-initial categories, the model correctly discriminated 45.1% of vowel tokens. When round vowels were assumed to neutralize across the board (in effect reducing the number of vowel categories to four), discrimination improved to 75.0%.

[4]This script is available at http://www.linguistics.ucla.edu/faciliti/facilities/acoustic/praat.html

[5]F3 was also used initially, but proved to be an insignificant parameter in the model, and was therefore removed.

[6]Many word-initial vowels were elided due to vowel syncope (see Kavitskaya 2013).

[7]The other three phonemic vowels were excluded, both because they figure far less prominently in the language, and because their occurrence post-initially does not conform to the regular application of harmony. By excluding these vowels, a parallel was established between possible root and target vowel categories that undergirds this portion of the analysis.

[8]As a point of reference, Hillenbrand et al. (1995), achieved 68.2% accuracy discriminating English vowel phonemes based on F1-F2.

The significant increase in discriminatory accuracy when rounding was assumed to neutralize post-initially points toward a very real reduction of rounding harmony. However, vowel discrimination in harmonic languages is less straightforward than in non-harmonic languages like English (e.g. Hillenbrand et al. 1995) because rounding harmony allows pairs of segments that are minimally distinct to surface despite violations of dispersion principles that are argued to affect inventory selection among the world's languages (Lindblom 1986; Flemming 1995). Since a number of weakly distinct pairs are permitted, it is possible that reducing the number of categories, in and of itself, accounts for the drastic increase in discrimination. In essence, an increase in post-initial vowel discrimination is not necessarily grounds for advocating neutralization, but rather may only demonstrate the intrinsic similarity of harmonic pairs. To address this potential confound, root vowels were analyzed using the same reduction of categories from eight to four in order to determine if category reduction, and not actual shifts in vowel realization, precipitated increased accuracy among post-initial vowels. When root vowel categories were collapsed from eight to four, vowel discrimination improved to 65.3%, a 10.1% increase in accuracy. Compared to the 66.2% increase in accuracy among post-initial vowels when categories were reduced (i.e. when neutralization was assumed), the increase in discriminatory accuracy among post-initial vowels does appear to reflect a significant degree of actual neutralization. When Figures 1 and 2 are consulted, a merger of vowel qualities in post-initial contexts is evident.

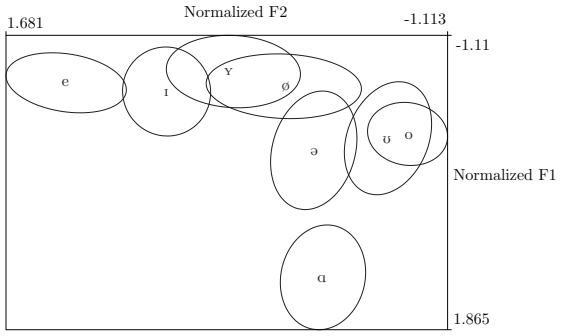


Figure 1: Plot of normalized root vowels with 1 sigma ellipses

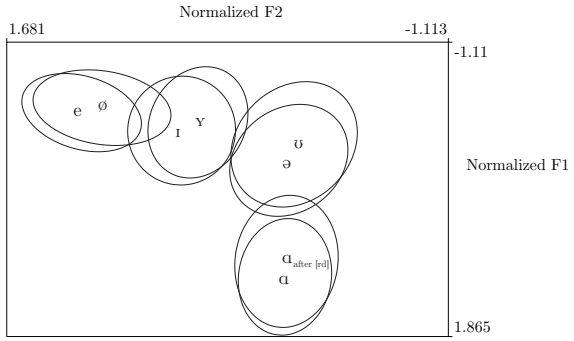


Figure 2: Plot of normalized post-initial vowels with 1 sigma ellipses

The distribution of root versus post-initial vowels in Figures 1 and 2 is strikingly different, showing the conflation of acoustic vowel qualities suggested by the discriminant analysis. In Figure 2, the vowels labeled as ø, ʏ, and ʊ are labeled according to previous descriptions. When each [±round] pair is considered, a merging of post-initial vowel qualities to [-round] appears appropriate. The quality of the non-high back vowel after a round root, as is predicted by previous accounts (e.g. Korn 1969; Kirchner 1998) overlaps almost entirely with the low back vowel after an unrounded root. The phonologically high back unrounded vowel (phonetically [ə]) is realized with similar F2 but lower F1 than [ɑ] in both roots and targets. In targets, though, the vowel previously recorded as [ʊ] surfaces much more like [ə] than root [ʊ]. Similarly, the centralization of [ø] is apparent in root position, but post-initially the non-high front vowel after round roots is realized with a much higher F2, more closely resembling root and post-initial [e] than root [ø]. The high front vowels show slightly less

merger post-initially, although there is significant overlap in the F1-F2 vowel space. Vowels show a decided reduction in contrast post-initially, with some variance according to backness and height distinctions.

4.2 Mixed Effects Modeling

4.2.1 Overall results

The discriminant analysis performed suggests that rounding of post-initial vowels is neutralized, and although it seems clear that the direction of neutralization is toward [-round], the analysis above doesn't explicitly suggest the direction of neutralization. Furthermore, discriminant analysis predicted categorical vowel qualities based on phonetic information, and while this categorical perspective is immensely helpful, framing the dependent variable as continuous offers a complementary look at the data. To do this, a linear mixed effects model was employed to predict acoustic realization of harmonic vowels based on a variety of categorical predictors. The underlying assumption is that the acoustic difference between [±round] pairs post-initially should reflect the difference between those same pairs in roots. Zsiga (1997:234-235) describes harmonic vowels as identical to their non-harmonically derived root equivalents in Igbo, gradient vowel change derives from phonetic processes. Moreover, Lanfranca (2012) finds that post-initial harmonic vowels in Turkish do approximate their root equivalents, and in some cases, expand the vowel space as a potential enhancement effect. Using the highest and lowest normalized values of F1-F2 plus or minus one standard deviation, a quadrilateral was plotted that roughly approximates the vowel space in roots versus post-initial contexts. The area of each quadrilateral was then determined, which, when compared showed a 27.23% contraction of the vowel space post-initially. Thus, assuming a relatively uniform contraction of the vowel space, if the difference in F2 (ΔF2) of each [±round] pair does not exceed a 27% contraction in post-initial contexts, then rounding persists. If, however, ΔF2 post-initially is significantly smaller (i.e. contraction is far greater than 27% for each pair), then acoustic differences are being diminished, and by extension, rounding is being neutralized.

In both initial and post-initial contexts, ΔF2 for each of the four harmonic pairs is presented in Table 1. The data show a very real decrease in ΔF2 post-initially, corroborating findings from the discriminant analysis.

Table 1. ΔF2 and contraction of the vowel space

[±round] pair	ΔF2 in roots	ΔF2 post-initially	% Reduction of ΔF2 post-initially
ɑ-o	0.529z	0.014z	97.45
ə-ʊ	0.469z	0.071z	84.87
e-ø	1.375z	.129z	90.63
ɪ-ʏ	0.42z	.103z	75.4

The data in Table 1 shows the degree of ΔF2 contraction post-initially for all four contexts. Of note, in addition to the F2 distinctions above, the most salient difference between[ɑ] and [o] is F1. For root vowels, ΔF1 was 1.453z. However, post-initially ΔF1 between [ɑ] and [o] was 0.16z, a 88.99% reduction in ΔF1. If neutralization is framed in terms of percent

ΔF2 contraction or in terms of size of ΔF2 post-initially, two asymmetries emerge: front vowels have resisted neutralization more than back vowels, and high vowels have resisted neutralization more than non-high vowels.

The reduction of normalized F2 as an acoustic correlate of rounding is attested throughout the data. Overall, the effect of root rounding on post-initial vowels (N=3,259, excluding vowels after the non-high back vowel) was -0.082z (SE=0.011, t=-7.13), an effect that when scaled back into Hz reflects a decrease of approximately 40-60 Hz for most speakers. This modulation of F2 does not typically surpass the perceptual threshold for ΔF2 (Flanagan 1955), and is therefore conceivably a phonetic coarticulatory effect. Furthermore, if Zsiga's (1997) criterion that categorical assimilation creates vowels acoustically identical to their root equivalents, then the data in no way reflects an active categorical assimilation process. Harmonic context-specific effects of root rounding are shown in Table 2 below.

Table 2. Acoustic effect of rounding by context

Harmonic context	Sample size	Effect (β) on post-initial F2	Standard error	T-value
non-high back	620	-0.034	0.022	-1.52
high back	736	-0.139	0.028	-4.98
non-high front	847	-0.098	0.020	-4.85
high front	1056	-0.098	0.017	-5.76

Overall, distance from the root was a significant predictor of normalized F2, β=0.101z (SE=0.01, T=8.72). Distance from the root was formulated with root-internal targets being the most proximate, then first suffixes, then second suffixes and so on. As distance from the root increases, so does normalized F2, which suggests that as distance from the root increases, reduction of F2 due to labialization is attenuated. In short, rounding harmony affects morphologically proximate targets more than morphologically distant targets (Vajda 1994:634; Kirchner 1998:320-321). The effect of rounding on root-internal and first suffix vowels is far greater than on second and third suffix vowels. This effect is very similar to what McPherson and Hayes (forthcoming) find in Tommo So- harmony "peters out" over the course of the word. This analysis is framed in terms of gradient phonetic modulations while their analysis of Tommo So hinges upon categorical information, but the underlying idea is the same, as expressed by previous writers of Kazakh: the effect of rounding diminishes throughout the word. In Figures 3-5 and 11-12, root, as well as post-initial vowels are plotted according to harmonic (i.e. backness and height) context and morphological environment.

4.2.2 Back vowels

In Figure 3, the predicted realization of non-high back vowels as [ɑ] and not *[o] after round roots (Korn 1969:101-102) was attested. In Figure 4, the high back vowels show more complex and interesting effects of morphological context. Root-internally, both the vowels predicted to be [ə] and [ʊ] were realized with normalized F2 values between root [ə] and [ʊ]. The lowering of F2 after [ɑ] is surprising, but I attribute this general lowering of F2 in this context to the adjacent [ɬ] and [p] the in the two roots elicited, *qʊɬʊp* 'lock' and *ɑɬəp* 'giant.'

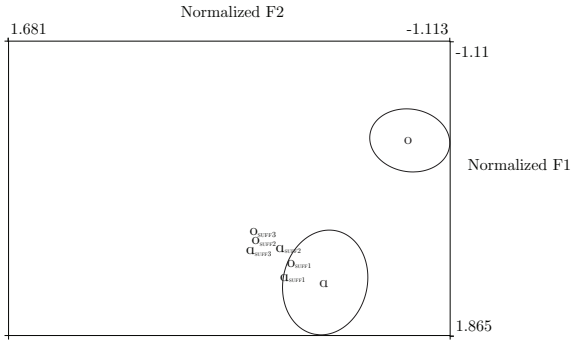


Figure 3: Plot of non-high back vowel roots (with 1 sigma ellipses) compared to post-initial means after [±round] roots

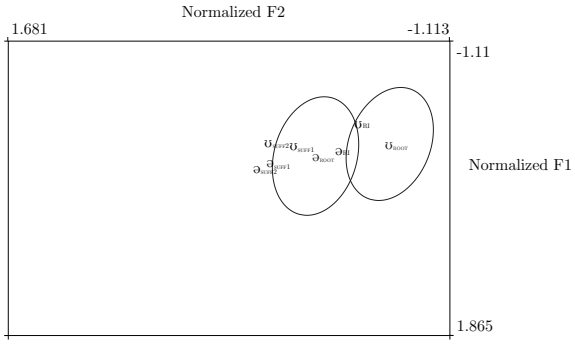


Figure 4: Plot of high back vowel roots (with 1 sigma ellipses) compared to post-initial means after [±round] roots

This is more evident when the second syllable vowels in the two variants, *qʊłʊp* ∼ *qʊłpʊ* 'lock' are compared, in Figure 5. In *qʊłpʊ*, when the lateral is no longer adjacent to the target vowel, the second syllable vowel is produced with a slightly increased F2.

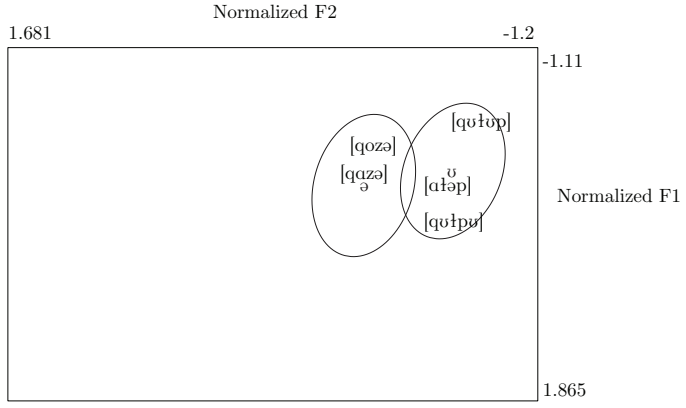


Figure 5: Plot of high back root vowels (with 1 sigma ellipses) compared to root-internal high back vowels by word

Table 3. Acoustic properties of root-internal [+high, +back] vowels by root

Root	Sample size	F1	SD	F2	SD
qɑzə	52	-0.042	0.536	-0.256	0.309
qozə	46	-0.245	0.576	-0.302	0.321
ɑłəp	35	0.056	0.392	-0.702	0.15
qʊłpʊ	9	0.345	0.514	-0.702	0.264
qʊłʊp	37	-0.487	0.369	-0.855	0.295

Kirchner (1990:56, 1998:319) argues that before the lateral /ɑ/ may be rounded. Phonetic rounding of /ɑ/ in initial syllables is attested in several related languages (e.g. Bashkir- Poppe 1964:8; Tatar- Comrie 1997:900; Harrison & Kaun 2003:204-205). Harrison & Kaun find that in Namangan Tatar the phonetic rounding of /ɑ/ actually triggers rounding harmony. Combined with Kirchner's observations, it is possible that decreased F2 of the second syllable vowel in *ɑłəp* derives from a phonetic rounding of the initial vowel. However, no indications of word-initial rounding of /ɑ/ were found during fieldwork. Subsequent inspection of articulation during vowel production further suggests that /ɑ/ is not rounded. Although the second syllable vowel matches the formant frequencies of root-position [ʊ] the lip gesture during production of the vowel is spread, and could be more narrowly transcribed as [ɤ].

Figures 6 and 7 show productions of [ɑłəp] 'giant' and [qʊłʊp-tə] 'lock-ACC', respectively by Speaker 2. Figures 8 and 9 show productions of [ɑłəp-tə] and [qʊłʊp-tə] from Speaker 7. In Figures 6 and 8, observe the lowered jaw for word-initial [ɑ] but notice that there is no lip rounding. In figures 7 and 9, lip rounding is observable throughout all segments in the root, [qʊłʊp], but the lips move to a more spread position in suffixes. Speaker 2 rounds her post-initial vowels after round roots slightly more than the group average (β = -0.094, SE=0.028 versus β = -0.082, SE=0.011), but Speaker 7 rounds her vowel more most speakers (β = -0.157, SE=0.028). Even among speakers who round subsequent vowels, like Speaker 7, the rounding gesture is gradually diminished throughout the first suffix vowel, as in Figure 9. When the word-final vowels of Figures 8 and 9 are compared, the vowel in Figure 9 shows more lip rounding than in Figure 8, but less rounding than root-internal vowels in Figure 8. In this particular utterance the slight rounding of the lips in the suffix is due to an anticipatory rounding before the affricate [ʤ] in the sentence, [qʊłʊptə̩ ʤɑp] 'Close the lock.' The voiced palato-alveolar affricate is produced with slight lip rounding in Kazakh, similar to its articulation in English. When the spectrogram of the utterance is viewed (Figure 10), it is clear that despite some anticipatory lip rounding the word-final vowel in [qʊłʊptə̩] has a much higher F2 than the root-internal vowels preceding it. In tandem, articulatory and acoustic data provide sufficient evidence for root-internal, but not suffix rounding.

Figure 6: Still images of Speaker 2 producing *ɑłəp* 'giant'.

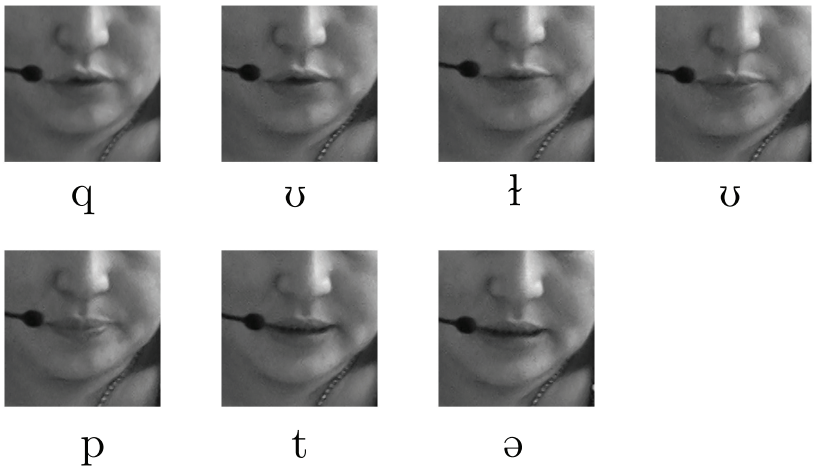


Figure 7: Still images of Speaker 2 producing *qʊɬʊptə* 'lock-ACC'.

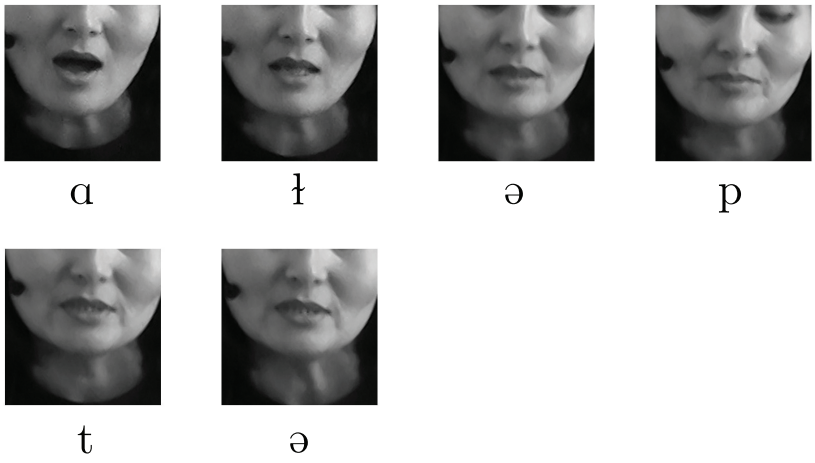


Figure 8: Still images of Speaker 2 producing *ɑɬəp-tə* 'giant-ACC'.

In Figure 5, note the difference between the high vowel in *qozə* 'lamb' and the second syllable high vowel in *qʊɬpʊ*. In *qozə*, the vowel surfaces as a schwa, with only a minor difference in F2 compared to the high vowel in *qazə* 'horse sausage.' Thus, rounding is affected by the character of the trigger in the [+back] context, where a [+high] vowel triggers post-initial rounding within a root, but a [-high] vowel does not.

4.2.3 Front vowels

As with the non-high back vowel, the non-high front vowel shows very little signs of categorical rounding. The acoustic distance between root [e] and [ø] is so great that the decrease in F2 caused by a round vowel is insufficient to approximate the formant values for initial [ø]. In later affixes, [e] is acoustically more centralized, part of the overall contraction of the vowel space post-initially.

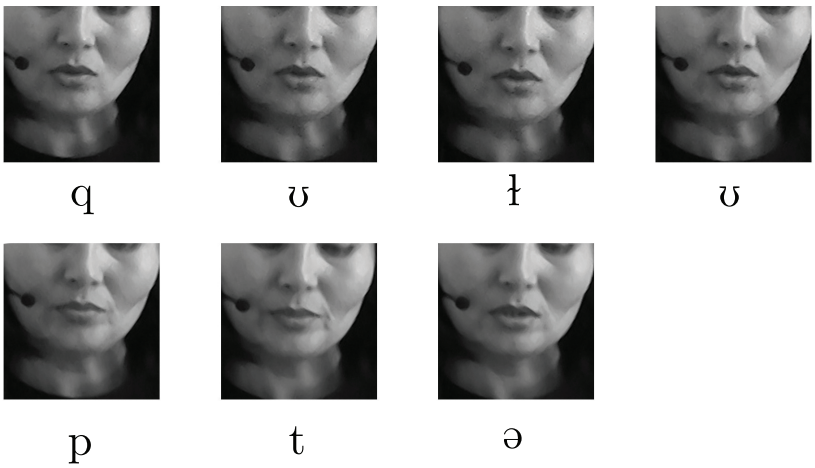


Figure 9: Still images of Speaker 7 producing *qʊɬʊp-tə̧* 'lock-ACC'.

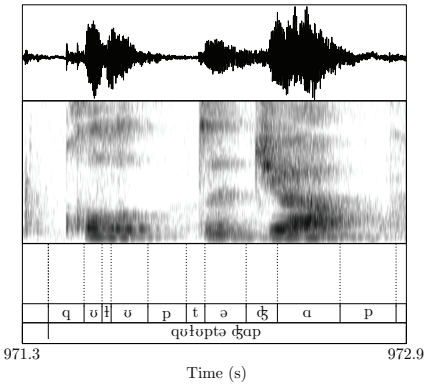


Figure 10: Waveform and spectrogram of Speaker 7 producing *qʊɬʊptə̧ ʤɑp 'Shut the lock.'*

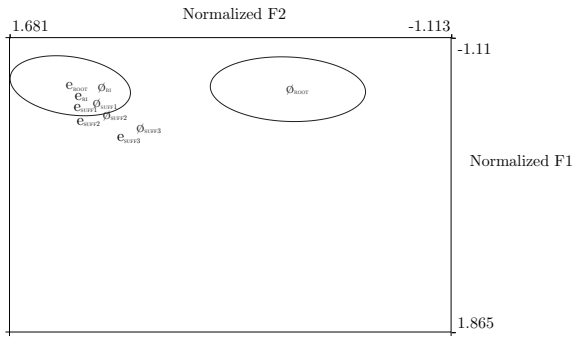


Figure 11: Plot of non-high front vowel roots (with 1 sigma ellipses) compared to post-initial means after [±round] roots

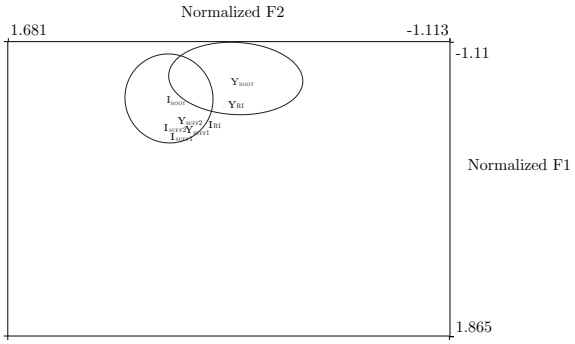


Figure 12: Plot of high front vowel roots (with 1 sigma ellipses) compared to post-initial means after [±round] roots

The realization of the high front harmonic vowel tends strongly towards [ɪ] in Figure 11, except root-internally. Within roots like *ʒʏzʏm* 'grape' and *kømʏr* 'coal', rounding occurs almost without exception. However, in other contexts lip rounding is rarely observed. Across morpheme boundaries rounding was more frequently attested in words like [kʏn-dʏ] 'day-ACC' or [kʏl-ʏp] 'laugh-CVB.' Continuing the trend of trigger-target dependencies noted above, rounding occurs more often and the effect of rounding is more pronounced after high triggers.

4.3 Contemporary Labial Harmony Outlined

In the sections above I addressed the quantitative measures used to characterize the effect of rounding on post-initial vowels, but these results, in and of themselves, do not directly speak to the contemporary status of Kazakh labial harmony in categorical terms. The following generalizations characterize the data collected, although there is very real inter-speaker variation. Vowels whose surface realization has changed since Korn's description are underlined below.

(4)	Previous description (Korn 1969)	My description	Gloss
	tøbø-lør	*tøbe̲-le̲r*	'hill-PL'
	ʒʏzʏm-dør	*ʒʏzʏm-de̲r*	'grape-PL'
	kømʏr-dʏ	*kømʏr-dɪ̲*	'coal-ACC'
	øt-tʏ-ŋ-dør	*øt-tɪ̲-ŋ-de̲r*	'pass-PST-2-PL'
	kʏn-dør	*kʏn-de̲r*	'day-PL'
	kʏl-dʏ	*kʏl-dɪ̲*	'laugh-PST.3'
	qʊłʊp-tʊ	*qʊłʊp-tə*	'lock-ACC'
	qozʊ-nʊ	*qoze̲-ne̲*	'lamb-ACC'
	qʊs-ta **qʊs-to*	*qʊs-ta*	'bird-LOC'
	qʊs-tʊ	*qʊs-te̲*	'bird-ACC'
	qozʊ-łar-də **qozʊ-łor-dʊ*	*qoze̲-łar-də*	'lamb-PL-ACC'

Generally, round vowels may surface in two contexts: in initial syllables, and among root-internal high vowels if the initial vowel is round. Among back vowels there is an additional

restriction- within roots, high vowels are rounded if the trigger vowel is also high. It is possible to construe rounding as a static co-occurrence restriction, and no longer a dynamic process in the language. However, viewing thie decay of rounding harmony along these lines does not explain why the rounding of root-internal vowels depends on vowel height. If all root vowels were lexically specified for roundness, then one would expect to find rounding of second syllable vowels in words like *tøbe* 'hill' *(*tøbø)* or *qozə* 'lamb' *(*qozʊ)*. Explaining the difference between high and non-high root-internal vowels is parallel to the well-known asymmetry in Turkish, where suffix vowel targets agree in roundness with the most proximate trigger if the target is high (e.g. Clements & Sezer 1982). Moreover, the distribution of round vowels within roots further parallels the distribution of round vowels in other related languages, like Kyzyl and Kachin Khakas (Korn 1969:102-103), as well as Chulym Tatar (Anderson & Harrison 2004). Kyzyl Khakas, for instance, prefers front and high vowel triggers, like Kazakh. With this in mind, the distribution of root-internal vowels in Kazakh, as in Tuvan (Harrison & Kaun 2000) is treated herein as the product of dynamic rounding harmony rather than a static co-occurrence restriction among roots.

Another reason to conclude that rounding harmony is still an active process in the language is the group of exceptions to the generalizations above. Apart from occasional exceptions that seem random, high, and occasionally non-high, post-initial vowels may be round if only one consonant intervenes between trigger and target. The frequency of this co-articulatory rounding is inversely proportioned to the duration of the intervening consonant, where the most likely consonants to allow the spreading of the lip rounding gesture are the shortest. In Kazakh, liquids are articulated with very brief obstruction of the oral cavity in Kazakh The rhotic is realized as a flap intervocalically, and the liquid is realized very similarly. The following forms are attested:

(5)

øl-ɣp ∼ *øl-ɪp*	'die-CVB'
kʏl-ɣp-tɪ ∼ *kʏl-ɪp-tɪ*	'laugh-PTCP-PST.3'
*kʏl-ø-*dɪ ∼ *kʏl-e-dɪ*	'laugh-NPST-3'
qʊɾ-ʊp ∼ *qʊɾ-əp*	'construct-CVB'
qʊs-əp **qʊs-ʊp*	'vomit-CVB'
qʊɾ-ʊɬ-ʊp ∼ *qʊɾ-ʊɬ-əp* ∼ *qʊɾ-əɬ-əp*	'construct-PASS-CVB'

I believe this rounding is a coarticulatory effect distinct from root-internal harmonic activity. Root-internally, intervening segments have no blocking effect on rounding. In fact, within a rounding harmonic domain, all segments are produced with rounded lips (Dzhunisbekov 1972; Abuov 1994; Vajda 1994). Spectral data from fricatives illustrates this effect, as high frequency noise is lowered in rounded segments (Fant 1971:64), as in [s] in *qʊs-tə* 'vomit-PST.3' below.

When the aperiodic noise of [s] in *qʊs-tə* and *qəs-tə* are compared (see Figures 13 and

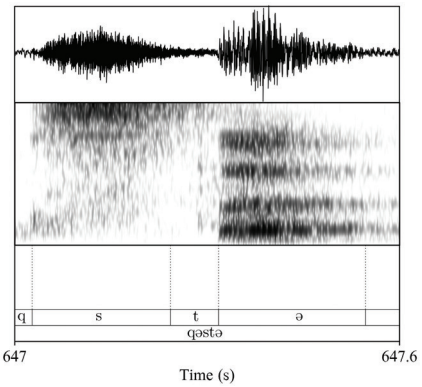


Figure 13: Waveform and spectrogram of Speaker 1 producing *qəs-tə* 'press-PST.3'

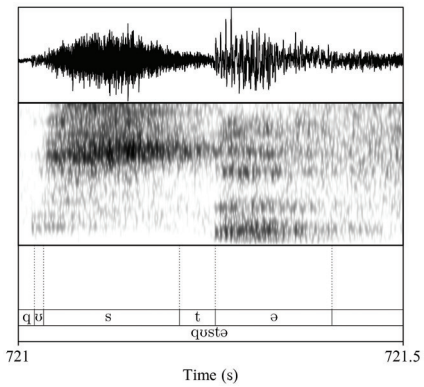


Figure 14: Waveform and spectrogram of Speaker 1 producing *qʊs-tə* 'vomit-PST.3'

14), a lower spectral peak is evident in the fricative after [ʊ]. When these spectral peaks at the midpoint of each fricative were analyzed using PRAAT's LPC function, a peak was found at 3453 Hz in *qʊs-tə*, and the corresponding peak in *qəs-tə* was at 5237 Hz. This same acoustic effect of rounding on fricatives is attested in Turkish (Ní Chiosáin & Padgett 2001).

In contrast to the labializing effect of round roots on root-internal fricatives, fricatives appear to block rounding of suffix vowels. As in (5), rounding of the high back suffix vowel in *qʊs-əp* 'vomit-CVB' (**qʊs-ʊp*) is unattested, but sometimes surfaces with words like *øl-ʏp* 'die-CVB' and *qʊɾ-ʊp* 'construct-CVB'. The difference between contexts where this coarticulatory rounding occurs is temporal. Consonants of longer duration, like fricatives, prevent rounding from affecting subsequent vowels. The liquids are produced with very short obstructions whereas the duration of the fricative is much longer. Between these two extremes stops and nasals both to varying degrees allow rounding of suffix vowels. In addition to the relative frequency of rounding of suffixes after liquids, rounding of non-high front vowels after a liquid is also sporadically attested, as in *kʏl-ø-dɪ*. Post-initial rounding of non-high vowels was almost never attested elsewhere in the data.[9] Rounding of the non-back vowel is unattested, even after liquids.

One more context-driven instance of rounding deserves mention. The only underlyingly specified suffix morpheme for [+round] is the deverbal gerundial suffix, GER. This suffix varies according to palatal context, surfacing as [ʏw] after front vowel stems, and as [uw] after back vowel stems. When a second syllable vowel occurs between a round root and GER it is almost always rounded, as in [qos-ʊɬ-uw] 'add-PASS-GET'. Even rounding after [o] generally obtains in this particular context. When additional consonants intervene, as in [qos-təɾ-uw] ∼ [qos-tʊɾ-uw] 'add-CAUS-GER', rounding is more variable. With other vowels this effect of intervening consonants is not noticeable, another indication of variable trigger strength. The gerundial suffix even triggers rounding of vowels after unrounded vowel roots when a high vowel immediately follows GER and is itself followed by a labial consonant, as in [kel-ʏw-ʏ-m] 'come-GER-POSS-1S', but not in [kel-ʏw-ɪ-ŋ] 'come-GER-POSS-2S'.

[9]These types of subphonemic effects have been noted in a variety of other languages, too, e.g. Laal (Lionnet 2013) and Kaska (Hansson & Moore 2014).

(6) *qos-tə̲ɾ-uw* ∼ *qos-tʊ̲ɾ-uw* ‘add-CAUS-GER’

kʏl-dʏ̲ɾ-ʏw ‘laugh-CAUS-GER’

øl-dʏ̲ɾ-ʏw ‘die-CAUS-GER’

qʊɾ-ʊ̲ɬ-uw ‘construct-PASS-GER’

qos-ʊ̲ɬ-uw ‘add-PASS-GER’

qas-uw-ʊ̲-m ‘scratch-GER-POSS-1S’

qas-uw-ə̲ ‘scratch-GER-POSS.3’
**qas-uw-ʊ̲*

kel-ʏw-ʏ̲-m ‘come-GER-POSS-1S’

kel-ʏw-ɪ̲-ŋ ‘come-GER-POSS-2S’
**kel-ʏw-ʏ̲-ŋ*

These instances demonstrate the combined coarticulatory effects of GER with round roots, as well as GER with adjacent [m]. No other labial consonants may occur in the appropriate context to trigger this type of rounding, but I assume that this effect would likely occur if the appropriate morphological environment were possible.

5 Analysis

5.1 Pathways of Decay

Throughout Section 4, I showed that labial harmony is greatly diminished in contemporary Kazakh. This reduction in rounding post-initially has occurred along two lines: domain contraction, where the active domain for rounding has been reduced from the word to the root, and the concomitant neutralization to [-round] outside the root and among non-high vowels. In this section I address these two interwoven aspects of this recent change.

5.1.1 Domain Contraction

As observed in Section 4.2.1, labial harmony “peters out” in contemporary Kazakh. Vowels that are closer to the word-initial vowel are more likely to be affected by rounding. Additionally, morphology interacts with harmony, with root-internal vowels more often being rounded than suffix vowels. Among suffixes, the occasional instances of rounding follow this same pattern, where first suffix vowels are more likely to be rounded than second suffix vowels. McPherson and Hayes use proximity as defined in Lexical Phonology (Kiparsky 1982), where an affix is more proximate to the root if its order with respect to another affix is fixed.

Thus, the plural morpheme in Kazakh is more proximate than case morphemes because the plural morpheme must precede case marking in the rightward construction of complex words in the language. The details of this approach are not explored herein, but offer a potentially-insightful approach to further analyzing the data. Rather than arguing for the relative proximity of any particular morpheme or stratum of morphemes, I only note that the harmonic domain is defined in morphological rather than phonological terms. In contrast to the Central dialect of Crimean Tatar (Kavitskaya 2010, 2013) and Karakalpak (Menges 1947), where the labial harmonic domain is two syllables, Kazakh defines the domain of harmony in a more restrictive way. In the Central dialect of Crimean Tatar and Karakalpak, rounding obtains for all eligible targets[10] within the two-syllable domain regardless of morphological constituency, as in (7) below. Kazakh only permits categorical rounding within a morpheme, so rounding across morphemic boundaries is generally prohibited.

(7)	Kazakh	Karakalpak	Crimean Tatar	Gloss
	mʊrʊ̲n	*mur̲un*	*bur̲un*	'nose'
	ʒuw-ə̲n-də̲	*ʤuv-u̲n-də̲*	*juv-u̲n-dɯ̲*	'wash-REFL-PST-3'

The contracted domain in contemporary Kazakh is, in effect, an another restriction on top of the two-syllable domain present in Karakalpak and Central Crimean Tatar. It seems likely that this additional restriction is a further landmark in the decay of labial harmony. Descriptions by Menges and Korn suggest that Kazakh used to round post-initial vowels more extensively, likely throughout the entire word. Dzhunisbekov's description, on the other hand, generally confines labial harmony to two-syllables, but no differences emerge from root-internal versus suffix vowels in his analysis. Thus, this further constraint on rounding is plausibly another indicator of the decay of this process in the language.

5.1.2 Neutralization

At the beginning of the 20^{th} century almost all Kazakhs spoke Kazakh as their first language. By the end of the Soviet era perhaps half had reasonable command of the language (Kirchner 1998; Dave 2002). The grammatical changes evident in many speakers is typical of language attrition scenarios. It is often argued that in these scenarios the phonological changes are typically simplificational in nature (e.g. Andersen 1982), and that these changes favor the unmarked (Campbell & Muntzell 1989). Therefore, for each [±round] pair neutralization should favor the unmarked. If markedness is defined along the lines ease of articulation, perception, and by extension, cross-linguistic frequency, the following generalizations should hold. Among front vowels, [ɪ] and [e] should be favored over [ʏ] and [ø], respectively. Among back vowels, similarly, [ə] and [o] should be preferred over [ʊ] and [ɑ].[11] However, in the non-

[10] In Crimean Tatar, only high vowels serve as targets, whereas in Karakalpak non-high vowels are also eligible targets if the root is a front vowel.

[11] I transcribe the high back unrounded vowel as [ə], as do Dzhunisbekov (1972) and Vajda (1994). Additionally, Johanson (1998:92-94) notes the lowering and centralization of the high vowels in Kazakh. However, most Turcologists transcribe this vowel as [ɯ].

high back context, the marked vowel, [ɑ] has historically surfaced instead of the less marked [o]. In the languages referenced in (6) above, it is likely than neutralization to [-round] in the high back environment also involves post-initial neutralization to the more marked segment . When comparing [u] to [ɯ] the infrequency of the [-round] vowel is clear from cross-linguistic data in Table 4 (from Moran et al. 2014; cf. de Lacy 2006:30-31).

Table 4. Kazakh harmonic vowels and their cross-linguistic frequency (Moran et al. 2014)

Vowel	Number of languages attested in (N=2155)	Frequency of attestation	Frequency compared to harmonic pair
ɑ	126	5.85	11.58/7.1x less frequent
o/ɔ	1459/894	67.7/41.48	
ə/ɯ	508/133	23.57/6.17	1.49x more/2.56x less
ʊ	341	15.82	frequent
e	1458	67.66	28.04/104.14x more
ø/ɵ	52/14	2.42/0.65	frequent
ɪ	362	16.8	30.17x more frequent
ʏ	12	0.57	

When the Kazakh data is considered, the language does exhibit a case of simplificational change, at least in some sense. The number of post-initial round vowels has been reduced from three to two, with a very limited distribution for those two vowels. However, a problem emerges when the typical view of markedness is invoked. The most marked vowels are, in fact, the vowels that continue to surface while unmarked vowels like [o] and [ʊ] are more likely to be neutralized in post-initial contexts. Walker (2013) notes this very issue for the treatment of Korn's Kazakh data. Framed in terms of constraints, the vowels that surface in the language support the following markedness hierarchy:

$$*\text{o} >> *\text{ø} >> *\text{ʊ} >> *\text{ʏ}$$

In the above hierarchy non-high rounded vowels are more marked than high rounded vowels and back vowels are more rounded than front rounded vowels. However, if cross-linguistic data is used to construct a markedness hierarchy, a conflicting hierarchy is generated

$$*\text{ʏ} >> *\text{ø} >> *\text{ʊ} >> *\text{o}$$

In the cross-linguistically informed hierarchy, front rounded vowels are more marked than back rounded vowels, and lax vowels are more marked than tense rounded vowels. The well-known generalization that back vowels tend to be round and front vowels tend to be unrounded, evident in the second hierarchy is flouted by the trajectory of this phonological change in Kazakh. The most marked vowels persist while the least marked vowels are neutralized. A segment-specific conception of markedness cannot adequately address this surprising trajectory of decay (McCollum 2015a; also Walker 2013).

5.2 Motivations for Decay

Harrison et al. (2002) attempt to model harmonogenesis as well as harmonic decay using an agents-based computational model. They successfully model a plausible S-curve reflecting the advent of harmony in Uzbek by using a variety of language-internal and social factors. However, their model fails to successfully model the decay of harmony. They view loanwords and vowel mergers as factors driving decay, and additionally note the likelihood of language contact in their model. Binnick (1991:38), however, contends that vowel harmony systems may be inherently unstable. Moreover, Dombrowski (2013) notes that other language-internal factors not included in Harrison et al.'s model, like underspecification, may contribute to the loss of harmony.

When labial harmony is viewed along perceptual lines (e.g. Kaun 1995), it is possible that underspecification accurately reflects a perceptual impoverishment of post-initial vowels. In Turkic languages, vowel height is the only intrinsically specified feature in a harmonic vowel. Backness and, to some degree, rounding are determined by the features of the root vowel. These alternating suffixes, as opposed to invariant morphemes, fall under Inkelas' criterion for being underspecified (1995; cf. Harrison & Kaun 2001). If alternating segments are actually underspecified (a notion that is inherently opposed to canonical Optimality Theory: Prince & Smolensky 1993; Smolensky 1996; Bakovic 2000), this underspecification runs counter to Lexicon Optimization. The argument is thus: a universal pressure is exerted on languages to fully specify all segments regardless of alternation. This pressure runs counter to the language-specific implementation of harmony. Following Dombrowski (2013), I suggest that this tension is a potential factor influencing the decay of harmony in Kazakh, where the underlying representations of post-initial vowels are perceptually impoverished as a result of harmony. Therefore, one byproduct of harmony, namely underspecification, potentially undermines the process from which it emerges, making vowel harmony an inherently unstable phenomenon, in accord with Binnick's earlier proposal.

6 Conclusion

Herein I have provided a contemporary description of labial harmony in Kazakh and the ways this harmonic process have changed since previous descriptions. Taking Korn (1969) as a starting point and subsequent mentions of decay (Dzhunisbekov 1972; Vajda 1994; Kirchner 1998; Kara 2002) as indications of the direction of change, I provided a bottom-up analysis of Kazakh data, modeling the effect of harmony in a mixed effects model as well as a discriminant analysis. The nature and trajectory of changes since Korn's description are then extrapolated from statistical findings to propose a description of the current working of labial harmony in the language. From this description multiple theoretical issues emerge: the morphological and phonological nature of harmonic domains, the pathways of neutralization, and underspecification as a potential motivation for decay. Addressing these questions from a variety of theoretical and experimental avenues may aid further research toward a fuller understanding of vowel harmony and harmonic decay.

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Reference to situation content in Uyghur auxiliary *bolmaq*

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This paper introduces the Uyghur auxiliary *bolmaq* (or *bol-*), and offers an account for its meaning by which it links the situation that it describes to certain propositional content in the discourse. In essence, the auxiliary is used when the described event satisfies some of that content, thus providing a role for content outside of attitude contexts. We explore and test our account using targeted elicitation, and are able to pinpoint very subtle effects that previous accounts overlooked.

1 Observations

We begin by introducing the auxiliary *bol-* and the pertinet facts concerning it and the Uyghur language.

1.1 Uyghur auxiliaries

Uyghur is a minority language of China, in the Turkic family. It has an extensive set of auxiliaries that have been impressed from lexical verbs. These auxiliaries follow the verb, which is marked with an *-İp* suffix.

(1) Subj Obj V-Suffix **Aux**-TAM-Agr

(2) *Alim nan-ni ye-p* ***baq**-ti-∅*
Alim bread-ACC eat-*İp* **look at**-PAST-3S
'Alim tried to eat the bread'

Often, the auxiliary's lexical meaning has been completely bleached. For instance, the lexical verb *baq*, 'look at' is used in (2) as an auxiliary meaning 'try to'. Table 1 presents a list of 5 of the 20 auxiliaries that follow this pattern.

verb root	lexical use	auxiliary use
baq	look at	try to V
két	go	unexpectedly V
tur	stand	keep V'ing
chiq	go up	not thoroughly V
al	take	take the chance to V

Table 1: Subset of Uyghur auxiliaries

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The auxiliary form bears a strong surface resemblance to converbial forms, because both employ *-İp* marking on the verb. However, their meanings are quite distinct. In (3), the first two uses of converb *-İp* adds a new event and pushes the narration forward. The use of *-İp* with *oqu-p* does not, because it has an auxiliary (*bol-*, which itself bears a converbial *-İp*). The last use, on *qayt* 'return', is a converbial use that links two verbs under a single event description.

(3) *men mektep-ke bér-**ip**, ders oqu-p bol-**up**, qayt-**ip** kel-di-m*
I school-DAT go-IP class read-IP AUX-IP return-IP come-PAST-1S
'I went to school, took the class, and went back.'

1.2 Auxiliary *bol-* and what it doesn't mean

Out of these nearly two dozen auxiliaries, this paper focuses solely on *bol-*. As a lexical verb it means 'become'.

(4) *Alim er **bol**-di-∅*
Alim man **become**-PAST-3S
'Alim became a man'

As an auxiliary, though, its meaning is rather more subtle. (Tömür 2003: 425) describes it as indicating that the described event was "carried out in full." Later, (Bridges 2008: 37) describes it as showing that "the action definitely happened and was completed". This kind of meaning can be characterized as 'completive', and it was based on cases like (5), where the *bol*-marked event is complete.

(5) *kél-idighan-lar-ning hämmi-si kél-ip **bol**-di-∅, majlis-ni*
come-IMPF-PL-GEN everyone-3S.POSS come-IP **bol**-PAST-3 meeting-ACC
bashla-yli
begin-1P.OPT
'All who are coming have arrived, so let's begin the meeting.'

However, event completion cannot form a definitive component of the meaning of auxiliary *bol-*, since it can be used with events that failed to culminate (6), or with events that have yet to culminate (7).

(6) *bu kitab-ni oqu-p **bol**-mi-di-m*
this book-ACC read-IP **bol**-NEG-PAST-1S
'I haven't read this book / I didn't read this book'

(7) *Ete bu kitab-ni oqu-p **bol**-imen*
tomorrow this book-ACC read-IP **bol**–FUT.1S.COP
'Tomorrow, I will finish this book'

If completion is not the crucial factor, what is? One might suspect volition— the event is caused willingly by the agent. That suspicion cannot account for context where you don't know there even was an agent, yet *bol-* is felicitous.

Context:
You and a friend enter a room you haven't been in. You look and see a window with a hole in it.

(8) *derize buz-ul-up* ***bol****-di-∅*
window break-PASS-IP **bol**-PAST-3s
'The window's broken.'

It also cannot account for cases where *bol-* is infelicitous even with clear agent intent.

(9) *# dëngiz-gha besh minut qara-p* ***bol****-du-m*
sea-DAT five minute look at-IP **bol**-PAST-1s
'I looked at the ocean for five minutes'

The failure of (9) suggests at first a role for telicity in the distribution of *bol-*. However, the auxiliary is often infelicitous despite clear lexical telicity, *e.g.*, the semelfactive in (10) and the achievement in (11).

(10) *# yötel-ip* ***bol****-du-m*
cough-IP **bol**-PAST-1s
'I coughed'

(11) *# put-um-ni sun-dur-up* ***bol****-du-m*
leg-1s-ACC break-CAUS-IP **bol**-PAST-1s
'I broke my leg'

These examples reinforce the point that completion is not a crucial factor for *bol-*, for *contra* the characterization of Bridges (see above), these actions definitely happened and were completed, yet *bol-* is infelicitous.

1.3 Context-dependency and methodology

These facts let us rule out a number of possible meanings for *bol-*, but while they narrow our domain of inquiry, the central question remains unresolved. A crucial step in the right direction emerges from observations demonstrating that the use of *bol-* depends on the context, not selection by the predicate. The same sentence is infelicitous given the context of (12), but fine with the context of (13).

Context:
You were in a meeting and you coughed, causing some embarrassment.

(12) *# yötel-ip* ***bol****-du-m*
cough-IP **bol**-PAST-1s
'I coughed'

Context:
You got an annual physical, and the doctor asked you to cough.

(13) ✓ *yötel-ip* ***bol****-du-m*
cough-IP **bol**-PAST-1s
'I coughed'

Since the context makes such a distinct difference in felicity of *bol-*, our investigation will rely on semantic fieldwork techniques focused on targeted, context-based elicitation (Matthewson 2004; Bochnak and Matthewson 2015). This will allow us to narrow down our truth-conditions and elucidate a meaning.

Our elicitations were carried out over the fall of 2014, at the University of Kansas. The tasks involved were judgment, production, or translation. In our testing, each sentence involved recounting things that had happened in the context provided, as if the speaker were telling a friend about it the next day. Exceptions to this method are noted. The context below exemplifies this technique for English, with a judgment task. The aim of this example is to test the truth-conditions of existential quantifiers, to gain negative evidence. The context thus sets up a scenario where the hypothesized truth-conditions aren't met, so sentences asserting that they are met should be rejected by any native speaker, while those that meet the conditions will be accepted. That is, we predict (14a) to be infelicitous and (14b) to be felicitous, and that is precisely the result we get.

Context:
You entered the coffeeshop carrying nothing.

(14) a. *# I carried a box into the coffeeshop.*
b. ✓ *I went in to the coffeeshop empty-handed.*

Applying this method, we quickly found that *bol-* is felicitous for other infelicitous examples we've seen, depending on the context. Events of breaking one's leg can be described with *bol-* if they're on purpose (16), but not if they're on accident (15). The sentences are identical, but their judgments are not.

Context:
You tripped and broke your leg yesterday.

(15) *# put-um-ni sun-dur-up* ***bol****-du-m*
leg-1s-ACC break-CAUS-IP **bol**-PAST-1s
'I broke my leg'

Context:
You are trying to avoid army service, and realized that being hurt would get you out of having to do it. So you decided to break your leg, and succeeded.

(16) ✓ *put-um-ni sun-dur-up* ***bol****-du-m*
leg-1s-ACC break-CAUS-IP **bol**-PAST-1s
'I broke my leg'

As pointed out, though, volition does not suffice, as it does not license *bol-* in (17). If it is satisfying doctor's orders, though, *bol-* is accepted.

Context:
You were walking along the beach and turned to look at the ocean a bit.

(17) # *déngiz-gha besh minut qara-p* ***bol****-du-m*
ocean-DAT five minute look at-IP **bol**-PAST-1S
'I looked at the ocean for five minutes'

Context:
Your doctor included in your treatment plan that you should look at the ocean for five minutes every day.

(18) # *déngiz-gha besh minut qara-p* ***bol****-du-m*
ocean-DAT five minute look at-IP **bol**-PAST-1S
'I looked at the ocean for five minutes'

1.4 A generalization

Given these different contexts, we can draw up a generalization over the felicitous ones. What brings these together?

(19) **Generalization**

- Part of a checklist (physical exam)
- Part of a self-made scheme (get out of the army)
- Part of an imposed regimen (doctor's orders)

In each case, the event is contributing to the completion of some intended outcome or some list that must be completed. Perhaps, then, *bol-* is referring to this outcome or list.

Before drawing up an actual hypothesis, we make one additional observation. The listener must be aware of the outcome or list that the speaker is referring to. Otherwise, *bol-* is infelicitous.

Context:
You plan to get hurt to get out of army service, and you keep it a secret. You break your leg, and the next day, your friend sees you in a cast and asks what happened.

(20) # *put-um-ni sun-dur-up* ***bol****-du-m*
leg-1S-ACC break-CAUS-IP **bol**-PAST-1S
'I broke my leg'

One audience member at BLS 41 inquired whether the causative in the leg-break examples was playing a role in the felicity of *bol-*. However, the distinction in judgments between (16) and (20) demonstrate that direct causation is not the crucial factor. Instead, contextual factors beyond the event itself are what matter.

2 Analysis

Our analysis will employ the following heuristic: Given a proper framework and testing method, we should be able to derive all the uses and functions of *bol-* from its denotation and structure (McKenzie 2014). We will propose the following claim:

(21) **Basic claim:**
The Uyghur auxiliary *bol-* can be used only if the described event satisfies the content of an anaphoric situation.

We discussed our testing method in section 1.3, so we will now lay out our framework.

2.1 Framework: Situation semantics

We employ a possibilistic situations semantics (Kratzer 1989, 2007), which is much like the now-standard semantic framework from Heim and Kratzer, supplemented by a class of objects known as situations. A situation is defined as a part of a possible world. Situations thus include events, individuals, locations, and worlds. For this paper, we will focus on event-like situations.

Table 2: Ontology

S	= the set of situations
W	= the set of all possible worlds ($W \subseteq S$)
$\wp(S)$	= the set of propositions (the power set of situations)
$\wp(W)$	= the set of world-based propositions (the power set of worlds)

Situations are represented in syntactic structures by silent pronouns (Stanley and Szabó 2000; Percus 2000), and can be anaphoric or bound. Propositions are defined as properties of situations (not just of worlds):

(22) $[\![\textit{It's raining}]\!]$ = λs. it's raining in s

Assertions involve Functional Application of a proposition to a situation (the part of the world the assertion is made about). This use of situations is known as a topic situation, paralleling Klein's (1994) topic time. In (23), the identity of the situation s_1 restricts the assertion to whatever part of the world is at issue. Facts about any situation besides s_1 are irrelevant for the computation of truth-conditions of (23).

(23) $[\![s_1\ \textit{It's raining}]\!]$ = [λs. it's raining in s](s_1) = it's raining in s_1

The process is the same as that which occurs when one asserts that Garfield loves lasagna— The DP meaning $[\![\textit{Garfield}]\!]$ restricts the assertion to facts about Garfield. Facts about other individuals are irrelevant.

2.2 A first attempt at an analysis

For our first attempted analysis, we begin with the observations in (19), that each felicitous use of *bol-* involves a part of some other situation: The cough situation is part of a check-up situation, and so forth. The first proposal is that *bol-* denotes a part-of relation between an event situation (s_E) and an outcome situation (s_O).[1]

(24) **(Not final) definition of *bol-***
$[\![bol\text{-}]\!] = \lambda s_E \lambda s_O .\ s_E \leq s_O$

If the plan is complete, (24) is suitable as a meaning for *bol-*. However, when the plan is not complete, defining *bol-* with a simple part-of relation runs afoul of our observations. Notably, it cannot apply to scenarios where the event situation is part of a plan that has not come to fruition. For instance, in our leg-break scenario (16), if the leg-break is complete, but the rest of the plan is not, the use of *bol-* is still felicitous.

The reason this is problematic has to do with the nature of situations. Defined as they are, as parts of a possible world, no situation can be part of more than one possible world. Likewise, no situation can be part of a situation that is not a part of its world. Applied to our example, it renders (24) untenable. If the event situation has happened, it is in the actual world. If the plan is not complete, then the complete plan situation is not (yet) in the actual world. Therefore, the event situation cannot be part of the complete plan situation. We cannot save this by proposing that the event situation is in the actual situation corresponding to the incomplete part of the plan situation, since we only shift the problem— the actual incomplete part cannot be a part of the non-actual plan situation.

Although the event marked with *bol-* can be generalized descriptively as describing part of a larger event, formally, an event situation cannot be part of an unrealized plan situation.

2.3 Content situations & satisfaction

The generalization in (19) is that each event is part of a plan situation, which the listener is aware of, but which might not yet be completed. One interesting fact we observe about this is that the outcomes of these plans might not be real, but the formulations of the plans are. We will thus be able to link the event situation to the plan via its formulation.

We will forge this link between event situations and plan formulation situations via the content of the latter. The formulation (or acceptance) of a plan or a list is a situation that has propositional content; the content is the plan or list itself. We build the notion of situations with content upon observations that individuals have content as well (Kratzer 2006; Moulton 2009).

(25) *The **rumor** that the governor will resign*
content : The governor will resign

(26) *The **claim** that the mayor will replace her*
content : The mayor will replace her

[1] Strictly speaking, this definition does not specify the type of situations involved; the description as 'event situation' and 'outcome situation' are mnemonic names to summarize the idea at hand.

Situations can have content as well, and that content consists of a set of propositions. In the case of a formulation situation, the content is the plan or list itself.[2] We will need to show how to get from a situation to its content. Kratzer's idea is to sever the modality of attitudes from the attitude predicates, instead placing it in the complementizer. The sense of content here is of a single proposition, which serves as the argument to the complementizer, which equates the worlds the proposition holds in with the set of worlds compatible with the content-bearing individual (or situation).

This approach serves well when the content is reduced to one proposition, and when compatibility is required. But with *bol-*, we propose contents that consist of a set of propositions. Let us define a function CONT from situations to some particular set of propositions.

(27) **Situation content:**
For any situation with content s_c,
$\textsc{cont}(s_c)$ = the set of propositions serving as the content of s_c.

The membership of $\textsc{cont}(s_c)$ depends on the nature of s_c. If our formulation situation creates the leg-break plan, the content (i.e. the plan) would be the smallest set of propositions that must hold for the intended outcome of the scheme to take place. An example of this is in (28).

(28) a. s_c = the formulation of the scheme

b. $\textsc{cont}(s_c) = \left\{ \begin{array}{l} \{ s \mid \text{I leave home in } s \}, \\ \{ s \mid \text{I have a broken leg in } s \}, \\ \{ s \mid \text{I check in with the army in } s \}, \\ \{ s \mid \text{I get an exemption in } s \} \end{array} \right\}$

Another distinction between this approach to content and that of Kratzer and Moulton is that we do not need full compatibility. In a modal sentence where the prejacent is the intended outcome of s_c, the worlds where the outcome obtains will be all those compatible with $\textsc{cont}(s_c)$. For instance, the content would serve as the modal base for a sentence like *I will break my leg*. Speakers of a language expect the entirety of a modal base to hold when making modal suppositions. But with *bol-*, one can't guarantee that the entire content holds— *e.g.*, breaking your leg does not entail the success of the rest of the scheme. Instead, only *some* propositions in $\textsc{cont}(s_s)$ hold, so our meaning cannot rely on modality, or even compatibility. We need to relate the proposition to the content in a different way.

We propose the relation of **content satisfaction** instead:

(29) **Content Satisfaction**
A situation s satisifies the content of a situation s_c if and only if $s \in \cup\textsc{cont}(s_c)$

Note that this is a relation between situations. If a situation exemplifies or holds of a proposition, it satisfies the content of any situation whose content contains that proposition. For instance, realizing any single part of the plan in (28b) will satisfy the content of the formulation situation in (28a). Our account of *bol-* will rely on this relation.

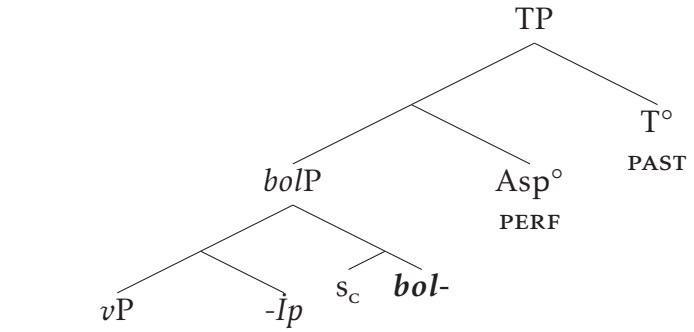
[2]It may end up being more accurate to say that the formulation situation produces an individual that contains content, rather than to say that the situation itself contains content.

2.4 The denotation of *bol-*

Before we provide an ultimate denotation for *bol-*, we will need to situate it in the syntactic structure. The structure in (29a) lays this out, based on (16). The verb phrase is the complement of *-İp*, which we analyze as a simple conjunction of propositions.[3] The first argument of *bol-* will be the content situation, then *bol-* (whose category we leave undefined) will merge with the *-İp*-marked *v*P, below the inflectional projections.

(16) *putumni sundurup boldum* 'I broke my leg'

a.



b. $[\![v\text{P}]\!] = \lambda s.\ \text{break(leg)(I)(s)} : \langle s, t\rangle$

c. $[\![\text{-İp}]\!] = \lambda p \lambda q \lambda s.\ \text{p(s) \& q(s)} : \langle\langle st\rangle, \langle st, st\rangle\rangle$

Given this structure, let us define a content satisfaction relation SAC that takes two situations, s and s_c, where s_c has content, and asserts that s satisfies the content of s_c.

(30) $[\![\text{SAC}]\!] = \lambda s_c \lambda s.\ s \in \cup\textsc{cont}(s_c)$. Only defined if s_c has content.

With this function and structure, we can now define *bol-* as expressing that the event situation satisfies the content of an anaphoric content situation.

(31) **The denotation of the auxiliary *bol-***

$[\![bol\text{-}]\!] = \lambda s_c \lambda s.\ \text{SAC}(s_c)(s) : \langle s, \langle s, t\rangle\rangle$
Only defined if s_c has content.

The composition proceeds as follows:

1. The first argument of *bol-* is a pronoun referring to the anaphoric content situation s_c.

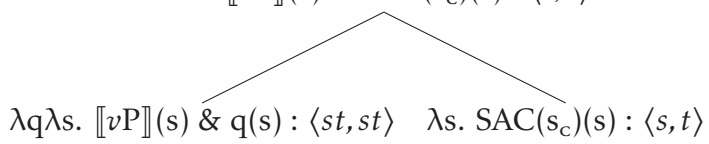
(32) $\lambda s.\ \text{SAC}(s_c)(s) : \langle s, t\rangle$

s_c $[\![bol\text{-}]\!]$

[3]Recall that propositions in a situation semantics are simply properties of situations; these include constituents much smaller than sentences, like verb phrases and adverbials.

2. Then, $[\![bol]\!](s_C)$ is plugged into the *-İp*-marked clause, creating an event description that is linked to the content situation.

(33)



The following examples exemplify this step for some of the examples we've seen so far.

(34) Cough as part of medical checkup (ex. (13))
   a. $[\![s_L]\!]$ = acceptance of physical list
   b. CONT(s_L) = the checklist for the physical
   c. $[\![bol\text{P}]\!]$ = λs. cough(I)(s) & SAC(s_L)(s)

(35) Leg-break scheme (ex. (16))
   a. $[\![s_S]\!]$ = adoption of scheme to get out of the army
   b. CONT(s_S) = the scheme
   c. $[\![bol\text{P}]\!]$ =λs. break(leg)(I)(s) & SAC(s_S)(s)

(36) Ocean-looking (ex. (18))
   a. $[\![s_D]\!]$ = delivery of doctor's orders
   b. CONT(s_D) = the doctor's orders
   c. $[\![bol\text{P}]\!]$ = λs. looked-at(ocean)(I)(s) & SAC(s_D)(s)

3. After that, the rest of the extended verbal projection takes place normally. The content situation's runtime is independent of the event runtime or the topic time. (37) is an example with past tense, while (38) has a (simplified) modal future.

(37) *put-um-ni sun-dur-up* ***bol**-du-m*
leg-1S-ACC break-CAUS-IP **bol**-PAST-1S
'I broke my leg'
   a. $[\![bol\text{P}]\!]$ = λs. break(leg)(I)(s) & SAC(s_C)(s) : ⟨s, t⟩
   b. $[\![(37)]\!]$ = λs. $s \prec s_U$ & ∃s′[$s' \leq s$ & $[\![bol\text{P}]\!](s')$]

(38) *Ete bu kitab-ni oqu-p* ***bol**-imen*
tomorrow this book-ACC read-IP **bol**–PROG-1S.COP
'Tomorrow, I will finish this book'
   a. $[\![bol\text{P}]\!]$ = λs. finish(this book)(s) & SAC(s_C)(s) : ⟨s, t⟩
   b. $[\![(38)]\!]$ = λs. ∀w[future(s)(w) → ∃s′[$s' \leq w$ & $[\![bol\text{P}]\!](s')$]]

2.5 Listener awareness

As we saw in (20), felicitous use of *bol-* requires that the listener be aware of the content. This is derived by the presupposition on the satisfaction relation. Since SAC is defined only if s_c has content, use of *bol-* brings about a presupposition failure when either there is not content, or the content is not known to all speech act participants.

2.6 Negation

As we would expect, the preupposition of *bol-* is not affected by negating the event situation, nor is the anaphoric nature of the content situation. For example, (39) presupposes some content, and asserts that there is no event of me reading this book which satisifes that content.

(39) *bu kitab-ni oqu-p* ***bol****-mi-di-m*
this book-ACC read-IP **bol**-NEG-PAST-1S
'I haven't read this book / I didn't read this book'
a. $[\![bol\text{P}]\!] = \lambda s.\ \text{read(this book)(s)} \ \&\ \text{SAC}(s_c)(s) : \langle s, t\rangle$
b. $[\![\text{NegP}]\!] = \lambda s.\ \neg\exists \mathbf{s}'[\ s' \leq s\ \&\ [\![bol\text{P}]\!](s')\ ]$

One fact does at first appear to present a problem to our account: The satisfaction condition cannot be negated at all, despite being in a conjunction in the scope of negation. Speaker reports indicate that (39) does not mean that you read the book, but not to satisfy some content. Another example demonstrates the point:

Context:
You're talking to your friend about Tömür's Uyghur Grammar. He tells you that he read it for a class. You read it, too, but not for any particular purpose, just for fun. So you reply:

(40) # *bu kitab-ni oqu-p* ***bol****-mi-di-m*
this book-ACC read-IP **bol**-NEG-PAST-1S
'I read that book (but not to satisfy any particular content)'

However, this observation falls out from the denotation of *bol-* in (31). In (40), there is no particular content the speaker has in mind. In that case, there is no particular content situation generating that content. Consequently, there is no argument for *bol-*, which leaves it unsaturated. That fact makes it uninterpretable.

2.7 Summary of the analysis

In this section, we have offered a novel analysis of the Uyghur auxiliary *bol-*, employing context-based elicitation to narrow down the truth-conditions, and a theoretical framework to shape its composition. The auxiliary indicates a relation between content situations and event situations, such that the event satisfies the content of the content situation. Consequently, the use of *bol-* does not depend on the nature of the event description itself, but rather on the link to some anaphoric content situation.

This account explains the distribution of *bol-* that we've seen. It makes a set of predictions as well— these will be detailed in the next section. We can use context-based elicitation to test those predictions.

3 Testing predictions

Our account of *bol-* provides a clear hypothesis that makes a number of predictions about particular types of contexts that determine the felicity of *bol-*. We can test these by building contexts exemplifying these types.

3.1 Content need not be specifically satisfied

The definition of content satisfaction relies on a proposition holding of a situation. This predicts that the event situation might not specifically exemplify the content proposition, but could still satisfy it.[4] For instance, if the content proposition is vague, like 'something bad will happen to you,' then any particular situation making that proposition true will satisfy the content.

In (41), a prediction involves bad things happening. If something happens, even completely by accident, that makes the prediction true, and you can describe it with *bol-*. Essentially, the leg-break event (s_E) satisfies the content of the prophesy.

Context:
A soothsayer tells you and your friend that three bad things will happen to you tomorrow. You both laugh it off, but the next day, you trip and break your leg.

(41) *put-um-ni sun-dur-up* ***bol****-du-m*
leg-1s-ACC break-CAUS-IP **bol**-PAST-1s
'I broke my leg'

a. s_P = the prophesy

b. $\textsc{cont}(s_P) = \left\{ \begin{array}{l} \{ s \mid \text{one bad thing happens to you in } s \}, \\ \{ s \mid \text{a second bad thing happens to you in } s \}, \\ \{ s \mid \text{a third bad thing to you happens in } s \} \end{array} \right\}$

c. $\text{SAC}(s_P)(s_E) = 1$

The satisfaction of vague propositions is a predicted effect of our analysis of *bol-*, and the prediction is confirmed.

3.2 Itinerary effects

Another prediction concerns itineraries. Events satisfying the completion of an itinerary are predicted to allow *bol-*, and that is what we find.

[4]Technical clarification: The event situation need not exemplify the proposition in the sense of Kratzer (2007), or be a minimal situation in the sense of Heim (1990).

Imagine you are taking a trip across Xinjiang province, from Hoten to Ürümchi, the capital. You take the following itinerary, from left to right.

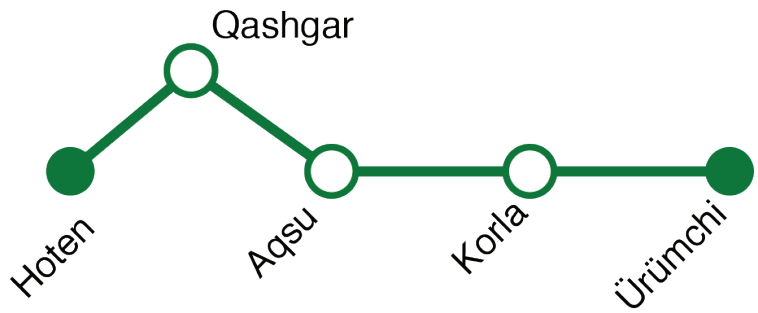


Figure 1: Itinerary from Hoten to Ürümchi

The formulation of this itinerary would be a particular situation; let's call it s_I. Its content would be the following set of propositions:

(42) $\textsc{cont}(s_I) = \left\{ \begin{array}{l} \{ s \mid \text{we leave from Hoten} \}, \\ \{ s \mid \text{we travel to Qashgar} \}, \\ \{ s \mid \text{we travel to Aqsu} \}, \\ \{ s \mid \text{we travel to Korla} \}, \\ \{ s \mid \text{we travel to Ürümchi} \} \end{array} \right\}$

Steps in a succesful voyage along this itinerary can be described with *bol-*.

