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Foreword

We are pleased to present the proceedings of BLS 38, held at the University of California, Berkeley in February 2012.

In this volume, the papers presented at the thematic session on language contact are those by Andrew Dombrowski, Mark Donohue, Victor A. Friedman, Nadine Grimm, Greg Key, and Justin Spence.

The following authors also presented papers at the conference, though their work does not appear in this volume: Patience Epps, Dominique Sportiche, Sarah Thomason, Rebekah Baglini, David Eddington, Matthew Savage, Donna Gerdts, Harald Hammarström, Vincent Homer, Tomoko Ishizuka, Yong-Cheol Lee, Nate Maddux, Keri Miller, Hiromi Oda, Kuo-Chiao Jason Lin, and Sylvia L. Reed.

We would like to thank the contributors to this volume and all those who attended and participated in the conference.

Oana A. David

Register-Specific Morphophonological Constructions in Japanese[*]

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Introduction

This paper argues that the idea of Construction Morpho(phono)logy (henceforth CM) in the sense of Booij (2010) works well in the analysis of many register-specific expressions in Japanese. Japanese is often (unofficially) said to be morpho-syntactically "less constructional" than languages like English. This kind of remark seems to stem in part from the apparent rarity of constructional template-based innovation like the one cited in (1a), in which the otherwise intransitive verb *sneeze* occurs in a transitive sentence frame with the help of the well-known "caused-motion construction" given in (1b). What seems to be its Japanese equivalent is clearly ungrammatical, as shown in (1c).[1]

(1) a. Fred sneezed the napkin off the table. (Goldberg 1995:156)
b. The caused-motion construction in English (Goldberg 1995:152):

syntax:	[SUBJ [V OBJ OBL]]
semantics:	'X CAUSE Y to MOVE z'

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* An earlier version of this paper was presented at BLS 38. I appreciate the insightful comments from the audience, especially Russell Lee-Goldman and Eve E. Sweetser. My gratitude also goes to Oana David, Atsushi Oho, and my ESP students at Osaka University (Fall 2011) for their helpful questions and comments. Related talks were given at a linguistics colloquium at the University of Tokyo and the 13th Annual International Conference of the Japanese Society for Language Sciences in 2011. I would also like to thank Geert Booij, whose course on Construction Morphology at LSA Summer Institute at University of California, Berkeley in 2009 turned my attention to the issues discussed in this paper. Remaining inadequacies are of course my own. This study was partly supported by Grant-in-Aid for JSPS Fellows (#21-2238), Grant-in-Aid for Young Scientists (B) (#24720179), and a Spanish Ministry of Science and Innovation grant to Proyectos de Investigación Fundamental no Orientada (Tipo A) (#FEI2010-14903).

[1] The abbreviations and symbols used in this paper are as follows: ACC = accusative; CONJ = conjunctive; IMP = imperative; NOM = nominative; NPST = nonpast; POL = polite; PST = past; Q = the first half of a geminate cluster; TOP = topic; μ = mora; σ = syllable; * = accent nucleus (only in constructional representations)

c. *Hureddo-ga teeburu-kara napukin-o kusyami-si-ta.
F-NOM table-from napkin-ACC sneeze-do-PST
'Fred sneezed the napkin off the table.'

In this study, however, it will be shown that the language has a rich constructional architecture at least at the word level.

The organization of this paper is as follows. Section 1 will outline CM as a theoretical standpoint this paper takes, and introduce a related case study on Japanese innovative verbs. In Section 2, six more cases of morphophonological constructions in Japanese—innovative adjectives, child-directed verbs, heavy-initial emphatic verbs, bipartite slang nominal adjectives, reduplicated attributive predicates, and mimetics (i.e., sound-symbolic, ideophonic words)—will be described with plenty of examples. Section 3 will discuss the form and function of the seven constructions from a general point of view, especially in light of the (iconic) constraints that the registers of the constructions impose on their other specifications. Section 4 will conclude the paper.

1 Previous Studies

1.1 Construction Morphology

Construction Grammar is a monostratal theory that views a form-meaning pairing (or "construction") as a fundamental unit of language (Fillmore and Kay 1995, inter alia). Constructions are posited for various levels of linguistic signs—words, phrases, sentences (e.g., (1b)), and even discourses.

Booij (2010) develops the framework of Construction Morphology, which is a constructional approach to words and word-like units. For example, deverbal *-er* agent nouns in English, illustrated in (2a), are analyzed as instances of the word-level construction given in a simplified fashion in (2b). The left and right parts of the schema specify the formal and semantic components of the construction, respectively, and their internal correspondences are coindexed.

(2) a. *baker*, *eater*, *shouter*, *walker*
b. $[V_j\text{-er}]_{Ni} \leftrightarrow [\text{one who PRED}_j]_i$

This paper focuses on three major advantages of this nonreductionist morphological theory. First, the existence of a construction guarantees the productivity of the word group. Booij (2010:2) focuses on cases of coinage, such as *skyper*, which is a recent innovation based on the denominal verb *skype* 'communicate by means of Skype' (cf. Kay 2002). Second, constructional schemas license words that do not have an established "base form," which a derivational approach would have to posit. For instance, *unbeatable* is a frequent adjective in English, but its assumed base adjective *beatable* is infrequent and unlikely to be registered in the English lexicon. CM solves this problem by simply positing the $[\text{un}[\text{V-able}]_A]_A$

construction (Booij 2010:42). Third, constructional templates capture the diversity of root types in a single word group. This last point will be discussed with actual instances in the next subsection.

1.2 Innovative Verbs in Japanese

Tsujimura and Davis (2011) discuss the constructional nature of a group of innovative verbs in Japanese, illustrated with their base words in (3a) (see Asao 2008 for another case of CM in Japanese).[2] Two important features of the morphophonological construction are cited in (3b).

(3) a. *gugúr-* 'conduct a Google search' (< *gúuguru* 'Google' [proper noun]), *zikór-* 'have a traffic accident' (< *zíko* 'accident' [Sino-Japanese noun]), *kopír-* 'make a copy' (< *kópii* 'copy' [non-Chinese loanword noun]), *guzúr-* 'be peevish' (< *gúzuguzu* 'peevish' [mimetic])

b. The innovative verb construction:

	*
morphophonology:	…(C)V(C)V-r]$_{\text{Vroot}}$-
pragmatics:	playful

(Tsujimura and Davis 2011:811, 818)

What is noteworthy about this construction is the wide variety of sources, as indicated in (3a). The constructional template in (3b) allows us to categorize all those innovative verbs into one group, which is characterized by the morphophonological and pragmatic features. (The construction is morphophonological in that it has specifications of root length (i.e., "two or more moras long") and accentuation (i.e., "root-finally accented").) The present paper extends the latter feature as "register-specificity." This term refers to a stylistic restriction on a word group in a broad sense, which limits the use of the members of the group to particular types of speakers, hearers, and situations, either strictly or loosely defined (see Halliday and Hasan 1976 for a classification of register). In the case of innovative verbs, the pragmatic specification of the construction (i.e., "playful") rules out their occurrence in formal text. For example, a governmental white paper in Balanced Corpus of Contemporary Written Japanese (BCCWJ) contains an instance with the conventional verb *kopii-su-* 'make a copy', which can never be replaced by its innovative counterpart *kopír-*, as shown in (4).

(4)

…	kyokasyoo-o	{kopii-si/	*kopít}	-te	kore-o	kaizan-si…
	permit-ACC	copy-do	make.copy	-CONJ	this-ACC	falsification-do

'…[he] copied a permit and falsified it…'

(Environmental White Paper 1980, BCCWJ)

[2] Accentual information will be given only when necessary.

In the next section, I will point out six more morphophonological constructions that have a register specification. It will turn out that the notion of register leads us to notice not only the non-partial significance of constructional generalizations in Japanese word formation, but also the existence of some previously not recognized word groups in Japanese.

2 Six More Register-Specific Word Groups in Japanese

This section discusses the formal and functional properties of six register-unique word groups in Japanese. Each of these groups is characterized by a set of constructional specifications, and thus serves as a further case for CM.

2.1 Innovative Adjectives

The first word class is innovative adjectives, which are in part similar and related to innovative verbs in Section 1.2. As shown in (5), they can be divided into four etymological subtypes.

(5) a. Clipped adjectives (some):
hazú~~kasi~~- 'embarrassed', *kimó~~tiwaru~~-* 'disgusting', *kisyó~~kuwaru~~-* 'weird', *muzú~~kasi~~-* 'difficult', *natú~~kasi~~-* 'good old', *uzá~~tta~~-* 'annoying'

b. Mimetic roots (relatively productive):
boró- 'ragged' (< *bóroboro/boroboro* 'ragged'), *gotú-* 'well-built' (< *gótugotu* 'rugged'), *hyoró-* 'lanky' (< *hyórohyoro* 'lanky'), *tyará-* 'flashy' (< *tyáratyara* 'flashy')

c. (Clipped) non-Chinese loanwords (limited in number):
annyú- 'languid' (< *annyúi* 'ennui'), *eró-* 'erotic' (< *erotíkku* 'erotic'), *guró-* 'grotesque' (< *gurotésuku* 'grotesque'), *mazó-* 'masochistic, too hard' (< *mázo* 'masochist'), *naú-* 'fashionable' (< *náu* 'now')

d. Native nouns (rare):
%natú- 'summerly' (< *natú* 'summer'), *%nazó-* 'mysterious' (< *nazo* 'mystery')

As is obvious in these examples, all innovative adjectives are two syllables long (cf. Kubozono 2002:87) and have a root-final accent, which may be moved to the left in some cases (e.g., *éro-*, *múzu-*).[3] It is interesting that the latter prosodic fea-

[3] Among young generations, innovative adjectives with more than two moras are sometimes jokingly created from nouns (e.g., *ameriká-* 'America-ish' < *amerika-* 'America') and nominal adjectives (e.g., *daizyoobú-* < *daizyóobu* 'all right'). They also have a root-final accent.

ture is shared by all innovative verbs, and the former by many of them. Moreover, like innovative verbs, these adjectives are stylistically playful. The innovative adjective construction can therefore be schematically represented as in (6).

(6) The innovative adjective construction:

	*
morphophonology:	$[\sigma\sigma]_{\text{Aroot}}$-
register:	playful

The aforementioned similarities between innovative verbs and adjectives suggest the existence of the superordinate "innovative predicate construction" in (7), which is elaborated by the two subconstructions above.

(7) The innovative predicate construction:

	*
morphophonology:	$\ldots\sigma\sigma]_{\text{V/Aroot}}$-
register:	playful

2.2 Child-Directed Verbs

The second group is child-directed verbs. As is the case for Japanese child-directed/motherese vocabulary items in general (Tomosada 2005), they are based on either a mimetic (or interjection) (see (8a)) or a child-directed word (typically a deverbal noun) (see (8b)). The former type is more productive than the latter, which is a highly closed class.

(8) a. Mimetics/interjections (productive):
aań-su- 'open one's mouth wide', *kénken-su-* 'hop on one foot', *mósimosi-su-* 'make a phone call' (< *mósimosi* 'hello'), *pái-su-* 'throw away', *póipoi-su-* 'toss', *tón-su-* 'jump down', *tyán-su-* 'sit down', *zyórizyori-su-* 'shave'

b. Child-directed action nouns (less productive):
án'yo-su- 'walk' (< *án'yo* 'foot' < *ayúm-* 'walk'), *háihai-su-* 'creep' (< *háw-* 'creep'), *húkihuki-su-* 'wipe' (< *huk-* 'wipe'), *nénne-su-* 'sleep' (< *ne-* 'sleep'), *nonnoń-su-* 'pray to Buddha' (< *nonno(n)-san* 'Buddha'), *ónbu-su-* 'give a piggyback' (< *obúw-* 'carry on one's back'), *tátti-su-* 'stand up' (< *tát-* 'stand up')

What is important here is that the two subtypes of child-directed verbs share typical prosodic/morphological properties. As illustrated by the verbs *póipoi-su-* 'toss' in (8a) and *háihai-su-* 'creep' in (8b), the base of many verbs from the two classes is reduplicated, has three or four moras, and/or begins with an accented heavy syllable (Kubozono 2005, Mazuka et al. 2008). This parallelism allows us to posit a general morphophonological construction like (9) for these child-directed verbs. Note that there is no particle element between a mimetic(-like) element and the verb *su-* 'do'. In adult-directed Japanese, we would add distinct particles to the two types of complex verbs: quotative *-to* for the mimetic type and accusative *-o* for the nominal type. The absence of them in child-directed verbs guarantees their formal uniformity.

(9) The child-directed verb construction:

morphophonology:	[mimetic(-like)-su]$_{\text{Vroot}}$-
register:	child-directed

Since this construction has a register specification as "child-directed," verbs instantiating it are unlikely to be used in adult-directed speech, as exemplified in (10). (See Akita 2011b for a more extensive discussion.)

(10) a. Doozo {suwat/ *tyán-si} -te kudasai.
please sit sitting.down-do -CONJ IMP.POL
'Please have a seat.'

b. Doozo {nemut/ *nénne-si} -te kudasai.
please sleep sleeping-do -CONJ IMP.POL
'Please sleep.'

2.3 Heavy-Initial Emphatic Verbs

The third group is heavy-initial emphatic verbs. Verbs in this group are characterized by their heavy-syllable "prefix," which has six types of origin, as summarized in (11).

(11) a. Verb roots (nearly 80% of all cases):
bun-nagur- 'beat violently' (< *but-* 'hit' + *nagur-* 'beat'), *hin-magar-* 'twist' (< *hik-* 'pull' + *magar-* 'bed'), *hun-zuke-* 'step on' (< *hum-* 'step on' + *tuke-* 'attach'), *tuk-kom-* 'thrust in' (< *tuk-* 'prick' + *kom-* 'put in'), *yop-paraw-* 'get drunk' (< *yow-* 'get drunk' + *haraw-* 'brush off')

b. Mimetic roots (or part of them) (some):
gat-tuk- 'devour' (< *gatu(gatu)* 'devouring' [mimetic] + *tuk-* 'be attached'), *sup-ponuke-* 'slip out' (< *suppori* 'entirely' [mimetic] + *nuke-* 'come off'), *tyon-gir-* 'snip off' (< *tyon* 'snipping' [mimetic] + *kir-* 'cut')

c. Prefixation (some):
sut-tob- ‘be blown away’ (< *suQ-* [emphatic prefix] + *tob-* ‘fly’), *sut-toboke-* ‘play the perfect fool’ (< *suQ-* + *toboke-* ‘play the fool’)

d. Infixation (rare):
o-kko-ti- ‘fall’ (< *oti-* ‘fall’ + *-kko-* [diminutive infix]), *to-n-gar-* ‘get quite sharp’ (< *togar-* ‘get sharp’ + *-n-* [emphatic infix])

e. Gemination (one):
mik-ke- ‘find’ (< *mi-~~tu~~ke-* ‘find’)

f. Clipping (one):
bak-kure- ‘skip (a class)’ (< *~~sira~~bakkure-* ‘feign ignorance’)

In most cases, there is (originally) a morpheme boundary between the “prefix” part and the rest. However, a few examples, including *sup-ponuke-* ‘slip out’ (< *suppo-nuke-*) in (11b) and *bak-kure-* ‘skip (a class)’ (< *bakkure-*) in (11f), are likely to undergo phonological reanalysis in terms of the formal specification of the construction formalized in (12). As specified at the formal level of the construction, the two components are always taken from the native lexical stratum.

(12) The heavy-initial emphatic verb construction:

morphophonology:	$[[\text{(C)VC}]_{\text{native}}\text{-}[\text{CV}\ldots]_{\text{Vnative}}]_{\text{Vroot}}$-
register:	rough

The construction leads us to notice those verbs with different etymologies as a register-constrained class (cf. Saito 1992, who focuses on the (11a) type). They have a more or less rough, violent, or sometimes childish flavor, which is more than mere emphasis of meaning. In fact, these verbs are not or less likely to be used in formal speech, as shown in (13), which is intended to be uttered in a news report, for example. (See Akita 2011b for a detailed observation.)

(13) a. Gootoohan-ga keikan-o {naguri/ *bun-naguri} -masi-ta.
burglar-NOM policeman-ACC beat beat.violently -POL-PST
‘The burglar beat a policeman (violently).’

b. Taihuu-de yane-ga {tobi/ *sut-tobi} -masi-ta.
typhoon-due.to roof-NOM fly be.blown.away -POL-PST
‘The roof flew away due to the typhoon.’

2.4 Bipartite Internet/Magazine Nominal Adjectives

The fourth group comes from Internet/magazine slang. Recent netspeak and magazine language in Japanese contain many coined nominal adjectives based on an unaccented four-mora template. The first and second two moras are either (part of) a mimetic or adjective root, and all four combinations are attested, as in (14).

(14) a. Mimetic root + mimetic root (productive):
moti-huwa ‘chewy and fluffy’ (< *motimoti* ‘chewy’ + *huwahuwa* ‘fluffy’), *tun-dere* ‘initially aloof but later kind-hearted’ (< *tuntun* ‘brusque’ + *deredere* ‘slovenly’), *waku-teka* ‘excited and gleaming’ (< *wakuwaku* ‘excited’ + *tekateka* ‘gleaming’), *yuru-huwa* ‘loose and fluffy’ (< *yuruyuru* ‘loose’ + *huwahuwa* ‘fluffy’)

b. (Clipped) adjective root + (clipped) adjective root (less productive):
dasa-ike ‘unrefined but cool’ (< *dasa-* ‘unrefined’ + *ikete-* ‘cool’), *kimo-kawa* ‘disgusting but cute’ (< *kimo(tiwaru)-* ‘disgusting’ (see (5a)) + *kawai-* ‘cute’), *kuu-kawa* ‘cool and cute’ (< *kuuru* ‘cool’ [loanword] + *kawai-* ‘cute’), *mote-kawa* ‘popular and cute’ (< *mote-* ‘be popular’ + *kawai-* ‘cute’)[4]

c. Mimetic root + (clipped) adjective root (limited in number):
huwa-kawa ‘fluffy and cute’ (< *huwahuwa* ‘fluffy’ + *kawai-* ‘cute’), *saku-uma* ‘crunchy and yummy’ (< *sakusaku* ‘crunchy’ + *uma-* ‘yummy’)

d. (Clipped) adjective root + mimetic root (rare):
yawa-kusyu ‘soft and crumply’ (< *yawaraka-* ‘soft’ + *kusyukusyu* ‘crumply’)

It is noteworthy that the two components of each of these nominal adjectives are either nearly synonymous or antonymous to each other, as indicated by “and” and “but” in their translations. Since not only synonymy but also antonymy is a semantic relation within one semantic domain (Cruse 1986), the construction for these words should possess this feature in its semantics, as shown in (15) (the absence of a pitch fall is represented by the overline at the morphophonological level). This semantic property critically distinguishes them from clipped loanwords, many of which also take an unaccented bipartite form but its first and second constituents are not meaningfully related to each other (e.g., *dezi-kame* ‘digital camera’ (< *dezitaru* ‘digital’ + *kamera* ‘camera’)).

(15) The bipartite Internet/magazine nominal adjective construction:

morphophonology:	$[\overline{[\mu\mu]_i\text{-}[\mu\mu]_j}]_{\mathrm{NAroot}}$- ($i, j$ = mimetic, adjective)
semantics:	similar (i, j)
register:	Internet/magazine slang

[4] *Mote-* ‘be popular’ in the last example is a verb but shares the stative aspect with the adjectives.

2.5 Reduplicated Attributive Predicates

The fifth morphophonological construction is proposed for reduplicated attributive predicates that are quite similar to English SALAD-salad expressions, cited in (16a). Like English SALAD-salad expressions, Japanese reduplicated attributive predicates refer to a "real" or prototypical instance of the referent of their base word, as illustrated in (16b,c).

(16) a. I'll make the tuna salad, and you make the SALAD-salad.
(Ghomeshi et al. 2004:308)

b. Kono   toori-wa   Kyooto-Kyóoto -si-te   i-ru.
this   street-TOP   K   -K   -do-CONJ   be-NPST
'This street is really Kyoto.'
(adapted from Yamada and Oho 2011)

c. Kono   ronbun-wa   Sigeto-ga-kai-ta-ronbun-
this   paper-TOP   S-NOM-write-PST-paper-
Sigeto-ga-kai-ta-rónbun   -si-te   i-ru.
-do-CONJ   be-NPST
'This paper has the typical writing style of Shigeto.'
(adapted from Yamada and Oho 2011)

As these examples show, the reduplicated part can be a word, a phrase, or even a clause. Significantly, however, they are always followed by *si-te i-* (do-CONJ be-) or *si-ta* (do-PST), both marking a state, and have an accent nucleus in the syllable containing the antepenultimate mora of their reduplicated part. (17) formulates the construction.

(17) The reduplicated attributive construction:

morphophonology:	$[[[\ldots]_{N_i}$-$[\ldots\overset{*}{\sigma}\mu\mu]_{N_i}$-si$]_{V_{root}}$-{te i-/ta}]
semantics:	'typical of N_i'
register:	colloquial

2.6 Mimetics

I conclude the data section with a CM analysis of sound-symbolic, mimetic items, which are also found in some of the above constructions. As I argued in Akita (2009, 2011a), Japanese mimetics have a set of characteristic morphophonological templates, including the three representative ones given in (18).

(18) a. Reduplicative (most productive):
dókidoki 'excited or nervous', *húwahuwa* 'fluffy', *móyamoya* 'hazy', *nósinosi* 'lumber', *órooro* 'bewildered', *páripari* 'crunching', *tékuteku* 'walking with light steps', *tíkutiku* 'pricking', *zókuzoku* 'shivering'

b. Suffixal:
dokiń/dokíQ/dokíri ‘startled’, *huwań/huwáQ/huwári* ‘fluffy’, *moyáQ* ‘hazy’, *paríQ/pariń* ‘crack’, *sukáQ* ‘refreshed’, *tikuń/tikúQ/tikúri* ‘pricking’, *tyokoń* ‘sitting quietly’, *zokúQ/zokúri* ‘shivering’

c. “Emphatic”:
dokkíri ‘startled’, *gessóri* ‘emaciated’, *hunwári* ‘fluffy’, *kongári* ‘baked lightly brown’, *ottóri* ‘gentle’, *pakkúri* ‘split open’, *sukkári* ‘completely’, *unzári* ‘fed up’, *zikkúri* ‘meticulously’

The use of mimetics is loosely limited to informal discourse. This stylistic characteristic constitutes the register information of the superschematic mimetic construction, which is inherited by all individual mimetic constructions. Moreover, the reduplicative and suffixal templates are associated with durative and punctual aspect, respectively (Akita 2009: Chapter 5). So-called emphatic mimetics are characterized by low iconicity and often by emphatic meaning (Akita 2011a). These semantic specifications are reflected in the individual constructions (19a-c).

(19) The mimetic construction:

semiotics:	iconic
register:	more or less colloquial

a. The reduplicative mimetic construction:

	*
morphophonology:	[(C)VCV-(C)VCV]
semantics:	durative

b. The suffixal mimetic construction:

morphophonology:	[(C)VCV-Aff]
semantics:	punctual

c. The “emphatic” mimetic construction:

	*
morphophonology:	[(C)VCCVri]
semantics:	moderately iconic, (emphatic)

It is important in terms of productivity that the mimetic lexicon contains several entries with non-mimetic origin, such as *mómimomi* ‘crumpling’ (< *mom-* ‘crumple’), *hiyáQ/hiyári* ‘feeling a chill’ (< *hiyas-* ‘make cool’), and *hossóri* ‘slender’ (< *hoso-* ‘thin’). The mimetic status of these words is primarily guaranteed by their morphophonological shapes (i.e., the formal aspects of the mimetic constructions).

3 Register-Constrained Constructional Specifications and Iconicity

In the previous section, I described six morphophonological constructions in Japanese. Each of these word groups, as well as innovative verbs in Section 1.2, exhibits more than one etymological type but shares a schematic template.[5] The seven word-level constructions have various types and degrees of register specifications. Furthermore, as noted above for the examples of each word group, some constructions or their subtypes are more productive than others. For example, coinage is in principle not allowed for heavy-initial emphatic verbs. This fact suggests the diversity of constructional status across morphophonological templates (cf. Goldberg 1995:136-8, Booij 2010:13).

In this section, I focus on another essential feature of the constructions: the construction-internal constraints (sometimes iconically) imposed by their register-specificity. I will discuss such constraints at the levels of morphophonology and lexical semantics in Sections 3.1 and 3.2, respectively.

3.1 Morphophonological Specifications

We can point out at least five formal features that are motivated by a register specification. First, four of our word groups—namely, innovative verbs, innovative adjectives, heavy-initial emphatic verbs, and bipartite slang nominal adjectives—illustrate two-mora clipping (e.g., *hazú~~kasi~~-* 'embarrassed' in (5a), *yawa~~raka~~-kusyu~~kusyu~~* 'soft and crumply' in (14d)). As Kubozono (2002:117) and Tsujimura and Davis (2011:819) discuss, clipping can be considered an effective strategy of secret language. Therefore, it is reasonably related to the register restriction of the word groups concerned.

Second, as noted in Section 2.2 above, child-directed verbs exhibit some typical formal features of Japanese babytalk, such as reduplication, an initial heavy syllable, an initial accent, and the root length of three to four moras. It can be speculated that these formal features are adopted because caregivers think they help their children find and understand the words. If this speculation is correct, the present case will count as another instance of register-motivated morphophonology.

Third, heavy-syllable "prefixes" of heavy-initial emphatic verbs are more or less iconic. In many cases, they are likely to acquire sound symbolism because of their CVC shape, which is typical of intensifier-like mimetics (e.g., *poń* 'pop', *zaQ* 'rough') (see Hamano 1998, Akita 2009: Chapter 5). Moreover, the existence

[5] The schematicity of the templates differs from construction to construction. Some constructions (e.g., the reduplicated attributive construction) have a lexically or segmentally fixed part, while others (e.g., the innovative adjective construction, the heavy-initial emphatic verb construction, the bipartite Internet/magazine nominal adjective construction, the mimetic constructions) are only specified for their lexical category/stratum and prosodic contour. This gradualness is particularly important in relation to the issue of "lexicon-grammar continuum" (Goldberg 1995, Croft 2001:17, Booij 2010:15-6, inter alia).

of a few phonosemantic minimal pairs of heavy-initial verbs confirms this possibility. That is, both *but-tób-* (< *bút-* 'hit' + *tob-* 'fly') and *hut-tób-* (< *húk-* 'blow' + *tob-* 'fly') mean 'be blown away', despite their etymological difference, and the former is more emphatic than the latter. This follows the general sound-symbolic pattern of voicing (see Hamano 1998). A similar contrast is shown by *zuk-kóke-* (< *zúr-* 'rub' + *kóke-* 'tumble') and *suk-kóke-* (< *suQ-* [emphatic prefix] + *kóke-* 'tumble'), both meaning 'tumble'. The sound symbolism of the heavy-initial prefixes seems to be one important feature that furnishes this verb group with distinct roughness.

Fourth, bipartite slang nominal adjectives consist of two roots with similar (or opposite) meanings. This is reminiscent of the intensifying function of reduplication (Abraham 2005, Inkelas and Zoll 2005), which is more precisely illustrated by reduplicated attributive predicates. The effect has an obvious iconic ground: a doubled form for (more than) a doubled meaning. It seems that the highly informal registers in which the two groups of attributive words are used make the speaker want to entertain the hearer with exaggerated utterances.

Fifth, needless to say, mimetics are iconic lexical items. It appears that an informal register allows one to use these words that have direct form-meaning connections and are easy to understand without the complicated definitions that come with many formal terms, such as Sino-Japanese words. In this respect, it should be noticed that all those colloquial constructions discussed in this paper, except the reduplicated attributive construction, involve mimetics as their major source of roots.

3.2 Semantic Specifications

Register specifications also seem to motivate a loose semantic constraint on at least three of our morphophonological constructions: the innovative verb, child-directed verb, and heavy-initial emphatic verb constructions. The three verb groups have a general semantic restriction as "dynamic," ruling out state verbs (Akita 2011b). For example, innovative verbs are least likely to be made from a noun that purely denotes an object (e.g., **sorár-* < *sora* 'sky'). Likewise, there is unlikely to be a child-directed verb that represents an internal state (e.g., ??*ziiń-su-* 'feel numb' < *ziin* 'numb' [mimetic]). Further, we cannot create a state predicate by combining the heavy-initial emphatic construction and a state verb, such as *kanzi-* 'feel' (e.g., **buk-kanzi-* 'feel absolutely').

These semantic restrictions can be drawn without difficulty from the three register features concerned: playfulness, child-directedness, and roughness. The conversational situations characterized by these register features demand a dynamic manner of speech that can (keep) attract(ing) the attention of the hearer (e.g., the speaker's kid).

In summary, register-specificity can, sometimes iconically, constrain or motivate other parts of a construction. All seven morphophonological constructions exhibit one or more such characteristics. These construction-internal correlations point to the significance of "interactive frames" in which words are used (Tannen and Wallat 1993). That is, for a full understanding of morphophonological constructions (or grammatical constructions in general), we need to take into account by and to whom, in what situation, and for what purpose they are used.

4 Conclusion

This paper has discussed the constructional status of seven word groups in Japanese, each of which is tied to a certain register. It turns out that the idea of constructions works well even in this syntactically "less constructional" language. Morphophonological constructions like the ones observed above appear to support the systematicity and productivity of the periphery, rather than the core, of the Japanese lexicon (e.g., motherese, slang, mimetics). The paper further argued that the register specifications of the seven constructions constrain and motivate some of their morphophonological and semantic properties. Thus, the notion of register seems to play a more fundamental role in morphophonology than previously assumed.

There is no doubt that Japanese has many more instances of register-specific word-level constructions. In this regard, existing descriptions in Japanese linguistics may help us extend the present study. More generally, it is hoped that these lines of research will lead to a constructional typology that pursues where (e.g., syntax, morphology), for what purpose (e.g., register-based grouping of non-canonical expressions), and to what degree each language uses "constructions."

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Reanalyzing Definiteness in Bangla

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1 Introduction

Definite descriptions in Bangla are expressed via two morpho-syntactic patterns, namely the bare classifier and the bare noun, discussed in detail in Simpson *et al*. 2011. The bare classifier form consists of a noun phrase and a classifier without a numeral, syntactically derived by NP-movement across the classifier ("NP-raising"). In the bare noun form, there is no classifier or a numeral accompanying the NP. In this paper, I argue that two factors, "anaphoricity" and "uniqueness", play important roles in the selection of the pattern of the definite expression in Bangla. The NP-raising structure is used exclusively in anaphoric contexts, and shows similar properties to "strong article" definites cross-linguistically (*cf*. Schwarz 2009). Uniqueness-based definites are expressed by bare nouns, which are otherwise similar in distribution to the "weak article" definites (Schwarz 2009). This paper contributes to our overall understanding of definiteness in Bangla, and of the cross-linguistic expression of anaphoricity and uniqueness aspects of definiteness.

In section 2, I present a description of the two strategies of forming definite descriptions in Bangla. Section 3 presents an overview of the two types of definites: "strong article" and "weak article" definites, as argued by Schwarz (2009). I present new Bangla data corresponding to the "bridging" uses of the definites, which are generally not accounted for in existing literature. Section 4 presents the links between the morpho-syntax and the semantics. Section 5 concludes the paper with suggestions for future work.

2 Word Order and (In)definiteness

Bangla (Bengali) is a South Asian language, spoken in parts of India and in Bangladesh. Unlike many other South Asian languages, Bangla has a set of numeral classifiers. Bangla classifiers (*-Ta, -khana, -khani* etc.) generally appear between the numeral and the noun (e.g., *Ek-Ta boi* 'one-Cla book'). The numeral-classifier combination precedes the noun phrase in the base word order [Num-Cla NP], shown in (1a&c). The numeral-classifier combination follows the NP in an alternative order [NP (Num-)Cla], as in (1b&d). This is exemplified below:

(1) a. Ek-Ta	pakhi	b. pakhi-Ta	
One-cla	bird	bird-cla	
'A bird'		'The bird'	
c. chO-Ta	pakhi	d. pakhi	chO-Ta
six-cla	bird	bird	six-cla
'Six birds'		'The six birds'	

The base word order (1a&c) and the alternative order (1b&d) are interpreted differently. The base order can have both strong and weak indefinite interpretations[1] (Dayal 2012). The alternative order, on the other hand, has a definite interpretation. (1b,d) are the result of the same mechanism of NP-raising – the NP raises past the classifier, or past the numeral-classifier complex - and they have the same definite interpretation. The following table elaborates the distribution of classifiers inside nominal phrases and the resulting (in)definite interpretations corresponding to the different word orders.

Table 1: Classifiers in Bangla, their relative orders and interpretations

Classifiers	Num-cla N (Base)	N-classifier (Alternative)			N Num-cla (Alternative)
		N_{Hum}-cla	N_{Mass}-cla	N_{Count}-cla	
default cla -*Ta*	Indefinite	Definite	Definite	Definite	Definite
Shape-specific -*khana*	Indefinite	×	×	Definite	Definite
-*khani*	Indefinite	×	×	Definite	Definite
Plural classifier -*gulo*	×	Definite	Definite[2]	Definite	×

2.1 Definite Interpretation of the NP-raised Order

The alternative order [i.e. NP (Num)-Cla] has been discussed extensively in the literature (Dasgupta 1983, Bhattacharya 1999, 2000, Ghosh 2010, Chacón 2010, Dayal 2012, Simpson *et al*. 2011). Bhattacharya argues that the alternative order

[1] See Dayal (2012) for a detailed account of Bangla classifiers. The paper presented at the BLS conference had several common observations with Dayal (2012). Dayal's paper was available after an earlier version of the BLS paper was submitted to the proceedings. The content has been modified in the current version of the paper to avoid repetition of the facts.

[2] Plural marking with a mass noun is possible in Bangla when it is coerced into a count noun.

contributes to a specific reading. In his account, the NP moves to the specifier of a complex Numeral-Classifier head for checking an optional specificity feature. He refers to this movement as the NP-“object”-shift, owing to the similarity of this movement to that of VP-fronting. However, the alternative order has been argued to involve definiteness by others (Dasgupta 1983, Chacón 2010, Ghosh 2010, Simpson *et al*. 2011, and Dayal 2012). Modifying the original proposal of Bhattacharya (1999), Chacón (2010) provides an alternative account, where the NP moves to the specifier of the DP for checking a strong definite feature. A schematic representation of the NP-raising in a layered DP structure is given below:

(2) $[_{DP}\,[_{NP}$(Adjective) Noun$]$ D^0 $[_{NumP}$ (Num) $[_{ClaP}$ Cla $[_{NP}\,\boldsymbol{t}_{NP}\,]]]]$

Note that the mechanisms for deriving (1b) and **Error! Reference source not found.**(1d) are the same, i.e. the NP moves past the Num-Cla to the Spec, DP. If the numeral is ‘one’, the definite form is [NP-Cla], in (1b), and it undergoes ‘one’ deletion (Dasgupta 1983). Otherwise, it is [NP Num-cla]. Dayal (2012) presents a set of tests that confirms the definite reading of the NP-raised order. Here I present one more test in support of this claim. The *familiarity*[3] test for definiteness (Lyons 1999, von Heusinger 2002) requires the referent to be identifiable to both the speaker and the hearer. According to this diagnostic, the raised-NP is interpreted as a specific-definite, i.e. the referent is familiar to both the speaker and the hearer. These have similar features as the “strong article” definite, discussed later. This test confirms definite readings of the NP-raised order with respect to all classifiers. A summary is presented in table 2.

Table 2: Base and alternative orders and their interpretations

	Num-cla NP	**NP-cla**	**NP Num-cla**
Familiar to speaker	yes/no	yes	yes
Familiar to hearer	no	yes	yes
Interpretations:	Indefinite (± specific)	Definite (+Specific)	Definite (+Specific)

2.3 Bare nouns and Definiteness

The previous section shows that the NP-raised order leads to an interpretation of a definite description in Bangla. However, the bare noun can also be interpreted as a definite description, as discussed in detail in Simpson *et al* (2011). Simpson shows that, cross-linguistically, classifier languages (Hmong, Vietnamese, Cantonese and Bangla) show a relative scale of the use of bare nouns to express definiteness. The alternation between the bare nouns and the bare classifier

[3] The difference between *identifiability* and *familiarity* is not explicit in the literature. But, both of them refer to the knowledge of the speaker and the hearer regarding the referent of the NP.

phrases (represented by the NP-raised order [NP-cla]) depends on the stage of grammaticalization the language has undergone in terms of expressing definiteness by means of the bare classifier phrase. Consider the following examples from Bangla showing definite uses of the bare noun:

(3) a. kukur bagane Dakche
dog garden-loc is-barking
'The dog is barking in the garden.'
'Some dog(s) is/are barking in the garden.'

b. mina, dOrja bOndho, cabi kothae?
Mina, door closed, key where
'Mina, the door is locked, where is the key?'
(Simpson *et al*. 2011, ex. (16c))

c. mukkhomontri chin-e gelen
prime-mininster China-loc went
'The Prime Minister went to China.'

Simpson et al. tests the judgments of speakers in five different contexts where definite determiners are generally used in determiner languages. The questionnaire is based on the following contexts of definiteness.

i. Discourse-anaphoric
ii. Visible, uniquely identifiable
iii. Association /inference
iv. Invisible, contextually unique
v. Culturally unique, familiar entities

Both types of definites, the bare classifier (or, the NP-raised order in Bangla) and the bare noun, are tested in each of the situations. Speakers' judgments shows preference of one form to the other in certain situations. I discuss the results in detail in section 4. In the following section, I show that the NP-raised order and the bare NP correspond to two main interpretive types of definiteness.

3 Two types of definites cross-linguistically

A definite NP has the discourse pragmatic properties of *familiarity* (Karttunen 1976, Heim 1982 a.o.). In other words, a definite NP is discourse-old. The discourse-bound property generally corresponds to *anaphoricity*, i.e., the referent of the definite description is found in the previous discourse. Bangla nominals with the NP-raised order are always anaphoric and refer to entities in theprevious discourse. For example, the NP-raised order is infelicitous in a sentence that begins the discourse, as in (4a). Consequently, the NP-raised version is the only appropriate form in a continuing discourse, as in (4b).

(4) a. gOtokal {ekTa chele-r / *chele-Ta-r} Sathe alap holo
yesterday {one-cla boy-gen boy-cla-gen} with meet was
'I met a boy yesterday.'

b. {chele-Ta /*Ek-Ta chele} triathlon champion
{boy-cla /one-cla boy} triathlon champion
'The boy is a triathlon champion.'

Uniqueness is another criterion for definiteness: the referent of a definite nominal phrase needs to be uniquely identifiable to the speaker and the hearer. No reference to the prior discourse is required. The unique referent is the most salient in the current context. Uniqueness is also satisfied by the criterion of *anaphoricity*, except that the antecedent of the anaphor needs to be present in the immediate discourse, while *uniqueness* involves maximal reference with respect to the current context. Based on these approaches, Schwarz (2009, to appear) presents an elaborate cross-linguistic account where the different aspects of the semantics of definiteness receive a different syntactic expression. In what follows, I summarize the syntactic encoding of the two types of definite interpretations and present a new perspective for understanding definiteness in Bangla.

3.1 "Strong article" definites: Anaphoricity

As mentioned above, *anaphoricity* requires the definite description to refer back to a linguistic expression that is mentioned in a previous discourse (Christophersen 1939, Heim 1982, Kamp 1981). Schwartz provides cross-linguistic evidence to show that languages often use a "strong" form of the definite article in anaphoric contexts. For example, between the two types of definite articles in the Frisian dialect of Fering, only the "strong" form is used to convey the anaphoric use (Ebert 1971). In other languages, such as Akan, which has only one overt determiner, it is used in the anaphoric contexts; elsewhere a bare noun is used. Similar pattern is noticed in Bangla for the NP-raised version of the definite description. That is, the NP raising is associated with anaphoric interpretation and corresponds to the "strong article" definite crosslinguistically.

3.2 "Weak article" definites: Uniqueness

The uniqueness approach is based on the idea that the referent of a definite description has a property that is unique, in general or in a contextual situation, and is sorted out by an appropriate description. A definite description in an anaphoric situation is also unique; however, *anaphoricity* is not an absolute criterion for uniqueness. For example, the referent of *the Prime Minister* matches the descriptive content of the definite description without any reference to the previous context. Uniqueness in languages can be expressed through various ways. Schwarz (2009) provides several instances of "situational uniqueness." For example, in (5a), "the$_{weak}$ dog" has a unique referent that fits the description of the noun phrase, when it is uttered in a situation where the referent – a single dog - is present.

(5) A hünj hee tuswark.
the$_{weak}$ dog has tooth ache
'The dog has a tooth ache.' (Schwartz 2009, originally from Ebert 1971)

b. Sabdhan! kukur-Ta kamRate pare
Beware! Dog-cla bite-ppl can
'Beware! The dog might bite you!'

Similarly is the case for the "larger situation" definites (e.g., *the king, the President* etc.). The referent is unique where it is part of a larger situation (e.g., *the President of America*). Culturally unique definites (e.g., *the king*) and the globally unique ones (e.g, *The Moon*) are also cases of situational uniqueness. Corresponding Bangla examples are given below.

(6) a. The President urged for peace.

b. rasTropoti-(*Ta) Santisthapon-er barta dilen
President-(*cla) make-peace message gave
'The President sent a message of peace.'

(7) a. Armstrong was the first one to fly to the Moon.

b. armstOng prothom cMad-(*Ta*)-e pa dilen
Armstrong first moon-(*cla)-loc foot gave
'Armstrong stepped on the Moon first.'

Consider that in Bangla, the NP-raised order is infelicitous in the "larger situation" use (6b), and in the global situation use in (7b), whereas, the definite NPs in English are felicitous in such cases. Schwarz (2009) reports, from a cross-linguistic study, that definiteness based on uniqueness prefers the "weak article" (e.g., Fering, German, Lakhota, Hausa etc.), or the bare nouns (Maurutian Creole, Akan etc.). Similarly, Bangla shows patterns of the latter group of languages where the definite article is predominantly used in the anaphoric contexts (Schwarz 2009). Only the bare nouns are felicitous in the uniqueness situations. The former group utilizes the weak articles in such cases. Note that the unique cases discussed in this section have an indirect connection to the discourse, unlike the straightforward link the anaphoric cases have.

3.3 "Bridging" definites

Schwarz (2009) discusses a third type of definite, "bridging" (also called "inferable" in Prince 1981). The context in the bridging cases has a very indirect connection to the discourse, and generally, it does not fit into the major approaches to definiteness described in the previous section. Schwarz distinguishes two classes of bridging use which relate to the context differently. In brief, the bridging cases are divided into (a) "part-whole bridging", and (b) "producer-product bridging". Cross-linguistically, the "part-whole" (e.g., crisper-fridge, kitchen-house, trunk-car etc.) is expressed by a weak article, while the "producer-product" (e.g., author-book, painter-painting etc.) is expressed by a strong article. Schwarz elaborates that in the first case, the entity (e.g., fridge) can be considered as the antecedent for bridging, while the part of the antecedent (e.g., crisper) as the "bridged" definite. In the latter case, the "producer" (e.g., author) is inferred from the "product" (e.g., play). Examples corresponding to the two cases, reflecting the article use in German, are given below (from Schwarz 2009, ex. (58) and (59), pp. 52-53).

(8) a.The fridge was so big that the pumpkin could be stowed in the
{**im**$_{weak}$/ **#in dem**$_{strong}$}crisper without a problem.

b. The play displeased the critic so much that he tore the
{**#am**$_{weak}$/ **an dem**$_{strong}$} author to pieces in his review.

Such "bridging" cases involve an alternation between the NP-raised word order and bare nouns in Bangla. Consider the following examples in Bangla.

(9) a.

frij-Ta		Eto	bORo	je
fridge-cla	so	big	COMP	

doRja-*(Ta)	du	hat-e	khulte	hOe
door-cla	two	hand-loc	open	be

'The fridge is so big that the door needs to be opened by two hands.'

b.

naTok-Ta	eto	bikkhEto	hoyeche	je
play-cla	so	popular	been	COMP

poricalok-(#Ta)	nije-i	Obak	hoye-gEchen
director-cla	self-emph	astonished	become

'The play has been so popular that the director himself has become astonished.'

c.

oSudh-Ta-r	parSo-protikriya	marattok,
medicine-cla-gen	side-effect	fatal

tai	kompani-(Ta)	o-Ta	bajar-theke	tule-niyeche
thus	company-cla	that	market-from	withdrew

'The side-effects of the medicine are fatal, so the company has withdrawn it from the market.'

Given the cross-linguistic similarity and the morpho-syntactic processes of expressing definiteness in Bangla, the "part-whole" relation would be predicted to involve bare noun, while the "producer-product" would involve NP-raising. However, the "part-whole" relation in Bangla involves the NP-raised version as in (9a), whereas, the "producer-product" relation involves an alternation between the NP-raised form and the bare noun, shown in (9b-c). The classifier *-Ta* on human nouns often has a pejorative connotation, for example, *director* in (9b). Thus, an alternative (e.g., *company* in (9c)) shows that alternation between the two forms of definites is found in Bangla.

4 Two strategies

Simpson *et al*. (2011) reports average acceptability rate of the two types of definite descriptions in five contexts, as mentioned earlier. In a 5-point scale where 5 is 'completely acceptable', the highest acceptability rate of the NP-raised version is in the "discourse-anaphoric" and "visible, uniquely identifiable" contexts [average rate 4.81/5 and 4.82/5, respectively]. The highest average rate of the bare nouns are in the "invisible, contextually unique" and "culturally unique, familiar" contexts [average rate 4.18/5 and 4.86/5, respectively]. The acceptance rate of the NP-raised version in the "association/inference" context is 4.35/5, whereas, the average rate of the bare nouns in the same is 3.73/5.

A comparison between the average ratings relative to the contexts where the two types of definites occur suggests that the two types of definites are selected on the basis of the context. More specifically, the NP-raised version marks anaphoric definites, (and probably deictic as well). Any referent that is salient in the context, either by virtue of a continuing discourse, or by sensory perception (e.g., referring to a chair when the speaker and the listener are in the same room), i.e. the "visible uniquely identifiable cases", prefers a "strong article" definite or an NP-raised version in Bangla. When the referent is not contextually salient, but uniquely identifiable given world knowledge (e.g., *The Sun*), the bare noun is utilized. As cross-linguistically attested, the strategy of the "weak article" or bare noun definite depends on the referent being salient, but not by the current context.

The alternation of the NP-raised definite and the bare noun definite corresponds to what Schwarz describes as the "bridging" cases. As shown in the examples in (9), Bangla utilized the NP-raising in the "part-whole" definite, but has an alternation between the two forms in the "producer-product definite" cases. I conjecture that this is the reason behind the relative high average rating of both forms in Simpson's study (i.e. 4.35/5 for NP-raised definite, 3.73/5 for the bare noun definite) in the context of "association/inference". I predict that a two-way classification of these cases, in terms of the "part-whole" and "producer-product" would yield clearer ratings.

In sum, we saw that the NP-raised word order is mandatory in the anaphoric reading, whereas the bare noun is used when uniqueness alone is at work. This indicates that the NP-raised word order in Bangla is the "strong article" definite and it requires the NP to move to the Spec, DP. The "weak article" definites are definite by uniqueness. Simpson provides possible explanations for the preference of the bare-classifier cases (NP-raised) in some contexts. For Bangla, it is possible that the NP-raised form might have other semantic contributions as well. Such as, this form naturally incurs a contrast or focus on the referent. Nevertheless, *anaphoricity* plays the main role in choosing the NP-raised version in Bangla.

5 Conclusion

This paper establishes a link between two ways of forming definites and two approaches to interpret it. It has been argued that Bangla has two strategies of forming definite descriptions. Generalizations on definiteness from previous work on classifier languages (Simpson *et al*. 2011) and crosslinguistic classification of definites (Schwarz 2009) suggest that there are two main interpretive effects associated with definiteness that are reflected in the morpho-syntax of definite nominals. *Anaphoricity* plays a major role in the so-called "strong article definite" use, which is parallel to the NP-raised form or the bare classifier form in Bangla. Non-anaphoric definite descriptions mostly utilize the "weak article" or the bare noun cross-linguistically. The discussion on Bangla definites adds to the recent body of work on definiteness. This paper establishes a cross-linguistic link between the definiteness strategies and leaves space for future comparative work on definiteness.

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Color Categories in Language Contact: ‘Pygmy’ Hunter-Gatherers and Bantu Farmers

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When speakers adopt colors from another language, do they only borrow certain lexical forms or do they absorb whole concepts? And if both a lexical term and a color category are borrowed, are they both borrowed at the same time or is one of them borrowed first? In this paper, I address the question of how color categories are borrowed, providing evidence from Gyeli ‘Pygmy’ hunter-gatherers (PHGs) in contact with Bantu farmers in southern Cameroon. The data shows rich variability in borrowing patterns. Color categories are not borrowed *in toto*, but only partially, i.e. the resulting color category in the recipient language only partially coincides with the color category in the donor language. Further, the borrowing of a color category may or may not be in conjunction with the borrowing of a color term from the recipient language. While Gyeli PHGs borrow a lexical term first from neighboring Bantu farmer languages and then expand the color category in a second step, the path of borrowing of Bantu farmers from colonial languages is the inverse. Farmer languages first adopt a new color category, but reject loanwords. Their second step in acquiring a new color is to find a name for the new color category.

1 Introduction

Intensive language contact between PHGs and agriculturalists in Central Africa is a well-known phenomenon in the linguistic and anthropological literature (Joiris 2003, Bahuchet in prep.). PHGs remain culturally distinct, despite the tendency to adopt farmers’ languages to different degrees. For instance, they maintain a different subsistence strategy and a different social organization. There is little information on what elements PHGs actually adopt when they shift towards farmers’ languages because, generally, data on many PHG languages are scarce and language affiliation is often based on lexical comparison.

Color systems are a fertile domain to investigate language contact and borrowing because, beyond assessing which lexical forms for color terms are borrowed, one can also analyze the semantics of the borrowings by observing different color categories and their partition of color space. Much of the extensive literature on color has focussed on the universality of basic color terms and comparing color systems across languages (Berlin & Kay 1969 on the Basic Color Term theory, Kay et al. 1997 and Cook et al. 2005 with the World Color Survey). Even though stages

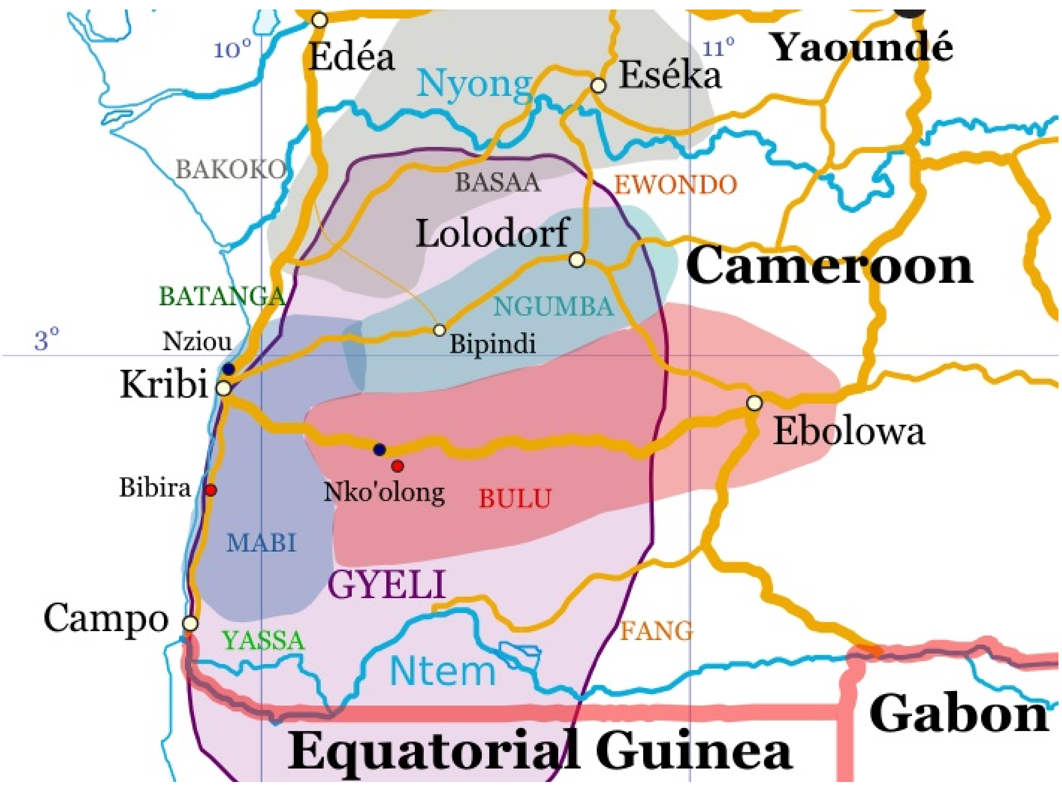
[1] I wish to thank the Gyeli, Mabi and Bulu speakers, the Volkswagen Foundation/DoBeS initiative, my DoBeS team including Maarten Mous, Emmanuel Ngue Um, Daniel Duke and Christopher Lorenz for helping and supporting me to gather the data which is the basis for this paper. I also thank Asifa Majid, Scott Grimm and the audience at BLS 38 for helpful comments and advice.

in cross-linguistic color evolution are an important part of these studies, less attention has been paid to the processes in particular languages of innovations and changes in color categories. Nor has the role of language contact been systematically examined. Both aspects are addressed in this study. In the following, I will outline the complex language situation and describe my methodology. In sections 2 and 3, I compare the paths of color borrowing between Gyeli PHGs and Bantu farmers and between Bantu farmer and colonial languages, respectively. This includes an analysis of the partition of color space in different speech communities as well as different effects a phase of transition has on the partition of color space.

1.1 The Language Contact Situation

Like most of west Africa, the south of Cameroon presents a highly complex language situation. Many indigenous languages in a small geographical area, multilingualism, and the use of colonial languages such as French and English contribute to a multitude of language contact situations with multiple layers and directions of borrowing.

(1) Map of the Gyeli area and its neighboring Bantu farmer languages (based on UN map of Cameroon, no. 4227)



For the analysis on color borrowing, I collected data from four speech communities: two Gyeli PHGs varieties and two neighboring farmer languages, Mabi and Bulu.

The Gyeli PHG varieties are represented by red dots and the farmer languages in this study by blue dots on the map shown in (1).[2] One Gyeli variety is in contact with Mabi (coastal Kwasio dialect), which I will refer to by its village name 'Bibira.' The other Gyeli variety is spoken in the inland village Nko'olong which is in contact with Bulu speakers. Data on farming communities come from these two contact languages. Mabi data was collected in Nziou, a village belonging to the Kribi district while Bulu color data was collected in the farmer village closest to Nko'olong which has the same name.[3] I will start out by describing Gyeli and then move on to the Bantu farmers' languages.

Gyeli, also called Kola in the north, is a Bantu A80 language spoken by about 4000–5000 PHGs known as Bagyeli (or Bakola). Speakers live in small communities averaging 20–30 Bagyeli in a settlement. These settlements are dispersed over an area of approximately 4800 sq mi (12.500 km^2) of mainly tropical rainforest. In this territory, eight other Bantu languages are spoken by farming communities. The Bagyeli are currently shifting from their traditional way of life to sedentary farming due to massive ongoing changes in the environment which ultimately make animals disappear that the hunter-gatherers depend on. In the course of adopting a new subsistence strategy, the PHGs also shift to the languages of their farming Bantu neighbors. Depending on which other Bantu language they are in contact with, different Gyeli dialects have evolved. For instance, Bagyeli who are in contact with Bulu communities speak a different variety than Gyeli speakers in contact with Mabi. Generally, language contact is intense between PHGs and neighboring Bantu farmers, as has been shown for other PHG groups in central Africa (Thomas 1976:28, Lewis 2002:18, Vorbichler 1960:87). Due to prestige and social pressure, PHGs borrow from and shift to farmers' languages, not the other way around.

Neighboring farmer groups consist exclusively of Bantu A speakers: Batanga and Yassa of the A30 group, Basaa and Bakoko of A40, Ewondo, Bulu, and Fang of A70. Kwasio is another A80 language and the closest relative to Gyeli. Languages of the farmers are generally more prestigious and therefore used in communication with Gyeli speakers who are shifting to (some of) the neighboring farmers languages. Language shift is gradual and differs across various Gyeli PHG groups and various neighboring farmers, depending on the nature of contact. For instance, the Bagyeli have a less close contact to the Yassa who are traditional deep sea fishermen (Daniel Duke, p.c.) and therefore have less of an interest in foraging produce. In contrast, contact between the Bagyeli and the Mabi, the Ngumba, the Bulu, and the Basaa is much closer.

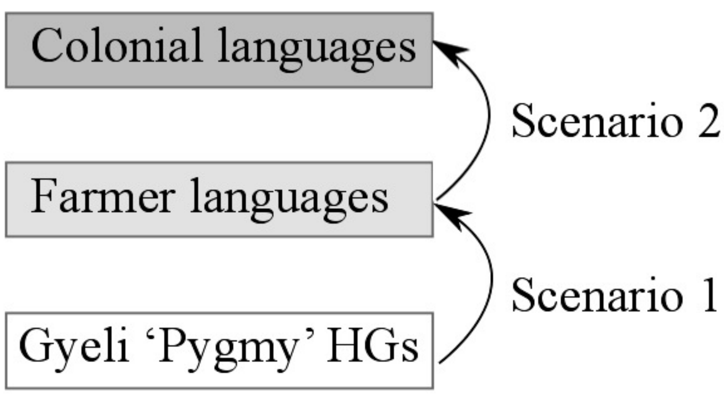
In addition to the Gyeli and farmers languages, a third layer of complexity is the colonial language French spoken in the area. French is still the language of the elite used in education, administration, politics, and institutions. Farming populations

[2] Note that language area extensions and the location of places are approximations.
[3] The Bulu of Nko'olong consider the PHG settlement as belonging to their village; however, the Bagyeli are spatially separated by about a mile.

study French at school and master it to varying degrees, depending on the level of education. Generally, the Bagyeli's neighbors have some command of French, which varies from basic to good and which they use in inter-ethnic communication if the interlocutors do not speak the same Cameroonian languages. In contrast, the Bagyeli do not speak French since very few of them, even among their children, have gone or are going to school, so they do not learn French. In communication with Bantu farmers, they usually use the farmers' language.

In terms of language contact, two color[4] borrowing scenarios arise as illustrated in (2). On the one hand, Gyeli PHGs borrow color terms, and eventually the color categories that go with the terms, from their farming Bantu neighbors. Farmer languages, on the other hand, borrow color categories from colonial languages, i.e. mainly French. I will explore the two scenarios in turn in sections 2 and 3.

(2) Two scenarios of borrowing situation



1.2 Methodology

I established basic color terms and the *partition of color space* in each of the four languages through elicitations with color chips and interviews. These data were then compared within the single communities as well as across communities (PHG—PHG, PHG—farmers, farmers—farmers). One way to understand the semantics of a color term in a speech community is to analyze the *partition of color space* and thereby the extension of single color categories in the space. (3) shows a chart of language-neutral color space composed of eighty color points, known as 'hues.' The chart shows how hues occur naturally and is not based on color naming in a particular language. Different languages and speech communities may divide up the space in this chart in different ways, depending on the kind, number, and extension of color categories existing in the language. For instance, one language may call a hue *pink* while for another language, the same hue falls into the category of *red* because that language either does not have the category *pink* or the *pink* and

[4] I consider 'color' here as a cover term including both color term and color category.

red categories receive different extensions.

(3) Color space chart

In order to establish the partition of color space for a particular speech community, basic color terms were elicited from individual speakers and in groups. In a second step, informants were interviewed one-by-one so that they could not influence the answers of others. In each community, at least twelve speakers were interviewed. Each informant was tested for color blindness. Then, consultants had to name each color in a booklet provided by the Max-Planck Institute of Psycholinguistics in Nijmegen (Majid & Levinson 2007), containing the eighty color chips shown in (3). In the booklet, the hues are, however, presented in a fixed random order. They are standardized Munsell colors and sampled twenty equally spaced hues at four degrees of brightness all at maximum saturation (Majid & Levinson 2007:23). Then I plotted the most frequently given term for every hue in a speech community onto the color space chart. This provided an average partition of color space for a speech community.

2 Scenario 1: Gyeli PHGs Borrow From Bantu Farmers

Gyeli PHGs have borrowed two colors from Bantu farmers, namely *yellow* and *green*. The path of borrowing is that the lexical form is adopted first. After acquiring the term, the corresponding concept, i.e. the extension of the color category in color space, is approximated, a process that has not been completed yet. In other words, the Gyeli PHGs have for instance adopted the word ‘yellow’, although there is some disagreement between Gyeli PHGs and their farming neighbors as to which hues qualify as instances of *yellow*.

Historically, Gyeli as well as the surrounding Bantu farmer languages disposed of only three color categories, namely *black*, *red* and *white*.[5] More recently acquired colors include first *yellow* and then *green*, an order which is predicted by

[5] Gyeli and Mabi have three different color terms for the white category, a scenario which is actually contrary to the predictions of the Basic Color Term theory. *ná mbàmbàlà* is the default term for

the Basic Color Term theory (Berlin & Kay 1999). Gyeli and Mabi use the same color terms for both traditional and newly acquired color expressions. The original basic color terms in Bulu differ significantly from those in the other two languages which indicates that no borrowing and/or areal spread seems to have taken place. The recently innovated color terms are, however, cognates in the three languages.

(4) Color terms for different color categories

Gyeli and Mabi	Bulu	
ná vyû	év̀ìndì	‘black’
ná bì	évèlè	‘red’
ná mbàmbàlà	éfùmùlù	‘white’
mpúlɛ̀	mfóò	‘yellow’
máká	bìkáá bìlók	‘green’

All of the languages under consideration show differences in the morphosyntactic properties of original basic color terms in contrast to the innovative color terms, as shown in (4). Also, traditional color terms display different morphosyntactic properties across languages. In Gyeli and Mabi, the original color terms seem to form a part of speech on their own. They may have originally been derived from verbs, but synchronically they do not take any subject agreement marker like verbs in these languages do. Instead, they are all preceded by a particle *ná*. Also, in contrast to newly innovated color terms, they can be reduplicated – *ná vyûvyû*, *ná bìbì*, and *mbàmbàlàmbàmbàlà*.[6] In comparison to Gyeli and Mabi, in Bulu, the original three basic color terms do not form a part of speech on their own, but are nouns belonging to noun class 7. According to Bates (1904), they are derived from the verbs *vé* ‘be/get red’, *vìn* ‘be/get black’, and *fùm* ‘be white’.

Recently acquired color terms are nouns in all three languages. They display a typical Bantu noun structure including noun class prefixes. In Gyeli and Mabi, *mpúlɛ̀* ‘yellow’ is used in the singular class 3 of gender 3/4 while *má-ká* ‘green’ takes the plural noun class prefix *mà-* of class 6 of gender 5/6. Recently adopted color terms in Bulu do not belong to noun class 7, unlike Bulu traditional color terms: *mfóò* yellow’ is in noun class 3 and *bìkáá bìlók* ‘green’ in noun class 8. Further, these color terms are not derived from verbs, unlike traditional color terms.

In terms of their meaning, recently innovated color terms not only designate a color, but refer originally to an object in the world of plants. *mpúlɛ̀* in Gyeli and Mabi and its cognate *mfóò* in Bulu designate, besides the color *yellow*, a kind

white. The other two white terms, *ná yɛ̂* and *ná pfû*, seem to implicate a change of color, but their semantics still need further investigation. Since these terms for *white* almost exclusively show up in individual use, but not in an average picture of the speech communities, the other two white terms will not be considered further at this point. Bulu does not have any additional color terms for either of the categories.

[6] The meaning contrast of the reduplicated forms is at this point unclear to me.

of tree, *enantia chlorantha*, which is known under the trade name *African yellow wood*. The primary meaning of *má-ká* is 'leaves'. In Bulu, it is the same word, *bì-káá*, just in a different noun class. Also, the color *green* in Bulu is not only expressed by 'leaves,' but by a juxtaposition of *bì-káá bì-lók*, meaning 'leaves grass.'

Looking at the way newly innovated color terms have spread in the area, I will show that recent color innovations were established earlier in Bantu farmer languages and that Gyeli PHGs borrowed the color terms for *yellow* and *green* from Mabi. This holds for all Gyeli PHG varieties; even in Nko'olong, which is in primary contact with Bulu, the Bagyeli use the Mabi borrowings and not borrowings from Bulu. The path of borrowing from Mabi into Gyeli is as follows. First, the use of a lexeme which actually already exists in the languages of the area, is borrowed. Both, *mpúlɛ̀* and *máká*, are already part of the Gyeli lexicon designating a type of tree and leaves respectively. The crucial thing which is borrowed is their use as a color term. In a second step, the associated color category is expanded according to the model of the donor language's category extension in the color space. Evidence that the recently adopted colors developed earlier in Bantu farmer languages than in the Gyeli PHG varieties who borrowed the colors from their farming neighbors comes from both historical records of Bulu as well as from the partition of color space in the single communities. Each of these will be discussed in turn.

2.1 The Case of *mpúlɛ̀* 'Yellow'

The color category *yellow* is a recent innovation in Mabi and Bulu, and even more recent in Gyeli varieties. The Bulu literature provides information on how the name of a particular tree developed a second meaning, namely that of a color. Initially, *yellow* in Bulu was used in a compound as a specification of *red*: *évèlè mfóò* (Bates 1904:145) meaning a specific type of *red*, namely the '*red* of the *mfóò* tree'. Eventually, *évèlè 'red'* was omitted from the compound, while, at the same time, *yellow* split off from the *red* color category and became a category on its own.

Currently, speakers are not aware of the connection between the tree and the color anymore. When asked whether *mpúlɛ̀* has another meaning than *yellow*, the usual answer is that it only designates the color. When explicitly asked about the connection between the tree and the color term, many speakers think that the tree was named after the color, even though the historical records in Bulu indicate that it was the other way around.

mpúlɛ̀ in Mabi and Gyeli shows signs of being grammaticalized. Some speakers have started using the marker *ná* with *mpúlɛ̀*, which usually is only used with the traditional, non-nominal color terms in these languages. The ongoing grammaticalization and adoption of traditional color term morphology shows that traditional color terms serve as role models of 'real' color terms. Treating newly innovated color terms grammatically like traditional color terms further indicates that the new color is firmly established as a category on its own.