Context:
You are traveling from Hoten to Ürümchi through these cities. Along the way, you reach Aqsu, after passing through Qashgar. At that point, you call home, and while explaining your journey so far, you say:

(43) *Qashgar-gha bér-ip* ***bol****-du-q*
Kashgar-DAT go-IP **bol**-PAST-1P
'We went to Kashgar' $\quad \textsc{sac}(s_I)(s_E) = 1$

On the other hand, we predict that *bol-* cannot be used to describe unexpected situations arising that don't satisfy the content of the itinerary. This is the case:

Context:
You were planning to take the shortcut from Hoten to Aqsu, but it was blocked. So instead, you had to go through Kashgar instead (Figure 2). You're telling your friend, who thought you were taking the shortcut:

(44) # *Qashgar-gha bér-ip* ***bol****-du-q*
Kashgar-DAT go-IP **bol**-PAST-1P
'We went to Kashgar' $\quad \textsc{sac}(s_I)(s_E) = 0$

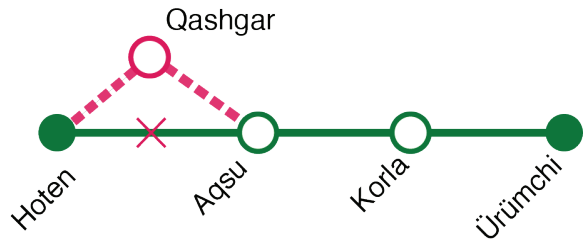


Figure 2: Detour itinerary

3.3 Serendipitous Accidents

The examples we've discussed where *bol-* is felicitous all involve volition. However, our denotation does not specify for it. Consequently, an accidental situation is predicted to be able to satisfy the content if it is relevant. This prediction holds.

In (45), you plan to wreck your car on purpose (Let's call the plan's formulation s_P). But before you could, an accident wrecked it for you. The wreck event can be described with *bol-*.[5]

Context:
You have a plan to wreck your car to get a new one with the insurance money. You told your friend two days ago that you'd do it in a week. But yesterday, someone hit your car.

(45) *mashina-m soq-ul-up* ***bol****-di-∅*
car-1s smash-PASS-IP **bol**-PAST-3s
'I got in a wreck' (*lit.* 'my car got smashed') $\text{SAC}(s_P)(s_E) = 1$

Another instance of this involves our leg-break scheme again. If an accident does the job for you, *bol-* can be felicitous.

Context:
You have a plan to get out of army service. You told your friend two days ago that you'd break your leg in a week. But yesterday, a car hit you.

(46) *put-um-ni sun-dur-up* ***bol****-du-m*
leg-1s-ACC break-CAUS-IP **bol**-PAST-1s
'I broke my leg' $\text{SAC}(s_S)(s_E) = 1$

(47) a. s_S = scheme

b. $\text{CONT}(s_S) = \left\{ \begin{array}{l} \{ s \mid \text{I leave home in } s \}, \\ \{ s \mid \text{I have a broken leg in } s \}, \\ \{ s \mid \text{I check in with the army in } s \}, \\ \{ s \mid \text{I get an exemption in } s \} \end{array} \right\}$

[5]Nothing rules out having content that specifies that the actions be conducted on purpose; in those cases, *bol-* should be infelicitous with accidents.

3.4 Apparent counterexamples

Some examples we discovered seemed at first to violate the predictions made by our denotation in (31). For instance, if you planned to go through Korla on the way to Ürümchi, and had to cancel your plan, but still went to Korla, *bol-* is infelicitous, despite accidentally satisfying the content.

Context:
You are near Korla on the way to Urumchi and your kid gets sick. You cancel the rest of your trip. You drive him to the hospital in Korla. You call home, your spouse asks "Are you in Urumchi?" You reply:

(48) # *Yaq, Korla-gha kél-ip* ***bol****-du-q*
No, Korla-DAT come-IP **bol**-PAST-1P
'No, we went to Korla'

The reason that (48) is infelicitous is not the fact that the content is satisfied, but the fact that the content is no longer at issue. That is, the content has been withdrawn, so s_I is not being plugged into a function like CONT or SAC. Lacking that, *bol-* lacks its first argument and is uninterpretable. This solution leads to its own prediction: If you reestablish a new content situation, *bol-* will become felicitous. This prediction holds, as in (49), where an old plan is scrapped and a new one put into place; the listener is aware of the new plan.

Context:
You are near Korla on the way to Urumchi and your kid gets sick. You call home, tell your spouse, who says "Take him to the hospital in Korla." So you do, and the next day you update your spouse:

(49) *Korla-gha kél-ip* ***bol****-du-q*
Korla-DAT come-IP **bol**-PAST-1P
'We went to Korla'

Another apparent exception occurs in instances where *bol-* is felicitous even if the event seems to be related to no apparent content. This is especially the case when there is no purpose involved, or if the event is a surprise.

Context:
You jump out of a plane to skydive. But your parachute doesn't open and you land hard, breaking all your bones.

(50) *Men hemme ustixan-lar-im-ni sun-dur-up* ***bol****-du-m*
I all bone-PL-1S-ACC break-CAUS-IP **bol**-PAST-1S
'I broke every bone in my body!'

Context:
You and a friend are watching a boat approaching, when it suddenly sinks. Once it's fully under the waves, you say:

(51) *Kéme chök-üp* ***bol****-di-∅*
boat sink-IP **bol**-PAST-3S
'The boat (completely) sank.'

Each of the examples we elicited like this involve the entire theme of the event. That observation will be the key to understanding the use of *bol-* in (50) and (51).

If content situations are presupposed, we expect them to be accommodatable, and in these instances, that's what is happening. Accommodation of a content situation is aided if the content is:

- Immediately salient (*i.e.*, the speaker and listener are witnesses)
- Involves an incremental theme (where the content propositions each represent an increment)
- All the propositions in the content are true (the entire theme is involved)

For instance, we can imagine the content of the accommodated content situation in (51) to contain the following propositions.

(52) $\textsc{cont}(s_c) = \left\{ \begin{array}{l} \{ s \mid \text{the bow sinks in } s \}, \\ \{ s \mid \text{the beam sinks in } s \}, \\ \{ s \mid \text{the bridge sinks in } s \}, \\ \{ s \mid \text{the stern sinks in } s \} \end{array} \right\}$

Likewise, if the listener is not a witness, the content situation should be less easily accommodated, to the point that *bol-* becomes infelicitous. This is the case— if you are talking to someone on the phone when the boat sinks before your eyes, *bol-* is infelicitous.

This accommodation may be the source of the 'completive' readings in (Tömür 2003) and (Bridges 2008). Each of their cases involves immediately salient completions of incremental events. What they supposed to be the common case turns out to the be the rare one.

3.5 Summary

This section has explored predictions of the account of *bol-* laid out in section 2. *Bol-* is felicitous if the event situation doesn't exemplify the content propositions, or if the event situation only accidentally satisfies the content. It is infelicitous with unplanned events that do not accidentally satisify the content. And lastly, a content situation can be accommodated under certain circumstances, and this accommodation can license the use of *bol-* when no content situation is in the discourse.

4 Overall Recap and Outlook

This paper has offered an account of the Uyghur auxiliary *bol-*. While the literature describes it as expressing completion, our targeted elicitation has revealed that it actually

indicates content satisfaction. The content is introduced by an anaphoric situation, and linked to an event description conjoined with the ⟦*v*P⟧ (31). This account makes predictions, which further elicitation has confirmed.

Looking forward, the use of content situations demonstrates a role for content outside of attitude contexts, cementing the notion that contents should not be linked to attitude predicates. It also highlights the role of subtle contextual restriction in determining morpheme denotations.

The present inquiry can be expanded in a number of directions. Synchronically, we are expanding the study by sending out a questionnaire to Uyghur speakers in Xinjiang province, to rely on numbers to tease out various effects. We also intend to apply the same methodologies to other Uyghur auxiliaries, and also check cognate auxiliaries in Turkic. For instance, preliminary conversations with Turkish speakers suggest similar effects in that language with the auxiliary *olmak*.

Also, Uyghur provides a rare opportunity to expand this study diachronically. Indeed, team member Gülnar Eziz's dissertation will explore the development of *bol-* and other auxiliaries over the years, focusing on corpora of Uyghur from a century ago and beyond.

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Case-Marking in Estonian Pseudopartitives

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1 Introduction

The examples in (1) and (2) exemplify what I will call pseudopartitives in Estonian.[1]

(1) hargi-täis$_{N1}$ põhku$_{N2}$
pitchfork-ful.nom straw.par
'a/the pitchforkful of straw' (ekss, entry for *hargitäis*)

(2) parv$_{N1}$ pääsukesi$_{N2}$
flock.nom swallow.pl.par
'a/the flock of swallows' (Nemvalts 1996:69)

The examples in (1) and (2) are the simplest kinds of pseudopartitives, containing only two nouns. The first noun (N1) serves a quantifying or measuring role, broadly speaking, like *hargitäis* 'pitchforkful' in (1). The second noun (N2) serves as a substance being measured or quantified, like *põhku* 'straw' in (1). Though I will largely focus on simple pseudopartitives, some examples of slightly more complex constructions are presented in (3) and (4).

(3) parv väikesi laevu ja kalapaate
flock.nom little.pl.par ship.pl.par and fishing.boat.pl.par
'a flock of little ships and fishing boats' (ekss, entry for *parv*)

(4) terve rida ne-id loomi
whole row dem.pl.par animal.pl.par
'an entire range of these animals' (parliament)

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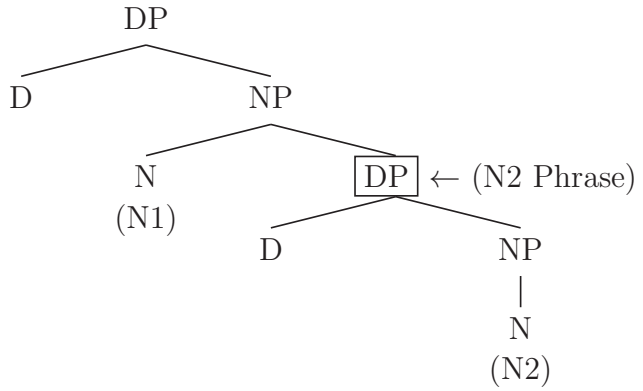
[1]Gloss abbreviations are as follows: 1 *first person*, 2 *second person*, 3 *third person*, abe *abessive case*, acc *accusative case*, ade *adessive*, all *allative case*, com *comitative case*, dat *dative case*, dem *demonstrative*, ess *essive case*, gen *genitive case*, ill *illative case*, imp *imperative*, ine *inessive case*, inf *infinitive*, nom *nominative case*, par *partitive case*, pl *plural number*, pst *past tense*, sg *singular number*, ter *terminative case*, trl *translative case*.

Naturally occurring examples have their sources indicated: an Estonian language dicionary (ekss), a corpus of Estonian parliamentary transcripts (parliament), and a balanced literary corpus containing equal parts journalism, fiction, and academic writing (balanced). All of these resources are available online at `http://www.keeleveeb.ee/`. Unannotated examples are from my fieldwork unless otherwise indicated.

In these examples, the "N2" is syntactically complex, thus it is perhaps more appropriate to refer to it as the N2 PHRASE rather than simply N2. In (3), the entire phrase *väikesi laevu ja kalapaate* 'little ships and fishing boats' is the N2 phrase. In (4), the entire phrase *neid loomi* 'these animals' is the N2 phrase. N2 phrases like these show the same case-marking alternations as pseudopartitives with simple N2 phrases.

For concreteness, the structure I assume for Estonian pseudopartitives is shown in (5).

(5)



In the Estonian pseudopartitive, I assume N1 is an N^0 taking a DP complement, the N2 phrase. The specifics of this structure are not the focus here, so I will not present direct arguments for it, but see Norris (2014:168–180) for argumentation.

The focus of this paper is on a case-marking alternation which is visible on the N2 phrase, as exemplified in (6) and (7).

(6) tükk leiba
piece.NOM bread.PAR
'a piece of bread' PARTITIVE PATTERN

(7) tüki-le leiva-le
piece-ALL bread-ALL
'onto a piece of bread' MATCHING PATTERN

In (6), we see that N2 *leiba* 'bread' bears partitive case, while N1 *tükk* 'piece' bears nominative case. Because N2 is marked with partitive case, I refer to this state of affairs as the PARTITIVE PATTERN. On the other hand, we have (7), where both N1 and N2 bear the same case; in (7), it is allative, but other cases show this same pattern. Because N2 matches the case of N1, I refer to this state of affairs as the MATCHING PATTERN. At its core, this alternation is about the case-marking on N2, so I will call it the N2 CASE ALTERNATION.

The goal of this paper is to precisely characterize and analyze the N2 case alternation. I will argue that the choice of case pattern can be determined on the basis of case-marking on N1. Further, I will show that the matching pattern and the partitive pattern are mutually exclusive and exhaustive. That is to say, they are the only case patterns seen in pseudopartitives, and the case pattern that a pseudopartitive shows can be predicted based solely on the case borne by N1. I will then argue that the alternation arises due to the syntax of case assignment, not the morphological mechanisms of case realization (*cf.* Brattico 2011; Pesetsky 2013).

More concretely, I will propose that partitive case in Estonian pseudopartitives is an **unmarked case** (in the sense of Marantz (1991)), assigned to caseless complements of N^0

heads. Under this proposal, the N2 case alternation becomes a matter of timing. The matching pattern arises because the independently necessary rule of case concord applies before unmarked partitive can be assigned, so unmarked partitive is unnecessary. The partitive pattern arises because the cases that show the partitive pattern are assigned after unmarked partitive is assigned—too late to affect case-marking internal to the pseudopartitive.

The paper proceeds as follows. I will describe the full range of case patterns in section 2, showing where the matching and partitive patterns appear and motivating the generalization that the case pattern exhibited by a pseudopartitive can be determined on the basis of the case-marking on N1. I will then argue against a morphological analysis in section 3 before proposing a syntactic alternative in section 4. In section 5, I will conclude.

2 Characterizing the N2 case alternation

As I have hinted thus far, the case pattern that a pseudopartitive shows seems to be based on the case-marking borne by N1. We saw in the introduction that a nominative N1 yields the partitive pattern (as in (6)), and an allative N1 yields the matching pattern (as in (7)). The full distribution of case patterns for Estonian pseudopartitives is given in Table 1 below. Before proceeding I want to make two observations about the distribution of case-marking exhibited in the table.

N1 Case	*Pseudopartitive*	*Pattern*	*Translation*
NOMINATIVE	tükk leiba	PARTITIVE	'a piece of bread'
GENITIVE	tüki leiba /	PARTITIVE	'of a piece of bread'
	tüki leiva	MATCHING	'of a piece of bread'
PARTITIVE	tükki leiba	(*can't tell*)	'a piece of bread'
ILLATIVE	tüki-sse leiva-sse	MATCHING	'into a piece of bread'
INESSIVE	tüki-s leiva-s	MATCHING	'in a piece of bread'
ELATIVE	tüki-st leiva-st	MATCHING	'out of a piece of bread'
ALLATIVE	tüki-le leiva-le	MATCHING	'onto a piece of bread'
ADESSIVE	tüki-l leiva-l	MATCHING	'on a piece of bread'
ABLATIVE	tüki-lt leiva-lt	MATCHING	'off of a piece of bread'
TRANSLATIVE	tüki-ks leiva-ks	MATCHING	'for/into a piece of bread'
TERMINATIVE	tüki leiva-ni	SUSPENDED	'until a piece of bread'
ESSIVE	tüki leiva-na	SUSPENDED	'as a piece of bread'
ABESSIVE	tüki leiva-ta	SUSPENDED	'without a piece of bread'
COMITATIVE	tüki leiva-ga	SUSPENDED	'with a piece of bread'

Table 1: Case patterns for the pseudopartitive *tükk leiba* 'piece of bread' (to be revised)

First, note that until now, I have only made reference to two patterns, but Table 1 contains a third pattern termed SUSPENDED. In the suspended pattern, the case-marker appears only on N2, and N1 bears genitive case. This is an obstacle to my claim that the only patterns are the partitive pattern and the matching pattern. Second, note that an N1 with genitive case apparently exhibits both the matching pattern and the partitive pattern. This is an obstacle to my claim that the partitive pattern and matching pattern

are mutually exclusive. That is to say, it is a difficulty for the claim that the case pattern can be determined solely on the basis of the case-marking on N1.

In this section, I will show that these difficulties are only superficial. Following Nevis (1986), I will argue that the cases showing the suspended pattern are not cases, but morphologically-dependent postpositions. Like most postpositions, their complement appears in genitive case, which explains the fact that N1 bears genitive case in the suspended pattern, as we shall see. As for the fact that genitive case apparently shows two case-marking patterns, I will propose that morphological genitive in Estonian is essentially two different cases: genitive and accusative. True genitive exclusively shows the matching pattern, and accusative exclusively shows the partitive pattern.

2.1 The last four cases are postpositions

The first obstacle to discuss is the presence of a third case pattern, which I termed the suspended pattern in Table 1. This pattern is exhibited by the terminative, essive, abessive, and comitative. These cases are typically written last in traditional case paradigms, and they are commonly called the LAST FOUR CASES. I will adopt this terminology for convenience. In pseudopartitives, they all show a pattern that is distinct from the matching pattern and the partitive pattern. Some examples are below.

(8) Oli-me taas **tüki leiva-ta.**
be.PST-1PL again piece.GEN bread-ABE
'We were once again without a piece of bread.' (Erelt et al. 1993:145)

(9) Õpetaja läks **rühma õpilas-te-ga** muuseumi.
teacher go.PST.3SG group.GEN student-PL-COM museum.ILL
'The teacher went to the museum with a group of students.' (Erelt et al. 1993:145)

What we see with the last four cases is that N2 bears a special case marker (abessive *-ta* in (8) and comitative *-ga* in (9)). N1 bears genitive case. Under the tentative assumption that the last four cases are cases, these examples clearly do not show the matching pattern, because the case-marking on N1 is distinct from the case-marking on N2. These examples also clearly do not show the partitive pattern, since partitive case is nowhere to be found. They appear to show a unique pattern, which I have thus far called the SUSPENDED PATTERN.

The suspended pattern exhibited by pseudopartitives marked by the last four cases is actually visible even in a normal DP:

(10) noore(*-na) ajakirjaniku-na
young.GEN journalist-ESS
'as a young journalist'

(11) nende(*-ga) suur-te(*-ga) hoone-te-ga
these.PL.GEN big-PL.GEN building-PL-COM
'with these big buildings'

The marking seen in the above examples is identical to the marking seen in pseudopartitives. The last word in the DP bears the case marker, and any preceding modifiers showing concord surface in genitive case. So, the peculiar marking seen in (8) and (9) is not localized to

pseudopartitives—it is a general fact about the last four cases in Estonian. The explanation I will adopt for this peculiar aspect of the last four cases is once again a departure from traditional descriptions: I propose that the last four cases are not "cases" at all, but phonologically dependent postpositions that assign genitive case to their complements. Because most morphological case forms are based on a stem that is identical to the genitive anyway, the end result is that these suffixes look like case forms of the word they attach to. I will call this the POSTPOSITION analysis, as opposed to the traditional CASE analysis.

There is a conspiracy in Estonian that makes it difficult to distinguish between the postposition analysis and the case analysis. First, let me note that genitive is the most common case assigned by postpositions in Estonian. Ehala (1994) conducted a corpus study of the usage of adpositions in 1905, 1972, and 1992. From that sample about 98% of postpositional usages have a genitive complement (Ehala 1994). Some examples are given below.

(12) Kardina-d on [akna **ees**].
curtain-PL.NOM be window.GEN front
'The curtains are in front of the window.' (EKSS, entry for *ees*)

(13) mehe **kohta**
man.GEN about
'about a man' (EKSS, entry for *kohta*)

In contrast to postpositions, prepositions are not dominated by genitive marking to the same degree. Even so, the figures Ehala (1994) provides still show that genitive is the most common among usages, at 38.4%, with partitive case second at 29.3% (see Figure 2, p. 181). Put simply, it is normal for adpositions to assign genitive case in Estonian.

This fact becomes relevant when viewed in light of the morphological decomposition of cases in Estonian. With the exception of the nominative and partitive, cases in Estonian are based on what looks like a genitive stem (see Table 2). This is true for the last four cases, but

Stem	*Ending*	*Case*	*Translation*
tigu		NOMINATIVE	'snail'
teo		GENITIVE	'snail's'
teo	-le	ALLATIVE	'(on)to a snail'
teo	-ga	COMITATIVE	'with a snail'
laud		NOMINATIVE	'table'
laua		GENITIVE	'table's'
laua	-le	ALLATIVE	'(on)to a table'
laua	-ga	COMITATIVE	'with a table'

Table 2: Case morphology in Estonian

it is also true for the other seven "semantic cases" in the language: illative, inessive, allative, ablative, adessive, allative, and translative. This means that if the last four cases are cases, then their forms will be based on a genitive stem. If the last four cases are postpositions, they will (most likely) take genitive complements. After they become attached to their hosts, they will look like case markers on a genitive stem. In other words, individual word forms cannot distinguish between the case analysis and the postposition analysis. However, there

are two facts about the distribution of the last four cases that are immediately explained if they are postpositions but must be stipulated if they are lumped together with the other Estonian cases.

First, recall that the last four cases are only realized on the rightmost element in a DP (which is generally the head noun):

(10) noore(*-na) ajakirjaniku-na
young.GEN journalist-ESS
'as a young journalist'

(11) nende(*-ga) suur-te(*-ga) hoone-te-ga
these.PL.GEN big-PL.GEN building-PL-COM
'with these big buildings'

Note that it is indeed morphologically possible for adjectives and demonstratives to host the comitative marker whenever they are the rightmost element inside a DP (and identical observations could be made about the terminative *-ni*, essive *-na*, and abessive *-ta*):

(14) Sina võta suur nukk ja mina mängi-n **väikese-ga.**
you take.IMP.2SG big doll and I play-1SG little.GEN-COM
'You take the big doll and I'll play with the little one.'

(15) Ma ole-n **selle-ga** rahu-l.
1SG be-1SG this.GEN-COM peace-ADE
'I am happy with this.'

Because there is no overt noun in (14) or (15), *-ga* attaches to whatever happens to be rightmost.

In this respect, the last four cases are just like postpositions and unlike case markers. Postpositions are always adjacent to the rightmost element in the DP, and true cases must be marked on all the modifiers showing concord.

(16) Postpositions appear rightmost:

a. kollase (*kohta) teo kohta
yellow.GEN snail.GEN about
'about a/the yellow snail'

b. suure (*ees) mäe ees
big.GEN hill.GEN front
'in front of a/the big hill'

(17) Cases appear on all modifiers showing concord:

a. selle*(-s) suure*(-s) maja-s
this-INE big-INE house-INE
'in this big house'

b. nende*(-ks) inimes-te-ks
these.PL-TRL person-PL-TRL
'for these people'

Treating the last four cases as postpositions thus immediately explains why they only occur once in the DP whereas the other elements appear in genitive case.

The second context where normal cases and postpositions show divergent behavior is in marking in coordinate structures, as noted by Nevis (1986). Postpositions can either appear in both conjuncts or only in the right conjunct.

(18) Postpositions:

a. isa ees ja ema ees
father.GEN front and mother.GEN front
'in front of father and in front of mother'

b. isa ja ema ees
father.GEN and mother.GEN front
'in front of father and mother'

There is a straightforward explanation for these facts. In (18a), what we see is coordination of full PPs; in (18b), there is a single P^0 taking a coordinated DP as a complement. Case concord ensures that the case assigned by the preposition in (18b) is marked on both conjuncts.

In contrast, normal cases must appear on both conjuncts. This is represented below for the allative *-le*.

(19) a. isa-le ja ema-le
father-ALL and mother-ALL
'to father and to mother'

b. * isa ja ema-le
father.GEN and mother-ALL
Intended: 'to father and mother'

This receives a straightforward explanation with the understanding that nominals in Estonian show case concord when these normal cases are involved. Thus, if the entire coordination receives allative case, case concord will ensure that each individual conjunct is marked with allative case as well. (19b) is ungrammatical because the conjuncts fail to show case concord.

It is known within the traditional literature (Erelt et al. 2000:519) that the last four cases behave like postpositions in coordinate structures—marking on the first conjunct is optional:

(20) jõe(-ni) ja metsa-ni
river(.GEN)-TER and forest(.GEN)-TER
'as far as the river and the forest' (Nevis 1986)

(21) maalikunstniku(-ga) ja skulptori-ga
painter(.GEN)-COM and sculpter(.GEN)-COM
'with a painter and a sculpter' (Erelt et al. 2000:519)

The endings of the last four cases can be left out of the first conjunct just like with normal postpositions, but unlike true cases.

Taking stock, the last four cases have the following distributional properties: (i) they do not show full concord in normal DPs, and (ii) in coordination, they are only obligatorily marked on the rightmost conjunct. It seems that the last four cases are more similar to

postpositions than they are to true cases. I thus propose that the last four cases are, in fact, postpositions. They assign genitive case to their complements, and postsyntactically, they attach to the element on their left. The variation in (20) and (21) is structural, just as with postpositions.

It is worth commenting on another diagnostic that Nevis uses to argue for the adpositional status of the last four cases, because it concerns pseudopartitives. Citing the examples in (22)–(24), he observes that the head of a pseudopartitive (=N1) "cannot be separated from its complement by a postposition or [one of the last four cases]."

(22) * See on tüki ees leiba
it be.3 piece.GEN in.front.of bread.PAR
Intended: 'It is in front of the piece of bread.' (Nevis 1986:83)

(23) * See läks tüki-ni leiba.
it go.PST.3SG piece(.GEN)-TER bread.PAR
Intended: 'It went up to the piece of bread.' (Nevis 1986:83)

(24) * See on tüki-ga leiba.
it be.3 piece(.GEN)-COM bread.PAR
Intended: 'It is with the piece of bread.' (Nevis 1986:83)

Indeed, examples like those in (22)–(24) are sharply ungrammatical. Nevis notes that speakers must use alternative structures to express the intended meetings given above. However, the alternative structures he suggests do not include the fully grammatical examples where N1 is marked genitive and N2 bears one of the last four cases.

(25) See läks tüki leiva-ni.
it go.PST.3SG piece.GEN bread(.GEN)-TER
'It went up to the piece of bread.'

(26) See on tüki leiva-ga.
it be.3 piece.GEN bread(.GEN)-COM
'It is with the piece of bread.'

When we were still operating under the assumption that the last four cases were true case markers, we referred to this as the suspended pattern: the "case" morpheme is suspended until N2. In light of the postpositional analysis of the last four cases, we can hold that N1 and N2 in fact bear the same case-marking in (25) and (26): genitive. This means that the last four cases show the matching pattern (because N1 and N2 must match in case). Because the last four cases are actually postpositions assigning genitive case to their complements rather than true cases themselves, anything that we say from this point forward about the behavior of genitive case should extend to DPs bearing one of the last four cases as well.

2.2 Morphological genitive has two sources in Estonian

This brings us to the second issue with the distribution of case patterns in Estonian pseudopartitives. When N1 of a pseudopartitive bears morphological genitive case, the pseudopartitive can either show the matching pattern or the partitive pattern. Thus, the following strings are well-formed pseudopartitives in Estonian:

(27) a. tüki leiba
piece.GEN bread.PAR
'a piece of bread'

b. tüki leiva
piece.GEN bread.GEN
'a piece of bread'

This fact is an obstacle to the claim that the case pattern of a pseudopartitive in Estonian can be wholly determined on the basis of the case-marking of N1. In other words, it is an obstacle to the view that the case patterns in Estonian pseudopartitives are mutually exclusive. However, there is reason to believe that this problem is only apparent. In order to see this, we must take a moment to look into object case-marking in Estonian, and I will turn to this now.

There is a distinction made in Finnic linguistics between "total objects" and "partial objects." The distribution is affected by many factors— see Tamm 2007 for a thorough discussion of the alternation in Estonian. We will simplify things here, as what is relevant for us is simply that there is a distinction. The alternation is connected to nominal semantics on the one hand and verbal semantics on the other. A partial object is one that is **either** (i) quantitatively indefinite, or (ii) the object of an ongoing (i.e., atelic) action. A total object is an object that is **both** (i) quantitatively definite and (ii) the object of a completed (i.e., telic) action (Tamm 2007). The distinction manifests in the case-marking of the object. Partial objects are always marked with partitive case. Traditionally, total objects are described as showing a split: singular objects surface in genitive case, but plural objects surface in nominative case (Erelt et al. 1993, 2000). This is summarized in Table 3 and some examples are given in (28) and (29).

	Total	*Partial*
Singular	GEN	PAR
Plural	NOM	PAR

Table 3: Morphological case of transitive objects in Estonian

(28) Total objects:

a. Heiko luge-s raamatu läbi.
HeikoNOM read-PST.3SG book.GEN through
'Heiko read a/the book (and he finished it).'

b. Heiko luge-s raamatu-d läbi.
HeikoNOM read-PST.3SG book-PL.NOM through
'Heiko read some/the books (and finished them).'

(29) Partial objects:

a. Heiko luge-s raamatu-t.
HeikoNOM read-PST.3SG book-PAR
'Heiko was reading a book.'

b. Heiko luge-s raamatu-id.
Heiko$_{\text{NOM}}$ read-PST.3SG book-PL.PAR
'Heiko was reading some books.'

This section will be devoted to an exploration of the marking of total objects. The glosses in the examples in (28) are unquestionably morphologically accurate: *raamatu* 'book.GEN' is the genitive singular form of *raamat*, and *raamatu-d* is the proper nominative plural form. There are no distinct word forms in Estonian that can be identified as the more familiar case for objects cross-linguistically, ACCUSATIVE.

However, this is not true for some of Estonian's close genetic relatives. From a morphological perspective, an accusative can be identified for Finnish, but it is only weakly present.[2] The structural cases in Finnish (following Kiparsky (2001)) are given in Table 4. Note that

	'bear'		'he, they'	
	Singular	Plural	Singular	Plural
Nominative	karhu	karhu-t	hän	he
Accusative	karhu, karhu-n	karhu-t	häne-t	he-i-dä-t
Genitive	karhu-n	karhu-j-en	häne-n	he-i-dä-n
Partitive	karhu-a	karhu-j-a	hän-tä	he-i-tä

Table 4: Finnish structural cases (Kiparsky 2001)

nouns do not have a distinct accusative form in Finnish. For singular nouns, the so-called ∅-accusative is identical to the nominative, and the so-called *n*-accusative is identical to the genitive. The choice between the ∅-accusative and the *n*-accusative is traditionally described as being governed by JAHNSSON'S RULE:

(30) JAHNSSON'S RULE (informal): Verbs which have no overt subjects govern the ∅-accusative; verbs with overt subjects govern the *n*-accusative (Kiparsky 2001:317).

In contrast to common nouns, pronouns do have a distinct accusative form, marked by *-t*. Some examples are provided in (31).

(31) Finnish accusative:

a. Anna Mati-n näh-dä karhu / sinu-t!
let.IMP Matti-GEN see-INF bear-ACC / you-ACC
'Let Matti see the(/a) bear / you!' (Kiparsky 2001:317)

b. Matti anta-a häne-n näh-dä karhu-n / sinu-t.
Matti.NOM let-3SG him-GEN see-INF bear-ACC / you-ACC
'Matti will let him see the(/a) bear / you.' (Kiparsky 2001:317)

In (31a), the common noun *karhu* is in the form traditionally described as the ∅-accusative.[3] In (31b), it is in the *n*-accusative form, which is identical to the genitive. Note, however,

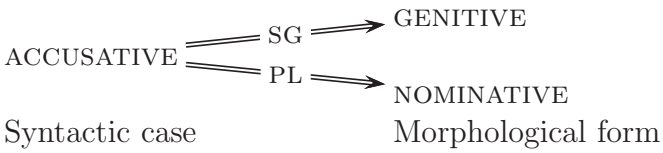
[2] Ariste (1968) also identifies an accusative in Vod/Votic, but like Finnish, it is largely morphologically syncretic (pp. 54–55). Ariste notes that the first and second person plural pronouns have an accusative with a separate marker (*-d/t*) in only a few villages. Otherwise, it exhibits the same nominative/genitive syncretism as Estonian and Finnish.

[3] Kiparsky (2001) actually glosses *karhu* in (31a) as nominative, following many others who treat the ∅-accusative as nominative. I have chosen the more traditional gloss of accusative for reasons of simplicity.

that the pronoun is in the distinct accusative form in both examples. I will not discuss the details of Kiparsky's (or any others') analysis of the Finnish structural case system— it suffices to note that the language has a morphological form corresponding to traditional accusative case.

The slightly more distantly related Saami languages also have fairly clear evidence for an accusative case. The accusative in Skolt Saami is syncretic with genitive in the singular, but illative (not nominative) in the plural (Feist 2010). The accusative in Northern Saami is syncretic with genitive for everything except some numerals and the pronoun meaning *what* (Nickel 1990:69). The accusative in Pite Saami is indicated by *-v* (singular) and *-jt* (plural), morphemes which are unique in the case paradigm presented by Wilbur (2014:93). There are thus good reasons for proposing an accusative case from a genealogical perspective. If Estonian had an accusative case, this would be the case that is assigned to total objects, and possibly only total objects if it is anything like the Finnish accusative. However, Estonian accusative would be purely syntactic— its actual morphological realization would be genitive in some instances and nominative in others.

(32)



In fact, this is the position analysis that Caha (2009), Hiietam (2003) and Tamm (2007) argue for.[4] Hiietam gives a number of arguments for treating direct object genitives and direct object nominatives as distinct from true genitives and nominatives.[5] I will not review her arguments here; they are certainly suggestive of a distinction, but I believe they are compatible with either an accusative analysis of Estonian objects or one that does not make use of an accusative. Instead, I want to provide what I believe is a novel argument from pseudopartitives in favor of treating direct object genitive as distinct from true genitives. The examples are not new, but their relevance for the accusative hypothesis has not been discussed, so far as I know. First, note that pseudopartitives in the position of true genitives (i.e., possessors or objects of adpositions) show the matching pattern: both N1 and the N2 phrase are in genitive case.

(33) Pseudopartitives as objects of adpositions show the matching pattern:

a. Putukas roomas ümber klaasi vee / *vett.
bug.NOM crawl-PST.3SG around glass.GEN water.GEN / water.PAR
'A/the bug crawled around a/the glass of water.'

b. Kui palju sa koti kartuli-te / *kartule-id eest
how much you.NOM bag.GEN potato-PL.GEN / potato-PL.PAR for
mak-si-d?
pay-PST-2SG
'How much did you pay for the bag of potatoes?' (Erelt et al. 1993:145)

[4]Tamm calls the case TOTAL CASE (for 'total object' case), but she still crucially distinguishes it from genitive/nominative in the language.

[5]See Miljan 2008 for a rebuttal.

(34) Pseudopartitives as possessors show the matching pattern:

a. Kolmandiku tordi / *torti hind oli kaks
third.GEN tart.GEN / tart.PAR price.NOM be.PST.3SG two.NOM
rubla.
ruble.PAR
'The price of a third of a tart was two rubles.' (Erelt et al. 1993:145)

b. enamiku inimes-te / *inimesi soov
majority.GEN people-PL.GEN / people.PL.PAR wish.NOM
'[the majority of people]'s wish' (Erelt et al. 1993:142)

In both circumstances, the N2 phrase must be genitive. This is true whether N2 is singular, as in (33a) and (34a), or plural, as in (33b) and (34b). Genitive case-marking in pseudopartitives behaves uniformly across these two common contexts for genitive case in Estonian: it always results in the matching pattern. If the genitive case borne by objects is the same as the case borne in these positions, then we expect direct object genitives to show the matching pattern as well.

This prediction is not borne out. When a pseudopartitive is assigned "genitive" in direct object position, N1 still bears genitive case, but the N2 phrase cannot. Instead, it must be partitive.

(35) Pseudopartitives as total objects show the partitive pattern:

a. Juku suusata-s tüki maa-d / *maa.
Juku.NOM ski-PST.3SG piece.GEN land-PAR / land.GEN
'Juku skiied a piece of land (i.e., an unspecified distance)' (Erelt et al. 1993:142)

b. Tõi-n koti kartule-id / *kartuli-te.
bring.PST-1SG bag.GEN potato-PL.PAR / potato-PL.GEN
'I brought a bag of potatoes.' (Erelt et al. 1993:145)

Thus, whether the N2 is singular as in (35a) or plural as in (35b), it must be marked with partitive case. This is different from genitives assigned to possessors and genitive assigned by adpositions. The existence of this split suggests that not all genitives have the same status in the language; there is something special about the total object genitive case that sets it apart from other instances of genitive. I propose that this generalization be captured in the syntax by adopting the view that Estonian does have an accusative case. To be concrete, the case assigned to total objects is not genitive/nominative, but a (covert) accusative. The examples from (35) are thus more properly glossed as follows:

(35) a. Juku suusata-s tüki maa-d.
Juku.NOM ski-PST.3SG piece.ACC land-PAR
'Juku skiied a piece of land (i.e., an unspecified distance)' (Erelt et al. 1993:142)

b. Tõi-n koti kartule-id.
bring.PST-1SG bag.ACC potato-PL.PAR
'I brought a bag of potatoes.' (Erelt et al. 1993:145)

Making this move allows us the possibility of treating the distribution of the matching pattern and the partitive pattern as truly being about the properties of individual cases. If we do not separate morphological genitive into two cases—accusative and genitive—we cannot properly state the generalization about marking in the N2 case alternation without reference to both (i) the particular case, and (ii) its syntactic function or position of the pseudopartitive, i.e., whether it is in direct object position or some other genitive position.

2.3 The case-marking of N1 determines the case pattern

If we adopt the two proposals about the Estonian case system outlined in the preceding sections, we can state the choice between case patterns in terms of case-marking on N1. If N1 is nominative or accusative, the pseudopartitive will show the partitive pattern. Otherwise, it will show the matching pattern. This revised distribution is presented below in Table 5. This is significant, because the case-marking on N1 always reflects the case-marking of the

N1 Case	*Pseudopartitive*	*Pattern*	*Translation*
NOMINATIVE	tükk leiba	PARTITIVE	'a piece of bread'
ACCUSATIVE	tüki leiba	PARTITIVE	'a piece of bread'
PARTITIVE	tükki leiba	(*can't tell*)	'a piece of bread'
GENITIVE	tüki leiva	MATCHING	'of a piece of bread'
ILLATIVE	tüki-sse leiva-sse	MATCHING	'into a piece of bread'
	⋮		

Table 5: Case patterns for the pseudopartitive *tükk leiba* 'piece of bread' (final version)

entire pseudopartitive constituent. Thus, the case pattern a pseudopartitive exhibits can be linked directly to its case. With this established, we are ready to consider possible analyses. I will begin with a morphological approach along the lines of Pesetsky's (2013), and we will see that it is not able to account for the N2 case alternation in a straightforward way.

3 A realizational analysis of the N2 case alternation

In a recent monograph, Pesetsky (2013) analyzes a case-marking alternation in Russian numeral phrases that is very similar to the N2 case alternation. The basic pattern is presented below.

(36) a. dva nov-yx stol-a
two.NOM new-GEN.PL table-GEN.SG
'two new tables' (Pesetsky 2013:28)

b. k dv-um xoroš-im stol-am
to two-DAT.PL good-DAT.PL table-DAT.PL
'to two good tables' (Pesetsky 2013:35)

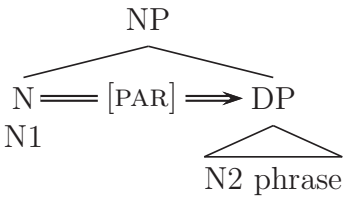
When the entire numeral construction is in a nominative (or accusative) position, the adjective and noun are marked genitive.[6] This is the Russian equivalent of the partitive pattern.

[6]There is a number distinction as well in the Russian examples—the adjective is plural while the noun is apparently singular. See Pesetsky (2013) for more discussion.

When the entire construction is in another environment, e.g., dative, then all of the elements are marked with that case: the Russian equivalent of the matching pattern.

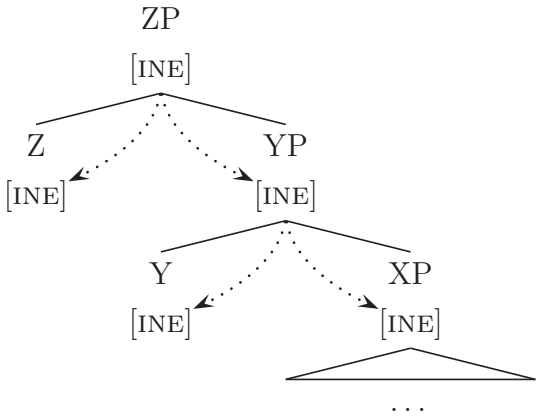
Some of the specifics of Pesetsky's analysis are particular to the Russian pattern, but the basic idea of the analysis can be ported over to Estonian fairly straightforwardly. Assume first that the partitive case sometimes borne by the N2 phrase is assigned by N1, as in (37).

(37)



Further material is merged with the structure in (37) until the entire pseudopartitive is built and merged with the clausal spine. At that point, it is assigned some other case based on its syntactic position. When that occurs, the case value is spread through the pseudopartitive, assuming a model of case concord where case spreads from a node to its daughters (Babby 1987; Chomsky 1981, 1986; Delsing 1993; Matushansky 2008; Pesetsky 2013; Richards 2012). A schematic tree is provided in (38).

(38)



In (38), the case value of ZP is spread to its daughters, Z^0 and YP. YP's case value is spread to its daughters, and so on. Note that a mechanism of case concord is independently necessary in Estonian, which exhibits concord in case and number in its nominal system. Some canonical examples are provided in (39).

(39) a. kõigi-s nei-s raske-te-s küsimus-te-s
all.PL-INE this.PL-INE hard-PL-INE question-PL-INE
'in all these hard questions' (BALANCED)

b. iga-le konkreetse-le ettevõtja-le
each-ALL particular-ALL entrepreneur-ALL
'to each particular entrepreneur' (PARLIAMENT)

In (39a), the quantifier *kõik* 'all/every', the demonstrative *see/need* 'this/that', and the adjective *raske* 'difficult' all inflect for plural number and inessive case, just like the noun *küsimus* 'question'. The words in (39b) inflect in a similar way for singular number (null) and allative case.

Returning to the main point, in a Pesetsky-style analysis, when this spreading reaches the N2 phrase of a pseudopartitive, the new case value (e.g., allative) is "stacked" outside the previously assigned partitive (Baker and Vinokurova 2010; Pesetsky 2013; Richards 2012). For Estonian pseudopartitives, this builds representations like those in (40).

(40) a. **Partitive Assignment:** [bag [potatoes-PAR]]
b. **External Assignment:** [bag-ALL [potatoes-PAR-ALL]]

In the first step (40a), the N2 phrase is assigned partitive case (by N1). The second case value is "stacked" on the N2 phrase outside of the previously assigned partitive, as in (40b). Note that this requires that syntactic elements be able to receive case more than once. This is transparently true in some languages (e.g., Lardil (Richards 2012)), but Estonian exhibits no visible case stacking (see, for example, (41)–(42)).

(41) * mees-t-le
man-PAR-ALL

(42) * mehe-le-t
man-ALL-PAR

Words like the forms in (41) and (42) do not exist in Estonian. Thus, something more must be said about how the abstract representations in (40) are realized morphologically.

To handle the realization of such case stacks Pesetsky (2013) proposes an algorithm that realizes the outermost case in a case stack. I will call this algorithm PRONOUNCE OUTERMOST.[7]

(43) PRONOUNCE OUTERMOST: only the outermost case in a case stack is realized.

PRONOUNCE OUTERMOST predicts the matching pattern straightforwardly, as demonstrated in (44).

(44) PRONOUNCE OUTERMOST predicts the matching pattern
a. **Partitive Assignment:** [bag [potatoes-PAR]]
b. **External Assignment:** [bag-ALL [potatoes-~~PAR~~-ALL]]

In (44a), *bag* is merged, and it assigns partitive case to the N2 phrase *potatoes*. In (44b), the entire pseudopartitive receives allative case, and this case value suppresses the realization of partitive case on the N2 phrase, resulting in the matching pattern. This is exactly what we want.

However, PRONOUNCE OUTERMOST extends the matching pattern too far: as formulated in (43), it is not capable of producing the partitive pattern, as shown in (45).

(45) PRONOUNCE OUTERMOST does not predict the partitive pattern
a. **Partitive Assignment:** [bag [potatoes-PAR]]
b. **External Assignment:** [bag-ACC [potatoes-~~PAR~~-ACC]] ✖
c. **Desired Outcome:** [bag-ACC [potatoes-PAR-~~ACC~~]] ☹

[7] Pesetsky initially calls it the ONE-SUFFIX RULE (p. 11) and later replaces it with the ONE-PROTOTYPE RULE (p. 120).

As before, partitive is first assigned to the N2 phrase in (45a), but when the entire pseudopartitive is assigned accusative case in (45b), PRONOUNCE OUTERMOST predicts that the accusative case stacked outside of partitive case will suppress the realization of partitive case on the N2 phrase. This would yield the matching pattern for accusative case, but what we want is the partitive pattern, as in (45c). The matching pattern requires pronunciation of the outermost case, but the partitive pattern requires pronunciation of the innermost case, which is something that PRONOUNCE OUTERMOST does not allow.

To give the PRONOUNCE OUTERMOST algorithm a bit of flexibility, we could augment it with a bit of morphology. Concretely, it has been proposed that such case pronunciation algorithms can consider whether or not a particular exponent is overt (Baker and Vinokurova 2010; Brattico 2008, 2010, 2011), as in (46).

(46) PRONOUNCE OUTERMOST OVERT: pronounce the outermost case with an overt realization.

The motivation for this move is straightforward— the only case that is trumped in the languages explored in that research is nominative case, and nominative case has no identifiable affix in those languages. This is, of course, also true in Estonian. However, this explanation cannot straightforwardly account for marking in Estonian pseudopartitives, because partitive case trumps both nominative and accusative— both would have to count as "not overt."

(47) a. tükk leiba
piece.NOM bread.PAR~~.NOM~~
'a piece of bread'

b. tüki leiba
piece.ACC bread.PAR~~.ACC~~
'a piece of bread'

Given that the nominative and accusative forms of *tükk* and *tüki* are distinct, it is clear that we must say that at least one of them is overt.[8]

Furthermore, any account that pins the choice between the matching pattern and the partitive pattern on case **morphology** runs into difficulty accounting for the difference between genitive and accusative in Estonian. Recall that, for singular nouns, genitive and accusative case are morphologically identical. Yet, they show different case patterns: accusative pseudopartitives show the partitive pattern (see (48)), and genitive pseudopartitives show the matching pattern (see (49)).

(48) tüki leiba / *leiva
piece.ACC bread.PAR / bread.ACC
'piece of bread'

(49) tüki leiva / *leiba
piece.GEN bread.GEN / bread.PAR
'piece of bread'

[8]Note that we also cannot say that the choice between case-marking patterns is a distinction between fusional cases (like nominative and accusative) and affixal cases (like allative). Such an analysis might hold that cases with an overt affix yield the matching pattern while cases without an overt affix yield the partitive pattern. This analysis would miscategorize genitive case, which has no overt affix in Estonian—it is fusional like nominative and accusative. However, as we have seen, genitive case shows the matching pattern.

In the examples above, note that the ungrammatical variants of the examples in each are exactly the grammatical variants of the other. In other words, there is nothing wrong morphologically with a string like *tüki leiva*, it is just not a well-formed ACCUSATIVE pseudopartitive. This suggests strongly that the choice between the matching pattern and the partitive pattern is not driven by morphemes *qua* strings of phonological segments, but by the abstract representations that ultimately get spelled out by those strings. I will now argue for a proposal that derives the N2-case alternation without appealing to exponents of morphological case.

4 Partitive as a DP-internal unmarked case

Descriptively speaking, we can state the generalizations about the N2-case alternation as a hierarchy like the one in (50). In this hierarchy, cases are ranked, with nominative and accusative ranked the lowest and all the cases yielding the matching pattern ranked the highest. The higher-ranked cases must be pronounced at the expense of the lower-ranked cases.

(50) MATCHING CASES[9] ≫ PARTITIVE ≫ NOMINATIVE, ACCUSATIVE

But stopping here would simply be a stipulation. I believe it is no accident that the only two cases yielding the partitive pattern are nominative and accusative. These cases are a natural class in many languages—the (clausal) structural cases—and they are a natural class in Estonian as well. Nominative and accusative are only assigned to DPs based on their clausal position, i.e., they are never assigned inherently and they are never assigned DP-internally. This generalization is missed if they are simply listed as in (50).

In this section, I will pursue the idea that nominative and accusative yield the partitive pattern because they come into play later than other cases. More concretely, I will propose that partitive case is an UNMARKED CASE inside of DPs (or more correctly, KPs).

(51) **Unmarked Partitive Hypothesis:** Partitive case in Estonian nominals is an unmarked case, assigned to complements of nouns that do not already have a case value.

If we adopt (51) as well as the assumptions about the spreading of case features from the previous section (i.e., case concord), the alternation between the partitive pattern and the matching pattern falls out as a matter of timing. This analysis is couched within the framework of case proposed by Marantz (1991) and developed in subsequent work. I will now turn to a discussion of the general system.

4.1 Marantz (1991): more than one way to assign case

One of the insights of Marantz's proposal is that there is more than one way for a DP to end up bearing morphological case. The various kinds of case that Marantz proposes are given in (52), with somewhat modernized descriptions of where they are assigned.

(52) Mechanisms of case assignment (Marantz 1991, *et seq*):

[9]This is simply a placeholder for an actual list of all the cases in Estonian that show the matching pattern.

a. **lexical/inherent case**: assigned by the selecting V^0 or P^0.

b. **dependent case**: assigned to one of two caseless DPs in an asymmetric c-command relationship.
   - C-commanded DP: accusative
   - C-commanding DP: ergative

c. **unmarked case**: assigned to otherwise caseless DPs; may be sensitive to syntactic environment (e.g., an unmarked case for caseless nominals inside DPs).

d. **default case**: case assigned to any DP that is not in a position to receive case (Schütze 2001).

Though Marantz (1991) proposes the four different kinds of case given above, he primarily focuses on an exploration of the behavior of dependent case, and much of the research in this framework has since followed suit.[10] The hypothesis that I pursue here holds that partitive case in Estonian pseudopartitives is an unmarked case. A first approximation of this proposal is given in (53).

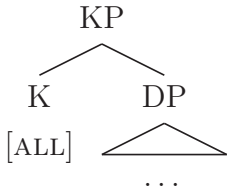
(53) Unmarked Partitive, to be revised: Assign partitive case to complements of N^0 that do not already have a case value.

Unfortunately, there has not been much research exploring rules or mechanisms of unmarked case assignment. In fact, unmarked case and default case are often collapsed (Bobaljik 2008; Levin and Preminger 2015). According to Schütze's (2001) tests for default case, it must be nominative in Estonian. Thus, I will pursue an analysis of unmarked case as distinct from default case in Estonian.

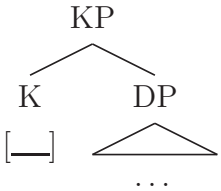
4.2 A syntactic distinction between the case patterns

The cases that yield the partitive pattern—nominative and accusative—are the two cases in Estonian that are only assigned based on a DP's position in the clausal spine. All other cases in the language yield the matching pattern. To capture the difference between these two sets of cases, I follow Bittner and Hale's (1996) proposal that case features are located on K^0 heads, which take DP complements. In Bittner & Hale's system, lexical/inherent cases K^0-heads that are merged with a case value. There are also K^0-heads that are merged without a value; these K^0-heads are ultimately assigned accusative case in nominative/accusative languages. Nominative case is formalized as the absence of a K^0-head.

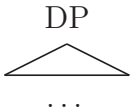
(54) a. Valued K^0:



b. Unvalued K^0:



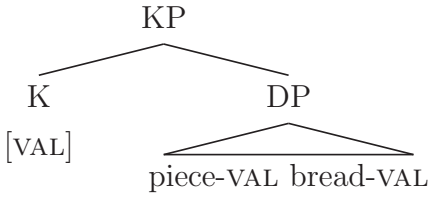
c. No K^0:



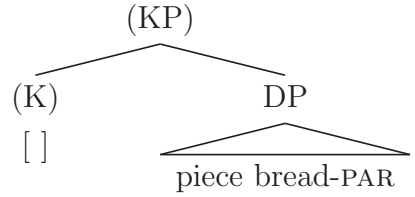
[10] See, for example, Baker 2014 on Shipibo, Baker and Vinokurova 2010; Levin and Preminger 2015 on Sakha, Poole 2014 on Finnish, or Tucker 2013 on Maltese.

The upshot of adopting this characterization is that the case pattern a pseudopartitive exhibits can be determined entirely on the basis of its K^0-head. If the K^0-head is merged with a value, then the pseudopartitive will show the matching pattern (see (55)). Otherwise, the pseudopartitive will show the partitive pattern (see (56)).

(55) Valued K^0: Matching Pattern



(56) Else: Partitive pattern



If we adopt this proposal, then the particular case pattern that a pseudopartitive exhibits will be determined at the moment the entire pseudopartitive is constructed. I thus propose that this is also the moment when the conditions for Unmarked Partitive assignment are checked. This leads us to the final characterization of the Unmarked Partitive case in Estonian, given below in (57).

(57) Unmarked Partitive: Assign partitive case to complements of N^0 that do not already have a case value when the pseudopartitive extended projection is complete.

In other words, it is only when the entire KP is built, as in (55)-(56), that the conditions for unmarked case can be checked.

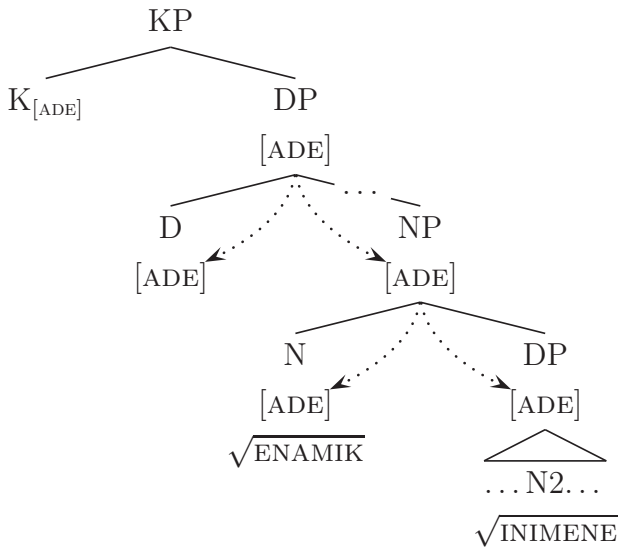
I will now turn to two illustrations showing how these assumptions derive the matching pattern and partitive pattern in a straightforward way.

4.3 Deriving the patterns

When a head like $K^0_{[ADE]}$ is merged, its case value spreads downward via case concord. Because the N2 phrase has no case value of its own, adessive case spreads all the way down to N2 itself, as in (59).

(58) enamiku-l inimes-te-l
majority-ADE person-PL-ADE
'(on) a majority of people'

(59)

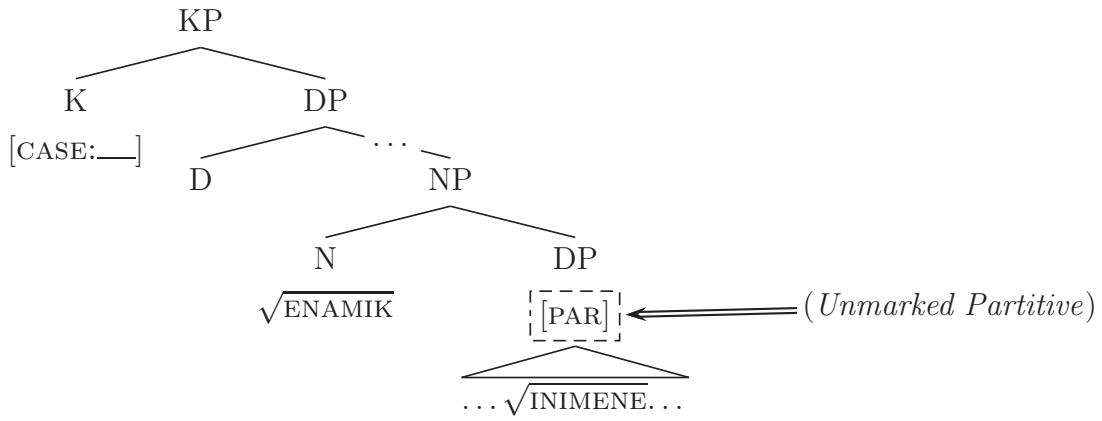


This yields full case matching between N1 and the N2 phrase. Under this analysis, the matching pattern is just another example of case concord, derived from the same mechanism as case concord between adjectives and nouns. Unmarked partitive case is not invoked, because there are no caseless complements of N^0.

If the K^0-head has no case value, the N2 phrase remains caseless (just like the rest of the KP). This is the environment that underlies the assignment of partitive case, so partitive case is assigned to the N2 phrase, as in (61).

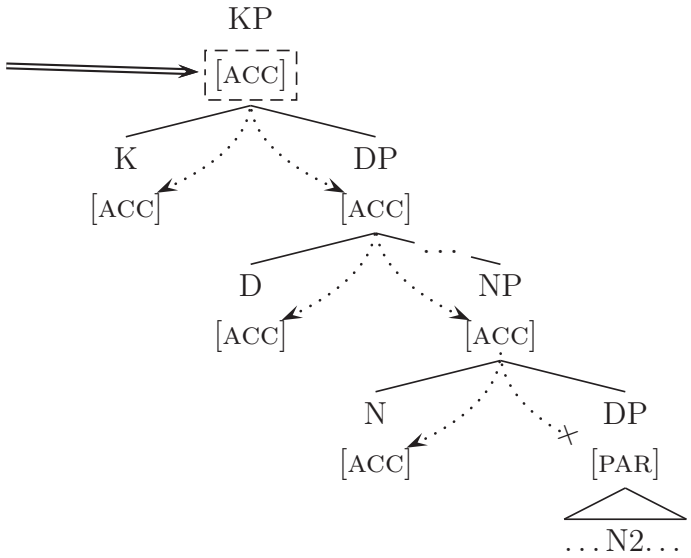
(60) enamiku inimesi
majority.ACC person.PL.PAR
'a majority of people'

(61)



When the pseudopartitive in (61) is merged with the clausal structure, it is eventually assigned accusative case, and this case value spreads as far as the N2 phrase by case concord. I then assume that the case value spreads no further, i.e., that accusative case spreads only as far as N1, and there is no case overwriting or stacking in Estonian.

(62)



This is not a necessary assumption, but I adopt it here for the sake of simplicity, as this analysis can account for the matching pattern without appealing to a mechanism of case overwriting.[11] The end result is that the N2 phrase is marked with partitive case, while the N1 and every structurally higher element in the pseudopartitive is in accusative case (or nominative, as the case may be).

4.4 Analysis summary

This analysis gives teeth to the oft-noted generalization that structural cases (e.g., nominative and accusative) are treated differently from inherent cases (Babby 1980; Moravcsik 1995; Richards 2012). Descriptively speaking, inherent cases overwrite the DP-internal partitive case in Estonian, but structural cases apparently cannot. Though this notion is straightforward to state, the proper way to formalize it is not obvious. Ideally, these effects would be derived from independently observable facts about structural and inherent cases without recourse to identifying such-and-such case as [+STRUCTURAL] (for example). The unmarked partitive analysis derives these effects as a matter of timing. The cases that yield the matching pattern enter the derivation **before** the unmarked partitive can be assigned, and thus, unmarked partitive is not necessary. The cases that yield the partitive pattern enter the derivation **after** the unmarked partitive is assigned, and thus, too late to have any effect.

5 Conclusions

In this paper, I have proposed an analysis of the N2 case alternation in Estonian pseudopartitives based on the way different cases are assigned, and more concretely, **when** they are assigned. Under the analysis proposed here, the matching pattern arises as a result of case

[11] If we allowed accusative to spread all the way down to the N2 phrase, we could then follow Baker and Vinokurova (2010) and assume that the innermost case value is always realized; this would account for the partitive pattern just as well. I make the stronger claim here and propose that case stacking does not occur in Estonian.

concord. Estonian is not unique in showing case concord in its pseudopartitive construction. This has been documented at least for Greek (Stavrou 2003) and German (van Riemsdijk 1998). Estonian differs from Greek and German in that it also has a DP-internal unmarked case—partitive case—and that case is assigned before nominative and accusative enter the picture. The emergence of two case-marking patterns is thus a byproduct of the timing of case assignment combined with the existence of a DP-internal unmarked case.

The N2 case alternation is not unique to the Estonian pseudopartitive. Similar alternations have been described and analyzed in Russian and Finnish numeral-noun constructions, and in fact, the alternation exists in Estonian numeral-noun constructions as well (see Norris 2014 for discussion). However, the specifics of the alternation in Estonian pseudopartitives are uniquely revealing about its possible analysis in Estonian, and by extension, in other languages. Estonian pseudopartitives unambiguously show the partitive pattern in two contexts: nominative and accusative. It is this fact that sets them apart from similar phenomena documented in the literature, as they arguably only show the partitive pattern in nominative contexts. As we saw, purely (or essentially) morphological accounts cannot straightforwardly account for the alternation in Estonian pseudopartitives. Pseudopartitves thus reveal that a syntactic account of this kind of case-marking alternation is needed in addition to (or in the place of) the existing morphological accounts.

More broadly, this investigation serves as an exploration of one possible formalization and implementation of Marantz's notion of unmarked case, distinct from default case. According to Marantz's original proposal, case assignment takes place in the morphological component: cases must "wait" to be assigned, even when the requisite syntactic structure is built. Recent analyses following Marantz's general research program (e.g., Baker and Vinokurova 2010; Levin and Preminger 2015; Preminger 2014) have proposed (*contra* Marantz) that case is assigned in the syntax. Furthermore, they argue that case is assigned as soon as its structural description is met, which will not work for the partitive in Estonian pseudopartitives (for reasons explored in §3). My conclusions are thus in line with the conclusions of Baker (2014): Marantzian case competition takes place at dedicated points during the derivation, and the requirements of case assignment are not checked until that time. The novel extension proposed here is that one of those points is the completion of the nominal extended projection.

The analysis presented here also supports a view of case assignment in which some cases are assigned as a last resort. That much is assumed in many modern analyses of case-marking systems. However, the results of this investigation suggest a stronger and more nuanced view, in which there is more than one kind of default: one that is context-free (like nominative in Levin and Preminger's (2015) account) and one that is context-dependent (like partitive in this analysis). Though I will not do so here, it is worth considering whether this account could be extended to other case-related last resort puzzles. For example, it has been suggested that *of* in English is sometimes inserted through last resort means (see, e.g., Harley (2009) and Harley and Noyer (1998)).[12] These investigations will be important as we continue to develop our understanding of the differing morphological and syntactic behaviors of case in natural language.

[12]See also Harizanov (2014) for an analysis involving DP-internal unmarked case in Bulgarian.

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Discourse Coherence and Relativization in Korean

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1 Introduction

It is widely accepted that the split between restrictive and nonrestrictive relatives generally coincides with their asymmetric contribution to discourse: restrictive relatives contribute content that is part of the main assertion of the sentence, while nonrestrictive relatives contribute content that is backgrounded or supplementary to the content of the main clause.[1] Recent studies (Huddleston & Pullum 2002:1033-1065; Potts 2005:93-94), however, have argued that this traditional dichotomy along model-theoretic lines is not successful, offering evidence that some cases of nonrestrictive relative clauses do have equality of informational status with their main clauses (see, for example, Huddleston & Pullum (2002:1064)). In line with these studies, the present work argues that the model-theoretic properties of a relative clause (restrictive vs. nonrestrictive) and the kind of content it contributes (at-issue vs. supplementary) do not always go hand in hand.

In Korean, two different types of relative clauses can be identified on the basis of whether the nominal that functions as an argument in both the relative and the main clause (henceforth, *anchor*) is outside the relative or not. In Externally-Headed Relative Clauses (EHRCs) like (1) the anchor *sakwa* 'apple' occurs immediately after the relative clause and there is a missing element within the relative that is coreferential with the anchor. In Internally-Headed Relative Clauses (IHRCs) like (2), by contrast, the anchor is within the relative clause, while the "external head" position is occupied by a defective noun *kes* that obligatorily takes a verbal complement. (1) and (2) are adapted from M. Kim (2004:101).[2]

(1) Minaka cepsiey issnun sakwalul mekessta. (EHRC)

Mina -ka [$\_\__i$ cepsi -ey iss -nun] sakwa$_i$ -lul mek -ess -ta
Mina -NOM [$\_\__i$ plate -LOC exist -ADN.IPFV] apple$_i$ -ACC eat -PST -DECL

Restrictive: 'Mina ate the apples that were on the plate.'
Nonrestrictive: 'Mina ate the apples, which were on the plate.'

*I thank Rui Chaves, Matthew Dryer, Jean-Pierre Koenig, Eunhee Lee and members of Syntax-Semantics Reading Group at University at Buffalo for comments and discussions that contributed to this work. I also thank the audience at BLS 41 for feedback and discussion. Any remaining errors are my own.

[1]Abbreviations: ACC (accusative); ADN (adnominal); CLF (classifier); COMP (complementizer); CONJ (conjunction); DECL (declarative);EXCLAM (exclamative); HON (honorific); IPFV (imperfective); LOC (locative); NEG (negation); NMLZ (nominalizer); NOM (nominative); PRS (present); PST (past); PRF (perfect); Q (question); RETR (retrospective); TOP (topic)

[2]Unless stated otherwise, the data in this study are my own and have been judged by nine native speakers of Korean (two male and seven female; average age 30.9).

(2) Minaka sakwaka cepsiey issnun kesul mekessta. (IHRC)

Mina -ka [sakwa$_i$ -ka cepsi -ey iss -nun] kes$_i$ -ul mek -ess -ta
Mina -NOM [apple$_i$ -NOM plate -LOC exist -ADN.IPFV] entity$_i$ -ACC eat -PST -DECL

Nonrestrictive: 'Some apples were on the plate and Mina ate them (= the apples).'

EHRCs and IHRCs differ in their meaning. While IHRCs are always interpreted nonrestrictively, EHRCs are ambiguous between restrictive and nonrestrictive relatives when taken out of context. For example, the EHRC in (1) has a nonrestrictive interpretation if the contextual set of objects denoted by the anchor equals the set of objects that satisfy the description provided by the relative: that is, the apples Mina ate are all and exactly those apples that were on the plate. On the other hand, the relative has a restrictive interpretation if it describes a situation where there are more apples on the plate than those eaten by Mina.

This paper attempts to solve a long-standing puzzle that arises from an asymmetry in acceptability between EHRCs and IHRCs, namely that IHRCs are often less acceptable than their EHRC counterparts (Kuroda 1976; Fuji 1996; Shimoyama 1999, 2001; Y. Kim 1996, 2002; M. Kim 2004, 2007, 2008). There is agreement that this asymmetry stems from a requirement that an IHRC must enter a semantic or pragmatic relation with the main clause in order for it to be acceptable, but there is disagreement on what exactly this relation is. In the present work, I argue that the EHRC-IHRC asymmetry arises from the fact that IHRCs are acceptable if and only if a *coherence relation* (Hobbs 1985; Mann & Thompson 1988; Kehler 2002; Asher & Lascarides 2003) holds between the relative and the main clause.

The rest of the paper is organized as follows. In Section 2, I present data that illustrate acceptability contrast between EHRCs and their IHRC counterparts. I point out that, contra M. Kim (2004, 2007, 2008), the various relations that can hold between the eventuality described by an IHRC and the eventuality described by its main clause cannot be subsumed under the notion of simultaneity. In Section 3, I show that this seemingly disparate class of relations correspond in fact to independently motivated coherence relations, but that there is a restriction on the range of coherence relations that are possible between IHRCs and their main clauses. In Section 4, I take up the issue of why failure to enter into a coherence relation gives rise to unacceptability in the case of IHRCs but not in the case of EHRCs. My answer is that IHRCs are associated with an inherent discourse goal that is tied to their meaning, and that this goal can only be achieved through the establishment of a coherence relation between the relative and the main clause. In Section 5, I summarize the major findings of this study.

2 Asymmetry between EHRCs and IHRCs

Since Kuroda (1976), studies on IHRCs in Japanese and Korean have agreed that IHRCs are subject to a condition whereby the relative clause is interpreted in relation to the content of the main clause. Kuroda distinguishes among several different relations that can license IHRCs (*co-temporal*, *co-locational*, *purposive*, *causal*), but many other studies (Fuji 1996; M. Kim 2007, 2008) assume that it is the co-temporal relation that is responsible for the licensing of IHRCs. The latter theory is encapsulated by the Simultaneity Condition in (3).

(3) THE SIMULTANEITY CONDITION: In order for an IHRC to be acceptable, it must be interpreted in such a way that the eventuality described by the relative temporally overlaps with the eventuality described by the main clause.

In the present study, I consider the following two hypotheses.

- HYPOTHESIS 1. The Simultaneity Condition is the necessary and sufficient condition for the licensing of IHRCs.
- HYPOTHESIS 2. The Simultaneity Condition is only a sufficient condition for the licensing of IHRCs.

Hypothesis 1 is proposed by Fuji (1996) and M. Kim (2007, 2008), among others. These studies essentially view licensing IHRCs as a problem of characterizing the notion of simultaneity in semantic terms. Hypothesis 2 is put forward by Kuroda (1976) and Y. Kim (1996), who argue that there are various pragmatic relations that can license IHRCs. In the remainder of this section, I provide a discussion on Hypothesis 1, focusing on M. Kim's (2007; 2008) rendition of the Simultaneity Condition, and give arguments against it.[3]

Assuming Hypothesis 1, the acceptability of (2) above is dependent on the availability of a simultaneous reading, where the event of Mina's eating apples is directly related to the state of these apples being on the plate 'at the moment of the eating event'. While the EHRC counterpart in (1) also entails that there is a temporal overlap between the eventualities described by the relative and the main clause, due to the imperfective aspect of the relative clause's predicate, the underlying assumption is that such temporal entailment is orthogonal to the licensing of EHRCs.

Typical examples used to support Hypothesis 1 are provided in (4)-(5).[4] Note that these sentences are string identical to (1) and (2) except for the grammatical aspect of the relative clauses' predicates and the temporal adverbs *ecey* 'yesterday' and *onul* 'today'.

(4) Minaka ecey cepsiey issten sakwalul onul mekessta. (EHRC)

Mina	-ka	[$\_\__i$	ecey	cepsi	-ey	iss	-ten]	sakwa$_i$	-lul	onul mek
Mina	-NOM	[$\_\__i$	yesterday	plate	-LOC	exist	-ADN.RETR]	apple$_i$	-ACC	today eat
-ess	-ta									
-PST	-DECL									

Restrictive: 'Mina ate the apples today that had been on the plate yesterday.'
Nonrestrictive: 'Mina ate the apples today, which had been on the plate yesterday.'

[3] M. Kim (2008) additionally assumes an optional pragmatic constraint that licenses additional readings (*circumstantial*, *cause-effect*, *concessive*) on top of the simultaneous reading licensed by an obligatory grammatical condition. Since the acceptability of IHRCs is explained solely by the grammatical condition, M. Kim's (2008) proposal is essentially the same as M. Kim's (2007).

[4] Embedded stative verbs in Korean take the retrospective marker (*-ten*) to refer to eventualities that are perceived to have taken place prior to speech time (Sohn 1995:41).

(5) ?Minaka sakwaka ecey cepsiey issten kesul onul mekessta. (IHRC)

Mina -ka [sakwa$_i$ -ka ecey cepsi -ey iss -ten] kes$_i$ -ul
Mina -NOM [apple$_i$ -NOM yesterday plate -LOC exist -ADN.RETR] entity$_i$ -ACC
onul mek -ess -ta
today eat -PST -DECL

'Some apples were on the plate yesterday and Mina ate them (= the apples) today.'

Despite the fact that (4) and (5) are parallel in content, (5) is less acceptable than (4). This observation fits well with Hypothesis 1, which attributes the oddness of (5) to the violation of the Simultaneity Condition.

Another example that lends support to Hypothesis 1 is given in (6) (Y. Kim 2002:551), which differs from (5) in the telicity of the predicate within the relative (*iss* 'to exist' vs. *tteleci* 'to fall'). Under the standard assumption that telic events have a natural endpoint that holds forever after the culmination of the event (Kratzer 1994), the Simultaneity Condition is met in (6) but not in (5).

(6) Mary-nun sakwaka ecey ttelecin kesul onul achimey cipe tulessta. (IHRC)

Mary -nun [sakwa -ka ecey tteleci -n] kes -ul onul achimey
Mary -TOP [apple -NOM yesterday fall -ADN.PRF] entity -ACC today morning
cipetul -ess -ta
pick.up -PST -DECL

'Some apples fell (from the tree) yesterday and Mary picked them (= the fallen apples) up today.'

M. Kim (2007, 2008) offers one of the most sophisticated semantic justification of Hypothesis 1. She explains the apparent effect of telicity and grammatical aspect on the acceptability of IHRCs on the basis of Parsons (1990)-style theory of aspect. The following assumptions are crucial in her analysis: (i) IHRCs introduce a temporary state, (ii) the temporary state must overlap with the eventuality described by the main clause, and (iii) the anchor must bear a thematic role in that temporary state. This way of characterizing the notion of simultaneity preserves the essence of the Simultaneity Condition but it also enables making precise predictions about the acceptability of different IHRCs that vary in telicity and aspect. M. Kim defines the notion of temporary state as in (7).

(7) Kinds of temporary state (M. Kim 2007:303-304):

a. An *in-progress* state is introduced by a progressive or imperfective predicate. It holds true of every individual that bears a thematic role during the runtime of the event.

b. A *resultant* state is introduced by a perfect predicate and it holds permanently after the culmination of the event. A perfect aspect on a telic predicate describes a *target* state in addition to a resultant state. While a resultant state holds true of the agent argument, a target state holds true of the theme argument.

Assuming M. Kim's account, the contrast between (5) and (6) is explained as follows. In (5) the relative clause has an imperfective predicate (M. Kim 2004:101) describing an in-progress state. This in-progress state does not overlap with the eventuality described by the main clause, and therefore the sentence is predicted to be unacceptable. In (6) the relative clause involves a perfect, telic predicate, in which case the relative introduces a target state as well as a resultant state. These states overlap with the eventuality described by the relative clause, and the anchor *sakwa* 'apple' bears a thematic role in both of these states; therefore, the acceptability of the sentence is correctly predicted.

However, M. Kim's analysis is unsatisfactory in a number of respects. The first problem is that it cannot exclude IHRCs that are temporally coincident with their main clauses but describe an irrelevant eventuality. For example, M. Kim would predict (8) to be acceptable, because the relative clause introduces a target state as well as a resultant state, and the anchor *Jina* is an agent that a resultant state holds true of. However, (8) is odd, as will be discussed in Section 3, there is no obvious connection between Jina's having finished a marathon yesterday and Swumi's meeting her today.[5]

(8) ?Swumika Jinaka ecey malathonul wancuhan kesul onul mannassta. (IHRC)

Swumi -ka [Jina$_i$ -ka ecey malathon -ul wancuha -n] kes$_i$
Swumi -NOM [Jina$_i$ -NOM yesterday marathon -ACC finish -ADN.PRF] entity$_i$
-ul onul manna -ass -ta
-ACC today meet -PST -DECL

'Jina finished a marathon yesterday and Swumi met her (= Jina) today.'

The second problem has to do with the fact that there are acceptable examples of IHRCs that do not satisfy the Simultaneity Condition. Under M. Kim's analysis, examples like (9), taken from (M. Kim 2008:97), would be incorrectly predicted to be unacceptable since a resultant state is true of the agent, but not the theme, argument.[6]

(9) Johnun Maryka ecey inhyengul halwu congil kaciko non kesul onul nayta peliessta. (IHRC)

John -un [Mary -ka ecey inhyeng$_i$ -ul halwu congil kaci -ko no
John -TOP [Mary -NOM yesterday doll$_i$ -ACC day long have -COMP play
-n] kes$_i$ -ul onul nayta peli -ess -ta
-ADN.PRF] entity$_i$ -ACC today take throw.away -PST -DECL

'Mary played with a doll all day yesterday and John threw it (= the doll) away today.'

Likewise, in (10) the relative clause describes an in-progress state which does not overlap with the eventuality described by the main clause, and yet the sentence is acceptable: the state of Minswu lying does not hold at the time his mother scolds him.

[5]Again, a proper contextualization can enhance the acceptability of (8). See Section 3.

[6]In fact, (M. Kim 2008:97) judges (9) to be unacceptable but the native speakers I consulted invariably judged it acceptable, and commented that the sentence is very natural under a causal or purposive reading: e.g. John discovered a reason to throw the doll away today.

(10) Emenikkeyse Minswuka ecey halwu congil nuwuemanissten kesul onul achim honnaysiessta. (IHRC)

Emeni -kkeyse [Minswu$_i$ -ka ecey halwu congil nuwue -man -iss
Mother -HON.NOM [Minswu$_i$ -NOM yesterday day long lie -only -prog
-ten] kes$_i$ -ul onul achim honnay -si -ess -ta
-ADN.RETR] entity$_i$ -ACC today morning scold -HON -PST -DECL

'Minswu was lying (on his bed) all day yesterday and his mother scolded him (= Minswu) this morning.'

Data such as (9) and (10) show that the relation between IHRCs and their main clauses cannot always be merely temporal: there are other readings that cannot be covered if simultaneity is the only relation that is possible between IHRCs and their main clauses. Crucially, (9) is acceptable under a cause-effect interpretation where John's throwing Mary's doll away is possibly motivated by the fact that the doll was so dirty that John could not simply bear to see Mary play with it. Likewise, in (10) Minswu's lying all day yesterday doing nothing provides a natural reason for his mother scolding him.

3 A Pragmatic Account of Korean IHRCs

I have shown that previous attempts at offering a semantic, simultaneity-based analysis of the relation between IHRCs and their main clauses have been unsuccessful. In this section, I propose a PRAGMATIC account of the relation between IHRCs and their main clauses that defends Hypothesis 2 mentioned at the beginning of Section 2. In doing so, I attempt to provide a principled characterization of the various relations between IHRCs and their main clauses within the context of theories of discourse coherence (Hobbs 1985; Mann & Thompson 1988; Kehler 2002; Asher & Lascarides 2003), while taking into account the semantics of IHRCs that imposes restrictions on the range of possible relations.

3.1 The pragmatic nature of the relation between IHRCs and their main clauses

I propose that the relation between IHRCs and their main clauses is only partially expressed. More specifically, I argue that, semantically, IHRCs and their main clauses are connected by a propositional connective and that the various interpretations of sentences instantiating an IHRC arise as a result of pragmatic enrichment. In this respect, my analysis is similar in spirit to Kay & Zimmer's (1978) treatment of nominal compounds and genitive constructions, and Nishiyama & Koenig's (2010) analysis of the English perfect. In Nishiyama & Koenig (2010:619) it is argued that the English perfect introduces a perfect state whose category is semantically a free variable, and the value of this variable is filled by pragmatic inferences. In a similar vein, I propose that the interpretation of sentences instantiating an IHRC arises as a result of inferences drawn by addressees on the interpretation of the propositional connective introduced by IHRCs. The fact that the nature of the constraint is pragmatic properly allows the particular relation or relations established between an IHRC and its main clause to be contingent on the knowledge of the addressee.

I start by presenting data in (8) (repeated in (11) below) and (12) that show that the relation between IHRCs and their main clauses is pragmatic in nature. As noted above, (11) is odd because there seems to be no natural connection between Swumi's completing a marathon yesterday and Jina's meeting her today. This is because, out of context, it is hard to think of why the meeting happened today, not yesterday, if the meeting had anything to do with the marathon; conversely, if the meeting had nothing to do with Jina's marathon, why would the speaker bother to mention it? (12), on the other hand, provides information that can be used by addressees for drawing causal or circumstantial inferences by which the two described events can naturally be connected: the information that the interviewer was a journalist indicates that Lee's completion of a marathon might be still newsworthy the day after the marathon took place. A purely semantic account cannot explain the contrast between (11) and (12), as these sentences are semantically parallel.

(11) ?Swumika Jinaka ecey malathonul wancwuhan kesul onul mannassta. (IHRC)

Swumi -ka [Jina$_i$ -ka ecey malathon -ul wancuha -n] kes$_i$
Swumi -NOM [Jina$_i$ -NOM yesterday marathon -ACC finish -ADN.PRF] entity$_i$
-ul onul manna -ass -ta
-ACC today meet -PST -DECL

'Jina finished a marathon yesterday and Swumi met her (= Jina) today.'

(12) Kim kicaka Lee ssika ecey malathonul wancwuhan kesul onul mannase inthepyuhayssta. (IHRC)

Kim kica -ka [Lee$_i$ ssi -ka ecey malathon -ul wancuha
Kim journalist -NOM [Lee$_i$ Mr. -NOM yesterday marathon -ACC finish
-n] kes$_i$ -ul onul manna -se inthepyuhay -ss -ta
-ADN.PRF] entity$_i$ -ACC today meet -CONJ interview -PST -DECL

'Mr. Lee finished a marathon yesterday, and journalist Kim met and interviewed him (= Mr. Lee) today.'

Similarly, the marginal status of (5) (repeated in (13) below) is due to the lack of sufficient information addressees can make use of when drawing inferences about the relation between the eventualities described by the relative and the main clause. If the context provides that one of the daily rituals of Mina is to put some apples on an empty plate and eat all of them, but she somehow forgot to eat the apples yesterday, (13) becomes acceptable.[7]

(13) ?Minaka sakwaka ecey cepsiey issten kesul onul mekessta. (IHRC)

Mina -ka [sakwa$_i$ -ka ecey cepsi -ey iss -ten] kes$_i$ -ul
Mina -NOM [apple$_i$ -NOM yesterday plate -LOC exist -ADN.RETR] entity$_i$ -ACC
onul mek -ess -ta
today eat -PST -DECL

'Some apples were on the plate yesterday and Mina ate them (= the apples) today.'

[7]The same occurs in Japanese, as originally observed by Kuroda (1976:272).

Although the relation between IHRCs and their main clauses is semantically underspecified, a temporal relation is generally *preferred*, as indicated by the fact that the majority of acceptable examples of IHRCs from previous studies are natural under a temporal reading. I argue that this bias toward a temporal interpretation is due in part to the semantic contribution of the adnominal markers such as *-nun* (imperfective) and *-(u)n* (perfect) which specify a temporal relation between the eventuality described by the relative and the eventuality described by the main clause. In this sense, a temporal relation, be it co-temporal or temporal precedence, always arises by default between an IHRC and its main clause.

I assume that the imperfective marker *-nun* indicates that two events are co-occurring, while the perfect marker *-(u)n* signals that there is a temporal progression. In other words, the imperfective adnominal marker *-nun* encodes that, for the temporal trajectories of the eventualities t_1 (described by the relative clause) and t_2 (described by the main clause), there exists a subpart t such that $t \subset t_1$ and $t \subset t_2$. I follow Nishiyama & Koenig's (2010:619) analysis of the perfect in making the following assumptions on the perfect adnominal marker *-(u)n*; (i) the perfect on a relative clause specifies that for t_1 and t_2, there exists a subpart t_0 of t_1 that precededs t_2 ($t_0 \prec t_2$) and (ii) the eventuality described by the relative clause introduces a perfect state s that overlaps t_2 ($s \circ t_2$), and the category of this perfect state is determined via pragmatic inferences.

The proposed account of the semantic contribution of Korean adnominal markers explains a possible source of a common misunderstanding among previous studies, namely that only a temporal relation is possible between IHRCs and their main clauses: unlike a temporal relation inferred largely based on the semantic encoding of the imperfective and the perfect, other relations such as cause-effect have a less direct source than the grammatical aspect markers and therefore are less immediately inferable out of context.

3.2 A Coherence-Based Account of the various relations between IHRCs and their main clauses

I argue that the various relations that hold between IHRCs and their main clauses correspond to *coherence relations* (Hobbs 1985; Mann & Thompson 1988; Kehler 2002; Asher & Lascarides 2003), which are relations between described eventualities that must be established for a discourse to appear coherent. My analysis builds upon the classification of coherence relations proposed by Hobbs (1985) and Kehler (2002). With these and others (e.g. Mann & Thompson (1988); Asher & Lascarides (2003)), I assume that discourse coherence arises in part by means of computing coherence relations (e.g. Occasion, Result, Parallel, Contrast). I note that, although similar in spirit, my analysis differs from Kuroda's (1976) in the following respects: on my account, the coherence relations between IHRCs and main clauses fall out of a general condition on successive propositions in a discourse, but they are IHRC-specific in Kuroda's analysis; second, Kuroda's analysis does not explain why it seems that IHRCs but not EHRCs must enter into a coherence relation with their main clauses, whereas my analysis does (see Section 4).

I begin by introducing the Occasion relation, with the definition and examples in (14)-(16). Occasion arises between eventualities described by two successive utterances S_1 and S_2 iff a change-of-state event has been inferred from S_1 and the final state of that event is inferred from S_2. In (15), for example, an inference arises such that the speaker took

his mother *from the airport when she arrived there* (the final state of the relative clause's event). The establishment of OCCASION promotes coherence by helping addressees construct a representation of eventualities that occur in temporal sequence.

(14) OCCASION:
Infer a change-of-state for a system of entities from S_1, inferring the final state for this system from S_2.
(Here and in all the definitions below, S_1 and S_2 refer to the relative clause and the main clause, respectively.)

(15) Nanun emenika konghangey tochakhan kesul cipulo mosiessta. Chung (1999:9)

Na -nun [emeni$_i$ -ka konghang -ey tochakha -n] kes$_i$ -ul cip -ulo
I -TOP [mother$_i$ -NOM airport -at arrive -ADN.PRF] entity$_i$ -ACC home -to
mosi -ess -ta
take.HON -PST -DECL

'My mother arrived at the airport and I took her (= my mother) home.'

(16) Chelswuka khemphyutheka mangkacin kesul kochiessta. Yang (1999:his (5.1b))

Chelswu -ka [khemphyuthe$_i$ -ka mangkaci -n] kes$_i$ -ul kochi -ess
Chelswu -NOM [computer$_i$ -NOM break -ADN.PRF] entity$_i$ -ACC fix -PST
-ta
-DECL

'A computer was broken and Chelswu fixed it (= the computer).'

OCCASION arises in sentences instantiating an IHRC that has a telic predicate since telic predicates give rise to a change-of-state entailment.[8] By contrast, if the relative has an atelic predicate, a BACKGROUND relation is generally inferred.[9] To illustrate, in (18) (repeated from (1)) the relative clause provides a description of the state of the apples, and this state acts as a background against which the event described by the main clause (Mina's eating these apples) takes place.

(17) BACKGROUND:
Infer a description of a system of entities from S_1, inferring from S_2 that some entity is placed or moves against that system as a background.

(18) Minaka sakwaka cepsiey issnun kesul mekessta. (IHRC)

Mina -ka [sakwa$_i$ -ka cepsi -ey iss -nun] kes$_i$ -ul mek -ess -ta
Mina -NOM [apple$_i$ -NOM plate -LOC exist -ADN.IPFV] entity$_i$ -ACC eat -PST -DECL

Nonrestrictive: 'Some apples were on the plate and Mina ate them (= the apples).'

[8] As Kehler (2002:23) points out, inferring a temporal progression by itself is insufficient for OCCASION; eventualities connected by OCCASION must cohere under a common scenario. This is why (8), for instance, is odd under an intended OCCASION reading.

[9] I follow Asher & Lascarides (2003) in assuming the relation BACKGROUND that establishes between eventualities that temporally overlap.

The next relation I discuss is RESULT. The definition in (19) states that RESULT arises when a causal link establishes between two propositions P and Q, such that Q holds as a consequence of the fact that P holds. In (20), for instance, a causal link can be established between the relative and the main clause because the fact that Sangho threw his fish away can naturally be understood as a direct consequence of the fact that the fish has gone bad and is therefore inedible.[10]

(19) RESULT:
Infer P from the assertion of S_1 and Q from the assertion of S_2, where normally $P \rightarrow Q$.

(20) Sanghoka sayngseni sanghan kesul peliessta.

Sangho -ka [sayngsen$_i$ -i sangha -n] kes$_i$ -ul peli -ess
Sangho -NOM [fish$_i$ -NOM go.bad -ADN.PRF] entity$_i$ -ACC throw.away -PST
-ta
-DECL

'(The) fish went bad and Sangho threw it (= the fish) away.'

Many existing accounts of IHRCs cover the data that I analyze as coherent under an OCCASION, BACKGROUND, or RESULT reading (Kuroda 1976; Fuji 1996; Y. Kim 2002; M. Kim 2007, 2008), and some argue that these readings all fall under a co-temporal reading (Fuji 1996; M. Kim 2007, 2008). However, there are other relations that are possible between IHRCs and their main clauses that cannot be subsumed under the notion of simultaneity. One such relation is VIOLATED EXPECTATION. In the VIOLATED EXPECTATION relation, a general assumption or expectation inferred from the first utterance is contradicted by the second. For example, the main clause's content in (22) violates the expectation about a two year old baby, namely that she is too young to be smart.

(21) VIOLATED EXPECTATION:
Infer P from the assertion of S_1 and Q from the assertion of S_2, where normally $P \rightarrow \neg Q$.

(22) Aika twu sal pakkey an toyn kesi ceypep yenglihata.

[Ai$_i$ -ka twu sal pakkey an toy -n] kes$_i$ -i ceypep
[Baby$_i$ -NOM two year only not become -ADN.PRF] entity$_i$ -NOM quite
yengliha -ta
be.smart.PRS -DECL

'(This) baby is only two years old and (yet) she (= the baby) is very smart.'

[10] (20) can also be understood as an example of OCCASION. In fact, OCCASION generally holds if RESULT holds, as result temporally follows cause in normal circumstances. In my view, this ambiguity is not a problem for the present analysis; rather, I follow Asher & Lascarides (2003) and Nishiyama & Koenig (2010) in assuming that coherence is maximized if more than one relation is inferable between two given event descriptions.

(23) presents another example. The sentence is originally presented as unacceptable in Y. Kim (2002:550) under a causal reading, but in fact it is acceptable under a VIOLATED EXPECTATION reading: the police should have arrested the students for theft, not for a violation of traffic law. In fact, a subsequent utterance such as (24) can help infer the VIOLATED EXPECTATION relation in (23).

(23) Kyengchal-i haksayngtuli totwukcilhanun kesul kyothongpep wuipanulo capassta. (Adapted from Y. Kim (2002:550))

Kyengchal -i [haksayng$_i$ -tul -i totwukcilha -nun] kes$_i$ -ul
Police -NOM [student$_i$ -PL -NOM steal -ADN.IPFV] entity$_i$ -ACC
kyothongpep wuipan -ulo cap -ass -ta
traffic.law violation -for arrest -PST -DECL

'Students were stealing (things) and (yet) the police arrested them (= the students) for a violation of traffic law.'

(24) Keyngchali michiessapoa.

Keyngchal -i michi -ess -napoa
Police -NOM be.crazy -PST -EXCLAM

'The police must be crazy.'

PARALLEL and CONTRAST are two other relations that are possible between IHRCs and their main clauses. These relations hold between propositions that involve similar (in the case of PARALLEL) or contrasting (in the case of CONTRAST) relations and entities. In (26) there are corresponding entities, Yuna and other kids, that are sufficiently similar (they share the property of being kids, presumably in the same class) and the same relation (missing the same problem in the exam) is predicated of these entities. (28) involves the same corresponding entities, but in this case two contrasting, rather than similar, relations are predicated of these entities (i.e. missing vs. getting a problem).

(25) PARALLEL:
Infer $p(a_1, a_2, ...)$ from the assertion of S_1 and $p(b_1, b_2, ...)$ from the assertion of S_2, where for all i, a_i and b_i are similar.

(26) Yunaka munceylul thulin kesul talun aitulto thuliessta.

[Yuna -ka muncey$_i$ -lul thuli -n] kes$_i$ -ul talun ai -tul -to thuli
[Yuna -NOM problem$_i$ -ACC miss -ADN.PRF] entity$_i$ -ACC other kid -PL -also miss
-ess -ta
-PST -DECL

'Yuna missed a problem (in the exam) and other kids missed it (= the problem) too.'

(27) CONTRAST:
Infer $p(a_1, a_2, ...)$ from the assertion of S_1 and $\neg p(b_1, b_2, ...)$ from the assertion of S_2, where for all i, a_i and b_i are similar.

(28) Yunaka munceylul thulin kesul talun aitulun motwu macchwuessta.

[Yuna -ka muncey$_i$ -lul thuli -n] kes$_i$ -ul talun ai -tul -un
[Yuna -NOM problem$_i$ -ACC miss -ADN.PRF] entity$_i$ -ACC other kid -PL -TOP
motwu macchwu -ess -ta
all get -PST -DECL

'Yuna missed a problem (in the exam) but other kids all got it (= the problem).'

So far, I have argued that the relations between IHRCs and their main clauses are independently motivated coherence relations. I have shown that IHRCs and their main clauses establish at least one of the following coherence relations: Occasion, Background, Result, Violated Expectation, Parallel, and Contrast. In fact, these six coherence relations are all and the only possible relations that can hold between IHRCs and their main clauses; other well-known relations such as Explanation or Elaboration are simply not possible in IHRC-instantiating sentences. In the remainder of this subsection, I offer an explanation for this restriction on the range of possible coherence relations between IHRCs and their main clauses.

Discourse theories often employ the notions of discourse coordination and subordination (Mann & Thompson 1988; Asher & Lascarides 2003; Polanyi *et al.* 2004; Asher & Vieu 2005). These notions inherently pertain to the structuring of discourse, but they can also motivate a classification of coherence relations into coordinating relations and subordinating relations.[11] One way to distinguish between coordinating and subordinating relations is to use *and* between the two clauses being related. According to Txurruka (2003), interclausal *and* has a semantic contribution that a simple logical conjunction does not have (see also Chaves (2012:488-490) for more discussion and related proposals): it specifies that a coordinating relation is established between its conjuncts. As such, *and* serves to restrict the range of coherence relations that are possible between its conjuncts. For example, (29a) admits a reading where the two propositions are connected by Explanation: Max fell *because* John pushed him. But the sentence can also admit a less immediate, albeit possible, Occasion reading: Max fell and *then* John pushed him. In the case of (29b), however, Explanation does not arise because *and* does not allow a subordinating relation to be established between its conjuncts.

(29) a. Max fell. John pushed him.

b. Max fell and John pushed him.

Applying Txurruka's test, we can divide coherence relations into the two groups in (30). Importantly, the distinction between coordinating and subordinating relations coincides with the distinction between those coherence relations that can obtain between IHRCs and their main clauses, and those that can not.

[11] See Asher & Vieu (2005) for criteria distinguishing coordinating and subordinating relations.

(30) A classification of Hobbs-Kehler coherence relations into coordinating and subordinating relations

a. Coordinating relations: Occasion, Background, Result, Violated Expectation, Parallel, Contrast

b. Subordinating relations: Exemplification, Generalization, Exception, Elaboration, Explanation, Denial of Preventer

I take the fact that the relation between IHRCs and their main clauses is limited to coordinating relations as indicating that IHRCs combine with their main clauses via coordination. More specifically, I argue that IHRCs specify in their semantics a propositional connective Crd that takes the propositions of the relative and the main clause. To implement this idea, I claim that sentences instantiating an IHRC are subject to a semantico-pragmatic constraint that requires that a coordinating relation must be established whenever there are two propositions that are arguments of Crd. I state the constraint in (31): for two propositions S_1 and S_2, if they are arguments of Crd, there exists a pragmatic relation that is a member of the set of coordinating coherence relations (cf. Crnič 2010).

(31) $\textsc{Crd}(S_1, S_2) \rightarrow$
$\exists \mathrm{R} \in \{$*Occasion*, *Background*, *Result*, *Violated Expectation*, *Parallel*, *Contrast*$\}$: $\mathrm{R}(S_1, S_2)$

The proposed analysis makes the correct prediction that the various relations by which addressees can make sense of IHRCs and their main clauses correspond to the categories of readings compatible with the connective *and*. A mere temporal characterization of the relations between IHRCs and their main clauses such as the one proposed by M. Kim (2007, 2008) cannot capture the various interpretations available for sentences instantiating an IHRC, and it also misses the generalization that these are all and the only interpretations that are compatible with *and*.

Studies on the relation between syntactic and pragmatic structures (Schleppegrell 1992; Blühdorn 2008) have provided evidence that syntactic coordination and subordination does not always coincide with hierarchical structures in discourse. My proposal that IHRCs, despite their subordinate syntax, combine with their main clauses via coordination in semantics and pragmatics preserves the insights of these studies. However, the proposals of these works are largely based on the observation that subordinate connectives such as *because* and *while* do play the role of coordinate connectives in discourse. Given that IHRCs are often analyzed as periphrastic nominalized clauses in argument positions that do not appear to involve a clause connective, it is not obvious how the syntax-semantic-pragmatics interface of the IHRC and the main clause works. Here, I submit that the coordinate semantics of IHRCs (Crd) is encoded in the morpheme *kes*. *Kes* is a polyfunctional morpheme, frequently used as a subordinator, nominalizer, sentential ending, and in third person non-human pronouns (Rhee 2008). I assume that *kes* has gained its status as an adverbial connective in its grammaticalization path. In fact, Kikuta (2002) and Horie (2011) discuss the use of the Japanese counterpart *no* as an adverbial connective, and the examples they provide naturally translate into Korean (see, for example, Kikuta (2002:207-208)). I propose that *kes* in IHRCs has the following two roles: (i) as a pronoun, it picks out the entity or entities referred to by the anchor and (ii) as a clausal connective, it conjoins the relative and the main clause.

4 At-Issueness and the Function of Korean Relative Clauses

In the previous section I presented a coherence-based analysis of Korean IHRCs. But assuming the notion of coherence adopted in this paper, it may come as a surprise that, as discussed in Section 2, EHRCs do not seem to be required to enter into a coherence relation with their main clauses: *Why is it the case that an establishment of a coherence relation is important in the licensing of IHRCs but not in the licencing of EHRCs?* In this section I submit the following. First, in order for a discourse to be coherent, every part of that discourse must cohere with the context it occurs in. Second, different types of Korean relative clause (restrictive EHRCs, nonrestrictive EHRCs and IHRCs) cohere with their main clauses in different manner. The second part of my proposal is the corollary of the fact that each type of relative clause has a specially designated discourse function that is partially correlated with the kind of content (*at-issue* or not) it contributes to discourse.

The idea that there is a kind of meaning called conventional implicature (CIs, henceforth) independent of 'what is said' (Grice 1975) has long been maintained (Frege 1892/1994; Grice 1975; Karttunen & Peters 1979; Potts 2005). What is of particular interest for our purposes is Potts' (2005) analysis of English relatives. Potts rejects the traditional restrictive/nonrestrictive distinction, and proposes an alternative classification that distinguishes between *integrated* relatives that contribute content that is at-issue and *supplementary* relatives that provide supplementary or CI content (*ibid.* p.94). Following Potts, I motivate a classification of Korean relative clauses along the at-issue/CI divide. Crucially, I argue that restrictive EHRCs and IHRCs contribute at-issue content, while the content of nonrestrictive EHRCs can be either at-issue or CI.

In what follows I present evidence supporting that IHRCs contribute at-issue content while nonrestrictive EHRCs have no such restriction. I leave out restrictive EHRCs from the discussion, as it is well established that the content of restrictive relatives are part of the at-issue content of their main clauses due to their inherent set-reducing function. The fact that a nonrestrictive EHRC does not necessarily provide supplementary content is illustrated by (32): the content of the nonrestrictive EHRC *keki sanun* 'who lives there' must be interpreted as at-issue no matter whether Speaker B has only one brother or not; interpreting the relative as supplementary would lead to an incoherent discourse.[12]

(32) A. Seoul-ey kaseyyo?

Seoul -ey ka -sey -yo
Seoul -to go -HON -Q

'Are you going to Seoul?'

B. Ney, keki sanun tongsayngi hana isseseyo.

Ney [keki $\_\__i$ sa -nun] tongsayng$_i$ -i hana iss -ese
Yes [there $\_\__i$ live -ADN.IPFV] younger.sibling$_i$ -NOM one exist -because
-yo
-DECL

[12]The arguments and data here echo those in Huddleston & Pullum (2002:1065).

'Yes, because I have a brother, who lives there.'

Unlike CI content that receives widest scope (Potts 2005; McCready 2010), at-issue content can be embedded under scopal operators that are higher in the structure. Thus, if an IHRC is embedded under a negation operator, as in (33), it can be interpreted as part of the denial.

(33) Sakwaka cepsiey issten kesul Minaka mekun kesun sasili anita.

[Sakwa$_i$ -ka cepsi -ey iss -ten] kes$_i$ -ul Mina -ka mek
[Apple$_i$ -NOM plate -LOC exist -ADN.RETR] entity$_i$ -ACC Mina -NOM eat
-n kes -un sasil -i ani -ta
-ADN.PFV -NMLZ -TOP fact -NOM be.not -DECL

'It is not true that there were some apples on the plate and Mina ate them (= the apples).'

Another test is provided in (34). The idea is that the truth of at-issue content can be subject to negotiation by other participants of the conversation, whereas CI content cannot (McCready 2010; AnderBois *et al.* 2015). In (34) B's response to A calls into question the truth of the proposition that the apples were on the plate. The fact that the utterances of speaker B is acceptable suggests that IHRCs convey at-issue content.

(34) A: Sakwaka cepsiey issten kesul Minaka mekesse.

[Sakwa$_i$ -ka cepsi -ey iss -ten] kes$_i$ -ul Mina -ka mek -ess
[Apple$_i$ -NOM plate -LOC exist -ADN.RETR] entity$_i$ -ACC Mina -NOM eat -PST
-e
-DECL

'There were apples on the plate and Mina ate them (= the apples).'

B: Sasili aniya. Sakwaka cepsiey epsesse.

Sasil -i ani -ya. Sakwa -ka cepsi -ey eps -ess -e
Fact -NOM be.not -DECL Sakwa -NOM plate -LOC not.exist -PST -DECL

'That's not true. The apples were not on the plate.'

So far I have argued that restrictive EHRCs and IHRCs provide at-issue content, while the content of nonrestrictive EHRCs can be at-issue or CI. I now propose an account of why IHRCs, but not restrictive and nonrestrictive EHRCs, are required to enter a coherence relation with their main clauses in order for sentences instantiating them to be acceptable. I assume that different types of relatives are tied to construction-specific discourse goals and that they contribute to discourse coherence by achieving these goals.[13] First of all, the

[13] Alternatively, one may argue that the basic difference between different types of relatives lies in whether they constitute an independent information unit (cf. Depraetere (1996)), and that the lack of a coherence relation between EHRCs and their main clauses is due to the fact that they form a single information unit. However, the notion of information unit is not entirely clear, and I therefore pursue an alternative account here.

inherent function of restrictive EHRCs is to help identify discourse referents by narrowing down the referents of the anchor to exactly those that satisfy the description provided by the relative. Once the reference set has been identified, it is available for reference in later discourse, which further contributes to effective communication. That nonrestrictive EHRCs and IHRCs do not have this set-reducing function is shown by examples (35) and (36): in the context where there are twelve apples on the plate, (36) is odd while (35) is acceptable only under a restrictive reading.

(35) Minaka cepsiey issnun sakwa yel kaylul mekessta. (EHRC)

Mina -ka [__$_i$ cepsi -ey iss -nun] sakwa$_i$ yel kay -lul mek -ess
Mina -NOM [__$_i$ plate -LOC exist -ADN.IPFV] apple$_i$ ten CLF -ACC eat -PST
-ta
-DECL

Restrictive: 'Mina ate ten apples that were on the table.'
Nonrestrictive: 'Mina ate ten apples, which were on the table.'

(36) Minaka sakwa yel kayka cepsiey issnun kesul mekessta. (IHRC)

Mina -ka [sakwa$_i$ yel kay -ka cepsi -ey iss -nun] kes$_i$ -ul mek
Mina -NOM [apple$_i$ ten CLF -NOM plate -LOC exist -ADN.IPFV] entity$_i$ -ACC eat
-ess -ta
-PST -DECL

Nonrestrictive: 'Ten apples were on the plate and Mina ate them (= the ten apples).'

Turning to IHRCs, I argue that the discourse function of IHRCs is tied to the clausal connective CRD, whose function is to construct tightly connected successive propositions that describe a single, overall situation. That is, an IHRC advances discourse in such a way that it contributes content that is part of a complex proposition that the main clause's content is also part of. Importantly, this discourse-advancing function of IHRCs is essentially what successive propositions in narrative discourse have. Given this parallel between narratives and IHRC-involving discourse, it naturally follows that IHRCs are required to contribute to the construction of a coherent discourse in such a way that they enter into a coherence relation with their main clauses, just like successive sentences in narrative discourse are required to do so.

Lastly, I claim that the function of a nonrestrictive EHRC correlates with the kind of content it provides. If a nonrestrictive EHRC provides CI, it contributes to discourse coherence by helping addressees understand the importance or relevance of the at-issue content contributed by the main clause. But if a nonrestrictive EHRC provides at-issue content, it plays the same role that an IHRC does: the relative contributes part of a complex proposition.[14] In the latter case, just as in the case of IHRCs, coherence is achieved if a coherence relation is established between the relative and the main clause. The proposed account

[14]Huddleston & Pullum (2002:1063) identify a similar class of relatives, which they call *continuative* relatives, that are not backgounded relative to the information conveyed by the main clause unlike other supplementary relatives.

makes the correct prediction that pragmatically enriching nonrestrictive EHRCs by inferring a coherence relation is a possibility: doing so does not lead to unnatural interpretations.

To summarize, I have argued for a new classification of Korean relative clauses on the basis of the discourse function of the relative and the (non-)at-issueness of its content. My proposal has been that IHRCs can be interpreted coherently if and only if a coherence relation is inferred between the relative and the main clause, while restrictive and nonrestrictive EHRCs can be part of a coherent discourse without entering into a coherence relation with their main clauses. The analysis I have proposed sheds light on the often ignored distinction between restrictive and nonrestrictive EHRCs in Korean, and offers a novel account of the three-way contrast between restrictive EHRCs, nonrestrictive EHRCs, and IHRCs. My account contrasts with the account suggested by M. Kim (2008), who argues that EHRCs have "restrictive" semantics (relating sets of individuals) whereas IHRCs' semantics relates sets of eventualities. A typology of relatives along this line is problematic because it obscures the difference between *nonrestrictive* EHRCs and IHRCs, as nonrestrictive EHRCs' semantics do involve relating sets of eventualities. Additionally, the results of the present study supports recent proposals that the traditional restrictive/nonrestrictive divide does not provide a satisfactory typology of relative clauses (Huddleston & Pullum 2002; Potts 2005) and echoes the observations in previous works on "strange" relative clauses that do not fit traditional distinctions (Carlson 1977; Grosu & Landman 1998; Koenig & Lambrecht 1999).

5 Conclusion

Scholars have long argued that Korean IHRCs are subject to an interpretability constraint that gives rise to an asymmetry in acceptability between IHRCs and their EHRC counterparts (Kuroda 1976; M. Kim 2007, 2008). In this paper, I have argued that a successful account of this asymmetry lies at the interface between the semantics of IHRCs and discourse-pragmatics. Building on previous works on discourse coherence (Hobbs 1985; Kehler 2002; Asher & Lascarides 2003), I have claimed that IHRCs semantically encode a clausal connective that is tied to coordinate coherence relations. The proposed analysis allows the various interpretations available for sentences instantiating an IHRC, while restricting these interpretations to those that are compatible with coordinating coherence relations.

I have also proposed a new classification of Korean relatives that distinguishes among different types of relatives on the basis of the at-issueness of the relative and the relative's discourse function, and offered an explanation as to why the establishment of a coherence relation seems to be relevant only in the case of IHRCs. In principle, every part of a discourse must help achieve a coherent interpretation of the discourse, and relative clauses do so by achieving construction-specific discourse goals: (i) restrictive EHRCs serve to construct a coherent representation of discourse by helping addressees easily identify the referents denoted by the anchor; (ii) IHRCs contribute to discourse coherence by providing an at-issue proposition that is connected to the proposition of the main clause by means of a coherence relation, thereby giving rise to a more tightly connected representation of a complex situation; (iii) Nonrestrictive EHRCs may serve a supplementary role by providing information that helps addressees better understand the at-issue content of the main clause, or they may enter into a coherence relation with their main clauses in order to contribute a coherent representation of a complex situation, just as IHRCs do.

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Negotiating Lexical Uncertainty and Speaker Expertise with Disjunction

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Abstract

There is a well-known preference for disjunctions *X or Y* to be construed so that *X* and *Y* are semantically disjoint. However, there are two felicitous usage patterns in which the speaker violates this preference in part to convey information about the language itself. First, disjunctions of terms in a one-way semantic inclusion relation, such as *boat or canoe*, can form part of a speaker strategy to manage lexical uncertainty surrounding the two terms, or block unwanted implicatures that the listener might draw from the general term alone. Second, disjunctions of synonymous terms like *wine lover or* ***oenophile*** can be used to convey definitional information. We explore both of these uses, relying on corpora to obtain a fuller picture of their motivations and their effects on the listener. In addition, we show how both these uses are predicted by a standard semantics for disjunction and a recursive probabilistic model of communication in which speakers and listeners simultaneously exchange information about the world and about the language they are using. We also use the model to begin to formally characterize the pragmatics of implicature cancelation or blocking.

1 Communicating in Language about Language

Natural languages are neither fixed across time nor identically reproduced in all speakers, but rather continually renegotiated during interactions (Clark 1997). Discourse participants accommodate to each other's usage patterns (Giles et al. 1991), form temporary lexical pacts to facilitate communication (Clark & Wilkes-Gibbs 1986; Brennan & Clark 1996), and instruct each other about their linguistic views. Some of this communication in language about language is direct, as with explicit definitions like *'oenophile' means 'wine lover'*, but much of it arrives via secondary pragmatic inferences, as when *X such as Y* conveys that *X* subsumes *Y* (Hearst 1992; Snow et al. 2005).

Disjunction supports what appear to be opposing inferences about language. On the one hand, *X or Y* tends to convey that the meanings of *X* and *Y* are presumed to be disjoint (Hurford 1974), because the speaker holds such a view of the lexicon or is worried that the listener might. This pressure to EXCLUSIVIZE is robust enough to overcome even seemingly non-negotiable aspects of the lexicon; a medical webpage warns "If you still have symptoms or severe blockage in your arteries, you may need angioplasty or surgery", sending a clear signal that angioplasty and surgery are distinct options. Its continuation presupposes just that: "Having one of these procedures may save your leg". The disjunction might seem to

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be a needlessly verbose way of conveying the meaning of the more general disjunct, but the costs could be worth paying in virtue of the lexical side-effect of exclusivization.

In apparent opposition to exclusivization, disjunctions like *wine lover or oenophile* can be used to convey that the two disjuncts are roughly synonymous (Horn 1989), thereby providing secondary information that maximally violates the pressure to exclusivize. This inference is more elusive than the exclusivization inference, but it can arise in a broad range of contexts in which such DEFINITIONAL or IDENTIFICATIONAL information has social or communicative value, and there are stable orthographic and prosodic devices that help signal it. It is striking that both the definitional and exclusivization inferences, which seem so opposed, are supported by a single lexical item, and the puzzle deepens when we see that the empirical picture is not a quirk of English, but rather one found in a wide range of typologically and geographically diverse languages.

In this paper, we capture both of these classes of inference within a single recursive Bayesian model of pragmatic reasoning. The model finds its conceptual origins in Lewis's (1969) work on signaling systems and builds on ideas from iterated best response models (Jäger 2007, 2012; Franke 2009) and more thoroughly probabilistic variants of them (Camerer et al. 2004; Frank & Goodman 2012; Russell 2012). The crucial feature of our model is that it lets discourse participants communicate, not just about the world, but also about the language they are using (Bergen et al. 2012, 2014). From the speaker's perspective, this means that one's intentions in production are characterized in terms of both world information and linguistic information. From the listener's perspective, this means that pragmatic inference is cast as a problem of joint inference about the speaker's intended meaning and the speaker's preferred lexicon (Smith et al. 2013). We show that, within this model, both exclusivization and definitional inferences arise naturally from the expected semantic content of disjunction, depending on contextual parameters relating to speaker expertise, listener malleability, and information in the common ground. The model thus offers a genuinely pragmatic account of these inferences as well as characterizations of their stability and communicative value.[1]

2 Lexical Side-Effects from Disjunction

This section explores the exclusivization and definitional uses of disjunction. Our goal is to more precisely characterize what the inferences are like and to begin to understand which contexts steer speakers and listeners toward one or the other. These findings inform the modeling we describe in Sections 3–5.

2.1 Hurfordian Perceptions and Intentions

Hurford's (1974) generalization (HG) is a direct statement of the overall communicative pressure to treat disjuncts as exclusive:

(1) "The joining of two sentences by *or* is unacceptable if one sentence entails the other; otherwise the use of *or* is acceptable." (p. 410)

[1]Implementations of our model and related models, and all the code and data used in this paper, are available at `https://github.com/cgpotts/pypragmods/`.

The generalization is stated in terms of sentences, but Hurford's examples, given in (2) with his original judgments, make it clear that he intends it to hold for sub-sentential disjuncts as well:

(2) a. Ivan is an American or Russian.
b. The painting is of a man or a woman.
c. The value of x is greater than or equal to 6.
d. * John is an American or Californian.
e. * The painting is of a man or a bachelor.
f. * The value of x is greater than or not equal to 6.

Hurford uses HG to probe the nature and distribution of conversational implicatures (see also Gazdar 1979; Chierchia et al. 2012). Singh (2008) extends it to certain cases in which the disjuncts are merely overlapping. We endorse the guiding insight behind these accounts but reject the assumption that HG violations reliably lead to, or even correlate with, unacceptability or ungrammaticality. Disjunctions of apparently entailing phrases are routine (Simons 2001); all of the disjunctions marked as ungrammatical in (2) are found in fluent English text on the Web:

(3) a. "...and we trust that some of our American or Californian friends will tell us something of its growth of flower and fruit in its native habitats"
b. "It doesn't matter if you ask a boy or a man or a bachelor or even a husband"
c. "...the effect was greater than, or not equal to, the cause."

Russell (2012: §5.3) reports a numbers of similar Web-derived examples. Here is a sample:

(4) a. "We also rent only the most modern limos to our customers, because we believe that when you look for a limo service in Northern California or San Francisco, you want the best limousine service possible."
b. "By the time I've gone in I've had to pull out an animal or a cat that's on the verge of dying."
c. "Every now and again, people tend to change their surroundings. We update wall colors, change the drapes. Have new flooring installed. Sometimes we purchase new furniture or chairs."

We have collected a large corpus of apparent HG violations, available at the website for this paper. Here is a small sample from that corpus:

(5) a. "Stop discrimination of an applicant or person due to their tattoos."
b. "Promptly report any accident or occurrence."
c. "The anchor will lie on the bottom and the canoe or boat will be held by the stream's current."
d. "As an actor or performer, you are always worried about what the next job's going to be," Hensley says.
e. "After the loss of the animal or pet, there are further coping strategies available for the grieving individual."

f. "Bush was captured slyly removing a candy or gum from his mouth."

g. "Heroic is not a word one uses often without embarrassment to describe a writer or playwright . . . "

h. "But he never attended school during his senior year, never attended a party or prom."

The dataset includes 90 cases where the left disjunct entails the right, and 79 in which the right entails the left. However, we caution against using these counts to make inferences about general frequency or the relative prevalence of the two disjunct orders. We created the corpus using heuristic techniques based on WordNet (Fellbaum 1998) and ad hoc Web searches, so it can provide only a glimpse of what is possible. In addition, we have found that, for any two nouns N_1 and N_2 one believes to be in an overlap or proper entailment relation, it is generally possible to find contexts in which "N_1 or N_2" and "N_2 or N_1" are felicitous, and Web searches will generally yield examples.

Of course, one would like to have a comprehensive picture of the distribution of HG violations. However, we do not see a way to achieve this systematically for the entire lexicon. The primary obstacle is, we believe, an important property of the phenomenon itself: judgments about lexical entailment are inherently messy because of the flexible ways in which people refine meanings in context. As a result, there often isn't a single objective answer to the question of whether two disjuncts stand in an entailment relation. For instance, whereas the disjuncts in (6a) have a dependable semantic relationship, (6b) is much less clear-cut.

(6) a. "The nuptials will take place in either France or Paris."

b. "In 1940, 37 percent of us had gone to a church or synagogue in the last week."

Some speakers have firm judgments that *church* and *synagogue* exclude each other, making (6b) clearly HG-respecting. However, it is easy to find uses of the phrase "synagogues and other churches", which presuppose that a synagogue is a kind of church. And we should take care even with our assertion that *France* and *Paris* invariably stand in an entailment relation. In contexts where France is being construed in terms of its countryside, or Paris in terms of its particular urban charms, *France* could come to mean something more like 'Paris outside of France'. The important thing for our purposes is that the insight behind HG shines through this uncertainty: no matter what one's initial view of the lexicon is, a speaker's use of a disjunction *X or Y* raises the likelihood that the disjuncts are semantically disjoint in her currently preferred lexicon. The speaker will be perceived as endorsing such an opinionated view of the language, at least for the current conversation, and the listener can either adopt that assumption or push back.

This LEXICAL UNCERTAINTY motivates our own explanation for why speakers utter HG-violating disjunctions. In broad terms, we say that such examples convey that the speaker is treating the two terms as exclusive. There are many potential motivations for this. Perhaps the most mundane is that the speaker simply lexicalizes the two terms as exclusive. The disjunction is likely to be easily justified in such cases, as it might be the most efficient and direct way of identifying the semantic union of the two terms.

More interesting are cases in which the speaker's disjunction seems to be part of an attempt to manage the listener's inferences. For instance, a speaker who uses the phrase *cheap or free* to describe an object or service might be concerned that using *cheap* alone will trigger

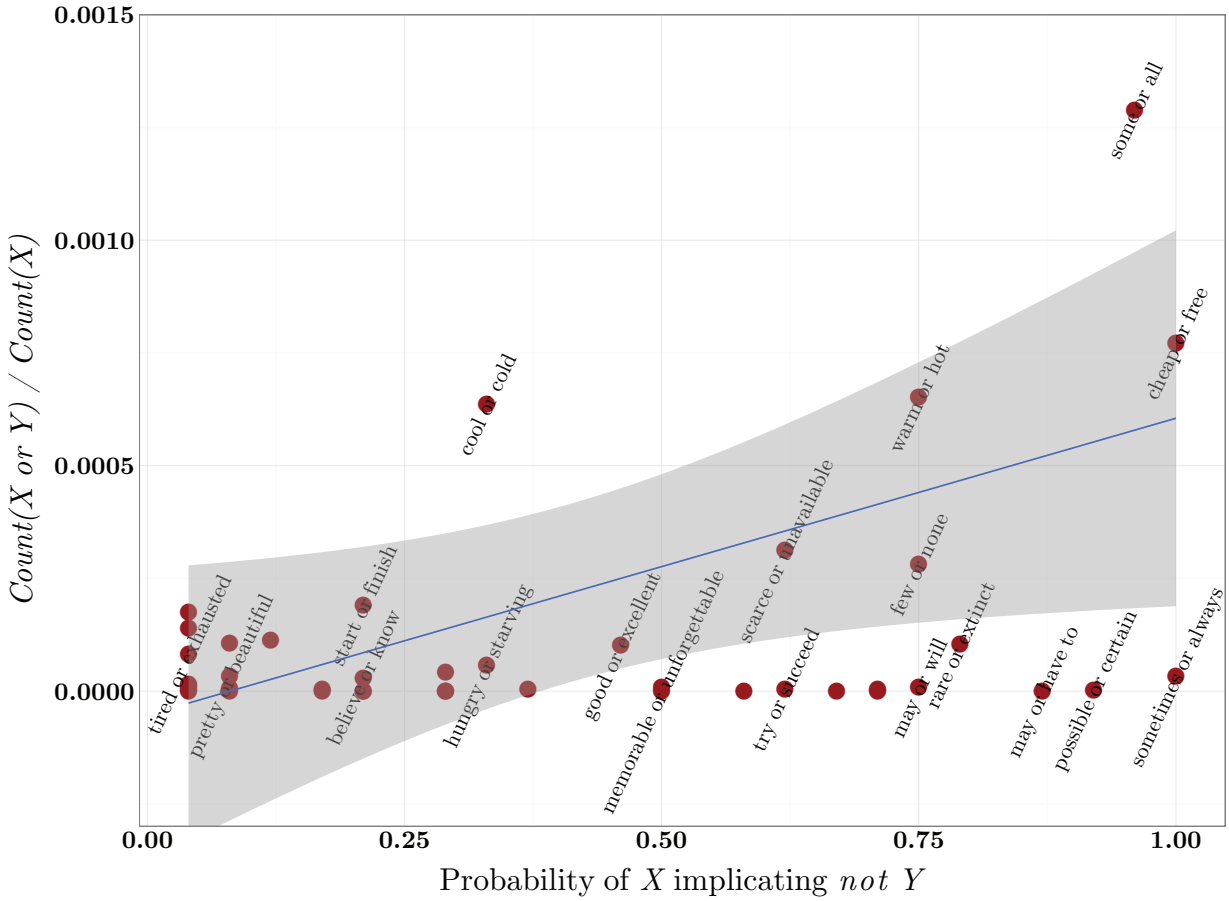


Figure 1: The relative frequency of *X or Y* is predicted by the probability of *X* implicating *not Y*. All the data points are given (red dots) and included in the analysis. For the sake of readability, only a subset of the associated disjunctions are printed.

a scalar implicature (Hirschberg 1985) excluding the possibility that the object or service is free. The HG violation then serves to cancel or block this unwanted inference. Chemla (2013) studies this class of inferences, presenting suggestive evidence that the frequency of disjunctions *X or Y* (*X* entailed by *Y*) is positively correlated with the likelihood that *X* conversationally implicates *not Y* as estimated by the experimental results of van Tiel et al. (2014). This connection is anticipated by Hurford's (1974) own analysis of disjunctions of scalar terms that seem to violate his generalization, and Chemla's findings suggest that it holds for a broad range of such cases.

Chemla's experiment relies on the hit counts in Google search results, which are notoriously unreliable (Liberman 2005), so we reproduced his main finding using the Google Books data set (Michel et al. 2011), pooling all the English-language tables and restricting attention to books from 1960 or later to avoid the encoding difficulties that plague earlier texts in that corpus. We also use a slightly more direct method than Chemla: we fit a simple linear regression in which the probability of *X* implicating *Y* is used to predict the relative frequency of *X or Y*. The implicature probabilities are from van Tiel et al.'s (2014) results, and the relative frequencies are given by $Count(X \text{ or } Y)/Count(X)$, where $Count(\varphi)$ is the token

count for the word or phrase φ in our Google Books sub-corpus. Our rationale (defined by Chemla) is that the prevalence of the implicature will positively correlate with the frequency of the disjunction: all other things being equal, the more likely the implicature, the more need there will be to block it. And this is what we find; the linear regression is significant ($p = 0.04$), suggesting a systematic relationship. Figure 1 summarizes this experiment.

Blocking a potential scalar implicatures is just one of the motivations a speaker might have for uttering a disjunction that superficially violates HG. Blocking an I(nformativeness)-implicature (Levinson 2000) might also be a motivating factor. Generally speaking, an I-implicature involves some kind of reasoning to a prototypical case — e.g., saying *The cup is on the table* implicates that the cup is in direct contact with the table. HG-violating disjunctions could be motivated by the possibility that a general term on its own would be understood as referring only more narrowly to a set of salient sub-kinds. For instance, at a busy marina in water-skiing country, *boat* might come to identify just motorboats. In that context, a speaker wishing to state a rule or regulation about all watercraft might use *boat or canoe* or *boat or kayak* to ensure that these non-motorized cases are included, lest people assume (or feel licensed to act as if they can assume) that these rarer kinds of boat are exempt. Such inferences often resemble scalar inferences, but a generalized notion of prior likelihood steers the calculation to a specific sub-kind among potentially many that might be at the same semantic or conceptual level.

In these implicature-blocking scenarios, the speaker is concerned that the general term X will be construed as $[\![X]\!] - p$ for some p overlapping with $[\![X]\!]$, and the disjunction hedges against that possibility. This is a DEFENSIVE position; the speaker's own lexicon might allow her to use just the general term to convey her intentions, but she is concerned that the listener will adopt a more restrictive interpretation. The costs of disjunction are therefore worth paying even if the disjunction adds no new information given the speaker's lexicon. However, the speaker can play a more active role as well, using disjunctions to instruct the listener about the correct lexicon. Our Section 1 example containing *angioplasty or surgery* seems to be an instance of this: the disjunction conveys secondary information that *angioplasty* and *surgery* will be treated as separate options in the discourse (Simons 2001). If HG were adopted as an explicit theoretical constraint, then the possibility of doing this would more or less follow. We would just require the additional premise that the listener is charitable and so will try to find an acceptable construal of the utterance. The model we develop in Section 3 also supports this reasoning, but it has the advantage of requiring no independent statement of HG.

2.2 Definition and Identification

Disjunctions like *wine lover or oenophile* seem to fly in the face of the Hurfordian pressure reviewed just above. Rather than avoiding overlap, they seem to embrace it, conveying something approximating identity.

Definitional disjunctions are even more contextually restricted than HG-violating ones, so identifying generalizations regarding their usage conditions is difficult. The examples in (7) were obtained by annotating the disjunctive clauses in a sample of 98 TED talks. These talks seem ideal for finding definitional uses, because the speakers are experts with broadly pedagogical aims. In addition, videos of the talks are available online, which made it possible

for us to use intonation and other cues to try to verify that the speakers had definitional intentions. These seven examples were drawn from a set of 344 disjunctive clauses, for a rate of only about 2%, despite the context being conducive to such uses. The examples are given with the punctuation from the transcripts that TED provides.

(7) a. "... more disorder, or 'entropy,' over their lifetimes"
(Alex Wissner Gross, 'A new equation for intelligence', 5:51)

b. "... by the gametes, or the sperm and the eggs."
(Carin Bondar, 'The birds and the bees are just the beginning', 3:02)

c. "This is Toxoplasma gondii, or Toxo, for short, ..."
(Ed Yong, 'Zombie roaches and other parasite tales', 9:33)

d. "the Carnegie Airborne Observatory, or CAO"
(Greg Asner, 'Ecology from the air', 2:22)

e. "We call this project VocaliD [vəʊkælɪdi], or vocal I.D., ..."
(Rupal Patel, 'Synthetic voices, as unique fingerprints', 3:50)

f. "they can self-renew or make more of themselves ..."
(Siddharthan Chandran, 'Can the damaged brain repair itself?', 8:05)

g. "the endogenous stem cells, or precursor cells, ..."
(Siddharthan Chandran, 'Can the damaged brain repair itself?', 14:48)

As these examples suggest, speakers often (but not always) signal definitional intentions with ad hoc prosody, italics, quotation marks, and other devices, which points to the marked nature of the usage. However, it would be a mistake to dismiss definitional uses as an idiosyncrasy of English. These uses are widely attested in typologically diverse languages; we have examples from Chinese, German, Hebrew, Ilokano, Japanese, Russian, and Tagalog. Even languages that seem to have a dedicated 'definitional' or 'metalinguistic *or*' (e.g., Finnish, Italian) seem also to allow the regular *or* to play this role.

For our purposes, the most important property of these uses is that they convey a meaning that is secondary to the main content of the utterance — an extreme instance of a meaning that is not at-issue (Tonhauser et al. 2013; Dillon et al. 2014). This contrasts with overt definitions like *'oenophile' means 'wine-lover'* or *oenophile: wine-lover* (in a dictionary context). We think it is no accident that another strategy for conveying definitional information in this non-asserted, taken-for-granted manner is via apposition, as in *oenophile ('wine-lover')*, since appositives too are often recruited to convey secondary, supporting information (Potts 2005, 2012; Syrett & Koev 2014). In this respect, the relevant inference resembles the exclusivization pressure identified by HG: both seem to emerge as side-effects rather than normal outputs. In our model (Section 3), both are in turn characterized as "meta-linguistic" — inferences about the lexicon rather than about the state of the world.

In addition, as with disjunct exclusivization, the relevant lexical inference might be temporary. For instance, in cases like *Internet or computer network*, the second phrase seems to be used as a rough-and-ready way of helping the listener bootstrap towards an understanding of what the Internet is. Even our wine-lover example involves only approximate synonymy; according to our intuitions, *wine lover or oenophile* seems apt in a context in which the speaker wishes to use *oenophile* to elevate the concept to something more specific

(or pretentious) than *wine lover* picks out. Similarly, the book title *A Geological History of Manhattan or New York Island* identifies Manhattan with New York Island while at the same time acknowledging the different histories and connotations of the two disjunct terms.

The speaker's motivations for using definitional disjunction are varied. Such readings seem to arise most easily when the speaker is mutually and publicly known to have EXPERTISE in the domain covered by the terms and the listener is mutually and publicly known to be inexpert in that area. In such cases, the speaker can use the disjunction to convey information about her preferred lexicon, fairly certain that the listener will be receptive. This characterization feels broadly fitting for our TED examples in (7). Some uses in this area have a self-corrective feel; the speaker, simulating her listener, might realize that she used a term that was inappropriate somehow — obscure, inexact, impolite (Clark 1994; Clark & Krych 2004). Disjunction provides a means for making amends fairly seamlessly. The following examples illustrate this strategy; in both, the speaker seems to realize that the first disjunct is potentially obscure and so rescues the phrase via definitional disjunction.

(8) a. "and e-waste is reported, or electronic waste is reported, by the UN, . . ."
(Leyla Acarogluk, 'Paper beats plastic', 14:10)

b. "Combined, the APR or annual percentage rate can be astronomical"
(Lou Dobbs Tonight, October 4, 2005)

While speaker expertise seems to be a genuine prerequisite, the listener's knowledge seems to impose little on felicitous uses (though it is certainly relevant). We find natural uses of this strategy when there is no direct information about the listener, but rather just a general assumption that one of the terms is relatively unknown. For instance, a newspaper article might contain *wine lover or oenophile* without presuming that all its readers are ignorant of the term; rather, such a use would seem to presuppose only that *oenophile* is relatively unknown, or obscure enough that it's useful to reinvoke its definition.

At the other end of the spectrum, the listener might actually be presumed to know the term, but the speaker sees social value in conveying that she shares this view. This could be because the speaker would like to display expertise, as when an ambitious pupil seeks to convey competence to a teacher. Similarly, a speaker of Australian English might use a phrase like *lift or elevator* with an American colleague to signal a willingness (or ironic lack thereof) to use the American form *elevator*.[2] And definitional uses also arise when the speaker and listener are both experts in the domain and see value (jointly or just in the current speaker's eyes) in using a word in a specialized sense in order to name a concept efficiently (e.g., the hypothetical academic paper title *What motivates the snobbish wine lover or 'oenophile' and how does he differ from the casual drinker?*).

For these reasons, we propose the following, more general set of desiderata that we believe must hold in order for definitional interpretations to be licensed. First, the discourse participants must have a mutual interest in communicating not only about the world but also about their language and arriving at a refined — even if context-specific and fleeting — joint understanding of it. Second, the discourse participants should share as a background assumption that the speaker and listener are willing to coordinate on the lexicon that the speaker seems to be using. That is, there must be tacit agreement between speaker and

[2]Our thanks to James Collins for bringing such uses to our attention.

listener that utterance interpretation can proceed on the assumption of speaker expertise in the language of the domain of the conversation. Third and finally, the cost (in the Gricean sense) of using a disjunction must be fairly small, all things considered, else it is hard to see how the speaker could justify using a disjunction *X or Y* to convey simply $[\![X]\!]$. That is, whatever the costs of using the verbose form, they must be worth paying in virtue of the benefits of identifying (for the purposes of the current talk exchange) the meanings of the two disjuncts.

3 Modeling Communication under Conditions of Speaker Expertise

We now describe our model of pragmatic reasoning. Our presentation is somewhat compact. Readers wishing to more fully explore the model are referred to the website for this paper, which provides implementations of this model (as well as those of Frank & Goodman 2012, Bergen et al. 2014, and Smith et al. 2013) and includes code for calculating all of the examples we review here.

In our model, production and interpretation are based in a recursive process in which speaker and listener agents reason about each other reasoning about each other. At the lowest levels of our model, these agents communicate using a single lexicon. However, we do not actually assume that a single lexicon is mutually and publicly recognized as the set of core conventions of the language. Rather, our model aggregates over many possible lexica, thereby allowing the agents to negotiate the structure of the language itself even as they communicate. Figure 2 summarizes this picture schematically; this section is devoted to explicating these agents and their relationships.

The core structures of our model are given in (9). Intuitively, we imagine that a speaker and listener are playing a game in which the speaker privately observes a state $w \in W$ and produces a message $m \in M$ on that basis, given the context defined by the signaling system. The listener then uses m to guess a state $w' \in W$. The communication is successful just in case $w = w'$. The agents that we define are rational in the sense that, by reasoning recursively about each other's behaviors, they can increase their chances of success at this signaling game.

(9) a. W is a set of states (worlds, referents, propositions, etc.).
b. M is a set of messages containing a designated 'null' message $\mathbf{0}$.
c. $\mathcal{L}^* : M \mapsto \wp(W)$ is a semantic interpretation function. $\mathcal{L}'(\mathbf{0}) = W$.
d. $P : \wp(W) \mapsto [0, 1]$ is a prior probability distribution over states.
e. $C : M \mapsto \mathbb{R}$ is a cost function on messages.

Clause (9b) designates a null message $\mathbf{0}$ and clause (9c) includes a stipulation that $\mathbf{0}$ is true in all states in all lexica. It can be thought of as a catch-all for the numerous messages in the language that are not discriminating in the context defined by the signaling system. No matter how big and complex the examples, such a message is always justified. Introducing $\mathbf{0}$ also helps ensure that various calculations in the model are well-defined. (For alternative methods of ensuring definedness, see Jäger 2012 and Bergen et al. 2014.)

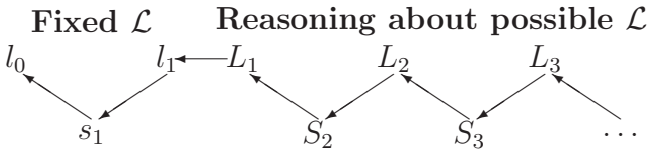


Figure 2: Summary of model structure.

3.1 Simple State/Message Signaling

As Figure 2 shows, our model defines an intuitive hierarchy of agents. The most basic are l_0, s_1, and l_1. In intuitive terms, these agents make meaning in a Gricean fashion: the pragmatic listener l_1 reasons about the pragmatic speaker s_1 reasoning about the 'literal' (purely semantic) listener l_0. These agents reason in terms of a fixed lexicon $\mathcal{L}$, which, for our purposes, can be thought of as a standard semantic interpretation function, as in (9c). These agents suffice to define a version of the Rational Speech Acts model of Frank & Goodman (2012) and Goodman & Stuhlmüller (2013).

The starting point is the literal listener, l_0. This agent simply turns $\mathcal{L}$ into a probabilistic formulation that can be used for decision-making in the presence of communicative indeterminacy. In short, given message m, this agent assigns 0 probability to states in which m is false. For the rest, its estimated probability for each state w is proportional to the prior $P(w)$.[3]

$$(10) \quad l_0(w \mid m, \mathcal{L}) \propto P(w) \text{ if } w \in \mathcal{L}(m), \text{ else } 0$$

This literal listener is pragmatic only insofar as it incorporates the contextual prior P into (a distribution derived from) the truth conditions. Richer pragmatic inferences start to emerge as soon as we envision a speaker that can reason in terms of this listener and plan its utterances accordingly. The minimal such speaker is s_1, which is defined in terms of l_0:

$$(11) \quad s_1(m \mid w, \mathcal{L}) \propto \exp\left(\alpha \log\left(l_0(w \mid m, \mathcal{L})\right) - C(m)\right)$$

This agent observes a world state w and, given $\mathcal{L}$, chooses a message m to try to communicate w. The definition appears cumbersome in its use of log and exp. These transformations are needed to ensure that all values are positive even with real-valued costs. At its heart, though, this agent is parallel to l_0 in that it combines a conditional distribution and a piece of contextual information — now costs on messages. The result is a distribution that one can imagine serving as the basis for decision-making in production: given that the agent would like to convey that a certain state holds, which message will do that most effectively for the l_0 listener? The real-valued parameter α controls the degree to which the speaker tries to capitalize on the distinctions l_0 encodes.