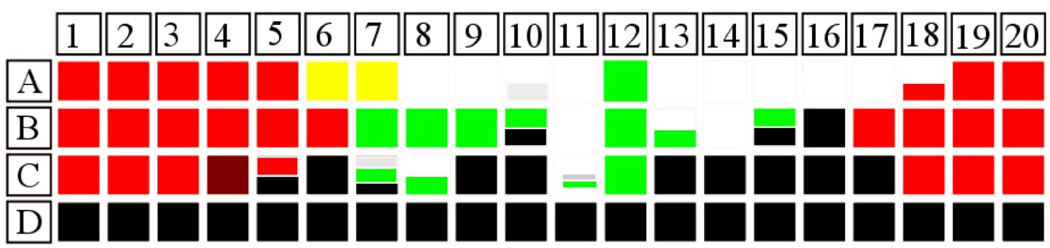
In comparison, *green* is an even more recent innovation and not being grammaticalized. Speakers are aware of the lexical source – *leaves* – that provides the color with a term and of using a kind of comparison. For instance, some explain that the color of leaves is *black*, but if someone is wearing a green shirt, one would say that the shirt has the 'color of leaves', *nsɪ́nó wá mákā́*.

2.2 Partition of Color Space in Gyeli PHG Varieties

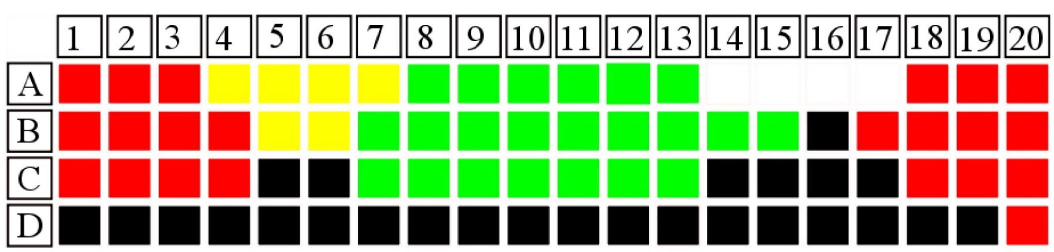
Comparing the partitions of color space in the various speech communities reveals significant differences across languages and even across varieties of the same language. The extension of the recently acquired colors *yellow* and *green* in the Gyeli PHG variety in Bibira is less expanded than in Nko'olong. At the same time, new color categories in both Gyeli varieties are not yet as expanded in the color space as in Bantu farmer languages from which Gyeli borrowed the color terms. The differences in the extension of color categories can be interpreted as representing different stages in the establishment of new colors.

Data on the Gyeli variety spoken in Bibira, illustrated in (5), which is in contact with the Mabi farmer language, shows that the extension of the *white* category is significantly larger than in the Gyeli variety in Nko'olong, (6), which is spoken in the Bulu contact area. At the same time, newly acquired colors such as *yellow* and *green* in Bibira do not have a large extension in the color space, compared to traditional color categories. In contrast, both categories take up relatively more space in the Gyeli partition of color space in Nko'olong.

(5) Partition of color space in Bibira, the Mabi contact area



(6) Partition of color space in Nko'olong, the Bulu contact area



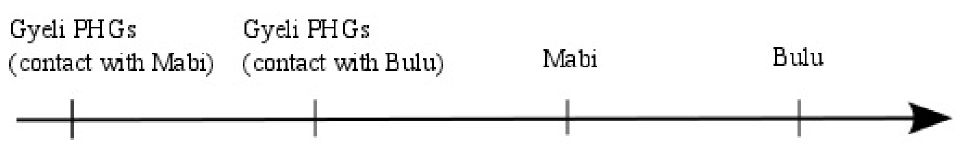
In contrast to farmer languages, Gyeli PHG varieties generally show a larger extension of traditional and a smaller extension of newly innovated color categories, comparing Gyeli in Bibira (5) with Mabi (8), and Gyeli in Nko'olong (6) with Bulu

(9). At the same time, newly innovated color categories generally have a smaller extension than in their farmer contact counterpart. Thus, both the *yellow* and the *green* space are much smaller among the Bibira PHGs than among the Mabi farmers. The same is true for the the Gyeli PHGs in Nko'olong where *yellow* and *green* have a smaller extension than among the Bulu farmers.

The partitions of color space in the farmer communities reflect a more evolved stage in color acquisition in comparison to the Gyeli PHGs. From the perspective of the Basic Color Term theory, languages add new color categories to their inventory in a predictable fashion (rather than losing them). Since farmer languages have more color categories than the Gyeli PHGs, as will be discussed in the next section, their color systems are at a later stage in the color evolution trajectory than those of the Gyeli PHGs. At the same time, there are also differences among the farmer languages. The Mabi color system is more conservative than the Bulu one since it has fewer color categories.

Also the two Gyeli PHG varieties are at different stages in the color acquisition trajectory. The Gyeli PHG variety in contact with Mabi is more conservative than the variety in contact with Bulu. Given the language contact situation where PHGs borrow from farmers (and not the other way around), it can be assumed that Gyeli PHGs orient themselves towards the farmer's color systems when establishing the extension of a color category. Therefore, the Gyeli PHG varieties reflect the differences in the color evolution trajectory of their respective contact farmer groups, as illustrated in (7).

(7) Color evolution trajectory in Gyeli PHG and farmer groups



The stability and conventionalization of a color category can be understood by examining the properties of the category boundaries. Well-defined category boundaries suggest that a category has stabilized, i.e. the speech community agrees upon its extension. Fuzzy boundaries indicate the opposite, namely that the category is not yet fully established, but still subject to transformation. Following this argumentation, the more conservative system in Bibira is not only reflected in its category extension, but also in its category boundaries which are less well-defined and clear cut than in the Gyeli variety in Nko'olong, (6). Especially the categories *white* and *green* do not represent contiguous areas as would be expected by Roberson et al. (2000:395) who claim that 'no language would exhibit categories that include two areas of color space but excludes an area between them.' Instead, a *green* strip divides the *white* category in two, one part stretching from 8 on the scale to 11, being interrupted at 12, and the other part stretching from 13 to 18. Also, the *green* category encloses little pockets of *white* as in C8. In contrast, color boundaries in Nko'olong are clearer and better defined. This indicates that color categories and their boundaries in Nko'olong are well established and conventionalized. Even the newly innovated ones, have become stable (for the moment) and speakers agree, on average, about the semantics, i.e. the extension, of single color categories. For Bibira, however, the interpretation would be that category boundaries have not been fully stabilized yet. Speakers are still in the process of conventionalizing how they call certain hues and what the extension of a certain color category is. This can also be seen in boundary areas such as C7 or C11. For these color chips, no majority answer was obtained, but three different answers covering a third of the interviewed consultants each. For instance, for C7, one third of the consultants labelled the color *black*, one third called it *green* and the last third called it *white*.[7] Differences in category boundaries in the farmer languages will be addressed in section 3.

As an interim summary, I conclude that the two Gyeli varieties represent different stages in the acquisition of new colors in a language. Both use the same lexemes for *yellow* and *green* as their farming neighbors, but the color categories are not yet as expanded in the color space as in their respective contact languages. At the same time, their expansion also differs inter-dialectally, the variety in Bibira being more conservative than the one in Nko'olong. The more conservative color space partition is characterized by a smaller expansion of recently innovated colors as well as a lesser degree of conventionalization and stabilization displayed in less well-defined category boundaries.

3 Scenario 2: Bantu Farmers Borrow from Colonial Languages

Ongoing innovation and acquisition of new colors in farmer languages stem from contact with colonial languages, particularly French, but to some degree also English. In contrast to color borrowing in Gyeli PHG varieties, farmer languages first adopt a new color category, but do not borrow the color term that goes with the category in the colonial language. For instance, Bulu speakers are aware that there is a *blue* category which is distinct from *green* or any other category, but at the same time, speakers do not have any conventionalized term for the new category. Both the Mabi and the Bulu seem to refuse the use of loanwords which they only used when pressured to give a hue a name. So, the second step in color borrowing in farmer languages is to find a vernacular name for the newly acquired color category.

Most Bulu and Mabi speakers are fluent in French since they received schooling in French for several years, unlike the Gyeli PHGs who usually do not go to school or, if they do, for not as long nor as regularly. The French education system seems to have a direct impact on farmers' color systems. This was apparent in the much longer reaction times farmer consultants had when asked for the name of the color

[7] What is special here about the *white* term is that in these boundary areas speakers sometimes do not use the default *white* term, but one of the more unconventional ones, namely *nà yɛ̂* which also has the meaning of *bleached out*. The other atypical *white* term, *nà pfû*, does not show up at all in the average picture of a speech community, but consistently in individual speakers.

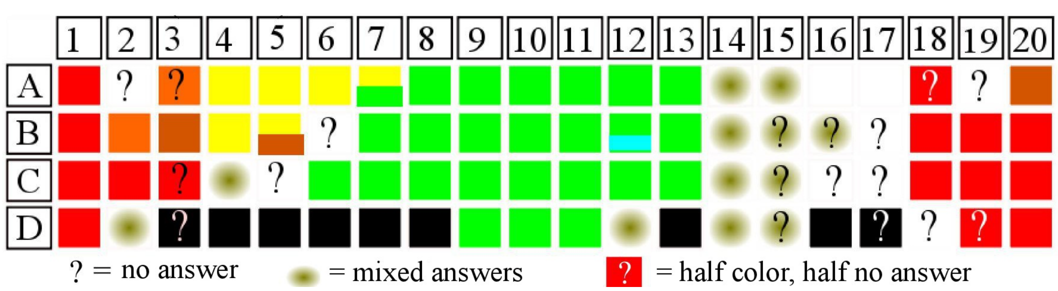
chips in their own languages, even though one would expect that they are more used to such interrogation tasks than community members who have not received any school education. When running the same naming task with Mabi and Bulu speakers, but asking for the color names in French, reaction times were, however, much shorter. Also, the answers for the French naming showed results nearly as one would expect them for French speakers. It seems, then, that two color systems are coexisting in speakers of farmer languages: a local and a colonial color system. At the same time, the colonial color system appears to greatly interfere with the local color systems. Speakers often gave answers such as, "I know that color, but we don't have a name for it in our language. In French, it would be *violet*."

3.1 Partition Of Color Space In Farmer Languages

The partition of color space in the farmer languages Mabi and Bulu is characterized by the emergence of new color categories which trigger major changes in the extension of previously existing color categories. The partitions of color space of the two farmer languages are not identical, but differ in (i) the number and type of color categories, (ii) the extension of color categories, and (iii) their boundaries. Category boundaries will be discussed in the following subsection. Mabi has a more conservative color system than Bulu, just like the Gyeli variety in contact with Mabi is more conservative than the Gyeli variety in the Bulu area.

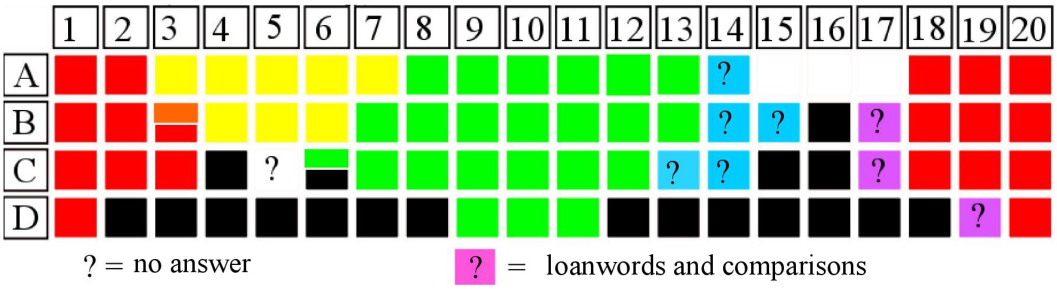
Mabi (8) has so far only developed an *orange* category. The emerging *blue* area in B12 does not fully count since, as indicated in the figure, only half of the informants called this hue *blue* while the other half would classify it as *green*. In this sense, the development of the Mabi color system goes against the predictions of the Basic Color Term theory which claims that *blue* should be the next category that is acquired after *green* (Berlin & Kay 1999). In comparison, Bulu (9) has already acquired more color categories including *blue* and *purple*. As with *blue* in Mabi, the *orange* category does show up in B3, but does not receive any majority answer. The Bulu color system and its development follow better the predictions by the Basic Color Term theory than Mabi does.

(8) Partition of color space among the Mabi in Kribi



For both farmer languages, the space of the original three color categories *black*, *red*, and *white* has shrunk due to the emergence of other color categories which are

(9) Partition of color space among the Bulu in Nko'olong



taking up the space. When comparing the partition of color space of farmer languages with their Gyeli PHG neighbors, the extension of the traditional color categories is much larger in the PHG varieties, which represents a more conservative system than in the farmer languages. As to the next wave of color innovation containing *yellow* and *green*, which are just entering the Gyeli PHG varieties now, these categories seem to have had reached a certain degree of stability before yet other colors such as *blue* or *orange* started emerging. They seem to be almost identical in the two farmer languages; differences in the extension and boundaries are only due to yet other new color categories such as *orange* which is taking up some of the *yellow* space in Mabi and *blue* which is taking up some of the *green* space in Bulu. Interestingly, the *green* category still has the largest extension of all categories in both farmer languages. Both languages also have in common that the latest color innovations, *blue*, *purple*, and *orange*, have a comparatively small extension in the color space.

3.2 Characteristics Of Transition Phase

The data on Gyeli PHGs and Bantu farmers suggest that the entrance of a new color category into a language is accompanied by a phase of transition. New categories expand and take up part of the space of previously existing categories. New category boundaries need to be defined. In a phase of transition, both the extension and the boundaries have not conventionalized and stabilized yet. The effects this phase of instability and transformation have on the partition of color space are, however, different in different speech communities and seem to correlate with the way a new category enters the system. In the Gyeli PHG varieties where a term is borrowed first before expanding the new color, category boundaries appear quite neat, even in the phase of transition, thus the only effect is that new categories have not yet reached their final extension. This is especially exemplified by the variety spoken in Nko'olong (6) which does not show any fuzzy boundaries. Effects of a transition phase are clearer in the Bibira variety (5) with some discontiguous *white* and *green* areas and a lack of majority answers for a few hues.

In contrast, farmer languages acquire a new color category first and then conventionalize a term for the new category. They show the same transition effects than the Gyeli PHGs in Bibira (discontiguous areas, no majority answer), but to a greater degree while also displaying other effects. Their transitory partition of color space and category boundaries appear less clear and well-defined than in the Gyeli PHGs. This impression of fuzzy category boundaries is caused by some characteristics of transitory effects that both farmer languages share, but that do not overlap entirely in both languages. Unconventionalized areas in the farmers' color space are generally marked by (i) discontiguous areas, (ii) a lack of majority answers, (iii) loanwords, and (iv) gaps. (10) shows, however, that not all of these characteristics occur in both farmer languages. For instance, loanwords are absent in Mabi, but used in Bulu. A cross in the table represents the absence of a feature while a tick represents its presence.

(10) Presence or absence of different transition effects in the color space

	Gyeli PHGs		Bantu farmers	
	Nko'olong	Bibira	Mabi	Bulu
discontiguous areas	✗	✓	✓	✓
lack of majority answer	✗	✓	✓	✗
loanwords	✗	✗	✗	✓
gaps	✗	✗	✓	✓

Just like Gyeli PHG varieties, farmer languages show discontiguous categories, but much more so: *black* in Bulu (9), and *black* and *orange* in Mabi (8) are more dispersed than the *white* outlier in Bibira. As to the second line in (10), the effect of finding no majority answer for a certain hue is absent in Bulu, but found in Mabi. The lack of a majority answer in Mabi is even more distinct than in Gyeli where every hue received at least a third of equal answers. In Mabi, however, certain hues received totally mixed answers. They are represented by a greenish dot in (8) and are typically found in the *blue* and *brown* areas.

Loanwords are not used in Mabi, but in Bulu. Some Bulu speakers call newly innovated categories such as *blue* and *purple* by their French loanwords–while pointing out that these terms are not part of the Bulu language–or through some comparison to objects in the world, both being represented by a colored square with a question mark in (9). For instance, for *blue*, many Bulu speakers use the word for 'sky', *yóp*. These comparisons are, however, not conventionalized and thus not used systematically across speakers. Comparisons and loanwords rather present transitory strategies in dealing with non-conventionalized color categories. In contrast, Mabi speakers do not use comparisons and loanwords when dealing with unconventionalized areas, they lack majority answers.

Finally, both farmer languages have in common that, in contrast to the Gyeli PHGs, there are gaps in the color space. Gaps, represented by a question mark on a white background in the color space, occur when a majority of speakers declared that they did not know any name for that particular hue in their language. Gaps occur in Mabi in the *purple* space and, in both Mabi and Bulu, in the *brown* space which has in neither language a term, i.e. the majority of speakers would neither use loanwords nor comparisons. Since none of the color terms they already have at hand can sufficiently describe the specific hue for which speakers seem to feel that they are not part of any other category, gaps may indicate that speakers are acquiring a new color category which is at an early stage of acquisition.

4 Outlook

The data from the the Gyeli PHG varieties and Bulu correspond, on the one hand, with the predictions of the Basic Color Term theory regarding the order in acquiring new color terms. Historically, these languages disposed of three color terms (*red*, *black* and *white*). Newly incoming colors follow the predicted order of *yellow* → *green* → *blue* → *purple*, *orange*, and *brown*. Mabi, however, contradicts these principles because *orange* becomes established before *blue*. On the other hand, the findings also support Levinson (2000)'s proposal that color categories and color terms emerge slowly and gradually under certain societal pressures. Bantu farmer languages acquire new colors under the influence of colonial color systems while Gyeli PHGs are adopting the recently and well established color categories *yellow* and *green* from the more prestigious Bantu farmer languages. The Gyeli and Bantu farmers cases show that either a lexical term or a color category can be borrowed without necessarily involving the borrowing of the two at the same time.

For future work, it would be valuable to track how the color systems of the four speech communities, and possibly other languages of the area, develop over time, for instance, to test whether new color categories of the Bantu farmers, once they are stably established, also trickle down into the Gyeli PHGs' language. Furthermore, since the present study is only concerned with color borrowing in a limited area, studies on color borrowing in other contact situations could shed light on whether one of the two presented paths of borrowing is more frequent than the other as well as whether a certain path of borrowing is constrained by certain factors.

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Bilingual Complex Verbs: So what's new about them?[1]

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Introduction

In this paper I describe bilingual complex verb constructions in Bengali-English bilingual speech. Bilingual complex verbs have been shown to consist of two parts, the first element being either a verbal or nominal element from the non-native language of the bilingual speaker and the second element being a helping verb or dummy verb from the native language of the bilingual speaker. The verbal or nominal element from the non-native language provides semantics to the construction and the helping verb of the native language bears inflections of tense, person, number, aspect (Romaine 1986, Muysken 2000, Backus 1996, Annamalai 1971, 1989). I describe a type of Bengali-English bilingual complex verb which is different from the bilingual complex verbs that have been shown to occur in other codeswitched Indian varieties. I show that besides having a two-word complex verb, as has been shown in the literature so far, bilingual complex verbs of Bengali-English also have a three-part construction where the third element is a verb that adds to the meaning of these constructions and affects their aktionsart (aspectual properties). I further show that monolingual Bengali complex verbs directly contribute to the rise of these bilingual complex verbs. This paper is divided into three sections. The next section discusses relevant literature on monolingual and bilingual complex verbs in Indian languages and their bilingual varieties. The third section accounts for the verbal system of Bengali and the fourth section describes Bengali-English complex verbs.

Most of the new bilingual Bengali-English data in this paper come from a fieldwork-based corpus of 30 fluent bilingual speakers of Bengali-English (age range 20-45 years) residing in Kolkata, India. I recorded informal conversations between these speakers. In addition, a few of the examples mentioned in this paper are mine, as a native speaker of Bengali-English.

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2 Literature Review

Complex verbs occur frequently in Indian languages (Butt 2003, Abbi and Gopalakrishnan 1991). Butt (2003) talks about complex verbs of monolingual Indian languages such as Urdu, Hindi and Bengali. Monolingual complex verbs have an N+V structure or a V+V structure. In an N+V structure, the noun is followed by a light verb such as *do* which bears inflections and turns the N+V construction into a verb. For example, *bikri kɔra* 'sale do' is an N+*do* construction in Bengali, which means 'sell'. The V+V structure consists of two or more predicational elements, where the main verb provides the main semantic information to the construction and is followed by a light verb which provides subtle semantic modifications such as benefaction, suddenness, volitionality and affects the aktionsart of the joint predication. The choice of light verb lends a slightly different meaning to the construction. An example of this structure is *b^{h}ule gec^{h}i* 'forget go' meaning '(I/we) have forgotten'. Together these two verbs predicate as a single element. The light verbs that occur in a V+V construction are verbs such as *give, take, go, move, sit* etc. These light verbs do not predicate fully and are identical in form to a main verb in the language. Butt (2003) does not make a distinction between light verbs such as *do* and *be* (that occur in N+*do* constructions) and light verbs such as *give, take, go, sit, come* etc. that occur in V+V constructions. However, in this paper I show that there are some crucial distinctions between these two types of light verbs (see also Basu 2010, which deals with the semantics and event structure of compound V+V verbs in Bengali).

Bilingual complex verbs also occur frequently in codeswitching between Indian languages and English. Romaine (1986) reports the occurrence of these verbs in bilingual Punjabi-English speech. In her data, the complex verbs consist of either English nouns, verbs, verbal nouns (such as *lobbying*) or phrasal verbs (such as *pick up*) alongside Punjabi operators such as 'do' *karna* and 'be' *hona*. Operators *do* and *be* distinguish between the stativity of the constructions, in that *do* occurs in actional constructions and *be* in stative constructions. The operators modify the English nominal or verbal elements and bear inflections. Romaine uses the term *compound verb* to refer to these constructions and says that there is a tendency for English verbs to occur more frequently in such constructions.

Annamalai (1971) distinguishes between constructions such as *try pannu* 'try' (V+*do*) and *business pannu* 'business' (N+*do*) in Tamil-English bilingual speech. He states that bilingual Tamil-English V+*do* constructions are different from bilingual N+*do* constructions because accusative case can be optionally added to *business*, but not to *try*. This shows *business* is a noun and not a verb. In addition, dummy verb *do* is added mainly after a main verb as a carrier of inflection. In a later paper Annamalai (1989) claims that balanced bilinguals and imbalanced bilinguals (people who are stronger in Tamil than in English) can be distinguished on the basis of the types of mixed compounds they use. He states that imbalanced bilinguals during code-mixing conform to native Tamil N+*do* constructions by using constructions like 'reservation do' and balanced bilinguals would use constructions such as 'reserve do' which are innovations in bilingual speech because in native Tamil, a V+*do* construction cannot occur. More research obviously needs to be done in this area.

Muysken (2000) distinguishes between bilingual N+*do* constructions from bilingual V+*do* constructions. He states that in bilingual V+*do* constructions, the foreign verb is adjoined to the helping verb of the native language, resulting in an alternational strategy which is different from noun incorporation, where the foreign noun occurs before a helping verb such as *do* because it is selected by it. For Muysken, the foreign verbs in complex verb constructions are not borrowings, because they are not phonologically adapted to the recipient language. He also states that bilingual complex verbs are productive, which is true for Bengali-English complex verbs with common English verbs such as *start, use, think* occurring in such constructions. However, Muysken (2000), Romaine (1986), and Annamalai (1971, 1989) do not mention anything about these verbs having a three-word structure.

Thompson (2010) briefly mentions verb borrowings in Bengali and says that any new verb created in Bengali will have an N+V structure. Bhattacharya (2001) states that when English verbs are borrowed into Bengali, they appear in complex verb structures along with Bengali operators such as *do* and *be* bearing inflection (see also Pillai 1968 for a brief description of Bengali verb borrowings).

In the next section I describe the verbal system of monolingual Bengali, and show later how bilingual complex verbs are based on Bengali structures.

3 The Verbal System of Bengali

The verbal system of Bengali can be divided into two types of verbs, simple verbs and complex verbs. As in other Indo-Aryan languages, complex verbs occur abundantly in this language. These complex verbs consist of several classes of constructions which are of the Noun/Adjective + *do* type (N/A+*do*), Noun/Adjective + *do* + Verb type (N/A+*do*+V) and Verb + Verb type (V+V). These properties of Bengali are outlined in table (1). N/A+*do* constructions have been called *conjunct verbs* and V+V constructions have been called *compound verbs* (Thompson 2010, Bhattacharya et al. 2006). The term *complex verb* is often used to refer to *conjunct* and *compound* verbs together as a class of verbs (Butt 2003). Although in the discussion on monolingual Bengali I will distinguish between *conjunct* and *compound* verbs, I will not make a strict distinction between these two constructions in the discussion of bilingual Bengali-English verbs. This is because *conjunct* constructions and *compound* constructions are not a source of confusion in monolingual Bengali. But the distinction between N+*do* and V+*do* in bilingual complex verbs is a matter of some debate and therefore will not be addressed in detail in this paper. This issue needs to be researched further.

Table 1: Verbal system of Bengali

Bengali Verbs	Sub types	Components of verbs	Examples of each type: Examples	Gloss	Translation
Simple verbs		1 verb	lek^{h}a pɔɽa	‘write’ ‘read’	to write to read
Complex verbs	Conjunct verbs	N+ *do* N + *do* + V	bikri kɔra ɟiggeʂ kore newa	‘sale do’ ‘question do take’	to sell to ask for oneself
	Compound verbs	V + V	ʂue pɔɽa k^{h}e newa	‘sleep fall’ ‘eat take’	to fall asleep to eat for oneself

3.1 Conjunct Verb Constructions of Bengali (N+*do* / N+*do*+V)

In Conjunct verbs constructions, nouns or adjectives occur along side helping verbs such as *kɔra* ‘do’. The nouns give the semantic content to the conjunct and the helping verbs turn the constituent N+V into a predicate. The helping verb also bears inflection. An example is *b^{h}ul kɔra* ‘to mistake’, formed by the noun *b^{h}ul* ‘mistake’ and the verb *kɔra* ‘do’. Bengali has a limited number of simple verbs and so many events are expressed by these N+V combinations.

Some conjunct verbs also have a third element, occurring after the noun and the helping verb, forming a N+*do*+V structure. This third element is a verb that alters the aktionsart of the complex verb and provides meaning. This verb has been referred to as a *vector verb* (Dasgupta 1977, Ramchand 1990), or it has been treated as part of the class of *light verbs* (Butt 2003), including verbs such as *do* and *be*. However, in this paper I make a distinction between helping verbs and vector verbs in bilingual Bengali-English because often they perform different functions. I use the term *helping verb* to refer to verbs such as *do* and *be* that turn N+V constituents into verbal predicates. The term *vector verb* is used for verbs such as *go, come, throw, sit, give* and *take* that affect the aktionsart of the complex verb and provide semantic nuances such as benefaction, suddenness and volition. (1a) and (1b) illustrate the two-part and three-part constructions.

(1a) ami ok-e bæpar-ʈa **ɟiggeʂ kor-ec^h-i** **(N+*do*)**
1SG 3SG-ACC thing-DEF question do-PFV-1P
I have asked him/her about the thing.

(1b) ami ok-e o-ʈa **ɟiggeʂ kor-e ni-ec^h-i** **(N+*do*+V)**
1SG 3SG-ACC thing-DEF question do-PFV.PTCP take-PFV-1P
I have asked him/her about the thing for myself (completely).

In (1a), which has no vector verb, the helping verb *korec^hi* 'did' bears inflection of tense, person and aspect. In the absence of a vector verb it is not clear for whom the action of asking was performed and also if the action of asking was completed. The vector verb in (1b) *niec^hi* 'take' makes it clear that the subject asked about the thing for his or her own self and also indicates that the action of asking was complete by adding telicity to the predicate. In a two-part conjunct verb, the helping verb bears tense, person and aspect inflection. In a three-part conjunct this verb is in the perfective participle form, whereas the vector verb bears tense, person and aspect inflection. Not every noun adjacent to a verb forms a conjunct verb. In regular object noun-verb constructions, the nouns are merely arguments of the verbs (2), which do not form a complex verb construction (for relevant distinctions see Bhattacharya et. al. 2006:347-350).

(2)	o	ama-r	t̪^heke	**ʂahajjo**	**ni-ec^h-e**	**(O V)**
	3SG	1SG-GEN	from	help	take-PFV-3P	
	He/She has taken help from me.					

3.2 Compound Verb Constructions of Bengali (V+V)

In compound verbs two verbs are adjacent to each other and express a single event. The first or the main verb is in the non-finite perfective participle form and the second verb is a light verb that carries tense, aspect and person inflection (Dasgupta 1977, Ramchand 1990, Basu 2010, Paul 2003, Abbi and Gopalkrishnan 1991, Butt 2003). The first verb is often referred to as the *pole* and the second verb as the *vector verb* (cf. Dasgupta 1977, Ramchand 1990). The examples below illustrate the difference between a simple verb and a complex verb.

(3a)	ami	boi	gulo	**guc^hi-ec^hil-am**	**(simple verb)**
	3SG	book	PL	arrange-PST.PFV-1P	
	I had arranged the books.				

(3b)	ami	boi	gulo	**guc^hi-e**	**d̪i-ec^hil-am**	**(cplx verb: V+V)**
	3SG	book	PL	arrange-PFV.PTCP	give-PST.PFV-1P	
	I had arranged the books (completely for someone else).					

In (3a) the verb *guc^hiec^hilam* 'arranged' carries inflection, while (3b) has a compound verb, in which the pole verb *guc^hie* 'arranged' is in the perfective participle form, and the vector verb *d̪iec^hilam* 'gave' carries inflection. Without the vector verb in (3a) it is not clear as to whether the books were arranged for the subject or for someone else and if the action of arranging was complete. In (3b) the vector verb loses its inherent meaning as *give* and instead specifies a benefactive role, by making it clear that the books were arranged for someone other than the subject (Paul 2003) and adds telicity to the predicate. In (3b) perfective aspect is marked on both the pole and the vector, although the pole is always in perfective aspect irrespective of what aspect the vector has.

Example (4b) shows a vector that affects only the aktionsart of the construction. In (4a) the simple verb *poɽec^{h}e* 'fell' indicates that the event of falling has happened but does not indicate whether it reached its endpoint. The vector *gæc^{h}e* 'go' in 4(b) makes it is clear that the event of falling has reached its endpoint. The verb *gæc^{h}e* inherently means 'has gone' but when it occurs in the position of a vector it does not carry any meaning of *going*. It only alters the aspectual information of the construction. Therefore *gæc^{h}e* 'go' is slightly different from *d̪iec^{h}i* 'gave' because the latter adds an additional meaning to the construction which the former doesn't (see also Basu 2010).

(4a)	s̯e	gac^h	t̪^{h}eke	**poɽ-ec^h-e**		**(simple verb)**
	3SG	tree	from	fall-PFV-3P		
	He/She has fallen from the tree.				(Thompson 2010)	

(4b)	s̯e	gac^h	t̪^{h}eke	**poɽ-e**	**gæ-c^h-e**	**(complex verb: V+V)**
	3SG	tree	from	fall-PFV.PTCP	go-PFV-3P	
	He has fallen from the tree (completely). (Thompson 2010)					

Different verbs can occur independently as simple verbs, pole verbs or vector verbs in Bengali. However, when they occur as vectors, they often lose their inherent meanings and add a slightly different meaning to the construction. For example, a vector such as *d̪iec^{h}e* 'give' indicates benefaction, *niec^{h}e* 'take' indicates doing something for oneself, *bos̯ec^{h}e* 'sit' adds suddenness, *p^{h}elec^{h}e* 'throw' indicates completion. There are about 12 to 16 vector verbs that can occur as vectors in Bengali (Thompson 2010, Basu 2010, Paul 2003) and all these verbs indicate change of state. The verbs that are commonly recognized as vector verbs are *go, throw, rise, lift, fall, sit, come, move, give,* and *take.*

There have been different claims about the status of the vectors in compound verbs. Hook (1974:94-97) and others claim that vector verbs of Indo-Aryan languages are semantically empty and have undergone a process of grammaticalization. I use the term grammaticalization to refer to the process by which lexical items such as nouns or verbs change into items that serve only a grammatical function in a language, often through semantic bleaching. Abbi and Gopalakrishnan (1991) argue that vector verbs are multi-functional and have functions such as *aspectual*, *adverbial* and *attitudinal*. For example, a vector such as *gæc^{h}e* 'go' has an aspectual function where it only affects aktionsart, whereas some vectors such as *bos̯ec^{h}e* 'sit' have an adverbial function that mark suddenness. Basu (2010:44) suggests that vector verbs undergo different stages of grammaticalization and that some vector verbs such as *gæc^{h}e* 'go' are more grammaticalized than other vector verbs such as *bæɽacc^{h}e* 'roam'.

Vector verbs of Bengali can be analyzed in terms of the mechanisms of grammaticalization proposed by Heine and Kuteva (2003). Firstly, vector verbs of Bengali only show signs of desemanticization (loss of meaning). For instance, when *gæc^h^e* 'go' occurs as a vector verb (4b), it does not add any meaning of *going* to the compound verb. It only acts as a grammatical item that carries inflections and affects the aktionsart of the construction. Therefore, in that context, it has undergone a semantic loss. However, when it occurs as a pole or simple verb, it retains its full meaning. This is in line with factors that are typical of the process of grammaticalization (Hopper and Traugott 1993).

However, in terms of the other mechanisms of grammaticalization such as *decategorization* (loss of structural properties such as the ability to bear inflections, case etc.) and *erosion* (loss of phonetic material), the vectors verbs of Bengali do not show either type of loss. Vector verbs only show a semantic reduction (see also Heine and Kuteva 2007 for additional mechanisms of grammaticalization). Some vectors such as *gæc^{h}e* 'go' and *p^{h}elec^{h}e* 'throw' show a complete loss of semantic content, while most vectors such as *give, take, sit, rise, lift, move, come,* do not show a complete loss but a reduction of semantic content. Based on these properties, it can be said that vector verbs as a whole set are in a grammaticalization path but do not act like completely grammaticalized items (see also Basu 2010:44).

Poles and vectors also need to be semantically compatible with each other (Paul 2003:8). Vectors such as *give, take, sit, come, move, keep, rise, lift,* and *roam,* when they occur in a compound, add a distinct meaning to the compound verb. That is why they pair with only those poles with which they have some semantic compatibility. The verb *nece* 'dance' is a motion verb. So in (5a) it pairs with a vector whose meaning matches with it. The vector *bæɽacc^{h}e* means 'roaming'. Therefore *nece* and *bæɽacc^{h}e* are in some sense semantically compatible with each other, because they both involve motion. However, verb *ʂue* 'lie' is stative and therefore it's pairing with a vector verb of motion sounds odd.

(5a)	me-ʈa	ʂara	d̪in	**nec-e**	**bæɽa-cc^h-e**
	girl-DEF	whole	day	dance-PFV.PTCP	roam-PROG-3P
	The girl is dancing around the whole day. (Paul 2003:8)				

(5b)	*me-ʈa	ʂara	d̪in	**ʂu-e**	**bæɽa-cc^h-e**
	Girl-DEF	whole	day	lie-PFV.PTCP	roam-PROG-3P
	The girl is lying around the whole day. (Paul 2003:8)				

On the other hand, vectors such as *gæc^{h}e* 'go' and *p^{h}elec^{h}e* 'throw' do not have a semantic compatibility requirement, in that they do not add any distinct lexical meaning to the compound but only modify aspectual information (4b). I hypothesize that this is because they have become grammaticalized and therefore do not require semantic compatibility with their pole. (Paul 2003: 8-9, Basu 2010: 44). An example of this is *more gæc^{h}e* 'has died', *more* is 'die' and *gæc^{h}e* is 'go'. Although *gæc^{h}e* 'go' is a motion verb, *more* 'die' is not, and in spite of that, this pairing is grammatical.

4. Bilingual Complex verbs of Bengali-English (N/V+*do*, N/V+*do*+V)

Bilingual Bengali-English complex verbs combine lexical nominal or verbal elements in the bare form from English with helping verbs from Bengali. English nouns (6a), verbs (7a), verbal nouns (6b) and phrasal verbs (6c) can occur in these constructions, although English verbs occur most frequently in my corpus. The term verbal noun refers to elements such as *shopping* and *skipping*, and phrasal verbs refer to elements such as *build up, work out, hang up*, following Romaine (1986). The elements from Bengali that occur in these constructions are the helping verbs *kɔra* 'do', in active constructions, and *hɔwa* 'be', in stative constructions, in line with Romaine's (1986) observation of Punjabi-English bilinguals. Each complex construction together expresses one single event, and the bare English nominal or verbal element provides lexical meaning and the helping verbs bear tense, person and aspect inflections. Although Muysken makes a distinction between (N+*do*) and (V+*do*) structures bilingually, I do not explore this distinction because my focus are three-part bilingual verbs. The sentences below illustrate some nominal and verbal elements that occur in bilingual Bengali-English complex verbs.

(6a) ʂei moment-e **operation** **kor-l-o** **(N+*do*)**
That moment-LOC operation do-PST-3P
In that moment, (he) did the operation.

(6b) t̪ui o-r ʂɔŋge **shopping** **kor-b-i**? **(Verbal noun+*do*)**
2SG 3SG-GEN with shopping do-FUT-2P
You will do shopping with her?

(6c) cinema-ʈa ɟe b^{h}abe **build up** **kor-ec^{h}il-o** **(Phrasal V+*do*)**
cinema-DEF COMP type build up do-PST.PFV-3P
The way they had built up the movie.

4.1 Three-part Bilingual Complex Verbs (N/V+*do*+V)

The literature on bilingual complex verbs in Indian languages has reported the occurrence of only two verbs. However some verbs of Bengali-English have a three-part structure that consists of a bare English nominal or verbal element, a Bengali helping verb and a Bengali vector verb. This structure differs from two-part complex verbs in important ways such as meaning and aspectual nuances. The examples below contrast a two-part (7a) and a three-part complex verb (7b).

(7a) o Ritayon-ra **shift** **kor-ec^{h}-e** **(V+*do*)**
Oh NAME-PL shift do-PFV.PTCP
Oh Ritayon and folks have shifted.

(7b) o Ritayon-ra **shift** **kor-e** **gæ-c^{h}-e** **(V+*do*+V)**
Oh NAME-PL shift do-PFV.PTCP go-PFV-3P
Oh Ritayon and folks have shifted (completely).

The three elements in the three-part complex verb together express a single event (7b). Examples (7a) and (7b) can be compared to examples (1a) and (1b) and (4a) and (4b) of monolingual Bengali, in the sense that the bilingual two-part verbs correspond to either simple verbs or to conjunct verbs (N+*do*) in Bengali and the bilingual three-part verbs correspond to either compound verbs (V+V) or three-part conjunct verbs (N+*do*+V) in Bengali.

In three-part complex verbs, the helping verbs are in perfective participle form and the vector verbs carry tense, person and aspect inflection, affect the construction's aktionsart and often provide additional semantic information. Vectors such as *gæc^{h}e* 'go' and *p^{h}elec^{h}e* 'throw' lose their lexical meanings completely, and only affect the construction's aktionsart. I hypothesize that this is because they have become grammaticalized and therefore perform only a grammatical function in the construction. For instance, in (7b) the vector *gæc^{h}e* 'go' does not add any extra meaning of going to the construction but affects the aktionsart by adding telicity to the predicate.[2] However, other vectors such as *give* and *take* partially lose their lexical meanings and add an additional meaning that is usually different from their own inherent meanings. For instance in (8) the vector *d̪iec^{h}e* 'gave' introduces a benefactive role. In itself, *d̪iec^{h}e* 'gave' indicates handing a concrete object to someone, but as a vector it adds a benefactive reading. In this respect, the vector *d̪iec^{h}e* 'gave' also affects the argument structure of the sentence since it implicitly introduces another argument to the predicate. In addition, it also affects the aktionsart of the construction by adding telicity to the predicate.

(8) ora park-ʈa **renovate** **kor-e** **d̪i-ec^{h}-e** **(V+*do*+V)**
3PL park-DEF renovate do-PFV.PTCP give-PFV-3P
They have renovated the park (completely for someone else).

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2 Other kinds of subtle aspectual distinctions also arise for progressive and habitual forms, which is in line with the aspectual subtleties provided by the perfective forms.

Helping verbs are in some ways similar to vector verbs because they can both carry inflections. However, they are also different because helping verbs turn N+*do* constructions into verbs, while vector verbs affect the aktionsart of the construction and often add semantic information. Helping verbs append to bare nouns and adjectives in monolingual Bengali and to bare nouns and verbs in bilingual Bengali-English. Also, helping verbs can append to both native and non-native elements while vectors append only to native verbs which are in perfective participle form. Only verbs such as *do* and *be* belong to the class of helping verbs while there are 12 to 16 verbs that occur as vector verbs. Table (2) summarizes the relevant similarities and differences.

Table 2: Similarities and differences between helping verbs and vector verbs

	Helping verbs	**Vector verbs**
Similarities	Carry inflection for tense, person and aspect	
Differences	Perform a verbalizing function	Alter the aspect and/or semantics of the construction
	Append to bare forms	Append to perfective forms
	Append to nouns, adjectives and verbs	Append only to verbs
	Class of 2, *do* and *be* [3]	Class of 12 to 16 verbs
	Append to both native and non-native elements; native elements are always nouns or adjectives	Append only to native verbs

4.2 Property of Semantic Compatibility

The principle of semantic compatibility that affects poles and vectors in monolingual Bengali also affects three-part bilingual complex verbs. There must be semantic compatibility between the Bengali vector verbs and the English nominal or verbal elements. On the one hand, with a Bengali vector verb such as *gæc*^{h}*e* 'go'(7b) and *p*^{h}*elec*^{h}*e* 'throw' (9), any English nominal or verbal element can occur. I hypothesize that this is because vectors such *gæc*^{h}*e* 'go' and *p*^{h}*elec*^{h}*e* 'throw' have lost their own inherent meanings and have become grammaticalized.

(9)	O	t̪ui	already	**apply**	**kor-e**	**p^{h}el-ec^{h}i-ş**
	Oh	2SG	already	apply	do-PFV.PTCP	throw-PFV-2P

[3] In monolingual Bengali, other helping verbs such as *take, cut, give* etc. occur (Thompson 2010). Pillai (1968) says that *give* can also occur as a helping verb in bilingual complex verbs. However, if *give* occurs as a helping verb in a bilingual complex verb, it is not clear if the construction is a complex verb or a regular object verb construction.

Oh, you have already applied (completely)?

On the other hand, with a Bengali vector such as *bos̯ecʰe* 'sit', the English nominal or verbal elements is more semantically restricted. This is because *bos̯ecʰe* 'sit' is a telic verb which means that it has a specific endpoint. As a vector, the verb *bos̯ecʰe* 'sit' means doing something suddenly. Therefore it cannot pair well with verbs such as *maintain* (10a) and *develop* that do not have definite endpoints, contrary to *delete* (10b).

(10a) *ami ama-r GPA **maintain kor-e bos̯-ecʰ-i**
1SG 1SG-GEN GPA maintain do-PFV.PTCP sit-PFV-1P
I have suddenly maintained my GPA.

(10b) are Pritam gaan-ʈa **delete kor-e bos̯-ecʰ-e**
So Pritam song-DEF delete do-PFV.PTCP sit-PFV-3P
Pritam has (unintentionally) and suddenly deleted the song.

4.3 Syntactic Tests on Bilingual Complex Verbs

Ramchand (1990) used some syntactic tests on Bengali compound verbs (V+V) to determine if the two verbs display syntactic unity. I have applied some of these tests to three-part complex verbs below, to show that the three parts form a constituent.

4.3.1 Adverb Intrusion Test

Insertion of adverbs in between the three elements of the bilingual complex verb results in ungrammaticality. In (11a), the adverb is placed before the complex verb. This is the position where adverbs should occur with respect to complex verbs. From this position, adverbs take scope over the entire complex verb and modify all the three verbs of the construction. However, if adverbs are placed between any of the three elements of the compound verb, the sentences become ungrammatical (11b).

(11a) Professor solution-ʈa **clearly explain kor-e d̪i-l-o**
Professor solution-DEF clearly explain do-PFV.PTCP give-PST-3P
The professor explained the solution clearly.

(11b) Professor solution **explain (*clearly) kor-e (*clearly) d̪i-l-o**
Professor solution explain do-PFV.PTCP give-PST-3P
The professor explained the solution clearly.

4.3.2 Negation Test

Negation occurs after the complex verb (12a), taking scope over the whole complex verb. If negation is placed in any other position the sentence becomes ungrammatical (12b). Therefore, it is not possible to negate only part of the complex verb.

(12a) Professor solution-ʈa **explain kor-e d̪i-l-o na**
Professor solution-DEF explain do-PFV.PTCP give-PST-3P NEG
The professor did not explain the solution.

(12b) Professor solution-ʈa (***na) explain (*na) kor-e (*na)**
Professor solution-DEF NEG explain NEG do-PFV.PTCP NEG
d̪i-l-o
give-PST-3P
The professor did not explain the solution.

4.3.3 Coordination Test

If there are two English nominal or verbal elements in a sentence then each nominal or verbal element should have its own Bengali helping verb and vector verb. Two English nominal or verbal elements cannot be coordinated with only one Bengali helping verb and vector verb. Therefore, sentence (13b), which has two English elements combined with only one operator and vector verb is not a well-formed sentence. Sentence (13a) is well formed because both English verbs *simplify* and *explain* have their own Bengali operators and vector verbs.

(13a) Professor solution-ʈa **simplify kor-e d̪i-l-o**
Professor solution-DEF simplify do-PFV.PTCP give-PST-3P
ar **explain kor-e d̪i-l-o**
CONJ explain do-PFV.PTCP give-PST-3P
The professor simplified and explained the solution.

(13b) *Professor solution **simplify** ar **explain kor-e d̪i-l-o**
Professor solution CONJ do-PFV.PTCP give-PST-3P
The professor simplified and explained the solution.

4.3.4 Question and Answer Test

The question and answer test needs to be modified slightly in order to test bilingual complex verbs. This is because if a sentence containing a complex verb is turned into a question, then the entire complex verb or only the Bengali verbs can be used as the answer to that question (14b). However, using only the English element as the answer is not acceptable (14d). Therefore the test does not work exactly the same way for a bilingual complex verb as it does for a monolingual compound verb. The test is still constrained in a way, because using only the English element is not allowed (14c).

(14a) Professor ki solution **explain** **kor-e** **d̪i-l-o**?
Professor Q solution explain do-PFV PTCP give-PST-3P
Did the professor explain the solution?

(14b) hæ (**explain**) **kor-e** **d̪i-l-o**
Yes explain do-PFV PTCP give-PST-3P
Yes (he) explained it.

(14c) *hæ **explain**
Yes explain
Yes explained.

These tests also apply successfully on two-part complex verbs thereby showing that two-part complex verbs also act as one syntactic unit. The table below (3) summarizes the similarities and differences between two-part and three-part complex verbs in bilingual Bengali-English.

Table 3: Similarities and differences between two-part and three-part structures

	Two-part complex verbs	**Three-part complex verbs**
Similarities	Express a single event and form a single syntactic unit	
Differences	No vector verb	Vector verb present
	Without the vector there is a difference in meaning from the three-part structure	Vector adds meaning and affects aktionsart
	Consist of two elements	Consist of three elements
	Helping verbs bear inflections of tense, person and aspect	Helping verbs in perfective participle form. Vector bears inflections.
	Semantic compatibility between English element and helping verb is unnecessary	Requires semantic compatibility between English element and vector verb

5 Conclusion

In this paper I described a different type of bilingual complex verb that occurs in Bengali-English bilingual speech which has not been reported so far in the literature on bilingual complex verbs in Indian languages. This complex verb has a three-part structure where the third element is a verb that provides semantic information and affects the aktionsart of the construction. The three elements together express one single event and with the help of syntactic tests I showed that all three elements are part of the same constituent. I also showed in what ways the two-part complex verbs differ from their three-part counterparts and the differences between helping verbs and vector verbs in three-part complex verbs.

There are some new directions and outstanding questions that need to be explored in future research about this intriguing topic. First, the structural differences between bilingual N+*do* and bilingual V+*do* constructions need to be teased apart. It is also necessary to explore a theoretical framework that can account for bilingual V+*do* constructions as innovations in bilingual speech. The property of semantic compatibility that applies to bilingual three-part constructions needs to be more nuanced and further explored. Finally, although substantial research has been done on vector verbs, it would be relevant to investigate the vector verbs as a class and identify common properties among them.

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Verbal Reduplication and Grammaticalization: A Study of Mandarin *VV-kan* and *V-kankan* Constructions

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Introduction

The present study investigates two constructions in Mandarin[1]—*VV-kan* and *V-kankan*—which show an interesting formal asymmetry in the distribution of verbal reduplication and *kan* 'see', but denote the same meaning 'try … and find out'. The *VV-kan* construction involves a schematic slot that is filled with a reduplicated verb, as in (1), while the *V-kankan* construction involves a verb that is followed by reduplicated *kankan* 'see.see', as in (2). What is intended to be discovered, or "found out," by trying out the action is either covertly implied through context, as in (1a) and (2a), or overtly expressed by an interrogative complement clause, as in (1b) and (2b). Despite the formal asymmetry between the two constructions, (1) and (2) are observed to be free variant forms competing for the same meaning 'try … and find out', since a speaker would switch from one to the other without even noticing their choices.

(1a)	zhe	shui	ni	hehe-kan	ba!
	this	water	you	drink.drink-see	PART

'Try drinking this water and find out (implied: how it tastes)!'

[1] Contemporary data examined in this study are based on Mandarin spoken in Taiwan.

(1b) zhe shui		ni	hehe-kan	weidao	ruhe
this water		you	drink.drink-see	flavor	how

‘Try drinking this water and find out how it tastes!’

(2a) zhe	shui	ni	he-kankan	ba!
this	water	you	drink-see.see	PART

‘Try drinking this water and find out (implied: how it tastes)!’

(2b) zhe	shui	ni	he-kankan	weidao	ruhe
this	water	you	drink-see.see	flavor	how

‘Try drinking this water and find out how it tastes!’

With evidence from corpus data, however, Cheng and Lu (2012) show that the two constructions can be distinguished based on the types of verbs that can fit into the schematic V/VV slot.[2] While both constructions can be used with monosyllabic verbs, as has been shown in (1) and (2), *V-kankan* can also be used with disyllabic compound verbs, as in (3a), and other complex verb phrases, as in (3b) and (3c). That is, both morphologically simple and complex verbs occur in *V-kankan*.[3]

(3a) [jiancha]$_{\text{comp}}$-kankan			(**V-V compound**)
examine-see.see			‘try examining and find out’
(3b) [zuo	shiyan]$_{\text{VP}}$-kankan		(**VO verb phrase**)
[do	experiment]-see.see		‘try doing some experiment and find out’
(3c) [ba	shiqing	wancheng]$_{\text{BA}}$-kankan	(***ba* construction**)[4]
[BA	business	finish]-see.see	‘try finishing the business and find out’

Syntactically, transitive use of *VV-kan* can take both clausal and nominal complements, as can be seen in (1b) and (4a), but *V-kankan* only allows clausal complements, as in (4b), and a nominal complement would have to be

[2] Cheng and Lu’s (2012) finding is based on data retrieved from the Academia Sinica Balanced Corpus of Modern Chinese. All 141 tokens of *VV-kan* are used exclusively with monosyllabic verbs. There are 16 tokens of *V-kankan* used with morphologically complex verbs (14 compound verbs; 2 V-O phrases) and 7 used with monosyllabic verbs.

[3] Since the majority of morphemes in Chinese are monosyllabic (with only a few exceptions in loan words), multisyllabic words generally are morphologically complex (Norman 1988:156).

[4] The *ba* construction in Mandarin involves the direct object being placed immediately after *ba* and before the verb (Li and Thompson 1981:463).

incorporated with the verb in V slot into a complex verb phrase that precedes *kankan*. Therefore, *ta* 'he' serving as *wen-kankan*'s complement in (4b) is unacceptable, but the complex verb phrase *wen ta* 'ask him' in [*wen ta*]-*kankan* 'try asking him and find out' in (4c) is acceptable.

(4a) wo qu wenwen-kan ta
I go ask.ask-see he
'I'll go and try asking him and find out.'
(4b) wo qu wen-kankan ?$[ta]_{NP}$/[ta yuan-bu-yuanyi lai$]_{CL}$
I go ask-see.see he/he willing-NEG-willing come
'I'll go and try asking him/and find out if he's willing to come.'
(4c) wo qu [wen $[ta]_{NP}$]-kankan [(ta) yuan-bu-yanyi lai$]_{CL}$
I go ask he-see.see (he) willing-NEG-willing come
'I'll go and try asking him and find out if he's willing to come.'

In addition, *V-kankan* exhibits ambiguity in two contexts. When preceded by a complex motion verb, *kankan* exhibits a fuzzy status between (i) an independent verb in serial verb construction [$V_{compx/motion}$ + *kankan*$]_{SVC}$ meaning 'to go somewhere to look around/take a look,' as in (5a)[5], and (ii) a grammaticalized particle in the construction $V_{compx/motion}$-*kankan* meaning 'to try going somewhere and find out,' as in (5b).

(5) wo xiangyao chuguo(-)kankan
I want go.abroad(-)see.see
a. 'I want to go abroad to look around/take a look (of the world).'
b. 'I want to **try** going abroad and find out.'

When *kankan* is preceded by a complex verb and followed by an interrogative complement clause, the collocation [V_{compx} + *kankan* + CL_{intrgv}] has two interpretations: (i) 'to do something to find out what happens', with V_{compx} and *kankan* + CL_{intrgv} serving as two verbs in serial verb construction, as in (6a); (ii)

[5] Mandarin serial verb constructions denoting two or more separate events are essentially ambiguous (Li and Thompson 1981:595). Here, a *purpose relation* between two events is the most appropriate interpretation, hence the translation 'V_1 to V_2'.

‘to try doing something and find out what happens’ with $\mathrm{V}_{\mathrm{compx}}$-*kankan* serving as a complement-taking construction meaning ‘try … and find out’, as in (6b).

(6) zhe ben shu ni naqu cankao(-)kankan you-mei-you bangzhu
This CL book you take.go reference(-)see.see exist-NEG-exist help
a. ‘Take this book as reference to find out if it can be of any help.’
b. ‘**Try** taking this book as reference and find out if it can be of any help.’

The two constructions raise particular interests because they show differences in their morpho-syntactic properties but are functionally equivalent when used with monosyllabic verbs. *V-kankan* can be used with both simplex and complex verbs, is syntactically constrained, and shows ambiguity in two contexts when preceded by complex verbs, while *VV-kan* shows a more stable behavior—it is used exclusively with simplex verbs, and takes both nominal and clausal complements.

In light of their synchronic properties as discussed above, this study is an attempt to examine the grammaticalization pathways that the two constructions have undergone by exploring uses of *kan*, *kankan*, and their diachronic evolution in Middle, Pre-Modern, and Modern Chinese.[6] It is demonstrated that although grammaticalization of the two constructions occurred in different morpho-syntactic environments at different historical stages in Chinese, a recurrent path has been taken first by *VV-kan*, and later by *V-kankan* which is right now emerging in Contemporary Mandarin. Taking into account all the interacting factors that have led to a synchronic competition of the two constructions, the phenomenon investigated then presents language as a complex adaptive system (The “Five Graces Group” 2009), in which change is motivated by interacting language-internal and language-external factors (Du Bois 1985).

This paper is organized as follows. A diachronic account of the two constructions is given respectively in section 1 and section 2. In section 3, their synchronic coexistence is examined with regard to interacting language-internal and external factors, and in section 4, the conclusion of this study is provided.

[6] The diachronic data examined in this study are retrieved from the Scripta Sinica database unless otherwise indicated. The periodicization of retrieved data generally follows Chen (1999:2) with minor modifications: (i) the period *Medieval Chinese* is referred to as *Middle Chinese*; (ii) a new period *Contemporary Chinese* is added to capture further development of the two constructions from their sources in Pre-Modern and Modern Chinese.

1 Verbal Reduplication and the Development of *VV-kan*

As has been discussed in literature, the *VV-kan* construction is diachronically related to the V-*yi*-V construction which consists of a head verb V, and *yi*-V which functions like an adverbial phrase denoting the meaning ‘once’ (Chao 1968: 205). The construction as a whole has the literal meaning ‘to do something just once’ but may also be metaphorically interpreted as ‘to do something a little:’

(7) shuo-yi-shuo (say-one-say) ‘say once ~ say a little’

Although still in debate, V-*yi*-V is generally considered as one of the diachronic sources that led to contemporary verbal reduplication (Wu 1995:165). First attested in early Pre-Modern Chinese, V-*yi*-V had undergone the drop of *yi* ‘one’ in the path V-*yi*-V > VV, and grammaticalized into VV, through which the metaphorical sense ‘to do just a little’ was conventionalized and came to be known as the tentative aspect in contemporary verbal reduplication[7] (Smith 1994:119). As can be seen in (8), reduplicated verbs cast a tentative scope over the designated event, hence *da* ‘play’ becoming *dada* ‘play some/just a little’.

(8a)	jintian	wo	xiang	da	lanqiu
	today	I	want	play	basketball
	‘I want to play basketball today.’				
(8b)	jintian	wo	xiang	dada	lanqiu
	today	I	want	play.play	basketball
	‘I want to play some / a little bit of basketball today.’				

What came to be associated with the V-*yi*-V construction was post-verbal *kan* during Pre-Modern Chinese. During Middle Chinese, the meaning of *kan* ranged from perception ‘look/see’ to cognition ‘find out/check’. The former is restricted to situations where the object/event being ‘looked at/seen’ is concrete or has

[7] Note that an optional *yi* ‘one’ may still be inserted into reduplicated verbs in contemporary Chinese. Therefore, the path V-*yi*-V > VV does not mean that all instances of V-*yi*-V grammaticalized into VV in Mandarin. It only refers to one of the diachronic sources leading to contemporary verbal reduplication (cf. the origin of *kankan* discussed in the next section).

already happened, while the latter is related to future-reference, or unknown nature of the object/event. Regarding their distribution (as main predicate or post-verbally in serial verb construction) and syntactic behaviors (transitivity), Middle Chinese *kan* can be categorized into the following four types:

(9a) Main predicate/transitive/perceptual (*kan*$_{vi.}$ + NP)
… kan xin fu (*ShiShuoXinYu*)
… see new woman
'… see the bride.'

(9b) Main predicate/transitive/cognitive (*kan*$_{vt.}$ + CL$_{intrgv}$)
… kan tang re bu (Wu 1995:162)
… see soup hot NEG
'… find out if the soup is hot or not.'

(9c) SVC/intransitive/perceptual (V$_{motion}$ + *kan*$_{vi.}$)
xin fei shu chu kan (*ShiShuoXinYu*)
Xin abandon book out see
'Xin then stopped studying and go out to see (what has happened).'

(9d) SVC/intransitive/cognitive (V$_{action}$ + *kan*$_{vi.}$)
ni shi shuo kan (*ZuTangJi*)
you try say see
'Try saying (it) and find out (what will happen).'

Note that the case in (9d) is usually found in imperatives, where a pragmatic implicature 'try' naturally arises: as the speaker requests that the hearer perform some action in order to find out what will happen as a result of that action, s/he is implicitly requesting the hearer to *try* performing that action. Therefore, 'try' is implied in (9e) below, even when the lexical verb *shi* 'try' is not present:

(9e) qing xong yu wu nian kan! (*ZuTangJi*)
please brother to I read see
'Please, my brother, read it / **(try)** reading it to me to find out!'

It was post-verbal intransitive *kan* with the cognitive sense 'find out' in (9d) and (9e) that came to co-occur with V-*yi*-V during Pre-Modern Chinese. As shown in

(10), the collocation [V-*yi*-V + *kan*] involves ‘try’ as its meaning even when the verb *shi* ‘try’ is absent and when occurring in declaratives:

(10) die	qi zhitou	suan-yi-suan	kan		(*ErKePaiAnJingQi*)
pile	up finger	count-one-count	see		

‘(He) piled up his fingers to try counting in order to find out.’

Tsao (2001:291) observes a close semantic connection between ‘do a little’ and ‘try’: “when one is just trying, one will normally do just a little.” Accordingly, ‘try’ implied by post-verbal *kan* may have been pragmatically strengthened by the semantics of V-*yi*-V, hence conventionalized in the context [V-*yi*-V + *kan*]. As V-*yi*-V grammaticalized into VV, the collocation [VV + *kan*] was also found in Modern Chinese:

(11) gu	chacha	kan	(*LuQiDeng*)
tentatively	check.check	see	

‘(I’ll) just try checking and find out.’

Note that by Modern Chinese, all cases of post-verbal *kan* were used intransitively. The transitive uses of *VV-kan,* as seen in (1) and (4a), are clearly a contemporary innovation, which indicates that (i) the meaning ‘try … and find out’ has been semanticized in [VV + *kan*]; (ii) a constructional schema *VV-kan* with the new coded meaning has emerged; and (iii) the grammaticalized construction has generalized its grammatical behavior to be used transitively in taking nominal and clausal complement,[8] hence is not restricted to the original context.

(12) Development of *VV-kan* from post-verbal *kan*

Mid. Ch.		**PreMdn.-Mdn. Ch.**		**Contemp. Ch.**
V_{motion} + $kan_{vi.}$				
V_{action} + $kan_{vi.}$	>	V-yi-V + $kan_{vi.}$ > VV+ $kan_{vi.}$	>	$VV\text{-}kan_{vi./vt.}$
‘try’ as pragmatic implicature	>	‘try’ as conventionalized implicature		> ‘try’ as new coded meaning

[8] Note that *kan* taking interrogative clauses as seen above in (9b) is still in use. The transitive use of *VV-kan* that takes an interrogative clause as its complement might be attributed to analogy to complement taking verbal *kan*.

2 Reduplicated *kankan*, Complex Verbs, and the Emerging *V-kankan*

V-kankan interestingly contrasts with *VV-kan* since the former involves post-verbal reduplicated *kankan* instead of a schematic slot filled with reduplicated verbs. However, unlike VV in *VV-kan*, *kankan* was among the verbs that underwent direct reduplication instead of the path V-*yi*-V > VV, as indicated by Tsuei (2010). In Middle Chinese, direct reduplication generally rendered a durative/continuous interpretation, and reduplicated *kankan* served like an adjunct adverbial clause with the meaning ‘as someone looks/observes for a while’, as in (13a). However, when followed by a nominal complement, reduplicated *kankan* came to have the meaning ‘to look at’, and when used in imperatives it may also servea tentative meaning ‘to take a look’, as can be seen in (13b).

(13a) Intransitive *kankan* ‘*durative* see’

kankan	shui	mo	lai	shi	lu	(Tsuei 2010:228)
see.see	water	submerge	come	time	road	

‘As (I) looked for a while, the water has submerged the road I took.’

(13b) Transitive *kankan* + NP ‘*durative* look at/*tentative* take a look at’

kankan	jia	shang	ying	(Tsuei 2010:228)
see.see	rack	up	eagle	

‘Look at/take look at the eagle on the rack!’

In Pre-Modern Chinese, the tentative meaning of transitive *kankan* was extended to several different contexts. Like *kan* in Middle Chinese, *kankan* at this period involved both perceptual and cognition senses. First, it began to take interrogative clausal complements and had the cognition meaning ‘find out’. Second, it began to occur in post-verbal positions in a serial verb construction, where the first verb can be classified into two categories: motion verbs and action verbs, as can be seen in (14).[9] Note that in (14c) there is a pragmatic implicature ‘try’ arising out of the context, since when one is doing something in order to find out what will happen as a result of performing that action, one is also *trying* that action out.

[9] There are also cases of *kankan* used as main predicate, but their functions are identical to those of their post-verbal counterparts, thus are not included due to spatial concerns.

(14a) SVC/transitive/perceptual (V_{compx} + *kankan* + NP)

xiaozi	jinwan	yao	**huiqu**	**kankan**	jiali	(*XingShiHengYan*)
little.boy	tonight	will	return.go	see.see	home.inside	

'The little boy is going to go back to take a look at/check on his family.'

(14b) SVC/intransitive/perceptual ($V_{motion/compx}$ + *kankan*)

xu	shangxian	**qinqu**	**kankan**	(*XiYouJi*)
need	up.celestial	personally.go	see.see	

'It requires that the great celestial go and take a look in person.'

(14c) SVC/transitive/cognition (V_{compx} + *kankan* + CL_{intrgv})

ni	**taitou**	**kankan**	wo	shi	nage	(*XiYouJi*)
you	lift.head	see.see	I	be	which.one	

'(**Try**) lifting your head/lift your head to find out which one I am!'

Also note that the verbs preceding Modern Chinese *kankan* were usually morphologically complex. This can be attributed to a long period of development of complex predicates that had been in progress starting from the period of Middle Chinese.[10] The newly formed complex verbs constitute a crucial factor that distinguishes the development of *V-kankan* from that of *VV-kan*, which will be discussed in the next section. Right now, it is appropriate to see the connection between the collocation [V_{compx} + *kankan* + CL_{intrgv}] in Pre-Modern Chinese and its counterpart in Contemporary Chinese.[11].

The reader is advised to refer back to (6) and compare it with (14c). Observe that while 'try' had been an implicature in (14c), it is included in one of the two meanings in the ambiguious [V_{compx} + *kankan* + CL_{intrgv}] in (6), where one interpretation is identical to the coded meaning in (14c), and the other interpretation includes 'try' serving no longer as an implicature but as part of the new coded meaning. According to Hopper (1991), grammaticalization crucially involves inferences being semanticized in a forming construction, the process of which may last for a long period where the old sense and the semanticizing inference coexist. Since there is evidence that [V_{compx} + *kankan* + CL_{intrgv}] is

[10] Multisyllabic complex verbs began to develop as the number of possible syllables had been decreasing due to simplification of the Chinese phonological system, before which the language had shown a one-word/one-syllable pattern (Norman 1988:112).
[11] No obvious changes are found in Modern Chinese [V_{compx} + *kankan* + CL_{intrgv}].

attested in both Pre-Modern and Contemporary Chinese, it can be inferred that the implicature 'try' is right now undergoing semanticization in this context.

(15) Semanticization of 'try' in [V_{compx} + *kankan* + CL_{intrgv}]

PreMdn.-Mdn. Ch. **Contemp. Ch.**

(**Try** doing)/do … to find out … > { do … to find out … / **try** doing … and find out … }

on-going semanticization of implicature 'try' → **try** doing … and find out …

Having established that there is an on-going process of semanticization in [V_{compx} + *kankan* + CL_{intrgv}], the other cases of *kankan*-related constructions (which are treated as instantiations of *V-kankan* in the introduction) exemplify a typical case of *layering* (Hopper 1991), where older and newer forms co-exist at an intermediate stage of grammaticalization. First, the fact that there is intransitive use of V_{compx}-*kankan*, as seen in (3) indicates that a gradual reanalysis [V_{compx}] + [*kankan* + CL_{intrgv}] > V_{comp}-*kankan* (+ CL_{intrgv}) is in progress. Second, the other case of ambiguity observed in [$V_{compx/motion}$-*kankan*] can be seen as influenced by the forming construction *V-kankan*, whose meaning 'try ⋯ and find out' is being analogically mapped onto the collocation [$V_{compx/motion}$ + *kankan*] where 'try' did not exist during Pre-Modern Chinese. Third, as *V-kankan* is forming, it is also spreading its use to monosyllabic verbs, as a result of generalization of its grammatical behavior.[12] Hence a competition with the extant *VV-kan* is set up.