The first pragmatic listener is l_1. It is parallel to l_0 except that it reasons, not in terms of the original lexicon, but rather in terms of s_1 reasoning about l_0 reasoning about the lexicon. This agent is essentially a derived, pragmatically-enriched probabilistic interpretation function:

$$(12) \quad l_1(w \mid m, \mathcal{L}) \propto s_1(m \mid w, \mathcal{L})P(w)$$

[3] '$P(a \mid b) \propto X$' is read 'the value $P(a \mid b)$ is proportional to the value X'. To obtain normalized probabilities, one divides each value X by the sum of all the values X' obtained by replacing a by one of its a'.

$\mathcal{L}^*$	w_1	w_2	w_3
p	T	T	F
q	T	F	T
$p \,\&\, q$	T	F	F
$p \,or\, q$	T	T	T
0	T	T	T

$\longleftarrow$

l_0	w_1	w_2	w_3
p	.5	.5	0
q	.5	0	.5
$p \,\&\, q$	1	0	0
$p \,or\, q$	.33	.33	.33
0	.33	.33	.33

l_1	w_1	w_2	w_3
p	.3	.7	0
q	.3	0	.7
$p \,\&\, q$	1	0	0
$p \,or\, q$	.17	.41	.41
0	.17	.41	.41

s_1	p	q	$p \,\&\, q$	$p \,or\, q$	**0**
w_1	.33	.33	.25	.08	0
w_2	.8	0	0	.2	0
w_3	0	.8	0	.2	0

Figure 3: Simple state/message signaling with disjunction. $P(w_i) = 1/3$ for all states $w_i \in W$, $C(or) = C(and) = 1$, and $\alpha = 1$. Listener l_1's best inferences are in gray. The recursive process separates disjunction and conjunction, and it also separates disjunction from each of its disjuncts.

Figure 3 shows how this model derives basic scalar implicatures. We've used disjunction to illustrate, but the reasoning holds wherever general terms compete with more specific (entailing or merely overlapping) ones. In terms of the communication game, suppose the speaker produced the message $p \,or\, q$. For the literal listener l_0, all three worlds have equal probability given this message, making it unlikely that the two agents will succeed in communication. However, the first pragmatic listener l_1, reasoning in terms of s_1, has a greater chance of success. It has already learned to separate the related terms: $p \,or\, q$ conveys that $p \,\&\, q$ is false, and the atomic propositions convey biases not present in their disjunction. One can also see that the speaker seeks to avoid ambiguities. For instance, where a unique atomic proposition is true, the speaker opts for it, thereby creating less uncertainty in the listener than a disjunction would.

This basic model has been shown to achieve good quantitative fits to experimental results (Degen & Franke 2012; Stiller et al. 2011) and to contribute to artificial agents that communicate effectively with each other to solve a collaborative task (Vogel et al. 2013). One can also generalize l_1 and s_1 to allow them to recursively respond to each other, which strengthens the scalar inferences seen in Figure 3. In our model, there is no further recursion of these lexicon-specific agents, but we do allow further recursion of the agents we define next.

3.2 Reasoning under Lexical Uncertainty

In the model defined by l_0, s_1, and l_1, the agents condition on (take as given) a fixed, shared lexicon. However, the data in Section 2 show that the lexicon is not known precisely, but rather negotiated during interactions. We now bring that insight into our model using the lexical uncertainty technique first introduced by Bergen et al. (2012, 2014). The first step is to define a space of lexica $\mathbf{L}$ and a probability distribution over them $P_{\mathbf{L}}$:

(13) a. $\mathbf{L} = \{\mathcal{L}' : \mathcal{L}'(\mathbf{0}) = W \,\&\, \forall m \in M\text{–}\{\mathbf{0}\}\,, \mathcal{L}'(m) \neq \emptyset \,\&\, \mathcal{L}'(m) \subseteq \mathcal{L}^*(m)\}$

b. $P_{\mathbf{L}} : \wp(\mathbf{L}) \mapsto [0, 1]$ is a prior probability distribution over lexica.

Clause (13a) defines a complete set of refinements of a basic lexicon: every lexical item can denote a subset of the space it denotes in the base lexicon $\mathcal{L}^*$, and all combinations of these refinements are available. The only requirements are that messages always have non-empty denotations and that the null message $\mathbf{0}$ always denotes the full set of states. We should emphasize, though, that these assumptions are not essential to our model. In the extreme case, we could admit every lexicon derivable from the messages M and states W, and then use the lexicon prior $P_{\mathbf{L}}$ to provide some structure to the space — say, by assigning low but non-zero probability to lexica that are not strict refinements, and zero probability to lexica in which $\mathbf{0}$ is not universal or some messages have empty denotations. This is a strictly more general perspective than the one given by (13). We do not explore these options further in this paper, but see Kao et al. 2014a,b for discussion of non-refinement pragmatic enrichment involving non-literal language.

Our first 'lexical uncertainty' agent is L_1, which is based on the model of Smith et al. (2013). Given a message, this agent makes joint lexicon–state inferences over the space $W \times \mathbf{L}$:

(14) $L_k(w, \mathcal{L} \mid m) = L_k(w \mid m, \mathcal{L}) L_k(\mathcal{L} \mid m)$

$L_k(\mathcal{L} \mid m) \propto P(\mathcal{L}) \sum_{w \in W} S_k(m \mid w, \mathcal{L}) P(w)$

This agent is defined for levels $k \geqslant 1$ as long as we assume that $S_1 = s_1$ (higher levels use the speaker in (15)) and $L_1(w \mid m, \mathcal{L}) = l_1(w \mid m, \mathcal{L})$. The first term uses a fixed-lexicon inference and the second, $L_k(\mathcal{L} \mid m)$, encodes the extent to which the current message biases in favor of the lexicon $\mathcal{L}$.

Our 'expertise' speaker responds to this lexical uncertainty listener. We assume that this speaker does have a specific lexicon in mind (this is the sense in which it is expert). More precisely, this speaker is taken to observe state–lexicon pairs and produce messages on that basis. It is defined for all $k > 1$:

(15) $S_k(m \mid w, \mathcal{L}) \propto \exp\left(\alpha \log\left(L_{k-1}(w \mid m, \mathcal{L})\right) + \beta \log\left(L_{k-1}(\mathcal{L} \mid m)\right) - C(m)\right)$

In broad terms, this agent is similar to s_1 except that it includes a new term $L_{k-1}(\mathcal{L} \mid m)$ encoding the information each message conveys about the lexicon. The importance of this information is controlled by a new real-valued parameter β. The relative weights of α and β govern the relative importance of conveying information about the world and information about the lexicon. As α grows, the agents venture riskier Gricean behavior: the speaker tries to extract as many distinctions as possible from its estimate of the listener, and it chooses utterances on this (hyper-)rational basis. The pattern is similar for β, but the target becomes exchanging information about the language itself. If we set $\beta = 0$, then the agents places no value on communicating about the lexicon, and the model reduces to a variant of the lexical uncertainty model of Bergen et al. (2014). As β rises, communicating about the language itself becomes more important. The precise relationship between α and β is extremely complex; much of our investigation of disjunction focuses on understanding it.

Let's return to the schematic diagram in Figure 2. Intuitively, if one begins at, say, L_2, then the reasoning flows down through the uncertainty agents S_2 and L_1, at which point it splits apart into lower-level agents that reason about specific lexica. Alternatively, one can imagine the lexicon-specific inferences flowing up to be pooled together by L_1, which then makes joint inferences about the state and the lexicon.

Figure 4 seeks to show how the model works with a simple case involving a scalar inference. In the figure, the bottom row specifies the lexica defined by (13a) with $\mathcal{L}^*$ as the starting point; the more specific term has no further refinements, but the general term has two further refinements, resulting in three lexica. The lexicon-specific agents l_0, s_1, and l_1 reason about these lexica. At the L_1 level, we have given just the joint table for the message *cheap*, but there are similar tables for the messages *free* and **0**. Similarly, we've given only one conditional probability table for S_2; there are similar tables for $\mathcal{L}^*$ and $\mathcal{L}_1$. Finally, we depict the *cheap* table for L_2. For this example, we set $\alpha = 1$ and $\beta = 2$. The relatively large β parameter means that the speaker values communicating about the lexicon, and we can see the effects of this in L_2, which displays a dispreference for $\mathcal{L}_1$, equivalently, a preference for the lexica that distinguish *cheap* from *free*. More generally, even in this basic example, $L_2(\mathcal{L} \mid m)$ discriminates among lexica, meaning that this agent can use S_2's message to gain insights into its lexical preferences. If β is lowered, then this becomes less pronounced, and $\beta = 0$ means that $L_2(\mathcal{L} \mid m)$ becomes flat (treats all lexica as identical).

3.3 A Return to Simple Signaling

The full model can be unwieldy because of the lexicon inferences. One often wants to return to the intuitive picture of simple state/message signaling, as in examples like Figure 3. To achieve this, one can marginalize (or sum) over lexica, as in (16) and (17). Both provide useful summaries of the model's predictions.

(16) $L_k(w \mid m) = \sum_{\mathcal{L} \in \mathbf{L}} L_k(w, \mathcal{L} \mid m)$

(17) $S_k(m \mid w) \propto \sum_{\mathcal{L} \in \mathbf{L}} S_k(m \mid w, \mathcal{L}) P_{\mathbf{L}}(\mathcal{L})$

Figure 5 uses these equations to summarize the inferences for L_2 and S_2 from Figure 4. We no longer get insights into the agents' lexical preferences and inferences, but we do see that they are computing scalar inferences in the manner we saw for the simpler model in Figure 3.

4 Compositional Lexical Uncertainty

There are two shortcomings of the model as presented so far that are important to correct before studying Hurfordian and definitional usage patterns. Both of these shortcomings are evident in the treatment of disjunction in Figure 3.

First, if we took the lexicon given there as the base lexicon and applied lexical uncertainty to it using (13a), the results would be highly unintuitive because many lexica would fail to respect the desired semantic relationships that hold among the messages. For example, there would be lexica in which $p \, or \, q$ strictly entailed p. The culprit here is that lexical uncertainty, applied naively, does not respect compositional semantics. To address this, we follow Bergen et al. (2014) and Levy et al. (To appear) in applying uncertainty only to the true lexical items, and then close each lexicon under the compositional operations of disjunction and

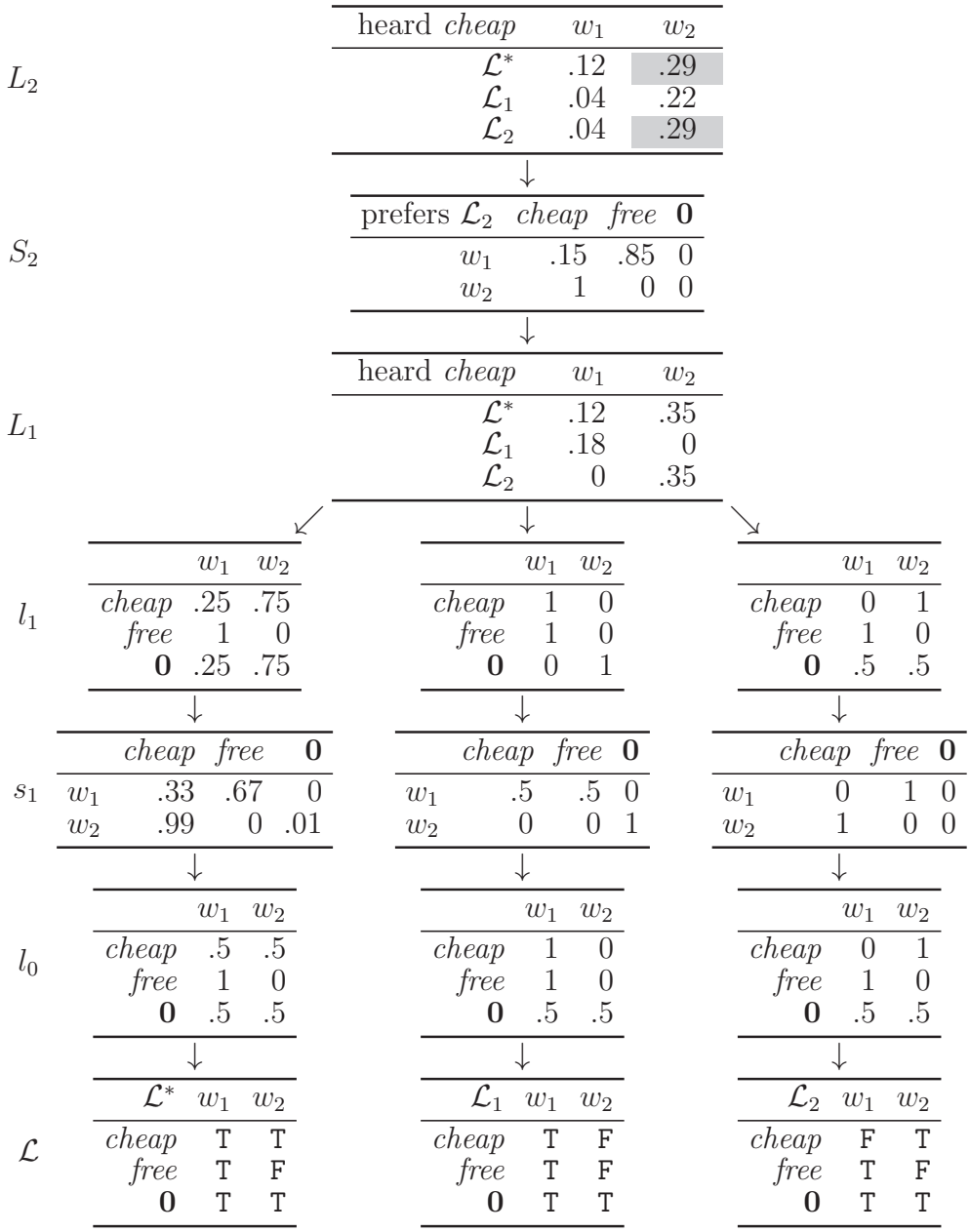


Figure 4: Illustration of the full model in action. The priors over worlds and lexica are all flat, message costs are all 0, $\alpha = 1$, and $\beta = 2$. The high β means that L_2 shows a notable dispreference for the undiscriminating lexicon $\mathcal{L}_1$.

	w_1	w_2
cheap	.2	.8
free	1	0
0	0	1

(a) L_2

	cheap	*free*	**0**
w_1	.23	.77	0
w_2	.92	0	.08

(b) S_2

Figure 5: Return to simple signaling for the simple scalars example in Figure 4.

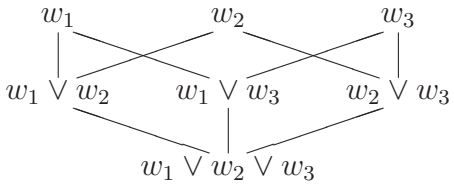


Figure 6: State space with disjunctive closure.

conjunction. Thus, in Figure 3, only p and q can be refined. This results in nine distinct lexica. Each of these is then expanded to include $p \,\&\, q$ and $p \; or \; q$, with their meanings determined by whatever meanings the atomic expressions have.

Second, the world space in Figure 3 does not create any room for the speaker to be uncertain. The pretense is that the speaker always observes the state perfectly (up to the level of granularity being measured) and then seeks to communicate that observation. This gives somewhat unintuitive results for disjunction. Disjunction is naturally used to convey speaker uncertainty, but we currently allow no room for such uncertainty. To address this, we close the state space under joins. For the set of atomic states $\{w_1, w_2, w_3\}$, this results in the semilattice in Figure 6. Interpretation via $\mathcal{L}$ then proceeds as one would expect: disjunction corresponds to union and conjunction to intersection. For example, if $\mathcal{L}(p) = \{w_1, w_2\}$ and $\mathcal{L}(q) = \{w_1, w_3\}$, then $\mathcal{L}(p \; or \; q) = \{w_1, w_2, w_3\}$. After join closure, this denotes the entire state space represented in Figure 6. Conversely, $p \,\&\, q$ denotes $\{w_1\}$, which does not change under closure. (We could expand the space of meanings to include meets, or even to the full Smyth powerlattice with states like $w_1 \vee (w_2 \wedge w_3)$, as in Levy & Pollard 2001, but we stick with the join space to keep the presentation as simple as possible.)

Formally, the model we have developed here is an instance of the compositional lexical-uncertainty model of Bergen et al. (2014) and Levy et al. (To appear), with two elaborations: we have placed value on transmission of the lexicon from speaker to listener (equation 15) and specified the structure of the state space for the classes of utterances presently under consideration. Figure 7 summarizes how our model behaves in this setting. We begin from a base lexicon $\mathcal{L}^*$ in which $\mathcal{L}^*(p) = \{w_1, w_2\}$ and $\mathcal{L}^*(q) = \{w_1, w_3\}$. We apply lexical uncertainty to obtain nine distinct lexica, close their state space under joins, and close their messages under disjunction and conjunction. We run the full model up to level L_2, and then marginalize L_2 and S_2 as in (16) and (17), respectively. The results are closely aligned with the comparable tables in Figure 3, in that we obtain all of the interpretive scalar implicatures and predict largely the same speaker behavior. The one major improvement is that we now directly capture the intuition that disjunction can signal speaker uncertainty: the speaker's best choice for state $w_2 \vee w_3$ is $p \; or \; q$.

5 Analysis

We now show how our model can be used to characterize a range of Hurfordian and definitional capacities of disjunction. We first illustrate the effects using parameters chosen by hand, giving an example of definitional inference in Section 5.1 and an example of Hurfordian inference in Section 5.2. We then show in Section 5.3 how our model derives the "defensive-speaker" Hurfordian disjunctions discussed in Section 2.1. Finally, in Section 5.4, we explore the space of parameters more fully to try to determine which settings — which

	w_1	w_2	w_3	$w_1 \vee w_2$	$w_1 \vee w_3$	$w_2 \vee w_3$	$w_1 \vee w_2 \vee w_3$
p	.25	.51	0	.24	0	0	0
q	.25	0	.51	0	.24	0	0
$p \,\&\, q$	1	0	0	0	0	0	0
$p \; or \; q$	.04	.06	.06	.18	.18	.28	.21
$\mathbf{0}$	0	.12	.12	.16	.16	.2	.24

(a) L_2

	p	q	$p \,\&\, q$	$p \; or \; q$	$\mathbf{0}$
w_1	.29	.29	.4	.02	0
w_2	.96	0	0	.04	0
w_3	0	.96	0	.04	0
$w_1 \vee w_2$	.79	0	0	.2	.01
$w_1 \vee w_3$	0	.79	0	.2	.01
$w_2 \vee w_3$	0	0	0	.95	.05
$w_1 \vee w_2 \vee w_3$	0	0	0	.93	.07

(b) S_2

Figure 7: Simple signaling for compositional disjunction.

approximations of the context — deliver each type of reading.

Throughout our illustrations, we assume that X is the target for refinement, that is, the general term for Hurfordian inferences and the unknown term for definitional ones. From the listener's perspective, we are concerned to see when $A \; or \; X$ gives rise to the inference that $[\![A]\!] \cap [\![X]\!] = \emptyset$ (Hurfordian reading) and when $A \; or \; X$ gives rise to the inference that $[\![A]\!] = [\![X]\!]$ (definitional). (From now on, we use $[\![m]\!]$ as a shorthand for 'the listener's construal of the message m'.)

It's worth highlighting again the dynamics of the model that facilitate these uses. First, we assume that the speaker has a preferred lexicon, and that she will choose her messages in part to help convey this preference. Of course, the recursive nature of the model means that the listener (or, rather, the speaker's expectations about the listener) are involved in this planning. Second, we assume that the listener is at least somewhat willing to defer to the speaker with regard to the best lexicon to use in context. Again, this deference is mediated by the recursive nature of the model, which defines all aspects of communication as a (boundedly) rational collaboration. We take these basic assumptions to be necessary, but not sufficient, for communicating in language about language.

In our model, the importance of communicating about the world is governed by the parameter α, and the importance of lexical communication is governed by the parameter β. If β is set to 0, then communication about the lexicon has no intrinsic value to the conversational agents. Where β is positive, the ratio of α to β is a rough guide to the relative importance of communicating about the world and communicating about the lexicon (though message costs and other facts about the context also play a role).

5.1 Definitional Contexts

We begin with definitional readings because they more clearly motivate the structure of our model. The central question is when *A or X* is intended and construed as equivalent to $[\![A]\!]$. From the listener's perspective, this involves an inference that (perhaps roughly speaking, and perhaps just for the current context) $[\![A]\!] = [\![X]\!]$, where X is the unknown term. From the perspective of production, we want to know when a speaker will favor producing *A or X* given that she favors a lexicon in which $[\![A]\!] = [\![X]\!]$ and observes a state equivalent to the literal meaning of $[\![A]\!]$. The full characterization of this phenomenon involves many complex factors relating to social status, mutual, public knowledge about knowledge, and so forth. We saw in Section 2 that the motivations are diverse and subtle. Our goal is to home in on the core aspects of these inferences.

Figure 8 summarizes a basic context in which the uncertainty listener makes a definitional inference and the speaker inclines toward definitional intentions. The context has three atomic states and three basic messages. The initial lexicon $\mathcal{L}^*$ gives rise to three refinements, pictured in the bottom row of the figure. (To save space, we depict just three of the messages.) Crucially, β is larger than α, encoding the primacy of lexical information over world information (though both remain highly relevant), and the cost of disjunction is low: 0.01.

The progression from bottom to top in Figure 8 helps explain how the model arrives at definitional construals and intentions. At L_1, the listener is undecided about whether the disjunction is definitional or Hurfordian. The information contained in the lexicon-specific reasoning patterns is enough to create a bias away from $\mathcal{L}^*$, but it is not enough to break the symmetry between the remaining inferences. At S_2, the effects of the high β parameter are beginning to be felt. Although this speaker has a bias away from using *A or X* to convey a definitional intention, this bias is only slight, because of the low cost of disjunction. Additionally, the likelihood of S_2 saying *A or X* is maximal when the speaker observes $\langle \mathcal{L}_2, w_1 \rangle$. Together, these factors strongly push L_2 to adopt a definitional construal of *A or X*. This construal is clearer (in the sense that the L_2 probability on $\langle \mathcal{L}_2, w_1 \rangle$ is higher) for *A or X* than for any other utterance. Crucially, L_2 inferences for X (not shown for reasons of space) are split between $\langle \mathcal{L}_2, w_1 \rangle$ and $\langle \mathcal{L}_1, w_2 \rangle$ because both these world–lexicon pairs give high likelihood to S_2 uttering X. As a result, S_3, who plans her utterances based on the expected inferences of L_2, strongly prefers to use the disjunction when in a definitional state. Once this definitional interpretation is reached, it remains stable through further iterations of listener–speaker recursive reasoning (also not shown for reasons of space).

The lexicon used in Figure 8 is tiny, and one might wonder whether the definitional inference comes about via a spurious process of elimination, given that there are only three atomic messages and one has a very general meaning. To address this concern, we ran the same simulation with a larger lexicon: five atomic messages and four atomic states. This is of course still unrealistically small for a natural language lexicon, but it certainly provides a much larger space for potential lexical refinements. The definitional reading arises in this lexicon with the same parameters as in Figure 8. This is unwieldy to visualize (there are fourteen distinct lexica), but the important thing is that the best lexicon is a definitional one. Here's the best lexical inference given the message *A or X* from the speaker:

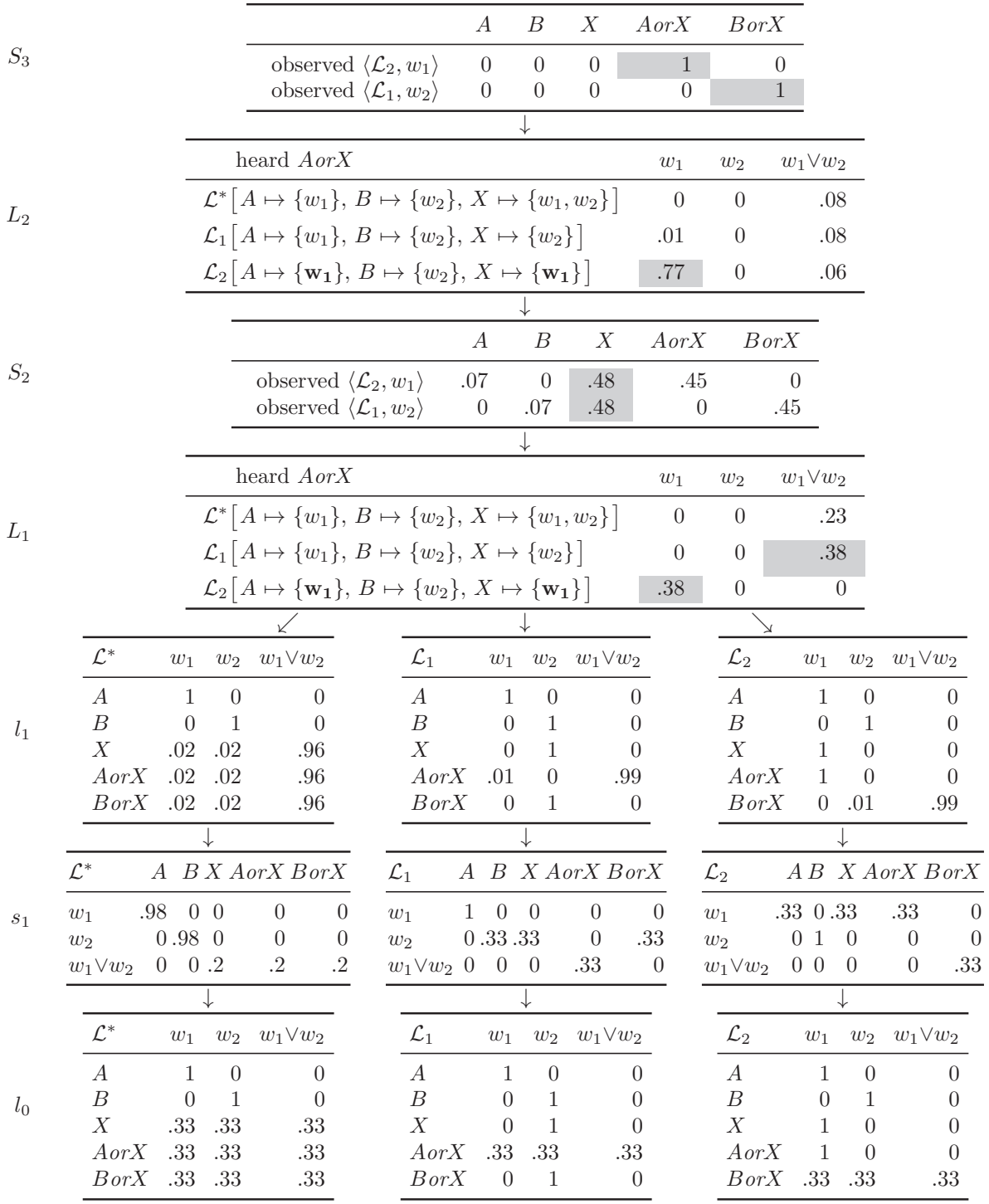


Figure 8: Definitional intentions and construals, with only a subset of the states and messages displayed due to space constraints. Priors are flat. $\alpha = 5$; $\beta = 7$; $C(or) = 0.01$. The definitional construal becomes prominent at L_2, and definitional intentions emerge at S_3.

	L_2 hears A *or* X	w_1	w_2	$w_1 \vee w_2$
$\mathcal{L}_1$	$\left[A \mapsto \{w_1\},\ B \mapsto \{w_2\},\ X \mapsto \{w_2\}\right]$	0	0	.04
$\mathcal{L}_2$	$\left[A \mapsto \{\mathbf{w_1}\},\ B \mapsto \{w_2\},\ X \mapsto \{\mathbf{w_1}\}\right]$	.92	0	.03

Figure 9: Definitional inference for L_2 with X constrained to have an atomic meaning. Priors are flat. $\alpha = 5$; $\beta = 7$; $C(or) = 0.01$.

$$(18) \quad \begin{bmatrix} A \mapsto \{w_1\} \\ B \mapsto \{w_2\} \\ C \mapsto \{w_3\} \\ D \mapsto \{w_4\} \\ X \mapsto \{w_1\} \end{bmatrix}$$

In our model, definitional uses are delicate in the sense that they arise only for a relatively narrow range of parameter settings. (We quantify this intuitive characterization in Section 5.4.) For example, if β is too close to α, or disjunction costs get too high, the listener fails to make the inference and the speaker tends to resort to using just A to convey w_1. This makes intuitive sense given the nature of these parameters. For example, if the speaker has little interest in communicating about the lexicon, or disjunction costs prohibit the wastefulness of using A *or* X to convey $[\![A]\!]$, then the meanings disappear.

Nonetheless, it is worth asking whether there are ways in which the reading can be made more salient and robust. We have found that the rate of definitional intentions and perceptions is increased as we raise the prior expectation in favor of lexica in which the unknown term has a maximally general meaning; this corresponds intuitively to situations in which there is a mutual prior expectation that the word is unknown. In addition, we can further encourage pedagogical expectations by imposing the additional lexical requirement that the meaning of X be atomic (as atomic as the known terms in the lexicon). This would correspond to a situation in which it was clear that X was an alternative for some lexical item. Under these circumstances, the meaning of the known disjunct serves as a FOCAL POINT (Schelling 1960) that the speaker and listener can coordinate on for the meaning of the unknown word. Figure 9 is a minimal variant of (the topmost table in) Figure 8 in which this extra lexical requirement has been imposed. This removes $\mathcal{L}^*$ from consideration. The listener inference is numerically stronger, and it is paralleled by a similar increased probability on the speaker side for producing A *or* X with definitional intentions. We will explore these atomic-meaning, focal-point contexts in more detail in Section 5.4.

5.2 Hurfordian Contexts

For Hurfordian readings, we seek to understand where and how A *or* X gives rise to the inference that $[\![A]\!] \cap [\![X]\!] = \emptyset$, where X is again the unknown word. We assume that the overall meaning will be $[\![A]\!] \cup [\![X]\!]$, i.e., that the relevant information concerns just the lexicon.

Figure 10 presents a context in which L_2 arrives at this conclusion. The states and messages are as in our definitional example (Figure 8). Anticipating the meta-theory we develop in Section 5.4, we note that setting $\alpha > \beta$ is important for achieving this result. Intuitively,

L_2 hears $A\ or\ X$	w_1	w_2	$w_1 \vee w_2$
$\mathcal{L}^*\big[A \mapsto \{w_1\},\ B \mapsto \{w_2\},\ X \mapsto \{w_1, w_2\}\big]$	.02	0	.32
$\mathcal{L}_1\big[A \mapsto \{\mathbf{w_1}\},\ B \mapsto \{w_2\},\ X \mapsto \{\mathbf{w_2}\}\big]$	.04	0	.45
$\mathcal{L}_2\big[A \mapsto \{w_1\},\ B \mapsto \{w_2\},\ X \mapsto \{w_1\}\big]$	.03	0	.14

Figure 10: Hurfordian inference for L_2. Priors are flat. $\alpha = 2$; $\beta = 1$; $C(or) = 1$.

this means that world information is valued more than lexical information. We also note that the cost of disjunction is relatively high. Where costs are high, the disjunction has to be justified. Letting the two terms overlap reduces the justification, whereas exclusivizing provides justification. In other words, the apparently undue prolixity of the disjunction (the more general term would seem to suffice!) supports the Hurfordian lexical inference.

Ours is a model of production as well as interpretation, so it's important to take the speaker's perspective as well. It's useful that the listener makes the desired inference upon hearing $A\ or\ X$, but the value of this observation is diminished if the speaker never uses this message to signal the relevant state–lexicon pair, especially since our corpus work (Section 2.1) suggests that speakers do in fact produce these utterances systematically. With the above parameters, our model predicts that they will produce such messages. Indeed, in this context, with these parameters, S_2's preferred message given observed state $w_1 \vee w_2$ and lexicon $\mathcal{L}_1$ from Figure 10 is $A\ or\ X$. This suggests that the strategy is a stable one in communication, in line with the intuitions we described in Section 2.1.

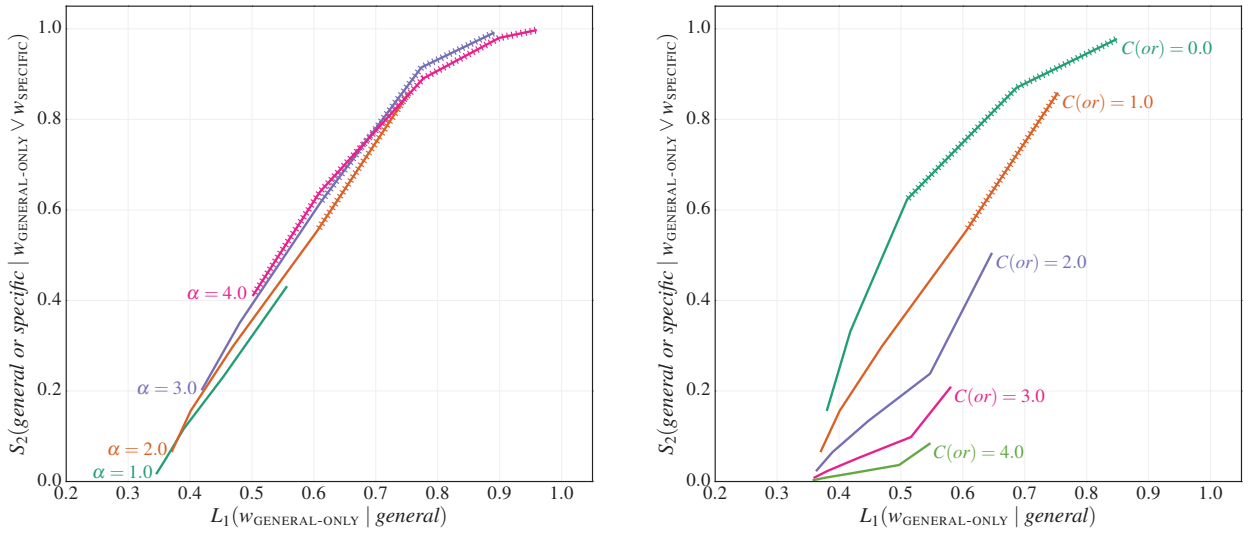
Once again, it is worth running the same simulation with a larger lexicon. We find that the above parameters deliver the same result with the lexicon size increased to five atomic messages and four atomic states: if the listener hears $A\ or\ X$ in this context, she infers that the speaker's lexicon is (19).

$$(19) \quad \begin{bmatrix} A \mapsto \{w_1\} \\ B \mapsto \{w_2\} \\ C \mapsto \{w_3\} \\ D \mapsto \{w_4\} \\ X \mapsto \{w_2, w_3, w_4\} \end{bmatrix}$$

This is the 'minimal' Hurfordian lexicon: the listener doesn't infer anything about X except that it is disjoint from A. Once again, this inference is mirrored by a speaker preference for producing $A\ or\ X$ given observed state $w_1 \vee w_2$ and the lexicon (19).

5.3 Defensive Speakers: Q- and I-implicature Blocking

In Section 2.1, we identified two classes of potential implicature inferences that can drive speakers to produce HG violations: Q-implicatures, where using only the general term might create an upper-bounding inference, and I-implicatures, where using only the general term might result in inference to a specific, salient sub-kind. As we describe below, our model can derive speakers' use of HG violations to block both kinds of implicatures. It also sheds light on two aspects of these inferences: the circumstances that favor each type of implicature, and the nature of defensive implicature-blocking behavior on the part of the speaker.



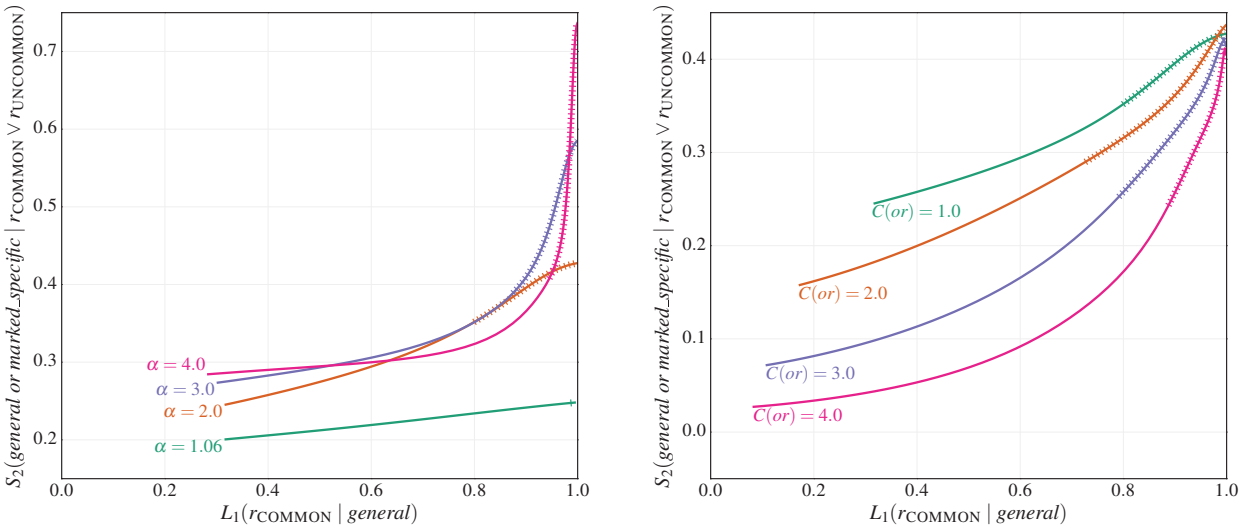
(a) Tracing five values of α with $C(or) = 1$.

(b) Tracing four values of $C(or)$ with $\alpha = 2$.

Figure 11: Q-implicature blocking. The variation in the x-axes is created by varying $C(\textit{specific})$ from 0 to 4, with lower costs corresponding to higher values (more implicature inferences from *general* to *not specific*). Dashes mark spans in which the speaker probability is maximal given the disjunctive observation, that is, where the HG violation is preferred.

Figure 11 reports on simulations involving the Q-implicature case. Intuitively, we have a general term like *cheap* and a specific term like *free*. The general term is true in both $w_{\text{GENERAL-ONLY}}$ and w_{SPECIFIC}, whereas the specific term is true only in w_{SPECIFIC}, creating an information state supporting a standard scalar implicature from the general term to the falsity of the specific one. In both panels of Figure 11, the x-axis tracks the probability that L_1, upon hearing the general term, draws an implicature inference that the specific term is false. We create this variation by changing the cost of the term *specific* from 0 to 4. As its cost rises, the listener's implicature becomes less probable. The y-axes depict the S_2 speaker's response to this listener upon observing the state $w_{\text{GENERAL-ONLY}} \vee w_{\text{SPECIFIC}}$. We are interested primarily in the conditions under which this speaker will produce the HG-violating disjunction *general or specific* having observed this state. The dashes on the lines mark spans in which an HG violation is the speaker's *preferred* choice here.

In both panels, the trend is the expected one, mirroring the corpus results from Figure 1. The patterns are heavily influenced by other parameters in the model, especially the setting of α and the cost of disjunction. For instance, consider the case where $\alpha = 2$, which is given by the orange line in Figure 11a. Here, when the listener probability reaches .6, the speaker's preferred move is to utter an HG-violating disjunction. With higher (more aggressive) α, the listener threshold drops to .5; at lower values of α, this particular speaker never violates HG. Similarly, in Figure 11b, where disjunction is free (green line), the speaker is willing to violate HG even when the listener's scalar inference is not all that strong; as the cost of disjunction goes up, the speaker needs a more compelling reason for the violation, that is, a stronger listener inference. If disjunction is sufficiently costly (e.g., the pink line), then this speaker never violates HG.



(a) Tracing four values of α with $C(or) = 1$.

(b) Tracing four values of $C(or)$ with $\alpha = 2$.

Figure 12: I-implicature blocking. The variation in the x-axes is created by varying $P(r_{\text{COMMON}})$ from 0.33 to 0.99, with higher values for this prior corresponding to higher listener inferences (more implicatures from *general* to *specific_unmarked*). Dashes mark spans in which the speaker probability is maximal given the disjunctive observation, that is, where the HG violation is preferred.

The key mechanism for this Q-implicature example is variation in the cost of the specific term. To simulate I-implicatures, we instead vary the prior likelihood of the referents. Figure 12 summarizes the picture abstractly. Here, we have a general term like *boat* and two specific terms like *motorboat* and *canoe*, referring to objects r_{COMMON} and r_{UNCOMMON}, respectively. This would correspond to a situation where we work at a marina that is largely devoted to motorboats, with canoes infrequent and not especially salient. As in Figure 11, the x-axes track the inferences of L_1. We are now interested in this agent's inference from hearing the general term (*boat*) to the more frequent sub-kind (*motorboat*) as the referent. We obtain this variation by varying the prior over r_{COMMON} from 0.33 to 0.99. The y-axes show S_2's responses given the disjunctive observation $r_{\text{COMMON}} \vee r_{\text{UNCOMMON}}$. Dashes again correspond to spans in which violating HG with the disjunction *general or marked_specific* (e.g., *boat or canoe*) is this speaker's preferred utterance. Here again, α and the cost of disjunction influence this agent's choices. For instance, 1.06 is approximately the lowest α that generates this behavior, whereas high values of α make it more likely. Conversely, high disjunction costs again reduce the number of HG-violations by making them worthwhile for the speaker only if the listener's tendency to draw I-implicatures is very high.

The above simulations show that the model can capture not only implicature inferences but also the behavior that would normally be characterized as implicature blocking. This possibility arises from the recursive nature of the model, in which pragmatic speakers can anticipate the construals of pragmatic listeners and plan their own utterances accordingly. We should emphasize also that the Q-implicature and I-implicature scenarios represented by Figure 11 and Figure 12 are just particular examples. Since neither kind of implicature is a

primitive of the model, but rather just emerges from other interactions, we are not limited to explanations that fall precisely into one of these two categories, which aligns well with our intuitions about the complex factors that guide HG violations in communication.

5.4 Parameter-Space Exploration

The above illustrative examples provide initial clues as to how our model characterizes Hurfordian and definitional uses from the speaker and listener perspectives. The goal of this section is to more thoroughly explore the space of options, with the goal of formulating a meta-theory of these behaviors and their relationships to the facts.

As we discussed at the start of this section, both uses require the speaker to be invested in some sense in communicating information about the lexicon. In a similar vein, the listener must have some lexical uncertainty, or at least be willing to defer to the speaker's preferences. Both of these forces are centered around the parameter β, which controls both speaker and listener behavior because of the recursive nature of the model. If β is set to 0, then the lexica are not distinguished from one another, and we end up with a system in which only information about the world is exchanged.

The above illustrative examples begin to show that β's relationship to the parameter α and the cost of disjunction are what steer the discourse participants to exclusivization or identification. Figure 13 gives a fuller picture of these dynamics using our larger lexicon setting (five atomic messages, four atomic states). The x-axis gives $\log(\beta/\alpha)$ for values of α and β between 0 and 14 inclusive, in increments of 1. The log-scale helps bring out the underlying relationships, and it also means that values above 0 are where β is bigger than α. The y-axis gives the cost of disjunction, ranging from 0 to 0.2, in increments of 0.01. The dots classify best inferences in this space of parameters, with green marking strictly dominant Hurford strategies, orange marking strictly dominant definitional strategies, and black marking cases where both strategies are strictly dominant (which is possible because we've reduced α and β to a single measure in order to visualize the space in two dimensions).

The picture that emerges from Figure 13 is relatively clear: definitional readings exist in a narrow space where $\beta > \alpha$ and disjunction costs are low. (Very small lexica and world spaces are somewhat more lenient about this, but it seems to hold in systems of sufficient complexity to allow meaningful adjustments to the messages.) As we said above, this makes intuitive sense: where costs are high, the disjunction has to be justified. Letting the two terms overlap reduces the justification, whereas exclusivizing provides justification with regard to α. However, the pressures of β also intrude. If β is high, then it might be worth paying the disjunction costs for the sake of teaching the listener about the lexicon, even if this reduces the amount of information conveyed per word.

In broad strokes, we can relate these ideas to Figure 13. At the bottom of the plot, where disjunction costs are low, we have, perhaps, a professor with ample time and not much to say; as we move right in this space, the professor becomes more invested in the "lingo", and hence definitional readings arise. At the top of the plot, the communications become time- or resource-constrained, and the pressures of HG become strong enough to compel exclusivization even with high β. From this perspective, it is clear why Hurfordian uses are more robust. They arise in a much wider range of contexts because they can easily survive high disjunction costs — exclusivization ensures genuine communicative value. In contrast,

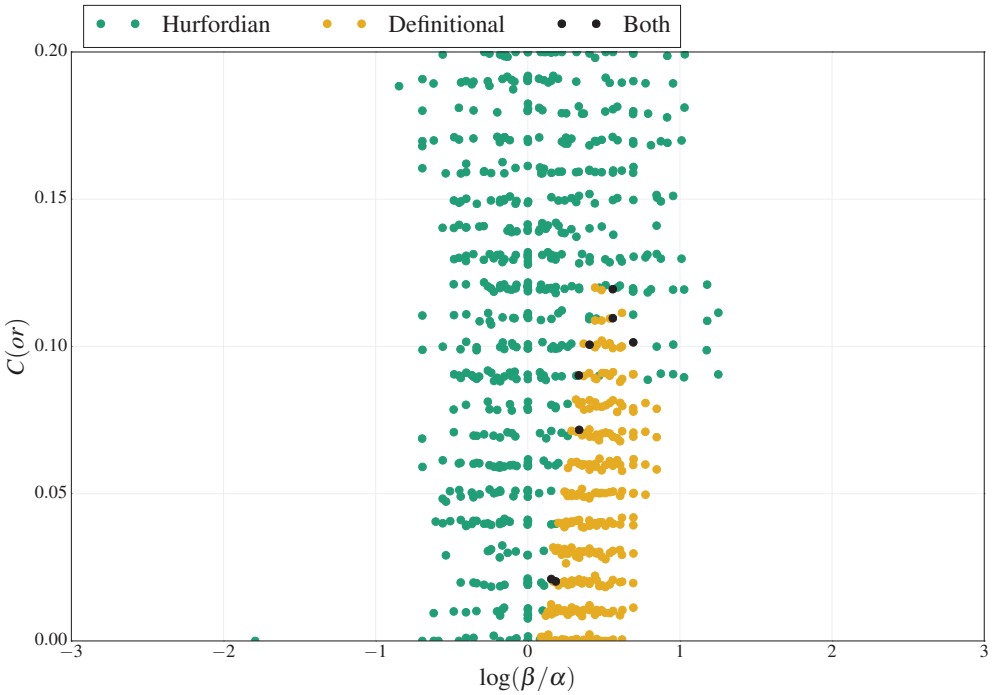


Figure 13: Hurfordian and definitional contexts with a large lexicon (five atomic lexical items, four atomic states).

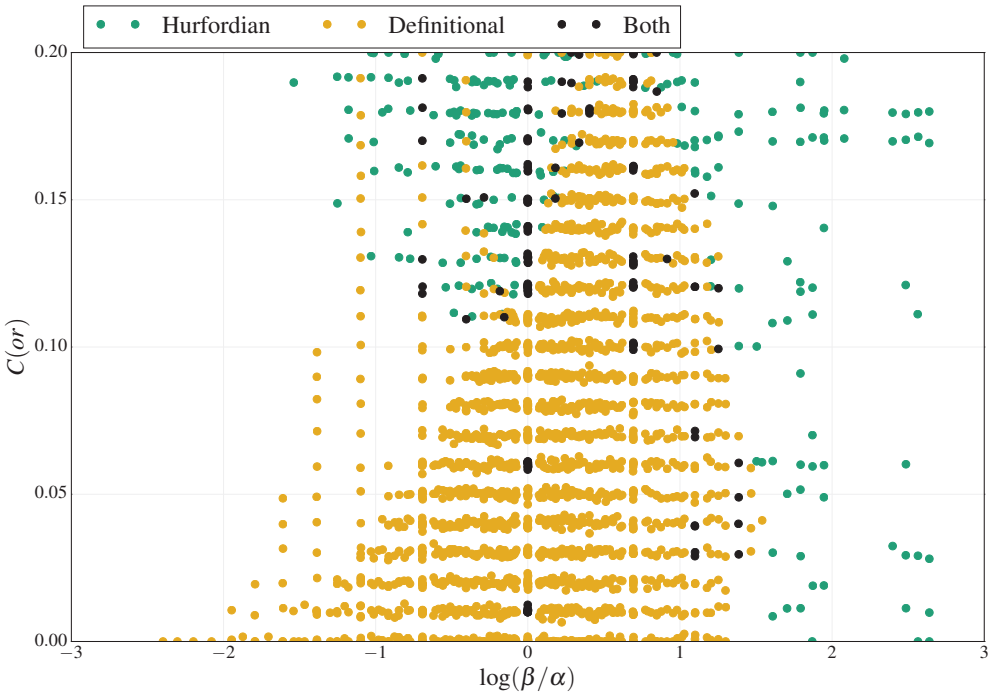


Figure 14: As in Figure 13, but with a focal point unknown word.

definitional readings exist mainly in the space of low disjunction and high β because the state information they convey is fully encoded in the first disjunct, making the full disjunction an inefficient way of conveying world information.

The quantitative picture also leads us to expect that there can be uncertainty about whether the listener should regard the disjunction as definitional or Hurfordian. The discourse participants might be in a blurry area in which small changes to the parameter settings push towards one inference or the other, with the difference between the best and next-best inferences relatively small. This can persist even when one of the words is unknown to the listener. (In such cases, the disjunctive meaning is just extremely general and will not do justice to the speaker's intentions.)

We saw in Section 5.1 that constraining the unknown word to have an atomic meaning — a meaning at the same level of specificity as the other lexical items — can greatly increase the strength of the definitional inference. Figure 14 shows that this is also reflected in the full parameter space. The figure is based on the same data as Figure 13 but with the focal point assumption constraining the space of lexica. The result is that definitional readings now exist in a much wider area of the parameter space: disjunction costs can be higher and β can be smaller than α. Thus, if a context supports this general constraint — for example, if the speaker is known to be trying to instruct the listener about words and concepts — then definitional readings should be more salient.

6 Conclusion

This paper synthesized and extended ideas from recent models of language production and construal, especially those of Smith et al. (2013) and Bergen et al. (2014), in order to provide a unified account of two seemingly conflicting inferences that disjunction supports — a pressure to exclusivize the disjuncts and a pressure to regard them as synonymous. From a single model of disjunctive semantics, coupled with general principles of pragmatic inference, a rich variety of uses of disjunction emerge: definitional interpretations (Section 5.1), Hurfordian exclusivization interpretations (Section 5.2), and defensive, implicature-blocking speaker behavior involving disjunction (Section 5.3). Each use within this rich variety traces to a specific set of relative priorities of the discourse participants with regard to communicating about the language itself, communicating about the world, and avoiding or tolerating undue message costs.

Our most fundamental contributions lie in the structure of the pragmatic model. We allow the speaker's communicative intentions to include linguistic preferences, and we allow listeners to make inferences about those preferences during the regular course of linguistic interactions. This structure is particularly important for exclusivization inferences, which do not affect truth conditions and so do not even emerge in most models. We hope this approach suggests new ways of detecting and understanding the secondary messages encoded in speakers' utterances, and that it can shed new light on the importance of communicating in language about language, and on related issues involving meta-linguistic negotiations and variable levels of perceived expertise about the language. More broadly, it could also serve as a way to connect pragmatic inference with phenomena relating to linguistic change and pedagogy, social identity, social hierarchies, and linguistic style.

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Patterns of Misperception of Arabic Consonants

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1 Introduction

There has been much investigation into perception of speech sounds, demonstrating a range of influences including listeners' native language (e.g. Cutler et al. 2004), the sounds' position in the syllable (e.g. Wang and Bilger 1973), and the presence of different types of masking noise (e.g. Phatak, Lovitt, and Allen 2008). However, there is no data on patterns of misperception of guttural consonants (uvulars, pharyngeals, and glottals); data on consonant discrimination in Arabic (e.g. Kishon-Rabin and Rosenhouse 2000) and the phonological characteristics of gutturals (cf. McCarthy 1994) suggest that they may pattern distinctly from consonants with other places of articulation. The study introduced here will investigate patterns in directionality of misperception of guttural consonants by presenting syllables containing guttural and non-guttural consonants in noise to be identified by native and non-native speakers of Arabic.

While there have been studies on how patterns of misperception of phonological structure differ depending on whether the structure is licit or not within the listener's native language (e.g. Dupoux et al. 1999), there have been few studies on the patterns of misperception that are present in identification of structures which are licit within a language. This study investigates such patterns and how they differ between guttural and non-guttural consonants.

1.1 Phonetic and Phonological Background

The guttural consonants, which are produced by constriction at the back of the mouth or in the throat, often exhibit shared characteristics, which are similar across languages with these sounds; e.g. causing neighboring vowels to be lowered or retracted. They also can share phonotactic restrictions that other consonants within a language do not have, such as not occurring within clusters or word-finally, or not co-occurring within a word. A number of features have been proposed to characterize the gutturals or certain sets of them, including advanced tongue root and retracted tongue root (Rose 1996; Shahin 2002), and +pharyngeal (McCarthy 1994; Esling 2005). However, the featural specifications used for gutturals do not present a clear picture of the guttural class, because the features shared under such systems often do not align with the physical gestures which these segments have in common.

During the past twenty years, there has been much progress towards clarifying the set of articulatory gestures involved in producing the guttural sounds in a number of languages, with data from laryngoscope (e.g. Esling, Fraser, and Harris 2005) and ultrasound (e.g. Zeroual, Esling, and Hoole 2011) expanding the information available from earlier X-ray

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work (e.g. Ghazeli 1977). Patterns of confusions can help elucidate the salient acoustic features shared by consonants (Chang, Plauché, and Ohala 2001), so will be of particular value for the guttural consonants.

1.2 Misperception Studies

There have been many perception experiments designed to test the stability and confusability of consonants in English (e.g. Miller and Nicely 1955; Bell et al. 1989), some in other Indo-European languages (e.g. Lecumberri and Cooke 2006), and very few in languages from other families (e.g. Singh and Black 1966; Bradlow et al. 2010). To my knowledge, there is no existing data on the misperception patterns of guttural consonants.

Misperception studies have looked at a range of influences. A number of studies have demonstrated that listeners distinguish between phonemes less accurately in phonological systems of languages which they do not speak natively (e.g. Mattys et al. 2010) and that non-native listeners are more strongly influenced by challenging listening conditions (e.g. Cutler et al. 2004). Other factors which can potentially influence results include the set of sounds given which listeners can choose from (e.g. Chang, Plauché, and Ohala 2001) and the phonological system which the sounds occur in (e.g. Shafiro et al. 2012).

The accuracy with which listeners identify segments is influenced by the type of masking noise which is present (e.g. van Engen and Bradlow 2007; Phatak, Lovitt, and Allen 2008) and the loudness of that noise relative to the speech stimuli (e.g. Miller and Nicely 1955). Misperceptions are based on the acoustic cues which remain apparent in the degraded signal (Soli and Arabie 1979), so the type of noise which most inhibits accurate identification varies by segment (e.g. Phatak, Lovitt, and Allen 2008; Dubno and Levitt 1981).

Consonant identification can also be influenced by the vowel context; however, the patterns of vowel effects are not consistent across studies, perhaps due to other differences in the phonetic environment, in the language being investigated, or the consonants being investigated. In English, Dubno and Levitt (1981) found that consonants are more accurately identified in the environment of /a/ than /i/ or /u/; Singh and Black (1966) found that consonants' place of articulation was identified less accurately before /i/ than before other vowels in English but not in other languages. Redford and Diehl (1999) found consonant identifications to be more accurate in cods after high vowels than after /a/, and Wang and Bilger (1973) found that coda consonants, though generally identified less accurately than onsets, were identified more accurately than onsets when the vowel was /i/.

Most perception studies use only single consonants, not clusters; this is probably in part because the number of possible responses gets exponentially larger when there are two consonants, which is prohibitive for the forced-choice design of many misperception experiments. Within the existing work on cluster perception, listeners are more accurate with identification of single consonants than clusters; most errors in clusters are due to deletions (Meyer, Dentel, and Meunier 2013). Much of the identifying information for the consonant not adjacent to the vowel is obscured in a cluster, based on the lack of formant transition cues from the vowel; these are the consonants which are most frequently neglected in complex syllables (Redford and Diehl 1999).

Much of the existing work on cluster misperception is based on perception of clusters which are illicit in the listeners' native language; such sequences are often poorly distin-

guished from sequences with a vowel dividing the consonants. For example, Berent et al. (2007) found that English speakers are less accurate in identifying number of syllables in monosyllabic words beginning with clusters that are with falling sonority than onset clusters with plateau sonority, which are themselves identified less accurately than onset clusters than rising sonority. Russian speakers, for whom these clusters are all acceptable, can identify onset clusters of all of these types with high accuracy. However, Russian speakers were slower to identify the more marked clusters. In a discrimination task, Dupoux et al. (1999) found that Japanese listeners had trouble distinguishing between VCCV and VCuCV sequences in a discrimination task; they also frequently reported vowels within VCCV sequences in an identification task, whereas French listeners distinguished between the presence or absence of a vowel in the same stimuli with high accuracy.

The previous literature does not provide data on patterns of misperception of guttural consonants or the interaction of place of articulation and noise type with accuracy of identification of syllable structure. The aim of the present study is to determine which cues listeners use for identifying guttural consonants by examining which other sounds these consonants are confused with and how noise of different frequencies influences identification, comparing these patterns in different phonetic environments and among native and non-native speakers of Arabic.

If the primary cues used for identification of guttural consonants are the transitions from neighboring vowels or the pseudoformants present within the consonants themselves, it is expected that the gutturals will be less accurately identified in low frequency noise than high frequency noise; if the primary cues for identification of gutturals are in the spectrum of fricative noise, it is expected that they will be less accurately identified in high frequency noise than in low frequency noise. Comparison of accuracy of consonant identification when adjacent to a vowel or to a consonant may indicate whether that consonant is identified by features within itself or more by transitions to adjacent vowels; however, some differences will likely be due to patterns of differences in production of these consonants in different environments.

The extent to which there is a difference in accuracy of identifications in each noise type furthermore indicates whether there are multiple cues at different frequencies which listeners can use; similar accuracy in both noise types would suggest that listeners are able to use multiple cue types and will focus on whichever cues are clearest in the signal. Non-native listeners are likely to have more difficulty identifying guttural consonants than other consonants, with a potentially larger effect of noise type, because most of these consonants are not present within the phonological system of English and thus these listeners may not have developed the same strategies that native listeners have for identifying these consonants.

2 Experiment Design

2.1 Participants

Participants were 9 native listeners of Arabic and 16 non-native listeners of Arabic, all reporting normal hearing. The ages of participants were 18–43 years (mean 24.2 years). Participants received monetary compensation for their participation.

Of the native Arabic listeners, six spoke a Levantine dialect, one a Maghrebi dialect, one a Gulf dialect, and one an Egyptian dialect; all of them had spent the majority of their

childhood in a country where Arabic was the primary spoken language.

The non-native listeners of Arabic were all native speakers of American English who had been studying Arabic for 0.5–10 years. None of them had lived in any Arabic-speaking region for more than one year nor had parents who spoke Arabic natively. Fluency in Arabic varied across the participants, but all were comfortable reading Arabic orthography.

2.2 Materials

In the first task, stimuli were nonce words[1] with syllables shapes of CV[2] and ʔVC. In the second task, syllable shapes were ʔVC, ʔVRC, ʔVRV, and ʔVRəC. Consonants were produced in the context of each of the contrastive Arabic long vowels: /i:/, /a:/, /u:/. The stimuli were elicited using a list of words written in the Arabic orthography and were produced in isolation. Isolated productions were used because there is generally resyllabification in running speech in Arabic (Ryding 2005).

There were no vowel-initial stimuli used in this experiment, as Arabic words never begin with a vowel. Vowel-initial words resulting from borrowing or morphological processes end up beginning with a glottal stop; this non-lexical glottal stop has little influence on surrounding sounds (Ghowail 1987). The choice of [ə] in ʔVRəC sequences was because this vowel has a weaker effect on guttural formants than other vowels do and also because this is the lexical vowel that is closest to neutral realizations of Arabic inter-consonantal epenthetic vowels.

The consonants included were the seven guttural consonants of Arabic: /q/, /χ/, /ʁ/, /ħ/, /ʕ/, /h/, and /ʔ/; 3 "emphatic" consonants (oral consonants with secondary uvularization): /tˤ/, /dˤ/, and /sˤ/; and 10 oral consonants for comparison: /w/, /t/, /d/, /s/, /z/, /r/, /l/, /dʒ/, /j/, and /k/.

Stimuli were produced in Modern Standard Arabic (MSA) by two male native speakers of Arabic, recorded in a sound attenuated booth. Their dialects were Palestinian and Iraqi Arabic, which have very similar standard phonetic realizations of consonants, but different syllabification patterns. Their pronunciations in the stimuli were generally leveled towards features of Modern Standard Arabic, which is the form of Arabic that is typically used in reading aloud. The one salient idiosyncratic feature present was the Iraqi speaker's pronunciation of /dˤ/, which was noticeably fronted. Speakers of the same gender were chosen to avoid potential interactions of speaker gender and noise type, as noise weighted at different frequencies is likely to affect voices of different fundamental frequencies unequally.

Each stimulus was mixed with one of two types of noise, which began 100 ms before the stimulus and continued until 100 ms after the stimulus. The types of noise used were pink noise, in which the intensity is inversely proportional to the frequency, and blue noise, in which the intensity is proportional to the frequency. Because the perception of loudness depends on frequency, the amplitude of the noise was calculated to have perceived loudness approximately equal to the average perceived loudness of the stimuli.

Perceived loudness was calculated using the average of the values produced by the ANSI S3.4 and DIN 45631 methods of calculating loudness, performed in Matlab. Although there are differences between the results produced by each method, they have both been found to correlate with listeners' subjective evaluations of loudness (e.g. Schlittenlacher et al.

[1]Some combinations of segments happened to be real words. See Section 3.5 for a discussion.

[2]Here and in following discussions of structure, C = any consonant, V = any vowel, R = a liquid ([l] or [r]).

2011). Having normalized loudness in this way, the effects of each type of noise can be more meaningfully compared, as results should reflect differences in noise type and not differences in perceived loudness.

2.3 Procedure

Each listener completed two experimental tasks, followed by a demographic questionnaire; each task was divided into blocks. Instructions were given in English in order to not bias responses based on exposure to a particular dialect during the experiment, as many Arabic speakers show accommodation to features of dialects used by their interlocutors (Abu-Melhim 1995). The experiment was run in Matlab on a laptop computer with 13 inch screen and a wireless mouse, with stimuli played over headphones in a quiet room.

In both tasks, the listeners saw an array of buttons of nonce words written in the Arabic script, listened to stimuli, and clicked the button corresponding to the word which they thought they heard. The order of stimuli was randomized within blocks.

The presentation of stimuli was self-paced. The next stimulus would not play until after the listener had made a response. Button selection and response time, measured from the end of the stimulus, were recorded in Matlab. The experiment lasted 40-60 minutes, depending on the participant's speed of responding.

In the first task, there were 20 buttons, each with a different consonant. The order of consonants within the array remained constant, following the alphabetical order of the consonants. There were 40 stimuli in each block, with each consonant presented twice, once from each speaker. In this task, there was alternation between blocks of CV stimuli and blocks of ʔVC stimuli; the vowel cycled between blocks among each of the three contrastive Arabic vowel qualities: /i:/, /a:/, /u:/, producing six combinations of consonant position + vowel. This was done to minimize possible carry-over effects between blocks based on sharing shape or vowel with the previous block. Participants had one of six orders of blocks; in each of these orders, the pattern was the same except for where in the order the experiment began, in order to separate effects based on phonetic environment and effects based on when in the task a stimulus was presented.

In the second set of blocks (mixed-structure blocks), there were 42 buttons. These blocks included a mix of syllable structures, to test errors in identifying structure; options were monosyllabic with a single coda consonant (ʔVC), monosyllabic with a coda cluster beginning with a liquid (ʔVRC), disyllabic with an intervocalic liquid and no final consonant (ʔVRV), and disyllabic with an intervocalic liquid and a final coda consonant (ʔVRəC). Due to constraints of array size and time, a smaller set of consonants was used in these blocks: /w/, /t/, /d/, /s/, /r/, /l/, /j/, /k/, /q/, /χ/, /ʁ/, /ħ/, /ʕ/, /h/, and /ʔ/. The liquids (/l/ and /r/) and glides (/w/ and /j/) did not appear in biconsonantal forms.

To aid participants in finding buttons, each type of syllable shape was given a different border color. There were 80 stimuli in each block in this task. As in the monosyllable blocks, selection options were written in the Arabic script. All short vowels and absence of vowels was marked in the script, to avoid ambiguity between written forms. In this task, there was alternation between blocks in which biconsonantal forms had [l] and blocks in which biconsonantal forms had [r]; as in the first task, the vowel cycled between blocks among each of the three contrastive Arabic vowel qualities: /i:/, /a:/, /u:/.

3 Results

There were differences between the two groups in accuracy of identifications, in which sounds were most frequently confused, and in the directions of confusion, as well as effects of phonetic environment, the consonant's place of articulation, and the type of masking noise. The lower accuracy among non-native listeners was most extreme for the guttural consonants. In both groups, identifications were more accurate in the first task (consistent blocks of CV or ʔVC stimuli) than in the second task (blocks with a mix of syllable structures) and were less accurate in low frequency noise than high frequency noise. The difference in accuracy between noise types was greatest for guttural consonants.

There was a general trend of increase in accuracy over time, though the pattern of change in accuracy differed between the listener groups listener groups in the two tasks; this increase in accuracy perhaps indicates listener acclimatization to the dialectal and idiosyncratic features of the stimuli, as well as the presence of the masking noise.

3.1 Structure Confusions

The accuracy of identifications of structure was higher in the native listener group (84.6%) than in the non-native listener group (74%). Both listener groups made more errors that involved not perceiving segments that were present than errors that involved perceiving segments which were not present.

Table 1: Native Listeners' Structure Identifications (as percents)

stimulus \ item selected	ʔVC	ʔVRC	ʔVRV	ʔVRəC
ʔVC	**95**	3	1	1
ʔVRC	8	**82**	1	8
ʔVRV	5	9	**67**	19
ʔVRəC	0	14	8	**78**

Table 2: Non-native Listeners' Structure Identifications (as percents)

	ʔVC	ʔVRC	ʔVRV	ʔVRəC
ʔVC	**91**	6	1	3
ʔVRC	22	**61**	2	15
ʔVRV	3	9	**70**	18
ʔVRəC	2	20	12	**67**

Accuracy of structural identifications increased across blocks in both listener groups. Among native listeners, mean structural identification accuracy increased from 81.5% to 86.6% from the first to the last block of the mixed-structure task ($p = 0.0084$); among non-native listeners, structural accuracy increased from 71.8% to 75.2% ($p = 0.057$).

Response times were significantly faster for accurate responses than inaccurate responses. For non-native speakers, the mean response time in the second task for structurally accurate identifications was 4.3 seconds and for structurally inaccurate identifications was 5 seconds ($p < 0.0001$); for native speakers, the mean response time in the second task for structurally accurate identifications was 4.5 seconds and for structurally inaccurate identifications was 5.7 seconds ($p = 0.00064$).

Response times differed by type of error; inaccurate structural identifications that involved perceiving segments which were not present had a higher mean response time than identifications that involved not perceiving segments that were present. For native listeners,

the mean response time was 7.2 s for errors of segment addition and 4.5 s for errors of segment loss ($p < 0.0001$); for non-native listeners, the mean response times were 6 s and 4.3 s, respectively ($p < 0.0001$).