(16) Layering and the emerging *V-kankan*

PreMdn.-Mdn. Ch. **Contemp. Ch.**

V_{compx} + *kankan* + CL_{intrg} (14c) > { [V_{compx}]+ [*kankan* + CL_{intrgv}] (6)

⇩ **(gradual reanalysis)**

V_{compx}-*kankan* (+ CL_{intrgv}) (3)

⇩ **(generalization to simple verbs)**

$V_{monosyll}$-*kankan* (+ CL_{intrgv}) (2) } (>*V-kankan*)

⇩ **('try' analogically mapped onto V_{motion} + *kankan*)**

$V_{motion/compx}$ + *kankan* (14b) > $V_{compx/motion}$-*kankan* (5)

[12] Note that no uses of *kankan* preceded by monosyllabic verbs with the meaning 'try … and find out' were attested before Contemporary Chinese.

The on-going change is explanatory of the syntactic constraint that *V-kankan* does not take nominal complements, as has been shown in (4b). This can be seen as a case of *persistence* (Hopper 1991) of original context since the collocation [V_{compx} + *kankan* + NP], as in (14a), did not involve implicature ‘try’ at all. Therefore, *V-kankan* is different from *VV-kan* in that the former is an emerging construction that is still undergoing grammaticalization, while the latter has developed into a full-fledged construction with its own generalized grammatical behavior.

3 A Recurrent Path and Co-existence of the Two Constructions

As has been shown, different morpho-syntactic contexts are observed in the grammaticalization of *VV-kan* and *V-kankan*: while the former involved intransitive *kan* that participated in the path V-*yi*-V > VV, the latter is emerging from the context [V_{compx} + *kankan* + $CL_{intrgv}]_{SVC}$. A close examination of the development indicates that their convergence in Contemporary Chinese is nevertheless motivated and can be attributed to a recurrent path that has been taken.

To begin with, the interaction of two historical factors—development of verbal reduplication and formation of complex predicates—plays a crucial role in providing context for the emergence of *V-kankan*. As mentioned above, the lexical source for *V-kankan*, i.e. reduplicated *kankan*, is created as distinct from those for *VV-kan* since the development of contemporary verbal reduplication can be seen as a merger of two diachronic paths into one synchronic morphological process.

(17) Two merging paths of verbal reduplication

V-*yi*-V + *kan*	>	VV + *kan*	>	*VV-kan*
V-*yi*-V	>	VV		
				VV (tentative aspect)
durative VV	>	*tentative* VV		
durative kankan	>	*tentative kankan*	>	V_{compx} + *kankan* (> *V-kankan*)

On the other hand, the context for *V-kankan*’s emergence crucially relies on the development of complex predicates. By the period of Modern Chinese, post-verbal monosyllabic *kan* had gradually lost its function as an independent verb since it has become highly dependent on the preceding VV in denoting the sense 'try … and find out' in the evolution of *VV-kan*. At the same period, *kankan*, whose tentative use had been well-developed, had also started to interact with newly formed complex verbs and developed periphrastic combinations that served to convey concepts that used to be expressed by post-verbal *kan* in Middle Chinese. As illustrated in (18), two uses of post-verbal *kan* in Middle Chinese have corresponding (near) synonymous uses of post-verbal *kankan* in Modern Chinese. Observe that the two stages are separated by a long period of development of complex predicates in the language.

(18) **Middle Chinese**		**Modern Chinese**
$V_{simp/motion}$ + *kan*$_{vi.}$		$V_{compx/motion}$ + *kankan*$_{vi.}$
'go … to find out …'	**development of complex predicates**	'go … to find out …'
$V_{simp/action}$ + *kan*$_{vi.}$		$V_{compx/action}$ + *kankan*$_{vt.}$ + CL_{intrgv}
'do … to find out …'		'do … to find out if …'

Furthermore, comparison of the development of the two constructions revealsthat the mechanisms involved are essentially the same despite the different, unpredictable morpho-syntactic contexts involved. Considering the nature of the lexical sources, *kan* and *kankan* at all levels both had the cognitive sense 'find out' from the perceptual sense 'see/look,' as a result of cross-linguistically attested metaphorical mapping between the domains of perception and cognition (Sweetser 1990). One characteristic of the rise of the meaning 'find out' from 'see/look' is future time-reference; that is, *kan*/*kankan* meaning 'find out' both refer to events that are unactualized but of interest to the interlocutors because they are to be actualized as a result of performing certain actions. Interacting with context, the meaning 'find out' then gave rise to the pragmatic implicature 'try' through metonymic inferencing (Hopper and Traugott 2003). As the implicature 'try' became conventionalized through pragmatic strengthening, and the context for the rise of the implicature have grammaticalized, the construction as a whole with 'try' semanticized as part of its meaning ceased to be restricted by the original context and developed its own grammatical behavior. The previous two sections have been devoted to accounting for the observation that synchronically

VV-kan has reached this final stage in which 'try' has been semanticized as new coded meaning, while *V-kankan* is right now entering this stage.

Considering the preceding discussions, the interaction of diachrony with cognitive mechanisms therefore leads to a recurrent path that has been taken first by post-verbal *kan* in the grammaticalization of *VV-kan*, and later by post-verbal *kankan* in the emerging *V-kankan*.

(19) Mechanisms involved in the recurrent path

'see' → 'find out'	>	'(try) … to find out'	>	'try … and find out'
Metaphor		**Metonymic Inferencing**		**Pragmatic Strengthening**
Perception→Cognition		invited inference of 'try'		conventionalization of 'try'

The recurrent path can therefore be seen as a *strange attractor* that yields a repeated global pattern despite showing differences in detail (Bybee 2010:198). In light of this, coexistence of the two constructions at the synchronic level is motivated by the interaction between language-internal factors (the development of verbal reduplication and complex predicates) and language-external factors (cognitive mechanisms of metaphor and metonymic inferencing). Note that the factors contributing to the coexistence of the two constructions are not independent but serve as different facets of the whole process of change, and that this process naturally leads to a competition of *VV-kan* and *V-kankan* at the synchronic level.[13] The phenomenon then highlights the adaptive nature of language as a self-organizing complex system, in that it undergoes change as a result of the interaction of its internal organization with external environments (Du Bois 1985:362, The "Five Graces Group" 2009:16).

4 Conclusion

The present paper has explored the diachronic development of two constructions in Mandarin—*VV-kan* and *V-kankan*. It has been shown that the formal asymmetry between the schematic V/VV slot and *kan*/*kankan* underlying the two constructions is attributed to the different morpho-syntactic contexts involved in

[13] Compare the competition between two coexisting negative constructions in English and their diachronic development (Bybee 2010:110).

grammaticalization, and that a recurrent path has led to synchronic coexistence of the older *VV-kan* with the younger, still emerging *V-kankan*. The phenomenon examined presents language as a complex adaptive system, in which global patterns emerge from the complex interaction of internal and external factors.

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Multiple Relative Marking in 19th Century West Rumelian Turkish

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Introduction

West Rumelian Turkish (WRT) refers to the dialects of Turkish spoken in the western Balkans. It is now spoken primarily in Macedonia and Kosovo, but was previously spoken more broadly in Bosnia, Greece, Albania, and Serbia. They differ from other dialects of Turkish in that they have been heavily affected by neighboring Indo-European languages like Serbian, Albanian, Aromanian, Romani, and Greek, and have undergone many of the changes characteristic of the Balkan *Sprachbund* (Friedman 2003). Table 1 gives a sense of the magnitude of divergence between WRT and other dialects of Turkish by comparing how various diagnostic syntactic constructions are realized in the two varieties.

Table 1. WRT vs. Standard Turkish syntax

WRT (Friedman 2003:61-65)	**Standard Turkish**
Lâzım-dır çalış-alım necessary-is work-1PL.OPTV 'We must work.'	Çalış-ma-mız lâzım work-INF-1PL.POSS necessary 'We must work.'
Başla-yaca-m çalış-am begin-FUT-1SG work-1SG.OPTV 'I will begin to work.'	Çalış-ma-ya başla-yacağ-ım work-INF-DAT begin-FUT-1SG 'I will begin to work.'
Yok-tur biz-im-le gele-sin (is_not)-is us-POSS-INST come-2SG.OPTV 'You will not come with us.'	Biz-im-le gel-me-yecek-sin us-POSS-INST come-NEG-FUT-2SG 'You will not come with us.'
Ne zaman git-ti-k sinema-ya what time go-PAST-1PL cinema-DAT 'When we went to the movies...'	Sinema-ya git-tiğ-imiz-de cinema-DAT go-PAST.PART-1PL.POSS-LOC 'When we went to the movies....'

Baba-si father-3SG.POSS 'Ali's father'	Ali-nin Ali-GEN	Ali-nin Ali-GEN 'Ali's father'	baba-sı father-3SG.POSS

As the examples in Table 1 demonstrate, WRT thoroughly restructures the Turkic system of subordination and word order to more closely parallel structures found in the Indo-European languages of the Balkans. In fact, languages spoken in close proximity to WRT like Macedonian and Albanian even have morpheme-for-morpheme correspondences to the WRT constructions in Table 1.

Very few written sources reflect this dialect prior to the 20th century, as Turkish-language writing from the Ottoman Balkans tended overwhelmingly to be in the Ottoman Turkish literary language. Since Ottoman Turkish incorporated Persian and Arabic grammatical and lexical items to such an extent that it was markedly distinct from *any* spoken variety of Turkish, texts in Ottoman Turkish do not provide much direct evidence for the evolution of vernacular varieties like WRT.

Therefore, researchers must look beyond Ottoman Turkish documents for sources that provide direct information about the development of WRT. A particularly valuable source is Gjorgji Pulevski's 1875 *Dictionary of Three Languages*, which was published in Belgrade and contains extensive parallel texts in Macedonian, Albanian, and Turkish. The text is mostly formatted as a series of questions and answers covering an encyclopedic range of content including the creation of the world, natural history and geography, and descriptions of the languages and peoples of the world. It is a historically and sociolinguistically notable source in that Pulevski articulates an early conception of distinct Macedonian national identity in three languages (Friedman 2008). Linguistically, the text reflects Pulevski's provenance from Galičnik in northwestern Macedonia; the Macedonian, Albanian, and Turkish texts all reflect corresponding dialect features, although some supradialectal forms occur. Late 19th century Serbian Cyrillic is used for all forms; in this paper, they are transliterated using standard conventions for transliterating Serbian Cyrillic into Serbian Latin orthography. The Turkish text of this document has not yet received any detailed analysis (although Hazai 1963 provides a brief overview of the document with a partial transcription of the first page). It may be noted that Pulevski is not an ethnic Turk. While this is true, his Turkish usage generally reflects phenomena found elsewhere in WRT, a main goal of the text is to reach a trilingual audience in a colloquially accessible idiom, and there is every reason to think that the role of Turkish as a lingua franca in the Ottoman Balkans played a major role in the development of WRT (Friedman 2006:29).

In this paper, I present a pattern of multiply-marked relative clauses in Pulevski's Turkish that has not been attested elsewhere in Turkic, in which relative clauses can be marked with one of six different combinations of (1) overt participial morphology, (2) the complementizer *ći*, and the interrogative *angisi* ‘which.’ I argue that this variation is caused by two factors: first, the fusion of the constructions {*ći* + finite verb} and {participle} into a new construction {*ći* + participle} and second, the introduction of relative marking using the interrogative ‘which’ based on models in surrounding Indo-European languages.

1 Multiply-Marked Relative Clauses in Pulevski’s Turkish: Data

A striking feature of Pulevski’s Turkish is that relative clauses can be marked using multiple overt relativizers. Example (1) is a simple example of a strategy for double-marking relative clauses that is found frequently in Pulevski.[1]

(1)	Kuš-lar, *ći*	ruzjar-a	uč-**an**.
	Bird-PL COMP	wind-DAT	fly-PART

‘Birds which fly upon the wind.’ (Pulevski 1875:34)

In (1), the relative clause is marked both by the complementizer *ći*, which is equivalent to standard Turkish *ki* (itself borrowed from Persian), and the participial marker -*an*. This is distinct from standard Turkish, in which the relative clause is marked only with the participle:

(2)	Rüzgâr-a	uç-**an**	kuş-lar
	wind-DAT	fly-PART	bird-PL

‘Birds which fly upon the wind.’ (modern standard Turkish)

Contrastingly, Indo-European languages spoken in close proximity to WRT form right-branching relative clauses by combining a relativizer derived from an interrogative pronoun with a finite verb. Example (3) illustrates this in Pulevski’s own Macedonian equivalent for (1):

(3)	Piljinjja,	koj-i,	ljeta-jed	po	vetor.
	birds	which-PL	fly-3PL.PRES	upon	wind

‘Birds which fly upon the wind.’ (Pulevski 1875:34 (Macedonian))

In light of examples (2) and (3), constructions like that found in (1) look like a blend of the Macedonian and Turkish constructions, in which the complementizer *ći* is analogized to the Macedonian *koji*, and the basic syntax is that of the Macedonian in (3), but with the addition of the Turkish participle in –*an*. One possible analysis would be to hypothesize that the participle in –*an* has been reanalyzed as

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[1] In examples drawn from Pulevski’s text, participial morphology is in **bold**, complementizers are *italicized*, and interrogative forms are underlined.

a finite verb, analogously to Uzbek, where verbal forms in *–gan* can be either participles or finite perfect tense forms depending on the syntactic environment. Likewise, one might hypothesize that *ći* is not really functioning as a relativizer. However, such an analysis is untenable, as both *ći* and participial morphology can be used by themselves to mark relative clauses, as shown in examples (4) and (5):

(4) mijakčes, *ći* pać mu xabed demek
Mijak (speech), COMP pure speech means
'Mijak, which means pure speech.' (Pulevski 1875:1)

(5) ve herdžins nefeslji suj-un deru n-de bul-un-**an**
and all_kinds_of creatures water-GEN under-LOC find-PASS-PART
'and all kinds of creatures that are found underwater.' (Pulevski 1875:8)

Additionally, relative clauses can be marked using the interrogative *angisi* 'which,' as shown in (6):

(6) Ilja adam-n dejlj sade tene-si var ama var ve
but man-GEN not only body-3SG.POSS exists but exists and

rux-u daxi angi-si uljumsuz-dir
soul-3SG.POSS also which-3SG.POSS immortal-COPL
'But man does not only have his body, but also a soul that is immortal.' (Pulevski 1875:11)

It is more common, however, for *angisi* to occur with *ći*. This is illustrated by examples (7) and (8) that illustrate relative clauses formed with *ći* + *angisi* + finite verb.

(7) Ićindži ljisani anil-r sojle-iš-i-ni *ći*
second language called-3SG.AOR say-NOM-3SG.POSS-ACC COMP

angi-si-jljen bir kavm, muxabet, ed-ejor,
which-3SG.POSS-INST one people conversation AUX-PROG

turče, đibi slavjančes, ve arnautčes
Turkish like Slavic and Albanian
'The second (sense of) language refers to the speech with which a people communicates, like Turkish, Slavic, and Albanian.' (Pulevski 1875:39)

(8) Maxalji anl-r, ol, taraf-lar, *ći* angi-lar-da,
populated called-3SG.AOR this area-PL COMP person

čok ixsan jaša-jor.
which-PL-LOC many live-3SG.PROG
'Areas in which many people live are called populated.' (Pulevski 1875:22)

Structures like those found in (7) and (8) can also occur with participial marking on the main verb instead of finite marking. This results in triply marked relative clauses, as shown in examples (9) and (10):

(9) Madem-ljer ičun *ći* angi-ljer
mineral-PL for COMP which-PL

daa čok iš-e đir-**en**.
more much work-DAT enter-PART
'About the mines that are most often worked.' (Pulevski 1875:25)

(10) Ol šećer, mev-ljen-ir, kaljem, ust-u-nde,
this sugar born-PASS-3SG.AOR stalk top-3SG.POSS-LOC

ći angi-si, misir, saman-i-na, benze-**jen**.
COMP which-3SG.POSS corn straw-3SG.POSS-DAT resemble-PART
'Sugar grows on a stalk that resembles a stalk of corn.' (Pulevski 1875:33)

Table 2 summarizes the variety of relative constructions that occur in Pulevski's text. The only possibilities that do not occur are (1) null relative marking and (2) *angisi* 'which' + participle.

Table 2. Relative Clause Marking Strategies in Pulevski (1875).

Examples	*ći*	*angisi* 'which'	participle
None	-	-	-
(4)	+	-	-
(6)	-	+	-
(5)	-	-	+
(7), (8)	+	+	-
None	-	+	+
(1)	+	-	+
(9), (10)	+	+	+

2 Relative Clauses: The Turkic Context

In order to formulate an analysis to account for the data found in Pulevski's text, it is first necessary to evaluate the data in the context of relativization in modern WRT and elsewhere in Turkic. [2]

2.1 Relative Clauses in WRT

Multiply marked relative clauses have not been documented in modern WRT, but WRT does have a tendency to thoroughly reorganize the Turkish system of subordinate clause marking. Of particular note is the tendency to use both interrogatives like *ne* 'what,' *kim* + *ne* 'who' and *nerde* + *ne* 'where' and the complementizer *ki* to form relative clauses. These patterns are shown in examples (11) – (13). These examples are drawn from Gostivar Turkish, which is spoken in western Macedonia (Tufan 2007: 171-172). However, other dialects of WRT display the same tendencies (Kakuk 1972:246-247, Sureja 1987:107-109, Friedman 2006:39-40).

(11) O kış-çe (*ne / ki*) gel-di biz-de şimdi
that girl-DIM what/COMP come-3SG.PAST we-LOC now

yaşa-r Stambol-da
live-3SG.AOR Istanbul-LOC
'The girl who came to our place lives in Istanbul now.'

(12) San-a güster-eci-m ev-i
you-DAT show-FUT-1SG house-ACC

nerde ne anne-m otur-ur
where what mother-1SG.POSS live-3SG.AOR
'I will show you the house where my mother lives.'

(13) O kız kim-ın ne fıstan-i dır
that girl who-GEN what dress-3SG.POSS is

kırmızı dır biz-ım koyşi.
red is we-GEN neighbor
'The girl whose dress is red is our neighbor.'

---

[2] I would like to thank Helga Anetshofer for many useful and insightful observations about relativization in the history of Turkic.

With regard to the use of the complementizer *ki* as a relativizer, Tufan (2007:172) states that it can be used in sentences like (11) with a non-restrictive reading.

Some descriptive uncertainty exists about the status of participles in WRT. In a discussion of relativization patterns like those demonstrated in (11) – (13), Matras (2006:54) states that Macedonian WRT has "no alternative structures to express relative constructions." However, Tufan (2007: 169) does document the existence of headless relative clauses marked with participles in Gostivar Turkish, as shown in (14).

(14) Dag-lar-da kay-an-lar var çok.
mountain-PL-LOC ski-PART-PL exist many.
'There are many people who ski in the mountains.' (Tufan 2007:169)

Nonetheless, participial morphology is not required in headless relatives in Gostivar Turkish, and it is fundamentally clear that participially marked relative clauses in modern WRT are much less productive than in varieties of Turkic that have not undergone such intense influence from Indo-European languages. Pulevski contains some evidence suggesting that participles were being reanalyzed in 19th century WRT, such as example (15) below in which the participle bears inflectional marking that shows that it has been reanalyzed as an adjective. The Macedonian equivalent to (15) also contains an adjective: *nestanoviti* 'inconstant.'

(15) Angi jildis-ljer ći kalk-ma-**jan**, dirlar, di-ver ban-a.
which star-PL COMP stay-NEG-PART-COPL-PL say-give_CONV I-DAT
'Tell me, which stars are inconstant?' (Pulevski 1875:73)

2.2 Relative Clauses Elsewhere in Turkic

The native Turkic structure of relative clauses is one that makes heavy use of participles, as shown in examples (2) and (14). However, many Turkic languages that have undergone intense influence from other languages display contact-induced innovations in their system of subordinate marking. In this section, I provide context for the three main innovations characteristic of Pulevski's Turkish: multiple marking of subordinate clauses, the use of the complementizer *ki* (realized as *ći* in Pulevski), and the use of the interrogative 'which' as a relativizer.

2.2.1 Multiply Marked Subordinate Clauses in Turkic

While the precise patterns of subordination found in Pulevski's Turkish do not have direct parallels in Turkic, doubly marked subordinate clauses are not at all unprecedented in the history of Turkish. Conditional clauses marked both by *eger* ‘if’ and conditional inflection are common in pre-modern Turkic (see examples in Adamović 1985: 279-300, Kirchner 2005: 309) and occur in modern Turkish (Lewis 1967: 270). Double-marked temporal subordination occurs in Old Anatolian Turkish (Anetshofer 2005: 135-150). Double-marked relatives appear to be rarer, though Kirchner (2006: 168) gives some examples of left-branching double-marked relatives in an interlinear translation of the Qur’an into Old Anatolian Turkish. A parallel exists in the western dialects of the Tungusic language Even , where doubly-marked relative clauses occur under influence from Yakut, but it is unclear whether these constructions are widely used or acceptable (Malchukov 2006: 129). Again, though, it must be stressed that these parallels are broad in nature: triply marked subordinate clauses like in examples (9) and (10) appear to be unique, at least within Turkic.

2.2.2 The Complementizer *ki* in Turkic

The use of *ki* (also found as *kim* ‘who’) has deep roots in Turkic despite being historically triggered by Persian influence. In addition to being used in non-standard varieties of modern Turkish, it occurs in Old Anatolian and Ottoman Turkish (Prokosch 1980: 172-178, Matras 2006: 52, quoting examples from Adamović 1985). Cypriot Turkish has a relativizer *şu* that is structurally parallel to the examples above using *ne/ki* and is used to form right-branching relative clauses (Demir 2002: 108).

The use of *ći* (< *ki*) in Pulevski’s Turkish is strikingly similar to the use of *ki* in other varieties of Turkish in that it is used not only for relative clauses, but also to introduce what Matras (2006:49) terms “realis complements of factual verbs of cognition, utterance, and perception” and optative clauses. Example (16) shows *ći* introducing the complement of ‘see’:

(16)	alax,	nazar	ed-ti	*ći*	isljax	ol-du.
	God	vision	AUX-PAST.3SG	COMP	good	be-PAST.3SG

‘and God saw that it was good’ (Pulevski 1875:6)

When used to introduce optative clauses, *ći* is most often followed by an infinitive rather than a finite form. This pattern is shown in (17):

(17)	ve	šafla-sin-lar	đoj-un	ćemer-in-den,	
	and	shine-OPTV-PL	sky-GEN	arch-3SG.POSS-ABL	1PL.POSS-DAT
	ći	toprag-miz-a	išig	đel-mek	surijedt.
	COMP	land-	light	come-INF	purpose

‘And let them shine from the sky, so that light may go onto our earth.’ (Pulevski 1875:7)

Constructions like (17) provide an interesting partial parallel to Ottoman constructions in which the complementizers *kim* and *ki* are used to introduce optative clauses that contain a finite verb.

Some examples of *ći* in Pulevski are difficult to characterize. In (18), it is used in a quotative sense, but there are also many instances elsewhere in the text where the verb ‘call’ is not followed by *ći*, as shown in (19).

(18)	Ol	anl-r-*ći*	ta bijet	iljim-i
	this	called-AOR-COMP	character	science-3SG.POSS

‘This is called morality.’ (Pulevski 1875:13)

(19)	Angi	taraf	anl-r	đun	dogu-su.
	Which	side	called-AOR	day	birth-3SG.POSS

‘Which area is called the east?’ (Pulevski 1875:17)

To summarize, the complementizer *ći* is used in Pulevski’s Turkish in a range of contexts – within relative clauses and in other environments – that do not map well onto 20th century WRT usage, but are deeply grounded in the history of Turkish.

2.2.3 ‘Which’ used as a relativizer in Turkic

In 20th century WRT dialects, the interrogative *angisi* ‘which’ is not used to mark relative clauses. Instead, as discussed in section 2.1, other interrogatives like ‘what,’ ‘who,’ and ‘where’ are used to build relative clauses under the influence of corresponding constructions in neighboring languages like Macedonian and Albanian. However, the use of ‘which’ as a relativizer has been well documented in Gagauz (Menz 1999:91-98). Modern Gagauz is spoken predominantly in Moldova and Ukraine, in conditions of intense contact with Russian, but was spoken in eastern Bulgaria until the middle of the 19th century. This connection to the Balkan *Sprachbund* is suggestive, but the innovation of *angisi* ‘which’ as a relative marker in Gagauz is recent. It was first attested in the 1930s, and seems to have become productive under heavy influence from Russian (Menz 1999:99-100).

Nonetheless, Gagauz provides a compelling analogue to Pulevski’s Turkish for two reasons. First, Gagauz has a comparable range of strategies for forming relative clauses, including (1) participles, (2) the complementizer *ki*, (3) a postposed complementizer *ani*, and (4) *angisi* ‘which’ (Menz 1999:76-98). Unlike

Pulevski's Turkish, though, it does not seem to be the case that these strategies can co-occur within individual Gagauz sentences. Second, the rapid development of *angisi* 'which' in 20th century Gagauz demonstrates that relativization systems can evolve very quickly under conditions of intense language contact, which helps contextualize the striking differences between Pulevski's relative clauses and those found in dialects of WRT documented in the 20th century.

3 Analysis and Conclusions

As shown in section 1, Pulevski's Turkish text displays a pattern of relative marking in which relative clauses can be marked by any one of six combinations of a participle, the complementizer *ći*, and the interrogative *angisi* 'which.' This pattern is novel in Turkic. The behavior of relative clauses in Pulevski's Turkish can be analyzed as the result of two concurrent innovations in 19th century WRT.

The first innovation concerns the status of participles in WRT. While participles may still exist in WRT (Tufan 2007:169 *contra* Matras 2006:54), they are nonetheless much less common and less productive than elsewhere in Turkish. This leads to the hypothesis that Pulevski's language reflects a transitional state, in which participles still existed but were becoming increasingly marginal in the grammatical system of WRT. In this context, it seems that the earlier relative constructions {*ki* + finite verb} and {participle} were fused into a new relative construction {*ći* + participle}. While examples do occur in which the older state of affairs is preserved – like (4) and (5), where *ći* and participles occur by themselves – they are not as frequent as the {*ći* + participle} construction and are therefore easily interpreted as remnants. This explanation accounts for three of the relative constructions attested in Pulevski.

The second innovation is the introduction of *angisi* 'which' as a relativizer due to influence from Macedonian and Albanian, both of which form relative clauses using 'which.' This directly accounts for constructions in which relative clauses are marked with 'which.'

The only remaining step is to hypothesize that in some cases the two types of constructions can be blended. It is not surprising that constructions with the structure {*ći* + 'which'} emerge, since the complementizer *ći* is used in such a wide range of subordinate clauses. Triply marked relative clauses can be then analyzed as a blending of the common relative constructions {*ći* + 'which'} and {*ći* + participle}. The only combination of markers that does not occur is {'which' + participle}, which is not surprising, since relative clauses marked only with participles are rare and archaic in Pulevski's Turkish, and therefore an unlikely target for blending with a more innovative construction.

A close examination of relative clause marking in Pulevski's Turkish reveals the existence of a pattern of multiple relative marking heretofore unattested in Turkish. These findings also provide a vivid example of the dramatic ways in which subordination systems can evolve under conditions of intense language contact.

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Studying Contact without Detailed Studies of the Languages Involved: A Non-Philological Approach to Language Contact

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Studies of contact have revealed that all kinds of language material can, in the right circumstances, be borrowed from one language to another. Detecting, describing, and analyzing such situations typically involve the detailed study of at least two languages. An alternative involves detecting contact situations through database analysis. This cannot supplant the detailed work that requires detailed descriptive work in particular fields, but can allow us to examine large enough samples of languages that we can start to better understand, through calibration against known histories and other non-linguistic data types, likelihoods of different 'social contact' scenarios resulting in different kinds of linguistic traces, and also allow for the more targeted investigation of specific areas and language-to-language interactions. I shall describe the method, and illustrate its application in a number of case studies in regions for which we have good samples of language data.

1 Too Many Language (Contact Situation)s, Not Enough Time

In this paper I address the question of how we, as a discipline, might have a chance of identifying more of the language contact situations that exist around the world, and propose steps towards a solution. This will involve calibrating the results from the computational analysis of multivariate and multidimensional data.

I shall discuss the nature of contact and relatedness, and then propose some operational heuristics that, while they do not automate the detection of areality, certainly to make the objective detection of such patterns more objective.

I shall not try to list bibliographically the numerous studies of contact and contact languages; suffice to say that contact appears to be as universal an ingredient in the synchronic and diachronic make-up of languages as is descent, and descriptions of contact are as varied as are the contact situations themselves.

2 'Contact'

In the linguistic sense 'contact' studies have multiplied enormously in the last decade, with approaches ranging from the social to the individual being promoted. A number of consequences of 'contact' have been described and catalogued, and a number of definitions of what might be a contact situation have been put forward. For the purposes of this paper I shall define 'contact' as being:

- a circumstance in which two linguistically distinct societies influence each other;
- facilitated by some portions of at least one society having some competence in the language of the other society;
- detectable and describable on the basis of linguistic data.

A stricter definition of ‘contact’ will include the requirement that a likely contact source can be identified (eg., Thomason 2009); this is necessary to avoid reclassifying as ‘contact’ elements of change in a language that arose from language-internal processes of change. Since, for most parts of the world, we do not have written data on ancient languages relevant to those found in contemporary distributions nor do we have means of inferring that data other than through the process of historical reconstruction, which would not in many cases distinguish between contact with a now-vanished language and independent developments, I shall not impose this constraint, useful though it is.1 We have other means of treating changed elements of a language (from a diachronic perspective) as suspicious or not suspicious, vis-à-vis putative language contact scenarios.

Evidence for contact can be detected in many ways. At the outset, evidence for contact may be present in one or more subsystems of a language (with a non-random distribution). A language may display contact in only one sub-part of the lexicon (for instance, lexical items with the semantic category of ‘tools’), without affecting the language structurally, either phonologically or morphosyntactically. Alternatively, an extreme example of contact would be thorough-going change throughout the lexicon, in the phonological system, in the forms and functions of bound morphemes, and in terms of the syntactic structures found. This might well be a good representation of what is detected when a community shifts language without strong first-language interference.

We also detect contact effects by the presence of features are are not expected to be the ‘natural’ result of internal language developments. To fully explore this possibility we must have an idea of what level of variation is ‘normal’ in a language family, and then explore the appearance of variation that lies beyond this normal range. This reflects the view, present in some work on diachronic linguistics, that language family membership is in part a function of whether the language has a close enough typological ‘fit’ (see, for instance, discussion in Noonan 2010). While this is not part of the methodology espoused in the classical comparative method, it is in a sense necessary in order to be able to discuss the problematic case of pidgin and creole languages. It is not hard to find examples of the application of this sort of principle within standard historical linguistics. In terms of sound change, we would not be surprised to find correspondences of the sort shown in (1), nor would it be unusual to identify a chain of sound changes of the form shown in (2). Other correspondences, such as are similarly generally judged to be ‘natural’, or at least plausible, are easy to find (such as (3)).

(1) b:p, p:f, f:h or h:Ø
(2) *b > p > f > h > Ø
(3) b:m:v:w

[1] Of course, when we do have attested records of an ancient language, or the witness of a donor language, we can identify contact by identifying the source(s) of the unexpected features in the borrowing language (e.g, Thomason 2009).

On the other hand the proposal that the history of a language can be better understood by positing a *b > t change would require convincing documentation and argumentation; a change such as *b > e would be even more exceptional, and require even more convincing argumentation, rather than simply noting the putative correspondences. This illustrates the existence of a 'range of variation' that linguists work with when evaluating possible language relationships. Typologically, the same principles can be applied to the kinds of changes found. Verb-initial languages are known to be susceptible to variation in their word order, sometimes leading to a change to subject-initial order; but a change of VOS > OVS is not expected, nor is an SVO > VOS change. Voiced stops in one language might correspond to voiceless, aspirated, prenasalized or imploded stops in a relative, but a correspondence of the form aspirated:imploded is not so expected. We do not expect phonological systems to show such a wide range of variation. Importantly, as noted above, different subsystems of the language can show variable levels of contact-affectedness. The history of the lexicon, that part of a language which the comparative methods pays attention to, with the careful methodology of that approach, need not match the history of the phonology, including accent, innovations, and local areal 'trends', and this too can logically (and attestedly) be independent of the history of the morphosyntax, including both inherited quirks and acquired patterns.

Any or many of these traits can be 'askew,' compared to the expected range of variation for a particular language family or subgroup. This tells us that something other than uninterrupted intergenerational transmission was going on (following Noonan 2010). Adding in the requirement that we find regular correspondences (in the lexicon, phonology and morphology) between languages, we can arrive at a simple factorial typology of language relations, shown in Table 1. While there are numerous 'exemplary' languages, showing the typological profile of their family as well as the regular (sound, morphological) correspondences that cement relationship in that genealogical unit, and while there are many pairs of languages which cannot be considered to be related at all, less attention has been paid to the 'plus-minus' languages, those that satisfy one of the criteria in Table 1, but not the other. Note that Table 1 provides a crude, but operational, means of discussing possible language contact: if a language is a 'plus-minus' language with respect to its relatives, contact should be suspected.

Table 1. Kinds of language relations, defined across two binary dimensions

	+ regular correspondences	–regular correspondences
+ 'typological fit'	genealogically related languages	(contact-affected languages?)
– 'typological fit'	(pidgin/creole languages?)	unrelated languages

The mention of 'typological fit' in Table 1 is already inadequate; having broken down our language data into the lexical, the phonological and the morphosyntactic, there is no reason not to break things down even more. The lexicon can be broken down by semantic categories such as Body parts, Kin terms, Pronouns, Animals, Plants, 'Human' plants, Natural world, Tools, Properties, Colors, Demonstratives, Locations, Numerals, Verbs, Interrogatives, etc., and these can then be independently investigated for contact effects. The phonology can be broken up into different natural classes, such as total number of consonants, total number of vowels, total number of tones; number of plosives, number of nasals, fricatives, liquids; number of high vowels, low vowels, front vowels, front rounded vowels; presence of level tones, rising tones, falling tones; presence and productivity of contrastive phonation types. The morphosyntax should be broken up into different constructions and categories, which are more salient than 'whole-language typology.' Some categories would include head-marking, dependent-marking; presence of ergative case(s) or accusative case(s); presence of a passive voice, or applicatives; use of verbal agreement, inflectional tense, evidentiality, etc.; marking of gender or clusivity, etc.

In short, to study contact objectively, we simply need to examine exhaustive lexical, structural and typological data for each language in the comparison set. This is true; but it is not a methodological step forward, as it certainly does not propose any time-saving elements. It is tempting to just pre-select the features to examine, but then we run the risk of (consciously or unconsciously) 'cherry-picking' the data to reach a certain set of conclusions (see discussion in Donohue, Wichmann and Albu 2008). An objective attempt to detect contact must examine different sub-systems of a language, and for each sub-system examine as much data as possible; and this involves typologizing languages according to many dimensions of variation, and in a way that allows for rapid (computational) evaluation.

3 Speeding Up the Contact Discovery Process

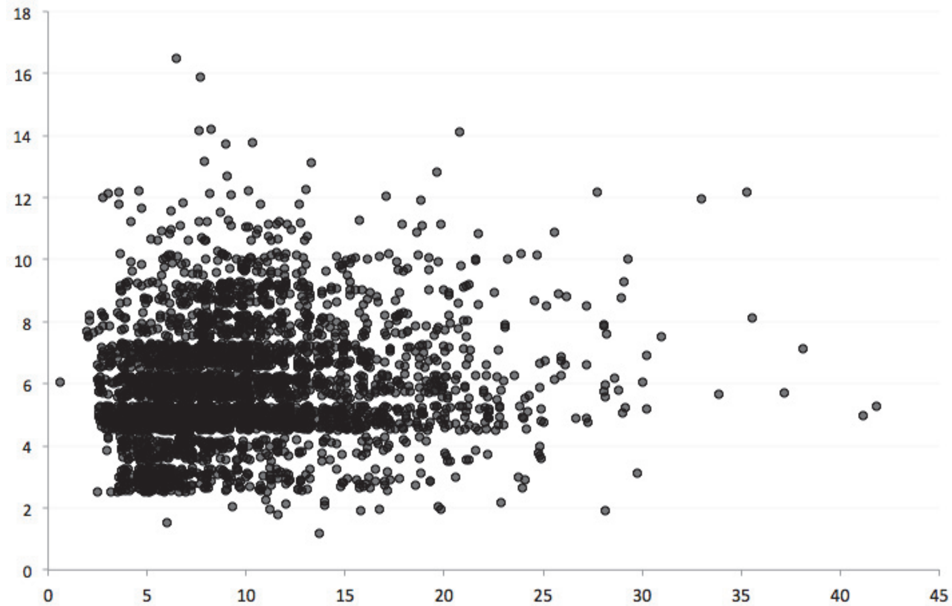
This data can be fed into a clustering algorithm (in this paper I use Splitstree – Huson and Bryant 2006). Such algorithms are designed to take large amounts of data and produce 'best fit' clusters for the input. Importantly, such algorithms cannot automatically detect relationship or non-relationship, but can simply detect a degree of relationship (along the dimensions examined) between pairs or clusters of languages. If the data evaluated is maximal, that is as inclusive as possible of the variation found in the language along the relevant dimension, then any relationship detected between two languages that cannot be attributed to a genealogical relationship must be assumed to represent one of (a) random chance, (b) the reflection of universal tendencies, or (c) the relics of contact.

3.1 Typology and Distance

A vast amount of work shows that linguistic traits are subject to distance decay effects; that is, the further it is between any two points, the less similar they will be, on average. This has been demonstrated repeatedly for lexical similarities (eg., the summary in Donohue et al. 2012). Holman et al. (in press) have shown similar effects for typological traits. Similarly, a vast number of publications shows the correlation of lexical similarity with distance, with complicating social factors (for an only partial list, see discussion in Nerbonne 2009 (and many other works), Donohue et al. 2012).

For instance, in Figure 1 we have a representation of languages (shown as individual dots) classified according to two dimensions. On the x-axis we have a measure of how many oral, egressive stops the languages contrast, and on the y-axis we see the number of contrastive vowel qualities are present; these two variables are approximately independent, as can be assessed by an examination of Figure 1, and so a typology based on these two variables is not vacuous. This is only one of many ways to typologize languages according to non-binary variables in two dimensions, and while crude it clearly represents an improvement over a typological classification measured along only one dimension.

Figure 1. Languages classified by size of plosive inventory and size of vowel quality inventory



It can and should be argued that a category such as ‘stops’ or ‘vowel qualities’ is too broad; languages do not, in contact situations, borrow (or lose) a number of vowels, or a number of stops. More appropriate would be to divide the stops into different variables for places and manners; to separate the ‘place’ variable into actual places (e.g., bilabials, linguo-labials, dentals, alveolars, alveolar affricates) and manners (e.g., voiced, voiceless, ejectives, implosives, prenasalized). When this is applied, the result yields approximately 40 dimensions of variation, with greater or lesser degrees of independence. (Similar decomposition of vowels will yield approximately 30 dimensions of variation.)[2]

3.2 Quantifying Multiple Dimensions of Typological Distance

What is the ‘typological distance’ between the different stop systems outlined in Table 2? That depends on our coding. If we code the oppositions present in the languages, then systems a. and c. are identical except on the dimensions [voiced] and [prenasalized]. If we code according to the phonemes present, then the two systems differ in six ways.

[2] Note that the approach I am advocating here is not based on looking at actual phonemes (or allophones). Especially given the variation found between individual linguists in coding data, or between separate linguistic communities for coding phonological contrasts, the existence of a contrast is more robust than coding and testing the nature of that contrast. For instance, whether different linguists have recorded a language as showing a /t̪/≠/t/, /t̪/≠/ʈ/ or /t/≠/ʈ/ contrast, all linguists would agree that there is a contrast in place for coronal stops. Similarly, the identity of a phoneme as /ts/, /tʃ/, /ʈʂ/ or /tɕ/ (to name just a few possibilities) is less important than the number of similar affrictes it contrasts with. The dimension of contrast is a more stable feature than the points of contrast in cross-linguistic comparison.

Table 2. Six small (oral) stop inventories

a.

p	t	k
b	d	g

b.

p	t	k
b	d	

c.

p	t	k
mb	nd	ŋg

d.

	t	k
mb	nd	ŋg

e.

p	t	k
	d	

f.

	t	k
b	d	

Table 3. Values of *phonemes* from Table 2 quantified.

	p	t	k	b	d	g	mb	nd	ŋg
a.	1	1	1	1	1	1	0	0	0
b.	1	1	1	1	1	0	0	0	0
c.	1	1	1	0	0	0	1	1	1
d.	0	1	1	0	0	0	1	1	1
e.	1	1	1	0	1	0	0	0	0
f.	0	1	1	1	1	0	0	0	0

Table 4. Values of *oppositions* from Table 2 quantified.

	Bilabial	Alveolar	Velar	Voiceless	Voiced	Prenasalized
a.	2	2	2	3	3	0
b.	2	2	1	3	2	0
c.	2	2	2	3	0	3
d.	1	2	2	2	0	3
e.	1	2	1	3	1	0
f.	1	2	1	2	2	0

When these data are analyzed into networks, the different coding decisions are apparent in the different configurations they generate. While most of the differences between the plosive systems in Table 2 represent structural differences, systems a. and c. are different in ways that would be expected variants across different dialects, or different closely-related languages, varying only in the emicization of prenasalization. In the network based on segment identities in Figure 2 they are as far apart as it is possible to be; a. and c. form a clade only if b. and e. are also included. When coded for oppositions, in Figure 3, a. and c. appear as divergent sisters. Coding for oppositions, then, leads to analyses that reflect structural phonological, rather than surface phonetic, differences in languages. This has good and bad points, but certainly overcomes the between-linguist differences that plague studies based on secondary sources (inevitable in any large comparison). Can we make an informed decision about which of these two coding choices should be made? The answer is no; there is no single universally appropriate way to code, with the choice dependent on what is revealed by the different choices.

Figures 2 and 3. Network analysis of the two tables of data in Tables 3 and 4.

Figure 2. Network analysis based on segment identities

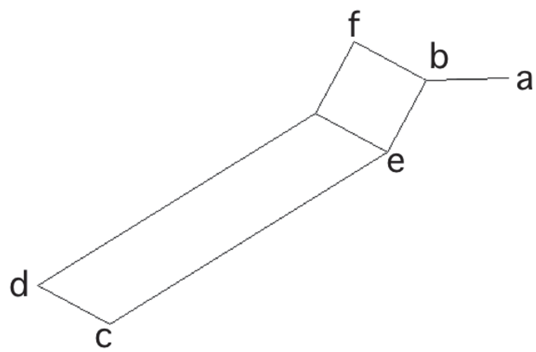
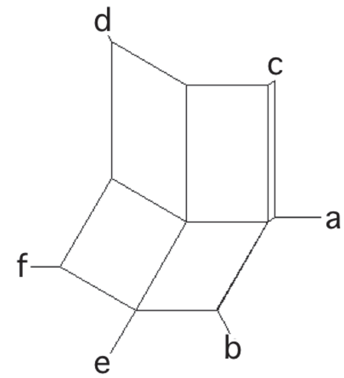


Figure 3. Network analysis based on segment oppositions



When this approach has been applied to the entire phonology, which is a finite system, we can avoid all claims of selectional bias. This is harder with morphosyntax, though the use of a feature set that was not created for a particular purpose also avoids the potential for this charge. One such database is the World Atlas of Language Structures feature set; the Syntactic Structures of the World's Languages project has a similar, overlapping set of features with different excursions. What is important is that the features selected form an objective set, with hopefully near-exhaustive coverage of at least some subsystems.

4 Illustrative case studies

When we apply these principles to whole language phonologies, or to large selections of morphosyntactic data (such as the feature set used in *WALS* – Haspelmath et al. 2005) we can find a series of useful heuristics for detecting contact.[3] We can examine this for a couple of case for which we have known histories, and then exemplify the method with more 'exotic' data.

Using the same simple method, we can arrive at hypotheses about possible contact events even in the absence of a hypothesis about where the contact may have come from (that is, examining data from within one genealogical (sub)group alone), or we can examine possible 'leanings' towards un-affiliated languages, to show where contact-induced change has applied.

4.1 Detecting Contact Without an Out-Group

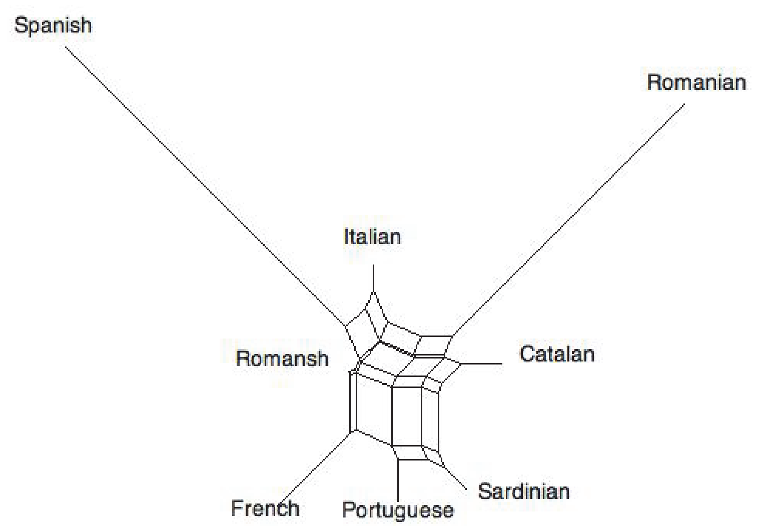
Examining languages that are known to subgroup together, we can easily find which of those languages are more or less 'typical'. While we do not yet have a strong theory about the level of change that is expected, and while such a theory would almost certainly have to be qualified endlessly to take account of local conditions, we can certainly examine relative

[3] I am not claiming that the features included in *WALS* are in some way 'optimised' for typological comparison, but we do note that they have been selected for typological breadth, and even more importantly they are a set of features that has been chosen independently of any particular study (and so cannot be accused of selectional bias – Donohue et al. 2010).

degrees of 'typicality': that is, the degree to which an 'essential nature,' to quote Noonan (2010), is preserved in common between the languages under examination.

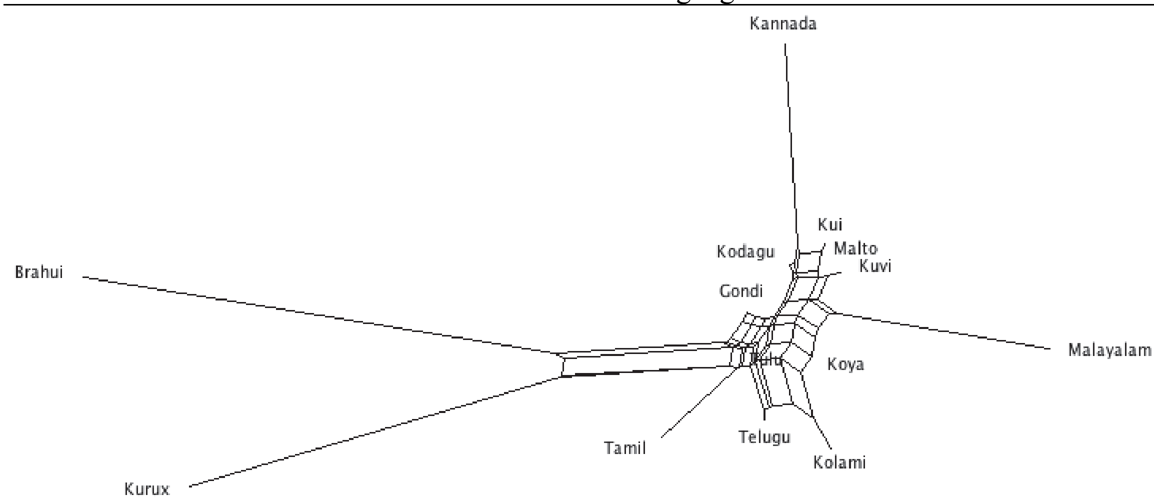
In Figure 4 we see the network that results from clustering ~200 morphosyntactic traits (essentially the morphosyntactic features used in *WALS*) for eight Romance languages of Europe. Here we see a relatively tight cluster at the bottom of the figure, in an area containing six of the languages; above that, in the figure, are two outliers, Romanian and Spanish. The tight cluster tells us what the expected range of variation is; Spanish and Romanian show us that some languages of this (sub)family exceed these levels of variation. Based on this data alone, we would *not* expect to find a significantly contact-affected story in the histories of Romansh, Italian, Catalan, Sardinian, Portuguese or French; at least, we would not as strong a level of contact as we are led to suspect for Romanian and Spanish. When we examine non-linguistic historical records we find these hypotheses are confirmed: Spain has a history of long occupation by the Moors, and Romanian is known to have been influenced through contact with Dacian and later Slavic.

Figure 4. Network analysis of the *WALS* morphosyntactic traits of eight Romance languages.



In Figure 5 we see the results obtained when examining Dravidian by applying a similar methodology to that conducted for Romance. While most members of this family are found in Southern India, three languages, Brahui, Kurux (/Oraon) and Malto are in the north of the subcontinent. While most of the languages are spoken by small, marginalized populations, four languages (Tamil, Malayalam, Kannada and Telugu) are official state languages with long literary traditions. Examining the network it is clear that the languages with long literary traditions, which are also those most influenced by the arrival of Indo-European languages via the Sanskrit written traditions, are divergent from the Dravidian 'canon' (though Telugu stays closest). Similarly we see Kurux and Brahui, the two most northerly languages, as highly divergent outliers. This clearly reflects the social circumstances that have denied them regular inter-Dravidian contact, since the arrival and ascendancy of the Indo-Aryan linguistic ecology in the north of South Asia. Perhaps less expected are the divergent positions of Malayalam and Kannada; both are major state languages, but have their territories on the west side of India, not the east. There is thus some level of relative isolation, compared to the strongly Dravidian linguistic ecology that prevails in the south and east of India. Again, in terms of contact-induced change, the network in Figure 5 leads us to two suspicions: firstly, that Brahui and Kurux have undergone more contact-induced change than Malto, the other northerly Dravidian language; secondly, that Malayalam and Kannada have been excluded from as extensive contact with the other southerly Dravidian languages; and thirdly, that there has been extensive inter-Dravidian linguistic contact between the other Dravidian languages (those with a focus to the east of India).

Figure 5. Network analysis of the *WALS* morphosyntactic traits of fourteen Dravidian languages.



Note that the hypotheses that we can draw about Romance and Dravidian, on the basis of the clustering analysis of morphosyntactic traits, are hypotheses that can be made without knowledge of local geography or relevant history. Given that for both Romance and Dravidian we have good records, we can confirm the structure-based hypotheses: Romanian *is* geographically isolated from all other Romance languages, and *does* have a strong history of contact (initially with Dacian, and later with Slavic). Spanish is known to have been catastrophically affected by the Moorish invasions, affecting the language both directly and via the Basque-related contact that was enforced by the location of the Spanish court in refuge in the north-east of the country. Amongst the Dravidians we know that Brahui and Kurux are large populations that have been strongly isolated from other Dravidian languages, while engaging in extensive interaction with their Indo-European neighbors. Malto is as isolated from other Dravidians, but is less affected by Indo-European contact, as a small isolated tribe practicing swidden agriculture.

4.2 Traces of Contact Between Language Groups

When Romance is placed in a wider family context, expanding the sample to include with other Indo-European languages of Europe, we see interesting patterns when the clusters are compared to clades in the genealogical tree. We can see clusters that match traditional subgroups, showing the results of the inheritance of shared innovations (which is the criteria for the classification of the languages as being part of the same subgroup) and also reflecting subgroup-internal contact (reflecting the tendency for genealogical units to share geographic, and social, affinity – see Donohue et al. 2012). We also see evidence for areal convergence that does not match with traditional subgrouping classification. Figure 6, from Donohue (2012), shows the clustering network arising from a comparison of WALS features in 36 languages of Europe. A striking pattern of convergence between the languages of the Balkans region, at the bottom of the figure, where we can see Romanian, Albanian, Greek, Macedonian and Bulgarian forming a loose (that is, highly reticulated) grouping. Bulgarian and Macedonian are only loosely affiliated with this cluster (reflecting the later appearance of Slavic languages in the Balkans), but the affinity of the other three languages is clear.

Figure 6. Network analysis of the *WALS* morphosyntactic traits of 36 European languages.

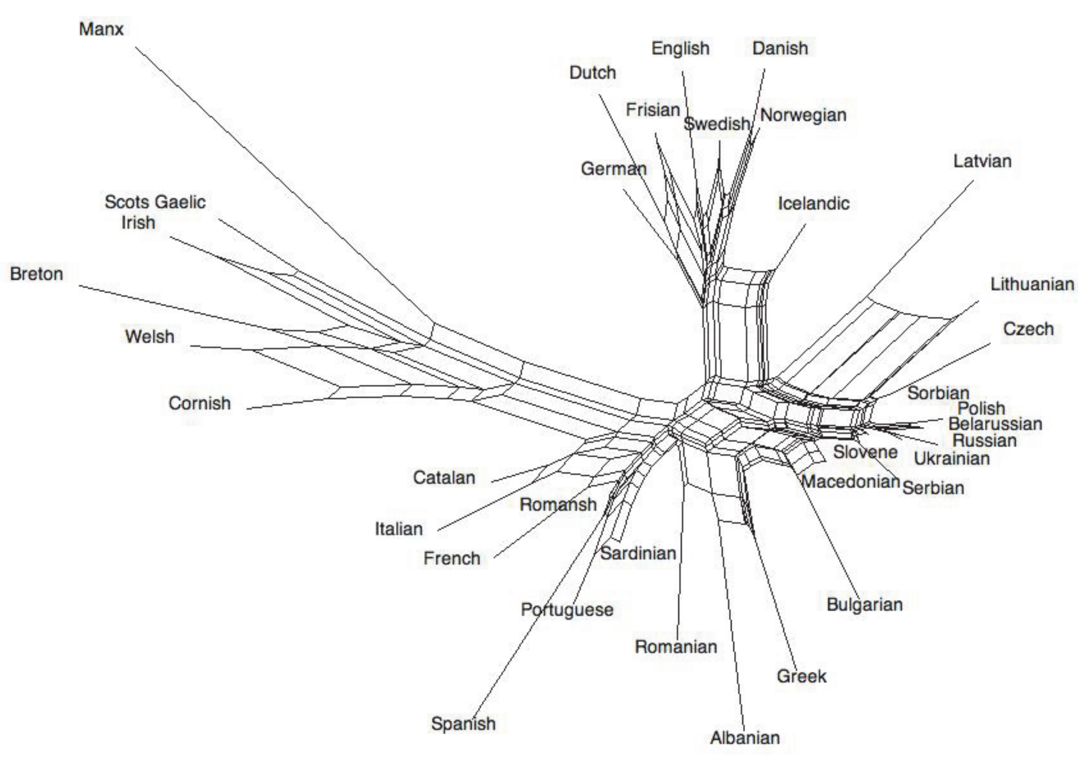


Table 5 shows the traits which are significantly different in the five identified 'Balkan' languages in the sample used here, the results of comparing both phonological and morphosyntactic databases and extracting those features that show a different distribution in the populations in, and out, of the Balkans (following the methodology in Bickel and Nichols 2012). Note that the presence, or number of central vowels, a trait frequently cited as being a feature of the Balkan linguistic area, does not test as being significantly higher in the Balkans than elsewhere in Europe.

In section 4.1 we saw that we are able to identify aberrant behavior within a group, and thus generate suspicions that external factors have played a role in shaping the structure of the modern language. In this section we have seen that it is possible to identify convergence between different languages in the same region, where contact has taken place over time.

Calibrating against these known histories, we can see that examining the dendrograms allows us to make realistic predictions about broad aspects of social history. From this, we can be confident that the same techniques can be extended to families and areas for which we do not have written histories against which to calibrate.

Table 5. Balkans compared to the rest of Europe

Feature	Balkans compared to the rest of Europe
Plural pronominal suffix	higher
definite and/or demonstrative suffix	higher
prohibitive not normal imperative	higher
hortative morphology	higher
evidentiality, realised through tense paradigms	higher
objects indexed on the predicate	higher
word order use to form questions	lower

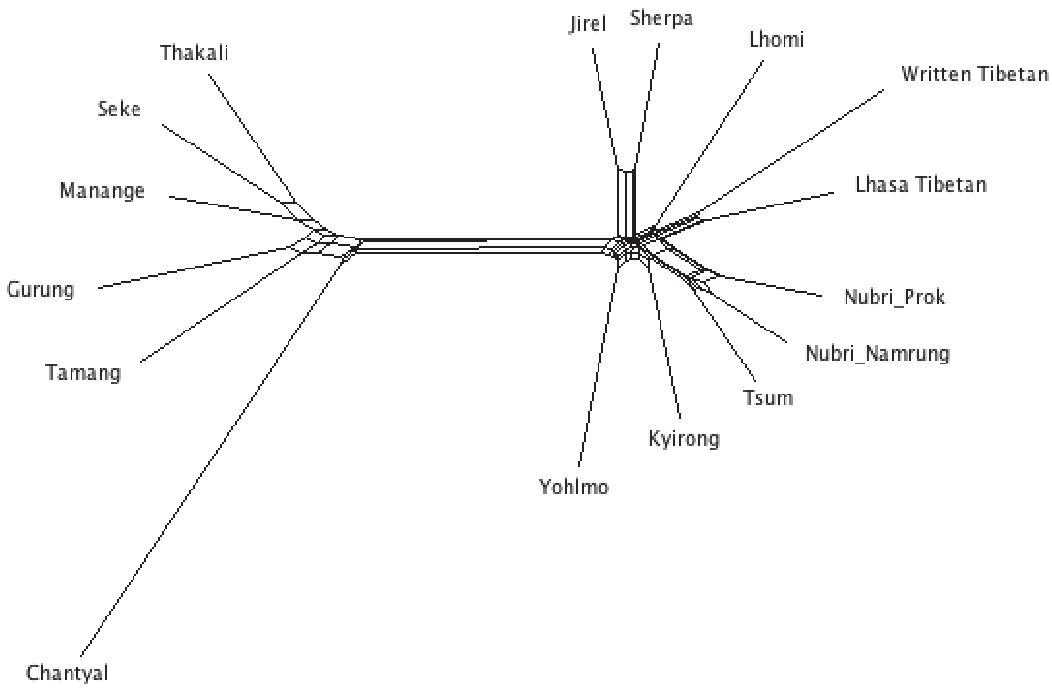
4.3 Contact in the Himalayas

Another, perhaps more traditional, example can be drawn from lexicostatistics. In Figure 7 we can see the clusters that emerge when we examine the lexicons of the geographically close Tamangic and Tibetan languages from north-central Nepal. Both are closely related subgroups within Tibeto-Burman, and both contain members that show evidence of contact. In the following figures we see the results of a comparison of cognacy across a 239-item wordlist.

In Figure 7 we see a network combining Tamangic and Tibetan, showing sixteen languages compared across all items in the wordlist. The lexical comparison clearly divides the languages into a Tamangic and a Tibetan group (Tamangic on the left). Within Tamangic there is a three-way division into Chantyal vs. the rest, strongly differentiated, and then a weaker split between Tamang and Gurung, the two large languages of the central hills, and Manange, Seke and Thakali, smaller languages of Himalayan valleys leading north towards Tibet (unfortunately insufficient lexical data is available for Nar-Phu, a Tamangic language of the Tibetan plateau which shows strong evidence of contact-induced change as a result of its existence on the edge of the Tibetan linguistic area).[4]

[4] The wordlist used contains 239 items: **Body parts**: body, head, hair, face, eye, ear, nose, mouth, tooth, tongue, breast, belly, arm, elbow, palm, finger, fingernail, leg, skin, bone, heart, blood, urine, faeces, knee, neck, liver. **Human relations**: name, man, woman, child, father, mother, older brother, younger brother, older sister, younger sister, son, daughter, husband, wife, boy, girl, person. **Pronouns**: I, you (informal), you (formal), he, she, we (incl.), we (excl.), you (pl.), they. **Animals**: fish, chicken, egg, cow, buffalo, milk, goat, horn, tail, dog, snake, monkey, mosquito, ant, spider, bird, louse, feather, yak (male), yak (female), fly (n.), horse. **Plants and food**: fruit, mango, banana, wheat, millet, rice, potato, eggplant, peanut, chilli, turmeric, garlic, onion, cauliflower, tomato, cabbage, oil, salt, meat, fat, seed, bark, barley flour, butter (yak). **Natural world**: sun, moon, sky, star, rain, water, river, cloud, lightning, rainbow, wind, stone, sand, mud, dust, tree, leaf, root, thorn, flower, earth, mountain, mountain pass, snow. **Tools and buildings**: village, house, roof, door, firewood, broom, mortar, pestle, hammer, knife, axe, rope, thread, needle, cloth, ring, path, fire, smoke, ash, gold, carpet. **Location**: above, below, this, that, these, those. **Numerals**: one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, twenty, hundred, few, many, all. **Adjectives**: white, black, red, green, yellow, blue / turquoise, old, new, good, bad, wet, dry, long, short, hot,

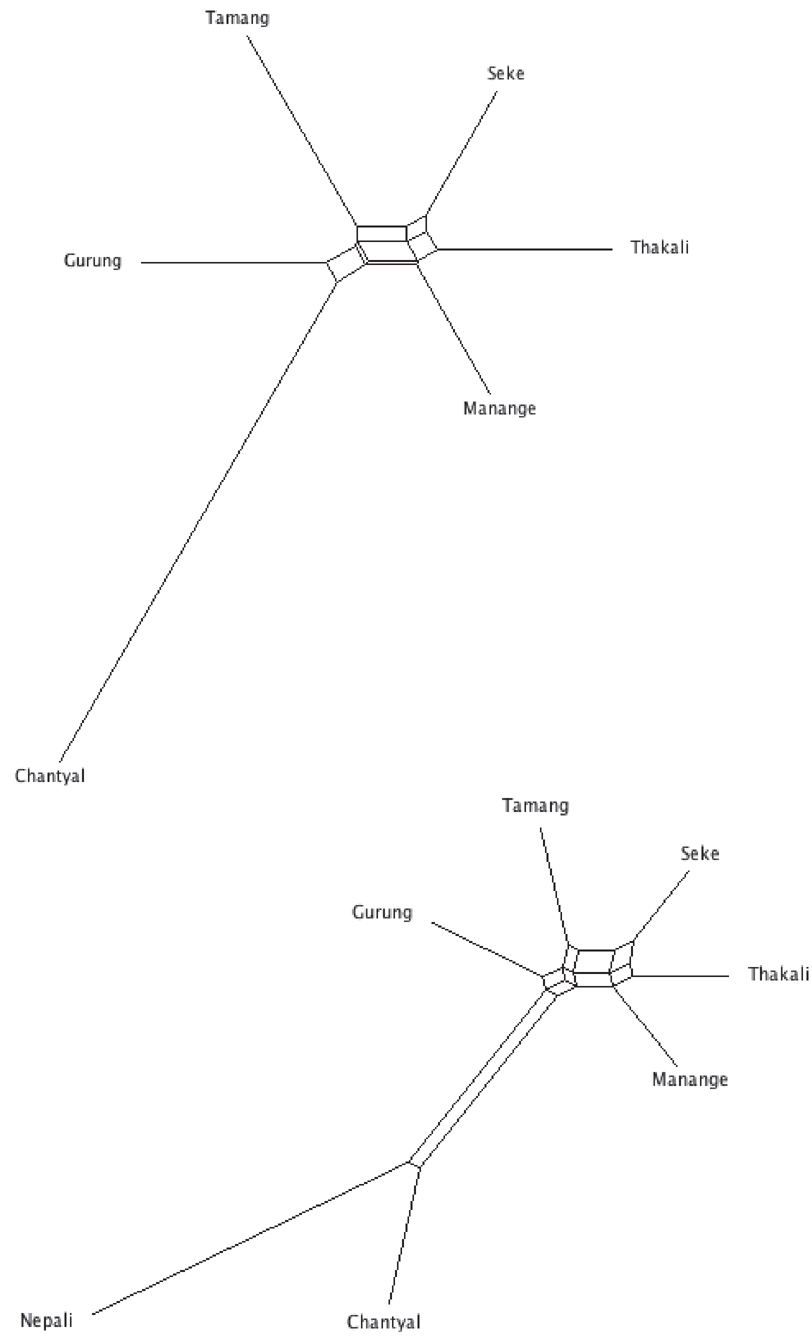
Figure 7. Network analysis of lexical similarities between Tamangic and Tibetan.



To better understand the divisions in the Tamangic group, we can examine the languages from Figure 7 in separate groups. Figure 8 shows the network for just the six Tamangic languages considered here. This representation largely confirms the comments made based on Figure 7, though there is not really any clear evidence that lexically Tamang and Gurung form a cluster. The position of Chantyal is made clear when we examine the second network in Figure 8, in which Nepali has been added. It is now clear that the lexical aberrancy of Chantyal with respect to the rest of its Tamangic relatives is due to extensive lexical contact with Nepali – exactly the position described in numerous papers by Noonan (e.g., 2003, 2008). The difference between the hill languages and the mountain valley languages might be attributed to contact with Nepali as well, though this is not as apparent as it is for Chantyal.

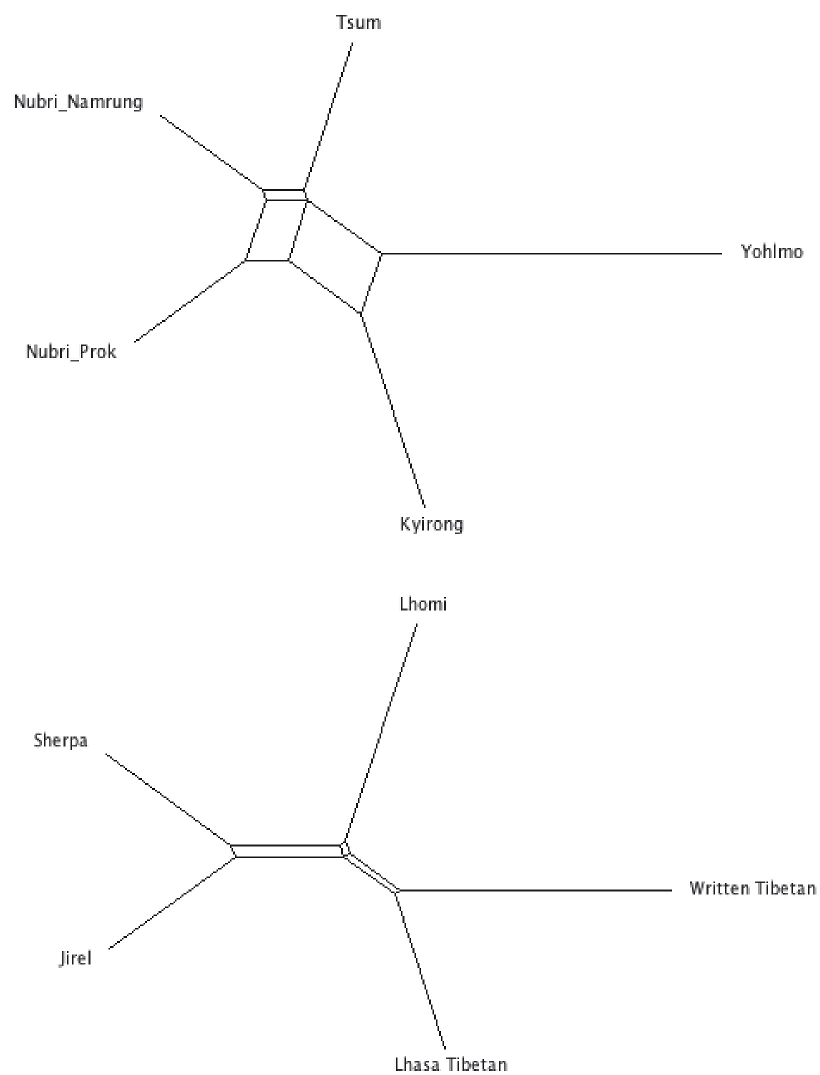
cold, right, left, near, far, big, small, heavy, light, same, different, whole, broken, full, round. **Verbs**: eat, bite, hungry, drink, thirsty, sleep, lie down, sit, give, burn (intr.), die, kill, fly (v.), walk, run, go, come, speak, hear, see, not, know, swim, stand. Interrogatives: who, what, where, when, how many, what kind. **Time**: day, night, morning, noon, evening, yesterday, today, tomorrow, week, month, year.

Figure 8. Network analysis of lexical similarities amongst the Tamangic languages (without and with Nepali).



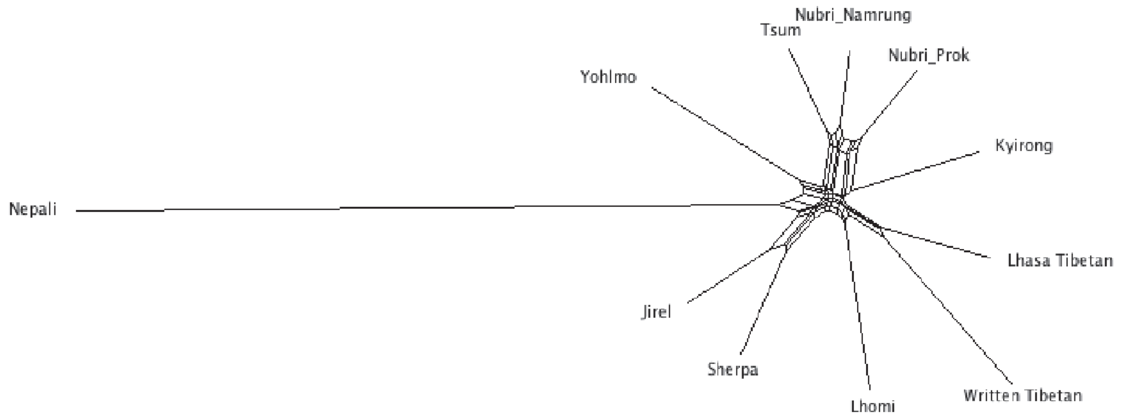
In Figure 7 the Tibetan languages show a very approximate division into the eastern languages (top of the Tibetan cluster) and the western ones (bottom). These two geographically-based groups are shown separately in Figure 9. In the case of the western languages Yohlmo is the aberrant language; for the eastern languages Sherpa and Jirel emerge as the most divergent.

Figure 9. Network analysis of lexical similarities amongst the Tibetan languages (western above, eastern below).



As with the Tamangic languages, adding Nepali, the national language, to the sample is revealing, though less so thatn for the Tamangic languages. What is important is that the same languages that were identified on subgroup-internal grounds as being aberrant, Yohlmo, Sherpa and Jirel, are the languages that show the greatest convergence with Nepali, just as in Figure 10 they also showed the greatest convergence with Tamangic.

Figure 10. Network analysis of lexical similarities amongst the Tibetan languages.



These comparisons have all involved comparing whole wordlists. In Figures 11-12 we can compare the different clusters that arise from a comparison of different semantic domains. Compare Figure 11 with Figure 7; when we restrict the comparison to body parts there is no evidence of convergence between Yohlmo and the southern languages (Tamangic and Nepali); if any Tibetan language shows evidence of convergence in this semantic domain, it is Tsum, which in Figure 7 forms an overall cluster with the two (geographically close) Nubri varieties included in the sample. Among the Tamangic languages, all but Chantyal form a tight cluster, and Chantyal shows an unambiguous borrowing relationship with Nepali (indeed, as can be seen in all of the Figures here, from a lexical perspective there are few domains in which Chantyal appears as a Tibeto-Burman language at all).

Figure 11. Network analysis of lexical similarities in body parts.

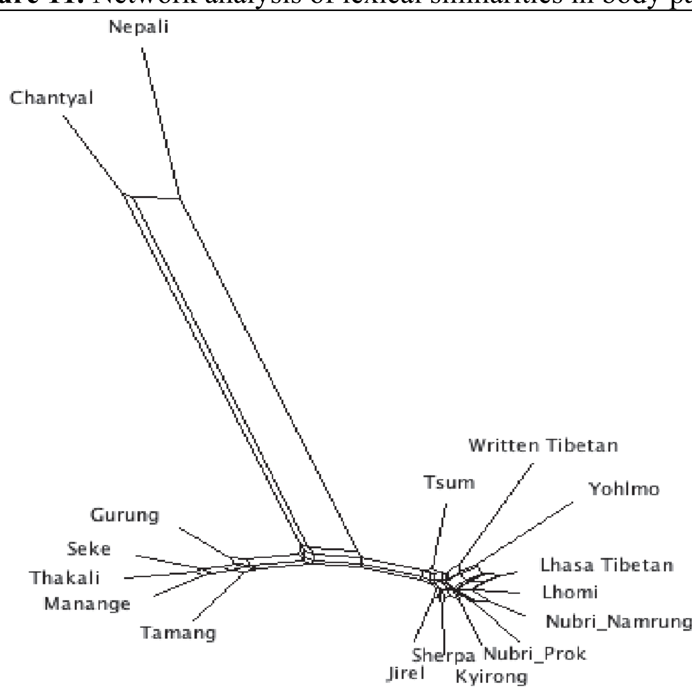


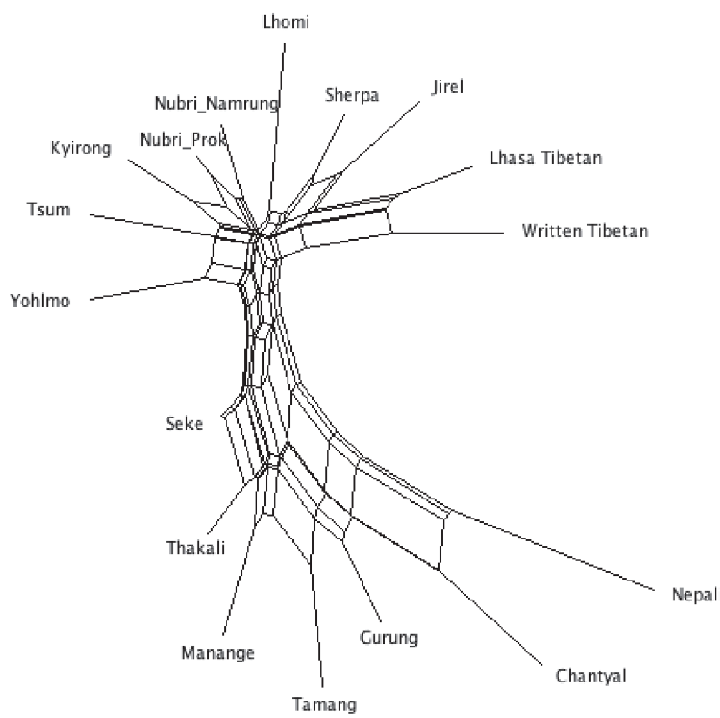
Figure 12 presents two more dendrograms, representing comparisons of two other semantic domains: plants and food (on the left) and tools and buildings (right). In these dendrograms Yohlmo is clearly strongly converging with the southern languages, especially for the 'tools' semantic domain. In the plants and food dendrogram we can see similarly see that the mountain valley Tamangic languages, Seke, Thakali and Manange, are much closer lexically to the Tibetan languages than their hill relatives. That these mountain valleys, above 3000m altitude, share a similar natural and plant ecology with the languages of the Tibetan plateau (~4000m altitude) makes it unsurprising that the lexicon for food that can be grown in their environments is more similar than it is with the southern languages (Tamang, Gurung, Chantyal and Nepali).

In terms of tools and buildings, none of the Tamangic languages show evidence of any convergence with the Tibetan languages, though the more southern and western languages to be more lexically similar with Nepali. Among the Tibetan languages Yohlmo is again closest to the Tamangic languages. Given the known history of Yohlmo in the Helambu valley (Clarke 1980a, 1980b), it is very likely that the patterns of convergence between Yohlmo, a close relative of (Lende) Kyirong, reflect contact with the pre-Tibetan language(s) of the Helambu area.

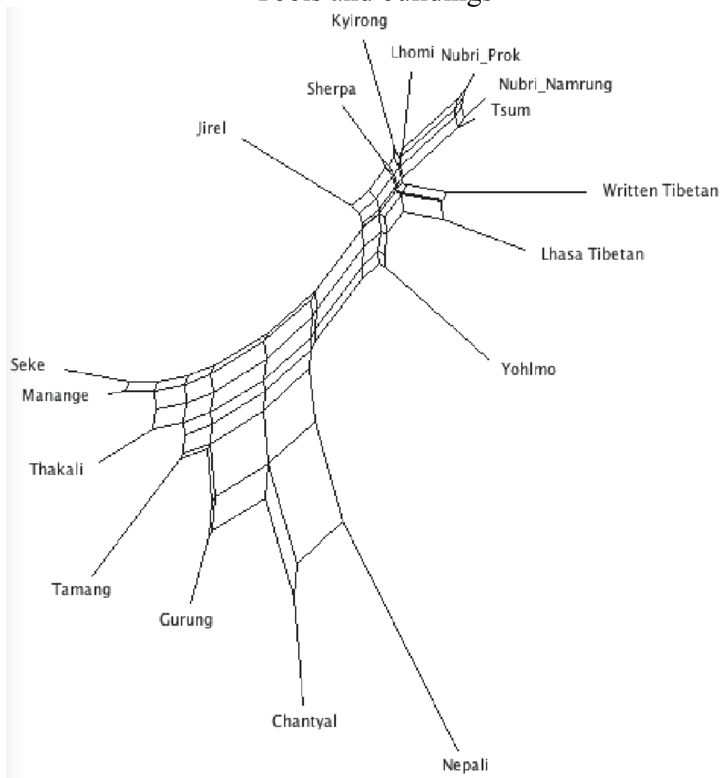
While the divergence of Yohlmo from a more general Tibetan profile for tools and building could be attributed either to convergence with Tamangic, or the presence of a common factor, Nepali influence, in both Tamangic and Yohlmo, the evidence from the plants and food dendrogram is less equivocal, with Yohlmo converging away from the other Kyirong Tibetan varieties, and towards Tamangic in preference to Nepali.

Figure 12. Network analysis of lexical similarities amongst the Tibetan languages: selected semantic domains

Plants and food



Tools and buildings



The examination of lexical data has again shown us that, even without an out-group to compare to, it is possible to develop realistic suspicious about contact histories in different languages. In Figure 7 it was clear even without the addition of the out-group Nepali that Chantyal had been heavily contact-affected in terms of its lexicon. In Figure 10 we can see that the effect of Nepali on the Tibetan languages has been much less than its effect on the Tamangic languages.

The discussion of subdomains of the lexicon is particularly interesting in light of the way the languages cluster when typological features, such as were examined in 4.1 – 4.2, are investigated. In Figures 13 and 14 we can see the clustering obtained in two subdomains of the phonology: all oppositions to do with consonants, and all oppositions not related to consonants (the full set of features examined is reported in Donohue et al. 2013). When the consonantal phonologies are examined we see three broad clusters: at the top of the diagram, the eastern Tibetan languages (plus Yohlmo) together with Thakali and Seke, the two Tamangic languages in this study that have been most influenced by Tibetan varieties (notably Mustang). The bottom right contains the three Tamangic languages spoken in the hills, and not in Himalayan valleys (plus, loosely, Nepali). The bottom left contains the western Tibetan varieties, plus Written Tibetan, plus Manange, the Tamangic language in most contact with these conservative varieties. Speaking of ‘the phonology’ is clearly not suitable, since the consonantal material tells a different story from that of the non-consonantal material. Examining the vowels, prosody and phonotactic conditions on the languages shows a very different picture, one in which there are two Tibetan poles (a conservative one on the left, and an innovative one on the right), with Jirel, Sherpa and Yohlmo assimilating to the Tamangic core in the middle of the network.

We should note that, unlike the analysis of lexical items, the analysis of phonological oppositions offers nothing to suggest a close relationship between Chantyal and Nepali.

Figure 13. Network analysis of consonantal similarities.

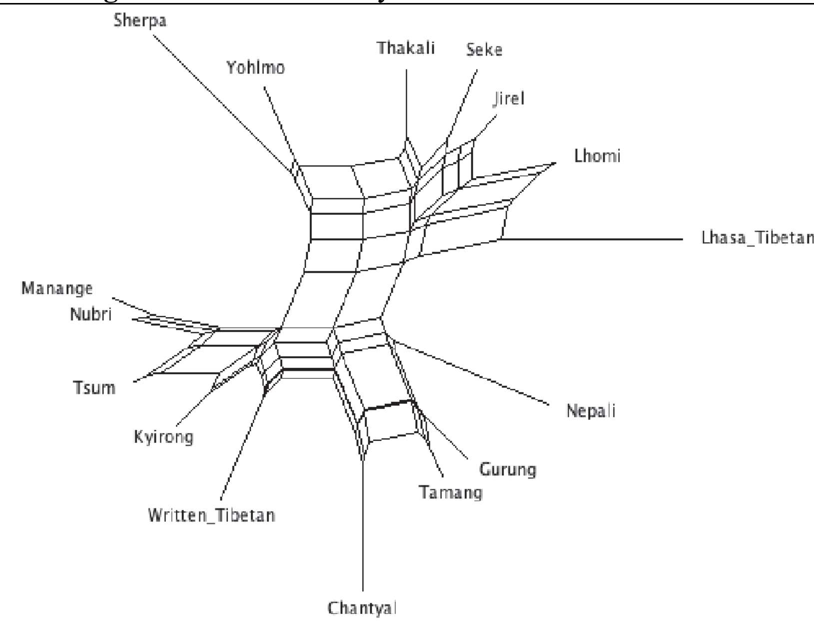
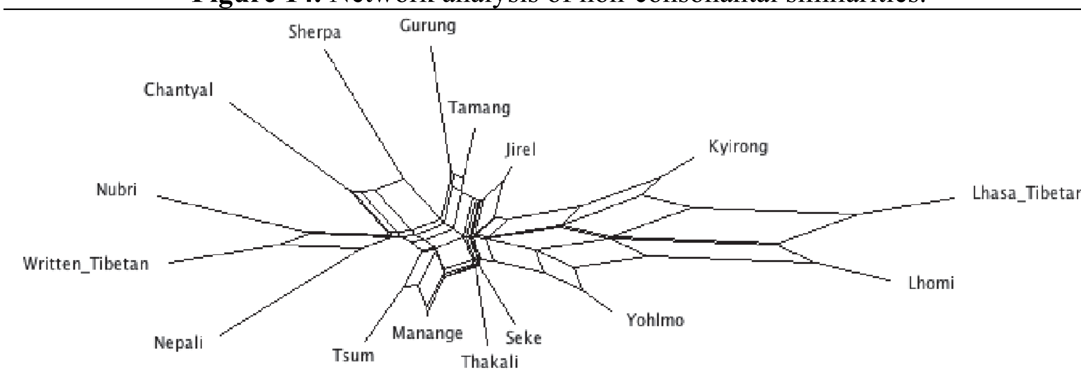
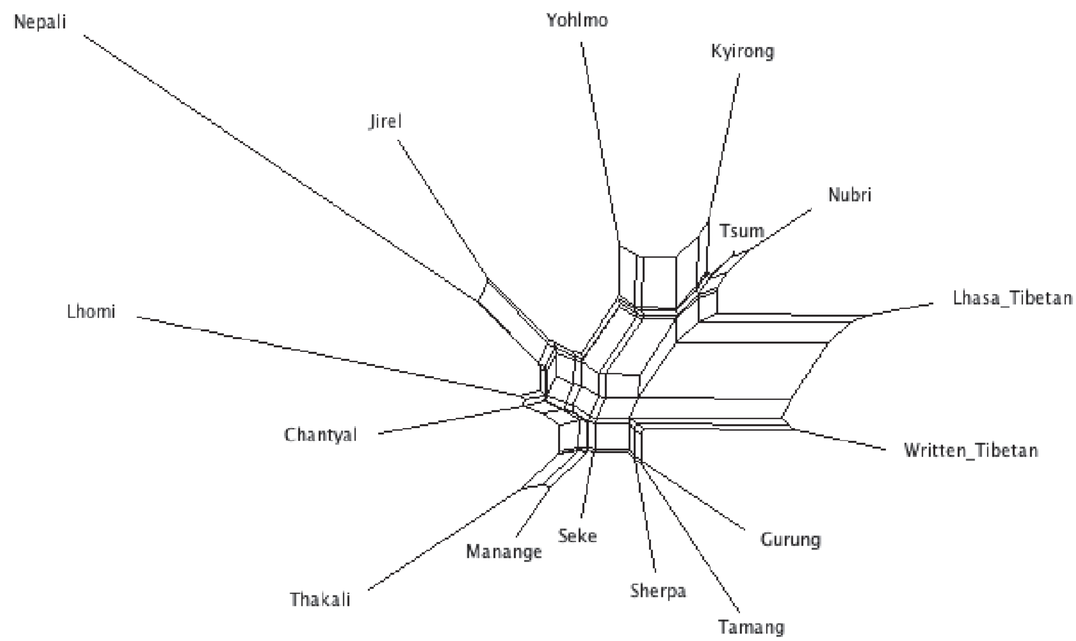


Figure 14. Network analysis of non-consonantal similarities.



When we examine broad morphosyntactic traits we can see that Sherpa is the Tibetan language most assimilated to the Tamangic profile, and Jirel is most affected by Nepali morphosyntactic patterns. Yohlmo is firmly embedded in a cluster with the other Kyirong-area Tibetan languages, with no evidence of assimilation to the southern languages.

Figure 15. Network analysis of morphosyntactic similarities.



Examining the Tibetan and Tamangic languages and their contact situation has shown that not only is the phonology different from the morphosyntax in terms of the kinds of clusters that emerge, but that sub-parts of the phonology have also been shown to reflect different histories. We have also seen that different kinds of linguistic data reveal different aspects of history: the consonantal system of Chantyal is firmly Tamangic, while the lexicon is clearly more strongly related to Nepali. For Yohlmo we can see a lexical pattern of assimilation to Tamangic, combined with a very conservative morphosyntax and consonant system, but a system of vowels and prosody that has been influenced by the Tamangic languages.

4.4 Exploring in Island Southeast Asia

The spread of Austronesian languages across a large portion of the world's surface has attracted much research in and across the disciplines of linguistics, archaeology, genetics and history. In this section I focus on the dispersal of Austronesian languages out of Taiwan and across Melanesia and Island Southeast Asia (ISEA).

Thanks to extensive records we have at least basic lexical data for a very large number of Austronesian languages, allowing great advances in our understanding of the linguistic history of these languages. While there is controversy about many of the proposed subgroups, two subgrouping facts are clear and uncontroversial: the Austronesian languages spoken outside Taiwan all form a single subgroup, Malayo-Polynesian, and the Austronesian languages of eastern Melanesia and Oceania form a single subgroup of Malayo-Polynesian, Oceanic.[5] Proto-Austronesian was spoken on the island of Taiwan, where all of the first-order subgroups of Austronesian are represented (e.g., Blust 2009). The Proto-Austronesian culture

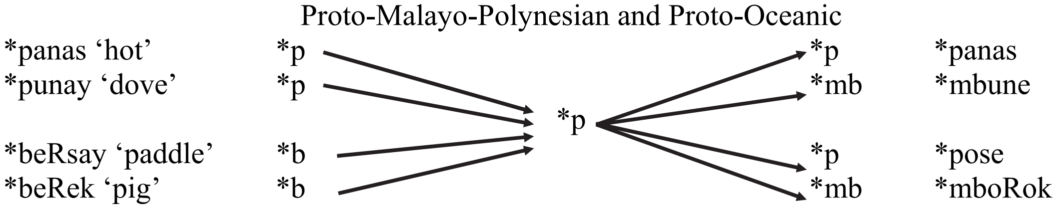
[5] Two languages of western Micronesia, Chamorro and Palauan, are exceptions to this, being Malayo-Polynesian but not Oceanic.

has been unambiguously linked to rice agriculture, other domesticates, a range of technological skills, and various cultural practices (Blust 2009, Pawley 2007). Proto-Oceanic reconstructions reveal some continuities compared to Proto-Austronesian and Proto-Malayo-Polynesian, but also many innovatory technologies (Pawley 2007). The location and cultural leanings that can be associated with Proto-Oceanic have been the subject of debate, and recent work on the heterogeneity of archaeological sites identified as being associated with Lapita culture, frequently claimed to have been tied to Proto-Oceanic, has emphasized the controversy (Donohue and Denham 2008, 2012, Specht et al. 2013). The questions we face, with respect to Proto-Oceanic, are summarized in (4).

(3) a. What is the relationship of Proto-Oceanic to the other Austronesian languages?
b. What is the relationship of Proto-Oceanic to the non-Austronesian languages of Melanesia?

Without disputing the Austronesian lexicon and sound correspondences with Proto-Malayo-Polynesian, we should point out that some of the defining criteria for Proto-Oceanic include the *irregular* correspondences found for the bilabial and velar stops. Figure 16 illustrates the correspondences that hold for four bilabial-initial nouns. In Proto-Malayo-Polynesian the words are distinguished by a voiced:voiceless opposition; in pre-Proto-Oceanic this opposition collapsed, and by the time of the Proto-Oceanic break-up the relevant parts of the lexicon had split into a voiceless vs. prenasalized opposition, without conditioning environment. Further, we should note that prenasalized stops are not an expected part of the phonology of the languages of Asia, including most of ISEA. They are, however, a feature of the languages of Melanesia, including north-east New Guinea (Donohue and Whiting 2011). (Another feature found in the reconstructed phonological inventory of Proto-Oceanic that is common in Melanesia, but not in ISEA, is the presence of rounded stops.)

Figure 16. Developments of labial stops between Proto-Malayo-Polynesian and Proto-Oceanic



These commonalities suggest that Proto-Oceanic includes substratal elements that have a provenance in the languages of eastern Melanesia.

Thanks to recent work describing the morphology and syntax of the languages we can meaningfully compare large amounts of data from a large sample of languages (e.g., Donohue 2007). Figure 17 shows a clustering analysis of morphosyntactic traits in Austronesian languages of ISEA, plus representative neighbors. Included are reconstructions of Proto-Austronesian and of Proto-Oceanic, as indicated. The regions marked on the dendrogram have been added based on the criteria in (4).

(4) a. Areas A and B are that part of the diagram that contains only Austronesian languages.
b. Area B is those languages most close, typologically, to Proto-Austronesian.

c. The two languages closest to Proto-Austronesian are Atayal and Paiwan, spoken on Taiwan.
b. Area D is that part of the diagram that contains only non-Austronesian languages.
e. Area E is that part of the diagram that contains the languages of mainland Southeast Asia.
f. Area C is the part of the diagram with a mixture of Austronesian and non-Austronesian languages.

There is certainly some continuity to the Austronesian languages, meaning that there is a block of languages that do not cluster with either the mainland Southeast Asian languages nor with the Melanesian languages. There is similarly a typological pole consisting of the (interior, highland) languages of New Guinea, with a few off-shore exceptions. Importantly there is a large typological region in which both Austronesian and non-Austronesian languages are found, intermingled, demonstrating that there is no strong genealogical reliability to the notion of typological traits. The languages in that part of the diagram labeled E could all be said to be leaning towards pidgin/creole-like structure.

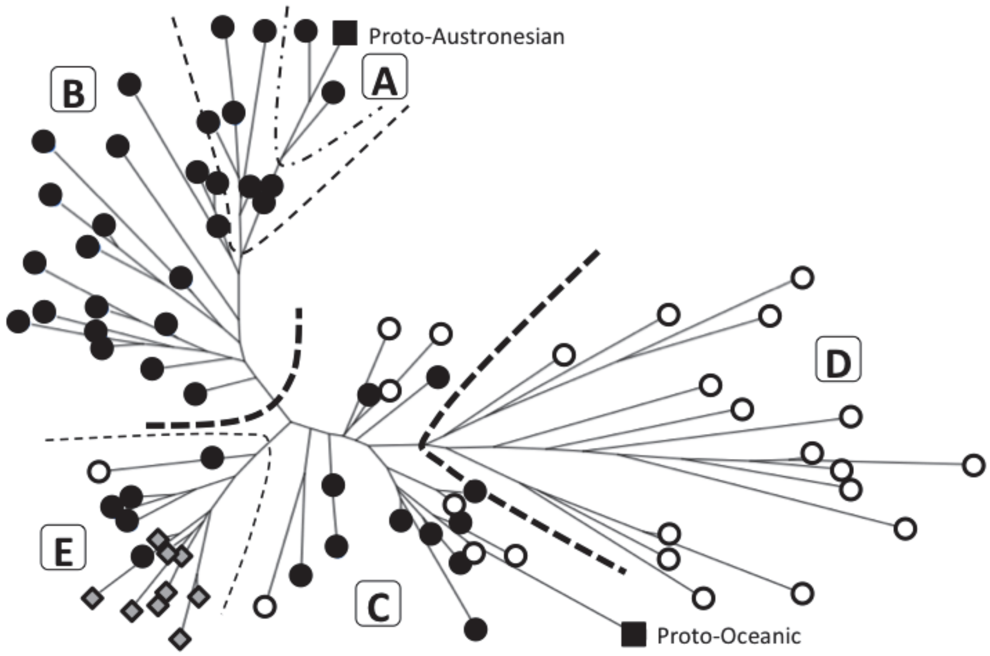
We can now examine the spatial distribution of the languages, with Map 1. There are two important point to note when examining the data in Figure 17 and Map 1.

- while cluster C and cluster E languages in Figure 17 are genealogically diverse, they can be modeled geographically without trouble:
    - cluster C is the buffer between B and D (remembering that Austronesian languages travelled along the north coast of New Guinea)
    - cluster E is found on mainland Southeast Asia, and as a buffer along the contact zone between clusters B, C and D
- while Proto-Austronesian *is* firmly embedded in a typological cluster of genealogically-related languages, Proto-Oceanic cannot be so defined.

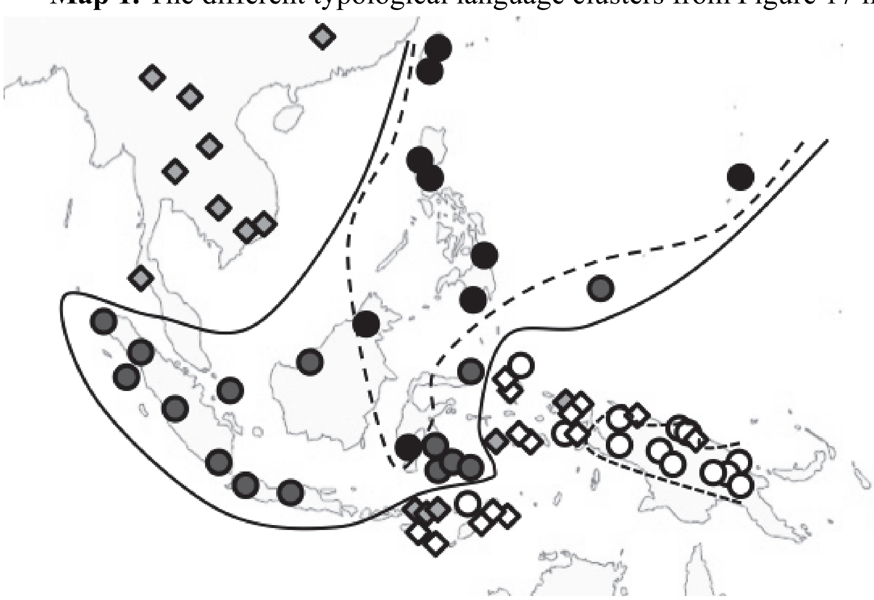
The significance of the position of Proto-Oceanic in the diagram is that it is clear that, from an Austronesian perspective, Proto-Oceanic appears to be drastically contact-affected. Given the evidence of a Melanesian 'accent' in Proto-Oceanic (witnessed by the development of prenasalized stop contrasts, discussed above), it seems (to preempt some of the discussion in section 5) that the demographic component of the arriving Austronesian culture must have been minimal. The morphosyntactic typology of Proto-Oceanic is not obviously recognizable as Austronesian, as defined in Figure 17, and the phonology fits better in north-east Melanesia than it does in the northern ISEA. (See the appendix for a guide to which language is where in the figure and map.)

This implies that even prior to the break-up of Proto-Oceanic, Proto-Oceanic was already strongly contact-affected. Elsewhere (Donohue and Denham in press) it has been suggested that we could more parsimoniously think of many of the Austronesian languages of eastern ISEA and Melanesia as being non-Austronesian languages of the region that have been partly relexified by contact with Austronesians. The level of morphological, phonological and lexical material shared between Proto-Malayo-Polynesian and Proto-Oceanic makes that an unlikely scenario for Proto-Oceanic, but a scenario in which Proto-Oceanic was the result of layers of language contact and language shift, conventionalized over a long time period, appears likely.

Figure 17. Clustering of 78 languages based on morphosyntactic features, focusing on Austronesian languages spoken west of New Guinea.



Map 1. The different typological language clusters from Figure 17 mapped out



Key: Black circle = Area A, Grey circle = Area B, White diamond = Area C, White circle = Area D, Grey diamond = Area E.

5 Conclusions

Contact can be detected in any area of a language, from simple lexical borrowings to more subtle patterns in the phonology and morphosyntax.

Even without detailed philological information we can detect contact scenarios, and even generate broad-outline social sketches that can direct the linguistic ecologies that will benefit from more detailed work. Table 6 (from Donohue 2013) presents possible demographic scenarios in broad outline, and the linguistic traces they might leave.

In this paper we have seen examples of many of these outcomes. The Romance data discussed in 4.1 shows Spanish acquiring elements of non-Indo-European morphosyntax as a result of the intense contact it has undergone with Arabic and Basque. With Romanian we see such heavy contact effects that it is hard to classify the language as Romance other than through the lexicon: the typology is convincingly Balkan and Slavic.

The Dravidian data similarly shows assimilation of the northern languages to non-Dravidian norms in their areas, again showing that we can detect a scenario in which a small but dominant outside group influences the language of the original inhabitants.

In 4.2 we managed to detect the Balkan *Sprachbund* without any philological data, comparing only general typological traits. In 4.3 we saw that using specialized sub-domains of linguistic data, rather than collapsing all the data from a particular domain, is revealing of kinds of contact scenarios that go beyond the broad typology shown in Table 6. And in 4.4 we examined the typology of the Austronesian languages of ISEA with the conclusion that contact, in the form of language shift, must have played a strong and early role in the formation of Austronesian.

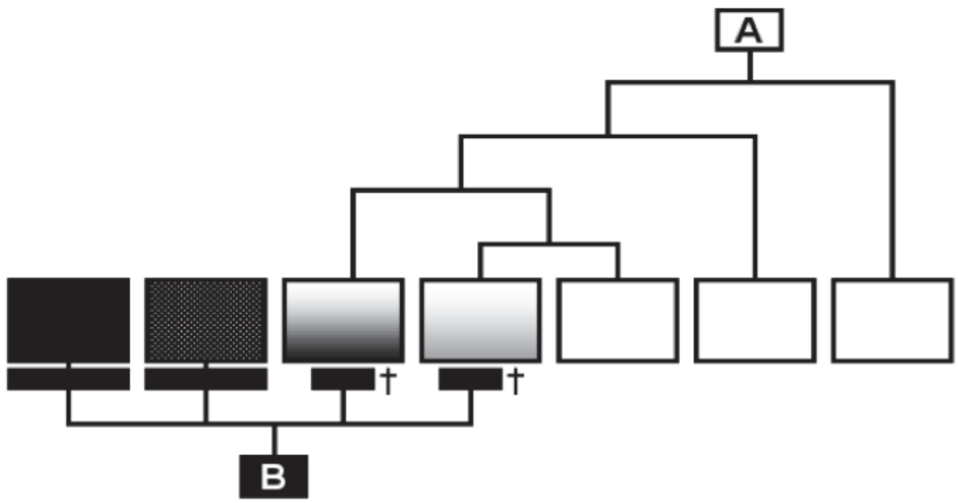
Table 6. Different superimposition scenarios (Donohue 2013)

	population	
socio-politics	intruder populous	intruder minority
intruder dominant	1. **intruder L largely unchanged**	3. intruder L acquires **phonology substrate** from local L
	2. *local languages lost*	4a. *local languages lost* *or* 4b. local L acquires **morphosyntax overlay** from intruder L
intruder subordinate	5. intruder L acquires **morphosyntax overlay** from local L	7a. *intruder languages lost* *or* 7b. intruder L acquires **morphosyntax overlay** from local L
	6. local L acquires **phonology substrate** from intruder L	8. **local L largely unchanged**

Importantly, the methodology for detecting contact has been calibrated against scenarios that are well-understood. With a well-annotated database (eg., Haspelmath et al. 2005, Donohue et al. 2013), and a simple clustering algorithm, we can detect contact even in areas where it was not previously suspected. Rather, we can detect suspicions of contact; any such suspicions would require a detailed examination of the languages concerned, such as was carried out for the Nepalese situation in 4.3.

When we examine data on a large scale it is hard to escape the conclusion that language shift is more common in the spread of language families than is generally discussed in the historical linguistics literature (see, e.g., Donohue and Denham 2011). This can be detected, as shown schematically in Figure 18, by detecting unexpected divergence in the typological profile of members of a language family.

Figure 18. Traces of earlier language ecologies survive in typological profiles



We might wonder what exactly we are detecting. Do the different subsets of features reflect different histories (inheritances, contact events)? Do the different clusterings tell us something about the stability of the different sets of features?

As a cautionary conclusion, we can finish with the observations that investigating typological features can be interpreted in ways consistent with known history. Equally, the method offers different results for different features, and is not a proxy for researching family relations (*à la* the comparative method), but it gives interesting insights into the language speakers' linguistic history. Wichmann and Saunders (2007) discuss the kinds of historical information that can be gleaned from typological analysis, and what information cannot be inferred; this paper extends points made by Wichmann and Saunders, both in detail and in application to different scenarios.

Importantly, in order to refine our heuristics that guide us to social scenarios we require more case studies that examine not only broad typological relationships, as in 4.1 and 4.2, but which go into details in multiple areas of analysis. As with most research projects, the interesting results emerge only when we are able to examine linguistic data not as monolithic 'black boxes' that can only yield a single 'sound bite' outcome, but rather treat each logically separate module of data separately, extending Oppenheimer's (2004) caution on the perils of too quickly combining interdisciplinary data to analysis that uses data from only one discipline.

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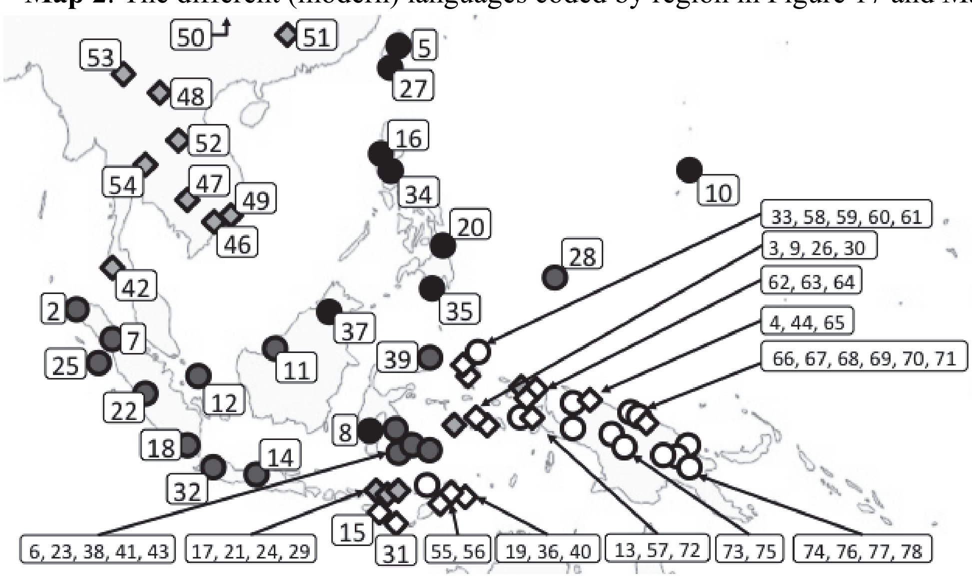
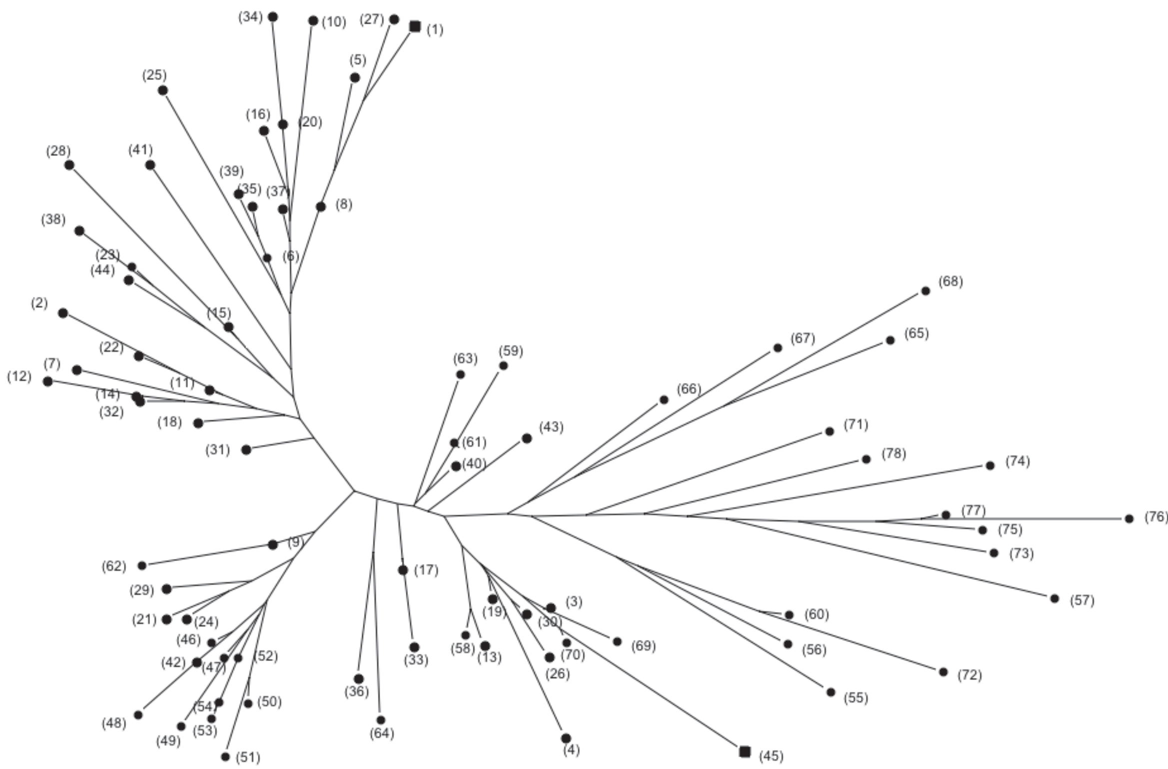
Appendix: Identities and Locations of Languages Discussed in 4.4.

Map 2. The different (modern) languages coded by region in Figure 17 and Map 1.



(Black circle = 'pure' Austronesian region, Grey circle = 'pure' Austronesian, but more distant from Taiwan. White circle = 'New Guinea' region; Grey diamond = mainland Southeast Asia region. White diamond = 'middle ground'.

Figure 19. Key to languages represented in Figure 17.



- Austronesian: (1) Proto-Austronesian; (2) Acehnese; (3) Alune; (4) Ambai; (5) Atayal; (6) Bajau; (7) Batak; (8) Bugis; (9) Buru; (10) Chamorro; (11) Iban; (12) Indonesian; (13) Irarutu; (14) Javanese; (15) Kambera; (16) Kapampangan; (17) Lamaholot; (18) Lampung; (19) Leti; (20) Mamanwa; (21) Manggarai; (22) Minangkabau; (23) Muna; (24) Ngada; (25) Nias; (26) Nuaulu; (27) Paiwan; (28) Palauan; (29) Palue; (30) Paulohi; (31) Sawu; (32) Sundanese; (33) Taba; (34) Tagalog; (35) Tboli; (36) Tetun; (37) Timugon; (38) Tolaki; (39) Tondano; (40) Tugun; (41) Tukang Besi; (42) Urak Lawoi; (43) Warembori; (44) Wolio; (45) Proto-Oceanic;
- Austroasiatic: (46) Chrau; (47) Khmer; (48) Khmu; (49) Vietnamese;
- Hmong-Mien: (50) Hmong Njua; (51) Mien;
- Kradai: (52) Lao; (53) Shan; (54) Thai;
- 'Papuan': (55) Kolana; (56) Tanglapui; (57) Iha; (58) Sahu; (59) Tidore; (60) Tobelo; (61) West Makian; (62) Abun; (63) Hatam; (64) Maybrat; (65) Yawa; (66) Dumo; (67) Isaka; (68) Sko; (69) Au; (70) Olo; (71) One; (72) Ekari; (73) Dani; (74) Kewa; (75) Una; (76) Fore; (77) Tauya; (78) Amele.

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The Articulatory Function of the Larynx and the Origins of Speech

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Introduction

The 'laryngeal articulator,' consisting of the glottal mechanism, the supraglottic tube, the pharyngeal/epiglottal mechanism, and including three levels of folds: the vocal folds, the ventricular folds, and the aryepiglottic folds, is shown to be responsible for the generation of multiple source vibrations and for the complex modification of the pharyngeal resonating chamber that accounts for a wide range of contrastive auditory qualities. These qualities are observed in a surprisingly large number of the languages of the world, both linguistically and paralinguistically, and they account for sounds which have been labeled as 'pharyngeal,' as 'epiglottal,' and as various phonation types. They reflect an expanding range of what have been known as the 'states of the glottis' and which may be more properly termed 'states of the larynx.'

It has also been observed that infants, in their first months of life, produce a range of qualities, reflecting both phonatory possibilities and stricture types, that can also be attributed to the laryngeal articulator mechanism. Systematic observation of infants' early speech production reveals that the control of articulatory detail in the pharynx is mastered during the first year of life. Understanding and control of manner of articulation in the pharynx appears to be a prerequisite for expanding articulatory control into the oral vocal tract. Taking the pharynx as a starting point for the ontogenetic learning of the speech production capacity offers fruitful insights into the phylogenetic development of speech.

Our research into the earliest vocalizations by infants in a research project including English (Victoria), French (Paris), Arabic (Morocco), and Bai (China) shows that (1) speech begins in the pharynx, (2) the production of phonation begins with laryngeally constricted settings, (3) infants explore their phonetic production capacity by employing 'dynamic alternations' and 'pharyngeal priming'. Evidence from the Infant Speech Acquisition (InSpA) Project illustrates instances of 'phonetic play' that demonstrate how infants systematically acquire basic control over the speech mechanism and over the arrays of place and manner of articulation during their first year of life.

1 Laryngeal Articulation

The 'Laryngeal Articulator,' consisting of the glottal mechanism, the supraglottic tube, the pharyngeal/epiglottal mechanism, and including three levels of folds: the vocal folds, the ventricular folds, and the aryepiglottic folds, is shown to be responsible for the generation of multiple source vibrations and for the complex modification of the pharyngeal resonating chamber that accounts for a wide range of contrastive auditory qualities. In a program of experimental phonetic research spanning two decades, it has been shown that the laryngeal articulator plays a key role in differentiating linguistic phonetic meaning in a surprisingly large number of languages of the world (Esling 1996, Esling and Edmondson 2002, Esling, Fraser, and Harris 2005, Edmondson, Padayodi, Hassan and Esling 2007). In the Laryngeal Articulator Model (Esling 1999, 2005, Edmondson and Esling 2006, Catford and Esling 2006), it has been demonstrated that the glottis is not the only source of periodic energy in the larynx, that the aryepiglottic folds also generate vibrations attested in speech sounds, and that the laryngeal constrictor, as the shaper of pharyngeal articulations and of pharynx volume, contributes primary cavity resonance in 'tonal register' and 'vowel harmony' sound systems. Many languages of the world exhibit features that can be classified in terms of 'laryngeal quality'. The acoustic cues of these features illustrate an extensive range of use of the pharyngeal resonator and the laryngeal constrictor mechanism (controlling changes from the glottis through the aryepiglottic folds). Elements of the fine control of laryngeal constriction have been observed laryngoscopically in over 20 languages and modeled to illustrate the parameters of movement available in the laryngeal/pharyngeal space. Laryngoscopic evidence drawn from e.g. Tibeto-Burman, Semitic, Cushitic, Kwa, and Gur languages demonstrates the distinctive use of the laryngeal articulator in pharyngeal trilling combined with glottal voicing, voiceless pharyngeal trilling, and epilaryngeal tube shaping to create opposing vocal register series. One such series is the [ATR/-ATR] contrast, but other harmony systems share a similar phonetic basis.

The laryngeal articulator has also been identified as the principal articulator that infants first start to control as they test and practice their phonetic production skills from birth through the first several months of life. The auditory/acoustic cues generated in the pharynx in the range of languages we have observed are the same elements of sound production observed in early infancy. The infant vocalization data illustrate that laryngeal quality is primal, that control of the articulatory and perhaps acoustic cues of speech originates in the pharynx, and that the acquisition of the ability to produce manners of articulation spreads from the pharynx in a process that parallels and complements the ability of infants to discriminate speech sound categories perceptually. It is important to point out that our initial observations relating the sounds of infant speech to the pharynx were auditory observations based on working with the various adult phonetic realizations across the languages of the world and then listening to infant productions that very clearly resembled a large number of the adults' pharyngeal forms in great detail. The audio samples presented in the BLS paper are designed to illustrate this close relationship in auditory quality.

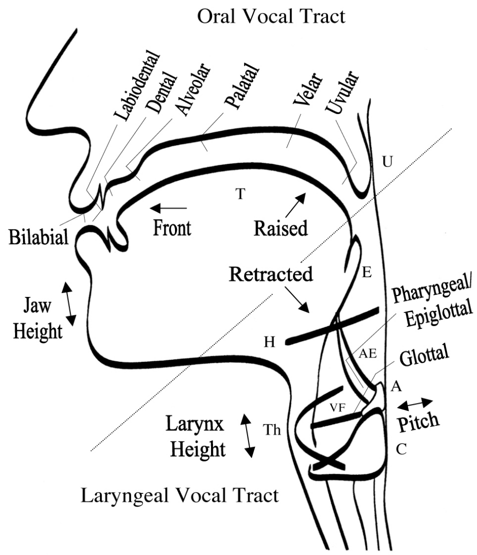
2 The Laryngeal Articulator Model

2.1 The Two-Part Vocal Tract

In the laryngeal articulator view, pharyngeals are considered to be laryngeal articulations, i.e. a function of the aryepiglottic sphincter mechanism, rather than being primarily a function of tongue position. The tools of investigation that we use in our phonetic research have allowed us to formulate a theory whereby the production of pharyngeal sounds is isolated within the 'laryngeal articulator'. We have examined laryngeal articulation in over 20 languages from diverse language families across the world to demonstrate the laryngeal states (Esling 2006), phonatory postures (Catford and Esling 2006), and manners of articulation (Carlson, Esling, and Harris 2004, Edmondson, Esling, Harris, and Huang 2005) that the laryngeal articulator can produce. We have shown that various complex adjustments within a relatively simple mechanism – the laryngeal constrictor – are responsible for the production of multiple manners of pharyngeal consonants, secondary sound source vibrations, and changes in pharyngeal cavity resonance, and we have shown how some languages use these articulatory parameters to generate distinctions that have been characterized phonologically as [lax/tense] or [+ATR/-ATR] (Edmondson, Padayodi, Hassan, and Esling 2007).

The vocal tract is reconceptualized into two primary articulatory domains in the Laryngeal Articulator Model (Esling 2005). The laryngeal section of the vocal tract is conceived of as a series of valves, each of which is responsible for a range of articulatory configurations and is made up of its own unique anatomical structures (Edmondson and Esling 2006). Figure 1 illustrates this conceptual expansion of the articulatory capacity of the laryngeal vocal tract and the primacy of the aryepiglottic folds in the production of sounds that have been termed pharyngeals and epiglottals. For infant speech, regardless of the differences in vocal tract shape from adults, it will be important to identify accurately sounds that originate in the laryngeal sector.

Figure 1: The 'two-vocal-tract' reconceptualization of the standard articulatory model of the vocal tract (minus the nasal tract) with jaw height determining close/open vowel setting at the front, and tongue raising/retracting determining vowel quality at the back. T, tongue; U, uvula; E, epiglottis; H, hyoid bone; AE, aryepiglottic folds; A, arytenoid cartilages; VF, vocal folds; Th, thyroid cartilage; C, cricoid cartilage. This figure is reproduced from Esling's original 2005 work in the *Canadian Journal of Linguistics*.



2.2 Laryngoscopic Descriptions of Laryngeal Behavior

Using this model, we have determined, for example, what the mechanism of pharyngeal trilling involves and where it occurs in the speech sounds of a language with pharyngeals in its phonology. We have also identified the mechanism of pharyngeal shaping that generates contrasting laryngeal features such as [+ATR/-ATR] vowels. The supplementary source mechanism and the resonance features resulting from narrowing of the pharyngeal space are illustrated particularly well in studies of Bai, Iraqi Arabic, Somali, Yi, Akan, and Kabiye (Edmondson, Padayodi, Hassan, and Esling 2007). Laryngeal/pharyngeal production in each language has been studied articulatorily by means of transnasal laryngoscopy. Bai was chosen because of its vocal register contrast that involves a complex of glottal and supraglottic phonatory modification (Esling and Edmondson 2002); Iraqi Arabic because of its extreme and phonetically challenging pharyngeal reflexes (Heselwood 2007, Hassan, Esling, Moisik, and Crevier-Buchman 2011); Somali because it has pharyngeals as well as a vocalic harmony system that interacts with shaping in the pharynx; Yi because of its register series that do not induce phonatory contrasts (Edmondson, Esling, Lama, Harris, and Li 2001); Akan because much is known about its phonetics, and because it is historically the model language for 'ATR' harmony (Tiede 1996). Kabiye, a Gurunsi language of Togo, Ghana, and Benin, compares closely with Akan with extremely regular vowel series and virtually exceptionless adherence to the rules of 'ATR' vowel harmony.

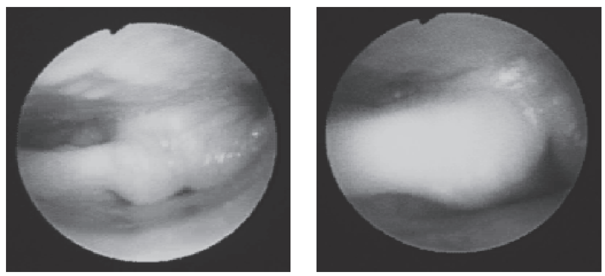
The experimental phonetic equipment in our laryngoscopic research facility consists of a Kay Elemetrics Rhino-laryngeal-stroboscope (RLS 9100) with a constant halogen cold light source to photograph the actions of the larynx. An Olympus ENF-P3 fibreoptic nasendoscope is attached to the camera (Panasonic GP-US522) and light source with a 28mm lens for optimal wide-angle framing of larynx mechanisms during extreme pharyngeal articulations and of laryngeal postures during the varying pitch conditions in which tonal paradigms occur. Recordings, originally made on VHS tapes, are now made directly on a Sony DCRTRV17 Mini-DV Digital Camcorder with high-quality audio. Video images have been postprocessed using Adobe Premiere 6.5 software and, more recently, with Sony Vegas Pro.

Canonical phonetic profiles obtained in baseline research (Esling 1996, 1999, 2005, 2006, Esling and Harris 2005) serve as the basis for comparing the production of phonemic contrasts by native-speaker subjects in the array of languages we have studied. Languages in the video database of the larynx and pharynx include: Nuuchahnulth (Wakashan), Nlaka'pamuxcín (Salish), Tigrinya (Semitic), Palestinian Arabic (Semitic), Iraqi Arabic (Semitic), Somali (Cushitic), Amis (Austronesian), Yi (Tibeto-Burman), Bai (Sino-Tibetan/Tibeto-Burman), Tibetan (Tibeto-Burman), Sui (Kam-Daic), Thai (Daic), Pame (Oto-Manguean), Cantonese (Sinitic), Chinese (Sinitic/whisper studies), Danish (Germanic), English (Germanic/whisper studies), Korean (Altaic), Bor Dinka (Nilotic), Chong (Mon-Khmer), Akan (Niger-Congo, Kwa), and Kabiye (Niger-Congo, Gur).

2.3 Laryngeal Qualities and Place and Manners

In the same way that canonical phonetic profiles obtained in baseline research constitute the basis for comparing sounds produced by native-speaker subjects of various languages, the data that we have obtained from the various native-speaker subjects constitute the basis for comparing sounds produced by infants in the Infant Speech Acquisition (InSpA) Project. Whereas invasive laryngoscopic experimentation can be carried out with adult subjects, invasive procedures are not possible with infant subjects; and they are not needed. The principal phonetic classification that takes place in the adult language studies remains largely auditory, with instrumental data providing support for the auditory distinctions that we identify in the various phonologies. The phonetic classification that takes place in the infant language studies is wholly auditory. Classifications are developed and assigned on the basis of intensive training in the system of the Laryngeal Articulator Model, with which all members of the research team are intimately familiar. Categories follow those developed while working with the data from the array of languages listed above and which are taught in undergraduate classes and in postgraduate seminars at the University of Victoria.

Figure 2: Maximum stricture of medial epiglottal stop [ʡː] in Iraqi Arabic /faʕʕal/ ‘made active’ (left) and voiceless epiglottal trill [ʜː] in /saħħar/ ‘made magic’ (right). Aryepiglottic folds, middle.



The categories of analysis from languages observed laryngoscopically include qualities and place and manner designations. Some examples of categories from our previous research are epiglottal stop (widely distributed in Semitic, Cushitic, Wakashan, Salish, and Austronesian languages), glottal stop (with an even wider distribution), voiceless pharyngeal trill (in Iraqi Arabic and Somali as well as in Tibeto-Burman register). In Somali, in a voiceless pharyngeal, an effect of harsh trilling of the aryepiglottic folds co-occurs, and it also appears that the combination of tight, harsh phonation at the glottis propagates through the supraglottic tube, inducing vibrations of the narrowed structures above it, including the tip of the epiglottis. A pharyngeal tap has also been identified in our data from Iraqi Arabic (a speech sound category not yet attested in the chart of the IPA). Most of these sound types, in fact, had been underattested among the world’s languages prior to the results of our laryngoscopic research; so it is now possible to say that many if not most of the categories of sounds generated by the laryngeal constrictor occur far more commonly than had been previously thought. It is also possible to specify more clearly how each category is related articulatorily to the others. Examples of the posture of an epiglottal stop and of a point during voiceless aryepiglottic trilling are shown in Figure 2. In both, the aryepiglottic folds are raised up and forwards towards the retracting tongue and epiglottis. During the trill, the aryepiglottic folds are vibrating vigorously while the glottis is open beneath in the state of breath. Detailed studies of this vibratory phenomenon as a secondary laryngeal periodic source have appeared in Moisik, Esling, and Crevier-Buchman (2010) and in Hassan, Esling, Moisik, and Crevier-

Buchman (2011). An articulatory model has also been developed which compares the movement at the glottis with the movement at the aryepiglottic folds (Moisik 2008).

The qualities (due to pharyngeal resonance) that we have identified as a function of the laryngeal articulator are an example of how source generation and articulatory dynamics in the laryngeal space interact with other phonological specifiers that are not considered to be 'pharyngeal' per se. The 15-way tonal register syllable distinction in Bai (Tibeto-Burman) based on pitch, phonation type, laryngeal-constrictor tension, and nasal quality is a good example of this relationship (Edmondson, Esling, Lama, Harris, and Li 2001, Esling and Edmondson 2002). The Bai registers have been called 'lax' and 'tense,' which are good phonological terms to differentiate the qualities. Phonetically speaking, we have argued that 'lax' reflects [-cet] ([-constricted epilaryngeal tube]) syllabic register, while 'tense' reflects [+cet] ([+constricted epilaryngeal tube]) syllabic register (Moisik and Esling 2011b). The feature [+cet] represents the engagement of the laryngeal constrictor mechanism and results in qualities that are articulatorily the same as pharyngealization. Yi (Tibeto-Burman) is an example of a language whose vocalic system is characterized primarily by a [-cet/+cet] syllabic register contrast, which is also called lax/tense. In phonetic terms, tense recapitulates the engagement of the laryngeal constrictor mechanism such that the resulting resonance of the pharyngeal tubes generates what has been called 'raised larynx voice' (Laver 1980). Lax encompasses an opposite posture – neutral larynx height with an open epilaryngeal tube, or even lowered larynx. But this is not an areally isolated phenomenon. West African languages that have been labeled with [+ATR/-ATR] harmony series demonstrate the same contrast in laryngeal behavior as those Tibeto-Burman languages with [-cet/+cet] (lax/tense) distinctions. Dinka as well as Somali also share the use of this phonetic property but in a paradigm where quality plays a more subtle role. The West African 'ATR' paradigm is virtually identical in articulatory phonetic terms to the Tibeto-Burman lax/tense paradigm. Examples are Akan/Twi (Kwa) and Kabiye (Gur), which can each be thought of as having one series of vowels that is [-cet] (+ATR) [i, e, u, o, a], and a parallel set of vowels that is [+cet] (-ATR) [ɪ̲, ɛ̲, ʊ̲, ɔ̲, ɑ̲]. That the distinction is pharyngeal, i.e. a function of the laryngeal constrictor mechanism, was hypothesized in 1996 (Esling 1996) and eventually confirmed through laryngoscopic observation (Edmondson and Esling 2006, Edmondson, Padayodi, Hassan, and Esling 2007). The constricted series of these paradigms will be used here to make the connection between the possibilities that are available for contrastive purposes in adult phonologies and with the way that infants begin their articulatory phonetic experience. The laryngoscopic examples that follow are of adults, but the constricted postures are very similar to the innate shape of the infant vocal tract (Fitch and Giedd 1999).

In the [+cet] (-ATR) vowels in Akan, shown on the right in Figure 3, the flatter forward-bending aryepiglottic angle, the more retracted tongue and raised larynx, and the narrowed posture of the laryngeal constrictor reflect the constricted state of the laryngeal vocal tract. Anatomically speaking, the constricted posture on the right resembles somewhat the shape of the naturally straight and short infant vocal tract. This comparison will be relevant when discussing what kinds of sounds infants produce in their first months of life. The existence of this body of auditorily catalogued laryngoscopic data will also assist us in understanding what inventories of laryngeally generated sounds infants produce at what stages of vocal development. The same situation exists in Kabiye (Gur), which has a similar [+ATR/-ATR] vowel harmony series. Each one of the vowels in the [+cet] (-ATR) set [ɪ̱, ɛ̱, ʊ̱, ɔ̱, ɑ̱] demonstrates a tightened configuration of the laryngeal articulator, as seen in the image on the right in Figure 4.

Figure 3: Mid-initial-vowel laryngeal posture of Akan /midi′/ ‘I am eating’ (left) and /mɪ̱dɪ̱̀/ ‘I am called’ (right). The lines trace the aryepiglottic fold angle: low and open on the left; raised and forwards-closing (towards bottom of photo) on the right.

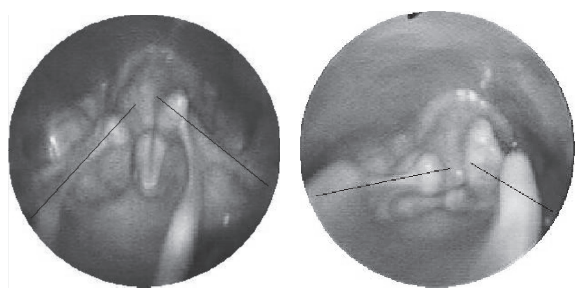
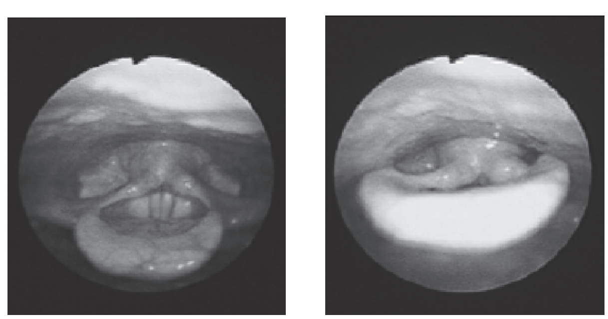


Figure 4: Mid-vowel laryngeal/pharyngeal posture of Kabiye /tú/ ‘elephant’ (left) and /tʊ́/ ‘bee’ (raised/constricted, right). Epiglottis, bottom; aryepiglottic folds, middle; pharyngeal wall, top.



2.4 Implications for the IPA Vowel System

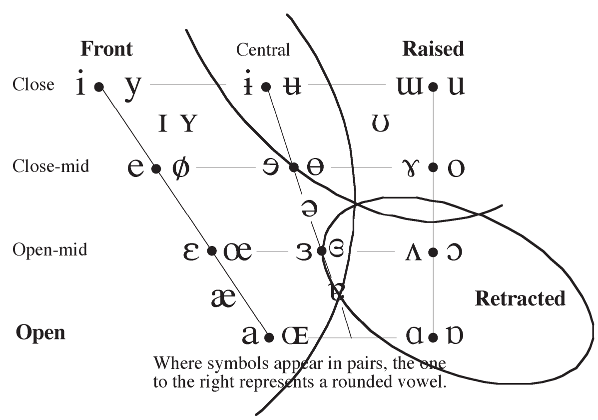
In addition to consonantal place and manner, therefore, vowels are also affected by the action of the laryngeal constrictor. This is clear in the evidence from Akan and Kabiye, where vowel quality (noted by differing symbol shapes) changes as pharyngeal quality changes. The ostensibly redundant notation of adding a subscript retracting symbol captures the generalization of the pharyngeal quality common to this series of vowels (Padayodi 2008). The upwards and forward-flattening aryepiglottic angle, retracted tongue and raised larynx during laryngeal constriction and the consequent narrowed configuration of the pharyngeal resonator produce a vowel that is 'lower' and 'backer' on the vowel chart (i.e. retracted), whatever the individual vowel quality due to oral lingual position.

These considerations imply that the 2005 International Phonetic Alphabet vowel chart may need revision in terms of its traditional 'Front-Back' and 'Close-Open' dimensions. The issue revolves around identifying articulators. If the tongue is taken to be the only articulator defining vowel quality and the vowel space, then the effect introduced by the laryngeally constricted set of vowels in the West African phonologies reviewed here occupies an ill-defined place in the system. 'Back' does not account adequately for the effect of the laryngeal constrictor mechanism. Another parameter is needed in the deepest part of the vocal tract. And since opening of the jaw only applies to the 'Front' section of the vocal tract, 'Open' is not a particularly apt qualifier for what happens to vowels in the lower right region of the vowel chart. These implications for revision are discussed in detail in the new *Handbook of Phonetic Sciences* (Esling 2010).

In many familiar systems of vowel location, vowels are described as lingually high or low and front or back. This conceptualization implies a model of lingual movement within the dimensions of a square space – four-cornered in two-dimensional terms – with the tongue moving up or down and from front to back. The tongue is usually represented in this model as the articulator responsible for changes in vowel quality along the high-low and front-back dimensions. This can be called the H-L-F-B model. This image of the tongue moving high in the mouth or back in the mouth, however, does not conform with articulatory behavior or with the evidence we have discovered for West African languages or for Tibeto-Burman phonologies or even for the effects of pharyngeals on 'low back' vowels in Semitic languages, as seen for Iraqi Arabic or Tigrinya. Neither is the traditional H-L-F-B model as useful an image as it could be for understanding how sound quality is shaped by articulator movement, vocal tract postures, and resulting cavity resonances in a multi-faceted set of chambers such as the vocal tract.

The principal reason why the H-L-F-B model inadequately represents (and perhaps even mistakenly portrays) the phonetics of the vocal tract is that it assumes oral lingual articulator activity while virtually ignoring laryngeal articulator activity (not to mention ignoring the role of the jaw). To the extent that the H-L-F-B model is intended to account for auditory quality, it has also misinformed acoustic theory. The assumption that H-L-F-B movement of the tongue drives vowel quality is not entirely adequate in the light of what we have discovered about how the laryngeal articulator controls the pharyngeal resonator. In fact, the laryngeal articulator can be also be shown to relate indirectly to velo-pharyngeal and mandibular settings in addition to lingual movement. The key in the development of a revised paradigm is to integrate a laryngeal articulator component between the mechanism of glottal airflow and the oral/front vocal tract articulators.

Figure 5: A revised IPA vowel chart to reflect three-way tongue movement: fronting, raising, and retraction, where retraction is a function of the laryngeal constrictor mechanism (Esling 2005, Edmondson and Esling 2006, Esling 2010).



The development of the Laryngeal Articulator Model (Esling 2005) therefore prompts a revision of the conceptualization of the vowel chart, as suggested in Figure 5 (Esling 2010). At the front, the tongue may be ‘Fronted,’ but the articulator responsible for ‘Open’ quality is the jaw. At the back, it is the laryngeal constrictor. Tongue ‘Raising’ is also oral (and dorsal); but vowels affected by the action of the laryngeal constrictor will move in the direction of lingual ‘Retraction,’ which is the part of the laryngeal/pharyngeal constrictor mechanism that connects to the oral tract (cf. Figure 1). The principal action of laryngeal constriction (aryepiglottic fold sphinctering) precedes lingual retraction and larynx raising in the hierarchy of the complex maneuver (Edmondson and Esling 2006).