In errors in which the listener failed to identify one of the consonants in the stimuli as being present, the consonant neglected was most frequently the second consonant. Among native listeners, 92% of the cluster simplification errors involved deleting the second consonant. The identity of the first consonant, [r] or [l], was always preserved. Among non-native listeners, 82% of cluster simplification errors involved deleting the second consonant. The identity of the first consonant, [r] or [l], was preserved in almost all cases. In 6% of non-native listeners' cluster simplification errors, the second consonant was preserved and the first consonant deleted. However, in 13% of cluster simplification errors made by non-native listeners, the consonant selected did not match either consonant present in the stimulus; in nearly half of these errors, the consonant selected was [ʁ]. It is unclear whether these cases are best characterized as neglect of one consonant and misperception of the other or an interaction between features of the liquid and the following consonant.

Response times varied by the type of structure as well as the set of options available within a block; responses were faster in blocks of consistent structure than in blocks of mixed structure. The slower response times in mixed-structure blocks could be in part due to the larger set of options to select from and in part due to the greater complexity of the stimuli in the number of segments present and the need to attend to structure in addition to consonant quality, whereas listeners did not need to consider structure within the consistent-structure blocks. Response times also differed among identifications for each type of structure present among the stimuli of the mixed-structure blocks, as presented in Table 3, which demonstrates that the response latency was influenced both by the structure of the stimulus and by the options present in the block.

Table 3: Response Times by Structure Type (in seconds)

Mixed-Structure Blocks

	Native	Non-native
ʔVC	4.5	4.2
ʔVRC	4.6	4.4
ʔVRV	6.9	5.4
ʔVRəC	4.6	4.6

Consistent-Structure Blocks

	Native	Non-native
CV	2.8	2.4
ʔVC	2.6	2.6

3.1.1 Effects of Phonetic Environment on Structural Accuracy

Some features of the phonetic environment influenced accuracy in structure identifications – in particular, which vowel was present in the word. There was no effect of liquid environment on accuracy of structure identifications in either listener group, but there was a significant effect of vowel environment, which was stronger among native listeners than non-native listeners.

The vowel whose quality is being considered here is the first vowel of the word; in sequences with a subsequent vowel between consonants, this vowel was always [ə]. Among

native listeners, accuracy was much lower following [a:] (77.8%) than following [i:] (86.9%); $p < 0.0001$. Accuracy was also lower following [a:] than following [u:] (89.1%); $p < 0.0001$. The difference in accuracy following [i:] vs. [u:] was not significant ($p = 0.2$). Among non-native listeners, there was a significant difference between accuracy following [a:] (72.1%) and accuracy following [u:] (76.2%), $p = 0.022$. The accuracy following [i:] (73.6%) was not significantly different from either [a:] ($p = 0.42$) or [u:] ($p = 0.13$).

The difference in structure identification accuracy following high vowels and the low vowel may in part be due to coarticulatory effects of a later [ə] being attributed to the prior vowel, as the largest difference between these environments was greater frequency of errors neglecting inter-consonantal [ə]. There were also many more errors in stimuli starting with [a:] of neglecting word-final vowels, particularly [u]; most such errors were for stimuli with trilled [r], perhaps because the [r] itself is very short but strongly influences the following vowel; the mix of trilled and bunched *r* stimuli may have allowed this *r*-colored [u] to be interpreted as a bunched [r]. This effect was weaker with [i], perhaps due to its more distinct F2. Word-final [a] was never neglected, but was more prone to interpretation as a consonant.

3.1.2 Effect of Consonant Place on Structural Accuracy

There are different patterns of structure identification errors based on the region of the consonant's place of articulation; the confusion matrices for structure separated by place of articulation are presented in Tables 4-7. Perception errors for stimuli with guttural consonants involved proportionally more segment insertion errors than for stimuli with non-gutturals, particularly among native listeners, as well as a greater number of identifications of consonants as vowels and loss of these consonants following vowels.

Non-native listeners had lower accuracy for identifying structure than native listeners; the difference was larger for sequences with gutturals (69.8% and 84.6% respectively, $p < 0.0001$) than for sequences without gutturals (83.1% and 88% respectively, $p = 0.00067$), but both reached significance.

Non-guttural consonants were identified with significantly higher accuracy than guttural consonants in both listener groups, though the difference was much larger among non-native listeners. Native listeners identified structure with 88% accuracy for words without gutturals and 84.6% for words with gutturals (p value = 0.025), and non-native listeners identified them with 83.1% and 69.8% accuracy, respectively ($p < 0.0001$).

Table 4: Native Listeners' Guttural Structural Identifications

	ʔVC	ʔVRC	ʔVRəC	ʔVRV
ʔVC	**97**	2	1	1
ʔVRC	9	**80**	10	2
ʔVRəC	0	13	**77**	10

Table 5: Native Listeners' Non-Guttural Structural Identifications

	ʔVC	ʔVRC	ʔVRəC	ʔVRV
ʔVC	**97**	1	0	1
ʔVRC	8	**86**	5	1
ʔVRəC	0	18	**79**	4

Non-native listeners frequently did not perceive a final consonant following another consonant or perceived a vowel between the two consonants, particularly when the second consonant was guttural. The difference between the number of errors with guttural and non-

Table 6: Non-native Listeners' Guttural Structural Identifications

	ʔVC	ʔVRC	ʔVRəC	ʔVRV
ʔVC	**92**	6	2	0
ʔVRC	25	**54**	18	3
ʔVRəC	2	20	**63**	15

Table 7: Non-native Listeners' Non-Guttural Structural Identifications

	ʔVC	ʔVRC	ʔVRəC	ʔVRV
ʔVC	**95**	3	1	1
ʔVRC	17	**73**	11	0
ʔVRəC	3	20	**73**	4

guttural consonants, compared with a χ^2 test, is significant: for vowel insertion $p < 0.0001$, and for consonant deletion $p < 0.0001$.

For native listeners there was not a significant difference in the number of consonant deletion errors in sequences with gutturals and sequences without gutturals ($p = 0.45$). The difference in relative frequency of vowel deletion errors between sequences with gutturals and without gutturals approaches significance ($p = 0.058$).

3.2 Segment Confusions

The patterns of confusions among segments and the directions of these confusions indicate perceptual similarity and potentially also which acoustic cues are being used to make identifications. The largest number of confusions among non-native listeners involved errors in place of articulation, while confusions among native listeners were more evenly balanced among place, manner, and voicing. The pattern of confusions among native listeners varied more between the blocks with simple vowel environment and the blocks with mixed structures.

Tables 8-9 present the matrix of confusions between consonants present in the stimuli. For space reasons, only a selection of segments is included: the consonants which appear in all environments, all of the vowels, and /r/. Responses for ∅ include only cases in which options were available with and without a segment i.e. with ʔVR and ʔVRV forms in the mixed-structure blocks. Cells with a value of 0 have been marked with a dash, for ease of reading. Responses have been pooled across all phonetic contexts.

The results for confusions are influenced by the selection options; errors were restricted by what competing options with similar were present in the array and in the phonological inventory of Arabic. The consonants included in the experiment were chosen to include all of the guttural consonants and a selection of non-guttural consonants for comparison. Confusions for a larger number of consonants for English have been presented in a number of previous studies, e.g. Miller and Nicely 1955.

Based on results of previous work on native vs. non-native speakers' patterns of misperception, it is expected that native Arabic listeners would be more sensitive to distinctions between sounds in their language, and thus make identifications faster and with a smaller percent of errors than other listeners, while native English listeners who have studied Arabic as a second language will be less sensitive to the distinctions between Arabic sounds, making decisions more slowly, less accurately, and with a potentially different set of typical errors. It is accordingly also expected that the non-native listeners will have the highest accuracy for phonemes which are also present within English.

This hypothesis is borne out, as presented in Table 10; while non-native listeners perform with significantly lower accuracy than native listeners for many of the consonants, the

Table 8: Native Listeners' Segment Identifications

	a	i	u	t	d	s	r	k	q	χ	ʁ	ħ	ʕ	ʔ	h	∅	other
a	**69**	6	-	-	-	-	-	-	3	-	9	-	-	-	12	-	-
i	-	**83**	-	-	2	-	-	-	-	-	4	-	-	2	2	4	4
u	-	-	**85**	-	-	-	-	-	-	-	6	-	-	-	6	2	-
t	-	-	-	**68**	2	1	-	12	3	3	3	-	-	2	1	3	-
d	-	-	-	4	**78**	-	-	1	-	2	4	-	-	1	-	4	4
s	-	-	-	3	-	**85**	-	1	-	3	1	-	-	-	-	-	6
r	-	-	-	-	-	-	**82**	-	1	-	10	-	3	3	-	-	2
k	-	-	-	6	1	1	-	**66**	8	4	3	-	1	3	2	2	3
q	-	-	-	2	-	-	-	6	**71**	5	3	-	1	4	-	-	5
χ	-	-	-	1	1	1	-	-	5	**77**	3	2	-	-	4	2	2
ʁ	-	-	-	-	2	-	4	-	1	1	**79**	-	2	-	1	3	5
ħ	-	-	-	-	1	-	-	1	3	3	-	**74**	6	3	5	4	-
ʕ	1	-	-	-	-	-	-	1	4	2	1	1	**67**	16	3	4	-
ʔ	1	-	-	1	1	-	-	-	2	1	1	-	2	**77**	4	6	2
h	1	-	-	2	1	1	-	1	3	7	2	16	2	5	**52**	6	1
∅	-	-	-	-	2	-	-	1	1	1	1	-	1	2	6	**85**	-

Table 9: Non-native Listeners' Segment Identifications

	a	i	u	t	d	s	r	k	q	χ	ʁ	ħ	ʕ	ʔ	h	∅	other
a	**71**	-	2	-	-	2	-	-	-	-	6	3	5	9	2	2	-
i	1	**88**	-	-	-	1	-	-	1	-	1	-	2	-	-	-	6
u	-	-	**87**	1	-	-	-	-	-	-	3	-	-	-	4	3	3
t	-	-	-	**55**	1	2	-	10	4	5	1	2	1	6	1	4	8
d	-	-	-	4	**65**	-	1	1	-	1	4	-	-	2	1	8	13
s	-	-	-	4	1	**73**	-	-	1	1	1	-	-	1	-	1	15
r	-	-	-	-	-	-	**76**	-	1	1	12	-	-	2	1	-	5
k	-	-	-	8	2	-	-	**46**	18	9	1	3	1	5	1	4	2
q	-	-	-	3	1	-	-	14	**49**	9	7	2	1	5	-	2	3
χ	-	-	-	3	1	1	-	4	4	**62**	3	8	1	4	3	3	1
ʁ	-	-	1	-	3	-	7	-	1	3	**59**	2	3	3	2	5	9
ħ	1	-	-	3	1	-	1	4	4	8	2	**36**	3	8	16	8	4
ʕ	1	-	-	-	-	-	1	2	5	3	2	5	**35**	31	3	10	-
ʔ	1	-	-	3	-	-	-	2	2	1	2	5	8	**59**	4	12	1
h	1	-	-	3	1	-	-	2	2	7	3	24	3	16	**21**	11	4
∅	-	-	-	-	-	-	-	-	-	1	2	2	2	5	3	-	**85**

difference is very large for all of the Arabic consonants which are not present within English. There are also several other sounds that are present within English that were identified with significantly lower accuracy among non-native than native listeners, some of which likely show this difference because there is no sound in English that is acoustically similar, whereas Arabic has a phonological neighbor; e.g. although [s] exists in English, Arabic also has [sˤ], which shares many acoustic features with [s]. Other confusions may be due to attention to different cues; for example, in English the contrast between [t] and [d] in many environments is aspiration, while in the dialects of Arabic represented in the stimuli, the difference is consistently voicing.

Table 10: Native and Non-native Listeners' Segment Identification Accuracy Compared

	Native Accuracy	Non-native Accuracy	p-value
w	.91	.92	0.61
t	.68	.55	0.00026***
d	.78	.65	0.00072***
s	.85	.73	< 0.0001***
l	.61	.64	0.57
r	.82	.76	0.17
j	.87	.82	0.14
k	.66	.46	< 0.0001***
q	.71	.49	< 0.0001***
χ	.77	.62	< 0.0001***
ʁ	.79	.59	< 0.0001***
ħ	.74	.36	< 0.0001***
ʕ	.67	.35	< 0.0001***
ʔ	.77	.59	< 0.0001***
h	.52	.21	< 0.0001***

The lower accuracy of non-native listeners for identifying particular sounds suggests that they are less sensitive to the cues used to identify these sounds, such that the presence of noise inhibits their ability to distinguish them. However, at least some aspects of their strategy seems to be similar to native listeners, as they show some of the same patterns in influence of phonetic environment. Cues from the vowel are particularly important for identifying consonant place of articulation, though the formant transitions for guttural consonants are less familiar to native speakers of English.

Native listeners' segment identifications increased in accuracy over the consistent-structure blocks, primarily over the first three blocks, from 73.7% to 79.4%, though this did not reach significance ($p = 0.078$); they also increased in accuracy over the mixed-structure blocks, from 66.8% to 71.9% ($p = 0.034$). Non-native listeners' mean segment accuracy increased over the consistent-structure blocks, from 54.3% to 66.7% ($p < 0.0001$); however, non-native listeners' mean accuracy did not change over mixed-structure blocks. This may indicate that they reached a plateau of familiarizing with the speakers' idiosyncrasies and learning to compensate for the masking noise, or were unable to adapt their expectations to the differences in pronunciation in the new phonetic contexts of the second section of blocks.

3.2.1 Segment Identification Accuracy by Phonetic Environment

There was only a significant effect of the consonant's position within a syllable on accuracy during the first task among native listeners; the trend among non-native listeners followed the inverse pattern. Among native listeners, segment identification accuracy was higher in codas (81.2%) than in onsets (77.1%); the difference is significant ($p = 0.021$). Among non-native listeners, accuracy was higher in onsets (61.5%) than in codas (60.2%), but the difference is not significant ($p = 0.4$). Patterns of responses and accuracy in onsets and codas also varied by individual segment.

Consonants were more accurately identified in blocks with consistent structure than in blocks with mixed structure. Among native listeners, the mean segment identification accuracy in consistent-structure blocks was 79.1% and in mixed-structure blocks was 70% ($p < 0.0001$). For non-native listeners, the mean segment identification accuracy in consistent-structure blocks was 60.8% and in mixed-structure blocks was 51.1% ($p < 0.0001$).

However, this difference in accuracy was not consistently the case for all consonants. For example, [q] was identified more accurately in the mixed-environment contexts than in simple contexts, with 53.1% vs. 43.8% accuracy among non-native listeners ($p = 0.047$) and 78.6% vs. 60.7% accuracy among native listeners ($p = 0.0022$). The explanation for this may lie in production differences, as the speakers tended to produce a longer and louder release burst for this sound in clusters than in simple codas.

The vowel environment also influenced accuracy of identification of segments. For native listeners, the mean accuracy in simple syllables with [a:] was 81.6%, with [i:] was 80.6%, and with [u:] was 75.2%. The difference between [u:] and each of the other vowels was significant ($p = 0.0042$ and $p = 0.017$, respectively). For non-native listeners, the mean accuracy in simple syllables with [a:] was 63.2%, with [i:] was 62%, and with [u:] was 57%. As with native listeners, the difference between [u:] and each of the other vowels was significant ($p = 0.0025$ and $p = 0.015$, respectively).

However, in blocks of mixed structure, the effect of the vowels differed. For native listeners, the mean segment identification accuracy in complex structures with [a:] was 61.6%, with [i:] was 70%, and with [u:] was 75.2%. All of these differences reach significance: for [a:] vs. [i:], $p = 0.00071$; for [u:] vs. [i:], $p = 0.031$; for [a:] vs. [u:], $p < 0.0001$. Among non-native listeners, the mean accuracy in complex structures with [a:] was 45.2%, with [i:] was 53%, and with [u:] was 55.1%; for [a:] vs. [i], $p = 0.00011$; for [u:] vs. [i:], $p = 0.3$; for [a:] vs. [u:], $p < 0.0001$.

Not all consonants were equally influenced by the phonetic environment. [ʕ] exhibited the greatest difference in accuracy for native listeners between simple and complex environments, with 89.8% accuracy in simple blocks and 51.5% accuracy in mixed-structure blocks ($p < 0.0001$); [t] was identified with 88% and 55.3% accuracy, respectively ($p < 0.0001$). This large effect of environment for these segments may suggest that cues in the adjacent vowel are important for identifying these consonants. Stops in general showed the largest effect of environment on accuracy of identification. The manner of articulation of [ʕ] in Arabic is debated; it is most often described as a fricative, but has also been called a stop or a glide. Within these stimuli, it was most frequently realized as a voiceless stop, which is consistent with this effect of environment.

The segments for which non-native listeners showed the greatest difference in accuracy

between the simple environments and the mixed-structure environments were [k] (60.3% and 36.5%, respectively, $p < 0.0001$) and [ʕ] (56.3% vs. 21.1%, respectively, $p < 0.0001$). The similar pattern in different environments between native and non-native listeners for this pharyngeal may indicate that the cues which non-native listeners are trying to identify are the same ones which the native listeners are attending to, even though non-native listeners do so with lower accuracy.

3.2.2 Effect of Consonant Place on Segment Identification Accuracy

The accuracy of segment identification differed by the region of the consonantal constriction. Non-native listeners had significantly lower accuracy in identifying guttural consonants than consonants with other places of articulation; in simple syllables, mean accuracy was 49.9% for gutturals and 74.1% for other consonants, $p < 0.0001$. For native listeners, this difference was also apparent in simple syllables: mean accuracy was 74.8% for gutturals and 84.5% for other consonants, $p < 0.0001$.

In mixed-structure blocks, the region of consonantal constriction influenced accuracy for non-native listeners but not for native listeners. For non-native listeners, mean accuracy for gutturals was 43.5% and for other consonants was 63.5% ($p < 0.0001$); for native listeners, mean accuracy for gutturals was 68.8% and for other consonants was 71% ($p = 0.28$).

Native listeners' lower accuracy identifying gutturals than other sounds in simple environments seems to be largely due to lower accuracy of identifications of other consonants in mixed-structure blocks, while guttural consonants are less strongly influenced by phonetic environment; perhaps the lack of difference in accuracy for guttural and non-guttural consonants in mixed-structure environments is because vowel transitions are important for many of the other consonants, many of which were stops, while most gutturals can be identified by their own features. Most of the gutturals were identified with similar accuracy in simple and complex environments, with the exception of [ʕ].

3.2.3 Accuracy by Feature

There were strong patterns in the relative accuracy of identification of different features across sounds. However, some of the sounds do not fall into clear categories due to the combinations of features present in them or the presence of several realizations of the phoneme in different environments; e.g. [ʔ] is sometimes realized a creaky vowel, and the pharyngeal transcribed as [ʕ] appears both as a voiceless stop and a voiced fricative.

Manner of articulation was maintained in consistent-structure blocks with 88.7% accuracy by native listeners and with 79.2% accuracy by non-native listeners. In mixed structure blocks, manner was maintained with 80.8% accuracy by native listeners and with 70.5% accuracy by non-native listeners.

Voicing was maintained in consistent-structure blocks with 95.5% accuracy by native listeners and with 89.7% accuracy by non-native listeners. In mixed-structure blocks, voicing was maintained with 84.7% accuracy by native listeners and with 77.9% accuracy by non-native listeners. Within the mixed-structure blocks, both groups of listeners made significantly more errors identifying voiced segments as voiceless than the converse: native listeners had 81.6% accuracy identifying voiced consonants as voiced and 89.4% accuracy

identifying voiceless consonants as voiceless ($p < 0.0001$); non-native listeners had 71.1% accuracy identifying voicing of voiced consonants and 84.2% accuracy identifying voicing of voiceless consonants ($p < 0.0001$). This effect may be the result of attributing voicing to the preceding liquid. Within the simple structure blocks, there was no significant difference among non-native listeners (90% accuracy for voiced consonants, 89.4% accuracy for voiceless consonants, $p = 0.53$); among native listeners the difference was marginally significant (96.5% accuracy for voiced consonants, 94.6% accuracy for voiceless consonants, $p = 0.042$).

Place of articulation was maintained in consistent-structure blocks with 84% accuracy by native listeners and with 73.3% accuracy by non-native listeners. In mixed-structure blocks, place of articulation was maintained with 73.5% accuracy by native listeners and with 59% accuracy by non-native listeners. The pattern of place identifications for glottals is similar to that of other places of articulation, which suggests that at least within Arabic, glottals do indeed have a place feature, instead of being placeless, as has been suggested for glottals in some phonological systems (e.g. Rose 1996).

Different places of articulation were identified with different accuracy. Among non-native listeners, the place of articulation which was maintained with the lowest accuracy was pharyngeal (39.3%), with low accuracy also for the glottals (49.8%), uvulars (66.4%), and velars (45.8%). Velars and uvulars were most often confused with each other. Pharyngeals were most often confused with glottals (28.8%), followed by uvulars (12.2%). Glottals were most often confused with pharyngeals (20.2%).

Among native listeners, the lowest accuracy of place identification was for velars (65.7%), followed by glottals (69.5%); velars were most often confused with uvulars (14.7%) and dentals (10.9%), and glottals were most often confused with pharyngeals (10.1%) and uvulars (7.9%). In both listener groups, glottals were the consonants most frequently not perceived in clusters and after vowels.

3.2.4 Response Time

Response times showed a number of patterns in relation to overall accuracy, as well as in relation to accuracy by participant and accuracy by segment. Non-native listeners made identifications more rapidly than native listeners, with a mean response time of 3.5 s vs. 3.7 s. Non-native listeners' response times decreased over time, with starting latencies longer than those of native listeners; native listeners' response times changed less during the experiment.

In both listener groups, the mean response time for segmentally accurate responses was faster than the mean response time for inaccurate responses: in consistent structure blocks, native listeners' mean latency for accurate responses was 2.4 s and for inaccurate responses was 3.7 s, $p < 0.0001$ (in mixed structure blocks, means were 4.4 s and 5.4 s, respectively; $p < 0.0001$); non-native speakers' mean accurate response time was 2 s and the mean inaccurate response time was 3.3 s, $p < 0.0001$ (in mixed structure blocks, means were 4.2 s and 4.7 s, respectively; $p < 0.0001$).

Figures 1-2 present plots of accuracy vs. response time among native listeners and non-native listeners, respectively, by segment. Response times and proportion of accurate identifications were z-scored by participant, to compensate for large individual variation in raw speed and accuracy of identifications. These calculations include only data from consistent-structure blocks, as certain consonants did not appear in all environments.

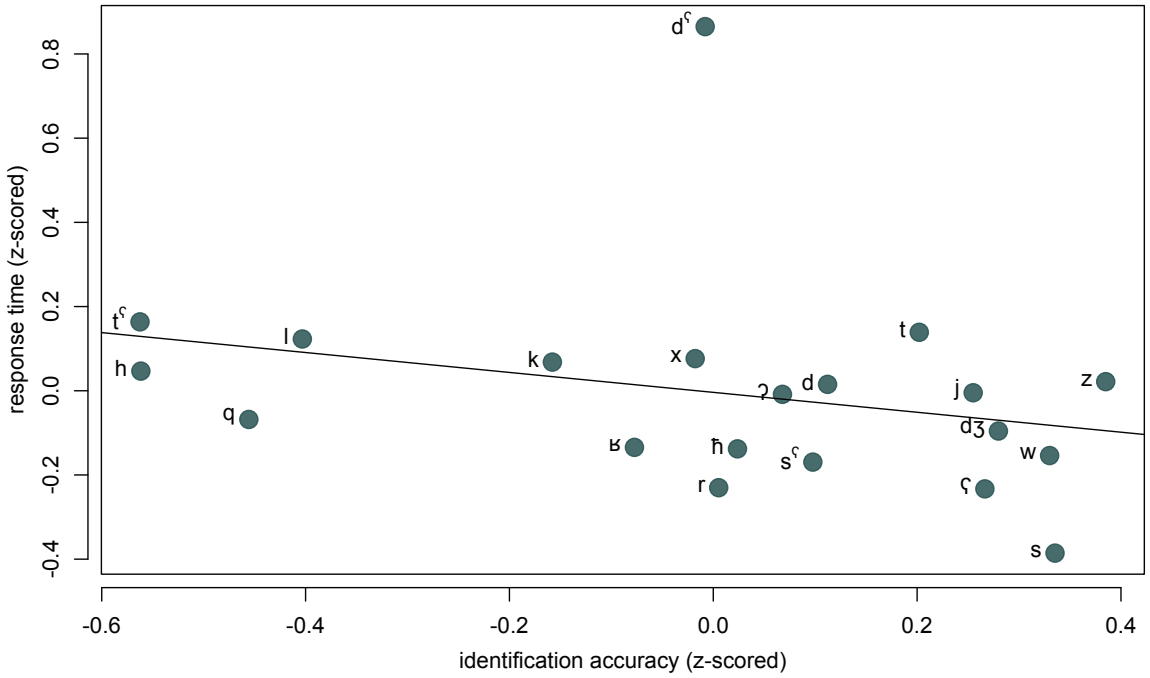

Figure 1: Native Listeners' Accuracy vs. Response Time, z-scored by Listener

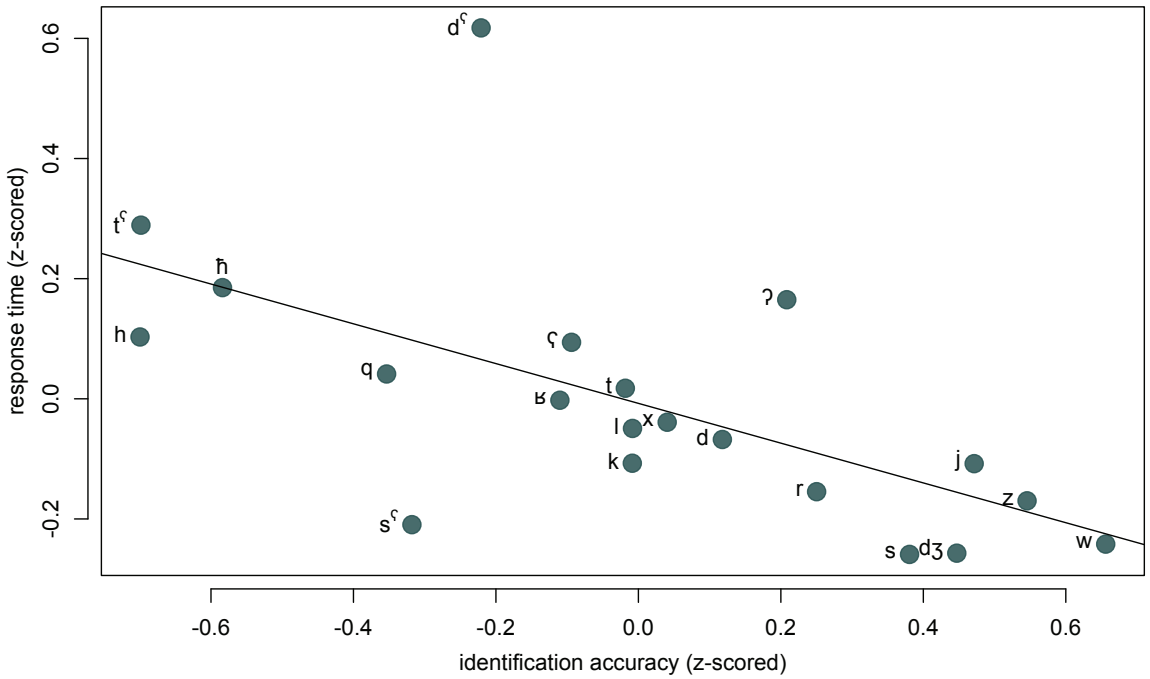

Figure 2: Non-native Listeners' Accuracy vs. Response Time, z-scored by Listener

The mean response times for segments had a strong inverse correlation with the mean accuracy of identification for each segment, pooled across all trials in consistent-structure blocks; among non-native listeners: R = -0.62 (p = 0.00046). This pattern of correlation was weaker among native listeners: R = -0.28 (p = 0.21).

For both listener groups, [dˤ] stands out as an outlier to the general pattern. This is the result of the Iraqi speaker's pronunciation, in which this sound was fronted, producing a segment which did not align with listeners' expectations, as there were no interdental or labial obstruents present among the selection options. The long response time seems to reflect listeners' lack of confidence in identifying this sound; several listeners asked about this sound after the task was over, wondering whether all of the sounds present in the stimuli were also provided as options in the button array. The moderate accuracy can be attributed to the same lack of strong competing selection options.

In the other direction, [sˤ] was identified relatively rapidly but with low accuracy among non-native listeners, which may suggest a low awareness among listeners of the confusability between this segment and [s], or at least little awareness of the presence of features in the stimulus that would make them wonder whether a token might be uvularized, such that they were confident in their identifications of this segment as [s] instead of deliberating about the choice. In contrast, trials in which [sˤ] was the selected response had a very long response latency. Uvularized consonants were relatively infrequent choices, within both listener groups but particularly in the non-native listener group.

Among native listeners, there was a positive correlation between each participant's mean response time and mean accuracy of identifications, R = 0.38; among non-native listeners, the correlation was negative: R = -0.34. However, neither of these correlations reached significance (p = 0.28 and p = 0.17, respectively).

3.2.5 Discriminability

In additions to the patterns of accuracy for each segment, there were patterns in the frequency with which each segment was selected as a response. Because some segments were selected as responses much more frequently than others, the percents of accurate responses are not all equally meaningful. The d' statistic was calculated for a sample of guttural and non-guttural sounds for native and non-native listeners, to evaluate the discriminability of these sounds, based on comparing the number of correct and incorrect identifications of each sound to the number of times stimuli without that sound were identified as having it or not; results are given in Table 11.

The discriminability of glottal and pharyngeal sounds was much lower among non-native listeners than among native listeners; some of these consonants were misidentified more frequently than they were correctly identified,[3] resulting in very low d' values.

Most non-guttural sounds showed greater similarity in discriminability among native and non-native listeners, though native listeners consistently had higher d' values across consonants, all even for consonants which are also present in English and which non-native listeners identified with high accuracy. Discriminability also depended on the number of other selection options which shared many features with a sound: the lower discriminability

[3]However, they were still significantly above chance levels of identification, which in a set of 20 selection options would be 5% accuracy.

of [k] compared to other oral obstruents among is largely due to the high number of confusions between [k] and [q].

Table 11: D' Scores for a Selection of Segment Confusions

	Native Listeners	Non-native Listeners
h	2.03	1.1
ʔ	2.64	1.74
ʕ	2.7	1.7
ħ	2.84	1.39
ʁ	2.67	2.07
χ	2.75	2.12
q	2.46	1.77
k	2.51	1.78
t	2.67	2.05
d	2.94	2.44
s	3.54	2.81
w	3.77	3.73

3.2.6 Patterns of Directionality

The patterns of consonant confusion among native listeners showed strong directionality for many consonants. Directionality is examined in Table 12, which gives the p-values produced by a χ^2 test for accurate identifications and confusions within each pair of sounds; the sounds included present a sample of confusions of guttural and non-guttural consonants. Where there were significantly more errors in one direction than the other for a pair of sounds, it was consistently the same direction for both native listeners and non-native listeners.

Table 12: P-values for Contingency Table Directionality, Selected Sound Pairs

	Native Listeners	Nonnative Listeners	directionality
h∼ħ	0.00097***	0.049*	h > ħ
ʕ ∼ʔ	0.69	< 0.0001***	ʔ < ʕ
χ∼ħ	0.5	0.48	none
χ∼h	0.47	0.049*	χ < h
ʁ∼ʕ	0.21	0.77	none
ʁ∼l	0.0003***	0.018*	ʁ < l
q∼tˤ	0.11	0.00018***	q < tˤ
t∼tˤ	0.023*	0.0059**	t < tˤ
s∼sˤ	0.015*	< 0.0001***	s < sˤ
t∼k	0.73	0.5	none
l∼d[4]	< 0.0001***	< 0.0001***	l > d

[4]Confusion between these sounds only occurs in syllable onsets.

One of the strong cases of directionality represented in several pairs of consonants was uvularized consonants identified as their non-uvularized counterparts. Other patterns of directionality were less consistent; between the pharyngeals and the glottals, the voiceless segments had a significant direction of glottals identified as pharyngeals in both listener groups, while the direction of the voiced segments, which was only significant among the non-native listeners, was of pharyngeals identified as glottals. None of the pairs of sounds have significantly different mean response times for each direction of confusion, which suggests that the errors in each direction are the result of the same decision process.

Several of these patterns go against the generally posited directionality of diachronic place of articulation change among guttural consonants, that the most likely pathways of change are from uvulars to pharyngeals, from pharyngeals to glottals, and glottals being lost (Kümmel 2007; Simpson 2002). However, this is not incompatible with the observed sound changes, as Simpson (2002) has observed that these characterizations of directionality hold most strongly when the sounds being produced by the change are not already present within a language's phonological inventory.

3.3 Effects of Individual Speaker and Listener

3.3.1 Effects of Speaker

The speaker had effects on accuracy of responses. As there were only two speakers represented in the stimuli, it is not clear whether differences between the speakers were based on dialect differences or idiosyncratic differences. The interaction between speaker and listener dialect for segment identification, with Levantine listeners performing with significantly higher accuracy on stimuli from the Palestinian (Levantine) speaker, may suggest that the differences were at least in part based on dialectal differences. However, non-Levantine listeners' greater accuracy in structure for stimuli produced by the Palestinian speaker suggests that features of this speaker's productions not related to dialect were important.

Native listeners as a group did not have significantly higher structure identification accuracy with stimuli from the Iraqi speaker (83.2% accuracy) or the Palestinian speaker (86% accuracy); the p-value for the difference was 0.076. There was also no significant interaction between listener dialect and speaker dialect. Native Levantine listeners identified structure in stimuli produced by the Palestinian speaker with only slightly higher accuracy (86.9%) than stimuli from the Iraqi speaker (85.5%), $p = 0.48$. Among non-Levantine listeners, the difference was greater but also not significant (84.9% vs. 80.4%, respectively; $p = 0.07$).

There was no significant difference in accuracy of structure identification among non-native listeners between stimuli from each speaker (73.1% accuracy and 75% accuracy, respectively, $p = 0.2$). All of the non-native listeners except one had learned the Levantine dialect, so there was not enough data to investigate potential interaction between speaker dialect and dialect studied on accuracy of identifications made by non-native listeners.

Native listeners performed with significantly higher segment identification accuracy with stimuli from the Palestinian speaker (76% accuracy) than the Iraqi speaker (72.1% accuracy); the p-value for the difference was 0.0034. This difference was largely due to significant interaction of speaker and listener dialect on segment identification: the mean segment accuracy of Levantine listeners with the Palestinian stimuli was 75.9% and with the Iraqi

stimuli was 70.8% ($p = 0.0055$); the mean segment accuracy of non-Levantine listeners with the Palestinian stimuli was 83% and with the Iraqi stimuli was 78% ($p = 0.18$).

The non-native listeners also performed with higher segment identification accuracy with stimuli from the Palestinian speaker (57.7% accuracy) than the Iraqi speaker (54.1% accuracy); the p-value for the difference was 0.0022. Differences between the two speakers did not hold for all segments, however; for example, [ʔ] as produced by the Iraqi speaker was identified with significantly higher accuracy both among native listeners (82.9% accuracy vs. 71.2% accuracy, $p = 0.023$) and among non-native listeners (70.8% accuracy vs. 46.2% accuracy, $p < 0.0001$).

3.3.2 Effects of Listener

In mixed-structure blocks, both listener groups had a large range of individual participants' mean accuracy, though the range was larger among non-native listeners (36.1%–70%) than native listeners (53.6%–82.5%); in consistent-structure blocks, native listeners had a smaller range (67.7%–88.4%) than in the mixed-structure blocks, though non-native listeners had an equally large range (40.7%–76.2%). The correlation between mean segment identification accuracy by listener in simple contexts and mixed-structure contexts was 0.85 for non-native listeners and 0.65 for native listeners. The lower correlation among native listeners is likely because environment had a greater influence, while for non-native listeners, errors were more based on listeners' familiarity with the features of Arabic consonants.

The variation among listeners' structure identification accuracy was greater among non-native listeners than among native listeners; among the native listeners, mean accuracy for structure identification ranged from 77.3% to 94.9%, while for non-native listeners it ranged from 55.5% to 91.5%. The correlation of accuracy in structure identifications with segment identification accuracy from simple contexts, by listener, was 0.73 ($p < 0.0001$) and with segment identification accuracy in mixed-structure blocks was 0.84 ($p < 0.0001$) for non-native listeners; among native listeners, the correlation was 0.52 with accuracy from simple contexts ($p = 0.1$) and 0.77 with mixed-structure blocks ($p = 0.0016$).

An individual listener's accuracy could vary widely among different segments, but there was a positive correlation for sound identification accuracy across many pairs of sounds, with more consistently positive correlations among non-native listeners (mean correlation 0.27, $p < 0.0001$) than native listeners (mean correlation 0.19, $p < 0.0001$). This indicates that among non-native listeners, some listeners were more able to accurately identify Arabic consonants than other listeners, though there was also variation for individual sounds.

There were some noteworthy patterns of high correlations among the native listeners; all of the correlations between accuracy for uvularized sounds were positive and at least moderately high. There is also a cluster of positive correlations among the velars and uvulars.

Among the non-native listeners, almost all of the uvulars and pharyngeals had very high correlations, though the correlations between the accuracy of identifications of the glottals and accuracy of any of these sounds was lower and less consistent; accuracy of identifications of the glottal stop were not strongly correlated with accuracy of identifications of any other sound. There was also a strong correlation among accuracy of identifications of the uvularized consonants with each other and with the uvulars [q] and [ʁ], though not [χ], which may be due to the more forward position of this consonant relative to the other uvulars.

Listener dialect did not have any overall significant effect on segment identification accuracy; the mean segment identification accuracy of Levantine listeners was 73.4% and the accuracy of non-Levantine listeners was 74.7% ($p = 0.31$).

There was a significant difference in overall structure accuracy based on listener dialect; the mean structure identification accuracy of Levantine listeners was 86.2% and the accuracy of non-Levantine listeners was 82.6% ($p = 0.026$). Higher accuracy of structure identifications by Levantine listeners is consistent with the phonetic permissibility of consonant clusters within Levantine dialects, while many other dialects do not permit them. This trend suggests that native speakers of Arabic may be influenced by knowledge of phonotactic constraints on structure that exist within their dialect, even when listening to Modern Standard Arabic.

3.4 Effect of Noise Type

Within the experiment, each listener was either in a condition of pink noise (weighted towards lower frequencies) or blue noise (weighted towards higher frequencies). Both native and non-native listener groups had a higher mean accuracy of identifications in the higher frequency noise than in the lower frequency noise.

Structural identification among native listeners was 79.1% in low frequency noise and 88.9% in high frequency noise ($p < 0.0001$); among non-native listeners structural accuracy was 71.5% in low frequency noise and 76.5% in high frequency noise ($p = 0.00061$).

Both listener groups identified segments with better accuracy in higher frequency noise than lower frequency noise: among native listeners, accuracy was 59.8% in low frequency noise and 76.1% in high frequency noise ($p < 0.0001$); among non-native listeners, accuracy was 47.4% in low frequency noise and 54.8% in high frequency noise ($p < 0.0001$). This interacted with the region of the consonantal constriction.

Table 13: Accuracy by Noise Type and Consonant Place for Native Listeners (percent accurate)

	blue	pink
guttural	77	64
non-guttural	82	74

Table 14: Accuracy by Noise Type and Consonant Place for Non-native Listeners (percent accurate)

	blue	pink
guttural	51	41
non-guttural	70	68

Low frequency noise hindered identification more for gutturals than non-gutturals. Among native listeners, the difference in accuracy in high frequency vs. low frequency noise for gutturals is highly significant ($p < 0.0001$); the difference is smaller but still significant for non-gutturals ($p < 0.0001$). Among non-native listeners the difference in accuracy in high frequency vs. low frequency noise for gutturals is highly significant ($p < 0.0001$); the difference for non-gutturals was not significant ($p = 0.17$). The difference in accuracy between gutturals and non-gutturals was significant in both listener groups in both noise types.

3.5 Nonce Word vs. Real Word Stimuli

While most of the stimuli were nonce words, some of them are real lexical items within Arabic. Previous work has found that phonemes are identified more accurately in meaningful words

than in nonce words (Boothroyd and Nittrouer 1988); differences have also been found in how native and non-native listeners are influenced by whether stimuli are real words; native listeners are more likely to make use of lexical information in identifying sounds in context (e.g. Mattys et al. 2010).

Among the native listeners, there was no significant difference in accuracy of identifications of real words (75.3%) than non-words (72.6%), $p = 0.16$. However, among the non-native listeners, there was a significantly higher accuracy of identification of real words (62.4%) than non-words (54.2%), $p < 0.0001$. This effect can largely be attributed to the higher relative frequency of real-word responses. Among non-native listeners the ratio of stimuli heard to responses clicked for real words was about 14:15, while the ratio for non-words was about 33:32. For the number of responses compared to the number of stimuli in each category, the χ^2 statistic = 4.3 ($p = 0.038$). Among the native listeners there was no significant difference between the relative number of responses in each category.

4 General Discussion

Patterns of confusions varied based on a number of factors; most errors were based on acoustic features, either intrinsic to the consonant or due to the obscuring effect of the masking noise or phonetic environment, while certain patterns of responses were due to language background and phonological knowledge.

4.1 Acoustics

Most common confusions were based on confusion of a single feature, sometimes two; among non-native listeners, the feature which was most commonly misidentified was place, particularly among consonants with a place of articulation not found in English.

The primary cues which listeners seem to be using for many of the consonants are the formant transitions in the neighboring vowels. These cues are obscured by environments in which there is no vowel adjacent to the consonant; in these environments many consonants were identified with much lower accuracy than in vowel-adjacent environments. The vowel cues are also partially obscured by low frequency noise, which is strongest at the same frequencies as the formants; this would explain why accuracy was lower for listeners who heard the sounds presented in low-frequency noise.

For guttural consonants, there are also pseudoformants present in the consonants themselves, which is likely why the phonetic environment does not have as strong an effect on accuracy of gutturals as for other consonants among native listeners. The low frequency noise obscures these cues, particularly F1, which is one of the clearest features associated with the identity of guttural consonants; this leaves only weaker cues for identification, such as duration and spectrum of the frication. However, native listeners are less influenced by noise type and phonetic environment than non-native listeners are, suggesting that they are better able to shift their attention to different cues for identification depending on which parts of the signal are obscured.

There are also differences in identification which result from acoustic differences present in the stimuli; part of the process of identifying stimuli is learning the cues being provided by individual speakers, who have subtle idiosyncrasies and sometimes very noticeable

idiosyncratic features that can be used for identification. Native listeners more rapidly accommodate to the features of the speakers whom they are listening to, as shown by their rapid increase in identification accuracy over the first three blocks of the first task and again in the new environments of the second task; non-native listeners' accuracy of identifications also increased, but more slowly and only during the task with simple syllable structures, suggesting that they are less able to acclimate to the speech characteristics of individual speakers across phonetic environments.

4.2 Phonological Knowledge

Listeners have a bias towards perceiving sounds which are not present in their native phonological system as sounds which are. For example, voiced pharyngeal consonants are often heard as a low vowel by individuals who do not have pharyngeals in their native language (Bessell 1992); the vowel [ɑ] is identified as one of the outcomes of Arabic pharyngeals among bilingual speakers of Jaffa Palestinian Arabic and Modern Hebrew, perhaps also originating in misperception by late bilinguals (Horesh 2014).

Subconscious phonological knowledge from one's native language interacts with conscious knowledge of the phonological system of a second language. Thus, non-native listeners do not always make errors of identifying sounds as those which are present within their system if they are aware that there are additional sounds within a foreign system. However, the acoustic features which they have associated with an orthographic symbol may not be a reliable representation of the sound which that symbol represents for native listeners, which complicates interpretation of non-native listeners' responses in identification tasks. For example, for many non-native listeners, the symbol meant to represent [ħ] seems to be more salient than [h] as a voiceless fricatives with low peak frequency, but it is not certain that its phonetic representation for them is a pharyngeal.

We might expect that the accuracy of identifications of a sound will be related to its frequency within a language. Speech errors have been associated with phoneme frequency (e.g. Levitt and Healy 1985), but accuracy of responses also depends on the consonants present in the system, how acoustically similar they are, and thus how much competition there is for identification. While not frequently reported within misperception studies, the correlation between phoneme frequency and identification accuracy can be calculated from the reported results; in some studies there was a weak correlation (e.g. R = 0.37 in Cutler et al. 2004), and not in others (e.g. R = 0.06 in Miller and Nicely 1955).

Based on the number of distinct occurrences of each consonant in Greenberg's (1950) collection of 3775 verbal roots, the order by frequency of the Arabic consonants used in this experiment is: r w l ʕ j d ħ q s dʒ ʔ k h χ tˤ sˤ z t ʁ dˤ. The frequency of these segments has a positive correlation with accuracy of identifications among non-native listeners, which approaches significance (R = 0.35, p = 0.11), and a positive but small correlation with accuracy among native listeners (R = 0.12, p = 0.61). The stronger correlation among non-native listeners may be the result of greater practice with the more frequent consonants in a variety of environments, which may improve individuals' mental categories of these new sounds, whereas native listeners have clear categories for all of these sounds.

Non-native listeners also seem to be influenced by their knowledge of the lexicon, more frequently selecting response options which are real words; this may reflect a strategy used by

non-native listeners in conversation also, using knowledge of the lexicon to guess the identity of words when they are uncertain about the phonetic form they have heard. This strategy may be particularly common among non-native speakers of a language with a phonological inventory very different than their native language, such as English speakers using Arabic.

5 Conclusion

Native listeners identified stimuli more accurately than non-native listeners both in structure and segment identity; this difference was strongest for the guttural consonants, but was also present for other consonants. There is much more variability in the identification accuracies among individual non-native listeners than among native listeners, probably reflecting the wide range of how established the Arabic phonological categories are for non-native speakers.

The higher accuracy of identifications in higher frequency noise than in lower frequency noise suggests that the pseudoformants of guttural consonants as well as the vowel transitions for both gutturals and non-gutturals are the most important cues used for identification, particularly of place. The similar effect of noise on both native and non-native listeners suggests that both groups are listening for the same main cues; the smaller effect of noise types and different phonetic environments on native listeners suggests that they have more flexibility in attending to different acoustic cues, based on which parts of the signal are accessible in different phonetic environments and noise contexts, while native listeners may be more limited in what cues they have learned to attend to.

Patterns of misperception provide data which may be useful in considering possible pathways of diachronic sound change. Directional asymmetries of misperception in experimental tasks parallel historical changes, because they are caused by some of the same processes (Garrett and Johnson 2013; Blevins and Garrett 2004). Data from misperception studies are not sufficient to make absolute conclusions about sound change, but may provide a useful line of additional evidence in reconstructing changes involving sounds for which there is little typological data.

6 References

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The Imperative Split and the Origin of Switch-Reference Markers in Nungon

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1 Introduction

The origins of switch-reference markers vary widely (Austin 1981, Haiman and Munro 1983, Haiman 1983, Jacobsen 1983, Li 1989, Roberts 1997, Fedden 2008).[2] This paper explores the origins of switch-reference markers and of the imperative inflections in the Papuan language Nungon. Nungon is among those Papuan languages in which the subject-indexing suffixes used in different-subject contexts on 'medial verbs' differ formally from the subject-indexing suffixes of 'final verbs'. While Haiman (1983:107) wrote that this distinction "is clearly an area which cries out for investigation", the historical origins of this type of switch-reference marking have not yet been surveyed in detail.

Nungon has two dedicated imperative inflections: Immediate and Delayed. Both imperatives inflect for all persons, including the 'non-canonical' (Aikhenvald 2010:3) first and third persons. The two paradigms are highly divergent morphologically. The Nungon Immediate Imperative paradigm is postulated to share an origin with the different-subject switch-reference markers, while the Delayed Imperative paradigm is shown to have originated through iconic vowel alteration of a Future Irrealis form, along the "intention, future, and prediction" imperative development pathway of Aikhenvald (2010:363). By describing these forms in Nungon, this paper is a first step toward Haiman's call for broader investigation of the divergent subject desinence forms phenomenon. Further, the shared origin of switch-reference and Immediate Imperative forms would seem to point to the archaism of switch-reference forms, contra general assumptions that switch-reference systems develop from non-switch-reference systems.

2 The Nungon Language

The Papuan language Nungon is spoken by about 1,000 people in the highest inhabited reaches of the Uruwa River valley on the Huon Peninsula, Papua New Guinea. Nungon is an umbrella

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[2] Abbreviations used: 1sg, 2du, etc. - person and number A - transitive subject BEN - benefactive DEP - dependent verb DS - different subject FOC – focus GEN - genitive LOC – locative LONE - lone MV - medial verb NEG – negator NF - Near Future tense NP - Near Past tense nsg - non-singular O – object pl – plural PRES - Present tense PRO - personal pronoun POSS - possessive RF - Remote Future RP - Remote Past RSTR - restrictive S - intransitive subject SS - same subject sg - singular

designation encompassing five separate dialects (Sarvasy 2013b, 2014c); that of Towet village will be used throughout this paper, unless otherwise noted. The five Nungon dialects form the southern portion of a dialect continuum within the Uruwa River valley; the northern, lower-elevation, dialects are collectively referred to as Yau.[3]

Nungon belongs to the Uruwa language family (McElhanon 1967, 1973) within the Finisterre-Huon language group, the largest language group within the putative Trans-New Guinea Phylum. Historical-comparative work on Finisterre-Huon languages is in its infancy (McElhanon 1973, Suter 2012, Sarvasy 2013c, 2014a), but McElhanon (1967, 1973) and Claassen and McElhanon (1970) described two major language clusters: the Finisterre group, under which the Uruwa family is classed, and the Huon group, which includes the Finisterre-Huon language best-known to linguists, Kâte.

Like many Papuan languages (Roberts 1997) and all known Finisterre-Huon languages (McElhanon 1973), Nungon features clause-chaining, with switch-reference marked on medial verbs within clause chains. Clause-chaining occurs primarily in discourse describing consecutive series of actions or events; as in the Papuan language Korafe (Farr 1999), other types of Nungon discourse may feature simple sentence coordination instead of clause chains.

3 Clause Chaining in Nungon and Other Papuan Languages

Most Papuan languages combine clauses in multiple ways: subordination, coordination, and clause chaining. A prototypical Papuan clause chain comprises one or more 'medial' clauses with verbal predicates bearing less-than-maximal inflection, capped off by a single 'final' clause with maximally-inflected verbal predicate. This fully-inflected verbal predicate is generally marked for tense/aspect or mood and subject person/number. The verb forms used in medial clauses are traditionally called medial verbs, and those used in final clauses are called final verbs.

As summarized in Sarvasy (2015a), clause chains have been referred to with linear metaphors by linguists: medial clauses have been described as "beads on a necklace" (Foley 1986:177), and as train cars pulled by a final clause locomotive (Longacre 1985:264). Clause chains may contain as many as twenty or more medial clauses before the final clause (McCarthy 1965:66, Spaulding and Spaulding 1994:197). Non-canonical clause chains (Sarvasy 2015a) may lack a final clause altogether, or include a medial clause postposed after the final clause.

In most clause-chaining Papuan languages (Roberts 1997), medial verbs are marked for switch-reference (Jacobsen 1967, Haiman and Munro 1983).

[3] The Summer Institute of Linguistics teams posted in the Uruwa River valley in the 1980s-1990s (Carol and Doug Lauver, then Johanna and Urs Wegmann) worked on Yau. The Wegmanns (1994:13) wrote that they had selected Yau as the Uruwa River valley equivalent to High German in Switzerland—to be the written dialect. Thus, Yau (<yuw>) is the name that was eventually given to the Uruwa River valley dialect continuum by Ethnologue.

3.1 Switch-Reference

In Papuan switch-reference systems (surveyed in greatest detail in Roberts 1997), the 'marked' clause precedes the 'controller' clause (terms from Comrie 1983). 'Marked' clauses are formally marked—either with unchanging morphemes or with morphemes that index the marked clause subject—according to whether the referent of their subject argument is the same as that of the following, 'controller', clause.

Modes of marking same-subject (SS) and different-subject (DS) vary greatly among Papuan languages (Roberts 1997:136). In Roberts's survey of 122 Papuan languages that mark an SS/DS distinction, 20 use special non-final subject-indexing suffixes for DS and either no marking or an unchanging morpheme for SS.[4] This is the type of marking evident in Nungon, as seen in Table 1.

Among non-final verb forms, Nungon marks a difference between Dependent verbs, which function as non-ultimate members of tight multi-verb constructions (Sarvasy 2014c), and Medial verbs, which function as predicates in medial clauses. Nungon Medial verbs may be understood to comprise Dependent verb forms plus a suffix *-a* (exception: 2/3du DS). Medial and Dependent verbs in Nungon are unmarked for tense or mood, although they can convey progressive aspect via periphrasis.

Table 1: Same-subject and different-subject suffixes

marked clause subject person/number		Dependent verb in tight multi-verb construction		Medial verb in medial clause	
		V-final roots	C-final roots	V-final roots	C-final roots
same-subject		*-ng*[5]	—	*-ng-a*	*-a*
different-subject	1sg	*-wa*	*-e*	*-wa-ya*	*-e-ya*
	2sg	*-i*		*-i-ya*	
	3sg	*-un*		*-un-a*	
	1du	*-ra*		*-ra-ya*	
	2/3du	*-un*		*-un-ya*	
	1pl	*-na*		*-na-ya*	
	2/3pl	*-u*		*-u-ya*	

The Nungon clause chain in (1) comes from a narrative describing a hunting expedition to amass game for a bride price ceremony. Here, a sequence of events is described in a series of medial clauses, all marked for SS.

[4] Roberts (1997) included the Uruwa dialect Yau in this count.

[5] In Sarvasy (2014c), the suffix *-ng* (phonetically, [ŋ]) is not analyzed as a dedicated same-subject marker. Instead, *-ng* is analyzed as the default consonantal coda added to the Dependent forms of vowel-final verb roots in the absence of subject person/number indexation. Here, these Dependent forms, and their consonant-final counterparts that lack *-ng*, are glossed as same-subject for ease of comparison with other languages.

1) Doo-ng-a, e-ng-a, keembot-no dombisum
3PL.O.beat-SS-MV come-SS-MV tomorrow-3SG.POSS morning

ho-ng giyo-ng-a, ömör-o eet-no,
cook-SS sear-SS-MV intestine-3SG.POSS leg-3SG.POSS

ömör-o nungon der-a, ambarak yoo-ng,
intestine-3SG.POSS what pick.SS-MV all 3PL.O.take-SS

kambot-no ganang=gon eet=dup to-ng-a,
bamboo.sp-3SG.POSS inside=RESTR insert.SS=COMPL do-SS-MV

e-ng-a, Yomong duo-go-mong.
come-SS-MV Yomong sleep-RP-1PL

'Killing them, coming, the next day (in the) morning cooking and searing (them), picking out the intestines, the legs, the intestines and what-all, taking everything and just inserting it completely into its *kambot* flask, coming, we slept at Yomong.' (Yinyiwen oe min 2:48-3:03)

The Nungon clause chain in (2) is much shorter. Here, the Medial verb bears DS marking. Note also that this medial clause includes a speech report, framed as a final clause.

2) 'Nok ma=ng-i-t' y-un-a, urop,
1SG.PRO NEG=go-IRR.SG-1SG say-DS.3SG-MV enough

nori=nang=gon ongo-go-mok.
1DU.EMPH.PRO=LONE=RESTR go-RP-1DU

'She$_i$ having said "I$_i$ won't go," then just we$_{j,k}$ two alone went.' (Rosarin Yupna hain 3:41)

4 Nungon Final Verb Morphology

The verbal predicate of the final clause in a canonical Papuan clause chain is fully-inflected for tense or mood and subject person/number. As noted above, the subject-indexing suffixes used with DS medial verbs differ from those used with final verbs in a sizable minority of Papuan languages (Haiman 1983, Roberts 1997). A final verb is the typical predicate of a minimal Nungon sentence (excluding verbless clauses). Arguments are optionally explicit.

3) Ep-pa-t.
come-PRES.SG-1SG
'I (have) come.'/'I am coming.'

4) Net-di-morok-ma.
1SG.OBJ.beat-IRR.DU-2/3DU-RF
'You/they two will beat me.'

Medial clauses are likewise frequently uttered in isolation, outside of clause chains (Sarvasy 2015a). In these instances, however, they serve as imperative strategies (Aikhenvald 2010:7) or as appended afterthoughts to clause chains, or are understood as elliptical. If spoken in isolation, example (5) could function as either an imperative strategy or as elliptical speech, implying some further action or event. Intonation and context would help the addressee(s) interpret its function:

5) Ne-un-ya.
1SG.OBJ.beat-DS.2/3DU-MV
'(You two,) beat me!' or 'You/they two having beaten me…'

4.1 Final verb inflectional suffixes

As noted above, Nungon final verbs are inflected for tense or mood and subject person/number.[6] Nungon has five distinct tenses: Remote Past (yesterday and before), Near Past (yesterday through earlier today), Present (in the past few hours, with current relevance; right now; and gnomic present), Near Future (between now and the end of the day), and Remote Future (tomorrow and beyond). The Near Future tense also functions to describe general time (see Sarvasy 2015b for parallels in the Bantu language Logoori). Two tense distinctions—between Near Past and Present, and between Near Future and Remote Future—are neutralized under negation.

Nungon final verbs may inflect for two categories of imperative mood: Immediate and Delayed. The Nungon Immediate Imperative is characterized by no tense marking and a distinct set of subject person/number suffixes, while the Delayed Imperative features tense marking similar to that of the Remote Future, and a distinct set of person/number suffixes only for second person.

The suffixes that index subject person/number on Nungon final verbs, and on DS Dependent/Medial verbs, may be divided into two morphological sets: those which occur after a tense suffix and those which occur in the absence of a tense suffix.

Set 1 follow the tense suffix on final verbs. These apply to verbs inflected for all five tenses, the Future Irrealis, and the Delayed Imperative.

Set 2 follow the verb root directly on verbs that lack tense suffixes. These apply to final verbs inflected for the Immediate Imperative and the Counterfactual, and to DS non-final verbs.

[6] As described in Sarvasy (2014b, c), a closed class of transitive verbs obligatorily bear prefixes indexing the person/number of the O argument. These are verbs that may be considered to prototypically take human, or at least animate, O arguments.

Table 2: Nungon subject person/number suffixes

	follow tense suffix			**follow verb root (no tense marker)**	
	set 1a	**set 1b**: RF, IRREALIS	**set 1c**: DEL IMP	**set 2a**: IMM IMP, CONTR[7]	**set 2b:** DS
1sg	*-t*	*-t*	*-t*	*-wa/-e*	*-wa/-e*
2sg	*-rok*	*-rok*	*-rök*	*-i*	*-i*
3sg	*-k*	*-k*	*-k*	*-un*	*-un*
1du	*-mok*	*-n*	*-n*	*-ra*	*-ra*
2/3du	*-morok*	*-morok*	*-morök*	*-run*	*-un*
1pl	*-mong*	*-n*	*-n*	*-na*	*-na*
2/3pl	*-ng*	*-ng*	*-ng*	*-rut*	*-u*

Table 2 shows that the Immediate and Delayed Imperatives employ different subject suffix sets, with the Immediate Imperative suffixes formally similar to the subject-indexing DS markers used on Dependent and Medial verbs. Why should the two apparent types of imperative mood marking be formally divided in this way, and what do Immediate Imperatives have in common with non-final verb forms, and with Counterfactuals?

Neither set of subject suffixes appears to be formally related to the free personal pronouns, listed in Table 3. Thus, historical cliticization of free contrastive pronouns, per Givón (1983:78) on anticipatory switch-reference marking, is unlikely to be the source of either set of subject suffixes. The historical source of either set of suffixes is unknown.

Table 3: Nungon free pronouns

	sg.	du.	pl.
1	*nok, naga*[8]	*non, nori*	*non, noni*
2	*gok, gaga*	*hon, hori*	*hon, honi*
3	*yu, ino*	*yu, yori*	*yu, yoni*

5 Historical Development of Set 2 Subject Person/Number Suffixes

The morphological similarities between Nungon Sets 2a and 2b in Table 2 are claimed to evince a historical connection between non-final verb forms and the Immediate Imperative and Counterfactual final verb forms. As yet, the detailed of this connection are murky. Original imperative forms could have come to be used in contexts of syntactic dependence or pragmatic

[7] The Counterfactual form comprises the Immediate Imperative form plus a final suffix *-m* after the vowel-final Immediate Imperative forms (1sg, 2sg, 1du, 1pl).

[8] The second entry in each cell is the 'emphatic' form, used reflexively or contrastively.

presupposition like clause chains. Alternatively, original non-final verb forms could have first been used occasionally as imperative strategies, then developed into dedicated Immediate Imperative forms, followed by Counterfactual forms. The development pathway from imperative strategy to dedicated imperative form is documented for other languages in Aikhenvald (2010:342-346). Alternatively, all three paradigms that use Set 2 suffixes could have evolved from a single tense-less form (as proposed for Indo-European by Kiparsky 1968).

5.1 Origins of Switch-Reference Markers Across Languages

Cross-linguistically, the sources for both switch-reference markers and imperative forms are highly heterogeneous. Switch-reference systems are largely assumed to be non-archaic, while imperative forms may preserve archaisms.

Switch-reference markers have been hypothesized to arise from a variety of sources across languages (Austin 1981, Haiman and Munro 1983, Haiman 1983, Jacobsen 1983, Li 1989, Aikhenvald 2008:Fedden 2008). Here, there is a necessary divide between switch-reference markers that are unchanging morphemes, as found in many North American languages (Jacobsen 1983) and some Papuan languages, and switch-reference markers that also index marked clause subject person/number, as in Nungon and many other Papuan languages. (A significant number of Papuan languages have been analyzed to combine these two types of markers: medial verbs may bear both special non-final subject-referencing suffixes and unchanging switch-reference morphemes.)

Switch-reference markers with unchanging form have been postulated to evolve from a diverse array of sources, including: case markers, especially the locative (Austin 1981 and other sources in Aikhenvald 2008:572-580), deictics, "subordinating particles" (Haiman and Munro 1983: xiii-xiv), or conjunctions (Haiman 1983:110). Li (1989) also describes the development of switch-reference marking in Green Hmong from contrastive coordinators. (As an isolating language with verb-medial constituent order, Green Hmong is unusual among switch-reference-marking languages.)

Languages in which switch-reference marking involves marked clause subject indexing show a further divide: the morphemes used to index medial clause subjects may be either formally identical to those used to index final clause subjects, as in Mian (Fedden 2008), or different from these—as in Nungon, and a sizable minority of Papuan languages in Roberts's survey (1997). Haiman (1983:107) summarizes this second possibility with the notation:

Final verb = Verb + person
Medial verb = Verb + PERSON

The origin of the PERSON desinences—the medial verb subject-indexing morphemes that differ from those used with final verbs—has not been well-explored for most Papuan languages which feature them.

Implicit in most discussions of switch-reference marker origins is the notion that switch-reference marking is not archaic; switch-reference markers are described as developing from other grammatical and lexical elements. Thus, final verb subject desinences are implicitly assumed to be more archaic than medial verb switch-reference marking in Papuan languages.

In contrast, imperative forms are known to often serve as windows into language history, showing high degrees of archaism (Aikhenvald 2010:362).

5.2 The Two Sets in Related Papuan Languages

Of Papuan languages related to Nungon, most have DS subject-indexing suffixes that closely resemble the Immediate Imperative suffixes and those used with the Counterfactual inflection. A sampling is in Table 4. In most of these languages, the Counterfactual comprises the Immediate Imperative form with an additional nasal suffix after vowel-final forms, as in Nungon.

Table 4: Subject person/number suffixes in selected Finisterre Papuan languages[9]

	Irumu	Awara	Nukna[10]	Yau	Nungon	Yopno	Nek
Remote Future		set 1a	set 1a	set 1a	set 1b	set 1a	set 1b
Future Irrealis			set 1a	set 1b	set 1b		set 1b
Immediate Imperative	set 2b	set 2b	set 1b	set 2a	set 2a	set 2b	set 2b
Counterfactual	set 2b	set 2b	set 2b	set 2a	set 2a	set 2b	set 2b
Delayed Imperative	unique	set 1b	set 1a	set 1c	set 1c		set 1b
Different-Subject	set 2b	set 2b	set 2b	set 2b	set 2b	set 2b	set 2b

These parallels show that the formal association between final Immediate Imperative and Counterfactual verb forms and non-final DS forms is not limited to Nungon. It is also evident in at least a few languages of the Huon branch of the Finisterre-Huon group, such as Kube (McElhanon 1973:27-28, 62).

5.3 The Connection Between Medial Verbs and Immediate Imperatives

Either Finisterre Papuan switch-reference markers evolved from imperatives, imperatives evolved from switch-reference markers, or they both evolved from a single archaic tense-less form. All of

[9] Sources: Ross Webb (p.c.) on Irumu; Quigley 2014 on Awara; Taylor 2013 on Nukna; Lauver and Wegmann 1991 on Yau, McElhanon 1973 on Yopno; Linnasalo 2014 on Nek.

[10] What Taylor (2013:39-40) describes as the Nukna "Imperative" suffixes are cognate with the Future Irrealis markers in Nungon, except for the Nukna 2sg Imperative. Indeed, in Nukna, Nek, and another related language, Ma Manda (Pennington 2014), the 2sg Immediate Imperative form is identical to the SS dependent form. This likely represents a former imperative strategy—use of the SS dependent form to command—becoming the preferred dedicated imperative form.

these are real possibilities. In many languages, imperative forms can be used for purposes other than to command, in suppositions, concessions, greetings and farewells, attention-getters, questions, and statements, among others (Aikhenvald 2010:234-255). If the Finisterre Set 2 suffixes originated as dedicated imperative markers, these imperative forms could have gained secondary functions in clause chains and counterfactual statements. There is also language-internal and cross-linguistic support for the notion that the Set 2 suffixes originated as dependent, non-final, verb forms, which were sometimes employed as commands. Today, Nungon Dependent and Medial verbs may be used as imperative strategies, as in one possible translation of example (5); this is documented for other Papuan languages in Sarvasy (2015a). De-subordinated verb forms used as imperative strategies have been described for numerous other languages as well (Evans 2007, Aikhenvald 2010:274-280).

The use of an imperative form as the basis for a counterfactual form is less well-documented outside of Finisterre. Since the Finisterre Counterfactual also uses Set 2 suffixes, this could weight the analysis here toward the third option, evolution from a single tense-less form: there are three relatively-unrelated present-day reflexes with common morphology. The problem with this is evident in Tables 2 and 3. In both Nungon and Yau, the Immediate Imperative and Counterfactual are closer to each other in form (employing Set 2a suffixes) than to the non-final verb forms (which employ Set 2b suffixes). These languages make it appear that the Counterfactual developed directly from the Immediate Imperative. Since there is no evidence for this in the other languages (in fact, Nukna could indicate the opposite, with a tighter morphological link between the Counterfactual and DS markers than the Imperative), the possibility of an original tense-less form with multiple applications will be pursued further here.

The generalization can be made that non-final verbs in Nungon and most other Finisterre languages are unmarked for tense; all final verbs are marked for tense except Immediate Imperatives and Counterfactuals. It makes eminent sense for the same subject-indexing suffixes used with tense-less final verbs to occur with non-final verbs.

Kiparsky (1968, 2005) describes the original Indo-European Injunctive as a parallel case: a form both unmarked and unspecified for tense and mood functioned in discourse contexts, such as clause coordination, where tense and mood were recoverable from other verbs or from context.[11] Kiparsky hypothesizes that the loss of this under-specified form accompanied the historical process of enrichment of verbal inflectional categories, and that in an intermediate stage the tense-specified Present form took over the original functions of the Injunctive (1968:38).