Larynx height is in fact a more voluntarily controllable variable than tongue retraction. Tongue retraction cannot occur without a prior engagement of the aryepiglottic sphincter mechanism. That is, there is an entailment relationship. The height of the larynx, however, can be controlled more freely. While reflexively linked to laryngeal constriction, so that the larynx normally raises during the constriction maneuver, the height of the larynx can be manipulated so that it may lower as a unit during constriction. Some phonologies may choose, as it were, to adopt this physiologically contrary setting as a coarticulatory component of pharyngeal sounds. The entailments at this vertical level of control, where aryepiglottic sphinctering, tongue retraction, larynx height, pitch and larynx tilt interact, is being investigated using simultaneous laryngoscopy and ultrasound (Moisik and Esling 2011a, Esling and Moisik 2011).

These experimental articulatory phonetic findings lay the groundwork for the auditory description of infant speech production. In the past, descriptions of sound qualities emanating from the laryngeal vocal tract have lacked the phonetic precision afforded by the Laryngeal Articulator Model. As a consequence, the labelling of infant speech sounds has been impressionistic rather than auditory phonetic (Stark, Rose, and McLagen 1975, Boysson-Bardies, Sagart, and Durand 1984, Boysson-Bardies and Vihman 1991, Hallé, Boysson-Bardies, and Vihman 1991, McCune, Vihman, Roug-Hellichius, Delery, and Gogate 1996, Oller 2000). Our goal has been to integrate the present findings, based on the Laryngeal Articulator Model, with the findings of these previous studies. The research findings summarized in this paper provide a phonetic account of the components of the laryngeal mechanism, including effects on vowel quality, that can be used to characterize infant vocalizations. It has been proposed that [+cet] is the feature that captures the articulatory generalization of the laryngeal constrictor, including pharyngeal consonants, tonal register, and quality harmony, by creating an independent designation for the action of the lower part of the vocal tract (Czaykowska-Higgins, Moisik, and Esling 2011). With this knowledge, it is possible to ask new questions about the ontogenetic development of the speech modality and to introduce new conjectures about phylogeny.

3 Speech Sounds in the First Year of Life

To determine how infants acquire the phonetic modality of speech production, a research project has been established to observe infant vocalizations during the first year of life in four separate language contexts where the phonological inventories of the adult languages contrast. The initial hypothesis is that speech-production processes begin in the laryngeal vocal tract rather than the oral vocal tract. In our model, 'the pharynx is in the larynx.' That is, the pharyngeal articulator is the laryngeal sphincter – the most essential valve complex in the mechanism of the larynx. Therefore, glottal phonation cannot be separated from pharyngeal activity in the analysis of infant speech. A secondary hypothesis is that manner of articulation is 'learned' at one place of articulation first and then transferred to subsequent places of articulation. The model predicts that stop, approximant, fricative, and trill can all be acquired at the pharyngeal place of articulation before the same manners of oral sounds appear. A tertiary hypothesis is that infants exposed to ambient languages that exploit the laryngeal vocal tract in their phonological inventories will use selected elements of pharyngeal speech production earlier in their babbling behavior than do infants whose ambient languages do not contain laryngeal phonological components. The reasoning is that if speech sounds are acquired first in the pharynx, then it is possible that those articulations will form part of early babbling sequences and earliest phonological acquisition where the phonologies require them.

3.1 The InSpA Project: Approach and Method

The four language contexts in the InSpA (Infant Speech Acquisition) Project, where phonological inventories of the ambient languages are designed to contrast, are English in Canada and French in France, which do not have pharyngeal features, and Arabic in Morocco and Bai in Yunnan, China, which do have pharyngeal features. Arabic has two pharyngeal consonants, and Bai has tonal register in which glottal state and laryngeal constrictor setting interact with pitch across the 8 oral syllable categories and 7 nasal syllable categories. Arabic also has emphatic consonants, but these have a different secondary pharyngeal configuration from the primary pharyngeals /ħ/ and /ʕ/ (Hassan and Esling 2011) and will require separate investigation. We are aware of course that English uses laryngeal constrictor settings for paralinguistic purposes and that the /r/ of traditional Parisian French dialect is pharyngeal (and that a pharyngeal reflex also occurs paralinguistically). However, accents of Parisian French have changed over the decades so that it is less likely than before that this feature will be found in the speech of adults, let alone infants in a targeted sampling of this type. The data reported here will cover only results based on the English, Arabic, and Bai samples.

The initial hypothesis tested with our data is that speech-production processes begin in the laryngeal vocal tract rather than the oral vocal tract. Findings in the initial phase of the study are based on data from 19 infants' vocalizations (4 English, 9 Arabic, 6 Bai), classified by trained phoneticians using auditory analysis supplemented by wide-band spectrograms of 3,197 utterances (English: 932; Arabic: 1,011; Bai: 1,254). While not all infants were recorded each month, the data include a recorded session of at least one infant per month from 1 to 12 months. Findings from a later phase of the study are based on approximately 3600 vocalizations, approximately 1200 in each language group, 300 in each of four age groupings: 1-3 months, 4-6 months, 7-9 months, 10-12 months (Benner 2009).

Vocalizations are defined as utterances separated from other utterances by at least two seconds of silence. Digital cameras with integrated microphones were used to record the infants interacting with caregivers in their home environments. Phonatory settings (constricted vs. unconstricted) occurring in babbling sequences towards the end of the first year were also extracted from the data, but all CV(C) utterances, whether monosyllabic, reduplicative, or variegated, were considered babbling and became part of the second-year phase of the Project. This continuing phase of the study aims to pursue the occurrence of pharyngeals developmentally for the particular language groups that have not had wide coverage in the phonological literature – Arabic and Bai. Some findings are mentioned here for the first few months of the second year of life for Arabic.

3.2 Exploring Phonatory Capacity: Dynamic Alternations

Infants appear to use their speech production ability to explore laryngeal settings actively and systematically, beginning with phonation, based on physiological predispositions but clearly under the infants' control. In vocalizing, infants are observed to 'play' by manipulating degrees of constriction and increasing the length of utterances while also implementing changes in pitch. Some infants also alternate phonetic parameters dynamically in sequence and then continue to alternate them in increasingly rapid succession over the months. For example, at 5 months, an infant may vary between a phonatory setting with less constriction to a setting with more constriction in a rudimentary pattern of alternation. At 7 months, an infant may alternate phonatory settings with and without constriction; or vocalizations at high pitch without constriction (falsetto) may alternate with high pitched vocalizations with constriction (tight harsh voice). At 8 months, an infant may explore degrees of glottal opening, alternating breathy phonation with modal phonation. At 10 months, constricted events may vary with unconstricted sequences, e.g. harshness with laryngeal closure followed by breathy voice, as unconstricted babbling sequences proliferate. It is the timing-control aspect of these alternations, as well as the nature of the phonetic values being alternated, that suggests to us that these patterns constitute a controlled 'intentional' activity. This patterned kind of alternating play has been more common in infants whose parents encourage the diversity of their vocalization, so to some extent this behavior is conditioned. Nevertheless, it constitutes an intriguing early use of a primal articulatory mechanism, and it deserves to be studied psycholinguistically in more detail.

3.3 Speech Begins in the Pharynx

From an anatomical point of view, laryngeal constriction as an available phonetic mechanism can be considered to be predisposed in the infant (Fitch and Giedd

1999). In our analysis of the phonetic production data (Bettany 2004, Esling, Benner, Bettany, and Zeroual 2004, Benner, Grenon, and Esling 2007, Grenon, Benner, and Esling 2007), even babies who are surrounded by English produce the laryngeal/pharyngeal sounds that have been identified in the languages described in section 2 that have pharyngeal consonant series, tonal register phonatory contrasts, or vowel harmony secondary coloring. All infants from all four ambient language environments in the study demonstrate the phonetic principle that speech production develops from a laryngeal/pharyngeal basis. The ‘first sound’ that infants can be said to produce, from a stricture point of view and other than crying with a constricted (retracted) vowel, is epiglottal stop [ʡ], as in Figure 2, since this stricture is a function of the laryngeal constrictor and because this maneuver is the primary airway-protection reflex (Gauffin 1977). Glottal stops [ʔ], which require more careful control than epiglottal stops, allowing slightly more laryngeal openness, only begin to appear in month 2 or 3 in our data. In terms of phonation type, infants begin by using phonatory configurations where laryngeal constriction dominates, e.g. harsh voice, whispery voice, and creaky voice. Gradually, while continuing to employ constriction, infants develop phonation types that do not have constriction, e.g. modal voice, breathy voice, and falsetto. In the earliest months, laryngeally constricted production dominates in all languages observed. Analyses of the initial 3,197 utterances, contrasting only constricted vs. unconstricted utterances across age groups, are significant ($\chi^2(3) = 93.34$, $p < .001$), indicating that the incidence of laryngeal constriction in infants' vocalizations varies primarily as a function of age, irrespective of linguistic background. In all language groups, earliest vocalization is almost exclusively constricted, that is, pharyngealized. Open-airway phonetic realizations occur only rarely. This is physiologically explainable. Constricted gestures protect the airway, as the infant must be able to close off the airway instantaneously, and the control of pharyngeals is inherently close to the innate reflex response. Producing ‘open’ (non-constricted) sounds could be viewed as a risk and must be learned gradually. Eventually, all infants progress towards finer control of oral (largely unconstricted) articulations. Nevertheless, there are differences across language environments over the course of the first year in how much constriction is retained and in how many unconstricted types of vocalizations are learned.

Figure 6: Proportion of constricted vs. dynamic vs. unconstricted vocalizations produced by Bai infants over the first year of life, in 3-month groupings.

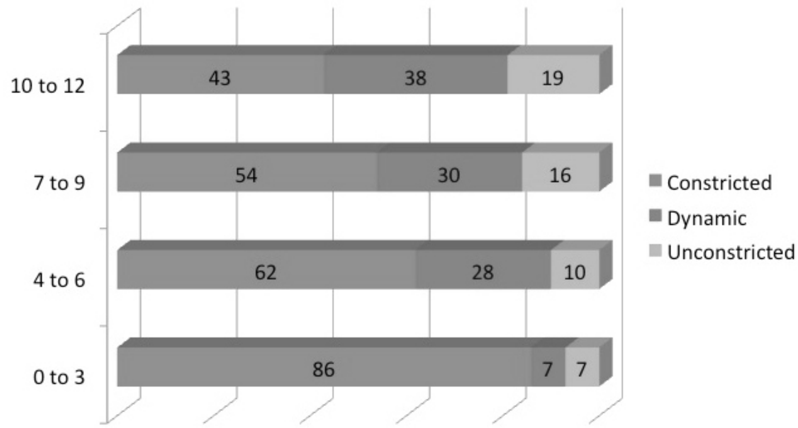
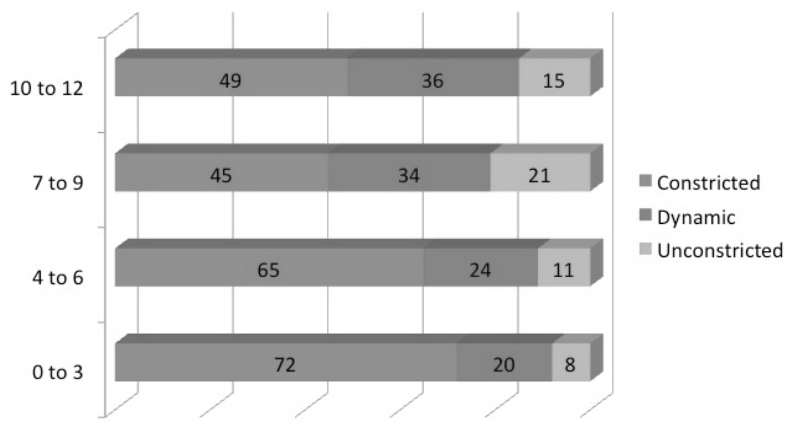
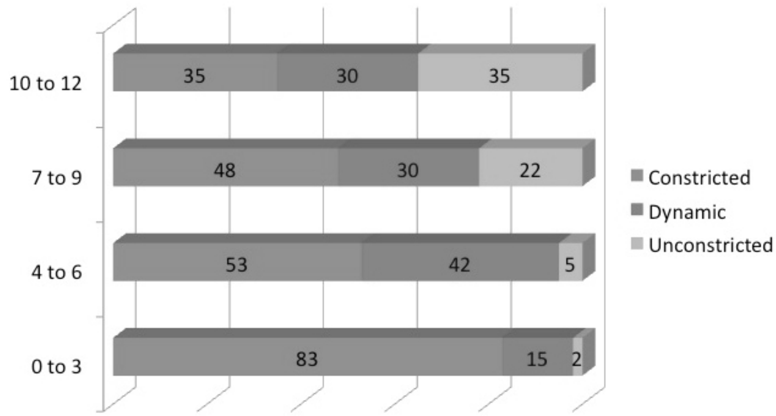


Figure 7: Proportion of constricted vs. dynamic vs. unconstricted vocalizations produced by Arabic infants over the first year of life, in 3-month groupings.



A comprehensive analysis contrasting percentages of constricted, dynamic, and unconstricted vocalizations in the larger 3600-utterance sample across age groups in the first year is shown in Figure 6 for the Bai infants. Most vocalizations in the first six months are in the constricted category or vary dynamically between constriction and another sound. Unconstricted vocalizations are rare. Even in the second six months, unconstricted forms constitute less than a fifth of utterances. The same situation is true for Arabic (Figure 7). The move to unconstricted forms does not expand greatly even at the end of the first year.

Figure 8: Proportion of constricted vs. dynamic vs. unconstricted vocalizations produced by English infants over the first year of life, in 3-month groupings.



The situation for English infants is the same as for Bai and Arabic infants in the first six months: virtually all sound-producing articulations are in the constricted mode (Figure 8). By the end of their first year, however, there is an increasing tendency for the infants in an ambient English environment to adopt unconstricted forms. This preference for oral sounds may be a product of the lack of pharyngeals (of anything back of velar, in fact) in English phonology. Benner (2009) has demonstrated that English adults/parents show a lack of preference for constricted vocalization in early infant speech, whereas Bai adults/parents show a marked preference for constricted sounds in any infant's vocalizations. This suggests that adult/parent response may play a role influencing which sounds infants are favored to produce (and which sounds lose favor, in the case of an ambivalent or a negative adult response). This could be further tested perceptually. In any case, the fact that infants even in an English context begin with pharyngeals and constricted phonation through most of their first year, just as Arabic or Bai infants do, supports the hypothesis that consonantal and vocalic sounds that are laryngeally constricted (through the action of the pharyngeal articulator) are acquired first, and lead phonetic acquisition, before unconstricted phonation types and oral strictures are able to be acquired.

3.4 Expanding Place of Articulation: Pharyngeal Priming

An even more important phonetic process than infants alternating their new phonetic 'discoveries' is what we have called 'pharyngeal priming.' We have observed that infants systematically explore new places of articulation by 'priming' the new sounds with a pharyngeal 'starter,' that is, new oral places of articulation are primed with a preceding sound emanating from the pharyngeal articulator in the larynx. In the first 6 or 7 months, infants produce mainly stop strictures and fricatives that arise from laryngeal constriction (pharyngeals and glottals). In the second half of the first year, infants begin to 'specialize' in the use of consonants that predominate in their ambient languages. So, in addition to constricted phonation types, infants learn various manners of stricture at the epiglottal/pharyngeal place of articulation. Stop, fricative, approximant, and trill manners are all observed to occur early at the laryngeal constrictor in the pharynx, that is, at the epiglottal/pharyngeal place of articulation (see Figure 1).

Beyond the pharynx, we have found that oral places of articulation do not develop spontaneously as purely oral articulations. Instead, velars, uvulars, labials, alveolars and palatals appear first in combination with a pharyngeal sound. The pharyngeal is typically a continuant. The deeper event primes the higher, oral event. For example, a constriction in the pharynx (harshness, friction, aryepiglottic trilling or just pharyngeal resonance) may precede and prime the oral stricture of a labial [m]; the pharyngeal event acting as a secondary articulation to the labial. Even oral stops may have a distinctly constricted phonation type as an onset or coarticulated background accompaniment (rather than just modal phonation). Fricatives at various places have been observed to be primed with pharyngeal-stricture onset. In months 7–12, infants play by producing sequences to explore all manners at each particular place of articulation (manners which were learned initially in the pharynx). We have ample evidence of infants 'playing with the phonetic instrument', for instance producing uvular trills in long sequences once the uvular place of articulation is discovered, even where uvulars are not found in the ambient language (English).

3.5 Constriction in Non-Babbling vs. Babbling

Once babbling begins, babbled utterances tend to be less constricted (more oral) than co-occurring non-babbled vocalizations. In our results thus far, English babbling is the least likely to feature laryngeal constriction, even at an age when the English infants' utterances overall contain a high proportion of constriction. Given that English does not use laryngeal constriction contrastively, this finding was expected. We also found that Arabic babbling consistently included a higher proportion of laryngeally constricted voice quality settings than English babbling.

Figure 9: Proportion of constricted vs. dynamic vs. unconstricted non-babbling vocalizations produced by English, Arabic, and Bai infants in the last 3 months of the first year of life.

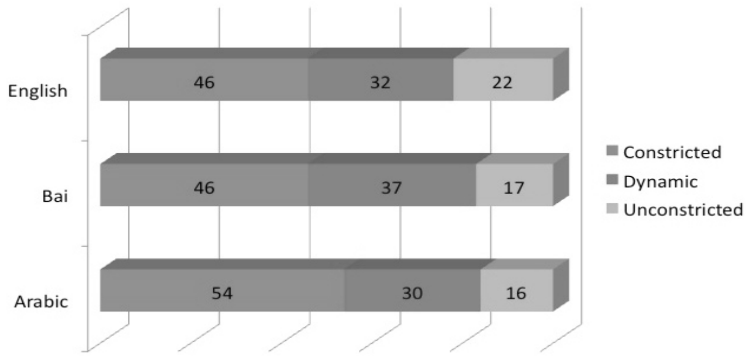
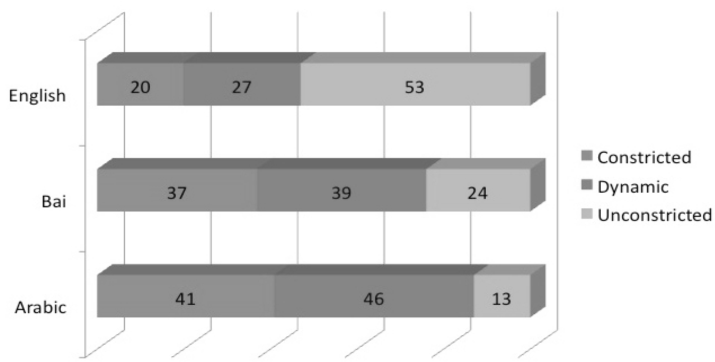


Figure 10: Proportion of constricted vs. dynamic vs. unconstricted babbling sequences produced by English, Arabic, and Bai infants in the last 3 months of the first year of life.



The predominance of constricted sounds as laryngeal articulations in infant speech gains further support by observing the comparison between non-babbled vocalizations and early babbling at the end of the first year. Figure 9 shows the percentages of constricted, dynamic, and unconstricted non-babbled vocalizations produced in the three language contexts in months 10-12. Even in the English context, the shift to unconstricted (non-pharyngeal) non-babbled sound types remains around a fifth of the utterances produced. Figure 10 shows the incidence of constricted, dynamic, and unconstricted babbling sequences produced in the three language contexts in months 10-12. For Arabic, the shift to oral sounds is heavily moderated by accompanying (dynamically combined) sequences, and purely oral (unconstricted) sounds are few. For Bai, unconstricted sequences are more numerous, but a large proportion of sounds remain dynamically alternating. For English, there is a clear (53%) preference for oral (unconstricted) sounds by the time babbling accelerates. Dynamic combinations are fewer, and the incidence of laryngeally constricted forms in babbling sequences is significantly reduced.

This finding is intriguing, since laryngeal constriction in Arabic contrasts mainly at the segmental level. It is possible that the Arabic infants have noticed the parameter ‘laryngeal constriction’ in their ambient language but have not yet differentiated between segmental and suprasegmental features. Alternatively, it is possible that voice quality settings are more constricted in language contexts where laryngeal constriction is employed at the segmental level. The rate of laryngeal constriction in the babbling of the Bai infants exhibits the most complex pattern by months 10-12. The incidence of constriction in Bai babbling is similar to that of the Arabic infants, while dynamic variation and purely unconstricted babbling are more evenly distributed. It may be that phonetic acquisition of laryngeal contrasts follows a more varied path in Bai than in English or Arabic, given that Bai employs a range of pitch-dependent phonatory settings in its tonal register system, contrasting harsh voice (laryngeally constricted), modal voice, breathy voice, and five pitch patterns (Edmondson, Esling, Lama, Harris, and Li 2001, Esling and Edmondson 2002). Where and when these phonetic contrasts first begin to appear contrastively in meaningful syllables in Bai will require observations of production from the second year of life.

4 Discussion

Our first hypothesis – that speech-production processes begin in the laryngeal vocal tract rather than the oral vocal tract – has strong support. The secondary hypothesis, that manner of articulation is ‘learned’ at the pharyngeal place of articulation first and then transferred to higher oral places of articulation appears to be true, as vocalizations from the laryngeal articulator accompany many other types of sounds. Alternations occur initially with phonation types, exercising states of the larynx, before patterns of oral combining can be performed. Furthermore, it is in the laryngeal region that these alternating patterns learn to be manipulated more and more quickly as control over the articulators grows. Then, sounds that are learned at new, oral places of articulation occur first with clear secondary ‘accompaniment’ from the original laryngeal/pharyngeal articulator in the performance of ‘pharyngeal priming.’ The tertiary hypothesis, that infants exposed to ambient languages that exploit the laryngeal/pharyngeal vocal tract in their phonological inventories will use selected laryngeal elements of speech earlier in their babbling behavior than do infants whose ambient languages do not contain laryngeal/pharyngeal phonological components, has only weak support at this stage. By the end of the first year, Arabic and Bai infants have begun to babble using some pharyngeal segments or clearly identifiable laryngeal registers in their CV(C) forms. However, the incidence of these forms is not as great as the proportion of purely unconstricted forms used by the English infants in their babbling. We have not yet been able to identify, from the data from the end of the first year or from the beginning of the second year, that the Arabic or Bai infants have begun to use pharyngeal segments or clearly identifiable laryngeal registers in meaningful (lexical) contexts. This will require further study with colleagues in Morocco and in China to determine when laryngeal/pharyngeal forms first begin to occur in specific words. It may be that infants whose ambient languages contain laryngeal/pharyngeal phonological components have to 'reacquire' these forms once the acquisitional 'clock' is right. Although the phonetic capacity to perform the pharyngeal/laryngeal forms has already been mastered, and mastered by all infants during the first several months, the actual use of that capacity may need to be activated by other conditions that do not coincide with the beginning of babbling. However, it is also possible that the amount of data we have collected is not yet adequate to give a clear picture of just how many constricted vs. unconstricted forms occur once babbling begins or when first words are beginning to be produced. The amount of speech by 12 months is much greater than the number of vocalizations produced before 10 months, and our methods have been more tooled for phonetic observation than to track phonological development. Hence, it is hypothesized that the emergence of pharyngeals/laryngeals in meaningful contexts will occur during events perhaps very early in the second year of life. Further tracking of months 13-15 and 16-18, particularly for Arabic and Bai, will help to determine whether or not there is a disjuncture in continuity as far as overt articulatory speech production by infants is concerned. In any case, our tracking of the use of constricted forms in the first months of infants' production of speech sounds provides new data to be added to the reformulation of the early stages of the continuity hypothesis (Vihman, Macken, Miller, Simmons, and Miller 1985). Our data collection is continuing into the second year, and analyses with native-language fieldworkers of the production data in the one-word stage in both Arabic and Bai contexts are being designed to address these theoretical issues.

5 Conclusions

There are four main points that need to be emphasized in describing the process of the first steps in the acquisition of the speech modality. The first is that we 'learn speech from the inside out;' and we do virtually all of it in the first several months of life. The 'inside' is the 'laryngeal vocal tract' component of the articulatory model, and the 'outside' is the 'oral vocal tract' component of the articulatory model. Laryngeal (including initially pharyngeal and then subsequently glottal) sounds are acquired first; then oral sounds begin to be learned, still employing a laryngeal 'base,' but not necessarily in a predictable order of places of articulation. The 'base' has three aspects: first, the laryngeal base serves as the point at which manner of articulation is acquired; secondly, the laryngeal base serves as the 'pivot point' against which other sounds are practiced in sequences of componential learning; and thirdly, the laryngeal base serves as a motor platform against which new sounds at the oral places of articulation are generated articulatorily.

Secondly, we have shown that manner of articulation can be adequately acquired in the pharynx. This has become clear as a result of our research into various languages with laryngeal phonological distinctions, and as a result of our research on infant speech, where stop, fricative, trill and approximant articulations emerge first as pharyngeals before appearing at later, oral places of articulation. A third finding is that productions of new vocalizations are 'tested' in patterns of alternating sequences that become increasingly supple in their temporal fluidity over the months of practice by the infants. For example, vocalizations with laryngeal constriction are 'tested' in alternation with new vocalizations that do not have laryngeal constriction in patterns of increasingly rapid switching of the articulatory parameters. Finally, we have established that babbling is 'primed' by the innately (i.e. initially reflexively) acquired laryngeal components of the speaking modality, so that the primarily oral sounds that occur typically in babbling emerge not as isolatedly oral articulations at the given place of articulation but rather are 'jump started' by a background, 'secondary' vocalization originating at the laryngeal place of articulation.

With regard to the babbling stage of infant speech, in the second part of the first year, babbling generally prefers new, oral, unconstricted sounds over those sounds that occurred in the first part of the first year and which are characterized primarily by laryngeal constriction. This phenomenon may relate to the split between brain stem neural control and cortical neural control, where brain stem control can be posited to account for the reflexive emergence of the innate use of the laryngeal articulator (responsible for the production of 'pharyngeal' and 'epiglottal' sounds in the taxonomy of the IPA). Later, cortical control is hypothesized to coincide with the shift from phonetic prebabbling practice (as described above) to the primarily oral control exhibited in the babbling stage, beginning around 6 to 8 months. From babbling into the word-development and word-combining stages in the second year of life, it may well be that we 'rediscover' the more basic, innate sounds we learned initially (if they are needed in the target language). Thus, a possible new working hypothesis is that the original, innately acquired constricted sounds will re-emerge 'from the outside in' in languages where they have to emerge eventually in the developmental phonology. The fundamental phonetic principle to be articulated here, on the basis of our research into early articulatory function and control, is that 'motor-phonetic awareness' is acquired very early – arguably just as early as perceptual awareness is known to be acquired, although on a different scale (Kuhl, Stevens, Hayashi, Deguchi, Kiritani, and Iverson 2006). Furthermore, speech production abilities accompany perceptual abilities in a complex array of motor performance that begins as early as the first few weeks of life.

These results provide evidence for universal and language-specific patterns in the use of laryngeal constriction in the first year of life. In the first months of life, all infants produce universally constricted voice quality settings. Over the course of the year, as infants systematically explore their evolving phonetic capacities, unconstricted settings make up an increasing proportion of their vocal repertoires. Within this general pattern, the distribution of laryngeal constriction in the infants' utterances may vary according to laryngeal/pharyngeal features exploited in the infants' ambient language. A language like English, lacking such features, may develop oral (non-constricted) sounds earlier in babbling. It is estimated that, within the first year of life, infants have learned the major parametric phonetic oppositions of laryngeal constriction vs. openness, glottal closing vs. glottal openness, glottal shortening vs. glottal stretching, larynx raising vs. larynx lowering, and the intermediate degrees required for contrasting manners of articulation, including differing requirements for airflow. The performance data suggest that one-year-old infants can exert paired control over these parameters, to the extent that they already have the articulatory tools at their disposal to produce the phonetically contrastive elements that occur in phonologies that exploit the pharynx, as in Semitic or Tibeto-Burman languages. Notwithstanding, of the range of prelinguistic vocalizations produced by infants, babbling behavior is the most likely to reflect emergent phonological properties and to exhibit cross-linguistic differences.

These findings also raise the question of whether the control of the laryngeal articulator, as a primary and reflexive instrument, may have deeper-seated physiological associations than the oral articulatory gymnastics that are most predominant in babbling. This is a question that will have to be addressed in cognitive science. The various voice qualities that are employed in distinguishing regional and social dialect often have a distinctive laryngeal component (Laver 1980). Phonation type, often erroneously thought of as merely a glottal-level phenomenon, has a close physiological relationship with pharyngeal adjustments (Esling and Harris 2005). The sociolinguistic variety in long-term voice quality, even just in English, has been shown to be as broad as it is finely discriminated (Esling and Edmondson 2011). It is not well known at what age children adopt the specific voice qualities that are part of the regional and social repertory of the accent they are acquiring, and of course without knowing this it is hard to identify if or when children may deviate from the voice quality setting combinations that adults use around them. With our current knowledge that the range of articulatory possibilities in the lower vocal tract, including phonatory effects, is mastered so early in life, we could hypothesize that the use of these features as coarticulatory accompaniments, even to the level of quasi-permanent voice quality, constitutes an element of phonological acquisition that needs to be assessed and analyzed before we can be certain of the path that phonological acquisition in fact takes. It is at least by no means certain that phonological acquisition can be tracked adequately by noting only the most obvious oral phonetic attribute of the sounds that an infant or a child is producing without noting their laryngeal/pharyngeal coarticulatory features.

It is worth making some comments about phylogeny. Burling's (2005) account of the evolution of language (and speech) makes many points that are strengthened by our research. The assertion that human speech sounds have conventional meaning rather than just being iconic from an early stage seems to be supported by our account of phonetic ontogeny. What our research adds to the equation is that infants acquire motor control over contrastively useful parcels of speech at a surprisingly early age and in a reflexively rich but visually hidden part of the vocal tract. And any speculation about oscillatory patterns of articulators – a concept drawn from MacNeilage (1998) – needs to take into account that these patterns would have developed in the pharynx first, before they progressed to the jaw or the mouth. This provokes speculation about early hominids. Basically, if speech sounds start ontogenetically in the pharynx, then there is every reason to suspect that speech sounds were prominent phylogenetically in the pharynx. In reflecting on Burling's account, it is important to point out that we are talking about infants in both cases rather than adults. It seems likely that speech representations did not start with an early hominid who had already reached adulthood. It would seem that, at any point in time, the path of developing the speech forms that would be used for spoken language was always a question of an infant interacting with adults, predominantly a mother. In our methodology, it has become very clear that adults become intensely aware of the human sound-producing capability when they have infants who are generating the basic elements of phonetic motor production during the first several months of life. The elements are familiar to the adults, but the infant is the driving force; that is, the sounds are created by each infant, in a logical progression of how sounds can be produced in the pharynx, rather than being 'taught' to the infant. Another way of putting this is that we all learn phonetics 'experimentally' (cf. Catford 2001). Early hominid infants, once they had the required cognitive criteria for language development that Burling enumerates, could be expected to have generated sounds similar to those pharyngeal sounds that every infant generates today, which could have served for linguistic meaning; and the mechanism for drawing the phonetic and the semantic processes together would have been precisely because of the infant-mother interaction. Burling's observation that 'it is the parent, not the child, who is the imitator' (2005:110) is given support from our observations of each infant's remarkable control and early mastery of our innate sound-producing instrument.

To summarize, we have identified the pharynx as the origin of earliest speech vocalization and the site of the earliest acquisition of manners of articulation. We have found evidence of dynamic alternation and strong evidence of pharyngeal priming as active strategies in the speech acquisition process. Data from the Infant Speech Acquisition (InSpA) Project typify instances of 'phonetic play' that demonstrate how infants systematically acquire basic control over the speech mechanism and the arrays of place and manner of articulation during their first year of life. The strategy of pharyngeal priming characterizes how infants progress articulatorily from a laryngeal/pharyngeal base to the formation of oral sounds. We have identified a gradual preference for oral articulations over laryngeal units as babbling progresses, depending on the oral-laryngeal balance in the target phonology. Our initial hypothesis that pharyngeal sounds will proliferate linearly when the ambient language contains those sounds (as in Semitic or in Tibeto-Burman languages) is only weakly supported by the evidence of laryngeals/pharyngeals in late vocalizations in Arabic and in Bai and in the babbling patterns of those languages. We are systematically monitoring the incidence of laryngeals/pharyngeals in Arabic and Bai infants through the second 12 months of life to explore how and when pharyngeal sounds enter production during babbling and in word formation in languages that have pharyngeal (laryngeal constrictor) contrasts.

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Compiling sonority scales with obstruent vowels

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1. Introduction

It has been argued that languages systematically license syllabicity to all segment classes more sonorous than the least sonorous syllabic segment in that language (Blevins 1995).[1] The syllabic segments found in American English, given in Fig. 1, exemplify this arrangement, which results in a contiguous zone of segment classes that can be licensed syllabicity (the *permitted nuclei*). Since sonority scales have been argued to be ranked with input from acoustic parameters such as intensity (Parker 2008), this could be taken to mean that all languages permit syllabicity in segments falling within a given range for an acoustic parameter. In this paper, I introduce *obstruent vowels*, phonetic obstruents that behave phonologically as permitted nuclei, and argue that they form a major exception to these generalizations, given their frequent separation from the contiguous range of other permitted nuclei in a given language. The permitted syllabic segments of Bai are also provided in Figure 1 as an example (Dell 1981) of this exceptional pattern.

After a brief overview in Section 2 of the sonority scale for syllabification, as it is canonically compiled, in Section 3.1 I introduce the obstruent vowels.[2] I

[1] For their valuable commentary and feedback, I thank: Sharon Inkelas, Keith Johnson, Larry Hyman, John Ohala, and numerous other commenters at Berkeley's Phonetics and Phonology Phorum. I also thank John Sylak-Glassman for our many ultimately useful discussions. Any errors in interpreting their input are my own.

[2] For lack of dedicated IPA symbols, and given that obstruent vowels are very nearly syllabic voiced fricatives, I will transcribe obstruent vowels as if they were voiced fricatives (e.g. [ɣ̩], [z̩]).

further demonstrate in Section 3 that the phonotactic arrangement shown for Bai in Figure 1 is not uncommon cross-linguistically by presenting a genetically diverse sample of 38 languages with multiple, discontinuous zones of permissible nuclei which include obstruent vowels. Finally, in Section 4, I discuss the implications of obstruent vowels' position in these discontinuous zones for the sonority scale and its compilation as a ranked set of segments: either the sonority scale is purely language-specific and lacks any relation to phonetic substance for at least some languages, or the compilation of sonority scales varies on a language-to-language basis and may take into account extra acoustic parameters such as the presence of prolonged aperiodic noise.

(1) Permitted syllable nuclei in English and Bai (Dell 1981). Classes labeled with "**Y**(es)" are permitted nuclei; classes labeled with "n(o)" are non-permitted nuclei. Consonant classes absent from a language are not labeled with either.

Languages	A	R	L	N	S	T
Am. English	**Y**	**Y**	**Y**	**Y**	n	n
Bai	**Y**		n	n	**Y**	n

2. Syllabicity and the sonority scale

Syllabification is widely said to make reference to the sonority of the individual segments of the input string (Clements 1990, Blevins 1995, Zec 1995). A sonority scale with a fairly fixed ranking of segment classes grounded in phonetic substance is usually assumed to apply for syllabification in all languages, with some language-to-language variation in the rankings of similarly high- or low-sonority segments, i.e. rhotics *vs.* laterals or fricatives *vs.* affricates (Jany *et al.* 2007). Intensity has recently been acknowledged as a good acoustic correlate for higher rank on the sonority scale (Parker 2008, Jany *et al.* 2007). Figure 2 is a typical representation of this scale, after Blevins (1995), where a capitalized A (for vowels) or a coronal segment in each segment class stands in for the segment class in general, a convention I will use in the remainder of this paper: R for rhotics, L for liquids, N for nasals, S for fricatives, and T for stops.

(2) *Vowel — rhotic — lateral — nasal — fricative — stop*
A R L N S T
highest sonority .... lowest sonority

Two generalizations upheld in the literature on sonority and syllabification are relevant for the discussion to follow. The first concerns the varying application of the sonority scale in Figure 2 to syllabification from language to language: languages have a varyingly low sonority threshhold for syllabicity. As noted in Blevins (1995), the upper bound is fixed—non-high vowels are universally permitted nuclei—but the lower bound for permitted nuclei varies from language to language. Despite this variation, Blevins notes, a language's least sonorous possible nucleus always demarcates a boundary above which all segments are possible nuclei. Put another way, it appears that languages must license syllabicity to all segments ranked higher on the sonority scale than the lowest-ranked segment (Figure 3), dividing the sonority scale into two zones: sufficient sonority and insufficient sonority. Since segments' intensity decreases with lower rank on the sonority scale, this can be taken to represent a cutoff in a parameter or set of parameters for a segment, dubbed "overall sound level" by Parker (2008).

(3) Languages with increasingly low threshholds of syllabicity, after Blevins (1995), except Liangshan Yi data (Li and Ma 1983).

Languages	A	R	L	N	S	T
Hawai'ian	**Y**		n	n	n	n
Sanskrit	**Y**	**Y**	n	n	n	n
Lendu	**Y**	**Y**	**Y**	n	n	n
English	**Y**	**Y**	**Y**	**Y**	n	n
Liangshan Yi	**Y**		**Y**	**Y**	**Y**	n
Tashlhiyt Berber	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**

The second generalization is that non-obstruent segments are assumed to universally outrank obstruent segments on the sonority scale. Zec (1995) makes use of a more granular scale in which vowels are more sonorous than non-obstruent consonants, which are in turn more sonorous than obstruent consonants. Phonetic investigations of a combined seven languages[3] also show that obstruents are consistently less phonetically intense than non-obstruents (Parker 2008, Jany *et al.* 2007). These two principles, if taken together, stipulate that if a language licenses syllabicity to obstruents (as do Liangshan Yi and Tashlhiyt), which must be lower-ranked on the scale than sonorants, then all sonorants will be licensed syllabicity. As we will see below, my own investigations show that this is not always the case.

3. Obstruent vowels as permissible nuclei

I aim to bring to attention a group of languages which escape the generalizations noted above: despite having obstruent segments (voiced fricatives) in the set of permissible nuclei, these languages fail to license some or all segments from the set of syllabic rhotics, liquids, and nasals. In terms of the generalizations discussed above, this results in extra zones of sufficient sonority not contiguous with the zone containing vowels. It is especially problematic that the non-contiguous zone is populated by an obstruent. Language-specific (re)rankings in the sonority scale are fairly common for certain segment classes, particularly within-category rearrangements of the non-obstruents and the obstruents Jany *et al.* (2007). The ranking in (4a), where vowels and nasals populate the set of possible nuclei, is particularly common cross-linguistically. We should *not* expect, however, a ranking as in (4b), where the more rigid ranking of non-obstruents over obstruents is not observed.

[3] English, Spanish, and Cusco Quechua in Parker (2008); Egyptian Arabic, Mongolian, Hindi, and Malayalam in Jany *et al.* (2007).

(4) a. *[A — N] — [R — L — S — T]*
yes no
b. *[A — S] — [R — L — N — T]*
yes no

Given the aforementioned fricative segments' unexpected phonological status as possible nuclei and their phonetic obstruent quality, I refer to these segments as *obstruent vowels*. In this section, I show that obstruent vowels are in fact phonetic obstruents that behave like vowels at a phonological level (Section 3.1), and that the pattern is typologically common in certain language families.

3.1. Overview of obstruent vowels

Obstruent vowels are voiced, obstruent segments with characteristics of both voiced fricatives and high vowels. Research on obstruent vowels has been carried out prior to this study, often under a different name than the one used here. The "apical vowels" of the Chinese languages have been examined in articulatory, acoustic, and perceptual terms for standard and Beijing Mandarin (Yu 1999, Cheung 2004, Lee 2005) as well as Suzhou (Feng 2007). The "fricative vowels" of Bantoid languages in western Africa are rarely but increasingly a subject of study (Connell 2007).

Obstruent vowels are very similar to voiced fricatives. Articulatorily, their tongue body position resembles a high, slightly lax vowel, central or front (Lee 2005, Feng 2007), except for an added constriction of one of two types: coronal (raised tongue tip or blade) or labiodental (lower lip raised to upper teeth). Coronal articulations range from alveolar to post-alveolar or retroflex, and a secondary articulation of lip rounding or protrusion is rarely attested (e.g. Feng (2007)). Constrictions significantly narrow the aperture of the airway; this is visible when the vowel is labiodental, and has been confirmed instrumentally for coronals (Feng 2007). The narrow aperture translates to turbulent airflow in most productions; fricative noise occurs in frequency bands consistent with the location of the obstruent constriction. Some formant structure is usually visible, although higher formant structure is almost always obscured by fricative noise.

Put another way, obstruent vowels are very nearly syllabic voiced fricatives. The primary distinction between an obstruent vowel and a voiced fricative at the level of phonetics is that obstruent vowels tend to lose some turbulence towards the end of their production. This non-obstruent portion is phonologically inert and usually realized as a central, mid-high vowel colored by carryover of the position of the tongue tip or lips from the obstruent portion. This generalization does paper over some variation in the category: the duration and intensity of turbulence varies widely from production to production and language to language.

Another major distinction between obstruent vowels and voiced fricatives lies at the level of phonology: obstruent vowels pattern as phonological vowels. In Kom, for instance, the two obstruent vowels /v z/ pattern as [–low] vowels with different [± front] specifications in vowel coalescence processes (Faytak 2013). Futhermore, in all languages surveyed in the next section, most contrastive suprasegmentals (tones, phonation) occur on obstruent vowels.[4] Obstruent vowels may also be *obligatory nuclei*, which must be realized with syllabic prominence (Blevins 1995). In Bai, for instance, the segment /v/ only occurs as the nucleus [v̩]; there is no corresponding non-syllabic initial [v-] (Dell 1981).

3.2. Discontinuous zones of permitted nuclei

Recall the patterning of permitted nuclei along a canonical sonority scale, given in (3). A significant number, but not all, languages that have obstruent vowels include these syllabic voiced fricatives in the set of permitted nuclei while excluding some or all non-obstruent segments, creating multiple zones of non-permitted nuclei, as schematized in (5). Certain languages described with obstruent vowels, such as Shanghai, do not prove to be problematic, since all permitted segments form a contiguous range, but languages like Limbum and Bai fail to permit some number of non-obstruent segments.

(5) Occurrence of various non-vocalic syllabic nuclei in four languages, after Blevins (1995). Shanghai data from Zhu (2006); Limbum data from Fransen (1995); Bai data from Dell (1981).

Shanghai	[A		L	N	S]	[T]
	[pṳ̄] 'step'		[l̩̄] 'ear'	[ŋ̩̄] 'five'	[z̩̄] 'tree'	*no*
Limbum	[A]	[R	L]	[N	S]	[T]
	[tɔ̄] 'hole'	*no*	*no*	[m̩̄táːɾ̥] 'thirty'	[ᵑgv̩̄p] 'fowl'	*no*
Bai	[A]		[L	N]	[S]	[T]
	[ts^{h}a^{44}] 'sing'		*no*	*no*	[lv̩^{33}] 'green'	*no*

Here, I introduce a sample of languages, compiled primarily from these two families, which make use of obstruent vowels. The heavy skewing of the sample toward Niger-Congo and Sino-Tibetan languages (6) was not the result of a targeted search within these families but rather emerged from a brute-force search of the available phonetic and phonlogical descriptive literature for all languages: the arrangement seen in Limbum and Bai is fairly common within several language families, namely the Sino-Tibetan and Niger-Congo languages, but not elsewhere. The sample plainly shows that although restricted in distribution by genetic grouping cross-linguistically, obstruent vowels are very common as members of discontinuous zones of permitted nuclei in the languages where they are found, and this arrangement is stable enough to be present in a large number of languages.

[4] The exception is nasalization, which may not occur on obstruent vowels at all, given that nasalization is antagonistic to achieving turbulent airflow (Yu 1999).

(6) Sample of obstruent-vowel-having languages with sources, arranged by genetic subgrouping.

Tibeto-Burm. (13)			
Bai	Dell (1981)	Lahu	Matisoff (1973)
Cuona	Sun *et al.* (1991)	Lüsu	Sun *et al.* (1991)
Ergong	Sun *et al.* (1991)	Naxi	He and Jiang (1985)
Ersu	Sun *et al.* (1991)	Nusu	Sun *et al.* (1991)
Gazhuo	Sun *et al.* (1991)	Trung	Sun *et al.* (1991)
Hani	Namkung (1996)	Tshangla	Sun *et al.* (1991)
Idu	Sun *et al.* (1991)		
Sinitic (12)			
Changsha	Wu (2005)	Pingyao	Hou (1980)
Jixi	Zhao (1989)	Suzhou	Qian (1992)
Liantang	Deng (1996)	Wenzhou	You and Yang (1998)
Loudi	Yan and Liu (1998)	Wuning	Sagart (1993)
Mandarin	Duanmu (2000)	Yangzhou	Li *et al.* (1996)
Meixian	Hashimoto (1973)	Xining	Li and Zhang (1994)
Niger-Congo (5)			
Dschang	Bird (1997)	Len	Connell (2007)
Ekajuk	Crabb (1965)	Limbum	Fransen (1995)
Kom	Faytak (2013)		
Hmongic (4)			
DNS Hm.	Niederer (1998)	DSJ Hm.	Niederer (1998)
LBH Hm.	Niederer (1998)	TS Hm.	Niederer (1998)
Altaic (2)			
Mangghuer	Dwyer (2008)	Santa	Kim (2003)
Japonic (2)			
Ō. Miyako	Pellard (2009)	M. Ishigaki	Izyuama (2003)

The sample in (6) was compiled with maximum genetic-linguistic diversity in mind. Since the overwhelming majority of the languages examined come from Sino-Tibetan and Niger-Congo, however, I appeal to subgrouping within these families to maximally distribute the sample among as much genetic diversity as possible. Sino-Tibetan subgrouping was aided by use of the classification in Namkung (1996); no more than four languages were selected from any one of Namkung's Tibeto-Burman subgroupings. In other families, data tends to be sparser, and essentially any data that could be found regardless of subgrouping was selected. Fortuitously, there is little genetic proximity elsewhere in the sample, with a few exceptions.[5]

[5] The four Hmongic languages are taken from the closely related Chuanqiandian "dialect cluster" (Niederer 1998); and the two Ryukyuan languages are fairly closely related (Bentley 2008). In both cases, however, the phonotactics of obstruent vowels in these languages are distinct enough even from their close relatives to merit inclusion in the sample.

The 38 languages of the sample were examined and their permitted and impossible nuclei noted. Some special considerations must be noted: marginal (often paralinguistic) use of nasals as nuclei is broadly present in the Sinitic languages. I count these cases as non-permitted but mark them with an asterisk (*) in the figures below. Rhotic and nasal vowels are frequently present in Tibeto-Burman and Sinitic; I do not count these as syllabic rhotics or nasals.[6]

(7) Patterns of syllabicity licencing in the 38 languages of the sample in (6). Asterisk (*) indicates marginal syllabification of a segment class, which is counted as non-permitted.

Languages	A	R	L	N	S	T
Gap $\geq$ 2: 23						
Cuona, Trung, Tshangla, Santa	**Y**	n	n	n	**Y**	n
Mandarin, Yangzhou	**Y**	n	n	*	**Y**	n
Ersu, Idu, Limbum, Naxi, Nusu	**Y**	n	n	**Y**	**Y**	n
Bai, Ergong, Hani, Len, Pingyao, all Hmong, Lahu	**Y**		n	n	**Y**	n
Minhe Mangghuer	**Y**	**Y**	n	n	**Y**	n
Changsha	**Y**		n	*	**Y**	n
Gap = 1: 15						
Dschang, Ekajuk, Gazhuo, Ishgaki, Liantang, Loudi, Lüsu, Ōgami, Meixian, Suzhou, Wenzhou, Wuning, Yudu	**Y**		n	**Y**	**Y**	n
Jixi	**Y**			*	**Y**	n
Xining	**Y**		**Y**	*	**Y**	n

The results are provided in (7). Ranges of permitted and non-permitted nuclei are delinated by square brackets containing "yes" and "no" respectively; asterisks indicate marginally permitted nuclei. The results can be divided into two groups: languages where the gap between the two zones of permitted nuclei comprises two or more segment classes, and languages where the gap comprises one segment class. Perhaps surprisingly, the majority of the sample (23 languages) exhibits a large gap ($\geq$ 2) between permitted nuclei zones; furthermore, if marginally permitted nuclei are excluded, nearly half of the sample (18 languages) has *only* vowels and fricatives as permitted nuclei.

4. Conclusion: Implications for the sonority scale(s)

Since the arrangement of the sonority scale is in a sense intended to reflect phonetics—arranging segments by Parker (2008)'s "overall sound level," for instance—a sim-

[6] One might object that obstruent vowels are counted as obstruents in this schema, but that rhotic and nasal vowels are not counted as rhotics or nasals. As noted previously, however, obstruent vowels are essentially voiced fricatives, with an obstruent manner of articulation, while nasal or rhotic vowels are not (respectively) nasal stops or rhotic approximants.

ple two-way division of segments into permitted and non-permitted nuclei suggests that one parameter or a closely related set of parameters working in conjunction distinguishes, for a given language, the threshhold below which a segment is not a permitted nucleus (see Language A in Figure 8 below). For many obstruent-vowel-having languages, then, the sonority scale is not effective: in its compilation, segments are ranked (and then selected as permitted or non-permitted nuclei) based on the value of some acoustic parameter(s), but the acoustic parameters which are typically used as input ("overall sound level" or intensity) fail to line up all segments such that the observed permitted and non-permitted nuclei match with the predicted permitted and non-permitted nuclei. Rhotics, liquids, and nasals, in particular, should serve as permitted nuclei if all nuclei with a sufficiently high overall sound level are permitted (Language B in Figure 8).

(8) Permitted and non-permitted nuclei as determined (or not determined) by a cutoff in the value for "overall sound level": for Language A, a clear cutoff value of 70 applies, but no such clear critical value emerges for Language B. Sound level values are *ad hoc* but are intended to reflect Parker (2008)'s overall sound level measurements.

Languages	A	R	L	N	S	T
Lang. A	**Y**	**Y**	**Y**	**Y**	n	n
Sound level	100	90	80	70	50	10
Lang. B	**Y**	n	n	n	**Y**	n
Sound level	100	90	80	70	50	10

Given that the problem appears to lie with the choice of acoustic parameters, one possible solution is to completely discard acoustic parameters as a ranking condition for the sonority scale in at least some cases. It is possible, as has been shown in Section 3.1, that obstruent vowels are phonologically vowels rather than voiced fricatives. It could be argued that for these languages, the sonority scale is a *purely logical* scale in the sense Mortensen (2006), or a scale whose arrangement reflects a *formerly* substantively grounded order that has persisted despite the loss, due to sound change, of its substantive grounding. The increase in the typological markedness of the sets of permitted nuclei is then simply maintenance of logical relationships among realizations of a vowel phoneme (in the case of Mandarin, identity). Diachrony supports this analysis in some better-documented cases: often, obstruent vowels' origins can be traced back to assimilation of high vowels to syllable-initial fricatives and affricates, as is the case with many descendants of Middle Chinese Chen (1976). In other languages, including in standard Mandarin, this allophonic realization of historically underlying high vowels as obstruent vowels (in Mandarin, /i/ > [z̩], [ʐ̩]) is the sole source of obstruent vowels synchronically.

I prefer a solution that factors in continuous aperiodic noise as part of the overall salience of a segment. While purely logical scales do offer a solution to the ranking problem, they also completely remove acoustic parameters as a factor, despite a substantial amount of research that suggests a close correlation of sonority and acoustic parameters. They also do *not* motivate the fairly frequent appearance of obstruent vowels in discontinuous zones of permitted nuclei, frequently without any other non-vocalic segments joining them. Rather than remove acoustic parameters, I propose that an additive approach be taken: that the languages scrutinized in this paper make reference to additional acoustic parameters not typically thought to be involved in raking segments along the sonority scale. One parameter in particular stands out as characteristic of fricatives: continuous turbulent airflow that results in salient, continuous aperiodic noise.

Further work is needed to see how, precisely, the extra parameter of continuous noise might be factored into the calculation of sonority ranking. One possibility that ought to be investigated further is a conjunction of scales for ranking a domain-specific scale (here, sonority for purposes of syllabification); a mechanism of conjunction is used in Optimality Theory to create complex, domain-specific constraints from simpler, broader ones (Moreton and Smolensky 2002). An analogous mechanism would allow the creation of a more finely tuned sonority scale from two less precise ones: a language that handles sonority similarly to Bai could be generated, where only the set of segments having the most intense periodic sound *or* the most intense aperiodic sound are permitted nuclei. The formal statement of such a mechanism, however, is beyond the scope of this research.

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Languages are Wealth: The Sprachbund as Linguistic Capital*

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My title is a translation from the Aromanian, Bulgarian, Macedonian, and Meglenoromanian versions of a Balkan proverb followed by a nod to Bourdieu (1991). The folk saying occurs in various forms in all the Balkan languages except Greek.[1] Thus, for example, the Albanian and Romani equivalents translate 'the more languages you speak, the more people you are worth'.[2] Turkish and Balkan Judezmo speakers both use the Turkish version: *bir lisan, bir insan; iki lisan, iki insan* 'one language, one person; two languages, two people.' Folk wisdom valorizing multilingualism can be taken as indicative of the conditions under which a sprachbund can develop, and the exception can be taken as symptomatic of the pressures to eliminate language contact.[3] I would like elaborate here on these issues by contributing to two important points made by Eric P. Hamp at the Third Annual Meeting of the Berkeley Linguistics Society (Hamp 1977) and by adding two more. First, when we have adequate historical data, we must utilize them in the pursuit of areal explanations for language change: areal linguistics is an historical linguistic discipline. Second, the notion that a sprachbund must have fixed borders like an ideal nation-state, rather than being leaky much as Sapir (1921:38) observed of grammars almost a century ago, is —

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[1] Brian Joseph (pc) heard the Greek equivalent in conversation with the mayor of a hellenophone village in Albania, but other hellenophone Albanians rejected the expression as imported from the Soviet Union.

[2] The Bosnian/Croatian/Montenegrin/Serbian version is like the Albanian and Romani. For the versions in the original languages, see Friedman and Joseph (Forthcoming).

[3] I treat sprachbund as a borrowing from German, like pretzel, rather than as a codeswitch, unless the use is a quotation from another source.

to use another of Sapir's metaphors in that passage — tyrannical.[4] My third point is that the absence of the abovementioned saying from Greek is indicative of the intersection of linguistic ideology and cultural politics that has given Greek a special place in the Balkan sprachbund, that of a nexus of negation of multilingualism. My final point is that, contrary to claims that the Balkan sprachbund ended with the end of the Ottoman Empire, and is therefore an artifact to be consigned to the dustbin of history, the processes that produced it are on-going at the local level, as well as in those polities that have preserved multilingualism as a positive value. Such preservation is fragile, however, and, ironically, some members of the EU are encouraging its demise at the same time as other EU structures are attempting to support it.

Hamp (1977) includes a critique of the conflation of areal and typological linguistics seen in Sherzer (1976) in describing indigenous languages of North America. Among Hamp's (1977:282) points is that what he refers to as "gross inventorizing" of what he characterizes as "a Procrustean bed of parameters" (Hamp 1977:283) cannot capture the historical depth and specificity that give meaning to areal developments. Such numbers games played with a small set of features, characterized by Donohue (2012) as "cherry picking," can produce maps in which languages seem to mimic modern politics, e.g. Haspelmath (1998:273), which shows a French-German-Dutch-North Italian "nucleus" to a presumed "Standard Average European," with the Indo-European Balkan languages at the next level of remove, and with Turkish entirely outside of "Europe." A subsequent representation (Haspelmath 2001:107) has only French and German at its core, with Albanian and Romanian as part of the next closest level, Bulgarian and the former Serbo-Croatian beyond that, and Turkish still totally outside. Van der Auwera (1998:825-827) has dubbed such constructs the "Charlemagne *Sprachbund*" on the undemonstrated assumption that Charlemagne's short-lived (800-814) empire, or its successor the Holy Roman Empire [of the German Nation; a.k.a. the First Reich] was the nucleus for a linguistically unified Europe whose influence can be detected today in mapping out synchronic feature points. This is, in essence, an extension of Sherzer's (1976) methodology to Europe (cf. also König 1998:v-vi), but rather than being the work of a lone researcher, this project — especially in the version known as EUROTYP — has involved many people, produced many volumes, and has taken place in a political context that is arguably motivated by a vision of what Winston Churchill called "a kind of United States of Europe" in his 1946 speech at the University of Zurich. To be sure, as with Sherzer (1976), the assembled data are welcome. The over-arching quasi-historical conclusion, however, is misleading and the lack of attention to

[4] The complete quotation is this: "Were a language ever completely 'grammatical' it would be a perfect engine of conceptual expression. Unfortunately, or luckily, no language is tyrannically consistent. All grammars leak." (Sapir 1921:38).

historical and dialectological detail of the type called for by Hamp (1977) is problematic.

Van der Auwera's (1998:827) formulation that on the basis of EUROPTYP's investigations "the Balkans do indeed get their *Sprachbund* status confirmed," while supporting the reference to linguistic capital in my title, nonetheless gives the impression of treating the Balkan languages like the Balkan states vis-à-vis the EU: their status on the international stage is determined in Brussels (the new Aachen) or Strasbourg (in former Lotharingia).[5] The politics of Western Roman and Eastern Roman (Byzantine) interests, for which the Balkans were always a peripheral but vital pawn, were very much at stake in Charlemagne's time; and the modern-day echoes are striking. But it was precisely the *Pax Ottomanica* of the late medieval and early modern periods — not Obolensky's (1971) Byzantine Commonwealth — in the regions that were part of the Ottoman Empire from the fourteenth to the beginning of the twentieth centuries, where the linguistic realities of the Balkan sprachbund (as identified by Trubetzkoy) took their modern shape. As can be seen from the textual evidence of such innovations as future constructions and infinitive replacement (see Asenova 2002:214, Joseph 2000), the crucial formative period of the Balkan sprachbund is precisely the Ottoman period, when, as Olivera Jašar-Nasteva said, with one *teskere* (travel document) you could travel the whole peninsula and, we can add, when much of the Charlemagne's former territory consisted of a variety of warring polities that only consolidated into modern nation-states as the Ottoman Empire broke up.[6]

To be sure, Hamp (1977:280) recognizes areal features that "may be crudely labeled Post-Roman European," but, for example, the spread of the perfect in 'have' into the Balkans has nothing to do with Charlemagne. The construction was a Late Latin innovation, whose origins are already apparent in Cicero and Julius Caesar (Allen 1916: 313), and it made its way into the Balkans with the

[5] To a certain extent, this is literally true. In 2005, the European Court of Human Rights in Strasbourg fined the Greek government for violating the human rights of its ethnic Macedonian citizens' in harassing the ethnic Macedonian organization *Vinožito* 'Rainbow'. In 2006, Vinožito used the money to re-publish the 1925 primer that had been published in Athens for Greece's Macedonian minority, combined with a modern Macedonian primer (Vinožito 2006). However, that same year, on September 29, 2006, at the inauguration of Latvian collector Juris Cibuls' exhibition of primers in Thessalonica, the Deputy Mayor for Culture and Youth of that city ordered the organizers to take the Macedonian primer out of the show case so that it could not be displayed (Juris Cibuls, pc).

[6] Differences in territorial, economic, and social mobility are beyond the scope of this paper, but we can note that during the centuries when Jews were locked into ghettoes in Western Europe, and Roms existed there only as peripatetic outcasts, in Southeastern Europe (i.e., Ottoman European Turkey) Roms were settled in both towns and villages (although some groups were peripatetic), and Jews lived in neighborhoods, not locked streets. The larger varieties of available modes of social (and thus linguistic) interaction implied by such differences should not be underestimated. Moreover, pace Haspelmath (2001), significant grammatical change can take place in the course of only a few centuries, as seen in the data in Asenova (2002) and Joseph (2000); cf. also the changes in English after 1066.

Roman armies, settlers, and Romanized indigenous populations. It became the preterit of choice — independently — in French and Romanian (except in the south; see Pană Dindelegan 2013:33), and continues to displace the aorist in other parts of both Western and Eastern Romance. In Balkan Slavic it was precisely those populations in most intensive contact with the Balkan Romance that became Aromanian that developed independent 'have' perfect paradigms, namely those in what is today the southwest of the Republic of Macedonia and adjacent areas in Greece and Albania (see Gołąb 1976, 1984:134-136 for details). Moreover, it is hardly coincidental that in Bulgarian dialects, it is precisely those that were spoken along the route of the Via Egnatia where similar perfect paradigms developed. As for Greek, as Joseph (2000 and references therein) makes abundantly clear, the use of 'have' as a perfect auxiliary is in fact of very different, albeit also Roman, origin. In Greek, it was the use of 'have' as a future marker — itself a Romance-influenced innovation — that gave rise to an anterior future with the imperfect of 'have' that became a conditional that became a pluperfect that then provided the model for the formation of the perfect using a present of 'have' plus a petrified infinitival form. This stands in stark contrast to the Romance perfect, which began as 'have' plus past passive participle, which participle then ceased to agree, which is exactly the construction that was calqued into Macedonian (and some Thracian Bulgarian). On the other hand, the perfect in the Romani dialect of Parakalamos in Epirus (Matras 2004), is clearly a calque on Greek, as is the innovation of a verb meaning 'have'. Albanian also has a perfect in 'have' plus participle, and the participle itself is historically of the past passive type found in Romance and Slavic. The directionality is difficult to judge. The Albanian perfect is securely in place by the time of our first significant texts in the sixteenth century — a time when it was still not well established in Greek — but the relationship to Latin or Romance influence is difficult to tease out. Such perfects are not found in the Torlak dialects of former Serbo-Croatian, a region where there is presumed to have been early contact with populations whose languages are presumed to have been ancestral to Albanian and modern Balkan Romance, and where there were significant Albanian speaking populations until 1878 (Vermeer 1992:107-108). The Slavic dialects of Kosovo and southern Montenegro — where contact with Romance lasted into the twentieth century and with Albanian is on-going, albeit strained — do not show such developments.[7] This fact itself may be due to the importance of social factors in language change. Living cheek by jowl does not necessarily produce shared linguistic structures. A certain level of coexistential communication must also involve social acceptance. On the western end of old Roman Empire, Breton is the only Celtic language with

[7] According to Rexhep Ismajli (pc), when Pavle Ivić was conducting field work on the old town former Serbo-Croatian dialect of Prizren (southern Kosovo) in the mid-twentieth century, he gathered a group of old women and asked them to count in the old-fashioned way (*po-starinski*) and they began: *ună, dao, trei, patru*.... 'one, two three, four (in Aromanian)'.

a 'have' perfect, and the directionality is clear. Still to describe all these perfects as part of a "Charlemagne *Sprachbund*" is to do violence to historical facts, although it arguably serves the interest of current political imaginings.

The spread of 'have' perfects exemplifies linguistic epidemiology in Enfield's (2008) sense. And thanks to the depth and detail of our historical records, we can tease out the facts. In some respects, it is heartening to see that humans can program computers to identify, to some extent, insights that humans had without their aid a century or two ago. Thus, for example, as Donohue (2012) demonstrated, WALS (2005) features for the main territorial languages of Europe, when "decoded into binary format, then pushed through computational algorithms (Splitstree) that cluster languages on the basis of 'best shared similarity'" — which he is careful to characterize as explicitly synchronic and not diachronic — produces groupings (moving clockwise from the north) for Germanic, Slavic, Balkan, Romance, and Celtic. The details within the groupings are interesting only because we already know the history: Icelandic and Faroese are closer to German than to Scandinavian, while Afrikaans is closer to Scandinavian than to Dutch, and Polish comes between Belarusan and Ukrainian, on the one hand, and Russian, on the other, while Portuguese is much closer to French than it is to Spanish. Moreover, the ability to differentiate areal from genealogical causality that prompted Trubetzkoy to postulate the sprachbund in the first place, is missing. These results demonstrate clearly Hamp's (1977) point: typological, areal, and genealogical linguistics are independent disciplines, the former achronic, the latter two "twin faces of diachronic linguistics" (Hamp 1977:279). Nonetheless, despite its many sins of omission and commission (under representation of so-called non-territorial languages [itself a problematic, bureaucratic notion], absence of crucial dialect facts, misanalyses, misleading generalizations, etc.), WALS (2005) is a blunt instrument that, if welded with care and sensitivity, can at least spur us to consider other approaches, as Donohue (2012) has productively done in his discussion of Australia.

In the context of the putative Charlemagne sprachbund (discussion of which featured on the program of the 46th meeting of the Societas Linguistica Europaea in Split, 18-22 September 2013), it will be instructive to cite here Jakobson's (1931/1971) concept of the Eurasian sprachbund. Jakobson deviated significantly from Trubetzkoy (1930) — who characterized the sprachbund as comprising languages "that display a great similarity with respect to syntax, that show a similarity in the principles of morphological structure, and that offer a large number of common culture words, and often also other similarities in the structure of the sound system" (translation mine) — by positing the notion of phonological sprachbunds and specifically a Eurasian sprachbund, concentrating on consonantal timbre (basically palatalization including some correlations with front/back vowel harmony), prosody (presence vs. absence of pitch accent or tone), and, in a footnote, nominal declension. He set up Eurasia as the center in terms of all these.

For nominal declension, Germano-Romance Europe and South and Southeast Asia were the peripheries; in terms of phonological tone, the Baltic and Pacific areas were the peripheries (with West South Slavic [most of Serbo-Croatian and Slovenian] as a relic island), while for palatalization the core was roughly the boundaries of the Russian Empire, with the inclusion of eastern Bulgaria (which, perhaps not coincidentally, was imagined as Russia's potential *zadunajskaja gubernaja* 'trans-Danubian province' during the nineteenth and part of the twentieth century). He even went so far as to suggest that palatalization in Great Russian [*sic*] finds its most complete expression, and it is thus no coincidence that Great Russian is the basis of the Russian literary language, i.e. the language with a pan-Eurasian cultural mission (Jakobson 1931/1967:191). All the foregoing is not to say that linguists positing sprachbunds that match political interests intend to act as tools of foreign policy, but once their works are published they can be adopted and adapted by those with policy goals; and in any case, language ideology appears to be at work.

It is also important to note here that, while Masica (2001:239) warns against confusing "recent political configurations" with "linguistic areas," it is precisely the legacy of political configurations such as the Ottoman Empire that created the conditions for the emergence of the Balkan sprachbund as it was identified by Trubetzkoy. At the same time, humans, like all other animals, are capable of traversing whatever barriers nature or other humans might construct, and thus sprachbunds are indeed not political configurations, with fixed boundaries. It is here that the German *Bund* 'union' in *Sprachbund* (in Trubetzkoy's original 1923 formulation, Russian *jazykovoj sojuz* 'language union' as in *Sovetskij Sojuz* 'Soviet Union') has misled scholars such as Stolz (2006), who frets that since sprachbunds do not have clearly definable boundaries like language families (or political entities) the concept should be discarded. His "all or nothing" methodology misses Trubetzkoy's original point that the sprachbund is fundamentally different from a linguistic family, and it fails to take into account the basic historical fact that, like the political boundaries and institutions that sometimes help bring sprachbunds into being, the "boundaries" of a sprachbund are not immutable essences but rather artifacts of on-going multilingual processes; in Hamp's (1989:47) words, they are "a spectrum of differential bindings" rather than "compact borders," a point to which he also alluded in Hamp (1977:282). It is also important remember that when Trubetzkoy first proposed the term, it was at a time when the *Sprachfamilie* 'language family' was widely considered the only legitimate unit of historical linguistics, while resemblances that resulted from the diffusion of contact-induced changes were described in terms such as those used by Schleicher (1850:143), who described Albanian, Balkan Romance, and Balkan Slavic as "agree[ing] only in the fact that they are the most corrupt (*die verdorbensten*) in their families." Trubetzkoy was explicitly concerned with avoiding the kind of confusion more recently generated by conflations of areal and typological linguistics, although in his time the issues involved areal and genealogical linguistics.

Turning now to language ideology in the Balkans itself, the difference between Greek and the rest is striking. As noted at the beginning of this article, Greek is the only language in the Balkans for which a saying valuing multilingualism is lacking. It is certainly the case that multilingualism itself does not guarantee the formation of a sprachbund. As Ball (2007:7-25) makes clear, in the multilingual Upper Xingu, multilingualism, while necessary for dealing with outsiders, is viewed as polluting, and monolingualism is considered requisite for high status. This endogamous region is quite different from exogamous, parts of Amazonia, where multilingualism is an expected norm, and lexical mixing is viewed negatively, but morphosyntactic convergence is rampant (Aikhenvald and Dixon 2006:237-286). Consider also the vertical multilingualism that Nichols (1997) has identified as characteristic of the Caucasus, which is similar to various Balkan multilingual practices, where specific types of multilingualism will index different types of social status.[8] Ideologies that consider contact-induced change as symptomatic of pollution and that equate isolation and archaism with purity were at work in the nineteenth century as well, as seen in Schleicher's formulation quoted above. We could even suggest that the Charlemagne sprachbund is an attempt both to redress this nineteenth century failing and to co-opt the new valorization of language contact.

Such is not the case, however, in Greece, however, nor was it the case more than a thousand years ago. Fine (1983:220) has formulated the explanation so clearly that it deserves extended quotation:

> By the end of the [eleventh] century, the language of the Bulgarian church became an issue. Byzantium's tolerance of Slavonic was a feature of its foreign policy: the annexation of Bulgaria and Macedonia made the liturgical literary language a domestic matter. Efforts toward the hellenization of the Bulgarian church may well have been the cause for the murder of the Greek bishop of Sardika [modern Sofia -VAF] by a mob in 1082. This policy of hellenization became particularly intense under Archbishop Theophylact of Ohrid (ca. 1090-1109), whose surviving letters are a major source for this period. Theophylact closed Slavic schools, introduced Greek-language services in many places, and encouraged the translation from Slavonic into Greek of many local texts. Theophylact himself translated into Greek the life of Saint Clement.
>
> There also seems to have been a systematic destruction of Slavic manuscripts. Not one Slavic manuscript written prior to the establishment of the Second Bulgarian Empire in the

[8] In vertical multilingualism, people in higher villages know the languages of those down the mountain, but those in the lowlands do not bother to learn highland languages. Nonetheless, as Tuite (1999) makes clear, aside from the features of shared glottalized consonants and a few phraseological calques, when examined closely the idea of a Caucasian sprachbund vanishes like a mirage. Hamp (1977), too, noted that the appearance of glottalization in Armenian, on the one hand, and Ossetian, on the other, must have distinct areal diachronic explanations.

> 1180s has survived within Bulgaria. Scholars have long blamed the Ottoman Turkish for the destruction of Bulgarian texts. But though it is certain that many Bulgarian manuscripts were destroyed during and after the Ottoman conquest, still this, as Yugoslav scholar Vladimir Mošin [1963] has shown, is not sufficient explanation. If the Ottomans had been responsible, one would not expect any medieval Bulgarian texts to have survived. However, several hundred manuscripts from the Second Bulgarian Empire have been preserved in Bulgaria. Furthermore, many Greek manuscripts from as far back as the ninth and tenth centuries have been preserved in Ohrid. Thus, Mošin reasonably concludes, a systematic destruction of Slavic manuscripts evidently occurred prior to the thirteenth century, namely during the period when Byzantium ruled Bulgaria. (Those writings from the First Bulgarian Empire which have been discussed in this work have all been preserved abroad, chiefly in Russia.) Not surprisingly, in this atmosphere Bulgarian culture seriously declined. No major Bulgarian writers were active during the Byzantine period. (Fine 1983:220)

During the rise of Balkan nationalisms in the late eighteenth and nineteenth centuries, this same attitude also surfaced. The introduction to the pedagogical lessons of Daniēl (1802)—which contained a quadrilingual manual the goal of which was to eliminate all languages other than Greek that were spoken by Orthodox Christians on what was then still Ottoman territory—is illustrative. Here are the first four lines:

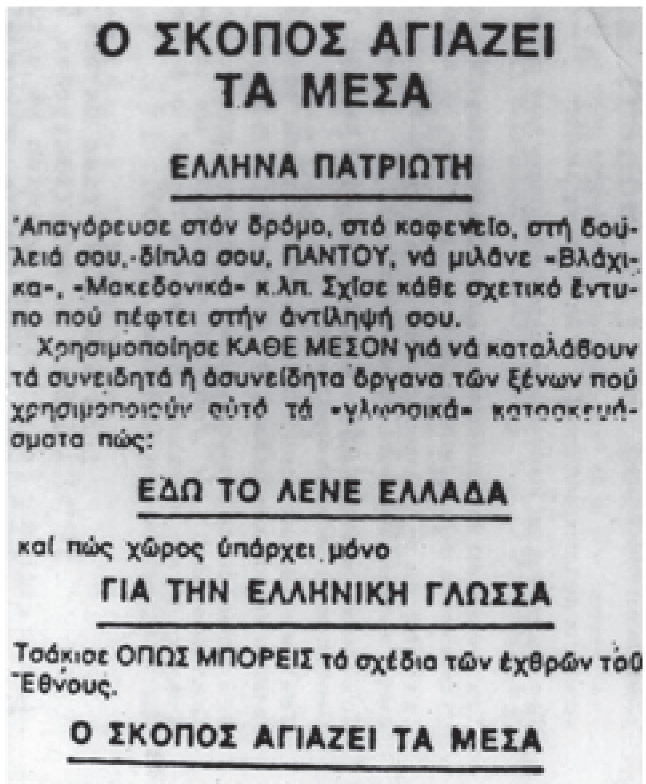
> *Alvanoì, Vlákhoi, Voúlgari, Allóglōssoi kharḗte,*
> Albanian,Vlahs, Bulgarians, allophones rejoice.2pl:IMP
> *K' etoimasthḗte óloi sas Rōmaîoi nà genḗte.*
> and prepare:2pl:IMP all you Greek SP become:2pl:PRES
> *Varvarikḕn afḗnontes glō̃ssan, fōnḕn kaì ḕthē*
> barbarian forego.PART:PL language:ACC speech:ACC and customs:ACC
> *Opoû stoùs Apogónous sas nà faínōntai sàn mûthoi.*
> so.that to.the descendants yours SP appear:3pl:PRES like myths
> ‘Albanians, Bulgars, Vlachs and all who now do speak
> An alien tongue, rejoice, prepare to make you Greek.
> Change your barbaric tongue, your customs rude forego,
> So that as bygone myths your children may them know.‘[9] (Greek in Daniēl 1802:vii/English in Wace and Thompson 1913:6)

The same sentiment is expressed somewhat more violently in a sign that was photographed in northern Greece some time in the 1950s. It was authenticated by

[9] In Greek orthography the poem is this:
Ἀλβανοὶ, Βλάχοι, Βούλγαροι, Ἀλλόγλωσσοι χαρῆτε,
Κ᾿ἑτοιμασθῆτε ὅλοι σας Ῥωναῖοι νὰ γενῆτε.
Βαρβαρικὴν ἀφήνοντες γλῶσσαν, φωνὴν καὶ ἦθη,
Ὁποῦ στοὺς Ἀπογόνους σας νὰ φαίνωνται σὰν μῦθοι. (Daniēl 1802:7)

Kostas Kazazis (University of Chicago), who said that the original colors were blue lettering on white (the Greek national colors). The image is given as figure (1). The translation is based on that supplied by Brian Joseph (Ohio State University). I have left it as literal as possible. It is a concrete example of how language death is sought by a state, but at the same time, it gives indirect evidence that Slavic-speakers in Aegean Macedonia were calling their language 'Macedonian' at that time.

Figure (1) Greek sign forbidding Aromanian and Macedonian



THE END JUSTIFIES
THE MEANS
<u>O GREEK PATRIOT!</u>

Forbid in the street, in the cafe, in your job, next to you, EVERYWHERE, that they speak "Vlah", "Macedonian" [Greek *makedhoniká* —VAF] etc. Tear up every relevant printed document that falls into your perception.

Use EVERY MEANS so that the witting or unwitting instruments of foreigners who use these "language" fabrications might understand that:

<u>HERE IS CALLED GREECE</u>

and that there is room only

<u>FOR THE GREEK LANGUAGE</u>

Break up HOWEVER YOU CAN the plans of the enemies of the People.

<u>THE END JUSTIFIES THE MEANS</u>

Although Turkish is permitted in Greek Thrace, the government insists that these Turkish-speakers are "Muslim Greeks" and linguistics even refer to Turkish in Greece as *Mousoulmaniká Thrákēs* 'Muslimish of Thrace' (Katasanēs 1998).

Greece's denial of the existence of its minorities has even penetrated the world of American men's magazines. The November 2006 issue of *Maxim* featured a photo spread of international "Miss Maxim"s each a scantily clad and provocatively posed representative of a different country with a putative quotation from the model and a "hometown fact" about the country such as the difference between Holland and Netherlands, the number of bulls killed annually in bullfights in Spain, and the number of tons of radioactive dust released in the 1986 the Chernobyl disaster in Ukraine. The hometown fact for "Miss Maxim Greece" was the following: "According to the Greek government there are no ethnic divisions in Greece" (p. 176).

My most recent experience with Greek linguistic ideology was in September 2012, at the Medžitlija-Niki border crossing between the Republic of Macedonia and the Hellenic Republic, on the Niki side of the border, and subsequently in Florina, Greece. There were four of us in a car on our way from Skopje to the book launch of the first Modern Greek - Modern Macedonian dictionary to be published in Greece. The book launch was taking place in the town of Florina, not far from the border, where there are still many Macedonian speakers. When we got to the Greek side of the border, it turned out that all four of our names were on a hand written piece of paper next to the passport control agent, who informed us we could not enter Greece. He then inspected the car and gave as his justification that fact that the driver had a small, ordinary video camera in his trunk. The European Board of Lesser Used Languages (EBLUL) was having its annual meeting in Florina, and the book launch was supposed to be an event associated with the meeting. The driver called an EBLUL representative in Florina, who called an EU representative in Athens, who called the Greek border, and after an hour of being held and threatened at the border, we were allowed to continue to Florina. When we arrived, we saw a busload of Golden Dawn thugs being brought in to surround the hotel where the EBLUL meeting was taking place. Eventually they were prevented from blocking the entrance, but they stood nearby chanting slogans and making threatening gestures. Such are the dangers of doing minority language research in an EU country.

The Greek ideology — which is well suited to the purposes of the type of classical nationalism that seeks to eliminate language contact and views its effects as "corrupting" — has infected other parts of the Balkans only in recent years. In the Republic of Macedonia today, when one cites the old proverb *jazicite se bogatstvo* 'languages are wealth' one sometimes receives the reply: *no i slabost* 'but also a weakness'. The reference here is to relations with Albanian, which in fact are both complex and ideologically cathected. The example of Greece's international success in blocking the Republic of Macedonia's access to various organizations, however, provides an unfortunate justification for similar exclusive nationalism in Greece's neighbors. At the same time, in the Republic of Macedonia, Turkish has re-emerged as the language of urban accommodation. As a consultant of mine put it, it was the mortar that held the bazaar together, and the shopkeeper's *buyrum* 'please/may I help you' (Turkish) is still the signal of urban coexistence. In the mountains of Gora in southwesternost Kosovo, all the villagers are Muslim, but some speak Albanian and others speak Goran (which is classified as Macedonian, Serbian, Bosnian, or none of the above, depending on the orientation of the speaker or the classifier).[10] Inter-ethnic tensions are present, demonstrating that common religion does not always determine ethnic feeling in this region. Here the Goran greeting *dobar den* and the Albanian greeting *mirëdita* both meaning 'good day' are both marked, and Turkish *merhaba* is the safest greeting if you're not sure of the ethnicity of your interlocutor.

Finally I should like to say a few words about on-going Balkan linguistic processes. The Kumanovo Arli and Skopje Barutči Romani dubitatives marked by Slavic interrogative *li* and Turkish interrogative *mi*, respectively (Friedman 2013), the Albanian use of the 3sg admirative present of 'be' — *qenka* —as a calque on the Macedonian *bilo* (an archaic optative usage of the 3 sg neuter old perfect of 'be') meaning 'whether...or...' (Friedman 2012), the tendency of Aromanian doubled prepositions to influence Ohrid Macedonian and then parachute to Skopje (Friedman 2011) are all examples of the fact that the Balkan sprachbund is alive and well in the Republic of Macedonia — the only Balkan nation state to specifically name other Balkan languages in its constitution. At the same time, Balkan multilingualism continues at the local level in all of the Balkan nation states, although trying to study it can be difficult or even dangerous in places like Greece. These facts in turn point to the importance of dialects for understanding language contact. The Balkan sprachbund was identified at a time when Balkan standard languages were at most nascent and nowhere widespread in their effects. Sandfeld's (1930) classic work is based largely on collections of folklore in dialects. While recent Eurocentric (or Eurological) work has focused on standard languages, in fact there is still much dialectological work to be done.

In conclusion, when speaking of language contact in an era of so-called globalization, I would like to make a plea for both the baby and the bathwater, as it were. New contexts of contact require assiduous study, but at the same time, the old ones still merit further attention. Both areal and typological linguistics have much to offer our understanding of how human language works. Nevertheless, as Hamp (1977) pointed out at BLS 3, the two enterprises are fundamentally different. This does not mean that we cannot search for suggestive patterns when

[10] On purely dialectological grounds, Goran is closest to Macedonian (Vidoeski 2005), and upwardly mobile Gorans have routinely gone to Macedonia, where their dialects are closest to the standard language.

historical records are lacking, but it does mean that we must pay careful attention to the details of those patterns and that we should not conflate the two for ideological or other purposes.

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Relative importance of phonation cues in White Hmong tone perception *

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1. Introduction

The study investigates the importance of phonation cues in White Hmong (henceforth, Hmong) tone identification. The tonal inventory of Hmong can be seen in Table 0.1, based on Esposito (2012). Hmong possesses seven productive tones, two of which involve non-modal phonation. The breathy (*-g*) tone is usually produced with a mid- or high-falling pitch contour similar to the high-falling modal (*-j*) tone (Esposito 2012). Therefore, the words *pog* [pɔ̤˥˨] 'grandmother' and *poj* [pɔ˥˨] 'female' differ mostly in phonation. The low modal (*-s*) tone and the low-falling (checked) creaky (*-m*) tones are characterized by phonation, pitch, and duration differences. Production studies have shown that the phonation differences between these two tones are large (Esposito 2012, Garellek 2012), although for at least some speakers, the low-falling (*-m*) tone is sometimes realized simply as a short, checked tone with *modal* phonation (Huffman 1987, Ratliff 1992). There is an additional non-productive tone, the *-d* tone, which is a syntactic variant of the *-m* tone.

Despite recent work on the production of non-modal phonation in certain Hmong tones, it is still unclear to what extent listeners use or rely on such changes in voice

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Table 0.1: Overview of White Hmong tones, from Esposito (2012).

Tone	Orthographic tone symbol	Example (IPA)	Example in Hmong orthography
High-rising	-b	[pɔ˦˥]	*pob* ‘ball’
Mid	∅	[pɔ˧]	*po* ‘spleen’
Low	-s	[pɔ˨]	*pos* ‘thorn’
High-falling	-j	[pɔ˥˨]	*poj* ‘female’
Mid-rising	-v	[pɔ˨˦]	*pov* ‘to throw’
Low-falling creaky	-m	[pɔ̰˨˩]	*pom* ‘to see’
Mid- to high-falling breathy	-g	[pɔ̤˥˨]	*pog* ‘grandmother’

quality. In a previous study on White Hmong and Green Mong perception, Andruski (2006) found that listeners were better at identifying natural tokens of the breathy and creaky tones than the low modal one, suggesting that they use phonation cues in tonal recognition. This hypothesis is consistent with findings on other tonal languages like Cantonese, Karen, Mandarin, and Vietnamese, where non-modal phonation (e.g. breathiness or glottalization/creakiness) accompanies certain tones (Belotel-Grenié and Grenié 1997, Brunelle 2009, Brunelle and Finkeldey 2011, Yu and Lam 2011). However, the relative importance of phonation compared to pitch and duration in Hmong tone identification is unknown.

To understand the relative role of phonation in White Hmong tone perception, we conducted a perceptual experiment where we manipulated F0 and duration, while keeping constant the original cues to breathy and creaky phonation (aside from those involving F0 changes). Given that the low-falling creaky tone in Hmong differs from the low modal tone not just in terms of phonation, but also in pitch and duration, we hypothesize that voice quality will be used in addition to duration and pitch cues, but its relative importance is unclear. In contrast, voice quality should be the major cue used for distinguishing the high-falling breathy vs. modal tones.

2. Method

2.1. Stimuli

Stimuli were produced from natural tokens of /pɔ/ with six of the seven possible tones, recorded in isolation by a female native speaker of Hmong. The string /pɔ/ in Hmong can form a licit word with any of the seven productive tones, as seen in Table 0.1. A summary of the F0 and duration manipulations used to create the stimuli is shown in Table 0.2, and further details can be found in Garellek *et al.* (under review).

Table 0.2: Summary of F0 manipulations used to create the stimuli.

Original token	Manipulation 1	Manipulation 2	Manipulation 3
[pɔ̤˥˨]	Flat F0 at different levels	F0 fall shortened	Entire contour lowered
[pɔ̰˨˩]	Kept short vs. lengthened	Lowered F0 of modal portion (for short and long stimuli)	Raised F0 of creaky portion (for short and long stimuli)
[pɔ˧]	Kept long vs. shortened	Raised F0 (for short and long stimuli))	Created F0 fall at end of stimulus (for short and long stimuli)
[pɔ˥] [pɔ˥˨] [pɔ˨˦]	Lowered F0	Raised F0	

The original breathy-toned stimulus (with a high-falling pitch contour) underwent three independent sets of pitch manipulations in order to obtain breathy tokens with varying F0 levels and contours. For the first set of manipulations, F0 was flattened to its starting high value (267 Hz) and then lowered successively in steps of 10 Hz steps to a minimum of 187 Hz. For the next set of manipulations, the starting high F0 of the original falling contour was lowered in steps of 10 Hz while keeping the end pitch constant, effectively decreasing the pitch change of the stimulus. For the stimulus with the lowest starting F0, the pitch change from start to end was only 10 Hz, compared with a fall of 60 Hz for the original breathy token. For the third set of manipulations, the entire original contour was lowered by 10 Hz increments, such that the final contour was low-falling instead of high-falling. However, in this set the pitch change in Hz from start to end did not differ across stimuli. In total, 25 stimuli were created from the original breathy-toned stimulus.

F0 manipulations were accomplished using the "Pitch-Synchronous Overlap and Add" (PSOLA) function in Praat, which alters F0 while preserving other spectral properties that can affect voice quality (Moulines and Charpentier 1990). This is done by separating the signal into discrete, overlapping segments, which are then repeated or omitted (for greater or lower F0, respectively). The remaining segments are finally overlapped and added together to reconstitute the speech signal.

The original modal and creaky words were first blocked according to length. Typically, the low modal tone is longer than the low creaky one, so a short version of the low-modal and a long version of the low-creaky words were created. Length of the vowel was manipulated in Praat by duplicating pulses from the middle of the vowel, which for both tones was modal-sounding. Low modal and low-falling creaky stimuli with both original and modified durations then underwent two independent types of pitch modifications. For the low modal words, we first shifted the entire contour by 10 Hz increments between 120 and 210 Hz. In the other manipulation, we lowered the F0 of the original low-modal words to simulate the pitch fall of the low-falling creaky tone. At about two-thirds of the vowel's duration (which is when F0 typically begins to fall for the creaky tone), the pitch fell in 10 Hz increments to a maximum 70 Hz drop. The slope of the fall was created using quadratic interpolation in Praat, such that it dropped gradually. In total, 24 stimuli (12 long and 12 short) were created from the original low-modal stimulus.

We also performed two independent sets of F0 manipulations on the original creaky-toned word. In the first set of manipulations, we varied the pitch of the original creaky-toned stimuli by lowering the F0 of the non-creaky initial part of the vowel by increments of 10 Hz. In the second set of manipulations, we raised the F0 of the original creaky stimuli during the creaky portion (in the final third of the vowel) by 10 Hz increments, until the pitch was nearly flat. In total, 30 stimuli (15 long and 15 short) were created from the original creaky-toned word.

The other modal tones also underwent pitch manipulations. The whole F0 contour of the high and high-falling modal tones was lowered by 100 Hz in 10 Hz increments, and the F0 contour of the rising tone was raised up to 80 Hz in 20 Hz increments. In total, 38 stimuli were produced from the other modal tones: eight from the high-level tone, 20 from the high-falling modal tone, and 10 from the rising tone. The task had a total of 127 stimuli, each presented twice for a total of 254 tokens. Stimuli were randomized prior to each testing session.

An acoustic analysis for voice quality measures showed that, despite the F0 manipulations, the acoustic cues to the voice quality of the original sound had not been altered (cf. Esposito (2010)). H1*-H2*, H1*-A1*, and harmonics-to-noise ratio below 500 Hz (HNR) were used to analyze the tokens' voice quality, because these measures have been shown to distinguish modal phonation from both breathy and creaky phonation types in Hmong (Garellek 2012). H1*-H2* is the difference in amplitude of the first two harmonics, and H1*-A1* is the difference in the amplitude of the first harmonic and the harmonic nearest the first formant. The asterisks indicate that the measures have been corrected for the effects of vowel formants (Hanson 1995, Iseli *et al.* 2007). Breathy vowels are expected to have higher H1*-H2* and H1*-A1*, but lower values for HNR, than modal vowels. Creaky vowels are expected to have lower values than modal vowels for all three measures. We obtained these measures using VoiceSauce (Shue *et al.* 2011). As shown in Table 0.3, this is true for all stimuli, regardless of the F0 and duration manipulations. Thus, the phonation of the manipulated stimuli were characteristic of breathy, modal, and creaky voice quality in Hmong.

Table 0.3: Mean values of H1*-H2*, H1*-A1*, and HNR in dB (standard deviations in parentheses) for high-falling breathy vs. modal and low creaky vs. low modal stimuli, across all pitch manipulations.

	H1*-H2*	H1*-A1*	HNR
High-falling breathy	8.36 (3.37)	27.11 (5.23)	27.67 (1.06)
High-falling modal	3.83 (2.18)	22.15 (1.34)	38.08 (4.39)
Low-falling creaky	1.40 (1.30)	21.68 (1.05)	35.94 (6.09)
Low modal	5.03 (1.96)	28.56 (2.97)	37.48 (6.12)

2.2. Participants

Participants were recruited at the Hmong-American Partnership and through personal contacts in St. Paul, Minnesota. Fifteen native speakers of White Hmong, eight men and seven women, participated in the experiment. All spoke English with varying degrees of proficiency, and all spoke Hmong daily, both at work and at home. They were all literate in Hmong Romanized Popular Alphabet (R. P. A.) script. The experiment lasted about 20-30 minutes and was conducted in a quiet room. Participants listened to the experiment using noise-attenuating headphones. They were compensated for their time.

2.3. Task

The experiment was implemented in Praat (Boersma and Weenink 2011), and consisted of a seven-alternative forced-choice identification task, during which participants listened to stimuli, and then indicated which word of the form /pɔ/ they heard. The possible words were displayed on screen in standard Hmong orthography, which uses letters after the vowel to mark the tone, except for the mid tone, which is not marked orthographically. Listeners could hear the stimulus as many times as they wished before selecting their response, which they were able to change before hearing the next stimulus. A bilingual English-Hmong experimenter ensured that the participants understood the task.

3. Results

Participants' responses were analyzed using logistic mixed-effects regression to determine the relevant factors that account for choosing a breathy or creaky response. The regression was done in R using the *lmer* function in the *lme4* package (Baayen

2008). The original phonation of the word was coded as being either breathy, modal, or creaky, according to the lexical tone.

For predicting ‘breathy tone’ responses, the logistic model included the original phonation of the stimulus (breathy vs. non-breathy), the F0 averaged over the first ninth of the vowel, the F0 averaged over the final ninth, whether the F0 was flat vs. a contour, and mean F0. The F0 was measured in the first and final ninths of the vowel in order to get start and end values of the measure. Average F0 values over short intervals were used (instead of values at single time points) in order to smooth the data. Participant was included as a random effect, and the dependent variable was whether or not participants chose a ‘breathy tone’ response. The results are shown in Table 0.4. Of the fixed effects, the only significant factor was whether the original stimulus was breathy, which significantly increased the likelihood of a ‘breathy tone’ response ($p<0.0001$).

Table 0.4: Fixed-effects results of logistic model predicting ‘breathy tone’ responses.

	Estimate	SE	*Z*-score	*p*-value
Intercept	-2.48	0.38	-6.58	<0.0001***
Orig. tone=breathy	3.98	0.18	21.57	<0.0001***
Mean F0	-0.0008	0.01	-0.09	0.93
F0 in 1st ninth	-0.01	0.01	-1.91	0.06
F0 in final ninth	0.01	0.01	1.02	0.31
F0 slope - flat	-0.04	0.16	-0.27	0.79

For predicting ‘creaky tone’ responses, the logistic model included the original phonation of the stimulus (creaky vs. non-creaky), the stimulus length (short vs. long), the F0 averaged over the first ninth, the F0 during the final ninth, slope of F0 (contour vs. flat), and mean F0. Participant was included as a random effect, and the dependent variable was whether or not participants chose a ‘creaky tone’ response. The results are shown in Table 0.5. The phonation of the original stimulus did not matter, even if it was creaky. Instead, the F0 in the final ninth, the F0 slope, and the stimulus length were significant (all $p<0.001$). Thus, a stimulus that was short in length, with a non-flat F0 contour, and/or a lower final F0 was associated with overall greater ‘creaky tone’ responses.

4. Discussion

The issue of whether non-modal phonation plays a primary role in tone perception in languages with and without phonation contrasts is understudied. In the case

Table 0.5: Fixed-effects results of logistic model predicting 'creaky tone' responses.

	Estimate	SE	Z-score	p-value
Intercept	1.30	0.37	3.55	<0.001**
Orig. tone=creaky	0.09	0.14	0.61	0.54
Mean F0	-0.005	0.01	-0.94	0.35
F0 in 1st ninth	-0.001	0.004	-0.34	0.73
F0 in final ninth	-0.02	0.004	-3.45	<0.001**
F0 slope - flat	-1.10	0.18	-6.18	<0.0001***
Length - short	1.11	0.13	8.69	<0.0001***

of White Hmong, phonation cues are fundamental for identifying the high-falling breathy tone, with F0 modifications having little effect. On the other hand, the role of phonation in the identification of the low-falling creaky tone is apparently minor, given that an F0 dip and short duration are what listeners relied on in this study. Therefore, whereas breathiness is used to make a categorical distinction between two tones, creakiness likely reinforces the F0 lowering and short duration of the low-falling creaky/checked tone. In this way, creaky voice quality appears to be a secondary cue to what is fundamentally a duration and pitch contrast. This might seem surprising, given the evidence that creakiness in Hmong is extensive in both time and degree (Esposito 2012, Garellek 2012).

The results show that participants treated breathiness and creakiness differently. Breathiness was independent of F0, such that pitch modulations of breathy stimuli did not change participants' responses. Thus, participants still perceived a flat F0 (at various pitch heights) as breathy, even though in natural speech the breathy tone in Hmong is produced with a falling pitch contour. If a breathy-toned vowel was low-falling instead of the more natural high-falling pitch contour, participants still perceived it as breathy, as shown in Figure 0.1. We found no significant change in 'breathy tone' responses when the starting F0 varied, even when its pitch contour resembled that of the creaky tone more than the modal or breathy high-falling tones.

On the other hand, identification of the creaky tone in Hmong was highly dependent on the duration and F0 of the stimulus. For participants to identify a word as creaky-toned, the vowel needed to be short and have a low-falling pitch contour, but creaky voice quality (aperiodic and with low spectral tilt) was not necessary. This is demonstrated in Figure 0.2, which plots proportion 'creaky' responses as a function of the pitch fall for short original creaky and low modal stimuli. There was little difference between the original creaky and low modal tokens with manipulated

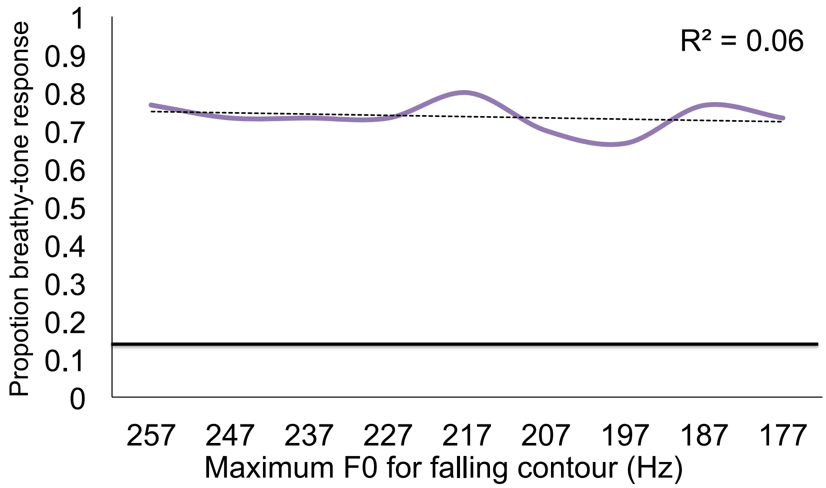
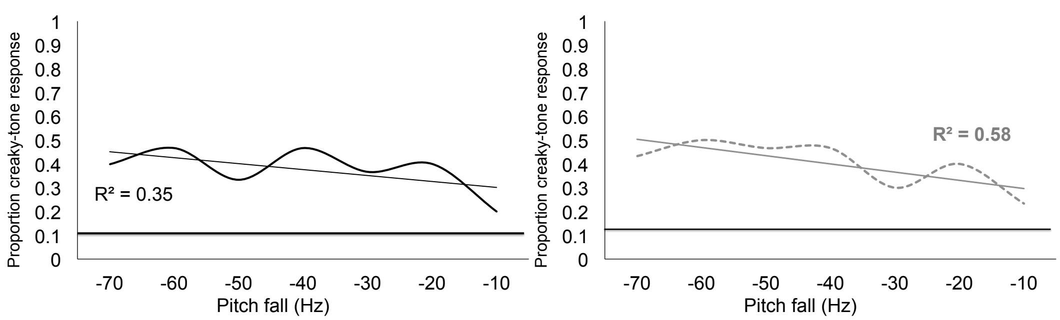


Figure 0.1: Proportion ‘breathy’ responses for breathy stimuli as a function of start of F0 fall. Chance is indicated at 0.14.

F0, with both groups identified as creaky only about 40% of the time. For both categories there was a moderate correlation between ‘creaky tone’ responses and the pitch fall, consistent with the logistic regression results. The absence of a difference between the modal and creaky stimuli shows that presence of creaky phonation in the original token mattered little in the prediction of ‘creaky’ responses. Note also that the overall creaky-tone identification rate was lower than for the breathy tone. This suggests that the stimuli were not ideal creaky-tone tokens, or that the low-falling creaky tone is in general more confusable with other tones.



(a) Short creaky-tone stimuli

(b) Shortened low-modal stimuli

Figure 0.2: Proportion ‘creaky’ responses as a function of start of F0 fall, for low-falling creaky (*-m*) and shortened original low modal (*-s*) tokens. Chance is indicated at 0.14.

However, we do not claim that the low-falling tone in Hmong need not be creaky at all. Rapid dips in F0 can cue creaky voice quality in Mixtec (Gerfen and Baker

2005) and glottal stops in English (Hillenbrand and Houde 1996), suggesting that some forms of creaky voice can be tied to pitch dynamics alone. Therefore, this study reinforces this fundamental distinction between breathy voice, which is pitch-independent, and creaky voice, which in some forms is a type of pitch setting.

5. Conlusions

This study shows that Hmong listeners used breathy voice quality when differentiating the breathy and modal high-falling tones. Creaky voice quality, however, is not a necessary cue for the low creaky tone, perhaps because the pitch fall and shorter duration are sufficient for listeners to identify it as distinct from the low modal tone. Creaky phonation can therefore be seen as a means of reinforcing the low F0 target at the end of the low-falling tone (and maybe also its checked-like short duration). In this way, it seems that in Hmong 'breathy' is contrastive in a way that 'creaky' is not.

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Are dislocated direct objects clause-external? Evidence from differential object marking

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1. Introduction

The aim of this paper is twofold. First, I examine the frequent cross-linguistic connection between Differential Object Marking (henceforth, DOM) and dislocated position, as well as the co-occurrence of DOM and Differential Object Indexation (henceforth, DOI) on the verb. Second, I discuss some severe problems these data pose for the fundamental assumption, shared by linguists of different theoretical persuasions, that i) verbal arguments can be expressed only once within the clause, and ii) that dislocated constituents have to be clause-external. In the remainder of this section I discuss the phenomena under analysis and the issues at stake. In section 1.1 I first examine the correlation between DOM and dislocation, and languages which show double marking of direct objects, i.e. both DOM and DOI. I then discuss the problems the examined data pose for the assumptions mentioned above in the treatment of argument structure. An alternative approach is proposed in section 3. Conclusions are drawn in section 4.

1.1. DOM and DOI

DOM is the phenomenon whereby some direct objects are overtly coded based on some semantic and pragmatic properties of their referents, such as animacy, definiteness, and topicality (Aissen 2003, Bossong 1985, Iemmolo 2011). This is illustrated by examples (1a) and (1b), which differ as to the morphological encoding of the direct object. In (1a), the direct object is followed by the postposition -*râ*, while in (1b) it is not. Tradiitonally, this difference is explained in terms of definiteness. Definite direct objects will be overtly coded, while indefinite ones will not:

(1) a. *Hasan ketab-râ did*
Hasan book-DOM see:3SG.PST
"Hasan saw the book

b. *Hasan ketab did*
Hasan book see:3SG.PST
"Hasan saw the book (Comrie 1989, 139)

In a substantial number of languages, DOM on the noun is complemented by DOI (often known as clitic doubling in Romance or Semitic languages) on the verb. For instance, in the Northeastern Neo-Aramaic dialect of Telkepe (Iraq) (Coghill 2010, to appear), DOM occurs solely in conjunction with DOI, while DOI can occur alone, as shown by examples (2a) and (2b):

(2) a. *kəm-šāqəl-lə ta barāna*
PST-take.3SG.M-OBJ.3SG.M DOM ram
"He took the ram

b. *kəm-šāqəl-lə barāna*
PST-take.3SG.M-OBJ.3SG.M ram
"He took the ram

Similar systems are rather widespread in the world's languages (Iemmolo 2011), and constitute a challenge for the assumption that an argument cannot be represented more than once within a clause.

1.2. The clause-external status of dislocated constituents

The term "dislocation" refers to a construction in which a constituent occurs at the left (i.e. left dislocation) or right (i.e. right-dislocation) edge of a sentence (Foley 2007, 443) and is (optionally, see below) resumed by a coreferential pronominal index within the clause, as in the English examples in (3) and (4):

(3) That book$_{[i]}$, I haven't read it$_{[i]}$.

(4) I haven't read it$_{[i]}$, that book$_{[i]}$.

It is commonly assumed, both in functionally- and formally-oriented approaches, that dislocated constituents are outside clause boundaries, i.e. they represent a sort of adjunct to the clause and are not governed by the verb (Lambrecht 2001, Baker 1996, Foley 2007, 1065). Rather, it is the pronominal index that saturates the verb valency and thus constitutes the "real argument" of the verb. The full NPs are thus "in apposition" to the clause and function as topical elements linked to the clause via an anaphoric relation expressed through the index on the verb.

This assumption follows directly from the principle, known under the label of "Functional Uniqueness condition" in Lexical-Functional Grammar (Bresnan 2001, 311) or "Theta-criterion" in different versions of generative grammar, that arguments cannot be mapped more than once within a predicate argument structure. A popular illustration of this principle comes from Chichêwa (Niger-Congo, Bantu). Chichêwa, as many other Bantu languages, displays DOI with topical objects (Bresnan and Mchombo 1987). According to Bresnan and Mchombo (1987)'s analysis, when present, DOI functions solely as an incorporated pronominal argument, and the NP coreferential with the indexation marker is a floating topic outside the clause. The contrast is exemplified by the following examples. In (5a), since there is DOI, the object must be generated in an adjoined-topic position and the actual argument is the pronominal index on the verb. In (5b), since there is no DOI, the DO is clause-internal and therefore does not trigger indexation.

(5) a. *Njûchi zi-ná-wá-lúm-a alenje*
bee.PL SUBJ.-PST-OBJ-bite-IND hunter.PL
"The bees bit them, the hunters"

b. *Njûchi zi-ná-lúm-a alenje*
bee.PL SUBJ-PST-bite-IND hunter.PL
"The bees bit the hunters"

Similar analyses have been proposed for the so-called "pronominal argument languages" (Jelinek 1984, Baker 1996, 2003), like Mohawk (Iroquoian, Baker 1996) or a number of Australian languages (Jelinek 1984). Under this hypothesis, known as Pronominal Argument Hypothesis (PAH), independent NPs are "adjuncts" that occupy a position outside the clause boundaries (behaving thus like dislocated NPs). Again, the indexes are the true arguments of the verb, and sentences are complete without any overt NPs. I will not dwell on the specific problems raised by the PAH hypothesis directly (but see, e.g., Austin and Bresnan 1996, Evans 2002 for discussion and criticism). Here I will concentrate on the specific problem posed by the claims that i) dislocated NPs are universally clause-external, and ii) in presence of double marking, only one of the expressions is the argument of the verb. I will discuss this postulate with particular regard to the following parameters that have been proposed to define dislocated constituents, namely:

- presence of a resumptive pronominal index;
- special prosody (Lambrecht 2001);
- default case marking or no case marking (Baker 2003).

As we will see below, none of the parameters above is a necessary and sufficient condition for characterising a constituent as dislocated and thus extra-clausal.

In fact, there are a number of languages where dislocated constituents are not resumed by any pronominal index, since not every language possesses them. Nor is special prosody, which usually amounts to an intonation break, necessarily present. Most important, as I will show in the next section with regard to DOM, the claim that dislocated NPs receive default case marking or no case marking at all (i.e. they are not subject to case checking, see Baker 2003, 125) does not hold true when empirical data are taken into account. If dislocated NPs are extra-clausal, how can we account for i) the presence of DOM with dislocated objects, and ii) the optionality of the pronominal element that occurs in some languages? These questions will be taken up in the next section.

2. DOM, dislocation, and double marking

The present study is based on a convenience sample of 133 languages showing DOM (Iemmolo 2011). As mentioned above, some languages also show indexation on the verb, thus giving rise to an (optional) double marking pattern. Each instance of DOM has been coded with respect to the main parameter(s) (i.e.the parameter that takes priority over the others) influencing the presence of overt coding of objects. The distribution of DOM relative to the main parameter is shown in Table (0.1):

Parameter	**No**	**%**
Animacy	45	33,83
Topicality	86	64,66
Dislocation	60	45,11
Definiteness	2	1,5
Total	133	100

Table 0.1: Distribution of DOM systems relative to the main parameter

As shown by Table (0.1), in 60 languages out of 133 (i.e. 45%), the main parameter for DOM to appear is the dislocated position of the object (i.e. at the left or right edge of the sentence) A straightforward example comes from Purepecha, an isolate language spoken in Mexico, where there is obligatory DOM with human objects, as in (6a). With other kinds of objects, DOM is obligatory only if the object is dislocated, as shown by the opposition between (6b), with optional DOM when the object is in the normal final-sentence position, and (6c), where DOM cannot be omitted. It should be noted that dislocation in Purepecha does not involve any resumptive element.

(6) a. *iʃe-ʃ-ka-ni* *ma nanaka-*(ni)*
see-AOR-DECL.1/2SG-1SG a young_girl-DOM
"I saw a young woman" (Chamoreau 1999)

b. *Pedru míti-h-ti eski Juanu kaká-ka má tsúntsu-(ni)*
Pedro know-PFV-3SG.IND that Juan break-3SG-SUBJ one pot-DOM
"Pedro knows that Juan broke a pot"

c. *Má tsúntsu-*(ni) Pedru míti-h-ti eski Juanu kaká-ka*
one pot-DOM Pedro know-PFV-3SG.IND that Juan break-3SG-SUBJ
"One pot, Pedro knows that Juan broke (it)" (Vázquez Rojas Maldonado 2010)

In Dullay (Afro-Asiatic. Cushitic), the situation is even more extreme, since only left-dislocated objects receive DOM obligatorily, while sentence-medial objects are only optionally marked: as illustrated by (7a) and (7b):

(7) a. *qawhó-n miʔé híʔí*
man-DOM child see.PST.3SG
"The man, the child saw (him)"

b. *miʔé qawhó-n híʔí*
child man-DOM see.PST.3SG
"The child saw the man" (Tosco 1994, 238)

Similar systems are found in many unrelated language families, such as Altaic, Sino-Tibetan, Nilo-Saharan, Indo-European, Dravidian, etc. (see Iemmolo 2011 for discussion and examples). If we accept the idea that dislocated objects with DOM are clause-external constituents, then the next logical step would be to expect the object marker not to show up in those contexts, which should not be subject to verb government. An alternative analysis would be to consider the marker as a topic marker when it marks a dislocated object. This is not a viable solution, since it would lead to the conclusion that the same marker works as a topic marker with dislocated objects and as a case marker when the object is *in situ*. Moreover, the optional appearance of DOM with objects in their canonical position (usually next to the verb phrase) would make this analysis even more opportunistic. It can indeed be easily seen that in none of the examples I have just discussed can the objects be considered as clause-external based on the criteria listed in section 1.2.

Languages where DOM and DOI appear at the same time pose another serious challenge to the assumptions discussed above. I will discuss here the case of Romance languages, where the co-occurrence of DOM with clitic doubling has been extensively studied (see, e.g. Anagnostopoulou 2006, Leonetti 2008 and references therein). Spanish and Italian are a good case in point. DOM in Modern Peninsular Spanish is obligatory with definite human direct objects (Leonetti 2004, Torrego Salcedo 1999)[1], while it is optional with indefinite specific and non-specific ones. The link within dislocation is still fairly strong, as shown by the fact that, with dislocated objects, DOM becomes obligatory even with objects for which DOM is optional when in post-verbal position. This is illustrated by the opposition between (8a) and (8b):

(8) a. *Ya conocía (a) muchos estudiantes*
already know.IPFV.1SG DOM many students
"I already knew many students"

b. **(A) muchos estudiantes, ya los conocía*
DOM many students already 3PL.OBJ know.IPFV.1SG
"Many students, I already knew (them)" (Leonetti 2004)

As expected, in the case of dislocation in (8b), there is a resumptive clitic element coreferential with the dislocated object. Under the assumption that the dislocated object is clause-external, the clitic would represent the argument of the verb. Still, this does not explain the obligatory presence of *a* in (8b). The latter structure presents an obvious puzzle to theories that postulate the functional uniqueness principle. Even more puzzling are the examples where the object is in its canonical post verbal position, and yet the clitic is obligatory. This is found with pronominal objects, as exemplified by the ungrammaticality of (9a) as opposed to 9b):

(9) a. * *Vimos a él*
see.PST.1PL DOM him
"We saw him"

b. *Lo vimos a él*
3SG.M.OBJ see.PST.1PL DOM him
"We saw him" (Leonetti 2004)

In examples like (9b), one might legitimately wonder which constituent has argument status. One proposal, known in the generative literature as "Kayne's generalisation", tries to capture the close link between clitic doubling and DOM by stating that clitic doubling occurs only if the NP is preceded by the preposition *a*. Under this analysis, clitics "absorb" accusative case (representing thus the arguments) so that the full object NPs would appear caseless. However, this would violate the Case Filter. The insertion of the preposition then just functions as a case-saving device to avoid the lack of case on the object NP.

As has been pointed out by several scholars, this analysis is rather problematic, because it postulates that clitic doubling is dependent upon DOM. That this is not the case is demonstrated by the fact that clitic doubling can occur without DOM, as in (14a) and (14b).

[1] DOM with inanimate direct objects is not uncommon (Company Company 2002, García García 2007 among others) and suggests that DOM is extending downwards the animacy hierarchy. I will not go deeper into this issue here.

(10) a. *Ya las lavé a todas*
already CLIT.3PL.F wash.1SG.PST DOM all.PL.F
"I already washed them all"

b. *Ya las lavé todas*
already CLIT.3PL.F wash.1SG.PST all.PL.F
"I already washed them all" (Mayer 2006)

Further, Kayne's generalisation remains fairly elusive on the key issue of this paper. If clitics absorb the argument position, but full NPs need to be case marked, it is unclear which constituent is to be considered the "argument". One analysis could be that, in presence of a case-marked noun, it is the noun that carries argument status, and its co-referential clitic is an indexation marker, as in (14a). In (14b), the lack of case marking on the object would lead to the conclusion that the object is an "adjunct" and the clitic an incorporated pronominal. However, in order to support this interpretation, we necessarily have to provide two different analyses for the very same element, i.e. the clitic. This constitutes one instance of what (Croft 2001) has called "methodological opportunism".

The Uniqueness Principle, as well as the extra-clausal nature of dislocated NPs, becomes even more difficult to support when empirical data from Italian are examined. Standard Italian, as well as Northern Italian varieties, are usually claimed to lack DOM and clitic doubling (Anagnostopoulou 2006 and references therein). However, as shown in Iemmolo 2010, Italian does show both constructions, albeit to a lesser degree than Spanish. Clitic doubling is obligatory with every dislocated object. DOM is restricted to first and second-person pronouns in dislocated position, where it is obligatory, as shown by examples (11a) and (11b). The omission of DOM renders the sentence ungrammatical, unless the object is a contrastive focus bearing prosodic stress:

(11) a. **(A) me non (mi) convince questo*
DOM me NEG CLIT.1SG convince.PRS.3SG this
"This does not convince me"

b. *A me non convince questo*
DOM me NEG convince.PRS.3SG this
"This does not convince me" (Iemmolo 2010, 249)

The evidence for the extra-clausal status of the pronominal object in (11a) is very controversial. First of all, no intonational break between the dislocated object and the rest of the sentence is present. Second, the clitic can be omitted, at least with some verbs classes[2]. If one assumes that the principles given above are correct, one

[2] Specifically, the omission of the clitic is possible when the governing predicate is either a psychological verb (as in the examples above), or a causative verb (*fare/lasciare*+infinitive). The exact details of such clitic omission have not been clearly understood yet, even though sociolinguistic factors seem to be at play (Iemmolo 2011).

would have to analyse the object in (11a) as clause-external and the one in (11b) as clause-internal. It is by no means clear why this should be so. Indeed, this would lead to the conclusion that the preposition *a* marks a core syntactic relation in one case and an adjunct in the other one. This is an unwarranted conclusion, and seems to be motivated only by purely theory-internal reasons.

Diachronic investigations also show that a close link between DOM and DOI does exist. As shown by Melis (1995), Pensado (1995), Laca (2006), DOM in Old Spanish was primarily governed by the topicality of the object. In particular, according to (Pensado 1995), DOM in Spanish indeed arose in left dislocations of personal pronouns to encode the object as a topic. The examples in (9b) from the *Cantar de mio Cid* nicely illustrate the connection with dislocation. When the object is post-verbal, there is no DOM, as in (12a). By contrast, when the object is pre-verbal, as in (12b), DOM shows up as expected:

(12) a. *Ca yo case sus fijas con yfantes de Carrion*
that 1SG.SUB marry.PST.1SG POSS.3PL daughters with princes of Carrion

"That I married off his daughters to the Princes of Carrion" (Cantar de mio Cid, 2956; 13th century)

b. *Que a mis fijas bien las casare yo*
that DOM POSS.1PL daughters good 3PL.F.OBJ marry.FUT.1SG 1SG.SUBJ

"That my daughters, I will marry them well" (2834; examples from Melis 1995)

Likewise, in Old Sicilian (Iemmolo 2010), and in Persian (Windfuhr 1979, Windfuhr and Perry 2009), DOM first emerged in left dislocation and was later extended to objects in the canonical sentence position.

Even more severe problems are posed by the so-called "double-marking languages" (Nichols 1986, Bickel and Nichols 2007), where the simultaneous presence of object indexation and case marking on the NP is obligatory. An example of such a language is Belhare, a Tibeto-Burman language spoken in Nepal, where overt argument NPs (i.e. both agents and objects) are obligatorily case-marked and indexed on the verb, as shown by example (13):

(13) *kubaŋ-chi-ŋa pitcha-chi n-ten-he-chi*
monkey-NSG-ERG child-NSG-ABS 3NSG.A-hit-PST-3NS.P

"The monkeys hit the children" (Nichols and Bickel 2011)

Grammatically, Belhare is a pro-drop language: overt argument NPs are never obligatory syntactically and a sentence is complete without any overt NPs, which should then be analysed as "adjuncts". However, the fact that, when they are overtly expressed, they must receive overt case, casts doubts upon the universal validity of the Uniqueness principle.

If this analysis is extended to every pro-drop language, the logical conclusion would be that, in the absence of an overt NP, the index on the verb saturates the valency and thus functions as an incorporated pronominal argument, while it is a mere indexation marker when an overt NP is present. This is indeed what Jelinek (1984, 48-49) claims about Spanish subject indexation. As is well known, in Spanish (as well as in many other Romance languages) subject NPs are normally dropped, as can be seen in examples (8a, 8b, 9a, 9b). When overtly expressed, they have an "emphatic, contrastive" value or serve to shift the topic or introduce a new one into the discourse, as shown by the opposition between (14a) and (14b):

(14) a. *Está en la calle*
be.PRS.3SG in the street
"S/he is in the street"

b. *Ella está en la calle*
she be.PRS.3SG in the street
"She is in the street" (personal knowledge)

This interpretation is highly debatable, as there are no grounds for assuming that overt pronominal subjects are in apposition to the sentence, apart from the theoretical postulate that arguments cannot be expressed more than once. Rather, as I will suggest in the next section, the issue of the double representation of arguments within a clause is better explained by appealing to functional considerations on the one hand and diachronic scenarios on the other one.

3. A unified approach

We have seen in the previous sections that crosslinguistic data show that DOM systems tend to be associated with dislocation. This fact goes against the widespread assumption that dislocated constituents are extraclausal and thus with no government relationship to the predicate. Furthermore, DOM often co-occurs with DOI, a fact that represents a puzzle for another related assumption in linguistic theory, namely that arguments cannot be expressed more than once within a clause.

I believe that these two assumptions should be abandoned as theoretical principles and a language-specific approach adopted. In order to account for the crosslinguistic variation found in this domain, one should ideally rely on formal and functional criteria to decide whether a NP is governed or not by the predicate. Similarly, the Uniqueness principle can be simply restated as a gradient phenomenon which depends upon language-specific criteria. This approach allows us to account for the large range of variation found among the world's languages as to the possible co-occurrence of an overt NP with indexation on the verb, without making any *a priori* assumptions which are not borne out by the data.

Let us review the arguments in support of this hypothesis. First, as we have seen in the preceding sections, the presence of case marking is a decisive criterion: if a constituent receives the same case marking it would receive if it were in "normal" position, then it is by no means clear why one should assume that it is extraclausal, especially when also other criteria, such as the presence of an intonation break, do not give any additional supporting evidence. Thus, one can have languages like colloquial English or French, where dislocated constituents are truly clause-external, separated by a break from the clause, and a "default" case form is used regardless of the role of the coreferential NP within the clause, as exemplified by (15):

(15) *Moi, je ne le sais pas*
Me, I NEG CLIT.3SG.M know.PRS.1SG NEG

"ME, I don't know" (personal knowledge)

Nonetheless, I hope to have shown that this pattern cannot be taken as universal, given the large number of languages where dislocated objects receive the expected case marking and do not show any other feature typical of dislocated constituents. This fact brings into question the recurrent co-occurrence of DOM and DOI and the issue of functional uniqueness. We have seen that, in order to preserve this theoretical postulate, one would be forced to analyse the indexation markers on the verb in a different way (either as an incorporated pronominal or as indexation) based on the presence vs. absence of an overt (case-marked) NP. The empirical evidence for such an analysis is fairly thin and inconclusive. First, as many linguists have observed, there are no clear criteria for distinguishing between "true" indexation and pronominal "anaphoric" indexation either on synchronic or diachronic grounds (Barlow 1992, Corbett 2003, Givón 1976, Lehmann 1988). Moreover, the existence of double marking, either optional, as in the case of DOM and DOI, or obligatory, as in Belhare, seriously undermines the cogency of this distinction.

This problem can be easily solved, in my opinion, by simply taking into consideration the fact that case marking and indexation are two distinct constructions, from a structural, functional and historical point of view (Croft 2001, Givón 1976, Siewierska 1999). As discussed in Iemmolo (2011), DOM and DOI systems are governed by the very same parameters and both tend to appear with topical objects. The role of topicality, however, is different in the two constructions. DOM is primarily a means of indicating topic discontinuities, such as topic shifts or topic reintroductions, while DOI is a means of maintaining topic continuity throughout the discourse. This functional difference explains the frequent association of DOM with dislocations and topicalisations, since these structures are means of putting a constituent in topical position. DOI is instead a device for encoding highly accessible referents, thus constituting a reference-tracking strategy (Barlow 1992, Givón 1983; Siewierska 2004, ch. 5). For this reason, DOI often occurs without a co-referential overt NP. If we take indexation as a discourse relation between a syntactic element (be it an NP, a pronoun, etc.) and a discourse referent (as proposed, e.g. by Croft 2001, 226, following a previous proposal by Barlow 1992), then it is perfectly plausible to have more than one realisation of a discourse referent within a clause. Similarly to what we have seen regarding dislocated NPs, we find a lot of variation in the world's languages as to the co-occurrence with an overt NP. There are languages where this co-occurrence is possible (like in many languages with both DOM and DOI), obligatory (as in double-marking language like Belhare). In languages where the co-occurrence is possible but not obligatory, the double representation of the argument may signal a difference in information structure, as in the Spanish or Italian cases discussed above. Over time, due to grammaticalisation (specifically to generalisation), the link with information structure might be weakened and the construction with the overt expression of both arguments might be reanalysed as pragmatically neutral. This process seems to be taking place in (Standard) Spanish, where, as we have seen above, DOI is already obligatory with case-marked pronominal objects. In other languages, we can have the exact reverse process whereby double representation is prohibited and thus no co-occurrence is possible. Such a system is exemplified by Noon, a Niger-Congo language spoken in Senegal, where only pronominal animate objects are indexed on the verb, while inanimate pronominal objects and full lexical NPs are expressed by independent forms and cannot be indexed on the verb (Soukka 2000):

(16) a. *Mi hay-yaa ki-wo'*
1SG AUX.FUT-2SG.OBJ INF-tell
"I will tell you"

b. *Mi hay-yaa ki-wo' beti-caa*
1SG AUX.FUT INF-tell women-DEF
"I will tell the women" (Soukka 2000, 195)

In this case, the most plausible diachronic scenario appears to be one involving a process of restriction. Since, as we have discussed above, indexation is mainly used to refer to highly accessible referents (which, not incidentally, tend to be animate and definite), then it comes as no surprise that in some languages bound markers are grammaticalised as markers of topic continuity, thus maintaining the link with information structure.

What remains to be explained now is why DOM and DOI often co-occur. Such a co-occurrence is often regarded as a "redundancy" in the in the descriptive grammars of some languages. I believe that the functional differentiation outlined above between DOM and DOI is very helpful in explaining this co-occurrence. The different functions covered by the two construction, namely the indication of topic discontinuity vs. topic continuity, obey Lambrecht (1994, 184)'s "Principle of the Separation of reference and role" (PSRR). According to this principle, speakers tend to avoid structures in which a referent is introduced and commented upon at the same time. In these cases, speakers often resort to dislocation constructions, which allow the establishment of the lexical NP as a topic, which is later on referred to via an indexation marker. Hence, after being lexically referred to, a referent can be encoded as the normal "unmarked" topic expression, i.e. as a pronoun. The differences between DOM and DOI, as well as their co-occurrence, therefore comply with the requirement of the PSRR, in that DOM serves to introduce the topic which will be later encoded as a normal topic expression through DOI.

Since case and indexation are two distinct constructions, the question of which one is the "real" argument of the verb is no longer relevant. Rather, it is more reasonable to assume that they occupy two different argument slots and are governed by different rules (Croft 2001, 229, 272 ff., Schultze-Bernd 2011). Of course, the exact details of the co-occurrence of case or overt NPs and indexation in individual languages will be regulated by language-specific constraints. The evidence adduced thus far then calls for a revision of the Uniqueness Principle. In the discourse-based approach like the one adopted in this paper, the Uniqueness Principle would be recast in semantic/pragmatic terms. Basically, it serves to rule out the possibility for the same argument to be represented by two (or more) expressions that do not have the same referent. That is, both expressions must refer to the same referent (see Barlow 1992, Croft 2001), thus excluding sentences like (17), in which the two expressions refer to different discourse referents, namely a first person participant (*me*) and a second person one (*ti*).

(17)	** A*	*me*$_{[i]}$	*non*	*ti*$_{[i]}$	*convince*	*questo*
	DOM	me	NEG	CLIT.2SG	convince.PRS.3SG	this

"This does not convince me"

4. Conclusion

DOM and DOI systems provide a profound challenge to some general assumptions widely accepted in different theoretical frameworks, in that they raise significant questions for i) the idea that arguments must be expressed only once in a clause and ii) the clause-external status of dislocated constituents. This paper has presented an alternative approach to the analysis of dislocated constituents and the issue of double representation of arguments, in which the universality of these postulates is rejected based on the examination of a range of cross-linguistic data. First, I have argued that the frequent diachronic and synchronic connection of DOM with dislocation makes it difficult to maintain the assumption that dislocated NPs are invariably extraclausal. Second, I have shown that double representation of an argument, by means of a case-marked lexical NP and indexation, can be easily explained by taking into account the fundamental discourse-functional difference between these two constructions. With particular regard to indexation, I have argued that the co-occurrence of an overt NP is the result of two different grammaticalisation processes, namely extension (which allows the co-occurrence) and restriction (which bans it). It is hoped that the account presented here is a first step towards the solution to the important descriptive and theoretical problems raised by the data presented in this paper.

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Additive Focus and Additional Functions of Karbi (Tibeto-Burman) =*tā*[1]

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1 Introduction

Karbi is a tonal[2] Tibeto-Burman language with about half a million speakers, most of them living in the Karbi Anglong district of Assam and adjacent areas in Northeast India. It is an agglutinating, verb-final language.

This study examines different functions of the enclitic =*tā* in Karbi with the goal to contribute to a cross-linguistic typology of additive focus markers. Karbi =*tā* translates as the English additive particle 'also,' but additionally occurs in at least five other constructions, as laid out in this paper. Specifically, the data show that besides 1) marking additive focus, =*tā* may 2) function as a coordinator, or 3) indicate the scalar additive meaning 'even.' Through that function =*tā* also appears to be part of concessive conjunctions. Furthermore, =*tā* functions 4) to mark universal quantification. Perhaps related to this latter function, =*tā* occurs seemingly just idiomatically with certain adverbs. Attaching to verbs, this enclitic occurs 5) in a copy verb construction that seems to have an intensifying function. Finally and most intriguingly, =*tā* functions 6) as a discourse structuring device.

Karbi =*tā* shares its enclitic position with three other markers, all of which occur on noun phrases to signal their discourse status, and also occur on verbs or predicates and adverbs. These three markers are 1) =*ke*, which appears to mark a topic-type discourse status - yet awaiting a more detailed pragmatic analysis - and further 2) =*si* and 3) its irrealis counterpart =*le*, which both mark contrastive focus. Karbi =*tā*, =*ke*, =*si*, and =*le* form a paradigm in that one particular constituent may only contain one of the four. However, within the same clause, these markers can to some degree co-occur on different constituents. On noun

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[2] The three tones of Karbi are low (indicated by `), mid (indicated by ¯), and high (indicated by ´).

phrases, the markers are not associated with syntactic roles, but purely indicate pragmatic status.

In the linguistic literature on Karbi, Grüßner (1978:61) mentions *=tā* 'also' in a section on nominal emphatic suffixes along with *=le*, *=ke*, and *=si*. Although he gives examples of *=tā* in several different functions, he does not explore these further. Grüßner does, however, offer another syntactic criterion that helps define the differences between the verbal functions of *=tā*, *=le*, *=ke*, and *=si*, which has to do with whether they follow final predicates or non-final verbs.

The article is structured as follows: Section 2 discusses the literature on cross-linguistic functions of additive particles. This is followed by the main body of the article in Section 3, where the different functions of *=tā* are discussed in six subsections. Section 4 provides a preliminary quantitative perspective on the distribution of *=tā* functions, followed by a conclusion in Section 5. The present case study is based on an approximately 10,000 word corpus of primary Karbi data collected between 2009 and 2011 in Karbi Anglong, Northeast India.

2 Cross-linguistic Functions of Additive Particles

Additive particles have not been explored cross-linguistically in their own right much, the notable exception being König (1991) in his pioneering comparative work on focus particles, which is largely based on European languages, but includes observations on other languages as well. König establishes functional clusters that additive particles mark or are part of marking in various languages, including the marking of coordination; indefinite pronouns such as 'whoever' in combination with interrogative pronouns; and concessive conjunctions such as 'even though' in combination with other elements. With respect to the cross-linguistically common syncretism between regular additive meaning (like 'also') and scalar additive meaning (like 'even'), König says that "unspecific additive particles like G[erman] *auch* that are compatible with both scalar and non-scalar contexts can be found in a wide variety of languages (1991:64)."

Several contributions in Haspelmath's (2004a) volume on coordinating constructions confirm the link between conjunction and additive focus as already pointed by König (1991). Especially Gil's (2004:389) article on Riau Indonesian contains an interesting discussion of the different functions of a morpheme functioning as a conjunction and additive particle in this language, which also includes universal quantification to mean 'all' or 'every' (cf. also Haspelmath 1997). Likewise, an interesting case study is Emeneau (1980), which lays out five different "usages" of the Sanskrit additive particle *api* and of additive particles in other Indo-Aryan and Dravidian languages in India. These functions overlap with the functions of *=tā* in marking the additive particle ('also'), the coordinator ('and'), the scalar additive particle ('even'), as well as universal quantification ("'totalizing' or 'summing'") and based on that also indefinite pronouns when occurring on interrogative pronouns.

What we can summarize at this point is that the connection between additive (scalar) particles and conjunctions on the one hand, and universal quantification on the other hand appears to be highly recurrent in language after language. In addition, there appear to be other related functions that are perhaps less commonly part of the functional range of additive particles such as marking sociative and sameness (cf. Gil 2004), which, however, are not found in Karbi.

The descriptive cross-linguistic literature on additive particles that function as discourse structuring devices is sparse and scattered, but there do seem to be commonalities between strategies in quite different languages, both from a geographic and a genetic point of view. In addition, more theoretical research on German has discussed the stressed variant of the additive particle *auch* as a marker of contrastive topics (Krifka 1999; Sudhoff 2010).

Additive particles with larger discourse functions have been described for Indo-European, Niger-Congo and Afroasiatic languages. In the Western Iranian languages Western Gilaki (Rashti) and standardized colloquial Persian, we find *=(h)œm* 'also; even; and, but' used "as a way to mark a new theme (Stilo 2004:323-6, citing Lazard (1989:281))." In the Kwa (Niger-Congo) language Avatime, the additive particle *tsyɛ* is not only used as a focus but also as a topic marker, often in conjunction with a topic-switch (van Putten 2011). Similar cases have been made for the Afroasiatic languages Gawwada (Tosco 2010) and Amharic (Demeke & Meyer 2008).

The literature reviewed here describes different discourse functions of additive particles, among them 'marking a new theme,' 'topic-switch,' 'contrasting topic,' and 'contrastive focus.' The purpose of this article is not to compare these different notions and to argue for the exact status of Karbi *=tā* vis-à-vis these terms - this is a matter for future research - but to produce a case study that contributes to a functional typology of additive particles.

3 Additive functions of Karbi *=tā*

This section presents the main body of this article and documents the following functions of *=tā*: 3.1) additive particle; 3.2) coordination; 3.3) scalar additive particle; 3.4) universal quantification; 3.5) intensifier; 3.6) discourse marker. I will discuss definitions of each function at the beginning of each subsection.

3.1 *=tā* as simple additive particle 'also'

As a starting point, we may use a somewhat simplified definition and say that additive particles "express that the predication holds for at least one alternative of the expression in focus (Krifka 1999:111)." This definition captures a lot of the instances of additive *=tā*, although not all as will be clear from examples below. When functioning as the simple additive particle 'also', *=tā* does "not induce an ordering" (König 1991:60) in relationship to the alternatives, for which the respective predication holds; this distinguishes it from the scalar additive meaning of 'even' (cf. Section 3.3).

Example (1) shows *=tā* functioning to presuppose that the predication *rongkèr pu dō* 'celebrate the Rongker' holds for another participant, which represents an alternative to *tekè atūm* 'the tigers.' Here, this presupposed alternative is 'humans,' or more specifically, the Karbi people. The parallel assertion that 'humans/the Karbi people celebrate the Rongker' is not explicitly stated in the preceding sentence, but is known as general knowledge within the Karbi community.

(1) *=tā* meaning 'also' with topic marker *=ke* in the same clause
*hako arnike... teke atum**ta** rongker pu do tangho*
*hakó arnì=ke [tekè a-tūm=**tā**] [rongkèr pu] dō tànghò*
then day=TOP tiger POSS-PL=**also** PN QUOT exist hearsay
'at the time (in the old days) **tigers also** (like humans) celebrated the Rongker' [HK, TR 035]

Interesting to note about example (1) is also that the topic marker *=ke* occurs in the same clause, but on a different noun phrase (NP), which is used adverbially: *hako arnike* 'in the old days.' This provides evidence for this particular co-occurrence possibility between *=tā* and the discourse structuring enclitic *=ke*.

Example (2) shows an interesting scope issue: *=tā* may attach to an NP while having scope over the whole clause. This example is from a folk tale, and specifically from a point in the story, at which a tiger is running off. Example (2) is produced by a listener - indicated here by curly brackets - asking the storyteller whether the tail of the tiger was standing up while the tiger was running, simply to make the storyteller include a more visual description as part of telling the story.