For Nungon and its relatives, it is as yet impossible to show which of the two subject desinence sets—Set 1, which occurs after tense marking, and Set 2, which occurs in the absence of tense marking—is older. The presence of both sets in all Finisterre languages described to date shows that both are relatively archaic. It is likely that the proto-language had a reduced system of tense markers that preceded Set 1, and a single tense-less form that took Set 2 and functioned in commands, clause chains, and counterfactual contexts. In languages with minor formal differences between Set 2a and 2b, it appears that the longer of the Set 2 forms eventually became formally

[11] Thanks to Andrew Garrett for pointing out this connection.

reduced in its function in clause chains, maintaining the longer form for commands and counterfactuals. It is possible that the historical source of the final *-m* in Nungon Counterfactual forms is the subordinator *=ma* (Sarvasy 2013a, and see Reesink 2014 on functions of its counterpart *-eng* in Usan). These changes are summarized in Figure 1.

Figure 1: Hypothesized development of Finisterre Set 2 subject suffixes

Proto-language		Changes		Daughter languages
a single tense-less form used for commanding, as non-final member of multi-verb constructions, and in counterfactual contexts	→	▪ (differentiation of Immediate Imperative and DS paradigms) ▪ development of Counterfactual inflection through reduction of contrastive marker (in Nungon, *=*ma*) into suffixed nasal (in Nungon, *-m*)	→	Immediate Imperative, DS markers, and Counterfactual

Kiparsky (2005:219) calls the Indo-European Injunctive, as evident in Vedic, "chameleon-like" for its compatibility with various moods and tenses. The proto-Finisterre tense-less form with Set 2 subject suffixes would have been similar. This form would have functioned to command in the appropriate context, taken its tense from another verb in a clause chain, or indicated an unrealized situation when followed by the nasal-initial contrastive subordinating clitic (*=ma* in modern Nungon).

In Nungon and similar Papuan languages, non-final verbs bear subject indexation only when the subject of the marked clause differs from the anticipated subject of the following, controlling clause. When the subjects of the two clauses are anticipated to be co-referential, the medial verb of the marked clause bears no subject indexation. Haiman (1983) interpreted this as a process of gapping across coordinated clauses, and it may be more broadly understood as a matter of information structure. Since the focus here is on the historical development of the two different sets of subject indexers, the reasons for the presence or absence of subject indexation on non-final clauses will not be discussed further.

6 Origin of the Nungon Delayed Imperative

The Nungon Delayed Imperative formally resembles the Remote Future and Future Irrealis inflections, rather than the Immediate Imperative. It is postulated here to have developed relatively recently from the Future Irrealis form—itself the recent source for the Remote Future inflection—through iconic vowel alteration of the Set 1 subject desinence in the canonical imperative persons. Although little is known about the origins of delayed imperative forms across languages, Aikhenvald (2010:376) notes that the Tariana delayed imperative marker is cognate with future markers in two related languages. Similarly, some Finisterre Papuan languages lack a

formally-distinct delayed imperative form, employing a future tense form in the contexts in which Nungon speakers would use the Delayed Imperative. It is also unsurprising that a future irrealis form might develop into a delayed imperative; cross-linguistically, irrealis forms used as imperative strategies may be used in similar discourse contexts to delayed imperatives, such as situations requiring politeness (Aikhenvald 2010:143-144 mentions Jamul Tiipay, Tsakhur, and rGyalrong, while Roberts 1990:384 discusses non-Finisterre-Huon Papuan languages).

6.1 Functions of the Immediate and Delayed Imperatives

The Immediate and Delayed Imperative are both used in directive speech acts, with the Immediate Imperative used for commands needing immediate results and the Delayed Imperative used for commands to be actualized in the future and/or in another location.

The command in (6) was directed at me to play a recorded narrative back on my netbook immediately, for the speaker to hear right then. Here, the Immediate Imperative form is used:

6) Hi-wi-ya, orom hi-wa.
put-DS.2SG-MV know put-IMM.IMP.1SG
'Put it on, that I may hear.' [Literally: 'you putting it, let me hear.']

The command in (7), however, directs me to take a recording to Australia for people to listen to it there, one month later. Here, the Delayed Imperative form is used.

7) Hana, worok ku-i-ya orom hi-nung.
Hannah that SG.OBJ.take.away-DS.2SG-MV know put-DEL.IMP.2/3Pl
'Hannah, take that away that they may hear (later).' [Literally, 'you taking it away, let them (later) hear.']

The temporal cut-off between the Immediate and Delayed Imperatives seems to be roughly one hour; if the command is anticipated to be actualized about one hour or more from the time of issuance, the Delayed Imperative is used, and the Immediate Imperative cannot be used. Of course, this is up to the speaker's judgment. If the command directs the addressee to act in another location, even within the next half-hour, the Delayed Imperative form may be used instead of the Immediate Imperative.

The Immediate Imperative may be negated for peremptory effect with the general verbal negating proclitic *ma*=, as in (9) and (11), the negated versions of (8) and (10) below:

8) To-i!
do-IMM.IMP.2SG
'Do it!'

9) Ma=to-i!
NEG=do-IMM.IMP.2SG
'Don't do it!'

10) Ho-un!
cook-IMM.IMP.3SG
'Let him/her/it cook/be cooked!'

11) Ma=ho-un!
NEG=cook-IMM.IMP.3SG
'Let him/her/it not cook/be cooked!'

The politest, and socially preferred, way to issue negative imperatives is without *ma*=, however. In this politer prohibitive form, the positive Future Irrealis inflected form receives a suffix *-a*:

12) Ho-i-rog-a!
cook-IRR.SG-2SG-PROH
'Don't cook!'

Sarvasy (2014c) analyzes this *-a* as having evolved from the attention-commanding suffix *-a* found elsewhere in Nungon. Historically, the alerting function of *-a* here became a warning function, which in turn became prohibition. The Delayed Imperative form itself never occurs negated.

6.2 The Delayed Imperative Evolved from the Future Irrealis

The Remote Future and Future Irrealis differ only in the presence of a final suffix, *-ma*, on the Remote Future. Under negation, this *-ma* does not occur, so that negated Remote Future and Future Irrealis are formally identical. The Delayed Imperative differs from the Future Irrealis only in the vowel of the final syllable of the 2sg, 2/3du, and 2/3pl forms. In the 2sg and 2/3du Delayed Imperative forms, the Future Irrealis vowel /o/ ([ɔ]) is raised and backed slightly to /ö/ ([o]). In the 2/3pl form, the Future Irrealis vowel /i/ ([i]) is backed to /u/ ([u]).These Delayed Imperative forms never occur negated. Table 5 shows the Nungon Delayed Imperative, Remote Future, and Future Irrealis paradigms.

Table 5: Delayed Imperative, Remote Future, and Future Irrealis forms of *hai-* 'cut down'

		singular	dual	plural
1	Del. Imp.	*haiw-i-t*	*hai-ri-n*	*hai-ni-n*
	Rem. Fut.	*haiw-i-t-ma*	*hai-ri-n-ma*	*hai-ni-n-ma*
	Fut. Irrealis	*haiw-i-t*	*hai-ri-n*	*hai-ni-n*
2	Del. Imp.	*haiw-i-rök*	*hai-ri-morök*	*hai-nu-ng*
	Rem. Fut.	*haiw-i-rok-ma*	*hai-ri-morok-ma*	*hai-ni-ng-ma*
	Fut. Irrealis	*haiw-i-rok*	*hai-ri-morok*	*hai-ni-ng*
3	Del. Imp.	*haiw-i-k*	*hai-ri-morök*	*hai-nu-ng*
	Rem. Fut.	*haiw-i-k-ma*	*hai-ri-morok-ma*	*hai-ni-ng-ma*
	Fut. Irrealis	*haiw-i-k*	*hai-ri-morok*	*hai-ni-ng*

The backing and raising of the vowel of the last syllable of Future Irrealis forms to yield the Delayed Imperative may have originated as iconic indication of distance in space and time. This happens elsewhere in Nungon: final /a/ ([a]) is backed and raised to /o/ ([ɔ]) when any utterance is framed as a Call-At-Distance (Sarvasy 2014b, c), that is, is directed at an addressee who is relatively far away. The final /a/ of Medial verb forms can also raise/back to /o/ to indicate that the situation described by the verb continued for a long time.

Commands in Nungon—as in many other languages—feature a wider pitch range than declarative statements. The vowel change between Future Irrealis and Delayed Imperative forms could alternatively—or in addition to the iconic alteration above—have originally accompanied this intonational distinction, as well.

The continued identity of the Future Irrealis and Delayed Imperative forms in the first person and 3sg may have resulted because the iconic vowel alteration originally applied only to canonical—second person—directives. Because of 2/3 person neutralization in non-singular numbers, an iconic change in the non-singular second person would apply to non-singular third person forms as well. The presence of only second person (and non-singular third person) special forms could then point to the relatively-recent development of this form, in contrast to the Immediate Imperative.

The development of the Delayed Imperative from a future form is an example of Aikhenvald's pathway for forms relating to "intention, future and prediction" to evolve into imperatives (2010:363).

6.3 Delayed Imperatives in Other Papuan Languages

For many Finisterre-Huon Papuan languages that have been described to date, both immediate and delayed imperatives have been identified. In at least one of these languages, Irumu, the Delayed Imperative person/number suffixes apparently share little morphology with Future tense suffixes (Ross Webb, p.c.). Unlike many other Finisterre-Huon languages, Irumu has been analyzed to have

only a single general future tense inflection. It is thus possible that one original future tense inflection developed into the Delayed Imperative, and was then lost as a tense inflection.

In other Finisterre-Huon languages, such as Ma Manda, Nek, and Nukna, there are no delayed imperative forms distinct from future tense forms (Pennington 2014, Linnasalo 2014, Taylor 2013).

Outside the Finisterre-Huon group, the Delayed Imperative form has been shown to be acquired by children much later than the Immediate Imperative form in the Papuan language Kaluli (Schieffelin 1985). Schieffelin explained this through the relative low frequency of Kaluli Delayed Imperatives in input from caregivers to children. It is as yet unclear whether the two imperatives in Nungon (or any other Finisterre-Huon language) are acquired by children at different developmental stages.

6.4 A Corollary: Origins of the Nungon Remote Future Inflection

Table 5 shows that the Future Irrealis is the probable source of both the Delayed Imperative and the Remote Future tense, which still shares a form with the Future Irrealis under negation. The time depth of the development of the Nungon Remote Future tense form itself is still a puzzle. This section provides further evidence for a relatively-recent development.

Under negation, the formal distinction between Future Irrealis, Near Future, and Remote Future is neutralized. Examples (13), (14), and (15) show positive statements framed in these three forms, with a Delayed Imperative example in (16).

13) Duo-nangka-ng.
sleep-NF.PL-2/3PL
'You/they will sleep (later today).' [Near Future]

14) Duo-ni-ng.
sleep-IRR.PL-2/3PL
'You/they might sleep.' [Future Irrealis]

15) Duo-ni-ng-ma.
sleep-IRR.PL-2/3PL-RF
'You/they will sleep (tomorrow or beyond).' [Remote Future]

16) Duo-nu-ng.
sleep-DEL.IMP-2/3PL
'Sleep (later, or far away)!' [Delayed Imperative]

The forms in (13) and (15) cannot be directly negated. The negated equivalent of (13-15) is the negated Future Irrealis, as in (17).

17) Ma=duo-ni-ng.
NEG=sleep-IRR.PL-2/3PL
'They won't sleep.'

The Remote Future is the only tense inflection in Nungon that occurs with an unchanging suffix after the subject person/number suffix. There is some evidence from conditionals that the *-ma* of the Remote Future originally served to mark reality status (Sarvasy 2013a). The only inflectional paradigm that operates in a similar way is the Counterfactual, in which vowel-final Immediate Imperative forms receive a final suffix *-m*, while consonant-final Immediate Imperative forms receive no suffix.

Surprisingly, the Nungon Remote Future form differs dramatically from that of the Yau dialects spoken within a three-hour hike (Lauver and Wegmann 1990:21-23), and from Nungon's next-nearest relative, Nukna. These other languages form the Remote Future tense inflection with a dedicated suffixed tense marker, followed by the equivalent of the Set 1a person/number suffixes.

Table 6: Yau and Nungon Remote Future and Future Irrealis forms of *öö-* 'ascend'

	Yau Remote Future: Set 1a 'will ascend'	Yau Irrealis: Set 1b 'might ascend'	Nungon Remote Future/Future Irrealis: Set 1b 'might (will) ascend'
1sg	*ö-ango-t*	*ö-i-t*	*ö-i-t(-ma)*
2sg	*ö-ango-roc*	*ö-i-roc*	*ö-i-rok(-ma)*
3sg	*ö-ango-c*	*ö-i-c*	*ö-i-k(-ma)*
1du	*ö-taha-mot*	*ö-ri-n*	*ö-ri-n(-ma)*
2/3du	*ö-taha-moroc*	*ö-ri-moroc*	*ö-ri-morok(-ma)*
1pl	*ö-naha-mon*	*ö-ni-n*	*ö-ni-n(-ma)*
2/3pl	*ö-nah-ing*	*ö-ni-ng*	*ö-ni-ng(-ma)*

In a few other Finisterre-Huon languages, one of the future tenses comprises another inflected verb form plus an unchanging final suffix. These are shown in Table 7; Nungon, Yopno, and Uri are Finisterre, while Kâte is Huon.

Table 7: Future paradigms in Finisterre-Huon languages with unchanging final morpheme[12]

	Nungon	Yopno	Uri	Kâte[13]
inflection *sans* suffix	Irrealis	Near Future	Imm. Imp.	Imm. Imp.
postulated suffix source	subordinator *=ma*	? conjunction *bo*	?	verb *mu* 'say'
1sg	*ong-i-t-ma*	*kʌ-kweŋ-bo*	*ka-wak-ga*	*lo-pe-mu*
2sg	*ong-i-rok-ma*	*kʌ-kwim-bo*	*ka-yat-ga*	*lo-c-mu*
3sg	*ong-i-k-ma*	*kʌ-zeak-bo*	*ka-wat-ga*	*lo-oc-mu*
1du	*ongo-ri-n-ma*	*kʌ-ndeŋ-bo*	*ka-dam-ga*	*lo-nac-mu*
2/3du	*ongo-ri-morok-ma*	*kʌ-nzil-bo*	*ka-demut-ga*	*lo-nic-mu*
1pl	*ongo-ni-n-ma*	*kʌ-neŋ-bo*	*ka-nam-ga*	*lo-naŋ-mu*
2/3pl	*ongo-ni-ng-ma*	*kʌ-nim-bo*	*ka-nit-ga*	*lo-niŋ-mu*

Especially because of the dissimilarity between the Nungon Remote Future tense form and that of the closely-related Yau dialects, it seems likely that the Nungon Remote Future is a recent innovation, involving the addition of an unchanging suffix *-ma* to the Future Irrealis form. What remains to be explored is why the way in which the Nungon Remote Future evolved—addition of an unchanging suffix to an existing inflection—has counterparts in a few far-flung relatives.

7 Conclusion

Switch-reference systems are not usually assumed to be archaic; various grammatical and lexical elements have been discussed as evolving into markers of switch-reference in languages around the world. In contrast, imperative forms are recognized as being highly archaic in many languages. In Nungon and related Papuan languages, the subject-indexing suffixes used in the switch-reference system appear to be archaic and related to the suffixes used in the Immediate Imperative paradigm, while the Delayed Imperative form likely developed much more recently than the switch-reference markers and is formally dissimilar to the Immediate Imperative in most languages.

The switch-reference DS suffixes in modern Finisterre languages could plausibly have originated in one of three ways: as original imperative markers that came to serve with dependent verbs in tight multi-verb constructions and clause chains; as original subject-indexers on dependent verbs that came to serve in commands and thence as dedicated imperative markers; or as

[12] Sources: For Yopno and Uri, McElhanon 1973:63-64; for Kâte, Pilhofer 1933. Note that Reed (2000) does not mention such forms for the Kewieng dialect of Yopno.

[13] According to Pilhofer, the future form with the final unchanging morpheme, his "Futur I," describes the nearer, not more remote, of the two Kâte future tenses. He writes: "Futur I besteht aus Hortativ I und dem Suffix *mu.* Dieses Suffix dürfte identisch sein mit dem glaichlautenden Verbum *mu* sagen, wollen. Die Bildung wäre dann folgende: Hortativ: *loc* nimm, *loc-mu* du nehmen sagen = du nehmen wollen = du nehmen werden" (1933:26).

subject-indexers on original multifunctional tense-less forms used in a range of different contexts, including imperatives, dependent verbs, and counterfactuals. In fact, in some Finisterre languages today there is little to no formal differentiation between the DS subject suffixes and those of the Immediate Imperative and Counterfactual. Because the morphological semblance between Immediate Imperative and DS switch-reference suffixes holds for most related languages, both inflections must be assumed to be relatively archaic.

In contrast to the Immediate Imperative, Counterfactual, and DS subject suffixes, the Finisterre Delayed Imperative—in those languages that have it at all—is likely of relatively recent provenance. The morphological split between Nungon's tense-less Immediate Imperative and tense-marked Delayed Imperative is one symptom of the Delayed Imperative's newness; both the Nungon Delayed Imperative and Remote Future inflections appear to have developed recently from the Future Irrealis form. The Remote Future form in Nungon even differs greatly from its counterpart in the nearby Yau dialects—another clue to its recent development.

Preliminary analysis shows that future tense forms, as well as delayed imperative forms, vary more among related languages than do the verbal inflections that occur with Set 2 suffixes—DS switch-reference markers, Counterfactuals, and Immediate Imperatives. If the Set 2 suffixes may indeed be traced back to an original tense-less form in proto-Finisterre, then the proposition of Kiparsky (1968) for Indo-European may be applicable to Finisterre: loss of a multi-purpose tense-less form may have occurred early in the development of more-complex tense systems in the Finisterre languages. This would have been followed much later by development of various future tense forms, and of the Delayed Imperative.

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Asymmetries in Long-Distance QR

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1 Introduction

A long-standing hypothesis in Generative Grammar is that reversal of quantifier scope is the result of a movement operation that does not feed the PF interface and is therefore invisible on the surface (May 1977, 1985). This movement is known as Quantifier Raising (QR). Since then, several differences between QR and *wh*-movement have been discovered that require a re-evaluation of the claim that QR is a covert form of Ā-movement. One of the well-known differences is that QR has been claimed to be clause-bounded, unlike *wh*-movement, which can span large distances through successive steps of local movement, as shown in (1). (1a) demonstrates that a finite clause boundary does not block *wh*-movement, whereas the absence of the inverse scope reading in (1b) (cited from Fox 1995: 336) suggests that it does block QR:

(1) a. $[_{\text{CP}}$ Who do you think $[_{\text{CP}}$ t'_{WH} that $[_{\text{IP}}$ she might have been kissing $t_{\text{WH}}]]]$?

b. One girl said $[_{\text{CP}}$ that $[_{\text{IP}}$ John talked to every boy$]]$. $*\forall > \exists$

Fox (1995, 2000) argues that unlike *wh*-movement, QR is restricted by Scope Economy in addition to standard locality constraints such as phases (Chomsky 2000, 2001). Hence, QR across a finite clause boundary should be possible only if QR to Spec of the embedded CP creates a new scopal reading, in satisfaction of Scope Economy. In (1b), after obligatory QR to a vP node, optional QR to the lower Spec CP fails to satisfy Scope Economy, since this movement crosses a non-scopal complementiser (*that*), and therefore cannot give rise to a new scope interpretation. Long QR directly moving across the matrix subject without using intermediate landing sites is disallowed by locality constraints, too. Thus, Scope Economy along with locality restrictions predicts the unavailability of the inverse scope reading in (1b).

However, in the previous literature, it has been argued that the following two asymmetries could aid scope-shift out of a finite clause: (i) the indicative-subjunctive asymmetry and (ii) the subject-object asymmetry. This raises the question of whether the locality of QR is a consequence of these two factors rather than Scope Economy. If so, it is predicted that QR is clause-bounded only if the embedded clause is a non-subjunctive finite clause and / or the quantifier is in the embedded subject position.

First, subjunctive clauses have been argued to be relatively transparent for syntactic dependencies such as long-distance anaphoric binding and A-movement (see Quer 2006).

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Similarly, Wurmbrand (2013) reports that scope-shift out of subjunctive finite clauses is much more effortless than scope-shift out of indicative clauses (see also Farkas and Giannakidou 1996). For example, (1) is scopally ambiguous. The surface scope reading is that what she has requested is that they read not a single linguistics book, whereas the inverse scope reading is that she has made no request for them to read linguistic books. The availability of the inverse scope reading indicates that a negated expression *not a single linguistics book* in the embedded object position can take scope over the subjunctive verb *requested* (Wurmbrand 2013: cited from Kayne 1998: 128):

(2) She has requested that they read not a single linguistics book. *not* > *request*

Second, Kayne (1998) presents a subject-object asymmetry in the (un)availability of the wide scope readings of negation over a subjunctive matrix verb, as shown in (2) and (3) (Kayne 1998: 128-129). Unlike the scope ambiguity in (2), in which a negated expression is an object in the lower clause, if a negated expression is subject in the embedded clause, as in (3), the wide scope reading of the negated expression becomes highly degraded:

(3) She has requested that not a single student read our book. ??*not* > *request*

Kayne points out that the subject-object asymmetry found in (2) and (3) is similar to the asymmetry found in *wh*-movement; for instance, the case of *that*-trace effects on *wh*-movement of the embedded subject to the matrix Spec CP (see Chomsky 1986). The movement approach to scope inversion predicts that scope-shift of a quantifier in the embedded object position over the matrix subject should be easier than scope-shift of a quantifier in the embedded subject position.

If Scope Economy is responsible for the locality of QR, then even QR from an embedded object position in a subjunctive clause like (2) should be restricted and then give rise to a reduction in the acceptability of inverse scope. If it is not, QR of a quantifier in the embedded object position and / or out of a subjunctive clause would be permitted.

This squib reports on an online questionnaire study based on acceptability judgement tasks, which examined (i) the hypothesis that QR is restricted by Scope Economy and therefore clause-bounded and (ii) whether the two asymmetries above play a role in facilitating long-distance QR as independent factors. In conjunction with the two factors, the hypothesis makes the general prediction that QR out of a finite clause should be marginally acceptable at best, since Scope Economy always restricts long-distance QR independently of the effects of these factors.

In order to properly compare the acceptability of long-distance QR with that of local QR of a universal in an object position across an existential in subject position, we tested sentences involved QR of a universal in an embedded clause across an existential in the matrix subject position like (1b). In order to let the participants clarify the (un)availability of an inverse scope (distributive) interpretation, however, we used indefinite subjects with a modifier *different* and universal NPs with a determiner *each*, unlike (1b). It is not suitable to examine long-distance QR by using constructions like (1) and (3), where a negated expression in an embedded clause undergoes QR across a subjunctive matrix verbal predicate, since it is very difficult to construct their local QR counterparts as control items.

2 Experiment

2.1 Design, Predictions, and Materials

In the study, we manipulated the indicative-subjunctive asymmetry and the subject-object asymmetry as the main factors: *Clause Type* and *Grammatical Function*, respectively. *Clause Type* was either indicative (labeled as Ind) or subjunctive finite clauses (Sub). *Grammatical Function* was either embedded subject (Sb) or embedded object (Ob). The 2 × 2 design resulted in four test conditions, as exemplified in (4):

(4) a. **Ind_{Sb}:** Last year, a different student said that each professor dated Sue.

b. **Ind_{Ob}:** Last year, a different student said that Nancy dated each professor.

c. **Sub_{Sb}:** After the lecture, a different professor suggested that each student talk to Prof Chomsky.

d. **Sub_{Ob}:** After the lecture, a different professor suggested that Prof Dawkins talk to each student.

Table 1 shows possible rankings of the four conditions that we may find from the outcome in the leftmost column. Depending on which ranking emerges, we can conclude whether the *Clause Type* effect (in the second column from the left) is present or absent, and likewise for the *Grammatical Function* effect (third column), as indicated:

Table 1: Possible findings ($\surd$ = present, × = absent. X < Y indicates that Y is significantly more acceptable than X. X ≈ Y indicates a non-significant difference between X and Y.)

	Finding	***Clause Type***	***Grammatical Function***
1	$\text{Ind}_{\text{Sb}} \approx \text{Ind}_{\text{Ob}} \approx \text{Sub}_{\text{Sb}} \approx \text{Sub}_{\text{Ob}}$	×	×
2	$\text{Ind}_{\text{Sb}} \approx \text{Ind}_{\text{Ob}} < \text{Sub}_{\text{Sb}} \approx \text{Sub}_{\text{Ob}}$	$\surd$	×
3	$\text{Ind}_{\text{Sb}} \approx \text{Sub}_{\text{Sb}} < \text{Ind}_{\text{Ob}} \approx \text{Sub}_{\text{Ob}}$	×	$\surd$
4	$\text{Ind}_{\text{Sb}} < \text{Sub}_{\text{Sb}} \approx \text{Ind}_{\text{Ob}} < \text{Sub}_{\text{Ob}}$	$\surd$	$\surd$

In the first ranking shown in Table 1, QR from either indicative or subjunctive clauses is unacceptable. Whether a universal quantifier undergoes QR from either an embedded subject or object position does not make a difference. If this result emerges, we conclude that both effects are absent. In the second ranking, QR from a subjunctive clause is more acceptable than QR from an indicative clause due to the syntactic transparency of subjunctives. Here, again, from which position a quantifier undergoes QR does not make a difference. In this case, the *Clause Type* effect is present despite the absence of the *Grammatical Function* effect. In the third ranking, QR of a universal from an embedded object position is more acceptable than QR of a universal from an embedded subject position from either a subjunctive or indicative clause. This finding indicates that only the *Grammatical Function* effect is present. Finally, in the fourth ranking, QR from an embedded object position in a subjunctive clause is easiest, and QR from an embedded subject position in an indicative clause should be the most difficult. Meanwhile, QR from an embedded object position in an indicative clause and

QR from an embedded subject position in a subjunctive clause are intermediate between the other two cases, and there is no significant difference between these two. In this case, we conclude that both the effects are present.

The core hypothesis that QR is restricted by Scope Economy predicts that long-distance QR will be less acceptable than local QR, irrespective of other determining factors. In other words, long-distance QR facilitated by the *Clause Type* effect and / or the *Grammatical Function* effect should still be marginal at best. The hypothesis will be falsified if the best case of long-distance QR is as acceptable as local QR.

Suppose, for instance, that if QR out of a subjunctive clause is more acceptable than QR out of an indicative clause, as given in the second ranking in Table 1, but more degraded than local QR ($\text{Ind}_{\text{Sb}} \approx \text{Ind}_{\text{Ob}} < \text{Sub}_{\text{Sb}} \approx \text{Sub}_{\text{Ob}} <$ Local QR). This result would support the hypothesis and the *Clause Type* effect on QR, in that long-distance QR is facilitated by the syntactic transparency of subjunctives but is still constrained by Scope Economy independently from that effect. On the other hand, if QR out of a subjunctive clause is as acceptable as local QR ($\text{Ind}_{\text{Sb}} \approx \text{Ind}_{\text{Ob}} < \text{Sub}_{\text{Sb}} \approx \text{Sub}_{\text{Ob}} =$ Local QR), this would falsify the hypothesis, because Scope Economy would not restrict long-distance QR. In this case, we would conclude that the indicative-subjunctive asymmetry indeed gives rise to the clause-boundness of QR since QR is blocked by non-subjunctive clause boundaries.

The four conditions were examined in two groups of subjects (the subjects for each group were randomly chosen). This grouping was manipulated as an independent between-subjects variable: *Group*. Each condition was tested by five different indicative or subjunctive matrix verbal predicates, and comparison of the Sb and Ob conditions was helped by keeping the set of five indicative and five subjunctive verbs constant per group. In order to reduce the possibility that the choice of embedded verb could give rise to unwanted effects, we used completely different sets of embedded verbs in each group. Each group judged 20 (4×5) test sentences. So there were 40 test sentences in total. In order to control for illusive scope effects (Fox and Sauerland 1996), all the test sentences had an episodic tense and were presented in an episodic context.

In addition to the test items, there were 20 control items. The same set of 20 control items was used for both the groups. Half of the control items involved local QR taking place without a constraint (labeled as CG: Control Good), whereas the other half involved universal quantifiers contained in constructions restricting scope-shift (CB: Control Bad); for example, scope islands (e.g. the Complex NP Constraint), and scope freezing constructions, such as double object constructions (Bruening 2001), and verbs that lexically give rise to scope freezing such as *contain* (Neeleman and Van de Koot 2012).

Each test and control sentence was preceded by two to three line written contexts intended to facilitate an inverse scope reading. A context used for (4a) is given in (5):

(5) *Sue is an attractive post-doc. There are five male professors in the department. Rumours fly. At least one PhD student of each of the professors started one at some point...*

The participants were asked to grade how acceptable each of the sentences was relative to a preceding context by assigning it a numerical grade between 1 (completely unacceptable) - 5 (completely acceptable).

2.2 Subjects and Procedure

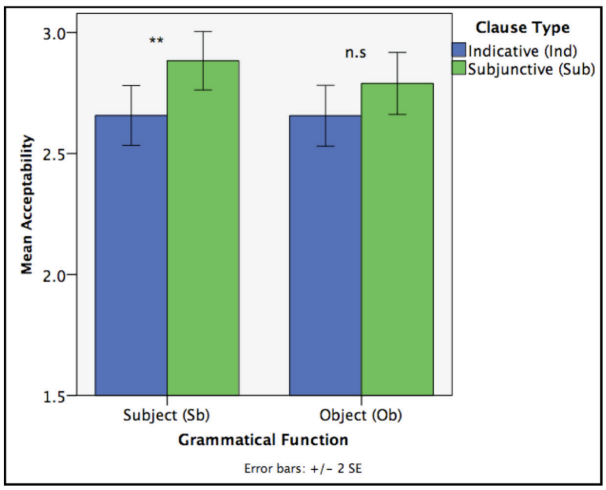
207 adult native speakers of British English participated in the study (Group A: 110 and Group B: 97). All the participants were UCL students. Once the subjects accessed the online questionnaire forms, we asked the subjects about themselves (e.g. age, gender, a linguist or not, etc.). After completing this part, the subjects were asked to read written instructions explaining how to grade each sentence and then allowed to proceed to the test. For each of the subjects, the ordering of 40 questions was completely randomized.

2.3 Results

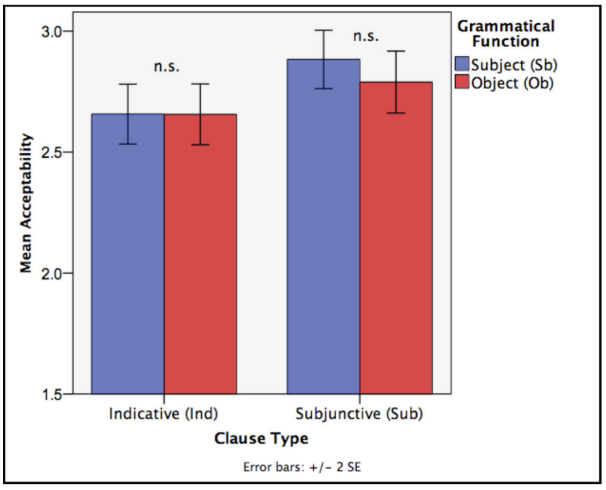
Subjects' responses given as numeral grades between 1 and 5 were analyzed in terms of the mean acceptability of the test sentences in each test condition. LMM (*Group* × *Clause Type* × *Grammatical Function*) revealed a significant main effect of *Clause Type* (F(1, 800.632)=8.303; $p < 0.01$), no reliable effect of *Grammatical Function* (F(1, 800.632)=0.566; $p= 0.452$), and no reliable effect of *Group* (F(1, 800.632)=0.404; $p= 0.525$). No interaction of *Clause Type* and *Grammatical Function* (F(1, 800.632)=0.609; $p= 0.435$), no interaction of *Group* and *Clause Type* (F(1, 800.632)=0.018; $p= 0.893$), and no interaction of *Group* and *Grammatical Function* (F(1, 800.632)=0.006; $p= 0.939$) was observed.

The outcome with regard to *Group* suggests that the different sets of embedded verbs used for each of the groups did not give rise to different response patterns. Hence, we will take a look at the overall mean acceptability rather than the group means. Figure 1 displays the overall test condition means:

Figure 1: Test condition means (error bars represent standard error for each condition). A significance level of each difference between adjacent conditions is indicated as follows: n.s.= non-significant, * = $p < 0.05$, and ** = $p < 0.01$ (adjustment for multiple comparisons: Bonferroni by SPSS).



(a) Indicative vs. Subjunctive



(b) Subject vs. Object

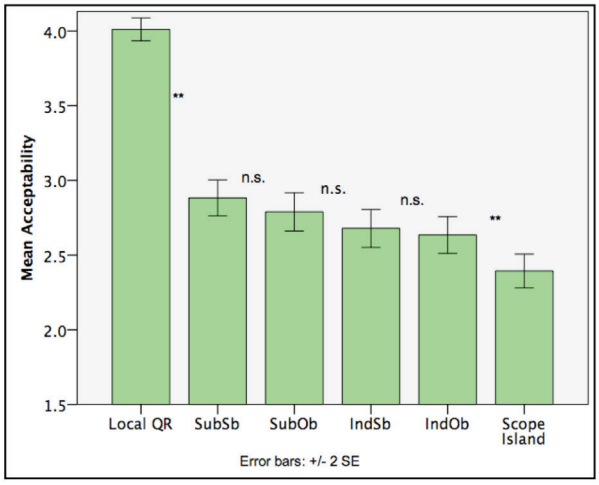
We now analyze the result of the F-test above on the basis of post-hoc multiple comparisons made by LMM. SPSS Bonferroni-adjusted p-values for pairwise comparisons are reported below (the conventional level of significance: $p < 0.05$).

The main effect of *Clause Type* is due to the fact that it was easier for the subjects to interpret inverse scope of a universal out of a subjunctive finite clause than out of an indicative clause ($p < 0.01$). As illustrated in Figure 1a, inverse scope out of a subjunctive clause was more likely to be accepted by the subjects than inverse scope out of an indicative clause in Sb condition ($p < 0.01$). The subjects were also able to interpret inverse scope out of a subjunctive clause more easily than that out of an indicative clause in Ob condition, but the difference fell somewhat short of significance ($p = 0.145$) due to Bonferroni Correction.

In contrast with the effect of *Clause Type*, the lack of reliable effect of *Grammatical Function* suggests that the acceptability of QR from the embedded subject position did not differ from that of QR from the embedded object position ($p = 0.452$). As shown in Figure 1b, the subjects were indeed more likely to obtain an inverse scope reading out of a subjunctive when a universal occupied the embedded subject position than when a universal occupied the embedded object position. However, this difference did not reach statistical significance after Bonferroni Correction (p= 0.279). Similarly, the location of a universal did not play a role at all in ease of inverse scope out of an indicative clause (p= 0.984). These facts resulted in the lack of the interaction between *Clause Type* and *Grammatical Function*.

Next, Figure 2 displays the overall result showing the mean acceptability of each of the test and control conditions:[1]

Figure 2: Test and control condition means (error bars represent standard error for each condition). A significance level of each difference between adjacent conditions is indicated as follows: n.s.= non-significant, * = $p < 0.004$ (0.05 / 12: adjusted by Bonferroni Correction), and ** = $p < 0.001$. The mean acceptability of Scope Freezing involved in the CB control items is excluded and not presented here.



[1]Note that we conducted two-tailed dependent T-tests twelve times for making further post-hoc multiple comparisons on the outcome including the control conditions. Therefore, the level of significance for the multiple paired T-tests has been manually adjusted to $p < 0.004$ (0.05 / 12) by Bonferroni Correction.

A two-tailed dependent T-test revealed that it was much easier for the subjects to accept scope-shift of a universal from an embedded subject position in a subjunctive clause than from an embedded object position in an indicative clause (SubSb versus IndOb: $t(206) = 4.603$, $p< 0.001$).[2] The subjects were more likely to accept scope-shift of a universal from an embedded object position in a subjunctive clause than that from an embedded subject position in an indicative clause, but as shown in Figure 2, the difference failed to reach the Bonferroni-adjusted level of significance (SubOb versus IndSb: $t(206) = 2.116$, $p= 0.036$).

Next, as displayed by Figure 2, the CG items involving local QR and the CB items involving QR out of a scope island function as good benchmarks for the acceptability of the test conditions. A two-tailed dependent T-test revealed that the subjects were more able to obtain inverse scope readings if scope-shift is a local operation not subject to any restriction, than if the universal is embedded in a finite clause (Local QR versus SubSb: $t(206) = 17.915$, $p< 0.001$). On the other hand, it was much harder for the subjects to scope the universal out of a scope island than out of a finite clause (Scope Island versus IndOb: $t(206) = -3.834$, $p< 0.001$). However, surprisingly, blocking effects of scope freezing environments were weaker compared with scope islands ($t(206) = 8.273$, $p< 0.001$) but comparable with SubSb ($t(206) = 1.106$, $p= 0.270$).[3]

3 Discussion

In summary, the outcome of the study confirms that Scope Economy (Fox 1995, 2000) indeed restricts long-distance QR out of a finite clause, as demonstrated by the comparison with local QR.

The fact that it was easier for the subjects to interpret the wide scope of a universal out of a subjunctive finite clause than out of an indicative clause confirms that the transparency of subjunctives for syntactic dependencies extends to QR.

In contrast with the effect of finite clause types, the syntactic position of the universal in the finite clause did not impact on the possibility of QR out of finite clauses. Hence, the second ranking in Table 1 mostly follows the outcome, except that QR of the embedded subject in a subjunctive clause was easier than QR of the embedded object in a subjunctive clause.

Critically, as predicted by the core hypothesis, QR from a subjunctive clause was at best marginal, since Scope Economy independently restricts QR even when the operation is facilitated by the syntactic transparency of subjunctives.

Thus, the overall outcome supports the hypothesis in that QR is restricted by Scope Economy. However, the fact that the clause-boundedness of QR was a less severe restriction compared with scope island effects indicates that Scope Economy does not perfectively block QR and therefore must be a weaker restriction on QR than scope islands. The degradedness

[2]The post-hoc multiple comparisons of the test conditions were provided by LMM and explained before on the basis of Figure 1. However, LMM did not run pairwise comparisons between SubOb and IndSb and between SubSb and IndOb.

[3]The scope freezing effect associated with verbs like *contain* is weaker than the scope freezing effect associated with specific syntactic structures like double object constructions ($t(206) = 3.398$, $p < 0.01$). Nonetheless, the scope freezing effect associated with verbs could be detected in comparison with local QR ($t(206) = -9.967$, $p < 0.001$).

of long-distance QR should be compatible with Scope Economy, as long as violations of this constraint lead to a reduction in acceptability rather than to absolute ungrammaticality. Otherwise, it is not possible to explain the contrast between long-distance QR and QR out of scope islands.

Finally, the lack of the subject-object asymmetry in long-distance QR could be construed as evidence against the movement theory of scope-shift, in that movement from the embedded subject position should be syntactically more constrained than movement from the embedded object position. This would be on a par with the *that*-trace effect that creates the subject-object asymmetry observed with *wh*-movement. Aoun et al. (1987) argue, however, that empty categories are subject to two different requirements that restrict their distribution at PF and LF, respectively. They also argue that the *that*-trace effect is a PF phenomenon. The same conclusion is reached by Ackema and Neeleman (2004), who base their argument on the fact that the *that*-trace effect disappears when an adverbial intervenes between *that* and a subject-trace, as originally noted by Culicover (1993: 557):

(6) Robin met the man {Op$_i$ that / who$_i$} Leslie said that *(for all intents and purposes) t_i was the mayor of the city.

If this work is on the right track, it is actually predicted that QR, an LF phenomenon, should not display the *that*-trace effect.

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The cross-linguistic distribution of sign language parameters

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1 Introduction

While there is a great deal of information available about the cross-linguistic distribution of grammatical features in spoken languages (Crothers 1978; Haspelmath et al. 2005; Moran and Wright 2009), the distribution of grammatical features in signed languages has received less attention. The work that has been done focuses mainly on interrogatives and negations (e.g. Zeshan 2005) and the markedness and distribution of specific handshapes (Crasborn et al. 2001; Rozelle 2003).

What has not yet been established, however, is how the use of broader phonological distinctions – similar to features in spoken language phonology – are distributed. Commonly called parameters, these have been well studied in Deaf community sign languages such as American Sign Language (ASL) (Stokoe 2005; Klima and Bellugi 1979; Brentari 1998). But this does not shed light on some central questions about the nature of the tools available to signers. Which parameters are rarer and which are more common? Are some or any parameters used universally? How do they rank with relation to each other? Are some parameters highly marked in terms of cross-linguistic distribution? Are any possible parameters not used?

Investigating these questions is essential if we are to understand the limits of human language use. While the study of spoken language phonetics has explored and marked the boundaries of 'the articulatory possibilities of man' (Catford 1968), the articulatory possibilities of hands remain understudied.

1.1 Parameters

Which is not to say that it has not been studied at all. The sub-lexical phonological units of sign are commonly called parameters (no relation to the Chomskyian use of term), although Stokoe originally suggested the term 'chereme' (Stokoe 2005). At this point, there are at least six major parameters that have gained general acceptance: handshape, location, movement, number of hands, palm orientation and non-manuals.

Handshape, location and movement were all proposed by Stokoe in his seminal work on the structure of ASL (Stokoe 2005). Handshape refers to the overall shape of the hands, including selection and posture of the fingers. At least 160 distinct hand-shapes have been attested cross-linguistically (Prillwitz et al. 1989). A minimal pair for handshape in ASL is SOUR and APPLE. SOUR is produced at the side of the mouth with the index finger extended. APPLE differs only in that the index finger is bent at the first knuckle. Location is where in space the sign is produced, and is usually referred to using the part of the body or face

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closest to the hands during sign production. A minimal pair for location is APPLE and ONION. As mentioned above, APPLE is produced at the side of the mouth while ONION is produced at the edge of the eye. Finally, movement is how the hands or fingers move during sign production. A minimal pair for movement is CHAIR and TRAIN. For both signs, the index and middle fingers on both hands are extended. In CHAIR the fingers of the dominant hand tap those of the non-dominant hand twice, while in TRAIN the fingers of both hands remain in contact, but the fingers of the dominant hand slide from the finger tips to the first knuckle and back repeatedly. At least for American Sign Language however, these three parameters are not able to fully capture all distinctions between signs.

One aspect not captured by the above parameters is the relationship of the hands to each other. Bellugi and Fischer (1972) suggest that both the number of hands used and their relationship to each other are necessary to describe signs. This will be referred to as 'number of hands' from here on out, but it should be noted that the relationship between hands when signing is complex and subject to a number of phonological processes (Battison 1978; Napoli and Wu 2003). A minimal pair for number of hands from ASL is PURPLE and PARTY. For PURPLE the dominant hand is held in front of the body with a P handshape and is shaken back and forth. In one popular variant of PARTY the non-dominant hand mirrors the dominant hand.

Another parameter is palm orientation, or the rotation of the wrist and forearm (Friedman 1975). This is necessary for distinguishing between signs such as BALANCE and MAYBE. For both signs, both hands are held in front of the body, parallel to the floor with the fingers pointing away from the body, and one hand is raised while the other is lowered in an alternating motion. For BALANCE the palms face downwards, while in MAYBE they face upwards.

Not all information in signed languages is on the hands, however. The face and body can also be used to encode lexical distinctions, such as between LATE and NOT YET (Liddell 1978). These signs are identical except for a grammatical facial expression during production of NOT YET: the head shakes from side to side, the lips are slightly opened and the tongue is pushed forwards in the mouth (though not usually protruding beyond the lips). In some contexts, the sign may be produced with the facial expression but not the manual component. These lexical facial expressions will be referred to as 'non-manuals'. Note that this is limited to non-manuals that are used to make lexical distinctions. They may also be employed for a range of grammatical functions, such a marking mood, aspect or syntactic structures such as topics (Pfau and Quer 2010). A language may use non-manuals for grammatical purposes but not lexical ones and only the latter will be considered here.

1.2 Village Sign Languages

The above parameters have been proposed based mainly on American Sign Language and other Deaf community sign languages. These are not, however, the only type of signed languages in use today. Deaf community signed languages are the primary languages of culturally Deaf populations that exist as a sub-culture within hearing society. The social situation is very different for village sign languages, however. This typological category of signed languages is characterized by use in small endogamous populations with a high proportion of deafness. In these communities, deaf individuals are fully incorporated into the

social life of a community where both hearing and deaf individuals use the signed language. Village sign languages often show grammatical divergence from other sign languages (Zeshan 2010). Given this, should village sign languages be included in this analysis? Can they be analysed in a parameter framework at all?

In order to clarify this question, I will focus on one of better-studied villages sign languages: Al-Sayyid Bedouin Sign Language, which is used in southern Israel. It has been argued that Al-Sayyid Bedouin Sign Language does not use parameters in the same way as languages such as American Sign Language:

> ABSL exhibit[s] the most variation in the formation of handshapes...ABSL signers are aiming for a holistic iconic image, and ... discrete phonological categories are not yet robust in the language.
> (Israel and Sandler 2011:6)

ABSL signers exhibit quite a bit of linguistic variation. The handshape used for the same sign may vary quite a bit between signers. This is not the case in more established languages such as ASL. Israel and Sandler argue that this is due to the fact that phonological categories are not yet solidified in ABSL. Given this, is it reasonable to say that ABSL makes use of handshape?

For the purposes of this analysis, yes. While there is not yet consensus in the language community about the phonological form of each sign, there is consensus that it should include a handshape. This is in contrast to what has been observed for some homesigners, for example, where the hand's shape is not always contentful (Coppola and Brentari 2014). The stance that ABSL does make use of parameters has also been taken by Al-Fityani (2007) in a cross-linguistic comparison of Arab Sign Languages. While village sign languages and emerging sign languages may tolerate more variation in production, they do make use of the same parameters as Deaf community sign languages.

1.3 Markedness

Most previous work looking at parameters cross-linguistically has focused on the distribution of possible settings within each parameter, such as the use of the same handshape across multiple sign languages (Mandel 1979; Rozelle 2003). That is in contrast to this investigation, which asks whether a sign language uses handshape at all.

But what will this analysis tell us? Two things, both of which fall under the general header of "markedness". (For a more in-depth discussion of how the term has been used, see Haspelmath (2006) and Rice (2007)). The first is the distribution of parameters, the second is their hierarchical relationship and the final is the identification of highly marked parameters.

Since no previous work has been done on this question, a general description of the distribution of parameters is a clear first step. While most grammars of signed languages do include information about which parameters the language uses, this information has not been previously compiled and analyzed. This means that it has not previously been possible to address questions such as whether some or any parameters are universals in a principled, quantitative way.

Once the general distribution has been described, the next step is to determine if there appears to be any relationship between parameters. Can a hierarchy be constructed such that higher ranked parameters must be present if lower ranked parameters are observed? Implicational hierarchies are often used in discussions of markedness in spoken languages (Greenberg 1966), but have not been applied to the use of different parameters in signed languages.

A final question that this analysis will address is the existence of "edge cases". What parameters are used by at least one sign language but are very rare? These are of especial interest because they help us to delimit what is a possible sub-lexical units in signed languages.

2 Data

In order to answer questions about the cross-linguistic distribution of parameters, parameter data from a large number of signed languages was necessary. This investigation uses data from the Sign Language Analyses (SLAY) database (Tatman 2015) for that purpose.

SLAY contains condensed cross-linguistic grammatical information from 87 signed languages, almost two-thirds of the roughly 140 attested signed languages. The information in the database is taken from a variety of different sources: primarily descriptive grammars, but work from related fields such as automatic sign language recognition was included if no other sources were available for a language. Sources from different scholarly traditions – such as Kakumasu (1968) and Fabian and Francik (2001), which do not use Stokoe's framework – were included to contribute converging evidence to the analysis. In addition, the database distinguishes between languages which were observed to use a parameter, those where it was explicitly looked for but not found and those analyses where a parameter was not discussed at all. Since the second is a stronger argument than the third, the difference is important to maintain.

There were some drawbacks to using SLAY, however. The first and most obvious is that it does not include primary linguistic data and relies on the accuracy of the grammars it includes. This is a potential source of error. In addition, as mentioned above, not all the included analyses were done by trained linguists. Given that signed languages are often un- or under-documented this was unavoidable. Because the grammars themselves were from different scholarly traditions and occasionally different languages, some analysis was necessary to determine if two different terms were referring to the same parameter. In addition, there is currently only one source for each language in the database, though this may change as more sources are included.

There is one final advantage of the database that can help to assuage these criticisms, however. It is currently publicly available via SQLShare, courtesy of the University of Washington (Howe et al. 2012) and interested researchers are encouraged to download, modify and append it as they see fit.

Parameter	Present	Absent	Not discussed
Handshape	100%	0%	0%
Movement	98.86%	0%	1.14%
Location	94.25%	0%	5.74%
Palm Orientation	51.14%	6.89%	41.37%
Non-manuals	35.23%	8.04%	56.32%
Number of Hands	13.64%	8.04%	78.32%

Table 1: Percentage of signed languages that make use of each parameter.

3 Findings

3.1 Distribution

The raw percentages of signed languages which make use of each parameter are summarized in Table 1. Note that, as mentioned above, there is a distinction maintained between languages where a parameter was looked for and not found ("Absent") and those languages where analyses do not mention the given parameter at all ("Not discussed").

The most striking pattern in the data is the fact that almost every language uses handshape, movement and location. Further, no researchers who looked for handshape, movement or location failed to find it. This suggests that handshape, movement and location may be universally used by signed languages to encode lexical differences. The other parameters–palm orientation, non-manuals and number of hands–were observed in roughly half or fewer of the languages. Further, all of these parameters were explicitly searched for but not observed in six or seven languages. This reinforces the idea that handshape, movement and location are preferred cross-linguistically and are thus less marked.

3.2 Markedness Hierarchy

The idea that handshape, movement and location are unmarked is further supported by a markedness hierarchy which emerges from the data. In a traditional implicational hierarchy, if a language has a given feature it must also have all features ranked more highly. Due to the number of analyses that did not include any argument either for or against all parameters, it is not yet possible to construct a complete hierarchy. However, it is possible to rank the parameters with relation to each other.

In constructing this hierarchy, a parameter was ranked above another parameter if it was observed while the second parameter was found to be missing. Analyses where a parameter was not discussed, or excluded, were not considered in this ranking, so "excluded" may be ranked higher or lower than either "yes" or "no." Using these criteria, it was not possible to rank handshape, movement and location with relation to each other. This hierarchy, as well as the number of languages in SLAY which displays each combination of parameters, is summarized in Table 2. The ranking can be represented more concisely as:

Handshape, Movement, Location > Palm Orientation > Non-manuals > Number of Hands

Handshape	Movement	Location	Palm Orientation	Non-manuals	Number of Hands	# of Langs.
yes	yes	yes	yes	excluded	excluded	20
yes	yes	yes	excluded	excluded	excluded	14
yes	yes	yes	yes	yes	excluded	14
yes	yes	yes	excluded	yes	excluded	6
yes	yes	yes	excluded	excluded	excluded	4
yes	yes	yes	excluded	excluded	yes	4
yes	yes	yes	no	no	no	4
yes	yes	yes	excluded	yes	yes	2
yes	yes	yes	yes	excluded	yes	2
yes	excluded	excluded	excluded	yes	excluded	1
yes	yes	excluded	excluded	excluded	excluded	1
yes	yes	excluded	excluded	excluded	yes	1
yes	yes	excluded	yes	yes	excluded	1
yes	yes	excluded	yes	excluded	no	1
yes	yes	yes	excluded	yes	excluded	1
yes	yes	yes	excluded	yes	no	1
yes	yes	yes	excluded	yes	yes	1
yes	yes	yes	no	excluded	excluded	1
yes	yes	yes	no	no	excluded	1
yes	yes	yes	yes	no	excluded	1
yes	yes	yes	yes	excluded	excluded	1
yes	yes	yes	yes	no	excluded	1
yes	yes	yes	yes	yes	excluded	1
yes	yes	yes	yes	yes	no	1
yes	yes	yes	yes	yes	yes	1
yes	yes	yes	yes	yes	yes	1

Table 2: Table summarizing markedness hierarchy between parameters. If a parameter was searched for and found absent, then no lower-ranked parameter (those to the right) were observed. The inverse is not always true, due to the number of empty cells, but the ordering should remain relatively stable as those cells are filled. The rightmost column tallies the number of languages in the SLAY database which use each combination of parameters.

As in the raw distribution, handshape, movement and location enjoy a privileged position, though they cannot be ranked with relationship to each other. Palm orientation is next highest ranked, followed by non-manuals and then number of hands. It is somewhat surprising that non-manuals are ranked so low given their central role in Deaf community sign languages such as ASL. And, indeed, many signed languages make use of them for grammatical purposes, but not to make lexical distinctions. Even ASL may eventually move away from using non-manuals lexically if historical trends continue (Frishberg 1975).

3.3 Highly-marked Parameters

The parameters discussed above are not, however, an exhaustive list of possible parameters. One minor parameter, contact, was often included in analyses. In addition, two other ways of encoding lexical distinctions are included in the database: duration and hand choice. These are notable for being highly marked. Not only do they occur in very few languages, but they are also used in a very restricted ways in those languages.

One parameter which was observed relatively often but is not used to make lexical distinctions (and is thus considered a "minor" rather than "major" parameter) is contact (Klima and Bellugi 1979). While many of the analyses in SLAY include contact, no minimal pairs

were offered in any language. It is mentioned here only in the interests of completeness.

Duration is used in many sign languages for encoding aspect. However, it does not appear to be widely used for lexical distinctions. Palestinian Sign Language does have a clear minimal pair for duration between HONEY and CRUSHED-SESAME (Abdel-Fattah 2005). Duration has also been proposed as a minor parameter in Australian Sign Language, also known as Auslan (Johnston and Schembri 2007). It was not included as a major parameter in any other signed languages, however. This suggests that, while duration is available for lexical distinctions in signed languages, it is highly marked. Perhaps it is the fact that duration is so often recruited by other levels of the grammar which makes it dis-preferred for lexical encoding. Like non-manuals, sign duration is often recruited by the syntax and morphology. The use of duration to encode aspect may be iconically motivated (Sexton 1999; Dahl 1994), which would help to explain its frequency. As a result, this may block it from being productively used for lexical encoding in most signed languages, in order to avoid confusion.

An even more marked parameter is hand choice. In most signing, the signer uses their dominant hand to produce signs (Vaid et al. 1989; Brentari 1998). There is no distinction between the same one-handed sign produced with the right hand by a right-handed signer and the left hand by a left-handed signer. However, Turkish Sign Language does make use of hands differently (Kubuş 2008). In the fingerspelling system[1], the letter P is produced with the non-dominant hand. However, signs produced with a p handshape, such as FIGHT are made with the dominant hand. Kubuş argues that this is due to the fact that the fingerspelling system has not undergone phonologization. Regardless of its phonological status, the use of the non-dominant hand for canonical signs is highly marked. The only other instance of producing signs with the non-dominant hand is in Walpiri Sign Language, used in central Australia. For a very small set of family signs, the same relation on the distaff and spear sides are signed with the same sign produced by different hands (Kendon 1988). It is not surprising that this parameter is incredibly rare; it's far more surprising that any sign language at all makes use of the non-dominant hand preferentially, even for a small portion of the signing system. Previous research suggests that language use, brain lateralization and lateralization of hand use are intrinsically linked (e.g. Bonvillian and Richards 1993; Skoyles 2000; Corballis 2003). Thus preferential use of the dominant hand during signing seems to be necessitated by cognitive factors and it is no surprise that assigning grammatical function to hand choice is so highly marked.

It is also useful to consider parameters which are possible but have not been observed in signed languages. For example, the use of the feet has been observed in homesign[2] (Hunsicker and Goldin-Meadow 2013). However, no analysis in the database suggested that the feet were used to make lexical distinctions. They were used as a location, notably in languages such as Adamorobe Sign Language (Nyst 2007) and Yolngu Sign Language (Bauer 2014) that are mostly produced while seated cross-legged on the ground, but not as active articulators. The lack of the use of the feet by signed languages may be due to perceptual pressures. Eye-gaze focuses on the face during the perception of sign (Emmorey et al. 2009).

[1]A method of manually encoding written language, with each written letter given a distinct handshape. Most signed languages used by Deaf communities in literate societies make use of fingerspelling.

[2]Gesture systems used for communication by deaf children who are not afforded access to full sign languages.

As a result, gestures made with the feet would be difficult to perceive without shifting the gaze drastically and possibly missing important grammatical information encoded on the face. This helps to explain why even signs which have a strong iconic reason to be produced with the feet, such as KICK, are produced with the hands instead. While this observation is predictable given previous research, it was not verifiable without a robust cross-linguistic sample of information about the phonological tools used by signed languages.

These edge cases help us to constrain the limits of what sign phonology should encompass. These limits will become firmer as more signed languages are documented and existing documentation is expanded upon.

4 Conclusion

To review, this cross-linguistic investigation of the use of parameters in signed languages has made three main contributions. The first is information on the general distribution of the parameters in signed languages. The evidence so far suggests that the use of handshape, movement and location may be universal in signed languages. This observation has emerged even in work outside of the Stokoe tradition. While lesser-used parameters, such as non-manuals, are necessary to describe distinctions between signs in languages such as ASL, this does not appear to be true in the majority of languages.

The second contribution is a preliminary markedness hierarchy of parameters in signed languages. Handshape, movement and location were the highest ranked and thus least marked in the hierarchy as well. There was also consensus between the two methods about the markedness of palm orientation, non-manuals and number of hands. They were ranked in that order using both in terms of frequency of observance and in thier position in the markedness hierarchy. This is converging evidence that handshape, movement and location are unmarked when compared to other common parameters, and that they may be universals.

On the other end of the markedness spectrum, there are very rare parameters, as well as those which are observed in homesign but not included in full sign language systems. This may be due to a number of different factors. Languages may prefer to use a certain parameter at other levels of the grammar, as for duration and possibly non-manuals. Or there may be cognitive factors that make a parameter unfeasible, as with the use of hand choice. Or a parameter may simply be very difficult to perceive, such as the use of the feet. We may expect that any additional parameters observed as the result of on-going documentation work will be restricted by these same factors.

There is substantial room for future research on this and related questions. One obvious space is the inclusion of additional signed languages and analyses in the database. As more sign languages are documented, we will develop a clearer picture of how sign languages encode lexical differences. The markedness hierarchy proposed here, for example, may change as "excluded" cells are filled in or if alternate analyses are adopted for some languages.

Another area for future work is to apply other types of markedness analyses to parameters. A good deal of psychological and developmental work has been done on parameters, especially in ASL, that helps to shed light on the relationship between handshape, movement and location. Hildebrandt and Corina (2002), for example, found that handshape may be of less central importance than movement and location for sign recognition. Movement between different handshapes is also acquired after other types of movements (Karnopp 2002). There

has been less attention paid to very rare parameters, though. This would be an interesting area for future experimental work.

Language change in sign languages is another area to mine for information on the markedness of parameters. Frishberg (1975) argues that as ASL developed, it moved towards the use of primarily the hands during signing and away from obligatory lexical non-manuals. Later work (Ceil et al. 2002) has supported this claim. The finding here that lexical non-manuals are marked cross-linguistically is unsurprising in light of these observations. But do similar processes of diachronic change take place in other signed languages, where more marked parameters are slowly lost from the canonical form of signs? This question may become clearer with as more work is done in under-studied sign languages.

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Homophony and contrast neutralization in Southern Min tone sandhi circle

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1 Introduction

Southern Min Chinese has a number of varieties, such as Xiamen (or Amoy) spoken in Fujian Province in China, as well as Taiwanese in Taiwan. The tone sandhi circle in Southern Min involves five lexical tones in a tonal chain shift. The surface forms of these tones alternate between a citation/juncture form that appears at the right edge of a tone group, and a sandhi form that appears elsewhere (Myers & Tsay 2008). The length of the tone group, i.e. the domain of the sandhi, can vary from a single noun phrase to a complete sentence (Chen 1987; Lin 1994). The following Taiwanese examples are taken from Myers & Tsay (2008)[1].

(1) Taiwanese tone sandhi circle

a. si^{24} → si^{33}-kan^{55}
"time" "time; time span"

b. si^{33} → si^{21}-tsiŋ^{53}
"temple' "temple monk"

c. si^{21} → si^{53}-tiam^{53}
"four' "four o'clock"

d. si^{53} → si^{55}-laŋ^{24}
"dead' "dead people"

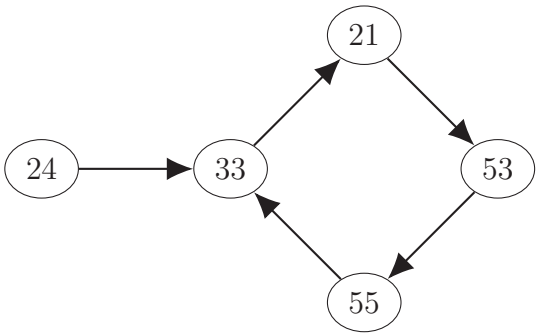
e. si^{55} → si^{33}-bun^{24}
"poetry' "poetry and prose"

The schematic diagram below illustrates the tone sandhi in Southern Min in chain forms. The contrast between two tones – the rising 24 and the high-level 55 – are neutralized, as they both become the mid-level 33 in non-phrase final positions.

(2) Schematic flowchart of the Southern Min tone sandhi circle

*I would like to thank Jane Tsay and James Myers for their assistance in this project, as well as comments and suggestions from the Phonies discussion group at the Ohio State University. All remaining mistakes are my own.

[1] 5 represents the highest tone level, and 1 represents the lowest tone level. The current paper focuses on neutralization of the lexical tones, and will not discuss the 21↔53 sandhi for syllables with plosive endings.



Recent constraint-based approaches (Hsieh 2005; Barrie 2006; Thomas 2008) assumed a need to alter the rising tone 24 in Southern Min. For example, Hsieh (2005) and Thomas (2008) suggetsed that it is phonetically more difficult to realize a full rising tone in a non-final syllable, as it is phonetically shorter than a final syllable. Such proposal concurred with previous phonetic and typological evidence posited by Zhang (2002). Therefore, the rising tone 24 becomes a mid-level tone 33 to satisfy the constraint *Rise.

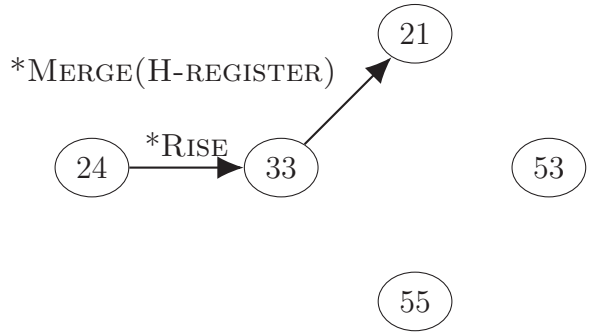
(3) *Rise
Assign a violation to each occurrence of rising tone.

(4) Markedness constraint changes the rising tone

Hsieh (2005), Barrie (2006) and Thomas (2008) suggested that the current neutralization of tones 24 and 33 violates the principle of contrast preservation (Lubowicz 2003), which penalizes the mapping of two different inputs to an identical output. Once again, such principle may be modeled using OT constraints. For example, we may treat the tones 55, 53 and 33 as H-register tones, versus the L-register tones 24 and 21 (Hsieh 2005; Barrie 2006). A constraint, *Merge(H-register), would then penalize the mapping of the H-register tone 33 and another tone (i.e. the rising tone 24 in our Southern Min example) to the H-register tone 33 (Hsieh 2005). To avoid such mapping, the H-register tone 33 is therefore changed into the L-register tone 21. Such second tone sandhi would also satisfy the *Merge(H-register) constraint by not merging into another H-register tone.

(5) *Merge(H-register)
Assign a violation to each mapping of a H-register tone and another tone to that particular H-register tone. (Hsieh 2005)

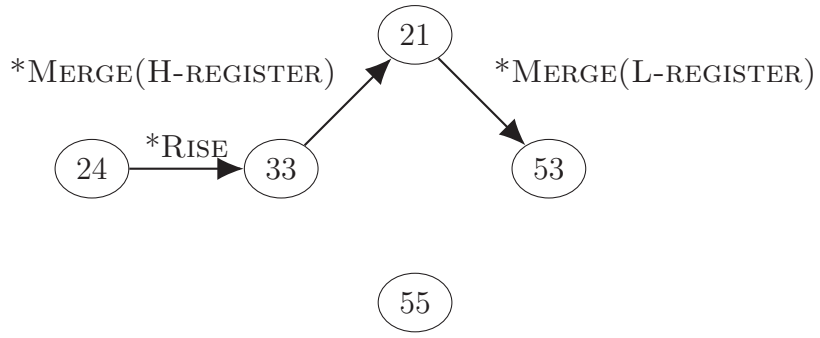
(6) *Merge(H-register) penalizes the first neutralization of tones 24 and 33, motivates the second neutralization of tones 33 and 21



This second neutralization of tones 33 and 21, once again, violates the principle of contrast preservation. A second contraint *Merge(L-register) would then penalize the mapping of the L-register tone 21 and another tone (i.e. tone 33) to the L-register tone 21. Such neutralization of two tones is avoided by another tone sandhi, which turns the L-register tone 21 into the H-register 53.

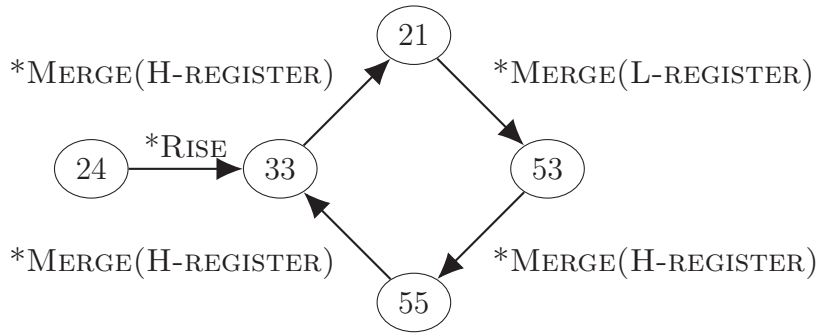
(7) *Merge(L-register)
Assign a violation to each mapping of a L-register tone and another tone to that particular L-register tone. (Hsieh 2005)

(8) *Merge(L-register) motivates further tone sandhi



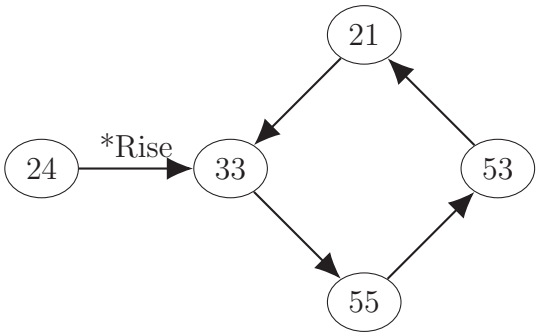
While the merger of the L-register tone 21 to 53 satisfies *Merge(L-register), it violates *Merge(H-register). These repeated violations of contrast preservation constraints prompt further tone sandhis, and generate the full tone sandhi circle.

(9) Southern Min tone sandhi circle, under the constraint ranking
*Rise >> *Merge(L-register) >> *Merge(H-register)



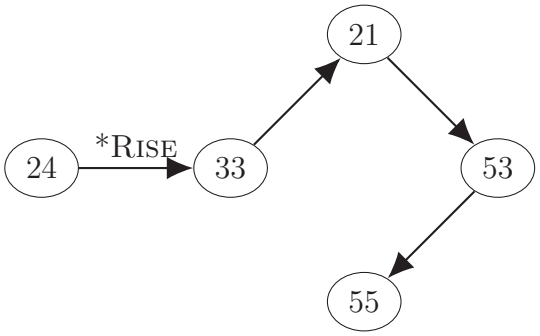
The recent accounts vary in the exact specification of the contrast preservation constraints. Hsieh (2005) utlized the *Merge(L-register) and *Merge(H-register) constraints, as specified above. Barrie (2006) suggested different contraints that aimed to preserve either register and pitch of the tones. On the other hand, Thomas (2008) proposed a single *Merge constraint that penalizes any kind of mergers. While the exact specification of the contraints differ, the motivation is clear: they all penalize merger of tones. Such constraint-based approaches imply that the attested sandhi circle, which merges tones 24 and 55 into tone 33, is more optimal than other possible-yet-unattested circles, such as the reversed circle in (10), where the direction of tone sandhis were opposite from the attested pattern.

(10) Possible-yet-unattested pattern: reversed tone sandhi circle



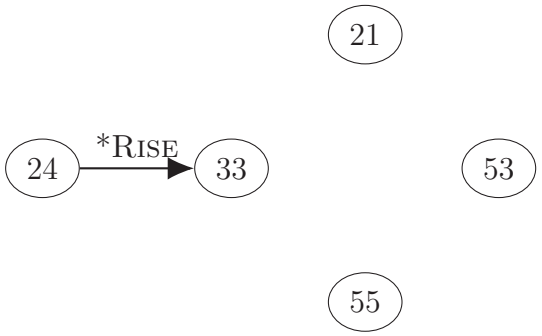
The attested tone sandhi circle should also be more optimal than other unattested non-circular chain shifts, such as the one shown in (11).

(11) Possible-yet-unattested pattern: non-circular tonal chain shift



Finally, if we assume the original motivation of the tone sandhi was to eliminate the rising tone 24, we may simply do so by having one single merger, as in the unattested pattern in (12). The constraint-based approaches, therefore, imply that it is more optimal to have the attested tone sandhi circle than not having any tonal chain shifts at all.

(12) Possible-yet-unattested pattern: no tonal chain shift



In sum, the recent constraint-based approaches suggested that the attested tone sandhi circle in Southern Min satisfies the principle of contrast preservation, and are more optimal than the unattested tone sandhi patterns. However, the reasons for preserving certain contrasts and not others are also not elaborated. For example, it is not explained why the rising tone 35 should merge into the mid-level tone 33, instead of one of the other three tones. In other words, it remains unclear *in what ways* is the attested circle more optimal than the unattested patterns, besides that the attested circle satisfies the proposed constraint rankings. These recent proposals lack independent evidence that supports the claim that contrast preservation is the motivation behind the attested Southern Min tone sandhi pattern.

The current study attempts to examine independent evidence for and/or against invoking the principle of contrast preservation in the explanation of the Southern Min tone sandhi circle. Section 2 reviews recent studies which suggested that phonological neutralizations avoid creation of homophones. Section 3 describes a series of simulations that compares the amount of homophony created by the attested and unattested tone sandhi patterns in Southern Min. Section 4 concludes the paper, and suggest that the Southern Min tone sandhi circle cannot be solely motivated by the principle of contrast preservation.

2 Contrast preservation and anti-homophony pattern

It would be very difficult for language users to communicate if their language has a lot of homophones – listeners would have to rely heavily on context to distinguish semantically-different homophones. The current section reviews recent studies which argued that phonological neutralization avoids high-functional contrasts. By preserving phonological contrasts that are often used to distinguish minimal pairs, the attested neutralization patterns create less homophony than the unattested ones, and therefore avoid creating confusion in the listeners.

Two recent studies by Silverman (2010) and Kaplan (2011) focused on the consonant neutralization patterns in Korean, and suggested that the attested neutralization patterns

create less homophony than other possible-yet-unattested patterns. For example, the coda neutralization eliminates the distinction between aspirated and plain stops. This is illustrated in (13) below. The underlying /t^{h}/ and /t/ codas both become [t$^{\neg}$] in the surface forms. Therefore, /pat^{h}/ 'heritage' and /pat/ 'field' share a homophonous surface form [pat$^{\neg}$]. The plain /k/ coda also becomes unreleased, and therefore /pak/ 'gourd' becomes [pak$^{\neg}$].

(13) Example of attested Korean coda neutralization (Silverman 2010; Kaplan 2011)

a. /pat^{h}/ → [pat$^{\neg}$]
"heritage"

b. /pat/ → [pat$^{\neg}$]
"field"

c. /pak/ → [pak$^{\neg}$]
"gourd"

We may also conceive other possible coda neutralization patterns for Korean. For example, instead of neutralizing the stops by place, we may set up a 'toy Korean' that neutralizes the /t/ and /k/ codas. In this toy example, /pat/ 'field' and /pak/ would share a homophonous surface form, while /pat^{h}/ 'heritage' would have a different surface form.

(14) Toy Korean coda neutralization

a. /pat^{h}/ → [pat^{h}]
"heritage"

b. /pat/ → [pat$^{\neg}$]
"field"

c. /pak/ → [pat$^{\neg}$]
"gourd"

The amount of homophony before and after the coda neutralization can be quantified in terms of 1.) number of word types, 2.) number of homophonous word tokens, and 3.) information content, in terms of Shannon's entropy in bits (Kaplan 2011). The calculation of homophony is exemplified in the toy example (15) below.

(15) Quantifying homophony in the toy example

	Before neutralization:			After neutralization:	
	/pat^{h}/	/pat/	/pak/	/pat^{h}/ → [pat^{h}]	/pat, pak/ → [pat$^{\neg}$]
Tokens	1	1	4	1	1+4 = 5
	Word types = 3 (/pat^{h}/, /pat/, /pak/) Homophonous word tokens = 4 (from /pak/) Information content =1.252			Word types = 2 ([pat^{h}], [pat$^{\neg}$]) Homophonous word tokens = 5 (from [pat$^{\neg}$]) Information content = 0.650	

Phonological neutralization decreases the number of word types, while increasing the number of homophonous word tokens. The information content of a corpus also decreases after the neutralization. In the toy example (15) above, coda neutraliztion decreased the number of word types from 3 to 2, while it increased the number of homophonous word tokens from 4 to 5. The information content of this tiny corpus also dropped from 1.252 to 0.650.

Using Korean corpora, Silverman (2010) and Kaplan (2011) simulated the attested consonant neutralization pattern (such as (13)), as well as other possible-yet-unattested patterns (such as (14)). They compared the amount of homophony before and after the attested and unattested patterns, and found that the attested patterns produced less homophony than the unattested ones. The attested patterns eliminated fewer word types, generated fewer homophonous word tokens, and removed less information content than the unattested patterns. A higher amount of homophony would "[make] communication more difficult", as listeners would have to rely on context to distinguish two semantically-different homophones (Kaplan 2011:p.3). Therefore, avoiding homophony in consonant neutralization would avoid bringing extra difficulties to the listeners. In other words, it appeared that the attested consonant neutralization patterns in Korean targeted the less-functional phonological contrasts, and had less impact on the communication system than the unattested patterns. Other corpus studies have also suggested that it is rare for high-functional phonological contrasts to be eliminated in historical sound changes, as such neutralization would create confusions in the listeners (Wedel et al. 2013b,a).

As discussed in the section 1, previous studies suggested that the Southern Min tone sandhi circle is motivated by the principle of contrast preservation (Hsieh 2005; Barrie 2006; Thomas 2008). It was more optimal to preserve certain tonal contrasts over others, and thus chain shifts were formed to avoid neutralization of particular tonal contrasts. If we assume that the reason for certain phonological contrast to be preserved over others is to avoid homophony (Silverman 2010; Kaplan 2011; Wedel et al. 2013b), and that the Southern Min tone sandhi circle is motivated by contrast preservation, we should expect that the attested tone sandhi circle generates less homophony than other possible-yet-unattested patterns. The next section describes three simulations, in which we compared the amount of homophony generated by attested and unattested tone sandhi patterns.

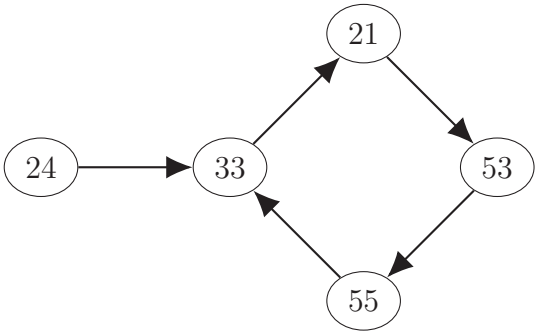
3 Homophony in Southern Min tone sandhi circle

Assuming contrast preservation is driven by homophony avoidance, we expect the attested Southern Min tone sandhi circle to produce less homophony than the unattested patterns – the attested pattern should eliminate fewer word types, generate fewer homophonous word tokens, and remove less information content than the unattested patterns. In this study, the attested and unattested tone sandhi patterns were stimulated, using a portion of the Taiwanese Spoken Corpus (Tsay & Myers 2005). The Taiwanese Spoken Corpus contains transcripts of radio talk shows in Taiwanese, and the current portion contained 78683 word tokens.

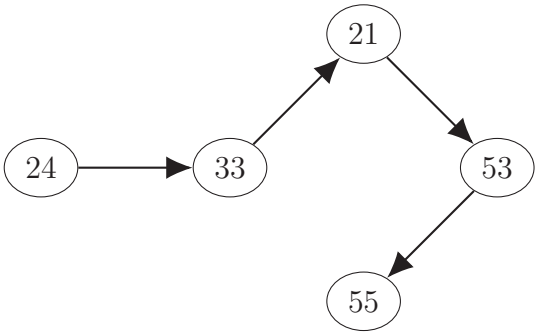
The attested and unattested tone sandhi patterns can be simulated by searching and replacing the corresponding tones in the Taiwanese Spoken Corpus. The amount of ho-

mophony can be quantified by measuring 1.) the number of word types, 2.) the number of homophonous tokens, and 3.) information content in the corpus, as shown in the toy example (15) above. Following previous studies (Hsieh 2005; Barrie 2006; Thomas 2008), the need to eliminate the rising tone 24 was assumed to be the original trigger of the tone sandhi. The attested pattern, along with 87 unattested patterns, were simulated. These include 24 circular patterns ($4 \times 3 \times 2 \times 1 \times 1$) that involve all four other tones (besides the rising tone 24, such as (16a)), 24 non-circular patterns ($4 \times 3 \times 2 \times 1$) that involve all four other tones (e.g. (16b)), 24 patterns ($4 \times 3 \times 2$) that involve three other tones (e.g. (16c)), 12 patterns (4×3) involving two other tones (e.g. (16d)), and 4 patterns that inovlve one other tone (e.g. (16e)).

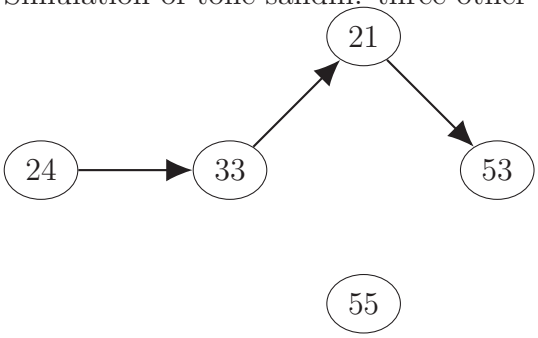
(16) a. Simulation of tone sandhi: all four other tones (circular)



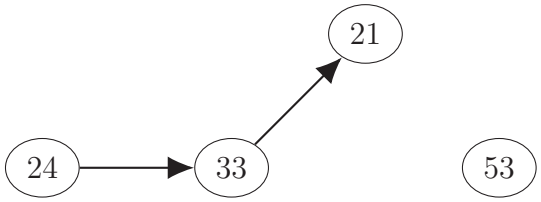
b. Simulation of tone sandhi: all four other tones (non-circular)



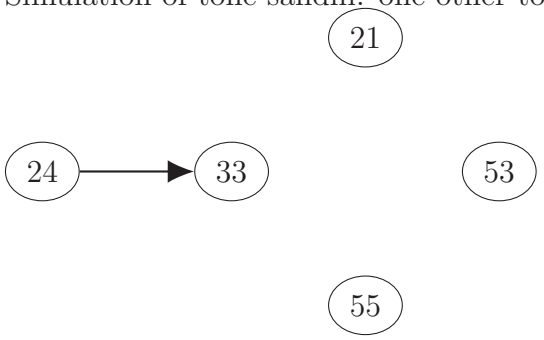
c. Simulation of tone sandhi: three other tones



d. Simulation of tone sandhi: two other tones



e. Simulation of tone sandhi: one other tone



One of the variables in the simulations is the domain for tone sandhi. The Southern Min tone sandhi circle is sensitive to syntax and semantics (Chen 1987; Lin 1994). Only the final tone in a tone group remains unchange, while the tone group could be as short as a single word, and as long as a complete sentence. Therefore, the amount of tone sandhi can vary greatly when we assume different tone group sizes. Consider the following example (17), taken from the Taiwanese Spoken Corpus. When we assume individual words to be tone groups of their own, only one tone is in the non-final position, and thus subject to tone sandhi. However, when we assume the whole sentence to be one single tone group, five tones are in non-final positions, and all five of them would undergo tone sandhi.

(17) a. Original ample from the Taiwanese Spoken Corpus

lai^{33}bin^{33} long^{53} tsuan^{24} si^{33} po^{53}
inside every/all all is treasure
"Everything inside is a treasure."

b. Tone group = word

(lai$^{\underline{21}}$bin^{33}) (long^{53}) (tsuan^{24}) (si^{33}) (po^{53})
inside every/all all is treasure

c. Tone group = sentence

(lai$^{\underline{21}}$bin$^{\underline{21}}$ long$^{\underline{55}}$ tsuan$^{\underline{33}}$ si$^{\underline{21}}$ po^{53})
inside every/all all is treasure

To the best of my knowledge, no current Southern Min corpora contain any phrasal / tone group information. Therefore, simulations of tone sandhi patterns were performed independently, using the smallest-possible (word) and largest-possible units (sentence) as tone groups . The small tone group (word) situation will provide a lower-bound measure of homophony after the tone sandhis, while the large tone group (sentence) situation will provide an upper-bound measure.

A second concern arises when we assume the size of tone groups to be larger than words. While tone sandhis may involve neutralization of tonal contrast and produce homophony, since lexical items do not undergo tone sandhi in the phrase-final position, two allomorphs are created for the same lexical item – one with the sandhi tone and one with the citation tone (Tsay & Myers 1996). Therefore, the amount of homophony may actually decrease in the surface, against our prediction, as new surface forms for the lexical items are created. Such phenomena is illustrated in the example (18) below. The lexical items 'know' /tsai^{55}/ and 'scholar' /tsai^{24}/ had different citation forms. The underlying tonal contrast is neutralized in the non-phrase-final position, where both lexical items become [tsai^{33}]. At the same time, however, two allomorphs are formed for each of the lexical items: 'know' can be [tsai^{33}] or [tsai^{55}], while 'scholar' can be [tsai^{33}] or [tsai^{24}]. These allomorphs decrease the amount of homophony by increasing the number of word types and decreasing the number of homophonous word tokens in the surface. As a result, when we assume the tone groups to be sentences in our simulation of tone sandhi, we need to evaluate the amount of homophony and consider the effect of allomorphy at the same time.

(18) Homophony and allophony in Southern Min tone sandhi

a. (...tsai$^{55\rightarrow33}$... ...tsai^{55})
know know

b. (...tsai$^{24\rightarrow33}$... ...tsai^{24})
scholar scholar

There are at least two solutions for quantifying homophony in light of allomophy. The first is to ignore the final word in the sentences, and focus on the amount of homophony generated by the tone sandhi. Such method, while leaving out the final word, would allow us to more accurately estimate the amount of homophony generated by the tone sandhi process. The amount of homophony generated by the attested and unattested tone sandhi patterns can be compared. Once again, our prediction would be that the attested tone sandhi pattern produces less homophony than the unattested ones, and thus create less impact on the communication system.

We can also include the sentence-final words in our calculation of homophony. Once again, the impact of homophony *and* allomorphy together on the communication system may be quantified by measuring the changes to the number of word types, number of homophonous word tokens, and information content in the corpus. Due to allomorphy, we expect that the number of word types to increase, and the number of homophonous word tokens to decrease after tone sandhis. The information content should increase as well. In the discussion of homophony in section (2), we assumed that neutralization patterns that create the least amount of homophony are more optimal because they produce the least amount of impact to the communication system. Similaly, in the current situation where both homophony and

allomorphy appear, we may assume that tone sandhi patterns that produce the least amount of impact to the communication system to be more optimal. The more allomorphs there are in the surface, the more surface forms the language users would have to learn. Therefore, when tone sandhi in sentences causes both homophony and allomorphy, the attested tone sandhi pattern should generate fewer new word forms and remove fewer homophonous word tokens than other unattested patterns if the attested pattern is indeed an optimal pattern.

3.1 Simulation 1: Tone sandhi in words

This section describes the results from the simulations of attested and unattested tone sandhi patterns in the Taiwanese Spoken Corpus, using individual words as tone groups. This is a lower bound measure of the amount of homophony generated by the tone sandhi patterns. Assuming that the attested sandhi pattern is more optimal under the principle of contrast preservation, we predict that the attested pattern should generate less homophony than the unattested patterns: the attested pattern should 1.) remove fewer word types, 2.) generate fewer homophonous word tokens, and 3.) decrease less information content than the unattested patterns.

Figures 1, 2, and 3 below show, respectively, propotional change in number of word types, number of homophonous word tokens, and information content after the attested and unattested tone sandhis. The attested tone sandhi circle removed more word types than 10 other unattested sandhi patterns, and increased the number of homophonous word tokens more than 45 other unattested patterns. The attested tone sandhi circle also removed more information content in the corpus than 26 other unattested patterns.

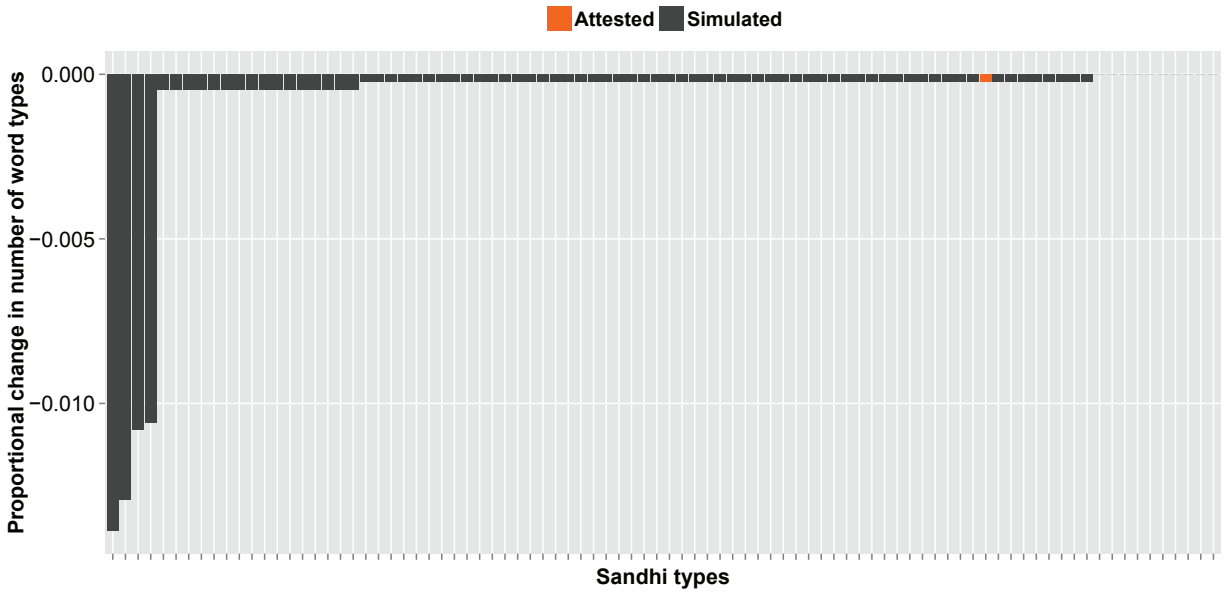


Figure 1: Proportional change in number of word types after attested and unattested tone sandhi, assuming individual words to be tone groups.

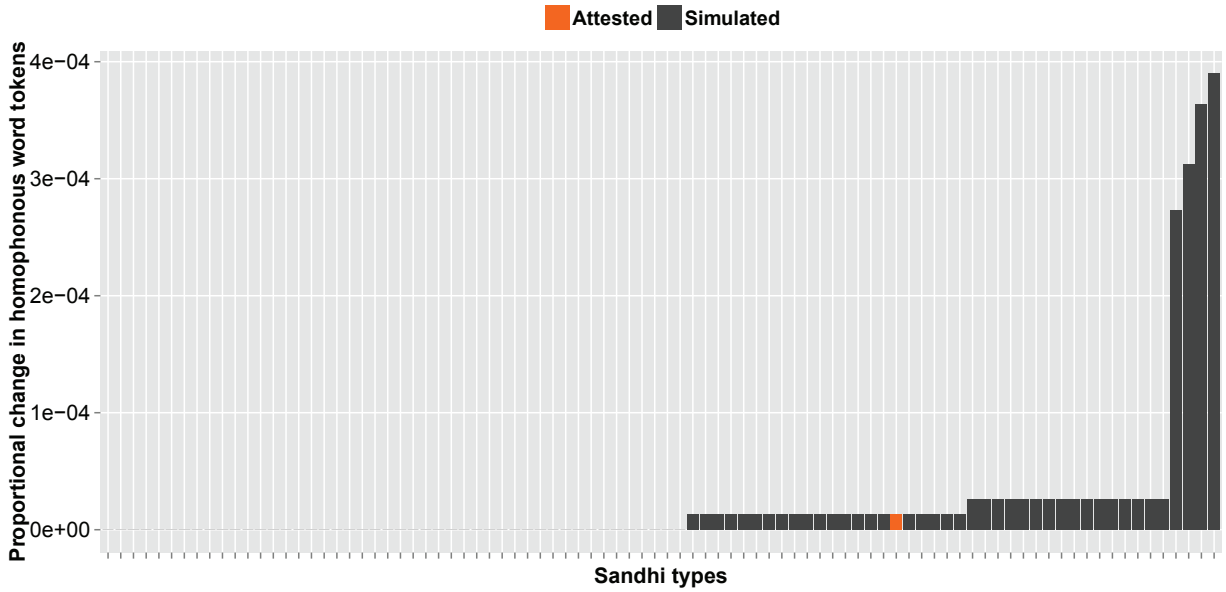


Figure 2: Proportional change in number of homophonous word tokens after attested and unattested tone sandhi, assuming individual words to be tone groups.

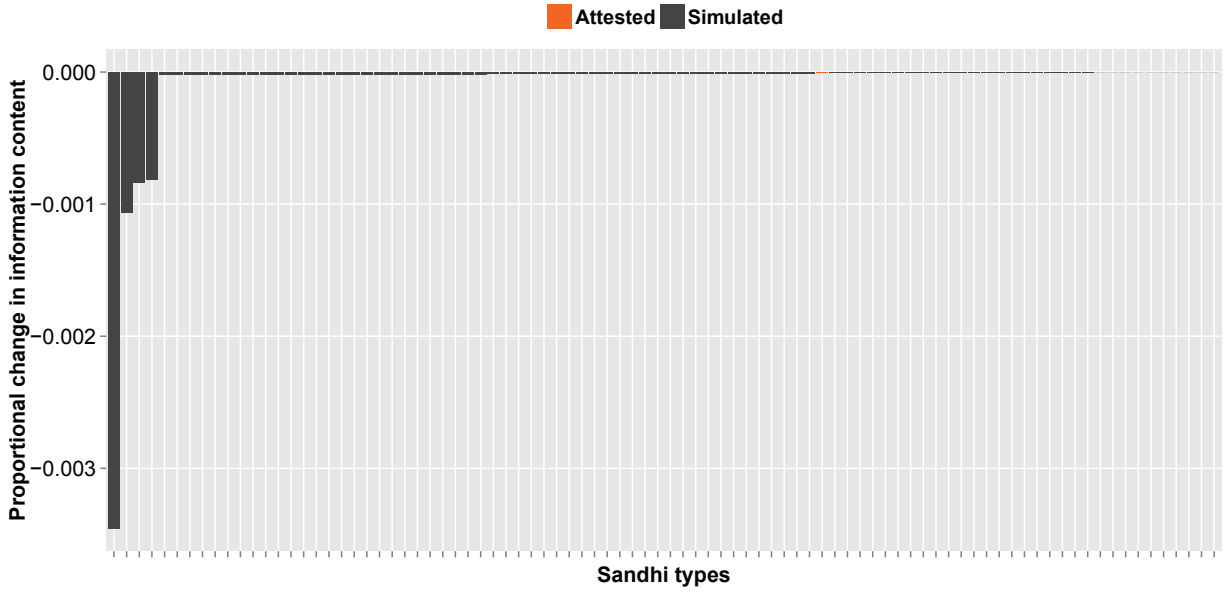


Figure 3: Proportional change in information content after attested and unattested tone sandhi, assuming individual words to be tone groups.

Based on the simulations of tone sandhis above, which used individual words as tone groups, it is unclear whether the attested tone sandhi circle in Southern Min is indeed the optimal pattern. Should we assume that contrast preservation is driven by homophony avoidance, the attested pattern is creating more homophony than at least 10 other possible

sandhi patterns. In other words, based on the simulations above, the attested tone sandhi circle appears to be less optimal than at least 10 other possible patterns.

3.2 Simulation 2: Tone sandhi in sentences, without final words

Attested and unattested tone sandhi patterns were also simulated in the Taiwanese Spoken Corpus, using sentences as tone groups. This session describes the simulation results without including the sentence-final words. By excluding the final words, we can exclude allomorphy in the lexical items, and produce a upper bound measure of the amount of homophony generated by the tone sandhi patterns.

Once again, assuming that the attested sandhi pattern is more optimal under the principle of contrast preservation, we predict that the attested pattern should generate less homophony than the unattested patterns: the attested pattern should 1.) remove fewer word types, 2.) generate fewer homophonous word tokens, and 3.) decrease less information content than the unattested patterns.

Figures 4, 5, and 6 below show, respectively, propotional change in number of word types, number of homophonous word tokens, and information content after the attested and unattested tone sandhis. The attested tone sandhi circle removed more word types than 14 other unattested sandhi patterns, and increased the number homophonous word tokens more than 7 other unattested patterns. The attested tone sandhi circle also removed more information content in the corpus than 14 other unattested patterns.

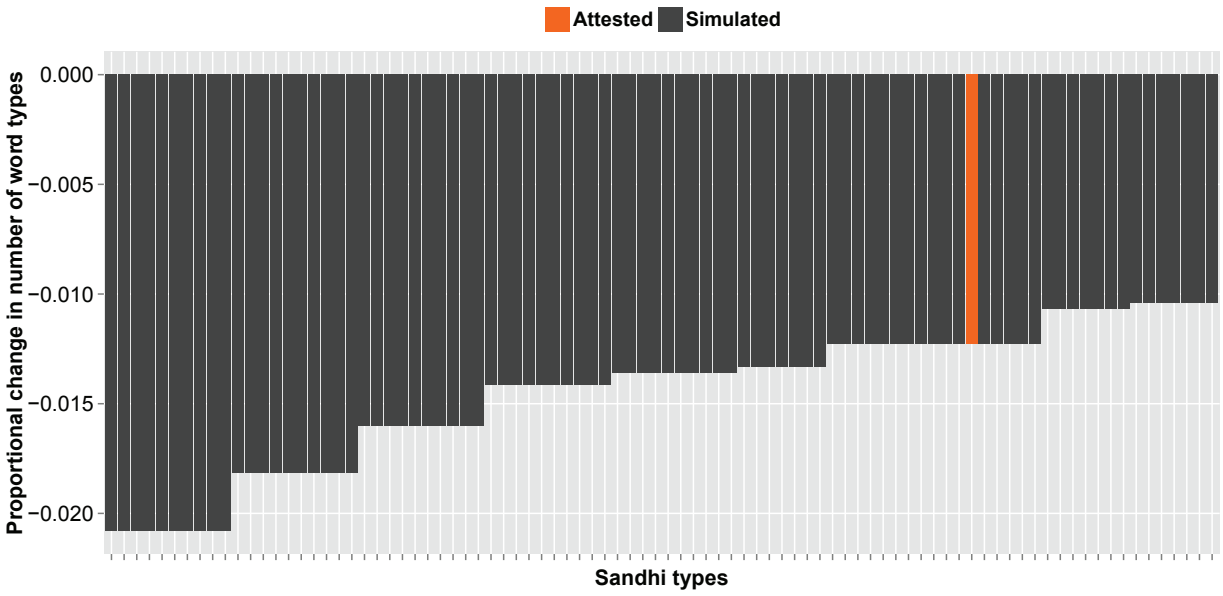


Figure 4: Proportional change in number of word types after attested and unattested tone sandhi, assuming sentences to be tone groups. Final words were excluded.

Based on the simulations of tone sandhis above, that used sentences as tone groups, it is again unclear whether the attested tone sandhi circle in Southern Min is indeed the optimal pattern. Should we assume that contrast preservation is driven by homophony avoidance, the

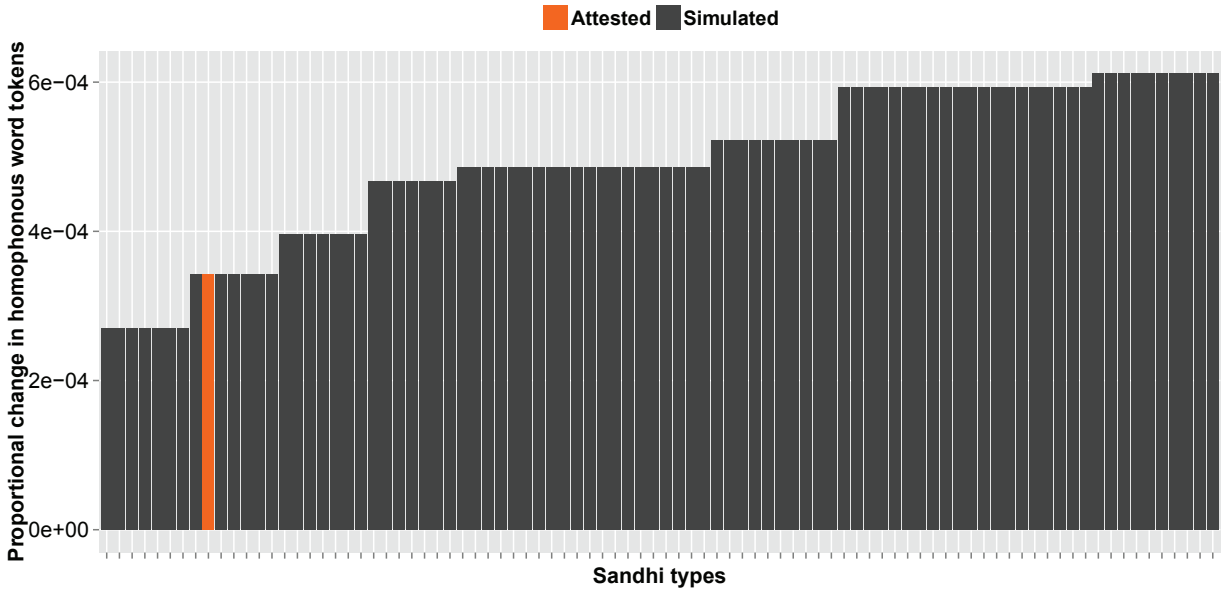


Figure 5: Proportional change in number of homophonous word tokens after attested and unattested tone sandhi, assuming sentences to be tone groups. Final words were excluded.

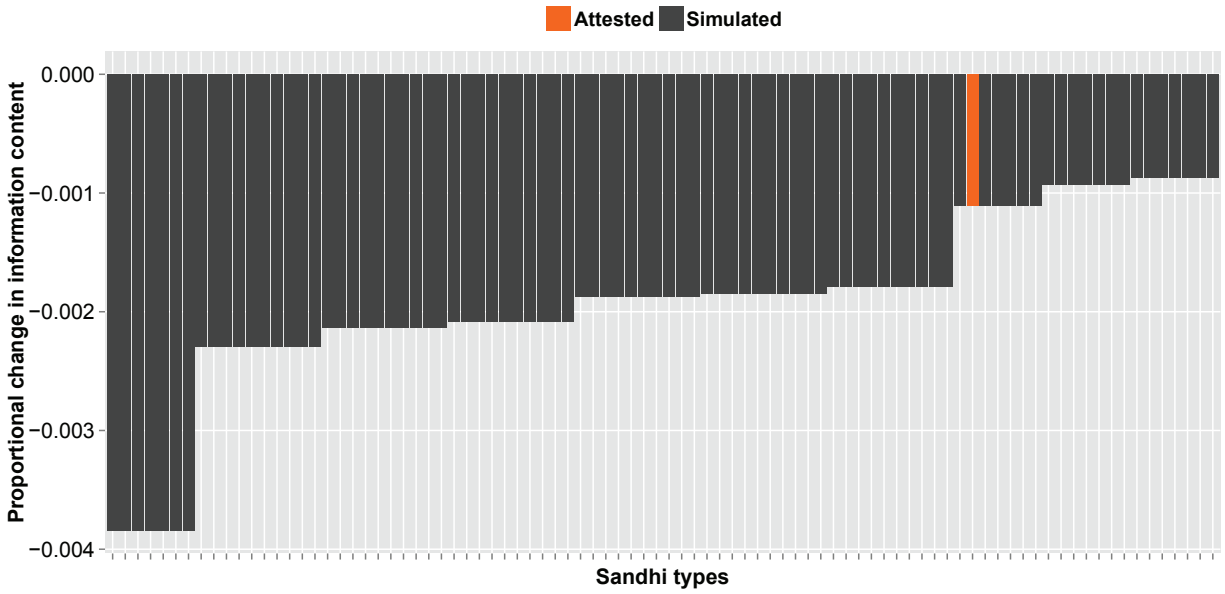


Figure 6: Proportional change in information content after attested and unattested tone sandhi, assuming sentences to be tone groups. Final words were excluded.

attested pattern is creating more homophony than at least 7 other possible sandhi patterns. In other words, based on the simulations above, the attested tone sandhi circle appears to be less optimal than at least 7 other possible patterns.

3.3 Simulation 3: Tone sandhi in sentences, including final words

Finally, the attested and unattested tone sandhi patterns were simulated, using sentences as tone groups. This time, the quantification of homophony includes the sentence-final words. Allomorphy in the lexical items is thus included. The assumption here is that the attested sandhi pattern is more optimal if it produces less impact on the communication system than other unattested patterns. Therefore, we predict that the attested pattern should generate less changes to the homophony in Taiwanese than the unattested patterns: the attested pattern should 1.) produce fewer word types, 2.) remove fewer homophonous word tokens, and 3.) increase less information content in the corpus than the unattested patterns.

Figures 7, 8, and 9 below show, respectively, propotional change in number of word types, number of homophonous word tokens, and information content after the attested and unattested tone sandhis. The attested tone sandhi circle produced more new word types than 78 other unattested sandhi patterns, and removed more homophonous word tokens than 82 other unattested patterns. The attested tone sandhi circle also removed more information content in the corpus than 75 other unattested patterns.

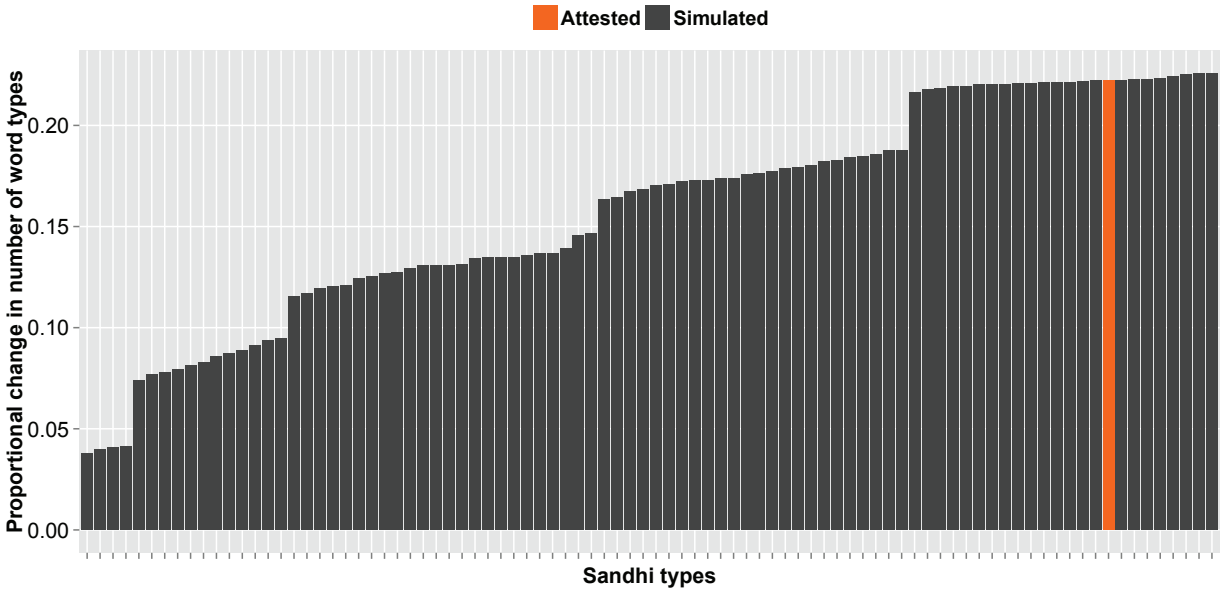


Figure 7: Proportional change in number of word types after attested and unattested tone sandhi, assuming sentences to be tone groups.

Based on the simulations of tone sandhis above, it is yet again unclear whether the attested tone sandhi circle in Southern Min is indeed the optimal pattern. When we include allomorphy in the simulations here, we expected the attested sandhi would bring in the least impact to the communication system. In other words, we expected the attested sandhi to create fewer word types and remove fewer homophonous word tokens than the unattested sandhi patterns. We also expected the attested sandhi to increase less information content than the unattested patterns. However, the attested pattern is generating a larger impact to the communication system than at least 75 of other possible patterns. Therefore, if we

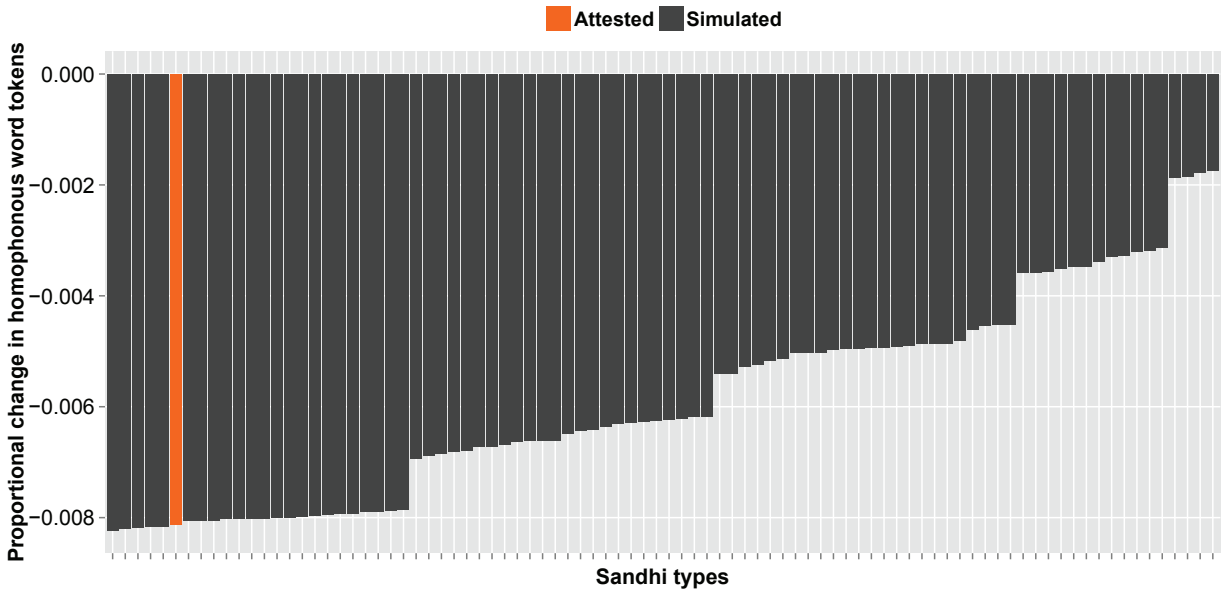


Figure 8: Proportional change in number of homophonous word tokens after attested and unattested tone sandhi, assuming sentences to be tone groups.

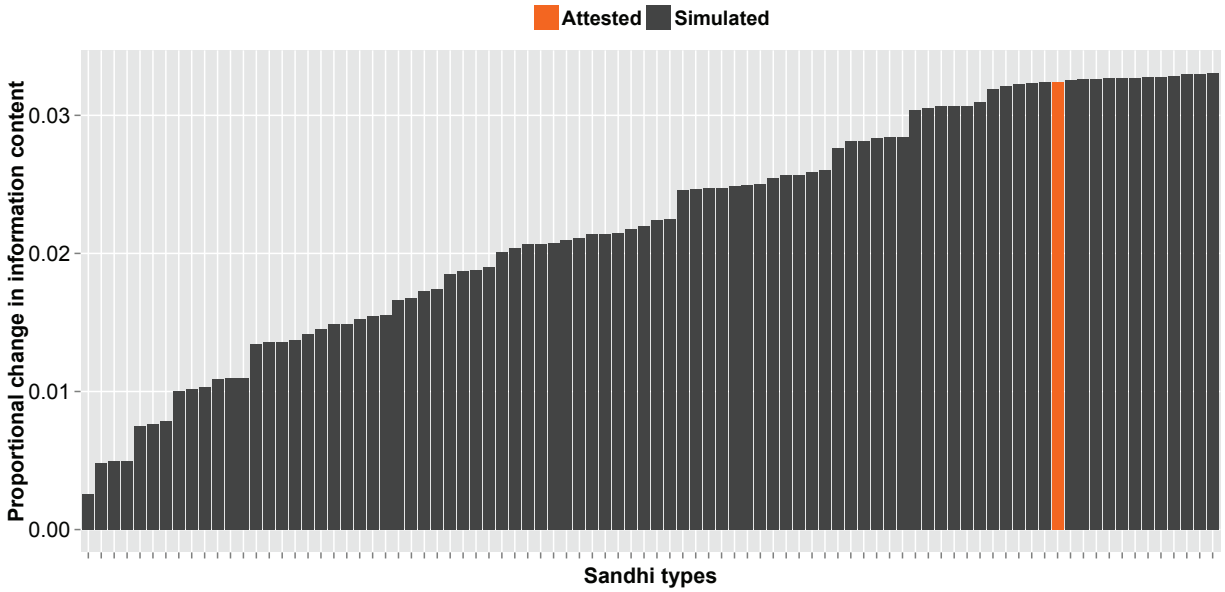


Figure 9: Proportional change in information content after attested and unattested tone sandhi, assuming sentences to be tone groups.

include allomorphy in our quantification here, the attested tone sandhi circle appears to be less optimal than at least 75 other possible patterns.

4 Discussion

Based on our results from the simulations in sections 3.1 and 3.2, it is unclear whether the tone sandhi circle in Southern Min is motivated by the principle of contrast preservation. Assuming that phonological contrasts are preserved to avoid homophony, a neutralization pattern is optimal if it generates less homophony than other possible patterns. However, the attested tone sandhi circle is generating more homophony than at least 7 other plausible patterns. Therefore, the Southern Min tone sandhi circle cannot be motivated by the principle of contrast preservation alone.

Results from 3.3 also cast doubts on whether the tone sandhi circle can be solely motivated by the principle of contrast preservation. For many lexical items, the tone sandhi circle generates two allomorphs: the sandhi version in non-phrase final positions, and the other version in phrase final positions. The conjecture here is that the tone sandhi pattern should create less impact on the communication system than other possible-yet-unattested patterns, if the attested sandhi pattern is indeed an optimal one. However, the attested pattern generates more surface word forms than at least 75 other unattested patterns. If our conjecture about homophony and allomorphy is false, and it is in fact optimal for the tone sandhi pattern to generate *more* surface forms instead of fewer, the attested sandhi pattern is still not the optimal pattern. This is because the attested sandhi pattern is removing fewer homophonous word tokens than 5 other patterns. It is, therefore, difficult to support the claim that the attested tone sandhi pattern in Southern Min is driven by contrast preservation.

In conclusion, while previous studies (e.g. Hsieh 2005; Barrie 2006 and Thomas 2008) suggested that the Southern Min tone sandhi circle is motiated by contrast preservation, the current study failed to found any supporting evidence. We assume that phonological neutralization should target non-functional contrasts and produce less homophony than other possible patterns (Silverman 2010; Kaplan 2011). Using a Taiwanese corpus, the attested tone sandhi pattern was simulated along with 87 possible-yet-unattested patterns, and the attested sandhi pattern produces more homophony than at least 7 other unattested patterns. Therefore, it appears that the Southern Min tone sandhi circle cannot be motivated by the principle of contrast preservation only.

The current study quantified the amount of homophony before and after tone sandhi in Southern Min, and examined whether this particular neutralization phenomenon generates less homophony than other possible-yet-unattested patterns of neutralization. This methodology can be certainly be extended to other neutralization phenomena in other languages, whenever a sizable corpus is available. A cross-linguistic corpus study can provide further insights to the relationship between attested versus unattested neutralization in terms of the amount of homophony that they generate (cf. Wedel et al. 2013a,b).

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Cultural Transmission of Self-Concept from Parent to Child in Chinese American Families: Does Language Matter?

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0. Abstract

Markus and Kitayama (1991) proposed that people in different cultures have different self-concepts. Research into self-concept malleability has demonstrated that independent and interdependent concepts of the self vary with different situational characteristics (Gardner, Gabriel & Lee, 1999). For bicultural individuals, language serves as a cue to rely on one cultural frame over another (Kemmelmeir & Cheng, 2004).

Bilingual children develop culture-specific self-knowledge early in life and parent-child narrative practices serve as a critical forum for such cultural transmission (Miller et al., 1997; Mullen & Yi, 1995; Wang, 2006). Parents model the appropriate ways of organizing experiences and drawing cultural views about the self. In parent-child conversations, Euro-American mothers frequently center on the child and refer to the child's roles and predilections, whereas Chinese mothers refer to social norms and behavioral expectations focusing on the social-relational context (Wang et al., 2010).

Synthesizing these two lines of research, this study aims to examine the associations between parent's use of English and Chinese and the socialization of independent and interdependent self-concepts. We hypothesize that bilingual parents are more likely to use English to model independent self-concept and use Chinese to model interdependent self-concept in parent-child conversations.

The sample consisted of 50 Chinese American children (mean age = 9.2 years, 26% first generation, 75% second generation) and their non-U.S. born parents recruited from the San Francisco Bay Area. Dyadic parent-child conversations were recorded during an eight-minute conflict discussion task (Eisenberg et al., 2008). The audio recordings were transcribed by Chinese-English bilingual research assistants. Parent's speeches were coded by instances of modeling independent self-concept (i.e., autonomous talk) or interdependent self-concept (i.e., didactic talk) categorized by language (English, Chinese, or code-switched) per turn.

A total of 777 parent and child utterances were found modeling independent and interdependent self-concepts. Of the total parent turns coded, a total of 231 (39.7%) turns were coded as socializing independent self-concept. Of these, sixty-one turns (26.4%) were in Chinese, 142 (61.5%) turns were in English, and 28 (12.1%) turns were code-switched. Of the total parent turns coded, a total of 351 (60.3%) were coded as socializing interdependent self-concept. Of these, 169 (48.1%) turns were in Chinese, 110 (31.3%) turns were in English, and 72 (20.5%) turns were code-switched. In support of our hypotheses, the frequency of English was higher in modeling independent self-concept ($p<.01$) and the frequency of Chinese was higher in modeling interdependent self-concept ($p<.001$).

The present study provided preliminary evidence for the association between language and the socialization of independent and interdependent self-concepts in English and Chinese in Chinese American immigrant families.

1. Introduction

1.1 Definition of the Self

The "self" is a delicate category which can be construed in two different ways. First, Hallowell (1955) introduced the notion of the universal self that people everywhere are likely to develop an understanding of themselves as physically distinct and separable from others. Neisser (1988) similarly referred to the ecological self, or the 'I', the person here in this place, engaged in this particular activity with some sense of an inner, private self, which seems to be shared across multiple cultures. Second is the divergent aspects of the self, which vary across multiple cultures. Neisser (1988) introduced this notion as the conceptual self, or conceptualization of oneself as a particular person in a social world. The conceptual self is sensitive to socio-cultural influences as they develop in interactions between individuals and their immediate and distal contexts, making up a self that integrates the framework of culture (Wang, 2006). This paper will focus on this latter conceptualization of the self, or self-concept.

1.2 Independent and Interdependent Self-Concepts

Markus and Kitayama (1991) proposed the model of independent and interdependent self-concepts concepts to explain the variations to which people from different cultures view the self. The independent self-construal involves a conception of the self as an autonomous, independent person, fundamentally separate from the other. One's behavior is organized and made meaningful primarily by reference to one's own internal repertoire of thoughts, feelings, and actions rather those of others. The interdependent self-construal, on the other hand, involves the conception of the self as fundamentally connected to others and part of an encompassing social relationship. Behavior is determined by, contingent on, and organized by what the self perceives to be the thoughts, feelings, and action of others in the relationship.

Various psychological and anthropological studies have indicated that such independent and interdependent self-concepts vary across Western and Eastern cultures. Studies using self-descriptions (Ross, Xun, & Wilson, 2002) and questionnaires, such as the Twenty Statement Questions (TST; Kuhn & McPartland, 1954), have consistently revealed that Euro-Americans provide more information about the independent self, such as personal attributes and beliefs (e.g., "I am tall, intelligent, good-natured") and less information about the interdependent self (e.g., "I am a son, a student, captain of the baseball team) compared to Asians (Bochner, 1994; Trafimow, Tirandis, & Goto, 1991; Wang, 2001).

1.3 Parenting Beliefs and Early Narrative Practices

Parents employ childrearing practices that instill such cultural ideologies and beliefs pertinent to the self (Miller, Wiley, Fung, & Liang, 1997; Wang, Leichtman, & Davies, 2000; Wang & Ross, 2005). The independent and interdependent self-concepts are reflected in parenting beliefs of European American and Chinese parents. Chao (1995) compared the European American and Chinese parents to determine if their childrearing practices reflected the cultural distinctions of the self drawn by Markus and Kitayama (1991). The results showed that European American mothers stress independence and individualism, provide child-centered environments, build the child's esteem and self-confidence, and process child's feelings, in contrast with Chinese

mothers who foster good relationship with the child, provide contexts which are determined by social roles or rules, stress obedience and respect, and report emotions that are more other-focused (Chao, 1995).

Early parent-child narrative practices also reflect culturally-specific childrearing beliefs. Miller, et al., (1997) found that personal storytelling functions as a cultural socialization practice and that storytelling practice is functionally differentiated as early as age 2 for children. In this study, American mothers provided more self-affirming framework that protects or enhances the child's esteem, whereas Taiwanese mothers provided a self-critical framework to encourage children's obedience to authority and appropriate conduct in relation to others (Miller et al., 1997). American mothers generally centered on the child, focused on child's personal attributes, interests, preferences and engaged in more autonomy talk, whereas Korean and Chinese mothers centered on social discipline, behavioral rules and engaged in didactic talk during family memory sharing (Mullen & Yi, 1995; Wang et al., 2010). A similar trend emerged in the discussion of emotion where European American mothers explained more emotion relating to the child's self, whereas Chinese mothers emphasized moral standards and behavioral expectations relating to others (Wang & Fivush, 2005).

1.4 Language and Cultural Self-Concepts

For bilingual, bicultural adults, language primes distinct cultural self-concepts. Ervin-Tripp (1964, 1967) used Thematic Apperception Test (TAT) on Japanese-English and French-English bilinguals and found that the content of the projective responses differed depending on the language the test was given in. Ross, Xun, and Wilson (2002) asked Chinese-English bilinguals to describe themselves and rate statements reflecting Chinese cultural values. Bilinguals who participated in Chinese described the self in more collective terms and endorsed Chinese values more than those interviewed in English. This relationship between language and self-concept is also observed in children (Wang, Shao, & Li, 2010). Chinese-English bilingual children interviewed in English provided more elaborate and self-focused self-descriptions and endorsed more strongly Western independent values compared with children interviewed in Chinese. The endorsement of cultural belief system moreover mediated the effect of language on cultural self-concept (Wang, Shao, & Li, 2010).

2. The Present Study

The present study synthesizes the existing literature on early narrative practices and cultural self-concept, and examines the association between language and socialization of cultural self-concept among Chinese American immigrant parents and children. A common linguistic profile in the immigrant family is one in which the family's heritage language (i.e., Chinese) is the first language acquired and the dominant language for the parent, whereas the child may first acquire this language, but subsequently become more dominant or proficient in the language of the host country (i.e., English), thus creating a bilingual family context (Fillmore, 1991; Buriel, Love, & De Ment, 2006). Immigrant families also have a challenge of socializing their children to develop a self-concept in relation to both host and heritage cultures, where the respective cultural values, norms, and expectations may not be congruent (Koh & Wang, 2013).

The main research question addressed in the present study is whether the parent's use of language (i.e., English or Chinese) is associated with the socialization of interdependent and

independent self-concepts. We hypothesize that the parent's use of English would be associated with socialization of independent self-concept and the parent's use of Chinese would be associated with socialization of interdependent self-concept.

3. Methods

3.1 Participants

Data was extracted from a longitudinal study on psychological, social, and academic adjustment of 238 Chinese American children from immigrant families in the San Francisco Bay Area. The first 50 Chinese-English bilingual parent-child dyads, including 39 (78%) mothers and 11 (22%) fathers, participated in the present study. Almost all parents (99% mothers, 96% fathers) were foreign-born. Majority of the parents were born in Mainland China (77% mothers, 68% fathers), Hong Kong (9% mothers, 9% fathers), and Taiwan (3% of mothers, 3% of fathers). The mean years of education were 13.0 and 12.9 years for mothers and fathers respectively. The participants' mean annual income was $11,910. Of the children, 26% were first-generation and 74% were second-generation Chinese American. The mean age of the children was 9.2 years old.

The sample was recruited via recruitment fairs in Asian American communities, schools, and referrals from Asian American community agencies and organizations. The study was described as a research project on Chinese American children's psychological adjustment. Eligibility criteria was as follows: 1) the child was in grades 1 or 2 at the time of screening, 2) the child lived with at least one biological parent, 3) both biological parents were ethnic Chinese, 4) the child was either first- or second-generation Chinese American, and 5) the parent and child were able to understand and speak English or Chinese (Mandarin or Cantonese).

3.2 Procedure

In the main study, one parent-child dyad participated in a 2.5-hour laboratory assessment at a time. The entire assessment was conducted by bilingual Chinese-English speaking undergraduate research assistants. Graduate student supervisors, who may or may not speak both languages, were also present. All written materials (including consent and assent forms and questionnaires) were available in English, simplified Chinese, traditional Chinese. At the end of the laboratory visit, parents received $50 for participation and the children received a small prize.

3.3 Measures

3.3.1 Socio-demographic Characteristics (Parent Report)

The family Demographics and Migration History Questionnaire was used to assess family demographic characteristics. The scale used in the present study was adapted from a measure used in a study of Mexican American immigrant families (Roosa et al., 2008), which included questions on maternal and paternal education, family income, mothers' and fathers' country of birth and length of stay in the U.S. Questions involving ethnicity and country of origin were modified for use in the present sample.

3.3.2 Parent-Child Conflict Discussion (Parent-Child Interaction)

Parents and children were asked to participate in a Conflict Discussion Task, adapted from a measure of conflict discussion in mother-adolescent dyads (Eisenberg, 2008). Parent-child dyads were given 8 minutes to discuss conflictual issues (two topics were provided to them, based on their reports of conflictual topics) and their conversation was videotaped. Dyads were asked to talk with each other about the "hottest" topic for 8 minutes. They were instructed to discuss the first issue and try to come up with a solution. The second topic was listed in case the dyads finished the first topic before the end of time. The conflict topics included: cleaning up, chores, how family gets along, respect and manners, school, noise, and free time. Prompt cards with instructions were written in English, simplified Chinese and traditional Chinese.

3.4 Coding

The 8-minute parent-child conversations were videotaped, transcribed, and translated into English by Chinese-English bilingual research assistants. A conversational turn was used as the unit of analysis (Griffin & Decker, 1996). Each turn was coded by language: English, Chinese (Mandarin or Cantonese), or English/Chinese code-switch.

The narrative social content was coded according to the coding scheme developed by Wang (2001). Two types of narrative social content were coded: autonomous talk and didactic talk. Autonomous talk includes parent's statements or questions about children's personal preferences or judgments regarding an object, person or an event itself. For example:

(1) P: **What did Blake want to do**? C: I wanted to take the rocks home (Wang, 2001)

Didactic talk includes parent's statements or questions about moral standards, social norms, or behavioral expectations. For example:

(2) P: **Why shouldn't children talk to each other in class?** C: Because they should listen to the teacher. (Wang, 2001)

4. Results

4.1 Language choice

In the 400-minutes of parent-child conflict discussion, total of 777 turns were coded for autonomous and didactic talk. Of the total parent turns coded, 230 (39.5%) turns were in Chinese, 252 (43.4%) in English, and 100 (17.2%) code-switched. Of the total child turns coded, 42 (21.6%) were in Chinese, 138 (70.6%) were in English, and 15 (7.7%) code-switched. The proportion of English and Chinese language use is consistent with the linguistic profile in many immigrant Chinese families whereby the acculturated child is more dominant or proficient in English than the parent.

4.2 Narrative social content

Of the total parent utterances, 351 (60.3%) turns were coded as didactic talk and 231 (39.7%) turns were coded as autonomous talk. Following are examples of utterances coded as autonomous talk:

(3) Right now you're learning math in third grade and then **what are your favorite subjects,** what do you feel like is not so hard, like, **what are the things you like to do?** (009; F26)

(4) P: Then you need, then **what time do you think is good time?** Do you think what mommy and daddy said, 9:30, is too, is bad, or is it too early, or is it too… (044; M19)

(5) So how does it make you, **how does the topic of school make you feel?** (009; F1)

In autonomous talk, the parent provides statements or questions that motivates the child to formulate his or her own individual preferences (example 3) or judgments (example 5). In example (3), the parent specifically asks about the child's preferences for academic subjects in school, rather than dictating which subject would be most useful for the child. In addition to asking about preferences, eliciting individual child's emotions, such as in (4), were frequently observed in parent's autonomous talk. In (5), the parent asks the child to make an independent judgment on a conflictual issue. The parent-child dyad discusses the topic of "family rules", specifically the time the child should go to bed. Although the mother recommends a particular time for the child, the parent asks for the child's opinions about the suggested time "is [the time] bad, or is it too early, or is it too…" The child makes his independent decision and agrees to the time suggested by the parent.

Didactic talk includes parent's statements or questions that focus on behavioral expectations or social rules, often placing the child in a social-relational context. Following are examples of turns coded as didactic talk in parent-child conversations:

(6) In other words, **good virtue is that you need to respect other people** (55; M5)

(7) Why aren't you **being a good older sister, you should teach her how to play the piano,** things she doesn't know (14; M6)

(8) **Help mom sweep the floor, mop the floor, do what I tell you to do**, understand? (51; M6*)*

(9) Okay! Now we are going to make a rule, make a rule. **We shouldn't be noisy or very loud, in other words, is to care about others.** (53; M10)

In didactic talk, parents frequently state and explain specific values they are trying to teach their children, such as in (6). Importantly, these values are situated in a socio-relational contexts. In examples (7) and (8), the value of specific behaviors such as "teaching how to play the piano" or "sweep[ing] the floor" is explained as positive impacts on immediate family members, such as

the mother or the sister. In (8) mother introduces the topic of "cleaning up the house" and promptly places the conflictual topic in the relational context of "help[ing] mom". She continues to list multiple chores for the child in the subsequent turns – "sweep the floor", "mop the floor", "fold up the clothes", "clean up the mess" – as the child silently nods. Similarly in (7), the parent requests a behavior from the child and explains that this is her duty and expectation as an older sibling. The effect of child's behavior on others moreover extends beyond the family to larger society. In (9) the parent-child dyad discusses the topic of "noise". Similar to (8), the mother introduces the topic of "noise" in the context of the mother-child relationship – "When mom gets back home and is so tired from a whole day of work. How would she feel when she hears so much noise?" In addition to stating the behavioral expectation "We shouldn't be noisy or very loud", the mother subsequently emphasizes "to care about others". The parent equates the house rule to a social rule that is valuable to follow as a member of society at large. In all of these examples, the parent is instructive and commands the behavioral expectation, rather than negotiating.

4.3 Association between parent's language choice and narrative social content

Of the total parent turns coded as autonomous talk, 61 turns (26.4%) were in Chinese, 142 (61.5%) turns were in English, and 28 (12.1%) turns were code-switched. Of the total parent turns coded as didactic talk, 169 (48.1%) turns were in Chinese, 110 (31.3%) turns were in English, and 72 (20.5%) turns were code-switched. Overall, the use of English was significantly associated with autonomous talk ($p<.01$) and the use of Chinese was significantly associated with didactic talk ($p<.01$) as shown in Figure 1 and 2.

Figure 1. Frequency of parent autonomous talk by language

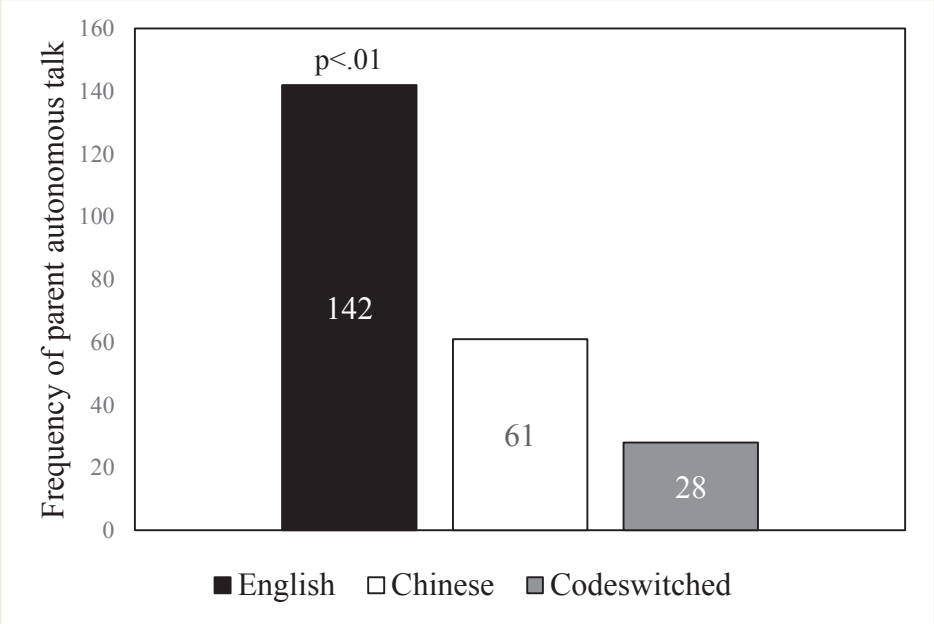
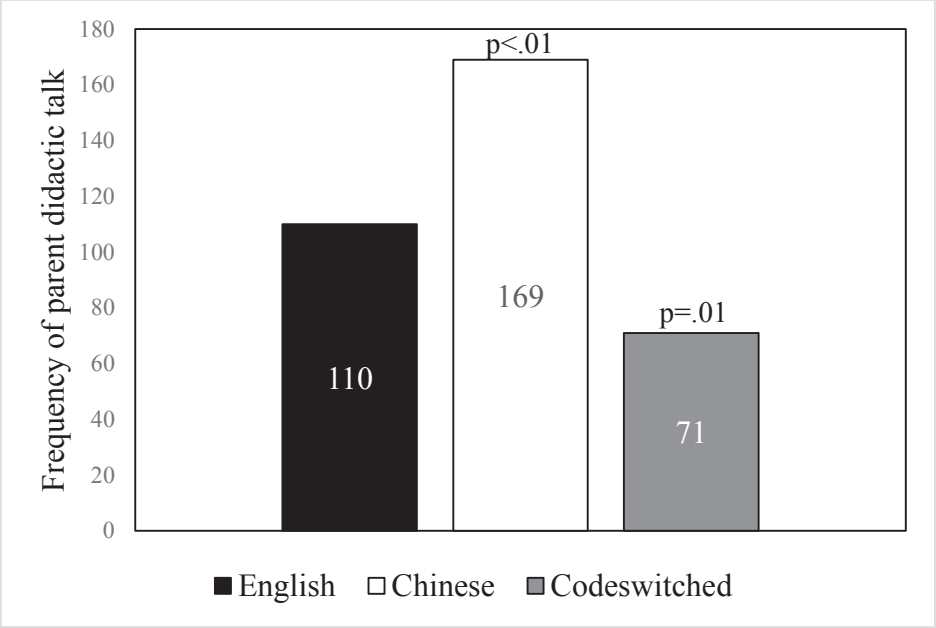


Figure 2. Frequency of parent didactic talk by language



5. Discussion

Preliminary findings suggest that language may be associated with parental socialization of independent and interdependent self-concepts in Chinese American immigrant families. The present study illustrated that in the conflict discussion among bilingual Chinese-American parents and children, the parent's use of English was associated with increased discussion of autonomous talk, whereby parents encouraged the child to develop their own individual preferences and judgments about conflictual topics. In contrast, the use of Chinese was associated with increased parental use of didactic talk, whereby the parent discussed the behavioral expectations and rules that socialize children to attend to the relationships with others.

Previous literature comparing early narrative practices in Western and Eastern cultures have demonstrated the use of autonomous talk or self-affirming framework in American parents and the use of didactic talk or self-critical framework among East Asian parents (Miller et al., 1996, 1997; Mullen & Yi, 1995. Wang et al., 2010). The present study tests these associations in the context of bilingual parent-child conversations. The results indicate that for bilingual immigrant parents who must socialize their bilingual, bicultural children in relation to values of both American and Asian cultures, language may play a key role. The language available to the bilingual parents may serve as a vehicle by which to don different cultural selves (Chen et al., 2012) and model both independent and interdependent self-concepts to their bilingual, bicultural children in the same conversation.

These findings also support the existing evidence for linguistic priming effect on culturally-specific self-concepts in bilingual speakers. Previous findings have shown that bilingual adults endorsed independent or interdependent selves depending on the use of English or Chinese (Ross et al., 2002; Wang et al., 2010). This study showed that immigrant parents in Chinese American families with varying degrees of acculturation also exhibited this use of English or Chinese to model independent and interdependent self-concepts in parent-child contexts. Early narrative

practices in which bilingual parent switches into one language over another to discuss self-concepts salient in one culture over another may over time socialize a bilingual child to develop associations between language and self-concept. This early narrative practice in bilingual families may partially explain the priming effect of language on self-concept in bilingual adults. Although child turns were too short to code for autonomous or didactic talk in the present study, future studies may examine whether children's choice of language and the narrative social content would reflect the patterns observed in their parents for each dyad.

There are limitations to this study which must be addressed in future studies. First, there is a need to investigate factors other than language that may impact the socialization of cultural self. In a study of bilingual children, Wang, Shao & Li (2010) showed that the endorsement of cultural belief system mediated the effect of language on self-concept. The immigrant parent's cultural orientation may be examined to see if it mediates language use and socialization of cultural self-concepts. Second, the coding categories of autonomous and didactic talk may be too broad to capture the parent's specific socialization behaviors. For instance, concrete strategies within didactic talk, such as nagging, value teaching, shaming, or guilt induction, can be coded by language for greater specificity (Chao, 1994; Fung & Chen, 2001; Fung & Lau, 2012). Third, while the present study used conversational turn as the unit of analysis, specific instances of inter- and intra-sentential code-switching may be useful in examining the shift of languages associated with the discussion of independent versus interdependent self-concepts in both parents and children.

6. Conclusion

In summary, the present study provided preliminary evidence for the association between language and the socialization of independent and interdependent self-concepts in Chinese American immigrant families. Globalization and transnational migration has rapidly increased the number of bilingual families in the U.S. In bilingual immigrant families, the maintenance of heritage language and culture among second generation children is not always successful. The parent's use of two languages to model independent and interdependent self-concepts may play an important role in intergenerational transmission of both heritage and host cultural values from immigrant parents to their bilingual, bicultural children.