(2) Scope: *=tā* attaching to NP even when scope is over whole clause
*{arme**ta** jarherjima} [...]*
*armē=**tā** jàr-hèr-jí=ma}*
tail=**also** be.standing.up-high.up-IRR2=Q
'{**and** its tail might have been standing up, **too**?} [...]' [HK, TR 117]

Here, *=tā* doesn't mean that the tail in addition to say the ears of the tigers were standing up - which would be NP scope - but that in addition or as part of the running, the tail was standing up, meaning that *=tā* here has clausal scope. The *=tā* in (2) is perhaps best translated with combining 'and' and 'too' in

English, which already gives an idea of the fuzzy boundary between additive and coordinating functions, which is explored further in the next section.

3.2 *=tā* as bisyndetic coordinator

Coordination may be defined to refer to the function of syntactically conjoining at least two, more or less symmetrical constituents to form a new constituent, following similar definitions by Mithun (1988) and Haspelmath (2004b). This is different from the additive particle function of 'also', which more loosely "point[s] out a parallelism between otherwise separate entities (Mithun 1988:340)." The additive particle links a constituent to previously mentioned information in the discourse or general knowledge, whereas a coordinator is a syntactic device to link constituents. Although *=tā* is not used for coordinating NPs,[3] it is used in other coordinating constructions, and constructions intermediate between additive and coordinating functions, as shown in this section.

The coordinating function of *=tā* is restricted to higher-level constituents (verb phrases and clauses, not noun phrases), even though there are examples, where *=tā* at least semantically coordinates subject noun phrases as in (3).[4]

(3) *=tā* as a coordinator across clauses

*[...] Bey Ki'ik abang**ta** ahem arit dolo*

[Bēy	*kV-ìk*	*abàng**=tā**]*	*a-hēm*	*a-rít*	*dō-lò*
PN	NMLZ-be.black	NPD**=also**	POSS-house	POSS-field	exist-RL

*Bey Ke'et abang**ta** ahem arit dolo*

*Bey Ronghang abang akibi abang**ta** ahem arit dolo*

'[...] Bey the Black had his (own) house and property, Bey the Fair likewise had his (own) house and property, and Bey Ronghang, the young one, also had his (own) house and property' [WR, BCS 004]

In this construction, the predicate - here *ahem arit dolo* 'had his (own) house and property' - needs to be repeated each time so that from a syntactic perspective *=tā* coordinates these clauses instead of the subject NPs, which form the coordinated list that is marked bisyndetically by *=tā* on each one.

Typologically, the construction in (3) seems odd because the subjects of the three clauses are semantically coordinated without actually being syntactically

[3] NP coordination is achieved by either simple juxtaposition or monosyndetic use of comitative/instrumental *=pen* 'with' (or by using *lapen* 'and (<this=with)' as a coordinator).

[4] Note that only the first of three consecutive clauses is interlinearized due to space constraints and their parallel structure.

coordinated. It therefore behaves like a hybrid between the 'also' and the coordinating function: the occurrences of *=tā* indicate more than just a semantic link but less than a syntactic coordination construction. Evidence that the three clauses form more than just a semantic link is not only that they follow in immediate sequence, but they also form a narrative unit, since new narrative units are marked by a word like *ánke* 'and then,' which does not intervene here.

A more prototypical example for the coordinating function of *=tā* is (4). Here, *=tā* may reasonably be argued to coordinate verb phrases, as it occurs bisyndetically on the objects of each verb phrase. The exact same construction exists in Hakha Lai, a not too distantly related Tibeto-Burman language (Peterson and VanBik 2004:348).

(4) More prototypical coordinating function of *=tā*

*lang**ta** junlong, an**ta** cholong*

*[lāng=**tā***	*jùn-lōng]*	*[àn=**tā***	*chō-lōng]*
water=**also.COORD**	drink-get.to	rice=**also.COORD**	eat-get.to

'[...] they got to drink water and they got to eat rice [...]' or 'they got to eat and drink' [KK, BMS 056]

This structural type of a clause coordinating construction, where the coordinator occurs on NPs and therefore internally to the clausal constituents that it coordinates, might seem unusual but is in fact one of the general types recognized by Haspelmath (2004b:9).

3.3 *=tā* as scalar additive particle 'even'

Following again Krifka (1999:111) we may define that "[s]calar particles assert that the predication holds for the expression in focus, and presuppose that this predication is prima facie less likely than the alternative predications." In other words, scalar additive particles like 'even' not only presuppose alternatives but also rank them, hence they are additive and scalar. In (5), *=tā* conveys both: the witch taking one step has an infinite number of alternatives, i.e. taking two, three, or any number of steps. Among an infinite number of steps, taking one step is assumed to be the easiest to achieve in the particular context, and therefore the likeliest, which is what is expected to be marked by a scalar additive particle in a negated clause. The use of *=tā* here presupposes the alternatives and ranks them.

(5) *=tā* meaning 'even'

*hala hi'ipi abangke ekam an**ta** kamkelang [...]*

hála	*hī'ipī*	*abàng=ke*	*e-kām*	*án=**tā***	*kàm-kē-làng*
that	witch	NPD=TOP	one-step	that.much=**even**	step-NEG-yet

'[and then,] the witch couldn't take **even one step** [...]' [CST, HM 105]

As pointed out in Section 2, 'even' particles often combine with other elements to grammaticalize as concessive conjunctions in languages across the world, which is also the etymology of 'even though' in English. Therefore, it seems anything but coincidental that we find the forms *bóntā* 'but' and *setā/sitā* 'although, but' in Karbi, where the second part of these forms is *tā*. The table in (6) shows the concessive conjunctions in Karbi as well as data from two other Tibeto-Burman languages (from Nepal): Darma (Willis 2007) and Dhimal (King 2009). King (2009:222) even points out that the Dhimal concessive conjunction is a combination of the sequential marker *-teŋ* and the additive particle *buŋ*, although he hypothesizes this to be an Indo-Aryan calque as the same construction is found in Nepali. It is, however, interesting that Karbi *setā/sitā* might have the same etymology, since *-si* is the non-final or sequential marker.

(6) Link between concessive conjunctions and additive particles

Karbi	**Other Tibeto-Burman languages**
bóntā 'but'	perhaps Darma (Willis 2007): *lekin* 'but' < *le* 'also' + X
setā/sitā 'but, although' (?< *-si* 'non-final' + *=tā* 'even, also')	Dhimal (King 2009:222): *-teŋ* 'SEQ' + *buŋ* 'also' for 'even though'

The example in (7) offers a recurring construction in Karbi, where *=tā* appears to function as a concessive conjunction all by itself when it occurs on the quotative marker *pu* following direct speech.

(7) *=tā* as 'even if' on quotative *pu*

*[...] "diho!" pu**ta**, kroikredetlo*

[dího	*pu**=tā**]*	*[krōi-krē-dèt-lò]*
leave.me!	QUOT**=although**	agree-NEG-PFV-RL

'[...] although she said "hey, leave me!", he didn't agree' [KK, BMS 080]

3.4 *=tā* marking universal quantification

Several labels are already in use to describe similar concepts for this next function of Karbi *=tā*: "'totalizing' or 'summing'" (Emeneau 1980:199), "universal quantification" (Gil 2004:389), "dismissive construction" (Post 2007:341), and "categorical propositions" (King 2009:263). Here, I will adopt Gil's (2004) term "universal quantification" for describing this function of Karbi *=tā*.

For this function, *=tā* occurs typically either on generic nouns or numerals, but may also occur on entire noun phrases, especially along with the quantifying particle *án* 'all, this much.' An example in which *=tā* attaches to a generic noun is

(8), where *ját* 'type' becomes *játtā*, which in a positive clause would mean 'everything', and in the negated clause here 'nothing' / 'anything.'

(8) Marking universal quantification: *=tā* on general noun *ját* 'type'
*jat**ta** manme, jirpo, ne pudun'etlo*

*[ját**=tā***	*mán-mē]*	*jīrpō*	*nè*	*pù-dūn-ét-lò*
type(<IND)**=UQ**	become/happen-NEG	friend	1EXCL	say-JOIN-PRF-RL

'**nothing** will happen, friend, I've already done the talking' [HK, TR 141]

In (9), *=tā* attaches to the numeral to indicate that the set is complete, i.e. 'both of them' refers to two friends, and there are only these two friends in the story.

(9) Indicating all of a specific set
*ha thengpi angsongsi dolo, banghini**ta***

há	*thengpī*	*angsóng=si*	*dō-lò*	*bàng-hiní**=tā***
over.there(<KHJ)	tree/wood	high.up=FOC	exist-RL	CLF-two**=UQ**

'up there on the tree top they are there, **both of them**' [HK, TR 152]

This use of *=tā* as in (9) seems to follow the same principle as discussed by Emeneau that "[t]his summation is found in references back to a group once it has been defined, or in reference to a 'natural' group (the two eyes, all the gods, the directions, etc.) (1980:200)."

Example (10) shows that *=tā* for this function may also attach to a whole NP, where in this case distributive universal quantification is expressed.

(10) Distributive universal quantification: 'each and every one'
laso aphike asitin akhei aphanta

[lasō	*aphī=ke]*	*[a-isī-tín*	*a-khéi*	*aphān**=tā**]*
this	after=TOP	POSS-one-each	POSS-community	PO**=UQ**

isisi ahem kikimpi do hadak [...]

isī~isī	*a-hēm*	*kV-kìm-pī*	*dō*	*hádāk*
one~DISTR.PL	POSS-house	NMLZ-build-BEN	exist	there

'after that, there was one house built for every tribe there [...]' [SiT, HF 045]

Another interesting parallel to findings from Emeneau's work on Indo-Aryan and Dravidian languages emerges from cases where the additive particle is "redundantly used with [...] 'all' [...] and [...] 'always' (Emeneau 1980:200)." The same phenomenon is present in the Karbi forms *kái(=tā)* 'always', *arnìváng(=tā)* 'every day', as well as in the cooccurrence of *=tā* with the quantifying enclitic *=án* 'all, this much.' These adverbs clearly have the semantics of temporal universal quantification, although this is perhaps less clearly the case for some other forms that seem to carry *=tā* idiomatically as well: *mó=tā* 'future; in the future', and *hakó=tā* (also reduplicated *hakó~kò=tā*) 'long ago; in the old days.' However, it is not implausible that future and past would be conceptualized as infinite in the temporal domain (like 'in all of the future' and 'in all of the old days'), which then would explain why *=tā* attaches to these forms.

3.5 *=tā* in intensifier verb construction: STEM=*tā* STEM-inflection

In this construction, *=tā* occurs on a copy verb stem immediately preceding the main inflected predicate, as in (11). The function of this construction appears to be intensifying.

(11) STEM=*tā* STEM-inflection construction
anke.... ***paprapta paprap'olo*** *[...]*
ánke ***pV-pràp=tā*** ***pV-pràp-ò-lò***
and.then **CAUS-be.quick=INT** **CAUS-be.quick-much-RL**
'and then, they did everything **very quickly** [...]' [HK, TR 160]

The same formal construction exists in Hakha Lai (Tibeto-Burman), where its function, however, is coordinating, i.e. this copy verb stem construction is found in two consecutive intransitive clauses and coordinates them (Peterson and VanBik 2004:350). The same type of coordinating construction is also found in Chechen (Haspelmath 2004a:9, quoting Good (2003:134)).

3.6 *=tā* as a discourse structuring device

The most intriguing function of *=tā* is where it structures the larger discourse within a text by marking reactions of participants towards preceding events or actions. The examples given here are selected so that the turns indicated by *=tā* will hopefully become clear from the smaller context of the preceding clause without requiring a renarration of the complete respective stories. An example is a part of a Karbi folk story about a frog and an ant given in (12a-c).

(12a) Frog and Ant Story
[...] chongho ami korlut
[chonghō a-mí] kòr-lùt
frog POSS-buttocks bite-enter
'[...] (the ant) bit the frog's butt with its teeth entering' [RBT, ChM 017]

(12b) =*tā* marking a reaction or direct consequence - subject change

*amat chongho**ta** chonthap chonphrulo*

amāt	*chonghō**=tā***	*chón-tháp*	*chón-phrú-lò*
and.then	frog=**DM**	jump-everywhere	jump-everywhere-RL

kesolo... karlesibongpo adon chonrai

kV-sò-lò	*karlēsibóng-pō*	*a-dón*	*chón-rài*
NMLZ-hurt-RL	sp.squirrel-M	POSS-bridge	jump-solid.object.breaking

'and then, **the frog was jumping around** because it was hurt, and it jumped on the ladder of the **squirrel** and it broke' [RBT, ChM 018]

(12c) =*tā* marking a reaction or direct consequence - subject change

*amat karlesibongpo**ta**... aning thilo [...]*

amāt	*karlēsibóng-pō**=tā***	*a-nīng*	*thī-lò*
and.then	sp.squirrel-M=**DM**	POSS-mind	be.short-RL

'and then, **the squirrel... got angry** [...]' [RBT, ChM 019]

(12a) introduces the event that leads to one consequence after another: the ant bites the frog. As a consequence, (12b) states that the frog jumps around and accidentally breaks the ladder of the squirrel, which leads to the squirrel getting angry in (12c). This chain reaction of one thing leading to the next is the whole idea behind the story and there are more events that set off in the same way after the squirrel gets angry. Structurally, the way these reactions of first the frog, then the squirrel, and so on, are marked is by adding =*tā* to the respective participant as it reacts to what just happened to it. It is this marking of a story participant as it reacts to something another story participant just did which is the discourse function of =*tā* here.

What is also noteworthy about (12b-c) is that the participant marked by =*tā* becomes the new subject or agent (perhaps topic, but that depends on further pragmatic analysis) compared to the preceding clause. This is different from (13), where the subject is the same across both clauses, and what is marked by =*tā* appears to be the immediate cause-result relationship between the two clauses: because the friend sees the money, therefore he becomes happy.

(13) Consequence resulting from previous statement - same subject

hala tangka atibuk theklonglo anke

[[hála	*tangká*	*a-tíbùk]*	*theklōng-lò]*	*[ánke*
that	money	POSS-earthen.pot	see-RL	and.then

*hala ajirpo**ta** aning arong'olo tangho [...]*

[hála	*a-jirpò**=tā**]*	*[a-nīng*	*aróng-ò-lò]*	*tànghò]*
that	POSS-friend=**DM**	POSS-mind	be.happy-much-RL	hearsay

‘(he) saw those money pots, **and so that friend** became very happy [...]’ [HK, TR 161]

Example (14) shows that *=tā* may also occur on a primary object while otherwise marking the same function of indicating a consequence: since the king in this story recognizes that the so-called Hingchong siblings are his children, he calls them home. The *=tā* here does not have an additive function, since there are no other children involved in this story.

(14) Consequence - same subject; *=tā* on primary object

o nangtum nesolo pusi... laso aHingchong

[[o	*nang-tūm*	*ne-osō=lo]*	*pu-si]*	*[[lasō*	*a-Hingchòng*
AFF	2-PL	my-child=AST	say-NF	this	POSS-PN

*musoso aphan**ta** hem chehang ponlo*

musōsō]	*aphān=**tā**]*	*hēm*	*che-háng-pòn-lò*
siblings.diff.gender.dual	PO**=DM**	house	RR-call-take.away-RL

‘<o, you are my children>, he said, **and so** he called **these two Hingchong siblings** home’ [CST, HM 106]

Although across the two clauses given in (14) - i.e. the direct speech followed by the simple declarative clause - the subject does not change as it is the king in both cases, *=tā* might still function as a general topic switch indicator since the clauses preceding the ones in (14) are about two other protagonists, namely the two wives of the king, one a witch, the other a Karbi woman. The Hingchong siblings are the Karbi wife’s children, whereas the witch claims that that is a lie. Therefore both wives are tested to see who speaks the truth, and the clause directly preceding (14) establishes that the witch had lied, whereupon (14) affirms that therefore, the Hingchong siblings are in fact the king’s children. In that sense, (14) does indicate a larger turn in the story, namely the turn between the testing of the wives and the resulting recognition of the siblings as the king’s children.

Lastly, a typical use of the discourse function of *=tā* is after the end of direct speech, where it marks a participant as reacting or responding to the preceding direct speech. An example is (15), where the dog gives Bamonpo a command, and Bamonpo in turn reacts by agreeing. This shows that *=tā* does not always mark a major turning point, but that it perhaps instead indicates a change in participant viewpoint, which may support an analysis in terms of a topic-switch for a future discourse-pragmatic analysis of this function of *=tā*.

(15) "Topic"-switch - reaction to preceding direct speech

nangdunle nangdunnoi ho pulo tangho

[[nang=dùn=le	*nang=dùn-nōi*	*ho]*	*pù-lò*	*tànghò]*
CIS=join=FOC:IRR	CIS=join-SUGG.IMP2	EMPH	say-RL	hearsay

*anke bamonpo**ta** <mh> kisung abidi*

[ánke	*bamón-pō**=tā***	*kV-sùng*	*a-bidí*
and.then	wise.person(<IND)-M**=DM**	NMLZ-be.difficult	POSS-wit

kijut'ong amat kroidunkoklo

kV-jūt-óng]	*[amāt*	*krōi-dūn-kòk-lò]*
NMLZ-finish-be.much	and.then	agree-JOIN-absolutely.required-RL

'"[...] Just make sure to join me", (the dog) said, **and Bamonpo** was troubled and at his wit's end, and he agreed' [KK, BMS 035-6]

Note also in (15) that the first clause contains an irrealis version of the intensifying verb construction discussed in Section 3.5, where the first copy verb stem occurs with the irrealis focus particle *=le* instead of *=tā*.

4 Preliminary quantitative perspective

In an approximately 3,800 word partial corpus of the whole text corpus - including the two longest, one medium-sized, and one short folk story, two from different speakers and two from the same speaker - there were 131 total occurrences of *=tā* as seen in (16). These were categorized according to the respective functions as discussed in this article, excluding 16 uncertain cases, which were left uncategorized. For the remaining 115 occurrences, the discourse-marking and additive functions were the most frequent ones at 39 and 28 occurrences. Note that the functions were unevenly distributed across the four different texts, as in the HK_TR text, there were more occurrences of the additive than the discourse function (19 and 11, respectively), whereas in the KK_BMS text - which is comparable in length - the frequency relationship between these two functions is reversed with 9 and 21, respectively. Although the very different numbers of *=tā* occurrences for the different functions across the four texts underscore how preliminary the quantitative perspective provided here is, there is still an interesting tendency emerging here with regard to speaker variation: Whereas it seems that speakers HK and SeT use *=tā* generally not as much, speaker KK has overall higher numbers of *=tā* occurrences and uses *=tā* especially in its discourse function. Again, these are very preliminary observations, but make for interesting directions for future research into the distribution of additive particle functions and inter-speaker variation.

(16) Frequency distribution of functions

=tā functions	*HK_TR (~1,500 words)*	*KK_BMS (~1,300 words)*	*KK_CC (~330 words)*	*SeT_MTN (~700 words)*	**TOTAL (~3,830 words)**
also	19	9	---	---	28
COORD	---	8	---	---	8
even	4	1	3	1	9
although	---	6	---	1	7
UQ	4	8	1	4	17
INT	2	3	1	1	7
DM	11	21	4	3	39
<uncertain>	<3>	<7>	3	<3>	<16>
TOTAL =tā	**43**	**63**	**12**	**13**	**131**

5 Conclusion

There are (at least) two major questions - and directions for future research - that arise as a result of surveying the different functions of *=tā*. One is the question of whether all these different functions are really marked by just one *=tā* morpheme, or whether there is more than just one morpheme from a synchronic perspective. One observation that suggests that here again inter-speaker variation may play a role comes from working with two different language consultants on analyzing the KK_BMS text. In one example, speaker KK uses *=tā* twice in the same clause, once in the universal quantification function and once in the additive function. This seemed acceptable to one consultant, but not to the other - perhaps because for one, this was the same morpheme that should not be used twice in the same clause, whereas these were two different morphemes for the other.

The other major question and direction for future research, as mentioned before, is a more detailed pragmatic analysis of the discourse function. However, there is also a syntactic component that awaits further analysis, which involves the exact relationships between *=tā* and the other three discourse markers mentioned in the introduction: *=ke*, *=si*, and *=le*. Here I want to refer to observations about two examples from this article: first, example (1) (and also (10)), which shows that *=tā* may co-occur with *=ke* in the same clause, and second, example (15), which shows that in the intensifier verb construction, *=tā* is replaced by *=le* if the predicate is in irrealis mood. This means that although technically all four markers form a paradigm in that none of them can co-occur on the same NP, there is also a sense of a separate clausal level, on which *=tā* has a syntagmatic relationship with *=ke* but still a paradigmatic relationship with *=le*.

Abbreviations

1	1st person	EXCL	exclusive	NPD	noun phrase delimiter
2	2nd person	FOC	focus	PL	plural
AFF	affirmative	SUGG.IMP2	suggestive imperative 2	PN	proper name
AST	assertive	<IND	from Indic	PO	primary object
BEN	benefactive	INDEF	indefinite	POSS	possessive
CAUS	causative	IMP	imperative	Q	question particle
CIS	cislocative	IRR2	irrealis 2	QUOT	quotative
CLF	classifier	<KHJ	from Khasi (Jaintia)	RR	reflexive/reciprocal
COORD	coordinator	M	masculine	RL	realis
DISTR	distributive	MID	middle	SG	singular
DM	discourse marker	NEG	negative	TOP	topic
EMPH	emphatic	NMLZ	nominalizer	UQ	universal quantifier

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Opacity in Crimean Tatar: The Interaction of Vowel Harmony and Syncope

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1 The Language

Crimean Tatar (CT) is an understudied language of the West Kipchak branch of the Northwestern subgroup of the Turkic language family (Berta 1998, Doerfer 1959, Johanson 1998, Izidinova 1997, Kavitskaya 2010, Memetov 1993, Sevortian 1966, Useinov et al. 2005). CT is spoken mainly in the Ukraine's Crimean peninsula and in Uzbekistan, as well as in small communities in Russia, Bulgaria, Romania, and Turkey. The data used in this paper come from the author's fieldwork conducted in 2002, 2003, and 2009 in Crimea, Ukraine.

CT is traditionally subdivided into three dialects: Southern (or Coastal), Central, and Northern (or Steppe) (Berta 1998), even though this classification is a matter of some controversy. The Central dialect is now used as the standardized variety, while the number of speakers of the other two dialects is rapidly diminishing; they are severely endangered, especially the Northern dialect. This paper addresses mainly the data from the Central dialect of CT, pointing out similarities and differences with the other two dialects where necessary.

The sociolinguistic history of CT is complex and tragic, and the dialectological research is rather difficult. In 1944, all Crimean Tatars were deported from Crimea by the Soviet government, mainly to Uzbekistan, but also to other places in the former Soviet Union, including Kazakhstan, Tajikistan, and several locations in Russia (Fisher 1978). During the exile, the speakers of CT did not generally live in communities corresponding to their dialects and were surrounded by other Turkic languages, e.g., Uzbek, as well as non-Turkic languages, e.g., Russian. Crimean Tatars were only allowed to return to Crimea at the beginning of the 90s. Former inhabitants of certain areas of Crimea attempted to resettle in their native villages, but they encountered great difficulties in doing so and were forced to settle far from their original homes.

All these factors contributed to the dialect mixture. The dialectological distinctions are clear only in the speech of those consultants who were born and preferably reached their teens before the time of the deportation. The data collected from these older speakers of CT form the basis for the investigation presented in this paper. In what follows, we will discuss the data in Section 2, concentrating on vowel harmony, syncope, and stress. We will continue with an OT analysis of CT opacity in Section 3.

2 Data

The vowel system of the Central dialect of CT is presented in (1).[1] The relevant contrasts are in vowel height, backness, and rounding.

(1) CT vowels

	-back		+back	
	-round	+round	-round	+round
+high	i	y	ɯ	u
-high	e	ø	a	o

A pilot study has shown that that /i/ and /ɯ/ have undergone a nearly complete phonetic merger (Kavitskaya 2010). However, they remain phonologically distinct, the high front unrounded vowel appearing in words with front harmony and the high back unrounded vowel in words with back harmony. Additionally, while /i/ acts as [-back] for the purposes of vowel harmony, it does not palatalize the preceding consonant, while its front rounded counterpart /y/ causes the phonetic palatalization of the preceding consonant.

2.1 Vowel harmony

As in many other Turkic languages, all CT vowels participate in backness harmony (except for some disharmonic roots), as illustrated in (2) by the alternations in the verbal suffix /-mAK/: the value for the feature [back] in the suffix vowel depends on the backness of the root vowel(s).

(2) Backness harmony

bil-mek	‘know’	juv-maq	‘wash’
ket-mek	‘go’	qorq-maq	‘be afraid’
tyʃyn-mek	‘think’	qɯr-maq	‘rub’
tøk-mek	‘pour’	ajlan-maq	‘turn’

CT also exhibits rounding harmony. The harmony is triggered by any round vowel and targets high vowels. The rounding harmony in the Central CT differs

[1] An additional high front unrounded vowel phoneme was posited for the Northern dialect (Berta 1998).

from a typical Turkic rounding harmony in that it is active only in the first two syllables of a word. When a suffix with a high vowel is added to a monosyllabic stem, as in (3a), its vowel agrees with the vowel of the stem in both backness and rounding. When such a suffix is added to a polysyllabic stem, rounding harmony does not target the vowel in the suffix, as in (3b). An example in (3c) illustrates that this is not morphologically conditioned: a stem vowel that is outside of the initial disyllabic window does not participate in rounding harmony either.

(3) Rounding harmony

a.	dost-um	'friend-1SG.POSS'
	kyz-lyk	'autumn-ADJ.SUF'
	bul-un-maq	'find-PASS-INF'
b.	tuzluɣ-ɯm	'salt shaker-1SG.POSS'
	syrgyn-lik	'deportation-ADJ.SUF'
	tykyr-in-mek	'spit-PASS-INF'
c.	tʃykyndir	'beets'

The loss of rounding beyond the second syllable of a word is attested in CT as early as at the beginning of the 20th century (Samoilovich 1916, Bogoroditskii 1933) and thus cannot be ascribed to the influence of Uzbek, the most common contact language during the years of exile, many dialects of which lost harmony (Bodrogligeti 2003). In the Southern dialect of CT, rounding harmony affects all high vowels in a prosodic word (low vowels are blockers), and in the Northern dialect, rounding harmony is lost; the feature [round] is licensed only in the initial syllable of the word. There are other languages, such as Vogul, Bashkir, Ostyak, that behave like the Northern dialect of CT *w.r.t.* rounding harmony (Steriade 1995:161-162). The first syllable is also special in Karaim, a language closely related to CT: [back] contrasts among [-high] vowels and [+round] vowels in initial syllable only (Hamp 1976).

2.2 Syncope

Syncope in CT targets high vowels, both word-initially and word-medially. Syncope of a high vowel in an initial syllable can create word-initial complex onsets, as in (4) (even triconsonantal ones, as in (4b)). Otherwise, complex onsets are not tolerated in the native vocabulary. The vowel may delete even when it is the absolute initial position in a word, as shown in (4c).

(4) Word-initial syncope

a.	kitap	[ktap]	'book'
	tiʃim	[tʃim]	'my tooth'
	bilem	[blem]	'I know'

b.	sɯkmaq	[skmaq]	‘to push, press’
	tɯʃlemek	[tʃlemek]	‘to bite’
	qɯsqa	[qsqa]	‘short’
c.	iʃlemek	[ʃlemek]	‘to work’

Complex codas are maximally bi-consonantal and obey the Sonority Sequencing Principle, being only of rising sonority. Word-medially, syncope is blocked if it results in structures not acceptable by the phonotactics of the language. For instance, the high vowel in (5b) never deletes.

(5) Word-medial syncope

a.	aldɯlar	[aldlar]	‘they took’
	keldiler	[keldler]	‘they took’
	otura	[otra]	‘s/he sits’
	ketirip	[ketrip]	‘having brought’
	epimiz	[epmiz]	‘all of us’
b.	øldyrmek	[øldyrmek] *[øldrmek]	‘to kill’

Word-initial and word-medial syncope are arguably not two different processes but rather different restrictions on word-initial vs. word-medial onsets (well attested in other languages; e.g., Georgian, famous for its complex onsets, only tolerates them word-initially).

If there is more than one high vowel in a word, the leftmost one undergoes deletion. As illustrated in (6), the deletion of the first vowel is preferred even though it creates an onset cluster, lexically unacceptable in CT, while the deletion of the second one would result in a word which is acceptable from the phonotactics' point of view.

(6) Syncope when there is more than one high vowel in a word[2]

tykyrem	[tʲkʲurem]	*[tʲykrem]	‘I spit’
piʃirem	[pʃirem]	*[piʃrem]	‘I cook’

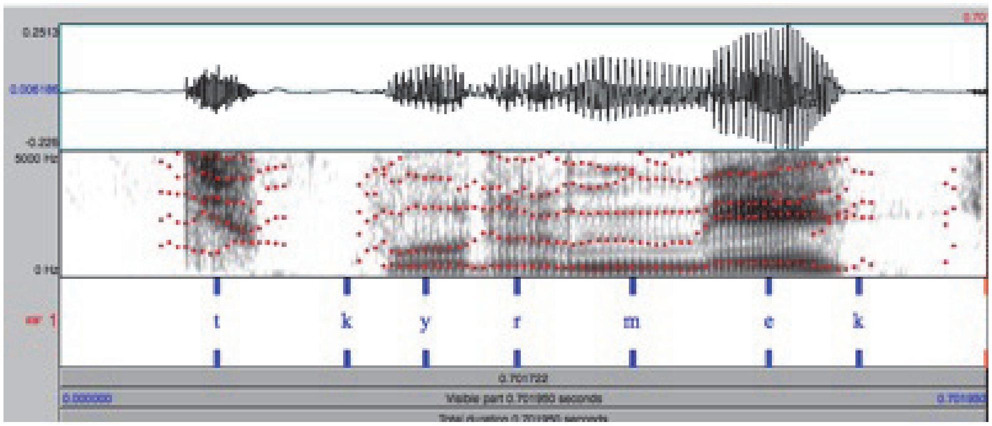
Examples in (7) show that high vowels in final syllables, regardless of whether they are the absolute final vowels, as in (7a), or not, as in (7b), do not delete. We will discuss final stress in CT later.

(7)	a. berdi	[berdi]	*[berd]	‘she gave’
	b. ketirip	[ketrip]	*[ketirp]	‘having brought’

[2] There is a different kind of vowel/zero alternation in CT; a class of words like burun-ɯm ‘nose-1SG.POSS,’ which always surfaces as [burnɯm], and not *[brunɯm]. We analyze this word as /burn/ in the input with the epenthesis of a high vowel driven by the considerations of syllable structure.

A spectrogram illustrating syncope is given in (8). Note that there is no trace of the first vowel present either in the sound wave or in the spectrogram. The first consonant is fricated and sounds palatalized.

(8) /tykyrmek/ [tʲkyrmek] ‘to spit’



2.3 Stress

Each lexical word in Crimean Tatar has exactly one main stress. The default stress position is word-final, as shown it (9). It has been argued for Turkish (Levi 2005) that its default final stress is postlexical: it is predictable, not “strong,” and native speakers are not aware of it. This seems to be the case for the related CT as well, even though more work is needed on the precise description of CT stress.

(9) a. araˈba ‘cart’

araba-ˈlar ‘carts’
cart-PL

araba-lar-ˈdan ‘from carts’
cart-PL-ABL

b. baʃla-ˈdɯ-m ‘I began’
begin-PAST-1SG

baʃ-lar-ɯmɯz-ˈnɯ ‘our heads’
head-PL-1PL.POSS-ACC

Final stress is overriden by lexical stress in roots and by pre-stressing suffixes. (10a) shows words that are lexically stressed on non-final syllables, examples of verbs with the prestressing 1st singular present suffix are in (10b), some examples of prestressing adverbial suffixes are in (10c), and the prestressing verbal negation suffix is in (10d).

(10)	a.	ˈnasɯl	‘which, how’		
		ˈmitlaqa	‘definitely’		
		ˈtezden	‘quickly’		
	b.	aˈʃar-ɯm	‘I eat’		
		iˈtʃer-im	‘I drink’		
	c.	geˈdʒe-lejin	‘at nights’		
		aʃɯq-tʃanˈlɯq-nen	‘in a hurry’		
		aˈna-dʒasɯna	‘in a motherly manner’		
	d.	bar-ˈdɯ	‘he went’	ˈbar-ma-dɯ	‘he didn’t go’
		bil-ˈmek	‘to know’	ˈbil-me-mek	‘to not know’

Vowel harmony in CT is a lexical process, whose domain is a word. The behavior of /i/ as a front vowel for the purposes of vowel harmony and the fact that it does not trigger palatalization also points to the generalization that vowel harmony is a lexical process, while palatalization and syncope are both later processes. Palatalization is postlexical and, in rule terms, applies before phrasal syncope. The phrasal nature of syncope is illustrated by the example in (11), where the last vowel of the first word deletes by virtue of being not the last one in the phrase.

(11)	baq-ɯp	otur-a	[baq.pot.ra]	‘looking at’
	see-CONV	sit-PRES		

3 Analysis

3.1 Classic OT and CT opacity

Harmony and syncope in CT interact opaquely.[3] We will use rounding harmony as an example here, noting that most of what we say applies to backness harmony, unless specifically stated otherwise. In rule terms, the spreading of the feature [round] and the syncope of the high vowel in the first syllable are in a counterbleeding relation: were syncope ordered before harmony, no rounding of high vowels in non-initial syllables would be observed (12).[4]

[3] Here we will focus on the interaction of harmony and syncope, leaving out the discussion of the opaque interaction between syncope and palatalization. We will not show palatalization in the following examples.

[4] Additionally, the deletion of a rounded vowel in the first or second syllable makes the

(12) Harmony and syncope in rule terms: tyʃ-Ir-Em ‘fall-CAUS-STEMV-1SG.PRES’

	a.		b.	
	UR	tyʃ-Ir-E-m	UR	tyʃ-Ir-E-m
	1. Harmony	tyʃyrem	1. Syncope	tʃIrEm
	2. Syncope	tʃyrem	2. Harmony	tʃirem
	Surface	tʃyrem	Surface	*tʃirem

As is extensively discussed in recent phonological literature, opaque interactions present a problem for classic OT (see an overview in McCarthy 2007). A possible classic OT account of the interaction of syncope and harmony in CT would require an AGREE[5] constraint to account for harmony, but it would be irrelevant in the case of opacity we discuss, so it is omitted from the discussion and the tableau.

Constraints that address rounding harmony are in (13) and (14).

(13) LICENSERD(σσ) (after Walker 2005)[6]
Feature [round] must be associated to positions in two syllables.

(14) DEP(round): Assign a violation mark for every instance of the feature [round] in the output that has no correspondent in the input (=don’t insert the feature [round]).

The constraints in (15) and (16) account for syncope. The *NUC/X constraints drive differential syncope that only targets high vowels. The ranking in (15) states that having high vowels in the nucleus of a syllable is worse than having non-high vowels in this position. MAXV is a constraint on vowel deletion.

(15) *NUC/i,u,y,ɯ >> *NUC/e,o,a,ø (informally, *NUC/high >> *NUC/low) (Gouskova 2003 on differential syncope, see also Prince and Smolensky 1993, de Lacy 2004, 2006).

(16) MAXV: Assign a violation mark for every input vowel that has no output correspondent (=do not delete a vowel).

The tableau in (17) illustrates the nature of the problem. There is no possible ranking under which the opaque candidate (17c) would emerge as the winner; it is harmonically bound. The LICENSERD constraint does not make a choice between

---

requirement that the feature [round] is realized over two syllables opaque.

5 To be replaced with SHARE on the basis of recent work by John McCarthy (McCarthy 2003, 2008, 2009) and others, and to be kept according to some other views, e.g., the recent book by Andrew Nevins (Nevins 2010).

6 The idea behind LICENSE(Feature, S-Position) is that a feature be affiliated with a perceptually strong position. The initial position is strong, however, it is not sufficient to license [round] in CT.

transparent candidates (17b) and (17d), and *Nuc/hi would rule out (17b) (a candidate with no syncope), but the transparent (17d) would still win.

(17) CT opacity in classic OT

/tyʃ-Ir-Em/	LicenceRd(σσ)	*Nuc/hi	Dep[rd]	MaxV
a. tyʃirem	1	2		
b. tyʃyrem		2	1	
☹ c. tʃyrem	1	1	1	1
d. tʃirem		1		1
e. tyʃrem	1	1		1

3.2 OT-CC and CT opacity

We will now outline an account of opacity in CT with OT with candidate chains (OT-CC, McCarthy 2007), a theory specifically developed to remedy the problem with opacity.

In OT-CC, the output is reached from the input via a series of steps (represented as a candidate chain); OT-CC is thus a version of Harmonic Serialism. From this follows a harmonic improvement requirement: each step in a chain must improve harmony. A gradualness requirement on the formation of a candidate chain holds that there should be one violation of one basic faithfulness constraint per step (dubbed as a localized unfaithful mapping, or LUM, in McCarthy 2007). The first step represents the most harmonic faithful parse of the input. Each chain has a correspondent set of localized faithful mappings (the ª-set) and an ordering of the elements in the set (the rLUMSeq).

To illustrate the generation of candidate chains, for the input /tyʃirem/ our constraints generate six harmonically-improving chains, shown in (18). Only these chains are the possible candidates under the OT-CC formalism. (18a) is the most harmonic faithful parse, and thus both sets of localized faithful mappings and an ordering of the elements are empty. (18b) is the candidate with harmony, where Dep(round) is violated. (18c) is a transparent candidate with the syncope of the first high vowel, and (18d) is also transparent, but with the syncope of the second high vowel. (18e) is an opaque candidate with both harmony and syncope, and (18f) is just like (12e), the difference being that the second and not the first vowel is deleted.

(18) Valid chains for the input /tyʃ-ir-em/ ‘I drop’

a. <tyʃirem> Ø, Ø (faithful)
b. <tyʃirem, tyʃyrem> {Dep(rd)@4}, Ø
c. <tyʃirem, tʃirem> {MaxV@2}, Ø
d. <tyʃirem, tyʃrem> {MaxV@4}, Ø

e. <tyʃirem, tyʃyrem, tʃyrem> {DEP(rd)@4, MAXV@2}, {<DEP(rd)@4, MAXV@2>}
f. <tyʃirem, tyʃyrem, tyʃrem> {DEP(rd)@4, MAXV@4}, {<DEP(rd)@4, MAXV@4>}

In OT-CC, we account for opacity with a precedence constraint PREC(A, B), where A and B are faithfulness constraints, which requires that all violations of B are preceded by and not followed by violations of A. The technical definition of PREC(A, B) is in (19).

(19) PREC(A, B)(*cand*) (McCarthy 2007: 98)
Let A' and B' stand for LUMs that violate the faithfulness constraints A and B, respectively.
Let *cand*=(*in, out*, ª-set, rLUMSeq)

i. ∀B'∈ª assign a violation mark if ∃¬A'∈ª where <A',B'> ∈ rL
ii. ∀B'∈ª assign a violation mark if ∃¬A'∈ª where <B',A'> ∈ rL

To account specifically for opacity in CT, PREC(DEP(round), MAXV) requires violations of DEP(round) (harmony) to precede and not follow violations of MAXV (syncope), that is, harmonize first, delete after that.

The tableau in (20) illustrates the analysis, as well as a problem associated with it. The constraints proposed above can indeed account for opacity, but they are not capable of choosing the candidate with the correct syncope site. That is, there is nothing that can select the actual candidate (20e), where the first vowel is deleted, over the candidate (20f), where the second vowel is deleted.

(20) A tableau for the input /tyʃ-ir-em/ ‘I drop’

/tyʃirem/	*NUC/hi	MAXV	PREC(DEP(rd), MAXV)	LICRD(σσ)	DEP(rd)
a. <tyʃirem> Ø, Ø	W_2	L		1	L
b. <tyʃirem, tyʃyrem> {DEP[rd]@4}, Ø	W_2	L		L	1
c. <tyʃirem, tʃirem> {MAXV@2}, Ø	1	1	W_1	L	L
d. <tyʃirem, tyʃrem> {MAX@4}, Ø	1	1	W_1	1	L
⊙ e. <tyʃirem, tyʃyrem, tʃyrem> {DEP[rd]@4, MAX@2}	1	1		1	1
⊙ f. <tyʃirem, tyʃyrem, tyʃrem> {Dep[rd]@4, MAX@4}	1	1		1	1

As was mentioned before, we cannot assume that the deletion of the first vowel happens over the deletion of the second vowel for the reasons of syllable structure, because the form in (20f) with the deleted second vowel is fully acceptable from the point of view of CT phonotactics (and if anything, is better than the actual winner in (20e)). In addition, CT does not show any evidence for secondary stress or further footing so CT syncope is different from the well-described metrical syncope and cannot be derived by metrical constraints.

To solve this problem, we need to consider CT stress. From the data we observe that in CT the prominence status of the initial syllable is different for different processes. The initial syllable is a common privileged position associated in the literature with phonological strength effects (see Barnes 2006; Beckman 1997; Kaun 1995, 2004). It is a strong position in CT as well, as shown by the fact that it licenses the feature round (note that in the Northern dialect of CT rounding is limited to the initial syllable). However, the same initial position is also weak, and is thus the best syncope site, as it is the furthest away from the final stress. The conflicting requirements on prominence are the source of opacity in the system.

Some support for this generalization is provided by words like [nasɯl] 'which, how', stressed on the first syllable. The second vowel is high and can be reduced, however, it is never fully deleted since the deletion of it would create a rising sonority coda. There is also work that shows that the coarticulation patterns in Turkish are stronger from right to left (Beddor and Yavuz 1995). If it works the same way in CT (which remains to be checked), it would also support the generalization.

To formalize the proposal, we modify OT-CC to include a family of constraints on the preference of the direction of iteration, PREFER(F_x, F_{x+1}), where F is a faithfulness constraint. The definition of PREFER(F_x, F_{x+1}) is provided in (21).

(21) PREFER(MAX_x, MAX_{x+1}): Assign one violation mark for a candidate chain that has a violation of MAX and a competitor chain in which this violation occurs earlier in the form.

(22) presents a modified tableau for the input /tyʃ-ir-em/. The tableau shows that the introduction of PREFER solves the problem; the correct candidate chain (22e) is picked as the winner.

(22) A tableau for the input /tyʃ-ir-em/ ‘I drop’

/tyʃirem/	*NUC/hi	MAXV	PREC(DEP(rd), MAXV)	PREFER(MAX$_X$, MAX$_{X+1}$)	LICRD(σσ)	DEP(rd)
a. <tyʃirem> Ø, Ø	W$_2$	L			1	L
b. <tyʃirem, tyʃyrem> {Dep[rd]@4}, Ø	W$_2$	L			L	1
c. <tyʃirem, tʃirem> {MAXV@2}, Ø	1	1	W$_1$		L	L
d. <tyʃirem, tyʃrem> {MAX@4}, Ø	1	1	W$_1$	W$_1$	1	L
⊙ e. <tyʃirem, tyʃyrem, tʃyrem> {Dep[rd]@4, MAX@2}	1	1			1	1
f. <tyʃirem, tyʃyrem, tyʃrem> {Dep[rd]@4, MAX@4}	1	1		W$_1$	1	1

4 Conclusions

To conclude, we have argued that conflicting prominence in CT is the source of opacity. The initial syllable is the most prominent for vowel harmony and licenses the most contrasts. However, it is also the least prominent, being the furthest away from stress, and thus is the best site for syncope. The decision between the initial and medial syncope cannot be made by metrical constraints since there is no evidence for further footing in CT, beyond the final stressed syllable. In order to account for these data, we proposed a constraint on the preference of the direction of iteration.

There are two venues that need to be explored in future research. First, the typological consequences of the PREFER constraint family are unclear and need to be addressed. Second, the Lexical Phonology and Morphology (Kiparsky 2000, among others) appears to be a theory that can naturally handle the CT problem, but stumbling upon the very issue with syncope, which needed to be resolved with the introduction of PREFER. It is possible that further investigation will reveal additional data on stress and footing that will point to a metrical solution.

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Differential Object Marking in Turkic and Persian as a Contact Phenomenon

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1. Object Marking in Turkish, Persian, and the Languages of Iranian Azerbaijan.[1]

Despite the absence of genetic affiliation, Turkish (SW Turkic) and Persian (SW Iranian) have nearly identical differential object marking patterns. Herein it is proposed that this is due in part to contact between Persian and Azerbaijanian, which is closely related to Turkish, and that Iranian Azerbaijan is an isogloss for this feature. The tableau of evidence is a large puzzle only a few pieces of which have been filled in. In this work, I present several of those pieces. Part 1 contains synchronic evidence of object marking patterns in various languages both inside and outside the proposed isogloss, while Part 2 contains the result of a study comparing object marking in Old Anatolian Turkish and Classical Persian manuscripts.

1.1 The Turko-Persian Pattern of Differential Object Marking (DOM)

Differential Object Marking (DOM) is the morphological marking of some direct objects and not of others, based on hierarchies such as animacy and referentiality (Bossong 1985, 1981; Aissen 2003). The Persian marker is *–râ* in the formal language, colloquially realized as *–ro* following a vowel and *–o* following a consonant. The Turkish object marker is *–I* following a consonant and *–yI* following a vowel, where *I* represents a high vowel realized as front or back, rounded or unrounded, according to the rules of Turkish vowel harmony.

The following marking pattern holds in both languages, regardless of the animacy of the object. Definite objects are obligatorily marked. Indefinite objects

[1] Thanks to Davoud Zamani for Iranian Azerbaijanian, and to Simin Karimi for Persian grammaticality judgments.

are usually unmarked, but may be marked under certain conditions.[2] Bare nominal objects (having no determiner or indefiniteness morphology) have a definite singular interpretation when marked, and a *kind-level* interpretation when unmarked. A *kind-level* noun (Karimi 2005) is unspecified for number, and non-referential (also called *categorial* (Göksel & Kerslake 2005)).

Feature 1: Definite objects are obligatorily marked.[3]

Persian

(1)	*Kimea*	***ketâb-o***	*xund.*
	Kimea	book-OM	read
	'Kimea read the book.'		

Turkish

(2)	*Ayşe*	***kitab-ı***	*okudu.*
	Ayşe	book-OM	read
	'Ayşe read the book.'		

Feature 2: Indefinite objects are usually unmarked, but may be marked.

Persian

(3) a.	*Kimea*	***ye***	***dâstân-(i)-_***	*goft.*				
	Kimea	one	story-IND-Ø	said				
	'Kimea told a story.'							
b.	*Kimea*	***ye***	***dâstân-i-ro***	*goft*	*ke*	*az*	*to*	
	Kimea	one	story-REL-OM	told	that	from	you	
	šenide	*bud.*						
	heard	was						
	'Kimea told a story that (she) had heard from you.' (Karimi 2005: 27)							

Turkish

(4) a.	*Bazen*	*masa-ya*	***bir***	***örtü-_***	*yay-ar-dı-k.*
	sometimes	table-DAT	one	cloth-Ø	spread-AOR-PST-2PL
	'Sometimes we would spread a cloth on the table.'				

[2] Marking of indefinites is claimed to be based on the specificity of the object (Enç 1991 for Turkish, Karimi 2005 for Persian). However, not all authors are in agreement on this, nor indeed on the proper characterization of 'specificity' (see Ghomeshi 1997, von Heusinger & Kornfilt 2005). Given the difficulty of characterizing specificity independently in either language, I will not address it in the present cross-linguistic study.

[3] Abbreviations: ABL ablative, AOR aorist, DAT dative, DUR durative, ERG ergative, GEN genitive, IMP imperative, IND indefinite, NOM nominative, OM object marker, POSS possessive, DEF definite, NEG negative, OBL oblique, OPT optative, PERF perfect, PL plural, PRET preterit, PST past, SG singular.

b. *Bazen* *masa-ya* *Ayşe-nin* *bize* *Meksika-dan*
sometimes table-DAT Ayşe-GEN we-DAT Mexico-ABL
getir-diğ-i ***bir*** ***örtü-yü*** *yay-ar-dı-k.*
bring-PRT-3SG one cloth-OM spread-AOR-PST-2PL
'Sometimes we would spread on the table a cloth that Ayşe had brought us from Mexico.' (Göksel and Kerslake 2005: 375-376)

Feature 3: Bare nominal objects have a definite singular interpretation when marked, and a *kind-level* interpretation (unspecified for number, and non-referential) when unmarked. For convenience's sake, the kind-level object *ketâb*/*kitap* is translated as 'a book/books'; however, it should be noted that 'book' as a kind-level object does not imply that any book was read in its entirety, and hence predicates taking kind-level objects are atelic.

Persian
(5) a. *Kimea* ***ketâb-o*** *xund.*
Kimea book-OM read
'Kimea read the book.'
b. *Kimea* ***ketâb-_*** *xund.*
Kimea book-ø read
'Kimea read a book/books.'

Turkish
(6) a. *Ayşe* ***kitab-ı*** *okudu.*
Ayşe book-OM read
'Ayşe read the book.'
b. *Ayşe* ***kitap-_*** *okudu.*
Ayşe book-ø read
'Ayşe read a book/books.'

1.2 DOM in Other Turkic and Persian Languages

Is this shared pattern due to contact? Although Turkey and Iran are contiguous, Turkish and Persian do not share a contact area. Literary Turkish of the Ottoman Empire was under influence from literary Persian, but the reverse was not true. However, Persian is in contact with Azerbaijanian (SW Turkic), a close relative of Turkish. The contact zone is Iranian Azerbaijan (in northwestern Iran). The Azerbaijanian language spoken in Iran has the same DOM pattern.

Feature 1: Definite objects are obligatorily marked.

(7) *Aisha* ***kitab-ı*** *okhudu.*
Aisha book-OM read
'Aisha read the book.'

Feature 2: Indefinite objects are usually unmarked, but may be marked.

(8) *Iran barasında* ***bir kitab-_/kitab-ı*** *akhtar-ır-am.*
Iran about a book-ø/book-OM search-PRES-1SG
'I'm looking for a book about Iran.'

Feature 3. Bare nominal objects have a definite singular interpretation when marked, and a *kind-level* interpretation when unmarked.

(9) a. *Aisha* ***kitab-ı*** *okhudu.*
Aisha book-OM read
'Aisha read the book.'

b. *Aisha* ***kitab-_*** *okhudu.*
Aisha book-ø read
'Aisha read a book/books.'

Since the contact area for Persian and Azerbaijanian is Iranian Azerbaijan, I propose that this area is an isogloss for the DOM pattern identified herein. As a first step in investigating this proposal, it is necessary to determine the distribution of this pattern both inside and outside of the proposed isogloss. The present study represents the rudimentary beginnings of such a project.

The languages spoken in Iranian Azerbaijan include Azerbaijanian (SW Turkic), Eastern Armenian (precise affiliation within the Indo-European family unclear), and the Iranian languages Persian (SW), Tatic (Tati, Taleshi), Gilaki, and Mazanderani (NW).

Eastern Armenian shows evidence of the pattern. In the dialect spoken in Iran, the morpheme *ə* (/n/ after vowels) differentially marks direct objects (Megerdoomian 2008). In traditional grammars, this is identified as the definite article. According to Megerdoomian, it is the marker for inanimate objects. The form *–an* is used for animates but apparently has the same differential properties with regard to definiteness. (The glosses have been slightly modified; in particular, Megerdoomian's gloss ACC (accusative) has been changed to OM.) 'YES' indicates a feature's presence, while 'NO' indicates its absence.

Feature 1: YES

(10) *Ara-n* ***girk'-ə*** *ayr-ets*
Ara-NOM book-OM burned
'Ara burned the book.' (Megerdoomian 2008)

Feature 2: YES

(11) *Ara-n* *mi* ***girk'-_/girk'-ə*** *ayr-ets*
Ara-NOM one book-ø/book-OM burned
'Ara burned a book/one book.' (Megerdoomian 2008)

Feature 3: YES

(12) a. *Sirun-ə* ***xəndzor-ə*** *ker-av*
Sirun-NOM apple-OM eat-AOR/3SG
'Sirun ate the apple.'

b. *Sirun-ə* ***xəndzor-_*** *ker-av*
Sirun-NOM apple-OM eat-AOR/3SG
'Sirun ate an apple/apples.' (Megerdoomian 2008)

At present I have scant data on DOM in NW Iranian languages, limited to examples in Bossong (1985) and Windfuhr (2009), which for the most part provide information on Feature 1 only. I will therefore limit the discussion of these languages to this feature.

Since inanimates are lower on the animacy hierarchy than animates, the marking of definite inanimate objects entails the marking of definite animates (Aissen 2003). Therefore, examples of marked inanimate objects are taken as evidence that marking is possible for all definite objects, regardless of animacy. Furthermore, the absence of any examples with unmarked definite objects leaves open the possibility that the marking of definite objects is obligatory. Such languages are tentatively considered to have Feature 1, the possibility that they exhibit full pattern remaining open (including Features 2 and 3).

Examples with unmarked definite objects are taken to mean that the language in question does not exhibit Feature 1, and hence does not exhibit the Turko-Persian DOM pattern. For Tati, Taleshi, Gilaki and Mazanderani, Bossong gives examples of unmarked indefinite objects, both animate and inanimate, showing that these languages have DOM. He provides no examples with unmarked definite direct objects, leaving open the possibility that these languages have Feature 1. (Again, the glosses have been modified slightly for consistency.)

Feature 1: Definite objects are obligatorily marked.

Tati

(13) *ä* *täxtä* ***musmar-ä*** *män* *bä-kälbäti-raz* *väkänd-ým*
from board nail-OM I to.pliers.with pull.out-1SG
'I pulled the nail out of the board with a pair of pliers.' (Bossong 1985: 56)

There are no definite objects among Bossong's examples of unmarked objects.

Taleshi
(14) *tâbut-e* *bə-nia* *zamin.*
coffin-OM CONJ-sets ground
'…sets the coffin on the ground.'

Gilaki
(15) *səmavər-a* *åtəš* *bu-kun*
Samovar-ACC fire CONJ-do
'Light the samovar!'

Mazanderani
(16) *jæk zan* *in* *harf-râ* *bä-šni-a*
one woman this word-OM PRET-hear-3SG
'A woman heard these words.'

Kurdish varieties, on the other hand, which are not spoken in Iranian Azerbaijan, lack the pattern. Sorani Kurdish entirely lacks morphological marking of objects altogether (Thackston 2006b). Kurmanji Kurkish, on the other hand, exhibits split ergativity. In the present tense, feminine nouns are marked OBL regardless of definiteness or specificity (i.e., marking is non-differential). Masculine nouns are not marked unless preceded by a demonstrative (Thackston 2006a).

(17) *Ez na-ç-im* *doktor.* *Ez* ***derman-_*** *ve-na-xw-im.*
1SG NEG-go-1SG doctor 1SG medicine-ø PRV-NEG-drink-1SG
Derzi-yê *jí* *naxwazim.*
stitches-OB also NEG-want-1SG
'I'm not going to the doctor. I'm not taking medicine. I don't want stitches, either.' (Thackston 2006a: 35)

(18) *Ez* ***wî*** ***derman-î*** *ve-na-xw-im.*
1SG that medicine-OB PRV-NEG-drink-1SG
'I'm not taking that medicine.'

Vafsi (NW Iranian), spoken outside of Iranian Azerbaijan, has DOM but not the Turko-Persian variety. It is also split ergative, and has DOM in the present tense only, where animate, specific objects are marked oblique (Stilo 2004).

Feature 1—NO

Definite animate: marked

(19) *tæ* ***in*** ***xær-i*** *næ-ruš-i?*
you this donkey-OM NEG-SELL-2SG
'Won't you sell this donkey?'

Definite inanimate: not marked

(20) ***gázæ-_*** *ú-gur*
pincers-ø PVB-take
'Get the pincers.' (Stilo 2004: 243)

The NW Iranian languages that appear to exhibit Feature 1 have a contiguous distribution in northwest Iran (see Figure 2). NW Iranian languages that clearly lack Feature 1 are found along this region's southern and western periphery. Note that the languages lacking this feature are surrounded by languages that have it, not only in NW Iran, but also Persian to the south and Turkish to the west. This distribution is consistent with a model wherein NW Iranian initially lacked the feature, but NW Iranian languages in Iranian Azerbaijan and the Caspian region later acquired it. It is also noteworthy that the these languages pattern together in seven of the eight isoglosses discussed in Stilo (2005).

It is also necessary to determine the DOM patterns in Turkic and Iranian languages farther afield from Iranian Azerbaijan. Here especially, an immense amount of work remains to be done.

Uzbek (SE Turkic) appears to have Features 1 and 2 (data from Raun 1969). I do not currently have information on Feature 3.

Feature 1

(21) ***kitɔp-ni*** *oqiydi*
book-OM reads
'He reads the book.'

Feature 2

(22) meŋ-ga ***bir*** ***stakan suw*** ber-iŋ!
1SG-DAT a glass water give-IMP
'Give me a glass of water!' (Raun 1969: 20)

Raun points out that '*-ni* may also be used to denote a less definite, or even indefinite object' (p. 20), although he gives no such examples. This indicates that Uzbek has Feature 2 as well.

As for geographically removed Iranian languages, Tajik, a variety of Persian spoken in Tajikistan and Uzbekistan also has Features 1 and 2 (Windfuhr & Perry 2009: 485). It is difficult to know exactly what to make of this. On the one hand, Tajik is a variety of Persian, and hence may inherit this feature from Persian generally. On the other hand, there is a plethora of contact situations in Central Asia, and there may be more than one isogloss for this trait.

Feature 1
(23) *kitob-ro* *xarid-am*
book-OM bought-1SG
'I bought the book.'

Feature 2
(24) (*yak*) *zan[-e]-ro* *did-am*
one woman-IND-OM saw-1SG
'I saw a certain woman.'

On the other hand, Hindi/Urdu (Indo-Iranian, Indic branch; India, Pakistan) lacks Feature 1.

(25) a. *Ravii-ne* ***kaccaa*** ***kelaa**-_* *kaaṯaa.*
Ravi-ERG unripe banana-ø cut.PRF
'Ravi cut the unripe banana.'

b. *Ravii-ne* *kacce* ***kele-ko*** *kaaṯaa.*
Ravii-ERG unripe banana-OM cut.PRF
'Ravi cut the unripe banana.' (Mohanan 1994a: 87-88)

2 Textual Evidence from Early New Persian and Old Anatolian Turkish

DOM patterns in the historical predecessors of Turkish/Azerbaijanian and Persian are another important piece of the puzzle. In Old Turkic (8th-13th centuries AD), non-specific objects are never marked, but marking for definites is optional (Erdal 2004). In Old Persian (6th-4th centuries BC), the accusative marker was not differential (i.e., it was used on all direct objects). Middle Persian (300 BC-AD 900) marked some objects, but it is not clear if its use was differential (Brunner 1977).

In the following, a study of two medieval texts, one Early New Persian (ENP) and one Old Anatolian Turkish (OAT), is presented. These were analyzed to determine the distribution of object markers on direct objects based on objects' definiteness and animacy. ENP data were collected from a facsimile of an early 14th-century copy of the *Nasihat-nâme* of Onsorolma'âli Kaykâ'us (Leiden Codex, dated AH 719/AD 1319), while OAT data were collected from a late-14th-century copy of a translation of the *Nasihat-nâme* (Birnbaum MS T 12, date missing). The original Persian was composed in the late 11th century. The Turkish manuscript is considerably shorter due to lacunae in the extant manuscript, and consequently fewer data were collected from it. Only the narrative portions of the texts were included.

In some sense, the texts are less than ideal for comparison, since they are from different centuries. However, the fact that the OAT text is a translation of the ENP text has some advantages. First, it allows us to compare identical examples in the two languages. Next, it makes clear that, as seen below, the Turko-Persian pattern found in OAT is not a translation effect.

Table 1. The distribution of marked and unmarked objects in the PQN

	+human		–human/ +animate		–animate		Total	
	= râ	ø	*= râ*	ø	*= râ*	ø	*= râ*	
Pronoun	54	0	2	0	0	23	56	23
Proper Name	18	0	0	0	1	2	19	2
Definite Common NP	23	2	3	2	9	177	35	181
Indefinite Common NP	9	23	1	4	4	157	14	184
Total	104	25	6	6	14	359	124	390
Combined Total	129		12		373		514	
Doubtful definiteness	3				2	17		

Table 2. The distribution of marked and unmarked objects in the TQN

	+human		–human/ +animate		–animate		Total	
	=(y)I	ø	*=(y)I*	ø	*=(y)I*	ø	*=(y)I*	ø
Pronoun	45	0	0	0	23	0	68	0
Proper Name	9	0	0	0	2	0	11	0
Definite Common NP	14	0	5	0	105	7	124	7
Indefinite Common NP	5	16	1	2	22	116	28	134
Total	73	16	6	2	152	123	231	141
Combined Total	89		8		275		372	
Doubtful definiteness			1		11	12		

Human definite nouns were as a rule marked in both texts. There are two exceptions in the PQN (see Key 2008 for discussion) and none in the TQN. In both, human indefinites were sometimes marked but more frequently unmarked. The main divergence between the texts is in the marking of inanimate definite common nouns, which, as mentioned in Section 1, is an important diagnostic for Feature 1.

In the PQN, only 9 out of 186 inanimate definite objects are marked, while in the TQN 105 out of 112 inanimate definite objects are marked.

(26) *sâqi* ***nabid-_*** *bed-in qâzi dâd čun qâzi*
cupbearer wine-ø to-this judge gave when judge
nabid-_ *mi-setad dar gholâm negâh kard...*
wine-ø DUR-take at slaveboy look did
'The cupbearer gave wine to this judge, when the judge took the wine he looked at the slaveboy.' (PQN 95b)

(27) *sâqi* ***šarap-_*** *getür-di* ***šarab-ï*** *al-ur-iken*
cupbearer wine-ø bring-PST wine-OM take-AOR-while
bu sâqi-nüŋ yüz-in-e baq-dï
this cupbearer-GEN face-POSS-DAT look-PST
'The cupbearer brought wine. As he took the wine, he looked at this cupbearer's face.' (TQN 114a)

This shows that the EPN variety exemplified in the PQN clearly lacked Feature 1, and hence the Turko-Persian pattern as a whole. In the TQN, on the other hand, the fact that 7 out of 112 inanimate definites (6.25%) were unmarked shows that the pattern was not absolute, but that marking was overwhelmingly the rule.

With respect to Feature 2, the PQN treated animate indefinites much as modern Persian does, but not inanimate indefinites, of which only 4 out of 157 were marked (2.5%). The TQN, on the other hand, marked such objects at a much higher rate, 22 out of 116 (19%).

Animate indefinites:

PQN

(28) *mo'tasim vaqti* ***mojrem-i-râ*** *piš-e xwiš kardan hami*
mutasim when criminal-IND-OM front-EZ self make DUR
farmud
commanded
'When Mutasim commanded that [they] bring a criminal before him...' (PQN 31b)

TQN

(29) *mu'tasim...****bir*** ***sučlu-yï*** *buyur-dï kim getür-e-ler*
mutasim... a criminal-OM command-PST that bring-OPT-PL
'Mutasim...commanded that they bring a criminal forward' (TQN 48a)

Inanimate indefinites:

PQN

(30) *šenid-am ke vaqti sâheb esmâ'il ben 'ubbâd nân-_ hami*
heard-1SG that when sir Ismail bin 'ubbad bread-ø CNT
xord bâ nadimân-e xwiš mard-i ***loqma-i-_***
ate with companions-EZ own man-IND morsel-IND-ø
az kâse bar-dâšt
from bowl picked.up
'I heard that when sir Ismail Ubbad was eating bread with his companions, a man picked up a morsel from the bowl' (PQN 27a)

TQN

(31) *bir gün ismâ'îl 'ubbâd yoldaš-lar-ï-le yiyesi*
one day ismail ubbad companion-PL-3SG-with food
ye-r-idi bir kiši ***bir loqma-yï*** *götür-icek daxi*
eat-AOR-PST one person a morsel-OM pick.up-when also
bir qïl bile yapïš-dï.
a hair with stick-PST
'One day Ismail Ubbad was eating with his companions. And when one person picked up a morsel, a hair stuck [to it].'

As for Feature 3, there is a dearth of evidence of kind-level objects in both manuscripts. There is a singled shared example.

PQN

(32) ***xatt-e mozavvar****-_ kard-i*
letter-EZ forged-ø did-HAB
'He wrote forged letters.' (PQ 100a)

TQN

(33) *sâhib bun-ï işit-di kim bu* ***tezvîr biti-_***
master this-OM hear-PST that this forgery letter-ø
yaz-ar deyü
write-AOR saying
'The master heard this, that he wrote forged letters.' (TQ 119a)

Extreme caution must be exercised in interpreting these results. Although the EPN manuscript lacks the Turko-Persian DOM pattern, while the OAT manuscript for the most part exhibits it, the former is three centuries older than the latter, and so this cannot on its own be taken to mean that Turkic had the pattern before Persian. However, the following observations can be made. First, the pattern found in the PQN, where definites are virtually always marked and indefinites sometimes marked *only if they are animate* is very similar to patterns found in genetically related languages such as Vafsi and Hindi/Urdu. Next, OAT clearly exhibited something very close to the modern Turko-Persian pattern, and this was not a translation effect, since the ENP of the source did not have the feature.

3 Summary and Further Proposal

The three features that make up the DOM pattern found in Turkish (SW Turkic) and Persian (SW Iranian) are also found in Azerbaijanian (SW Turkic) and Eastern Armenian (Indo-European). Persian, Azerbaijanian, and Eastern Armenian are all spoken in Iranin Azerbaijan.

Most other languages spoken in that region are NW Iranian. These languages show evidence of Feature 1, except Kurmanji, Sorani, and Vafsi, which are located on the western and southern periphery of the region. Evidence regarding the other features is currently lacking.

Analysis of an Old Anatolian Turkish manuscript shows that the pattern was present in SW Turkic as early as the 14th century (predating written evidence of a distinct Azerbaijanian language). The fact that the Persian text from which this was translated lacks the pattern indicates that the pattern was not a translation effect.

Analysis of an Early New Persian text (composed in the 11th and copied in the 14th centuries) shows the pattern for human objects but not for inanimates.
If these texts are representative, one possiblity that suggests itself is that Turkic influence may have eliminated the animacy distinction in Persian. This influence may date from the Safavid state (founded ca. 150), the rulers of which were Persianized Turks who spoke a variety of Middle Azerbaijanian that might actually have been a mixed language incorporating Ottoman elements (Stein 2005: 228).

Much work remains to be done to establish the validity of the proposed isogloss, but the preliminary results are supportive of the hypothesis.

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Figure 1: Languages demonstrated to exhibit Features 1, 2, and 3. Azerbaijanian (SW Turkic), Eastern Armenian (Indo-European), Persian (SW Iranian)

(Basic map taken from http://www.world-geographics.com/maps/middle-east/map-of-iran/)

Figure 2: NW Iranian languages. Underlined languages show evidence of Feature 1; languages not underlined clearly lack it.