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Fruits for Animals: Hunting Avoidance Speech Style in Murui (Witoto, Northwest Amazonia)

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1 Introduction

This paper focuses on the hunting avoidance speech style in Murui, a Witoto-speaking group from Colombia and Peru. Murui men employ a special vocabulary when hunting bigger game. It is a system of lexical substitution meant to 'deceive' the animal spirits by avoiding the utterance of the animals' 'true' names. Uttering the names would result in an unsuccessful hunt: animal spirits would know they are to be hunted and would escape. Animals are, therefore, 'renamed' to 'trick' their spirits. This culturally significant speech register is subject to a high degree of metalinguistic awareness, and is referred to by native speakers as 'skilled speech'. Many of the avoidance terms and their referents appear to be iconic. They are based on physical similarity between the animal whose name is avoided and some (typically non-faunal) natural objects (commonly fruits), or the animal's characteristic behavior. Other are based on mythical associations and appear to have ontological origins.

This paper is divided into six parts. The first section briefly introduces the sociolinguistic profile of the Murui language. The following part addresses the typology of avoidance speech styles. Subsequently, section three and four deal with the Murui avoidance speech style and the substitution terms that it employs. The remaining parts of the paper discuss the use of this special register in the Murui hunting discourse, touching upon interpretations of dreams. The final section offers a brief summary and identifies areas that need further research.

1.1 The Witoto People

Northwest Amazonia is home to a great number of ethnic groups, many of which include representatives of larger language families (such as Arawak, Carib, and Tucanoan), smaller families (such as Kakua-Nukak, Peba-Yagua, Bora as well as the Witotoan language family), and a number of language isolates (among them Andoqué and Ticuna) (see e.g. Aikhenvald 2012, Aikhenvald and Dixon 1999). Murui, the language of this study, is a member of the Witotoan language family.[1]

*I wish to thank the Murui people for their efforts to teach me about the hunting speech style. I would like to thank Alexandra Aikhenvald, Bob Dixon, Juan Alvaro Echeverri, and Luke Fleming for their helpful comments on the material. Thanks to the audience at Berkeley Linguistic Society 41 and the Language and Culture Research Centre in Cairns, Australia, for helpful feedback.

[1]The following abbreviations are used in this paper: 1 first person; 2 second person; A subject of transitive verb; CLF classifier; CONJ conjunction; DES desiderative; E event nominalizer; EMPH emphatic; EPIST epistemic; EXCL exclamation; FOC focus; G generic; INCP inceptive; INHER inherent; INTERJ interjection; INTENS intensifier; KIN kinship; LK linker; LOC locative; N.S/A topical nonsubject; NEG negative/negation; NMLZ nominalization; PL plural; PURP purposive; Q question marker *ni*; RED reduplication; S subject of

Murui together with three other related language variants constitute in all likelihood a dialect continuum. In the literature, all these groups are referred to as 'the Witoto people' who are speakers of a single language, called also 'Witoto'. In fact, the word *witoto* is an exonym of Carijona (Carib) origin, meaning 'enemy', that was employed by early missionaries and rubber traders (Petersen de Piñeros and Patiño 2000:219). Traditionally, the Witoto inhabited the region of the Amazon Basin between the Putumayo and Caquetá Rivers in south-eastern Colombia.[2] Nowadays, they also live in northern parts of Peru.[3]

All the Witoto people share a number of cultural traits with other unrelated groups in Northwest Amazonia. Together, they are considered to form a cultural area (or a 'network'), called the 'People of the Center'. It encompasses seven ethnolinguistic groups spoken in south-eastern Colombia and northern Peru (Echeverri 1997:27). Nowadays, this cultural network numbers approximately 10,000 people (DNP 2010). The groups are representatives of the following languages and language families:

- Witotoan language family with Ocaina, Nonuya, and Witoto,
- Bora language family with Muinane, Bora (and Miraña, a dialect of Bora),
- Arawak language family with Resígaro, and
- Andoqué, a linguistic isolate.

The cultural traits that the People of the Center share, separate them from other indigenous groups that inhabit the same area: the Carijona (Carib) to the north, the Siona, Secoya, and Coreguaje (West Tucanoan) to the west, Orejón (or Máíhɨki) to the south, and the speakers of Arawak and East Tucanoan languages to the north-east (see Figure 1).[4] Even though the People of the Center are scattered across a vast ground area, they all share a similar social organization where patrilineal filiation determines one's lineage.[5] Traditionally, the People of the Center resided in multi-family *malocas* (i.e. communal dwellings of a circular shape), with larger villages consisting of multiple communal units. All these groups used pairs of slit wooden drums called *manguaré* (*juaɨ* in Murui) for long-distance communication of up to 20 kilometers throughout the forest (see e.g. Thiesen 1969). The People of the Center have numerous cultural customs in common. Perhaps the most characteristic is the ritual of *mambe* (*jibibɨrɨ* in Murui) that involves ingesting the green (pulverized) powder of processed coca (*jibie*) leaves mixed with *yarumo* leaves, and licking of *ambil* paste (processed tobacco mixed with ash-salt from the forest). The consumption of tobacco by licking among these groups is a unique phenomenon in this part of Northwest Amazonia (see Wilbert 1987:40 in Echeverri 1997:50). The People of the Center share similar ritual discourses as well as they partake in the exchange of ritual dance masters and singers of different linguistic backgrounds (Echeverri 1997, Gasché 1977, 2009, Seifart 2005, 2013, Seifart and von Hildebrand 2009).

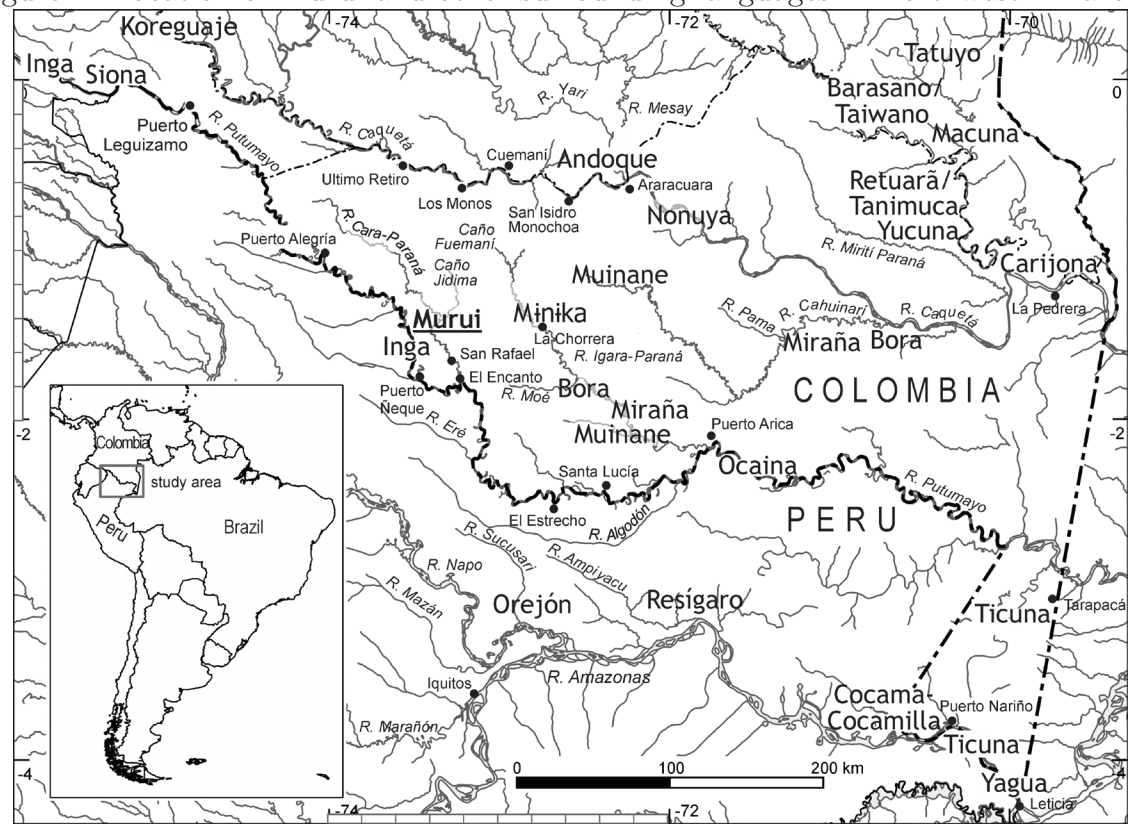
[2]In Brazil, the Caquetá and Putumayo Rivers are called Japurá and Içá.

[3]This paper is a work in progress, reporting on research that is currently underway on Murui (an extensive reference grammar of the Murui that the author has in an advanced stage of preparation).

[4]The maps presented in this paper are author's own estimations, based on the careful examination of the current literature and my field notes.

[5]Among the Witoto, kinship is 'bilaterally transmitted through both the paternal and maternal sides' (Echeverri 1997:80).

Figure 1: Location of Murui and other surrounding languages in Northwest Amazonia



In the past, the People of the Center must have had some contact with other groups. For instance, the Witoto people have a traditional 'Carijona' dance called *rɨaɨ rua*. Although the West-Tucanoan Secoya consider the Witoto people their traditional enemies, they seem to have borrowed from the Witoto manioc squeezers (Sp. *tipití*) as well as bitter manioc (Gasché p.c.). The Bora people, close neighbors of the Witoto, have also borrowed dances from other neighboring groups. Resígaro (Arawak) has restructured its verbal morphology under the influence of the unrelated Bora (Aikhenvald 2001:182-188, Seifart 2011:5).

The People of the Center share a tragic history of atrocious exploitations of indigenous population, their enslavement, forced displacements, and subsequent spread of diseases (Casement and Mitchell 1912 [1997]). The period between 1879 and 1910 in Amazonia is referred to as the *Rubber Boom* during which the 'Peruvian Amazon Company' (called *Casa Arana*), led by rubber baron Júlio Cezar Arana, was responsible for tens of thousands of indigenous deaths (Hardenburg 1912, Pineda Camacho 2000). With the gradual collapse of the Rubber Boom, the barbaric exploitation of indigenous population ended by about 1920's.

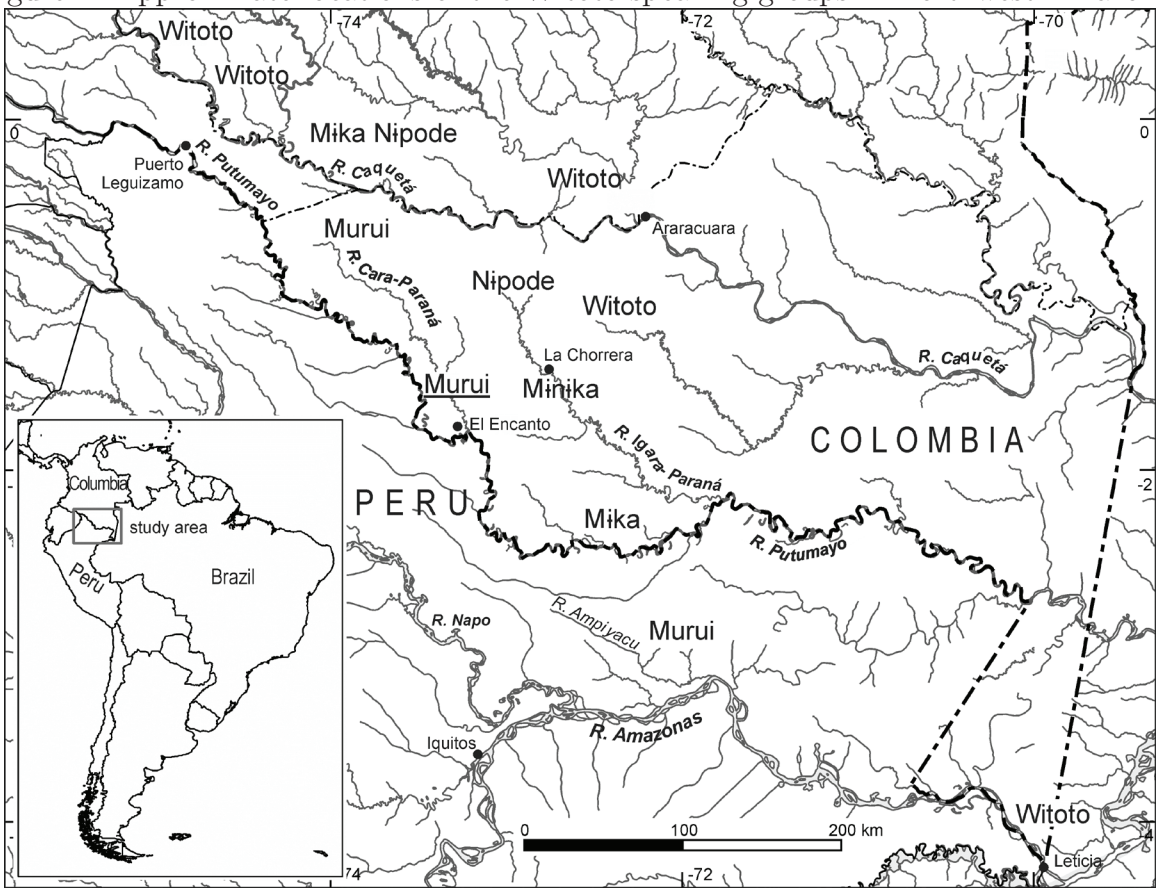
1.2 The Murui Language

The 'Witoto language', commonly used as a collective umbrella term, encompasses four mutually intelligible dialects: Murui, Mɨnɨka, Nɨpode, and Mɨka.[6] Differences between these

[6]The unclassified Bɨnɨka is possibly a variation of Mɨnɨka, spoken by one family in La Chorrera (Petersen

language variants lay mainly in their phonology and morphology. Figure 2 shows approximate locations of the Murui, Mɨnɨka, Nɨpode, and Mɨka speakers in Colombia and Peru (communities where more than one Witoto variant is spoken, are marked as 'Witoto').

Figure 2: Approximate locations of the Witoto-speaking groups in Northwest Amazonia



The Witoto recognize their common mythological origin but consider themselves to be divided into separate social groups that speak 'different languages'. That is why, I refer to Murui as a 'language' in the political sense, although linguistically, it is merely one of the Witoto variants. The internal classification of the entire Witotoan language family (with Ocaina and Nonuya) is illustrated below:

Nonuya (moribund with a few speakers, Ethnologue code NOJ)

Ocaina (moribund with about 50 speakers, Ethnologue code OCA)

Witoto (all together approximately 6,000 speakers)

- Mɨnɨka (Ethnologue code HTO)
- Nɨpode (Ethnologue code HUX)
- Mɨka (lacking code)
- Murui (Ethnologue code HUU)

In terms of the language structure, Murui is nominative-accusative with both head and dependent marking.[7] The language is agglutinating with some fusion and predominantly suffixing. Typical clause structure is predicate final (SV/AOV) but ordering can be determined by pragmatic factors. Syntactic functions are expressed through case markers where marking of core arguments is related to focus and topicality. The most salient characteristic of Murui is a large multiple classifier system. Its principal function is the enrichment of the lexicon by formation of new words (Wojtylak in prep.).[8]

2 Special Speech, Avoidance, and Linguistic Taboo

Cross-linguistically, a prevalent speech register type is one in which everyday words are pragmatically marked in contexts of risk-prone activities, such as uttering a name of a respected person or deceased person. To avoid the potential danger, such words are replaced by substitute lexemes or avoidance terms.

Best documented are undoubtedly the 'mother-in-law languages' of Aboriginal Australia (such as Dyirbal) with elaborate substitute vocabularies employed in affinal co-presence (Dixon 2015). Such registers are used whenever anyone in an avoidance relationship, such as mother-in-law or a son-in-law, is close-by (Dixon 2002). Almost all Australian languages traditionally had such an avoidance speech style. Dyirbal, a language spoken in north-west Queensland, has been described as having two styles: *Guwal*, the everyday language style, and *Jalnguy*, a special style used in the presence of 'avoidance kin'. *Jalnguy* has an elaborate lexicon of generic avoidance terms where every lexeme appears to be different between everyday and avoidance styles (Dixon 2015).

Beyond Australia, such context-dependent avoidance speech registers are most commonly found in contexts of subsistence activities such as hunting, fishing, mining, and harvesting. For instance, fishing registers have been reported to be used by Sangir speakers and Tetun of Timor (Indonesia) (Grimes and Maryott 1994, Therik 1995). A hunting register is used on Buru (Indonesia) (Grimes and Maryott 1994) and among the Semelai on the Malay Peninsula (Kruspe 2004:7-10). As Kruspe put it:

> "When the Semelai enter the jungle to hunt, collect forest products, or prepare a swidden, it is imperative to employ this speech style. The jungle is seen as fraught with peril, so in order to avoid the danger of attack from (...) 'malevolent spirits', this taboo is used. Failure to do so can result in a range of afflictions including soul-loss. Other consequences are falling victim to a tiger, crocodile, snake, or centipede."
> (Kruspe 2004:7)

[7] Information on Murui was obtained during my original fieldwork in the Murui communities of the Cara-Paraná river (Colombia), conducted between July 2013 and January 2014 to collect data for the reference grammar of the Murui language (Wojtylak in prep.).

[8] For phonetic symbols, the following conventions are used throughout this paper: <f> represents the voiceless bilabial fricative, <v> is the voiced bilablial fricative, <z> is the voiceless dental fricative, <r> is the flap,

The Kewa and Kalam in the eastern Papua New Guinea Highlands have a special harvesting avoidance register used when collecting pandanus nuts (Franklin and Stefaniw 1992). It is prohibited to use the 'pandanus language' outside the area where the trees grow. Among the Ma Manda people, a Finisterre-Huon-speaking group from Papua New Guinea, there are certain concepts which cannot be talked about when being away from the safety of people's own villages. When the Ma Manda are out in the jungle, they fear that certain words or phrases will attract the attention of evil spirits. There is a lexicalized linguistic taboo for 'water' that is replaced with 'come-go' in all the contexts (Ryan Pennington p.c.).[9]

Amazonia has numerous speech styles as well as linguistic taboos. For instance, the Matis, a Panoan-speaking group, employ a special vocabulary when preparing poison for arrows called *curare*. Certain words cannot be uttered during this activity, otherwise they would render the poison used for the arrows weak (Fleck and Voss 2006). Another example are the Tariana (North Arawak from Brazil). The Tariana have a specific word taboo: words which resemble the root *piri* 'Yuruparí flute' cannot be pronounced in front of women (Aikhenvald 2013:64). In the Tariana mythology, women once owned the secret flutes but lost them to men.

Other tabooed terms in Amazonia are secret names given at birth. Such name taboos are found among e.g. the Trio in Suriname (Carlin 2004) and many Panoan groups (Fleck 2013). From the point of view of the Witoto people, a man's name, as much as his limbs, is identified with his soul. Should one possess it, they are able to perform evil magic against the person. Therefore, real names are kept secret and their substitutes, such as kin terms or indirect forms, are employed in ordinary life (Whiffen 1915:153).

In Amazonia one also finds various speech styles that relate to specific types of avoidance. For instance, the Kalapalo (Carib-speaking group from Central Brazil) and Kamaiurá (Tupí-Guaraní from Northern Brazil) have distinct affinal civility registers similar in characteristics to Australian 'mother-in-law' speech styles (Basso 2007, Seki 2000). Yanomami groups of Venezuela and Brazil have a special language called *Wayamo*. *Wayamo* was used by Yanomami men under specific circumstances such as during intertribal feasts in communal houses, fight challenges, burning of the dead body of a relative, puberty rite parties, and shamanic chants (Aikhenvald 2012:369). Another example are various synonym sets found in the lexicons of the Panoan-speaking groups. In Matses, animals can be referred to by various synonymic terms, e.g. 'lowland paca' [*Cuniculus paca*] has at least three 'archaic' synonyms and three other additional terms (Fleck and Voss 2006). Such a variety of terms could perhaps be explained by traditional raids that brought women as wives from other related and unrelated tribes (Aikhenvald 2012:361).

Amazonian peoples do not lack specific avoidance speech styles that were used in the context of subsistence activities such as hunting. Traditionally, the Palikur (Arawak-speaking group from Northern Brazil) used to employ a special vocabulary to 'trick' evil spirits when fishing (Diana Green in Aikhenvald 2012:365). Nowadays, such avoidance speech styles are becoming obsolete. In the case of the Palikur people, their fishing register is now gone, as

[9]This practice stems from a story which describes how a young girl tells her father that she was really thirsty, and then a spirit came in the night and cut her neck to fill her with water (Ryan Pennington p.c.). For other studies relating to the topic of special speech, avoidance, and linguistic taboos see also Aikhenvald 2009, Allan and Burridge 2006, Diffloth 1980, Emeneau 1948, Foley 1986, Fox 2005, Hale 1971, Herbert 1990, Treis 2005, Sapir 1915, Simons 1982, and Stasch 2008.

the Palikur were ultimately Christianized and they do not fear evil spirits anymore. I turn now to yet another such avoidance register from Amazonia - the hunting avoidance speech style as used by the Murui people.

3 Hunting Avoidance Speech Style of the Murui

Among the Murui, hunting is a male enterprise and it is still widely practiced. Although nowadays, many Murui people live on river banks and rely on fish as their primary animal protein source, culturally, hunting was regarded as more important than fishing. When hunting, the most important game is that of mammals; birds and reptiles are of secondary concern. Traditionally, Murui men used to hunt with blow-pipes, spears, and wooden traps (Whiffen 1915:108, Minor 1973:29).[10] Today, hunting with a shotgun has been widely adopted by all the Witoto groups, the Murui among them.

When hunting, Murui men use a special vocabulary; this vocabulary is meant to 'disguise' true names of animals that are going to be hunted. This avoidance speech style is a system of lexical substitution where animal spirits are 'deceived' as they do not 'understand' avoidance names uttered by Murui men. Pronouncing the 'real' name of an animal would result in an unsuccessful hunt: animal spirits would 'overhear' they are to be hunted and would escape the hunter. Animals are thus 'renamed': their 'true' names are substituted with words that designate plant-(related) species (mainly fruits). For instance, when willing to hunt a peccary, a Murui man would say that he is going to collect an '*umarí* fruit'.

3.1 Characteristics of the Hunting Speech Style

The hunting speech style has a very prestigious status among the Murui men. It is subject to a higher degree of metalinguistic awareness: the native speakers easily reflect on this unusual use of vocabulary. They refer to it as a type of 'skilled speech' (Sp. *palabra catedrática*) that is unintelligible to women as well as to those men who have a limited knowledge of the Murui culture.[11] Traditionally, boys acquired substitution terms as part of their general upbringing and the initiation rituals; nowadays, some do so at night by listening to elder men in communal roundhouses, the *ananeko* (Sp. *maloca*).

The use of the Murui avoidance speech style is determined by sociolinguistic parameters. Avoidance terms are used only between men who gather at night in the *ananeko* before they set off for a hunt, consume coca and tobacco, and conduct the verbal 'power-discourse' called *rafue* (*ra* 'thing, power', *-fue* mouth CLF:STORY). *Rafue* belongs to the *jibibɨrɨ uai* (coca-CLF:GATHERING word) genre, called 'language of the yard and coca' (Echeverri and Román-Jitdutjaaño 2013:3). It is an abstract genre that is common to the Witoto. It has been interpreted as a 'Word that becomes a Thing' that 'evokes' things in the world

[10] In 1973, Dorothy Minor, an SIL missionary who worked on the Minɨka language, together with her husband, Eugene Minor, gave the following account: "(...) the blowpipes (*obillakaɨ*), war clubs made of hard wood (*bɨgɨ*), spears (*dukɨrada*), archers (*zɨkuira*), and arrows (*zɨkuirada*) appear in Witoto legends, and only elders remember what they were like."] (Minor 1973:29, my translation).

(Echeverri 1997:185). According to Echeverri (1997:30), *rafue* has a 'performative' function and represents more than the normal 'ethnic discourse' - *rafue* goes beyond the Witoto mythology, the Witoto ethnocentric view of the world, and the linkage to their ancestral territory. *Rafue* is unlike other Witoto genres, such as *bakaki* (mythological narrations) or *ruaki* (songs). Non-*rafue* genres are generally 'about things' and do not evoke anything in the world.

Some of the transformations between animals and plants discussed in this paper appear to have been derived from the 'original' *rafue* (which evokes the 'history of Creation'). Those transformation manifest themselves as certain association sets used also in the hunting speech style (and extend into the dream world). This makes the hunting speech style an integral part of the *rafue* discourse (see Echeverri 1997).[12] *Rafue* has also other subtypes, such as the so-called '*rafue* of ash-salts' described for Mɨnɨka (Echeverri and Román-Jitdutjaaño 2011, 2013). In '*rafue* of ash-salts', plant species of ash-salt substitute names for other plants, animals, insects and parts, organs, affects, capacities of the body and objects, and institutions and activities of the human world (Echeverri and Román-Jitdutjaaño 2013:5). Such substitution terms are based on semantic associations similar to the 'animal-plant' synonym sets used in the hunting avoidance speech style. '*Rafue* of ash-salts' is used for sexual education and, as it is conducted, it re-enacts the history of creation.

Substitution terms found in the Murui hunting avoidance speech style are also typical of other *rafue* registers (cf. Echeverri and Candre, 2008, Echeverri and Román-Jitdutjaaño, 2013). Nevertheless, the correspondences between animals and plants in the hunting resister are one-to-one, where one animal is generally associated with one plant. In the '*rafue* of ash-salts', there are one-to-many correspondences, where one plant, from which ash-salts are extracted, can have various associations, not just one. For instance, the species of the *jimena* tree [*Bactris gasipaes (Arecacea)*] is associated with underwater beings, anteater, and throat (Echeverri and Román-Jitdutjaaño 2013:7).

As an integral part of the wide Witoto *rafue* discourse, the form and the use of terms employed in the hunting avoidance speech style appear to have been 'inherited' from perhaps what was a Proto-Witotoan mythology. Not only Murui but also Mɨka, Mɨnɨka, and Nɨpode share this type of hunting avoidance register. In terms of variations between different association sets across the Witoto variants, lexical replacements are fairly similar - that is, the same plants are used for the same animals in Murui as well as e.g. in Mɨnɨka. Occasional differences in forms of classifiers seem to be related to morphophonological variations between the Witoto languages, rather than the hunting style itself.

The homogeneity of the avoidance terms used for hunting big game, the one-to-one formal and semantic correspondences between the animal's everyday names and the substitution terms, as well as their unique sociolinguistic manifestations reinforced by the metalinguisitic awareness of the Murui speakers (men, as opposed to women), allow us to treat the Murui hunting register as a special speech style in its own right.

We now turn to the relationships between everyday terms and their avoidance substi-

[12]The issue of ontological implications of such practice is an intriguing one. As it is not yet usefully explored by the author, it will not be discussed in this paper. Interested readers should refer to the anthropological works of Echeverri (1997), Echeverri and Román-Jitdutjaaño (2013), and, the most important works by Preuss (1921-1923), who provides the exceptional descriptions of the religion and mythology of the Witoto people.

tutions, based on a selection of Murui avoidance names. A number of ritual discourses on hunting were produced by elders in the traditional Murui community of Tercera India, Colombia, and were recorded at night in the *ananeko* while men were gathering to consume coca and lick the tobacco paste, and prepare for hunting. They were addressed to *Mo* 'the Father, the Creator' while women and children listened on the side. The texts were transcribed and translated with men. A textual excerpt of one such hunting discourse in which a request is made to the Creator asking to be granted a successful hunt, is presented in §5. The Murui elders who I worked with were eager to share the material recorded on the hunting speech style as a matter of scientific record.

4 Substitutions

The Murui hunting speech style employs the same grammar as the regular everyday speech style. The phonology, morphology, and syntax are the same as in the normal everyday speech. What differs is the lexicon. This 'avoidance lexicon' has a fairly limited vocabulary. During my fieldwork, I collected some 20 identifiable lexical items.[13] These substitution terms appear to be stable as there is almost no formal or functional variation among them between Murui speakers. Everyday terms and replacement terms have one-to-one correspondences, where one animal has typically only one substitution term. Since perceivable associations (e.g. similarity of form) between 'real' names of animals and replacements used in their stead can justify their connections, I identify the following four types of animal-plant associations: behavioral, impressionistic, formal, and mythical. I will discuss these in turn, starting with behavioral associations.[14]

4.1 Behavioral Associations

The animal-fruit associations are relations between everyday terms for animals and substitution terms for plants that are a result of the existing connection between those animals and plants in terms of animal's behavior, such as its feeding habits, and possibly, its usual habitation. For instance, the connection between a woolly monkey *jemɨ* (Sp. *churuco*) and the *ikɨkɨ* fruit (Sp. *juansoco*) arrives from the fact that the *ikɨkɨ* fruit is greatly favored by the woolly monkey *jemɨ*. Another example is the everyday term *ɨme* 'agouti rodent' and its avoidance term *mɨzeyɨ*, the '*maraca* fruit'. The explanation for this specific association is that the '*maraca* fruit' is a favorite food source for agouti rodents. Although I have not yet found any instances of behavioral associations in terms of animal's usual dwelling place, Echeverri and Román-Jitdutjaaño (2013:8) give the following example from the Mɨnɨka '*rafue* of ash-salts':

[13] For '*rafue* of ash-salts' in Mɨnɨka, Echeverri and Román-Jitdutjaaño (2013) collected 208 items over the period of four years.

[14] Such connections defined otherwise as 'indices' in Echeverri and Román-Jitdutjaaño (2013), after Peirce (1998 [1909]), have been categorized as existential, symptomatic, and designative. I loosely follow this approach. In his approach, Peirce (1998 [1909]) places his 'indices' as markers of 'real connections'. In

"(...) the connection between the *jaɨtaikurungo* beetle (indet.) and the *Oenocarpus bacaba* palm [is] because the beetle lives in the palm."
(Echeverri and Román-Jitdutjaaño 2013:8)

The similar (and perhaps also other) principles are likely to occur in the Murui hunting avoidance speech style as well. Murui behavioral associations between animals and plants are summarized in Table 1.[15]

Table 1. Behavioral associations between regular and avoidance terms

Regular term	**Avoidance term**	**Relation terms**
ɨme 'agouti, rodent species' [*Agouti paca*] (Sp. *boruga*)	*mɨzeyɨ* 'the *maraca* fruit' [*Theobroma bicolor*]	the *maraca* fruit is favored by agouti rodents
jemɨ 'species of primates, a woolly monkey' [*Lagotrix lagotricha*] (Sp. *churuco*)	*ikɨkɨ* 'the *juansoco* fruit' [*Couma macrocarpa*]	the *juansoco* fruit is greatly favored by woolly monkeys

4.2 Impressionistic Associations

Another mechanism of associations reflects sensory properties animals and plants share. In this spirit, names of animals are replaced according to a resemblance between an animal and a plant. Such resemblance can be based on some visual or olfactory property. For instance, a jaguar (*janayari* in Murui) is replaced with *uibiyɨ*, a type of fruit. The reason for such 'transformation' appears to be based on the physical resemblance between the *uibiyɨ* fruit and the shape of the jaguar's paw. Similarly, *mero*, a peccary, is replaced with *obedo*, a 'black *umarí* fruit'. This association has been explained in terms of olfaction: the *obedo* fruit appears to have a specific scent which, just like peccaries, attracts mosquitoes. Murui impressionistic associations are exemplified in Table 2.

Table 2. Impressionistic associations between regular and avoidance terms

Regular term	**Avoidance term**	**Relation terms**
janayari 'jaguar' (*Panthera onca*) (Sp. *tigre mariposo*)	*uibiyɨ* 'type of fruit' (*Batocarpus amazonicus*) (Sp. *árbol del pan*)	the *uibiyɨ* fruit has a shape that is similar to the shape of the jaguar's paw
jɨgadɨma 'tapir' (*Tapirus Terrestris*) (Sp. *danta*)	*zañaraɨ* 'decomposed wood'	the smoked meat of tapir looks like decomposed wood
oño 'frog type' (Sp. type of *zapo*)	*ɨbegɨrai* 'decomposed leaves'	the frog looks like decomposed leaves
mero 'type of peccary' (*Tayassu Tajacu*) (Sp. *cerillo*)	*obedo* 'black *umarí* fruit' (*Poraquiba Sericea*) (Sp. *umarí negro*)	the fruit has a specific scent which, like peccaries, attracts mosquitoes

[15]Latin names for Murui plants and animals have been adopted from Echeverri and Candre (2008) and Seifart and von Hildebrand (2009). An extensive study of Witoto plants has been done by Maria Cecilia

4.3 Formal Associations

Murui animal-plants substitutions can correspond to sharing phonologically similar linguistic forms (such as verbal or nominal roots). This appears to be the most frequent association type found in the hunting avoidance speech style. An example of this is the connection between a type of lizard called *turaki* which is associated with *turao*, a type of vine. Both lexemes are related in form, in that they contain the same nominalized verbal root *tu-* 'disperse, scatter' but differ in terms of their classifiers. The lizard *turaki* contains the classifier *-ki* (CLF:INHER) with overtones of some kind of possession or inherent feature; the *turao* vine is derived with the classifier *-o* (CLF:FLEX) which denotes long and flexible forms.

Murui men who have limited knowledge of the Murui culture, as well as women (who are not supposed to 'know' hunting substitution terms), intuitively draw connections between lexical sets which share similar phonological forms. Interestingly, they do not have such intuition for other associations types (i.e. behavioral, impressionistic, and mythical). If they do not know the 'real reason' for the association, they explain such synonym sets in terms of behavioral or impressionistic associations. Other times, they interpret them to have some kind of a 'possession' relation. And often, both explanations are given at the same time. For instance, I was told by a young Murui man that, in case of the *turaki* lizard and the *turao* vine, the vine is somewhat 'similar' in shape to the lizard. As an afterthought, he concluded that the lizard and the vine do not share any physical resemblance, therefore, the *turao* vine must somehow 'belong' to the *turaki* lizard. According to Murui elders and other knowledgeable speakers of Murui, the connection is much more profound. The *turaki* lizard and the *turao* vine are similar in that both are both very hard to catch (that is, 'they disperse'). A number of regular and avoidance terms that share phonological forms in Murui are illustrated in Table 3.

Table 3. Impressionistic associations between regular and avoidance terms

Regular term	**Avoidance term**	**Relation terms**
fekoda 'type of edible worm' (Sp. *suri*)	*fekorai* 'type of plant'	the *fekorai* leaf is similar to the shape of the *fekoda* worm; a plant belonging to worms
jedo 'opossum'	*jedo ɨaiña* 'type of plant'	the plant 'belongs' to opossums
turaki 'type of lizard'	*turao* 'type of liana'	both are hard to catch

4.4 Mythical Associations

The last type of animal-plant associations reflects their connections from within the Witoto mythology. Perhaps, these are the 'original' connections on which all previously discussed associations types were based (in terms of the ontological origins of all Murui synonym sets).

The hunting avoidance speech style seem to have a limited set of mythical associations. So far, I have encountered only one example of what could be considered to be a 'mythical association'. The Murui everyday term for 'giant anteater' [*Myrmecophaga tridactyla*] (Sp. *oso hormigero*) is *ereño*. Its avoidance term is *buinaireño* 'the anteater ancestor'. Both terms

appear to have a totemic relation: *buinaireño* is the totem or the 'power' of the Anteater clan (the *Ereiaɨ* clan). Further research needs to examine more closely if the hunting avoidance speech style 'assists' to develop a mechanism to hunt totemic animals, that are normally tabooed and depend on clan's totem, such as an anteater among the members of the Anteater clan. It may be that changing a name of clan's totemic animal could remove the prohibition on hunting this animal. Such avoidance terms may vary among different Murui clans.

5 Discourse

The usage of the avoidance terms in the ritual discourse illustrates a number of unique characteristics of the hunting speech style. Consider the following textual example from *Momo Jɨkakaza*, an 'Appeal to the Father', in which the Creator is asked to grant a successful hunt:

(1) oka rana uiñotɨo

o -ka ra -na uiño -tɨ -o
2SG -FOC thing -N.S/A.FOC know -LK -2SG

'You... You know things!'

(2) kɨodo, maɨjiiakadɨkue iadɨ rɨye iñena

kɨo -do, maɨji -iaka -dɨ -kue iadɨ rɨ -ye i -ñe -na
see -LK+2SG work -EMPH+DES -LK -1SG CONJ eat.meat -PURP be -NEG -E.NMLZ

'You see, I want to work and there is no food!'

(3) jae ua uzutɨaɨ jaijaikaiya mei ɨfo nɨnomo **obedo** *uaide*

ja -e ua uzu -tɨaɨ jai -jai -kai -ya mei ɨfo nɨ
past -CLF:G INTENS grand.parent -PL.KIN go -RED -INCP -E.NMLZ INTERJ head Q2
-no -mo **obe** **-do** *uai -d -e*
-CLF:SP.PLACE -LOC umarí.black -CLF:POINTED fall -LK -3

'In the past, our ancestors used to go where black *umarí* fruit falls.'

(4) **obedona** ore mo kue itoza

obe **-do** -na ore mo kue i -to -za
umarí.black -CLF:POINTED -N.S/A.FOC EXCL father 1SG give -LK+2SG -EPIST

'I ask you Father, give me black *umarí* fruits!'

(5) kue urukɨ kue ekayeza

kue uru -kɨ kue eka -ye -za
1SG child CLF:INHER 1SG feed -PURP -EPIST

Consider the *obedo* 'black *umarí* fruit', marked in bold in the lines (3) and (4). As it was shown in section on impressionistic associations in §4.2, *obedo* is the avoidance term for *mero* 'peccary' (the association is explained in terms of an unpleasant smell black *umarí* fruits and peccaries share). In this 'appeal to the Father', the hunter is not asking for black *umarí* fruits. He is in the *ananeko*, consuming coca and liquid tobacco, preparing for hunting. He is using avoidance terms because he wants to assure that he will feed his family with the peccary meat.

This textual excerpt also exemplifies another salient characteristic of the usage of avoidance terms in the hunting discourse, that is, names of the avoided animals are used in a figurative way. In line (3), the verb that describes actions of the *obedo* is *uaide* 'to fall'. This clearly illustrates conventional metaphors referring to fruits and their actions: the black *umarí* fruit (which is *de facto* a peccary) does not 'move around' or 'run' like an animal but literally falls off the *obe-rai* (umarí.black-CLF:TREE.TYPE) tree.

6 Meanings in Dreams

The Murui hunting goes beyond the acquisition of food. Curiously, people also employ certain everyday terms and avoidance terms when interpreting dreams. In those contexts, plants indicate which animals will become hunter's prey. This is illustrated by a hunter dreaming about *nekazɨ* 'green *umarí* fruit' [*Poraqueiba sericea*] (Sp. *umarí verde*). The significance of such dreams is straightforward: the hunter's prey is going to be a *zuruma*, a large herbivorous mammal called 'tapir' (Sp. *danta*). Likewise, when a hunter dreams about the *coco del monte* fruit, he is going to kill a wild pig (Sp. *puerco*). As Echeverri and Candre (2008:65) put it:

> "All is the result of tobacco and coca hunting. (...) this means, hunting of people. And this way, what is to be hunted comes to us in dreams in the form of fruit."
> (Echeverri and Candre 2008:65, my translation).[16]

The actual big-game hunting takes place in dreams. There, the animals have to be defeated first before they are defeated in the physical world of the everyday life:

> "What happens 'right here' (*beno*) - bad feelings, accidents, problems - is reflected 'out there' (*jino*) as animals. Just to set traps out there is not enough. Those feelings (animals) first have to be defeated right here. The actual hunting takes place in dreams, then an animal will go to fall into the trap outside. This way of turning feelings and dreams into animal bodies is called *monáitate* 'to make dawn'. The ability to make that happen is called *dɨona máɨrie* 'tobacco power'. This power is acquired through tobacco discipline, or *yetárafue*."
> (Echeverri 1997:154)

[16] "(...) Todos son cacería de tabaco y coca, es decir *cacería de gente*. Y asimismo en los sueños esa cacería aparece representada en la forma de esos frutales."

> "(...) 'Tobacco hunting' consists of making dawn [*monáitate*] in the body of animals that which first manifests itself as illness, rage, negligence, quarrelling, and so forth. Food is only a by-product of this sort of hunting. As such, the preparation of tobacco and coca are as closely related to hunting as are the setting up of traps. Tobacco and coca are actual hunting weapons."
> (Echeverri 1997:129)

In other Witoto genres, such as ritual songs *ruakɨ*, names of the animals are commonly uttered. For instance, in songs sung during celebrations in the Murui *ananeko*, the 'real' animal names are freely used for the Muinane people, e.g. *eizaɨkaɨ biya* from a Muinane song can be roughly translated as "peccary came", where the referents of 'peccary' are the Muinane people.

7 Summary

The Murui people, a Witoto-speaking group from Northwest Amazonia, have a special prestigious speech style used by men that relates to hunting game. It is a system of lexical substitution that shifts from faunal terms to floral terms, and it is employed to 'deceive' animal's spirits 'assuring' a successful hunt. Associations between everyday terms (that is, animals) and avoidance terms (plants) have behavioral, impressionistic, formal, and mythical connections. They reveal certain ways in the Murui people organize their natural surroundings and are important for indigenous taxonomies of fauna and flora. The hunting avoidance speech style employs figurative expressions for avoided animal's names. It is also used in interpretations of dreams, where hunting takes place in the spiritual sphere. It forms part of a much larger Witoto register, called *rafue*. Nowadays, with the decreased importance of spirits among the Murui, the hunting avoidance speech style is on the wane.

Further research that goes beyond the mere description of the avoidance speech style would be of great help. One could venture into the realms of pragmatics, ideology and, more importantly, the ontological bases of such practice. One may also ask how the change from animal to plant names reflects a local division of labor (e.g. hunting versus gathering) and how it relates to territorial and seasonal based prohibitions.

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A Quest for Linguistic Authenticity: Cantonese and Putonghua in Postcolonial Hong Kong

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1 Introduction

Authenticity has attracted increasing attention from sociolinguists and linguistic anthropologists (see, e.g., Lacoste et al. 2014, Wilce and Fenigsen 2015). The word *authentic* brings to mind something that is real, natural, and original. In sociolinguistics, the authentic (e.g., "authentic speaker," "authentic language") has traditionally been viewed as an object to be discovered. Mary Bucholtz and Kira Hall have challenged this view in a series of articles (Bucholtz 2003, Bucholtz and Hall 2005). First, they argue that we should turn our attention from authenticity to authentication. This requires us to analyze authenticity as an outcome of linguistic practices and take a close look at the semiotic processes through which authenticity is produced. Second, since identity is a relational phenomenon, we ought to study authentication in tandem with denaturalization, which calls attention to the ways in which claims to the "inherent rightness of identities" (Bucholtz and Hall 2005:602) are subverted. Researchers (e.g., Jaffe 2009, Shenk 2007) have taken heed of these insights and used discourse data to examine the use of linguistic resources to assert or challenge claims to authenticity in social interaction. This case study takes a different approach: it analyzes metadiscursive data from print and social media to illuminate the popular use of linguistics in the authentication and denaturalization of identity.

In the last few years, many Hongkongers have clamored for the protection of Cantonese against the encroachment of Putonghua. Cantonese is the mother tongue of over 90% of the city's population (Hong Kong Census and Statistics Department 2013). Since Hong Kong reverted to Chinese rule in 1997, Putonghua (also known as Mandarin), which is the official language of the People's Republic of China, has become more prominent in Hong Kong society. Cantonese is genetically related to but not mutually intelligible with Putonghua. This study examines how a group of pro-Cantonese Hongkongers selectively draws on linguistic facts to construct a narrative that presents Cantonese as more authentically Chinese than Putonghua and Cantonese speakers as the true guardians of traditional Chinese culture. Through this case study, I hope to: (1) demonstrate the semiotic processes involved in the linguistic authentication and denaturalization of identity; and (2) shed light on how the on-going conflict between Hong Kong and mainland China is played out in the linguistic realm.

2 The Debate over the Official Status of Cantonese in Postcolonial Hong Kong

This study takes a "language ideological debate" (Blommaert, ed. 1999) as its point of departure. In January 2014, Hong Kong's Education Bureau, which is the government agency responsible for developing and implementing educational policies in the territory, posted on its website the claim that Cantonese was "not an official language" of Hong Kong. Many Hongkongers perceived this as a slight and began to demand the protection of their mother tongue. Using data from print and social media, this study investigates how pro-Cantonese

Hongkongers create a narrative of Cantonese superiority to delegitimize Putonghua speakers and the central government in Beijing.

Who are these pro-Cantonese Hongkongers? Since pseudonyms are often used, it is not easy to determine their identity. With a few exceptions, they do not seem to be well known to the public, nor do they appear to be linguists or sinologists. To be sure, pro-Cantonese Hongkongers are not a homogeneous group; not every one of them subscribes to this narrative (at least, not in its entirety). I decided to focus on this narrative because: (1) it has been widely circulated in print and social media; and (2) it serves as a prime example for illustrating the complexity of the linguistic authentication and denaturalization of identity.

This study draws on a large corpus of data from various sources. The corpus includes articles and readers' comments on several news websites:

Apply Daily (蘋果日報)	http://hk.apple.nextmedia.com/
Ming Pao (明報)	http://www.mingpao.com/
South China Morning Post (南華早報)	http://www.scmp.com
Hong Kong Economic Journal (信報)	http://www.hkej.com
Am730	http://www.am730.com.hk/
House News (主場新聞)	https://thehousenews.com/
Passion Times (熱血時報)	http://www.passiontimes.hk/

The first four are major newspapers in Hong Kong. *Apple Daily* is a tabloid-style newspaper known for its anti-Beijing and pro-democracy stance. It is the second best-selling newspaper in Hong Kong. *Ming Pao* is widely regarded as the most credible Chinese newspaper, and the *South China Morning Post* is the leading English newspaper.

I also included in the corpus postings on several Facebook pages that are dedicated to language issues in Hong Kong:

港人講雅言 'Hongkongers Speak *A-Yin*':[1]
https://www.facebook.com/cantonese.hongkongs.tradition
香港語文運動 'Hong Kong Language Movement':
https://www.facebook.com/HongKongLanguageMovement
2014 香港人醒覺 '2014: Hongkongers, Wake Up!':
https://www.facebook.com/hkwakeup
普教中學生關注組 'Students Say No to the Use of Putonghua for Teaching Chinese':
https://www.facebook.com/scholars.say.no.to.PMI

Since some components of this narrative originated in a debate over the status of Cantonese in neighboring Guangzhou in 2010, I included several newspaper articles that were published before the debate in Hong Kong in 2014. Although not all the components are new, it

[1] In this article, the Yale system (see Matthews and Yip 1994) is used for the romanization of Cantonese. For easier reading, tones are not indicated unless they are relevant to the discussion.

is interesting to see how these disparate elements have come together to form a coherent master narrative that underscores the superiority of Cantonese over Putonghua.

3 Locating the Origins of Cantonese and Putonghua in Time and Space

For many Chinese and non-Chinese people, Putonghua is synonymous with the Chinese language. After all, it is the standardized variety taught in Chinese classes all over the world. To counteract this belief, pro-Cantonese Hongkongers assert the authenticity of Cantonese by tracing its lineage to the Tang dynasty (618-907), and highlight the "corrupt" nature of Putonghua by locating its origin in the Qing dynasty (1644-1911) and portraying it as a "linguistic bastard" heavily influenced by the languages of "northern barbarians" who conquered China many years ago. In an article that explains why Cantonese is a "real language", Alex Lo, who is a columnist for the *South China Morning Post*, claims that:

(1) **Cantonese has a much longer and venerable lineage than Putonghua, a mix of the Han Chinese, Mongolian and Manchu languages from the Qing dynasty** [1644-1911]…. Cantonese emerged as a recognisable language from the time of the An Lushan Revolt [755-763] during the Tang dynasty, when an exodus of refugees flooded the south.
(Lo 2014; original quote in English)

On various news websites, pro-Cantonese netizens refer to Cantonese as part of "authentic Chinese civilization", "the cultural essence of the Chinese race", "the language of the Tang people or the Tang dynasty", "the fossil of ancient Chinese", and "*a-yin*" (雅言), which was the lingua franca used in educational, cultural, and diplomatic activities in the Zhou dynasty (1046 BC-256 BC) (Chen 1999:7):

(2) Cantonese and traditional Chinese characters are part of **authentic Chinese civilization [華夏文化正宗]**. They are where the respect for Hong Kong culture resides.
(Thunder 2014; original quote in standard written Chinese)[2]

(3) Cantonese is ***a-yin* [雅言]**. It is the **cultural essence of the Chinese race [中華民族僅存的文化精髓].**
(Jik-Siu-Sing-Do 2014; original quote in standard written Chinese)

(4) The whole world calls Cantonese **"the Tang language" [唐話], the language spoken by the Tang people [唐人說的話].** It is the authentic Chinese culture brought here by the Tang people when they fled to Hong Kong and overseas communities to escape from the Manchu bastards of the Qing dynasty, who tried to kill them all.
(Sung 2014; original quote in Cantonese and standard written Chinese)

[2] Unless otherwise indicated, all translations are mine. Chinese words in the original quotes are in square brackets.

(5) Cantonese is not only a regional language, but it is also **the fossil of ancient Chinese [古漢語的化石]**. In other words, Cantonese is the ancestor of mainland China's Putonghua. (Yeung 2014; original quote in standard written Chinese)

On the other hand, pro-Cantonese Hongkongers call into question the Chineseness of Putonghua by associating it with foreign invaders like the Manchus and the Mongols. They refer to Putonghua as *wu-yu* (胡語), Manchu, and "the language of Jina":

(6) We won't lose anything if we don't learn a **barbarian tongue [胡語]** like Putonghua. (Ng 2014; original quote in Cantonese)

(7) The Shanghainese who want to learn their own Chinese language are said to want to gain "independence" from China. On the other hand, Northerners claim to be Chinese even though they speak **Manchu [滿州話]** rather than Chinese. (Mok 2014; original quote in standard written Chinese)

(8) **The language of Jina [支那話]** isn't Chinese. It was imported from Manchuria [the homeland of the Manchus who ruled the Han Chinese in the Qing dynasty]. (England 2014; original quote in Cantonese)

Wu-yu (胡語) refers to the "barbarian tongue" of non-Chinese tribes in the north, and Manchu (滿州話) is the Altaic language spoken by the rulers of the Qing dynasty. *Jina* (支那) is a Japanese word that refers to China. Considered offensive by many Chinese people, this term is now sometimes used in Hong Kong to refer to mainland China and mainland Chinese people.

In essence, pro-Cantonese Hongkongers claim that Cantonese is more authentically Chinese than Putonghua because it is closer to the "original". In this case, the "original" is not the variety of Chinese spoken in the Qing dynasty, the Yuan dynasty, or even the Han dynasty; rather, it is the literary standard of the Tang dynasty. Pro-Cantonese Hongkongers locate "authentic Chinese" in the Tang dynasty for various reasons. Not only is the Tang dynasty widely recognized as the golden age of Chinese poetry and a high point in Chinese civilization, but it also has a special place in the Cantonese imagination. The Cantonese call themselves "people of the Tang", their cuisine "Tang food", and their clothing "Tang clothes". It was during the Tang dynasty that the mixture of natives and immigrants in the Guangdong area reached a critical mass of acculturation (Ramsey 1987:98).

4 Cantonese and Tang Poetry

How do pro-Cantonese Hongkongers associate Cantonese with the Tang dynasty and Putonghua with the Qing dynasty? To construct this linguistic genealogy, they: (1) highlight archaic lexical and phonological features that are found in Cantonese but not in Putonghua; (2) gloss over areas in which Cantonese is actually less conservative than Putonghua; and (3) exaggerate the influence of Altaic languages on Putonghua and downplay the influence of Tai-Kadai languages and English on Cantonese.

First of all, pro-Cantonese Hongkongers call attention to the presence of archaic features in Cantonese. This can be illustrated by an image posted on the Facebook page "Students Say No to the Use of Putonghua for Teaching Chinese" on February 5, 2014 (https://www.facebook.com/scholars.say.no.to.PMI/photos/a.601314826602128.1073741828.465613356838943/601332043267073/?type=1). The image is entitled:

(9) 香港有文化 'Hong Kong has culture.'
粵語最古雅 'Cantonese is the most ancient and elegant.'

The title consists of two lines that rhyme, which give it a poetic feel. This image highlights the ancient origins and literary nature of fourteen colloquial Cantonese expressions that are not found in Putonghua. Each expression is explained, and an example is given to show its use in a classical Chinese literary text. The Cantonese expression 幾(多), which is the first one in the third row, means "how many" or "how much". Its Putonghua equivalent is 多少 (*duōshǎo*). The example in this case is:

(10) 問君能有**幾**多愁 'Oh, ask me, **how much** sorrow can I bear?'

This is a line from 虞美人 'Beauty Yu', a famous classical Chinese poem written in the 10th century. Even nowadays, students all over the Chinese-speaking world are required to learn this poem by heart.

The sound system of Cantonese attracts even more attention than its lexicon. Compared to Putonghua, Cantonese has more faithfully preserved: (1) Middle Chinese final consonants; and (2) Middle Chinese tonal categories (Bauer and Benedict 1997, Chan and Newman 1984:165-172). (Middle Chinese is the historical variety of Chinese that is phonologically recorded in 切韻, a rime dictionary first published in 601.) Cantonese retains all six Middle Chinese final consonants: *-k, -p, -t, -n, -m,* and *-ng*. Putonghua retains only two: *-n* and *–ng* (see Table 1).

Table 1: Cantonese and Putonghua Final Consonants

Cantonese final consonants: -k, -p, -t, -n, -m, -ng (same six in Middle Chinese)		***Putonghua final consonants: -n, -ng***		
lik9	unreleased stop	*lì*		'power, energy'
lip9	unreleased stop	*liè*		'to hunt'
lit9	unreleased stop	*liè*		'cracked'
lin2	nasal	*liàn*	nasal	'necklace'
lim2	nasal	*lián*	nasal	'curtain'
ling4	nasal	*líng*	nasal	'zero'

Cantonese has also more faithfully preserved the tonal categories of Middle Chinese. Middle Chinese had four tonal categories: "level," "rising," "going," and "entering" (see Table

2). The "entering" category included only those syllables that ended with the stop final consonants *-p, -t,* and *-k.* Each of these four categories was further split into upper and lower registers. This was conditioned by the initial consonant: syllables with voiced obstruent initials were pronounced with a lower pitch than those with voiceless obstruent initials. Voicing was lost in the late Tang period (approximately 1,100-1,200 years ago). This produced eight tonal categories as the upper/lower register distinction became phonemic. Cantonese maintains these tone distinctions even though their acoustic properties have changed. It also developed an additional distinction in the entering category. It now has nine tones (see Table 3). Putonghua, on the other hand, has four tones (see Table 4).

Table 2: Middle Chinese Tones

	Level (平)	**Rising (上)**	**Going (去)**	**Entering (入)** (*-p, -t, -k*)
Upper (陰): Voiceless Obstruent Initials	Upper Level	Upper Rising	Upper Going	Upper Entering
Lower (陽): Voiced Obstruent Initials	Lower Level	Lower Rising	Lower Going	Lower Entering

Table 3: Cantonese Tones

Tone Category	**Tone Contour**	**Example**	**Meaning**	
High Level	55	*si1*	'poem'	**Upper**
High Rising	25	*si2*	'history'	
Mid Level	33	*si3*	'to try'	
Low Falling	21	*si4*	'time'	**Lower**
Low Rising	23	*si5*	'city, market'	
Low Level	22	*si6*	'is/are/was/were'	
High Level (Entering)	55	*sik7*	'to know'	**Entering**
Mid Level (Entering)	33	*sek8*	'aluminum'	
Low Level (Entering)	22	*sik9*	'to eat'	

Table 4: Putonghua Tones

Tone Category	**Tone Contour**	**Example**	**Meaning**
High Level	55	*shi1*	'to lose'
Rising	35	*shi2*	'ten'
Falling Rising	214	*shi3*	'history'
Falling	51	*shi4*	'city, market'

Pro-Cantonese Hongkongers take special pride in the nine tones of Cantonese. This is evident in a comic strip created by 阿塗 (A-Tou), an illustrator known for his efforts to use humor to promote Hong Kong culture. Entitled 粵語九聲訣 'Secret Manual of the Nine Tones of Cantonese', this comic strip was published in the March 18, 2014 issue of the *Passion Times* (A-Tou 2014; http://www.passiontimes.hk/article/03-18-2014/11264). It draws on the genre of Chinese martial arts stories, which is hugely popular in Hong Kong. It depicts a rooster and a chick. The rooster is a kung-fu master, and the chick is his apprentice. In the first frame, the rooster asks his apprentice if he has memorized the nine tones. The rooster then gives his apprentice a secret manual that explains these features. The nine tones are presented as the ultimate kung-fu technique. They will help the chick protect Cantonese and promote world peace. There are six examples at the end. Each consists of nine words, which illustrate the nine tones consecutively.

Pro-Cantonese Hongkongers believe that since Cantonese preserves the final consonants and tonal categories of the literary standard of the Tang dynasty, Tang poems sound closer to the original when read in Cantonese than in Putonghua. Given the prominent place of Tang poetry in Chinese culture, this further supports the claim that Cantonese is more authentically Chinese than Putonghua. In an article that argues against the use of Putonghua for teaching Chinese, the author claims that "Tang poems sound much better when read in Cantonese than in Putonghua" because Cantonese still has the entering tones but Putonghua does not:

(11) Tang poetry is an important part of Chinese literature. **Those who know Cantonese have a clear advantage when studying the tonal structure of Tang poems. On the other hand, Tang poems sound quite discordant when read in Putonghua because Putonghua does not have the entering tones.** Many parents in Hong Kong buy *300 Tang Poems* [the best-known anthology of Tang poems] for their children. They even buy Putonghua recordings of Tang poems and play them day and night, but few of them know that **Tang poems sound much better when read in Cantonese than in Putonghua**.
(Saan-Dei-Ma 2014; original quote in standard written Chinese)

This claim has some support from linguists (Newman and Raman 1999, Ramsey 1987:88), but it is important not to overstate it. Evidence that has been offered is often impressionistic and highly selective. Counter-examples can easily be found. Even if there is statistical evidence, we must not confuse tendencies with categorical statements. Claims like this are prone to the "hall of mirrors" effect (Wareing 1996; cited in Cameron 1998: 946): this happens when a modest claim becomes represented as more and more absolute when it is cited, discussed, and popularized over time.

By focusing on tonal categories and final consonants, pro-Cantonese Hongkongers are able to forge an ideological link between Cantonese and Tang poetry. However, they gloss over areas in which Cantonese is actually less conservative than Putonghua. Putonghua has kept the Middle Chinese three-way distinction in initial consonants, but Cantonese has not. The number of initial consonants was reduced from 36 in Middle Chinese to 20 in Cantonese, and this reduction was largely accomplished by the merging of the Middle Chinese retroflex, palatal, and dental fricated series (Chen and Newman 1987:172).

Table 5: Distinctions in Initial Consonants

	Cantonese		Putonghua	
"die"	*sei*	(alveolar)	*si*	(dental)
"stone"	*sek*	(alveolar)	*shi*	(retroflex)
"west"	*sai*	(alveolar)	*xi*	(palatal)

This example illustrates what Mary Bucholtz and Kira Hall (2005: 599) refer to as "adequation." Cantonese and Middle Chinese are not identical, but in order for them to be positioned as alike, they must be understood as sufficiently similar. Differences are downplayed, and similarities are foregrounded.

5 Authenticity and Linguistic Purism

To underscore its "corrupt" nature, pro-Cantonese Hongkongers exaggerate the influence of non-Sinitic languages on Putonghua. This is best illustrated by an image entitled 普通話之前世今生 'The Past and Present of Putonghua', which was posted on the Facebook page "2014: Hongkongers, Wake Up!" (https://www.facebook.com/hkwakeup/photos/a.363025483838971.1073741829.361448877329965/371331046341748/?type=1) on March 13, 2014. Putonghua is presented as the sum of three elements:

- northern Chinese patois (中國北方土話);
- the "poisonous sounds" of the Manchus' and Mongols' "barbarian languages" in the Yuan, Ming, and Qing dynasties (元明清三代 滿蒙蠻胡毒音); and
- stereotyped writing of the proletariat imported through contact with Russian literary forms in the Soviet era (工農兵機械八股 蘇俄文體接種).

These three elements produced Putonghua, which is described in this image as: "the deformed fetus of China (華夏畸胎), the bastard of Emperors Yan and Huang (炎黃雜種)." Emperors Yan and Huang were two of the legendary Chinese sovereigns in pre-dynastic times.

The claim that Putonghua is not Chinese is often merely asserted. Evidence for the similarities between Putonghua and Manchu is rarely offered. In a sense, Putonghua is characterized by the absence of certain archaic Chinese features rather than the presence of Manchu features. Pro-Cantonese Hongkongers attempt to explain this absence in terms of language contact. Although researchers (e.g., Coblin 2000, Hashimoto 1976, Wadley 1996) have demonstrated the influence of Altaic languages on Putonghua, pro-Cantonese Hongkongers have exaggerated it to the point that they actually call Putonghua an Altaic language (see (6), (7), and (8)).

With regard to Cantonese, researchers (e.g., Bauer 1996, Peyraube 1996, Yue-Hashimoto 1976) have shown that Tai-Kadai languages have left their imprint on its syntax, phonology, and morphology. It is also true that there are many English loanwords in Hong Kong Cantonese (see, e.g., Li 1996). While pro-Cantonese activists exaggerate the influence of Altaic languages on

Putonghua, they either downplay the influence of non-Sinitic languages on Cantonese or present such influence in a positive light. Chin Wan, who is a pro-autonomy advocate and associate professor of Chinese at Lingnan University in Hong Kong, distinguishes between the "good" influences on Cantonese and the "bad" influences on Putonghua:

(12) Cantonese has drawn on three sources: the regional languages of southern nationalities in ancient times, the Chinese lingua franca [雅言] on the central plains in the Han and Tang dynasties, and loanwords from the West. **After thousands of years, the mixing of Chinese and regional languages produced the proper result [正果], which has become even livelier with new words borrowed from the West**. By contrast, the northern vernacular or the "Common Language" [Putonghua] promoted by Communist China incorporated the language of government officials in Jiangsu and Zhejiang in the Ming and Qing dynasties, the poisonous sounds of the Manchu and Mongolian languages, and writings translated from Russian during the Soviet era. **These three mixed with each other for only a few hundred years and in a disorderly fashion**.
(Chin 2010; original quote in standard written Chinese)

This is quite a departure from how linguists generally view language-mixing. Linguistic features borrowed from other languages are often nativized after a long period of time, but why are they "better" than those that are borrowed more recently? What's more, northern Chinese varieties have been in contact with Altaic languages for much longer than Cantonese has with English. It is also unclear how we can determine whether language-mixing proceeds in an "orderly" or "disorderly" fashion.

6 Understanding the Present through the Past

Pro-Cantonese Hongkongers associate Cantonese with the Tang dynasty and Putonghua with the Qing dynasty. Through these ideological links, the opposition between Cantonese and Putonghua produces a set of contrasting meanings: e.g., "authentic" vs. "inauthentic", "pure" vs. "impure", and "Chinese" vs. "not Chinese". These contrasting meanings are then projected onto speakers and political entities (see Irvine and Gal's (2000) discussion of "iconization" and "fractal recursion").

Cantonese and Putonghua are taken as iconic representations of their speakers. The Chineseness of Putonghua speakers becomes suspect as a result of their "impure" speech. On several news websites, pro-Cantonese writers and readers refer to Putonghua speakers as "northern barbarians" (Ma 2014), "descendents of the Manchu barbarians" (Chan 2010), and even "neo-Manchus" (Chan 2014). (Recall that the Manchus were the non-Han Chinese rulers of the Qing dynasty.) By contrast, they regard Cantonese speakers as the rightful heirs of Chinese culture. In (13), a reader refers to migrants from the north as 蠻夷 (a term for non-Chinese tribes), and Hong Kong as "the last stronghold of defense for traditional Chinese culture":

(13) Guangzhou [Canton] residents, like Hongkongers, have long been unhappy with northern **barbarians' [蠻夷]** invasion of the south. Beijing newspapers have recently referred to these **barbarians [蠻夷]** in Hong Kong as "new Hongkongers"…. Quite a few Guangzhou residents I have come into contact with overseas have told me that their city has gradually been taken over. I think Hong Kong **is the last stronghold of defense for traditional Chinese culture [最後的華夏文化保衛戰要塞]**.
(On 2014; original quote in Cantonese and standard written Chinese)

The Cantonese vs. Putonghua narrative takes on a decidedly nationalistic tone. In (14), Chip Tsao, who is a well-known writer and cultural critic, associate Cantonese with Chinese revolutionaries who fought against the Qing government, the most famous being Dr. Sun Yat-Sen, who is regarded by many as the father of modern China. In (15), Chin Wan, the cultural critic mentioned earlier, compares the Communist government with the Manchu rulers of the Qing dynasty. He believes that in both cases, "the barbaric has replaced the civilized":

(14) The Cantonese are known in history for being rebellious and starting trouble. **The usurpers Sun Yat-Sen, Wang Jingwei, and Hong Xiuquan, who fought against Qing China, were all Cantonese**…. The Cantonese have been the scourge of China for this historical reason. China can never allow Cantonese and its culture to spread. If Cantonese is not destroyed, China will be destroyed by Cantonese and its speakers.
(Tsao 2014; original quote in standard written Chinese)

(15) Cantonese may no longer be taught in Chinese classes in traditional schools. Elegant language [雅言] is now considered vulgar. **The barbaric has replaced the civilized. Don't you think this is ridiculous? It was like this during the time of the Manchus. The Chinese Communists have replaced the Manchus, but the situation has remained the same.** I am opposed to Communist China, not only because I enjoy my freedom, but also because I want to preserve the traditional ways of Chinese culture.
(Chin 2010; original quote in standard written Chinese)

On the *Apple Daily* website, some readers even claim that the Hong Kong government is fighting for the return of the Qing dynasty (復興滿清) (Tso 2014), and a writer (Faan 2014) compares the language policies of Communist China to the Qing government's policy of forcing all Chinese men to adopt the Manchu hairstyle as a sign of submission.

7 Conclusion

This study reveals authentication and denaturalization as relational processes that produce a web of intertextual links between the "authentic" (Cantonese), the "inauthentic" (Putonghua), and the "original" (the literary standard of the Tang dynasty):

Cantonese → *Chinese*
Tang dynasty (golden age of Chinese culture)

Cantonese speakers	→	*Rightful heirs of traditional Chinese culture*
Pro-Cantonese activists	→	*Chinese revolutionaries who overthrew the Qing dynasty*
Putonghua	→	*Manchu* *Qing dynasty (a shameful period in which the Han Chinese were ruled by Manchu invaders)*
Putonghua speakers	→	*Northern barbarians*
The Communist government	→	*The Qing government*

Through these intertextual links, linguistic differences between Cantonese and Putonghua are imbued with ideological content, accorded social significance, and used to justify political ends. Pro-Cantonese Hongkongers align contemporary Hong Kong with imperial China at the end of the Qing period. By doing so, they use powerful imagery from the past to not only understand their present predicament, but also imagine a possible future. The Communist government is likened to Manchu invaders who came from the north to impose their rule on the Han Chinese. Cantonese speakers, like the revolutionaries who overthrew the Qing dynasty, must rise up to protect their culture, language, and homeland.

This study also demonstrates how the on-going conflict between Hong Kong and mainland China is played out in the linguistic realm. Bolton (2011) argues that in postcolonial Hong Kong, the relationship between Cantonese and Putonghua is far more contentious than the relationship between Chinese and English. As this preceding discussion shows, it is impossible to fully understand the tension between Cantonese and Putonghua without examining their respective relationship with Chinese. So what exactly is Chinese? Few would refute the close linguistic relationship between Putonghua and modern written Chinese. However, pro-Cantonese Hongkongers believe that modern written Chinese (現代漢語) is not coextensive with Chinese (中文); Classical Chinese (文言文) is an important part of the equation. The role of classical Chinese literature – particularly, Tang poetry – in Chinese culture cannot be overstated. Even nowadays, students in Hong Kong, mainland China, and Taiwan are required to learn Classical Chinese and recite Tang poetry. As we have seen, pro-Cantonese Hongkongers argue that Cantonese is more authentically Chinese than Putonghua because it is closer to the "original". Cantonese speakers are, therefore, the true guardians of traditional Chinese culture. The dragon has long been be used as a symbol of China. Ultimately, part of the Cantonese vs. Putonghua debate is about who can rightfully claim to be the descendants of the dragon (龍的傳人).

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