(Basic map taken from http://www.world-geographics.com/maps/middle-east/map-of-iran/)

Reconstruction of Proto-Kampa Verbal Morphology

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1. Introduction

1.1. Historical linguistics in the Amazon

Detangling the complicated relationships among languages in the Amazon is complex. Epps (2009) advocates a fine-grained approach to establishing language relationships, pointing out that internal subgrouping and reconstruction of families is an important step toward understanding relationships among languages. However, the trend in the literature has been to suggest large-scale classifications. Furthermore, the lack of descriptive work on many languages creates an obstacle to doing much of the necessary historical work.[1]

This is especially true of the Arawak language family. Large-scale classifications of Arawak languages have been suggested, but these are often problematic. Matteson (1979) presents a reconstruction of Proto-Arawakan. However, this work is not built up from reconstructions of smaller groups. It also includes languages that have never been proven to be (and are generally believed not to be) related to the Arawak languages.

Payne (1991) presents an internal classification of Arawak languages, but includes only 24 languages in his sample and suggests subgroupings on the basis of shared retentions (rather than innovations). The paper notes that the methodology is less than ideal, saying "These reconstructions are to be considered as preliminary...a

[1] Many thanks to Pattie Epps, Lev Michael, Nora England, the members of the UT MAL and LARGA research groups, and the BLS audience for their extensive comments on earlier drafts of this paper. Thanks also to Lev Michael for access to the data. All remaining errors are my own.

more proper methodology would have been to reconstruct each subgroup and build successively backwards to the reconstruction of Proto-Maipuran [Proto-Arawak]. This task still remains to be done" (Payne 1991:356).

Aikhenvald (1999) directs the reader toward the major problems in Arawak historical linguistics research, saying "Though there are no doubts concerning the genetic affilation of the Arawak languages...problems still exist concerning internal genetic relationships within the family and possible genetic relationships with other groups" (Aikhenvald 1999:73). Da Silva Facundes (2002) notes the same issues with previous work on Arawak but attempts a move toward finer-grained classifications by presenting a preliminary reconstruction of the Piro-Apurinã-Iñapari branch.

One of the greatest stumbling blocks to earlier reconstruction attempts was a simple lack of data (Aikhenvald 1999). Since Payne (1991), the amount and quality of available descriptive work on Arawak languages (and Kampan languages specifically) has improved greatly. With respect to the Kampan languages discussed in this paper, scholars in the last ten years have produced a reference grammar of Ashéninka Perené (Mihas 2010) and a detailed sketch of Nanti (Michael 2008). Serious documentation projects have begun on Nomatsigenga, Matsigenka, and Kakinte.

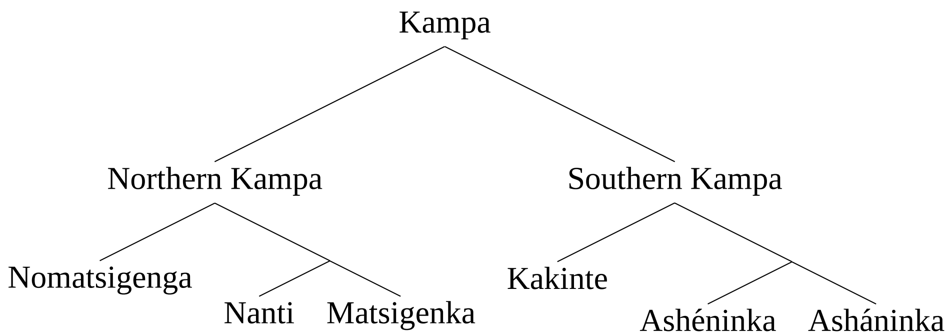
In this paper, I adopt a fine-grained approach to reconstruction, reconstructing a number of verbal morphemes for the Kampan branch (a small branch of Arawak). In this paper, I intend to identify easily-reconstructable morphemes and suggest a preliminary path of development for morphemes that are less transparent. In the remainder of §1, I introduce the Kampan branch's internal groupings and phonology. In §2, I reconstruct the Kampan bound subject pronouns. In §3, I reconstruct object markers, followed by number marking in §4, directionals in §5, reality status markers in §6, and valence-changing morphology in §7. Finally, I revisit the topic of subgrouping within the Kampan branch in §8.

1.2. Kampan languages

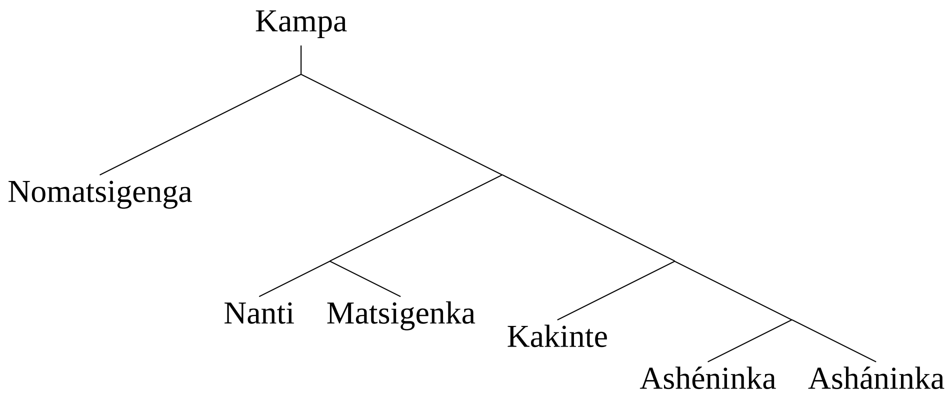
Reconstructing the Kampan branch of Arawak is one step toward reconstruction of larger groups. The Kampan branch is comprised of six languages: Nanti, Matsigenka, Nomatsigenga, Kakinte, Ashéninka, and Asháninka. All of these languages are spoken in the Andean foothills and Amazonian areas areas of Peru, although some speakers of Ashéninka spill over into Brazil.

While it is clear that these languages do make up a subgroup of Arawak (Michael 2011), the exact makeup of the branch is not completely clear. Specifically, there are two plausible groupings, as shown in (1) and (2).

(1)



(2)



In (1), Proto-Kampa (henceforth PK) is assumed to have first split into a Northern Kampa and Southern Kampa subgroup, after which the Northern Kampa group was differentiated into Nomatsigenga, Matsigenka, and Nanti while Southern Kampa split into Kakinte, Ashéninka, and Asháninka. On the other hand, the tree in (2) assumes that Nomatsigenga split off from the rest of the group first, followed by a branch that subsequently broke into Matsigenka and Nanti, followed by Kakinte, followed by a final split between Asháninka and Ashéninka. Crucially, a choice between these two analyses requires a common innovation either among the languages in the 'Northern Kampa' branch–Nomatsigenga, Nanti, and Matsigenga (1), or among all of the languages but Nomatsigenga (2).

1.3. Proto-Kampa phonology

Michael (2011) presents a PK phonological reconsruction, which supports the analysis shown in (2) by demonstrating a sound change of *s >ʃ/ __ i in Matsigenka, Nanti, Kakinte, Ashéninka and Asháninka (all languages but Nomatsigenga). However, a sound change of *s >ʃ is cross-linguistically quite common.

Michael (2011)'s phonological reconstruction demonstrates the regular sound changes in (3-10).

(3) *s >ʃ/ __i (Nanti, Matsigenka, Kakinte, Asháninka, Ashéninka)

(4) *ɨi >i (Kakinte, Asháninka, Ashéninka)

(5) *s >ʃ/ __e (Kakinte, Asháninka, Ashéninka)

(6) *g >∅ / V__V (Asháninka, Ashéninka)

Manner/Place	Bilabial	Dental	Alveopalatal	Velar	Glottal	Unspecified
Stop	*p *b	*t		*k *g		
Fricative		*s	*ʃ		*h	
Affricate		*ts	*tʃ			
Nasal	*m	*n				*N
Liquid			*ɾ			
Semivowel			*j			

Table 0.1: Proto-Kampa Consonants

(7) *mp, *ŋk >m, ŋ (Nomatsigenga)

(8) *a >o /__C[+labial] (Nomatsigenga)

(9) *t >ts/ __i (Ashéninka)

(10) *ts >t^h/ __a, o (Ashéninka)

The consonant inventory of PK, as reconstructed by Michael (2011), is shown in Table 0.1, the vowels are shown in Table 0.2.

	Front	Mid	Back
High	*i	*ɨ	
Mid	*e		*o
Low		*a	

Table 0.2: Proto-Kampa Vowels

In this paper, I suggest that there are two other common processes occurring sporadically that are important for reconstruction. These are /h/ deletion and the reanalysis of a morpheme-initial /a/ as epenthetic.

There are several morphemes discussed below for which I reconstruct a segment /h/ which is lost in the reflexes in the modern languages. There does not appear to be a regular environment for these deletions, nor do these changes appear to be the result of analogical change. However, Nomatsigenga, Nanti, and Kakinte both have synchronic processes of optional /h/ deletion (Michael 2008; Lawrence 2011; Swift 1988), as can be seen in the Nanti example in (11). This synchronic process may have provided a motivation for dropping the /h/ in these forms altogether[2].

(11) (Nanti) [pãho] ∼ [pão] 'gourd sp.' (Michael 2008:231)

I also suggest a widespread process of reanalysis of /a/, in morpheme-initial position, as epenthetic or vice versa (an epenthetic /a/ reanalyzed as part of a morpheme). Verbs in Kampan languages are polysynthetic, and suffixing often results in illegal consonant or vowel clusters. Illegal clusters that follow the verb root are

[2] Some forms may also have been misanalyzed by researchers.

resolved by epenthesis–epenthetic /a/ is used to break up consonant clusters, as shown in (12). I suggest that, as a result of this process, some suffixes with/a/ in initial position have been reanalyzed as a sequence of an *epenthetic* /a/ and a suffix, or vice versa.[3][4][5]

(12) ikamAke (Nomatsigenga)

i= *kam -k* *-i*
3mS= die -PERF -REAL.I

'He died.'

1.4. Materials and Methodology

Data comes from grammatical sketches, reference grammars, and my own field notes on Nomatsigenga. Data comes primarily from Shaver (1996) and Lawrence (2011) for Nomatsigenga; Michael (2008) for Nanti; Snell (1998) for Matsigenka; Swift (1988) for Kakinte; Kindberg (1975) for Asháninka; and Payne (1980) for Ashéninka.

2. Subject Pronouns

For verbs, I reconstruct five PK bound subject pronouns, which are shown in Table 0.3, along with reflexes in the modern languages. Pre-vocalic variants are shown in parentheses.

Language	1 sg./pl excl.	2	3 non-masc.	3 masc.	1 pl. incl.
Nomat.	na=/no= (n=)	pi= (p=)	o= (p=)	i= (y=)	a=/o=)
Matsi.	no= (n=)	pi= (p=)	o=	i= (y=)	a=
Nanti	no= (n=)	pi= (p=)	o=	i= (y=)	a=
Kakinte	no= (n=)	pi= (p=)	o=	i= (y=)	a=
Asháninka	no= (n=)	pi= (p=)	o=	i= (y=)	a=
Ashéninka	no= (n=)	pi= (p=)	o=	i= (y=)	a=
PK	*no= (*n=)	*pi= (*p=)	*o= (*w=)	*i= (*y=)	*a=

Table 0.3: Proto-Kampa A/Sa proclitics

[3] Here and elsewhere, epenthetic segments are shown in the first line of a gloss using an uppercase A or T. Other characters are IPA equivalent, except *r*, which represents /ɾ/ and *N*, representing a nasal not specified for place of articulation.
[4] glossing conventions are as follows: 1sS first-person sing./pl. excl. subject; 3mO third-person masculine object; 3mS third-person masculine subject; 3nmS third-person non-masculine subject; IMP imperfective; IRREAL irrealis; PERF perfective; PL plural; REAL.I realis, class 'I' verb
[5] It should also be noted that, in some cases, the source for data may contain errors in morphological segmentation. For all morphemes, I use the form listed in the relevant source for the language, except where I have data for Nomatsigenga.

2.1. Alignment in Proto-Kampa

Most Kampan languages are primarily nominative-accusative languages, although some also show traces of other alignment patterns. Ashéninka has a split intransitive pattern (Mihas 2010; Payne and Payne 2005). Nanti also has traces of fluid-S alignment (Michael 2008). It is beyond the scope of this paper to reconstruct PK's exact alignment system. However, as noted by Nichols (2003), ergativity is a relatively "recessive" feature. While it is not clear whether the same is true of split or pragmatic systems such as have been described for Kampan languages, I assume that Proto-Kampa was not a completely nominative-accusative language, but that accusative patterns have arisen in some languages.

2.2. First-person singular/plural exclusive subject

For the first-person singular/plural exclusive bound subject marker, I reconstruct a Proto-Kampa form **no=*. Nanti, Matsigenka, Kakinte, Asháninka, and Ashéninka all have the basic form *no=*, while Nomatsigenga has the allomorphic distribution shown in (13).

(13) (Nomatsigenga) $$\text{na=} \quad \rightarrow \quad \begin{cases} \text{n=} & / \quad \underline{\quad}\ \text{*V} \\ \text{no=} & / \quad \{\underline{\quad}\ \text{*Co},\ \underline{\quad}\ \text{*C[+labial]}\} \\ \text{na=} & / \quad \text{elsewhere} \end{cases}$$

I suggest that this distribution in Nomatsigenga was created first from a levelling of the subject and object markers (the first-person singular/plural exclusive marker is *-na* in all the Kampan languages), so that Nomatsigenga then used the subject marker *na=*. Nomatsigenga also underwent a general sound change in which /*a/ became /o/ before labials (8), a process which created the allomorph *no=* before bilabials. However, the origins of the vowel-harmony rule for this morpheme are unclear. While this may suggest that the PK form should be **na=*, with a vowel harmony rule to create **no=* (under this analysis the PK **no=* variant then spread to be used with all verb roots in the other five languages), there is no other evidence to suggest that the vowel-harmony variant existed in Proto-Kampa. Further, some Arawak languages believed to be closely related to the Kampan languages have the first-person variant *no=*, as in the case of Piro (Matteson 1965).

On the other hand, there is an additional piece of evidence for suggesting that the *na=* form is older than the *no=* form in the Kampan languages. This evidence comes from some archaic forms from Nanti. In the Kampan languages, verbal subject markers and possessive markers on nouns have both the same basic form and the same allomorphic rules. Since this is true of all the Kampan languages, I suggest that PK must also have used the same markers for verbal subjects and to mark possession. Some Nanti noun stems require an irregular *na-* form to mark a first-person singular possessor, as shown in (14). Such forms could be evidence to suggest that *na-* is an older form. However, this morpheme could be the reflex of something that was archaic even in Proto-Kampa.

(14) (Nanti) naneni

na- *neni*
1sS- space

'the space at my side'

2.3. Third-person non-masculine

I suggest that the Proto-Kampa third-person non-masculine is **o=* with the allomorph **w=*. Nanti, Matsigenka, Kakinte, Asháninka, and Ashéninka use *o=* for third-person non-masculine subject and possessor. With vowel-initial stems, vowel hiatus is resolved by deleting the *o=*, as shown in (15), from Nanti.

(15) Aratehanake. (Nanti)

o= *arateh* *-an* *-ak* *-i*
3nmS wade -ABL -PERF -REAL.I

'She waded away.' (Michael 2008:269)

Nomatsigenga also has *o=* to indicate a third-person non-masculine subject, but it uses the allomorph *p=* before vowel-intial stems, such as in example (16).

(16) pisamini (Nomatsigenga)

p= *isam* *-i* *=ni*
3nmS= sleep -REAL.I =IMP.A

'She is sleeping.'

I suggest that Proto-Kampa's third-person non-masculine marker was **o=* with **w=* as a pre-vocalic allomorph, which was lost in all the languages but Nomatsigenga, where **w=* $>$*p=*. This is certainly a surprising sound change (which is problematic for the analysis). However, this change does have the phonetic advantage of creating a larger sonority difference between the onset and nucleus of the word-initial syllable and analogy with the second-person subject marker *pi=* may have also helped to drive the change.

Reconstructing **w=* as an allomorph of **o=* also has the advantage of reconstructing symmetry in the third-person pronouns, with vowels (**i=*, **o=*) used with consonant-initial roots and glides **j=*, **w=*, used with vowel-initial roots. No phoneme /w/ is reconstructed for PK. However, Nomatsigenga, which also doesn't have a phoneme /w/, does have a process that changes some morpheme-final [o] to [w] before vowels, suggesting that there may be an analogous process in PK. Further, a similar allomorphy pattern to the one reconstructed here for PK is found in Apurinã. Apurinã, which is fairly closely related to the Kampan branch, has the third-person feminine subject marker *o-*. Before vowel-initial forms, *o*^{w}- is sometimes used. Before stems beginning with /h/, *õ*^{w} is always used, as in (17).

(17) *õʷ-ẽnẽma*
3nmS-saliva
'her saliva' (Da Silva Facundes 2002:149)

2.4. Second Person, third-person masculine, first-person plural inclusive

The second-person and third-person masculine subject markers seem to be unproblematic, since all the languages use the same forms and the same pre-vocalic variants. Therefore, I reconstruct the basic form **pi=* and the pre-vocalic allomorph **p=* before vowels for the PK second-person subject marker. Similarly, I reconstruct **i=* with a pre-vocalic allomorph **j=* for the PK third-person masculine subject marker. I reconstruct the first-person plural inclusive marker as **a=*, since this morpheme is *a=* in all the Kampan languages, except Nomatsigenga, where it is *o=* before bilabial consonants. I suggest that the Nomatsigenga allomorphy stems from the regular sound change shown in (8).

3. Object Marking

Language	1 sg./pl. excl.	2	3 non-masc.	3 masc.	1 pl. incl.
Nomat.	-na	-mi	-ro	-ri	ái
Matsi.	-na	-mpi	-ro	-ri	-ai/-ae
Nanti	-na	-mpi	-ro	-ri	-
Kakinte	-na	-mpi	-ro	-ri	-ahi
Asháninka	-na	-mpi	-ro	-ri	-na
Ashéninka	-na	-mi	-ro	-ri	-ai
PK	*-na	*-mpi	*-ro	*-ri	*-ahi

Table 0.4: Proto-Kampa object markers

3.1. Second-person object

I reconstruct **-mpi*, based on the form found in most of the languages. In Nomatsigenga, the form is reduced to **-mi*, which is expected based on sound change (7) (sequences of labial or velar nasals and stops are reduced to a homorganic nasal). Ashéninka has also reduced the form to **-mi*, which is not expected based on sound changes. However, there seems to be substantial contact between Nomatsigenga and Ashéninka, suggesting that the Ashéninka morpheme may be a borrowing.

3.2. First-person singular/plural inclusive & third person

The form of the first-person singular/plural exclusive is *-na* in all extant Kampan languages, leading me to reconstruct **-na* for this morpheme. Similarly, the marker for third-person non-masculine objects is *-ro* in all Kampan languages. Therefore, I reconstruct **-ro* for this morpheme. Similarly, I reconstruct **-ri* as the third-person masculine object marker, since the reflexes have the same phonological form in all the Kampan languages.

3.3. First-person plural inclusive

I reconstruct **-ahi* as a first-person plural inclusive marker. This morpheme has been lost entirely in Nanti, where a free pronoun is used for this purpose. In Asháninka, this morpheme has also been lost, with the use of the first-person singular bound pronoun extended for all first-person reference. The reflex of this form remains in Kakinte, Ashéninka, Nomatsigenga, and Matsigenka. Kakinte retains the form *=ahi*, while both Ashéninka and Nomatsigenga have lost the medial /h/ (causing high tone in Nomatsigenga). The loss of /h/ is a relatively common sound change, meaning that these could be independent innovations in both languages. On the other hand, the Ashéninka form could be borrowed from Nomatsigenga, as was also suggested with the second-person object marker.

The Matsigenka marker presents another challenge. Snell (1998) lists the marker as *-ai* in realis clauses and *-ae* in irrealis clauses. In Matsigenka and other Kampan languages, *-i* is a realis suffix, and *-e* is an irrealis suffix, suggesting that the first-person plural marker and the reality status markers have been fused. These reality status suffix precede object-markers in other Kampan languages, but given that the use of the first-person plural object marker causes the reality status markers to delete in some other Kampan languages (e.g. Nomatsigenga), the sequence *ai* could have been reanalyzed as a sequence of a person marker and a reality status marker.

4. Number Marking

Proto-Kampa had plural, distributive, and partitive markers, which are shown in 0.5.

Number	Nomat.	Nanti	Matsi.	Kakinte	Ashá.	Ashé.	PK
Plural	-hig	-hig	-(a)ig	-hi(g)	-hei	-aij/-he	*-hig
Distributive	-ge	-ge	-ge	-	-je	-je	*-ge
Partitive	-garant	-	agarant	-garant	-aarant	-	*-garant

Table 0.5: Number Marking

4.1. Plural

The plural is a verbal morpheme that can make *either* the subject or object referent plural. I reconstruct **-hig* for this morpheme, with the /h/ lost in Matsigenka. The loss of the /g/ in Ashéninka and Asháninka is predictable from the regular loss of /g/ intervocalically in those languages. It is unclear what process would lead to the loss of the final /g/ of the Kakinte morpheme, but it seems clear that this /g/ could not have been an innovation in the other languages.

In Ashéninka, there is both a plural suffix *-he* and a discontinuous plural marker made up of either *-he* or *-aij* ('aiy') plus the suffix *-ni*. The *-ni* may be historically related to a morpheme *-ni* which is used synchronically in Ashéninka Perené and Kakinte as an augmentative (Mihas 2010; Swift 1988) and as a 'durative extremal' in Matsigenka (Michael p.c.). The *-he* portion of the morpheme seems to be the reflex of Proto-Kampa **-hig*. Since Ashéninka underwent a process in which intervocalic /g/ was lost (6), and this morpheme appears word-medially, the loss of the /g/ is explicable, although the change in vowel quality is unexpected.

4.2. Distributive

I reconstruct **-ge* as a distributive, which has the meaning that the action described by the verb stem was carried out several times in different locations. This morpheme was lost in Kakinte, although a non-cognate morpheme has a similar purpose. The Asháninka and Ashéninka forms are both *-je*. These two languages deleted intervocalic /g/ (6). The /j/ in these forms (and in the Ashéninka plural *-aij*) may have developed in order to break up vowel sequences. Although an epenthetic /t/ is normally inserted when there are illegal clusters of vowels in verbs in Kampan languages, the forms would originally have had an initial consonant, perhaps blocking /t/-epenthesis.

4.3. Partitive

I suggest the reconstructed form **-garant*. In Asháninka, the /g/ was lost intervocalically, as expected from (6), and in both Matsigenka and Asháninka the preceding epenthetic /a/ was reanalyzed as part of the morpheme. The form was lost in Nanti and Ashéninka.

5. Directionals

Proto-Kampa had allative and ablative verb markers, as well as a marker that had a meaning that the action was "goal-oriented." These markers are shown in 0.6.

Directional	Nomat.	Nanti	Matsi.	Kakinte	Ashá.	Ashé.	PK
Allative	-an	-an	-an	-an	-an	-an	*-an
Ablative	-apa	-apah	-apa	-apoh	-apaa	-apag	*apah
Receptive	-ab	-ab	-ab	-ab	-ab	-ab	*-ab

Table 0.6: Kampa Directionals

5.1. Ablative

I reconstruct **-apah*, suggesting that the /h/ was lost in Nomatsigenga, Matsigenka, and Asháninka, but maintained in Nanti. In Asháninka, the morpheme has a long vowel /aa/, which could be the result of losing the morpheme-final /h/ and reinterpreting a following epenthetic /a/ as part of the morpheme.

However, Ashéninka has a /g/ morpheme-finally, which is problematic since it requires that /*h/ >/g/. *-apag* only seems to be found in one variety of Ashéninka (Payne 1980), other varieties have *-ap* (Mihas 2010). The form *-apag* may have been created on analogy with the causative *-akag* in this variety. Although this analysis may be problematic, it seems similarly troublesome to suggest that the reconstructed form should be **-apag*. From what has been proven with respect to the internal subgrouping of Kampa, this would have to have occurred independently at least three times, in the Northern Kampa group (assuming such a group exists), in Kakinte, and in Asháninka. While this sound change isn't unlikely, the independent innovation multiple times in this group does seem unlikely.

6. Reality Status

All six languages have realis and irrealis markers, which are fused with verb class markers. Realis clauses use a suffix (differentiated for verb class), while irrealis clauses use a prefix (the same for all verbs) and a suffix (differentiated for verb class). The Nomatsigenga forms are shown in Table 0.7. The markers for all the languages are shown in Table 0.8.

	Class I	Class A
Realis	-i	-a
Irrealis	N- -e	N- -ima

Table 0.7: Nomatsigenga Reality Status Markers

	Nomat.	Nanti	Matsi.	Kakinte	Ashá.	Ashé.	PK
Irreal. prefix	N- (r-)	N- (r-)	N- (r-)	N- (r-)	N- (r-)	N- (r-)	*N- (*r-)
Realis I	-i	-i	-i	-i	-i	-i	*-i
Realis A	-a	-a	-a	-a	-a	-a	*-a
Irrealis I	-e	-e	-e	-e	-e	-i/-e	*-e
Irrealis A	-ima	-empa	-empa	-empa	-empa	-ia/-ea	*empa

Table 0.8: Kampan reality status markers

6.1. Irrealis prefix

The irrealis prefix is *N-* for all languages. This morpheme and the phoneme /N/ appear only syllable-finally before a stop consonant, as shown in example (18). Before a vowel or a non-stop consonant, as in example (19), the morpheme doesn't have an overt realization. All the languages have an allomorph *r-* for the irrealis prefix, used with vowel-initial verb stems with a third-person masculine subject marker. I reconstruct this process for PK as well.

(18) ompatɯije (Nanti)

o= *N-* *patuh* *-∅* *-e*
3nmS= IRREAL- break.in.two -IMP -IRREAL.I

'It will break in two.' (Michael 2008)

(19) noʃiga (Nanti)

no= *N-* *ʃig* *-e*
1sS= IRREAL- run -IRREAL.I

'We will run.' (Michael 2008)

This process is the same in all languages, except Nomatsigenga. In Nomatsigenga, sequences of *Np [mp] or *Nk [ŋk] were collapsed to [m] and [ŋ], respectively (sound change 7). With Nomatsigenga verb stems that begin in /p/ and /k/, the irrealis prefix surfaces as a homorganic nasal replacing the stop, as shown in example (20).

(20) nomɨini

no= *N-* *p-* *e* *=ni*
1S= IRREAL- eat -IRREAL.I =IMP.A

'I will eat.'

6.2. Realis suffixes

In all the Kampan languages, there is a class I realis marker *-i* and a class A realis marker *-a*. I reconstruct these markers as **-i* and **-a*.

6.3. Class I irrealis suffix

I reconstruct **-e* for the class I irrealis suffix, since all languages have the form *-e* except in Ashéninka, it is sometimes *-i*. The Ashéninka form may possibly be due to collapse with the class I realis form and facilitated by the fact that irrealis mood is also marked with a prefix. There are some contexts, notably after the perfective suffix *-ak* in most of the Kampan languages where the class I realis (*-i*) and irrealis (*-e*) suffixes are neutralized.

6.4. Class A irrealis suffix

The form of the class A irrealis suffix is *-eNpa* ([*-empa*]) in Nanti, Matsigenka, Kakinte, and Asháninka. The Nomatsigenga form, *-ima* is partly predictable based on the reduction of sequences of [mp] to [m] (7). I further suggest that the shift in the initial vowel of the suffix was created by analogy with the class I realis suffix. For the Ashéninka form, I suggest that the neutralization of /i/ and /e/ in some contexts for the class I irrealis suffix has led to some reanalysis of the initial vowel (similar to the suggestion for the Class I irrealis suffix).

7. Valence-changing inflectional morphology

PK has a number of causative and applicative affixes, as shown in Table (0.9).

	Nomat.	Nanti	Matsi.	Kak.	Ashá.	Ashé.	PK
Agent caus	ogi-	ogi-	ogi-	-	oi-	-	*ogi
Non-agent	o[+voi]-	o[+voi]-	o[+voi]-	-	-	-	*o-/ *∅
Malefact.	omí-	omiN-	om(in)-	-	omiN-	-	*omiN-
Influential	-kag	-akag	-(ak)ag	-akag	-akaa	-akag	*-akag
Instrument.	-ant	-ant	-ant	-ant	-ant	-	*-ant
Presential	-mo	-imo	-imo	-imo	-imo	-imo	*-imo
Separative	-pi	-apitsa	-apitsa	-apitʃa	-apitsa	-pit^{h}a	*-apitsa
Purposive	-si	-aʃi	-aʃi	-aʃi	-aʃi	-aʃi	*-asi

Table 0.9: Kampa valence-changing morphology

7.1. Agentive causative

I reconstruct a morpheme **ogi-*, which is the form in most of the languages with a reflex of this morpheme. In Ashéninka, the form is *oi-*. This is the expected form considering the regular loss of intervocalic /g/ (6).

7.2. Non-agentive causative

There are three languages with a reflex of this morpheme–Nomatsigenga, Nanti, and Matsigenka. This is a *possible* subgroup of Kampa (see 1), Therefore, this may an innovation in a subgroup or a feature that lost in the Kakinte-Asháninka-Ashéninka subgroup. I reconstruct a form **o[+voice]*, (adding a [+voice] feature to the first segment of the stem), but whether this is a PK form or a form reconstructable only to a Proto-Nomatisgenga-Asháninka-Ashéninka branch is unclear.

7.3. Malefactive causative

I reconstruct a Proto-Kampa form **omiN-*, which is retained in Nanti and Asháninka, and possibly in Matsigenka, which has the allomorphs *omin-/om-*, but the conditioning environments are unclear. In Nomatsigenga, the /N/ has been lost, possibly causing high tone on the preceding /i/ (*omí*). The morpheme was lost in Ashéninka and Asháninka.

7.4. Influential

I reconstruct the form **-akag*, suggesting that the first /a/ was reanalyzed as epenthetic in Nomatsigenga. In Asháninka, the /g/ was lost, predictable from the regular loss of /g/ intervocalically (6) (this morpheme is word-medial, there is always a following vowel). However, it is unclear why the cognate form in Ashéninka, which also underwent this sound change, did not lose the /g/. Finally, Matsigenka shortens the form to *-ag* in some contexts, although it's unclear which.

7.5. Presential

All the languages have a presential applicative, which I reconstruct in PK as **-imo*, which is maintained in most of the languages, but Nomatsigenga has a reduced form, *-mo*.

7.6. Separative

There is a separative applicative form that reconstructs to **-apitsa*. Nanti, Matsigenka, and Ashéninka all have *-apitsa* as the reflex of this form. Ashéninka has *-apit^{h}a*, which is expected based on sound change (10). Nomatsigenga has a morpheme that may be cognate, although, if so, it has undergone significant reduction to *-pi* via the reanalysis of initial /a/ as epenthetic. The loss of the final syllable of the morpheme, /tsa/, is more opaque.

7.7. Purposive

All six Kampan languages have a reflex of this form, which I reconstruct as **-asi*. Nomatsigenga has reanalyzed the /a/, originally the first segment of the morpheme, as an epenthetic segment. In the other five languages the morpheme has become *-aʃi*, as expected from sound change in (3).

8. Subgrouping

The morphological reconstruction provides slight evidence for either of the subgroupings suggested in (2). Specifically, the innovation of the third-person nonmasculine subject marker, shown below in (21) makes a case for (2). However, this reconstruction is far from unproblematic, suggesting that this subgrouping has yet to be conclusively proven. Further, as noted by Nichols (2003), pronouns are relatively unstable and subject to change on the basis of leveling and analogy–therefore, perhaps not the best pieces of evidence to use to prove subgrouping.

(21)	*o=/*w=	>	o=/p=	(Nomatsigenga)
		>	o=	(Matsigenka, Nanti, Kakinte, Asháninka, Ashéninka)

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The Representation of Contour Tones in Cantonese

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Introduction

A central question in tonal phonology is the representation of tone. One of the focal points is the representation of contour tones, especially since Goldsmith (1976) and subsequent works have analyzed contour tones in Bantu languages as sequences of level tones. Cross-linguistically, it is generally well-recognized, following Yip's (1989) terminology, that contour tones in African languages are typically clusters, which are sequences of level tones and consist of multiple tonal root nodes, and that contour tones in Asian languages are typically tone units, which have only one tonal root node. This paper points out an important exception—Cantonese—particularly in light of Yip (2001) and Barrie (2007) on Chinese contour tones. The correct view is at least implied in earlier analyses: Cantonese tones, contour and level alike, should be represented as sequences of level tones but not unitary tone units.

Recently, for Chinese languages including Cantonese, Yip (2001) and Barrie (2007) propose that the contour tone be represented as a unitary entity (i.e., a tone unit, with one tonal root node) with only the tonal onset specified. This paper argues, however, that this is incorrect for Cantonese. Specifically, the correct representation of contour tones in Cantonese is the one akin to the Africanist tradition where the tonal onset and offset are independently specified as two separate tonal root nodes. Three arguments converge to this conclusion: (i) the phonetic realization of the high-rising tone, (ii) tonal morphophonology, and (iii) the mapping between tone and musical melody in pop music.

The structure of this paper is as follows. First, section 1 introduces the proposal of Chinese contour tone representation by Yip (2001) and Barrie (2007) and its predictions. In section 3, these predictions are shown to be false when faced with Cantonese, after my proposal of tonal representation for Cantonese is presented in section 2. Finally, section 4 concludes the paper with analytical, typological, and methodological remarks.

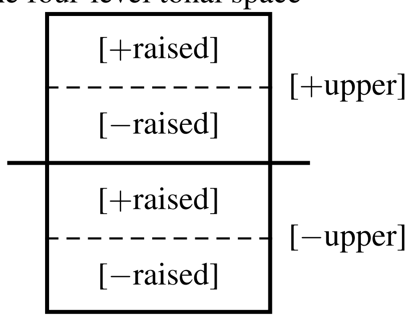
1 The one-target contour tone representation by Yip and Barrie

To set the stage for my reanalysis of Cantonese tonal representation, this section presents the contour tone representation for Chinese languages by Yip (2001) and Barrie (2007). The predictions of Yip and Barrie's proposal are highlighted.

1.1 Tonal space

The discussion of contour tone representation begins with how pitch levels are featurally represented. Following Yip (1980) and Pulleyblank (1986), the tonal space is divided into four levels with the two binary features [±upper] and [±raised]:

(1) The four-level tonal space



1.2 Yip and Barrie's one-target contour tone representation

With this categorically delineated tonal space, the next step towards a tonal representation is to ask how exactly these features are structured to represent different types of tones. To a large extent, it is this question which is at the center of this paper. For Chinese languages, Yip (2001) has recently provided an answer for contour tones; a main reason supporting her idea is the phonetics of contour tones (see section 3.1). Barrie (2007) adopts and further develops Yip's (2001) proposal. In this present paper, we focus on contour tones, though level tones will also be discussed, particularly in the analysis of Cantonese tones. The terms 'tonal onset' and 'tonal offset' are used as descriptive labels to refer to the starting and ending points of a contour tone, respectively.[1]

The major characteristics of Yip and Barrie's proposal for contour tones in Chinese languages are as follows. First, as is generally assumed for Chinese, contour tones are unitary entities, with only one tonal root node. Second, only one register

[1] Two remarks are in order. First, Yip (2001) and Barrie (2007) differ in terms of level tones; see section 2. Second, throughout this paper, the binary features [±upper] and [±raised], as named, are used. In fact, Barrie (2007) uses unary features [upper] and [lower] in lieu of the binary [±upper], whereas Yip (2001) uses [±high] instead of [±raised]. These terminological differences have no effect on our discussion.

feature [±upper] is specified for the whole contour tone. Third, only the tonal onset, but not tonal offset, is specified for the pitch feature [±raised]. That is, this is a *one-target* proposal, with only the tonal onset explicitly and fully specified (cf. the two-target unitary-entity proposal in Yip (1989)). Fourth, a [contour] feature (Barrie) or an unspecified "rebound" (Yip) signals a contour tone. All these properties are illustrated by the following examples, based on Barrie's system:

(2) The one-target tone unit representation

a. High-rising tone

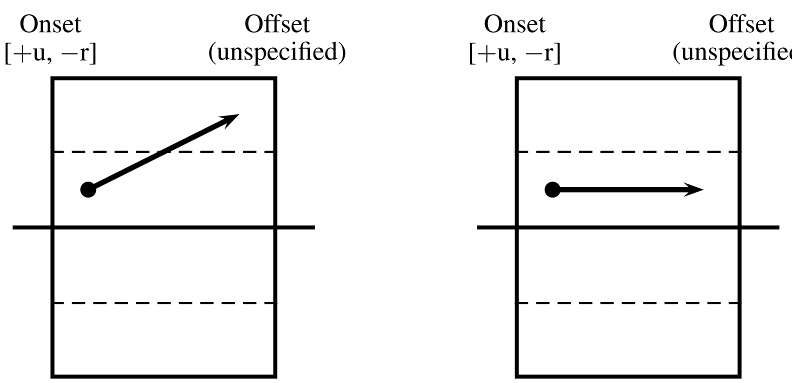
T

[+upper] [−raised, contour]

b. Mid-level tone

T

[+upper] [−raised]



In (2) above, the two exemplified tones are a high-rising tone and a mid-level tone. In terms of the one-target tonal representations, these two tones share a great deal in common. They are both tone units with only one tonal root node denoted by 'T' in (2). Their tonal onsets are the same: the register feature is [+upper] and the pitch feature is [−raised]. The only difference between the two tones is that the pitch feature of the high-rising tone (2a) has the additional specification of [contour], which requires the tonal trajectory to deviate from the tonal onset. In the case of the high-rising tone here, the tone can only go upward but not downward, because going downward would cross the boundary between [+upper] and [−upper]. This is disallowed, because the *entire* tone is specified to be [+upper]. Without [contour], as in (2b) for the mid-level tone, the tone simply stays level.

The two tones in (2) are also depicted using the tonal-space diagram from (1). The solid black dots • denote fully specified tonal targets; only the tonal onsets are specified. The arrows show the direction of tonal trajectory. The tonal offsets are featurally unspecified, but are implied by where the tonal trajectory ends.

1.3 Predictions of Yip and Barrie's proposal

Two important predictions stem from Yip and Barrie's proposal with respect to Chinese contour tones:

(3) Predictions of Yip (2001) and Barrie (2007) on Chinese contour tones
  a. A contour tone cannot cross the boundary between [+upper] and [−upper].
  b. The tonal offset of a contour tone cannot be specifically referred to by the phonology.

Both predictions have been alluded to in the discussion of the two tones in (2) above. The first prediction, in (3a), results from the property of Yip and Barrie's proposal that only one register feature [±upper] is specified for the whole contour tone. The second prediction, in (3b), is due to the fact that the tonal offset of a contour tone is not fully specified in Yip and Barrie's proposal: [±raised] is unspecified for the tonal offset.

Both Yip (2001) and Barrie (2007) analyze the contour tones of a particular Chinese language, Cantonese, in terms of their proposal of tonal representation. In fact, however, Cantonese is a counterexample among the Chinese languages they discuss. Both predictions in (3) are false with respect to Cantonese. In the following, the analysis of Cantonese tones in Yip and Barrie's terms is contrasted with my reanalysis in section 2. To justify the proposed reanalysis, the arguments that the predictions in (3) are falsified for Cantonese are presented in section 3.

2 Cantonese tones: The reanalysis

This section presents the analysis of Cantonese tones in terms of Yip (2001) and Barrie's (2007) proposal and contrasts it with my proposed reanalysis, with crucial differences in relation to the predictions in (3) above.

2.1 Cantonese tones as one-target tone units

Yip (2001) and Barrie's (2007) analysis of Cantonese contour tones follows their proposal of the one-target contour tone representation. Note that Yip (2001) and Barrie (2007) share a similar analysis for contour tones but differ in terms of level tones; for Yip, *both* tonal onset and offset of level tones are featurally specified for [±upper] and [±raised].

In (4) below, the analysis of Cantonese tones is illustrated based on Barrie's discussion, particularly the featural specifications from Barrie (2007:351). The six-way lexical tonal contrast in Cantonese is illustrated with the segmental material [si]. Following the convention in the literature on Chinese linguistics, tones are transcribed using the Chao tone numbers, where '5' denotes the highest tone and '1' the lowest. The featural specifications for [±upper, ±raised] are based on Barrie's. For clarity, I also present Barrie's analysis visually in a tonal-space diagram on the right hand side of (4). In Barrie's representations, there are two contour tones which bear [contour] featurally and therefore have a non-horizontal tonal trajectory. The features [±upper] and [±raised] specify only the tonal onsets.

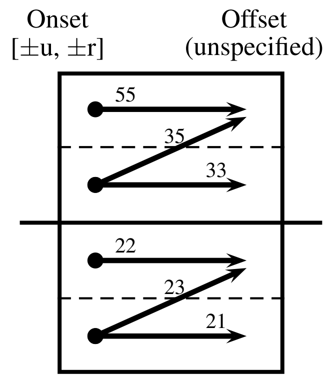
(4) Cantonese tones as one-target tone units, based on Barrie (2007)

a. Contour tones

'history'	si35	[+upper, −raised, contour]
'market'	si23	[−upper, −raised, contour]

b. Level tones

'poem'	si55	[+upper, +raised]
'to try'	si33	[+upper, −raised]
'affair'	si22	[−upper, +raised]
'time'	si21	[−upper, −raised]

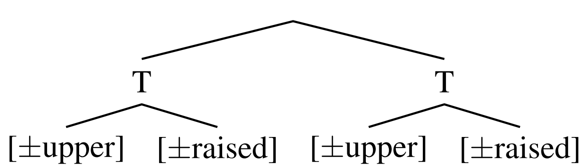


The point of presenting Barrie's analysis of Cantonese tones is to show how a particular tone system can be represented in terms of the one-target tonal representations. The way how particular tones in Cantonese are represented is not critical here. For instance, the tone 21 is sometimes transcribed as 11 due to variation in production between a low-falling tone and an extra-low level tone; see Matthews and Yip (2011:ch.1).

2.2 The reanalysis

In contrast to Barrie's analysis, this paper proposes that Cantonese tones, contour and level alike, be represented as sequences of level tones, each with its own tonal root node and featural specifications for [±upper] and [±raised]. In other words, the reanalysis is that Cantonese tones are representationally similar to those in Bantu languages. One possible way to represent a Cantonese tone geometrically is in (5) below:[2]

(5) Cantonese tone represented with independent tonal root nodes and features



The Cantonese tone as represented in (5) above has two independent tonal root nodes, each denoted by 'T'. The first 'T' on the left represents the tonal onset, and the second 'T' on the right the tonal offset. Each tonal root node has its own

[2] Whether the register feature [±upper] and the pitch feature [±raised] are in a sisterhood relationship or some sort of dominance relationship is immaterial to the points of interest in this paper.

[±upper] and [±raised]. Both tonal onset and offset are fully specified in featural terms.

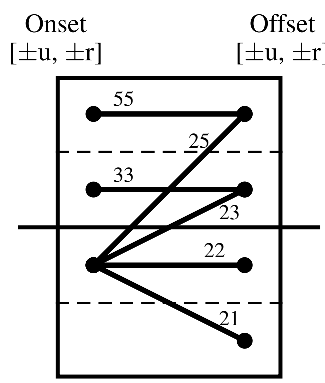
Under this reanalysis, the six Cantonese tones are represented as follows:

(6) The six Cantonese tones as sequences of level tones

a. Featural representations:

Tone		Onset [±upper]	Onset [±raised]	Offset [±upper]	Offset [±raised]
High-level	55	+	+	+	+
Mid-level	33	+	−	+	−
Low-level	22	−	+	−	+
High-rising	25	−*	+	+*	+
Low-rising	23	−*	+	+*	−
Low-falling	21	−	+	−	−

b. In the tonal-space diagram:



The two most important differences between my analysis of Cantonese tones and Barrie's lie in the representation of contour tones and tonal offsets. First, in my analysis, the two rising tones—high-rising 25 and low-rising 23—switch the feature value for [±upper] from '−' at the tonal onset to '+' at the tonal offset, marked by '*' in (6a). In terms of the diagram in (6b), these two tones cross the boundary separating the [+upper] and [−upper] regions, *contra* the prediction of Yip and Barrie that a tone can only be within either [+upper] or [−upper] (3a). Second, the tonal offsets of all tones, contour and level alike, are fully specified for both [±upper] and [±raised]. This is indicated by the solid black dots for tonal offsets in (6b); there are no arrows in this diagram, cf. (4) above. The theoretical implication is that, contrary to the prediction in (3b), phonology can potentially refer to tonal offsets.

Although this reanalysis with sequences of level tones is arguably less parsimonious than Barrie's analysis using one-target tone units, the next section justifies my analytical choice with empirical evidence.

3 The arguments

This section presents the arguments that Cantonese tones should be represented as sequences of level tones rather than tone units. The arguments are from the perspectives of (i) the phonetic realization of the high-rising tone, (ii) tonal morphophonology, and (iii) the mapping between tone and musical melody in pop music.

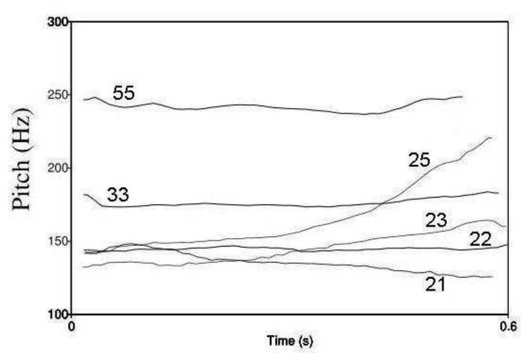
3.1 Argument 1: Phonetic realization of the high-rising tone

The first argument aims at a better phonetics-phonology mapping in general, a goal which is also endorsed by Yip (2001) herself. Specifically, the argument is about the phonetics of the Cantonese high-rising tone. In Cantonese, there are two sources of the high-rising tone: it can either be a *lexical* high-rising tone or a *derived* high-rising tone from another tone. The complete argument here has to do with both of these two types of the high-rising tone.

3.1.1 The lexical high-rising tone

Bauer and Benedict (1997) report that the lexical high-rising tone, commonly transcribed as 35 in and before the 1990s (see, e.g., Yue-Hashimoto (1972); Matthews and Yip (1994)), begins acoustically at a similar pitch level as the low-rising tone 23. The high-rising tone has a lower acoustic tonal onset than previously thought. Moreover, the mid-level tone 33 has an acoustic tonal onset higher than that of the high-rising tone and the low-rising tone 23. All these instrumental observations led Bauer and Benedict (1997) to suggest a revision of the transcription convention: the (lexical) high-rising tone is more suitably transcribed as 25. The following pitch tracks from Mok and Wong (2010) show that the high-rising tone 25 shares a similar tonal onset with the low-rising tone 23 but not with the mid-level tone 33.

(7) Pitch tracks of Cantonese tones from Mok and Wong (2010), with tone numbers added



The phonetics of the high-rising tone has important implications for its phonological representation. If the mid-level 33 is in the [+upper] region, and if the low-rising tone 23 has its tonal onset as [−upper], then the high-rising tone 25 should begin as [−upper] as the 23 tone does. However, the 25 tone clearly must end with [+upper] for its tonal offset. In other words, the high-rising tone 25 crosses the boundary between [−upper] and [+upper]. This is a paradox for Yip and barrie's one-target contour tone unit proposal, because it allows a tone to be specified for only one, but not two, [±upper] feature. The first prediction of their proposal, from (3), that a contour tone cannot straddle the [±upper] boundary, is falsified.

3.1.2 The derived high-rising tone

The Cantonese high-rising tone can be derived by a (possibly optional) tone-alternating process for a variety of semantic and morphological reasons. This is illustrated in (8) below, where the tones are transcribed in the way this paper ultimately intends; '**5**' denotes a derived high tone '5'. Such tonal alternation applies to all tones as input, except for the high-level 55 and the high-rising 25 itself.

(8) Cantonese tonal alternation
(cf. Bauer and Benedict 1997; Matthews and Yip 2011; Yu 2007a,b; Yue-Hashimoto 1972)

a.	Nominalization				
i.	sou33	'to sweep'	→	sou3**5**	'a broom'
ii.	tsʰɔ21	'to plough'	→	tsʰɔ2**5**	'a plough'
b.	Aspects (e.g., perfective)				
i.	sɪk22 tsɔ25	'eat-PERF'	∼	sɪk2**5**	'eat.PERF'
ii.	kin33 tsɔ25	'see-PERF'	∼	kin3**5**	'see.PERF'
c.	Unpredictable/no apparent meaning				
i.	wu21 tɪp22	'butterfly'	∼	wu21 tɪp2**5**	'butterfly'
ii.	ɐp̚33	'duck'	∼	ɐp̚3**5**	'duck'

Yu (2007a) discovers that, if the non-derived tone is the mid-level 33 (but not 23, 22, or 21 with an acoustically lower tonal onset), the derived high-rising tone actually has a correspondingly higher acoustic tonal onset than the lexical high-rising tone. Also, if the non-derived tone is one of 23, 22, and 21 (but not 33), the derived high-rising tone is acoustically indistinguishable from the lexical high-rising 25. This means that there are two distinct high-rising tones. We shall transcribe the one derived from 33 as 35, and the one derived from 23, 22, and 21 as 25.

In terms of their phonological representations, the two high-rising tones 25 and 35 pose a problem to Yip and Barrie's one-target contour tone representaion. Both 25 and 35 must end in [+upper] for their tonal offset. If 35 is entirely within the [+upper] tonal space, then the only way to represent another rising tone ending in [+upper] is to say that the tonal onset of 25 is [−upper]. This is disallowed in

Yip and Barrie's system, however. If the two high-rising tones 25 and 35 are to be featurally represented by [±upper] and [±raised], then the prediction that a contour tone can only be either [+upper] or [−upper], from (3), does not hold.

For Yip (2001), one important motivation for the one-target tone unit proposal is the phonetics of contour tones. She points out that, phonetically, the contour tones in Chinese languages mostly begin as a level plateau as the tonal onset and simply shoot away from the tonal onset without an ending level plateau. The tonal offset, then, is wherever the tonal trajectory ends. This is why Yip argues that only the tonal onset of a contour tone is featurally fully specified and that some other feature signals the drift of the pitch away from the tonal onset. To the extent that Yip's idea works for numerous cases of Chinese contour tones, it does not properly capture the rather complex situation of Cantonese contour tones, as discussed in this section.

3.2 Argument 2: Tonal morphophonology

Barrie (2007) extends Yip's (2001) proposal of one-target contour tone representation to include level tones as well. That is, for Barrie (2007), generally all Chinese tones, contour and level alike, are represented as one-target tone units. This presents a problem to the tonal morphophonological analysis of Cantonese. Having the tonal onset and offset independently and fully specified for [±upper] and [±raised] eliminates the problem.

We have actually examined some of the important data. In Cantonese, the only synchronically productive (morpho)phonological process is the kind of tonal alternation illustrated in (8) above, where a high-rising tone is derived from another tone. The new data presented below is the attenuatives (meaning 'a little X') in Cantonese which demonstrate the points to be made in this section most succinctly.

(9) Cantonese attenuatives (Lee 2012)

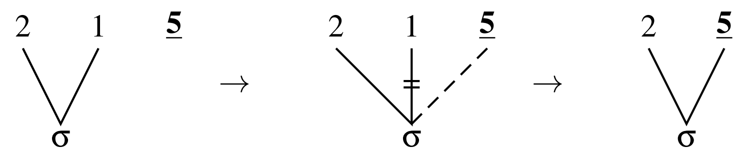
a.	syn55	'sour'	→	syn55 syn5**<u>5</u>** teɪ25
b.	jiu25	'girly'	→	jiu25 jiu2**<u>5</u>** teɪ25
c.	ts^{h}i33	'similar'	→	ts^{h}i33 ts^{h}i3**<u>5</u>** teɪ25
d.	kuʏ22	'tired'	→	kuʏ22 kuʏ2**<u>5</u>** teɪ25
e.	k^{h}ɐn23	'near'	→	k^{h}ɐn23 k^{h}ɐn2**<u>5</u>** teɪ25
f.	hʊŋ21	'red'	→	hʊŋ21 hʊŋ2**<u>5</u>** teɪ25

In (9), each of the six tones in Cantonese is illustrated with a word and its attenuative. The attenuative constructions involve reduplication and the concomitant affix *teɪ25*. Of particular interest is the tone of the second reduplicant. Ostensibly, only the non-derived tones 33, 22, 23, and 21 undergo tonal alternation to become a high-rising tone (9c-f), but the tones 55 and 25 remain unaltered (9a-b). A more insightful way to describe this situation is to say that the *tonal offset* of a non-derived tone (any of the six lexical tones) has to be the high tone '5' at the second reduplicant. Under this view, there is tonal alternation at the analytical level for the non-derived high-level 55 and high-rising 25, although on the surface it appears that nothing happens. Tonal alternation applies vacuously for 55 and 25.

A straightforward analysis to capture such tonal behavior for Cantonese has been around for a long while, at least since Yip (1980). The formal analysis hinges on a floating high tone which is diachronically motivated; see Yu (2007b) for the historical details. In brief, it consists of the docking of the floating tone and the delinking of some other tonal specification, as illustrated with the non-derived low-falling tone 21 in (10) here:

(10) The floating-tone analysis of Cantonese tonal alternation (Yip 1980; Cheung 1986; Bao 1999; Chen 2000)

a. b. c.



This floating-tone analysis entails that only tonal offsets are altered in tonal alternation, and that the tonal onsets are unaffected. This is empirically supported by the phonetics of the derived high-rising tone as discussed in section 3.1 above.

The phonological representations of Cantonese tones should readily accommodate such an analysis of tonal alternation. If the tonal offsets are fully specified for [±upper] and [±raised], as is argued in this paper, then the floating-tone analysis amounts to delinking the tonal root node of the tonal offset, with replacement by a high-tone offset '5' specified as [+upper] and [+raised]. In contrast, Yip and Barrie's representations of Cantonese contour tones would not allow this, because the tonal offsets of contour tones are not fully specified and consequently there is no tonal offset to delink. Yip and Barrie's analysis of Cantonese contour tones is incompatible with the floating-tone analysis of Cantonese tonal alternation in (10).

For complete argumentation, the following question is in order: how would tonal alternation in (9) be accounted for if Cantonese tones were represented as one-target tone units? We use Barrie's analysis of Cantonese tones for discussion (Yip does not analyze level tones as one-target tone units):

(11) Cantonese tonal alternation in terms of Barrie's tonal representations

a. One-target input tones

	[±u]	[±r]	[contour]
55	+	+	Ø
33	+	−	Ø
22	−	+	Ø
35	+	−	✓
23	−	−	✓
21	−	−	Ø

b. What the outputs would be

	[±u]	[±r]	[contour]
55	+	+	Ø
35	+	−	✓∗
35	+∗	−∗	✓∗
35	+	−	✓
35	+∗	−	✓
35	+∗	−	✓∗

(11a) is Barrie's analysis of Cantonese tones, identical to (4). For [contour], since it is a unary feature, '✓' denotes its presence, and 'Ø' its absence. (11b) is what Barrie's analysis would have to say as to what the six tones become for tonal alternation in Cantonese attenuatives in (9). The high-level 55 and high-rising 35 remain changed, whereas all other tones become the high-rising 35. Interestingly, Barrie is perfectly aware of the Cantonese attenuative data in (9), as is clear from his footnote 20 on page 350, but no analysis is provided.

In terms of Barrie's representations, a comparison between (11a) and (11b) reveals what features would have to be altered. In (11b), the features marked by '*' are different from their counterparts in (11a), which do not appear to pattern together in a consistent pattern. If the goal of a phonological analysis is to come up with a *unified* analysis for the tonal (non-)alternation involved, then it is unclear how the features which would be altered can be described by natural classes. For this reason, representing Cantonese tones as sequences of level tones is a preferred option, so that the floating-tone analysis of tonal alternation can be expressed directly to account for the attenuative reduplication data.

The upshot of this argument is that Cantonese contour and level tones bear fully specified tonal offsets because they are sequences of level tones rather than one-target tone units. The floating-tone analysis of tonal alternation crucially makes reference to tonal offsets. The second prediction from Yip (2001) and Barrie's (2007) proposal that the tonal offset of a contour tone cannot be referred to by phonology, stated in (3b), is falsified.

3.3 Argument 3: Mapping between tone and musical melody in pop music

The third argument is about the mapping between tone and musical melody in Cantonese pop music, given that songs shed light on phonological theory; see, for instance, Dell (2011) on Berber syllables. Phonologists study songs sung in tone languages because of the intriguing questions of how the tones of the lyrics map onto the musical melody and what the mapping patterns or restrictions are, if any. For Cantonese songs, it is the tonal offsets which play an important role, which suggests that they are phonologically specified.

Researchers have observed that, in Cantonese lyrics writing for pop music, the low-rising 23 and mid-level 33 are interchangeable, whereas the high-rising 25 and the high-level 55 are interchangeable (Chan 1987; Ho 2006). The tones are interchangeable in the sense that, for example, if the tone 23 is compatible with a particular musical note, then 33 is also compatible; see the references cited for more musical details. The consensus is that the tone pairs 55/25 and 33/23 pattern in the way they do by sharing the same tonal offset. If this is the case, then the phonological representations of the tonal offsets should reflect that they are explicitly referred to. The implication is that Cantonese tones are sequences of level tones, so that the tonal offsets are fully specified and can be phonologically referred to.

In the following, we compare how the tone pairs 55/25 and 33/23 are represented by phonological features in two systems, the one-target tone unit system by Barrie (2007) and my proposal with sequences of level tones.

(12) Comparing the featural specifications of the tone pairs 55/25 and 33/23

a. Cantonese tones *à la* Barrie (2007)

	[±u]	[±r]	[contour]
55	+*	+	Ø
35	+*	−	✓
33	+	−*	Ø
23	−	−*	✓
21	−	−	Ø
22	−	+	Ø

b. The reanalysis in this paper

	Onset		Offset	
	[±u]	[±r]	[±u]	[±r]
55	+	+	+	+
25	−	+	+	+
33	+	−	+	−
23	−	+	+	−
21	−	+	−	−
22	−	+	−	+

The point is that each of the tone pairs 55/25 and 33/23 should be *uniquely* identified in featural terms. Barrie's (2007) representational system in (12a) is unable to do so for neither of the tone pairs. Although 55 and 35 pattern together by [+upper] only (marked by '*' in (12a)), 33 is also [+upper]; the relevant feature values are enclosed in a dotted box in (12a). A similar issue arises for the tone pair 33/23: both 33 and 23 share [−raised] only (marked by '*'), but 35 and 11 are also [−raised]. In contrast, the reanalysis of Cantonese tones in this paper squarely captures the two tone pairs straightforwardly, as shown by the dotted boxes in (12b), because the tonal offsets are fully specified. It is noteworthy that Yip (2001) also attempts to explain the Cantonese tone-music mapping patterns discussed in this section, albeit with ad hoc formalism.

As in the second argument on tonal morphophonology in section 3.2 above, this argument on tone-music mapping shows that the tonal offsets in Cantonese have to be referred to by phonology and specified separately from tonal onsets, thus falsifying the prediction in (3b) that phonology cannot refer to tonal offsets.

4 Conclusions

This paper has argued that, with a focus on contour tones, Cantonese tones are represented as sequences of level tones, rather than unitary entities. If phonology is an abstract representational system, then this paper has pushed for a closer mapping between phonology and other domains: (i) phonetics, for the tonal trajectory of the high-rising tone; (ii) morphology, for the attenuative and other derived constructions; and (iii) native-speaker intuition, for how tones are categorized as evidenced by songs. It is reasonable to ask if an analysis with sequences of level tones rather than one-target tone units is less parsimonious. Indeed, the answer is positive: if both tonal onsets and offsets have their own independent [±upper] and

[±raised], then a tonal inventory of 16 tones is predicted, but Cantonese has only six tones. Notwithstanding this mathematical issue, there are good reasons to opt for sequences of level tones for Cantonese. First, if we stick to *binary* features only, there are no feature systems that could single out six distinct objects; two features would differentiate four objects, and three features eight. Second, phonological features are meant to be interpretable. If an *n*-ary or hybrid feature system is able to represent exactly six entities, it is unclear if the features involved in such a system are sufficiently meaningful; for instance, one single senary feature with six possible values might well capture the six Cantonese tones, but such a feature is inevitably meaningless.

Typologically, Cantonese joins other Chinese varieties whose contour tones have been argued to not be represented as contour tone units; see Duanmu (1994) and Chen (2010). Beyond the Sinitic family but still within Asia, tone languages without unitary contour tone units are not unheard of, an example being Kuki-Thaadow (Hyman 2007). This present paper further undermines the general view that contour tones across African and Asian languages are fundamentally different in terms of representation.

From the methodological perspective, this paper has demonstrated that it is important to analyze individual languages *solo* without the assumption that genetically related languages (e.g., Chinese languages) somehow share the same grammar. In Chinese linguistics, there is sometimes a controversial assumption of a universal Chinese grammar, at least implicitly (Yue-Hashimoto 1993; Matthews 1999, To appear). A typical scenario has a few Chinese varieties examined for a given research question, and then the conclusions are generalized to the entire Chinese group. This paper argues for a more cautious approach. Analytically, this paper is concerned solely with Cantonese. As such, all conclusions drawn only apply to Cantonese and not necessarily, and certainly not immediately, to any other Chinese languages, or other languages in general. It is after individual linguistic varieties are analyzed that we make concrete typological statements for the varieties studied.

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Multiple Interpretations and Constraints of Causative Serial Verb Constructions in Korean

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1 Introduction

In this paper I discuss the light verb *ha* 'do' in Korean, which I show forms a range of uses in various constructions (see the basic properties of light verbs in Butt and Geuder (2001), Butt (2004) and Korean light verbs in Choi and Wechsler (2001), Lee (2011), *inter alia*). In particular, I aim to elucidate what is involved in the multiple interpretations of the causative *serial verb construction* (SVC) like (1).

(1) Mary-ka **khephi**-lul **ttukep**-key **hay** **mek**-ess-ta.
Mary-Nom coffee-Acc hot-Key do.Comp eat-Pst-Dec
'Mary made the coffee$_j$ hot, and then ate it$_j$/ tried to eat it$_j$.'
'Mary brewed the coffee$_j$ hot, and then ate it$_j$/ tried to eat it$_j$.'

Most research on causative constructions is only concerned with the canonical resultative reading (see Comrie 1981, Song 1996, among others). However, Korean causative constructions are in fact very ambiguous as illustrated in the English translations for (1). The light verb *hay* in (1) can have the meaning of *made* or *brewed* and the final verb *mek-ess-ta* can have the resultative reading *ate* or the purposive reading *tried to eat*, in whose event structure an unspecified causing subevent of eating necessarily occurs but the result of eating is not entailed, but just intended.

Addressing the origins and constraints of the multiple interpretations of causative SVCs, I first explore the three kinds of constructions headed by the light verb *ha*. Examples of the constructions are illustrated in (2).

(2) a. Jane-i **khephi**-lul **hay**-ss-ta.
Jane-Nom coffee-Acc do-Pst-Dec
'Jane brewed/ drank the coffee.'

b. Jane-i **khephi**-lul **ttukep-**key **hay**-ss-ta.
Jane-Nom coffee-Acc hot-Key do-Pst-Dec
'Jane made/ brewed the coffee hot.'

c. Mary-ka **khephi**-lul **hay** **mek**-ess-ta.
Mary-Nom coffee-Acc do.Comp eat-Pst-Dec
'Mary brewed the coffee$_j$, and then ate it$_j$.'

In (2a), the related issue is how the specific meaning (*brew* or *drink*) of the light verb *ha* gets picked up in the construction (developed from Lee (2011, 2012)). In (2b), the light verb is not just giving the standard small clause type reading for the causative, but also picking up on the predicates related to the common noun. Many scholars assume that in periphrastic causatives we have a structure like [[$_{sc}$ NP XP] CAUSE] where the NP is not directly predicated of by the causal verb, and thus this should never happen. But in the small clause structure, the XP "transmits" the associated predicate (e.g. *brew*) of the NP (e.g. *khephi* 'coffee') up to CAUSE. Or, it could be that CAUSE takes directly two arguments (the NP and XP). The latter analysis appears to be more perspicuous. In the SVC (2c), an important question is why the light verb *hay* is restricted to a certain associated predicate (*brew*, but not *drink*), and how other related constraints of SVC should be reflected in explicit semantic analysis of *hay*. These issues are interconnected with each other in the causative SVCs like (1). Note that the sentences in (2) can also have their relevant purposive interpretations, which will be discussed in the sections that follow.

Based on the properties of the constructions, I then suggest a formal analysis of the constructions in the framework of Minimal Recursion Semantics (MRS) (Copestake *et al*. 2006) of Head-driven Phrase Structure Grammar (HPSG) (Pollard and Sag 1994, Sag *et al*. 2003).

2 Background: Purposive and Resultative Readings

In this section I present a puzzle about Korean resultatives, namely the fact that the putative result states need not actually obtain. The Korean equivalent of the following English sentence is acceptable: *He wiped the table clean, but the table is not clean*. The crucial question that naturally arises is what exactly the meaning of the resultative construction is, especially when the result does not necessarily obtain. I will argue that in fact these constructions are systematically ambiguous between two readings: a canonical resultative reading in which the result does obtain and an additional reading in which the result is simply intended, with a semantics much like a purposive construction.

First, in the typical purposive construction (3a), the putative result of *napcakha-key* 'flat-Key' is cancellable. In (3b), it shows that the construction is compatible with the modifier *intentionally*, but not with *accidently*.

(3) a. John-i soy-lul napcakha-key mantul-kiwihay twutulki-ess-ta.
John-Nom metal-Acc flat-Key make-to hammer-Pst-Dec
kulena soy-ka napcakha-ci anh-ta.
but metal-Nom flat-Comp Neg-Dec
'John hammered the metal$_j$ to make it$_j$ flat, but the metal is not flat.'

b. John-i soy-lul napcakha-key mantul-kiwihay
John-Nom metal-Acc flat-Key make-to
ilpwule/ #**wuyenhi** twutulki-ess-ta.
intentionally/ accidently hammer-Pst-Dec
'John intentionally/ #accidently hammered the metal$_j$ to make it$_j$ flat.'

The event cancellation in (3a) indicates that the result state of the Adj-*key* phrase is not entailed in the purposive construction. In (3b), the contrast in modification shows that purposive constructions require some intentionality on the part of the subject of the matrix clause.

The typical Korean resultative construction with the secondary predicate (*napcakha-key* 'flat-Key') in (4a) (see more Korean resultatives in Wechsler and Noh (2001)) also allows the result cancellation like the purposive in (3a). However, in (4b), the modification of *accidently* is permitted unlike (3b).

(4) a. John-i soy-lul napcakha-key twutulki-ess-ta.
John-Nom metal-Acc flat-Key hammer-Pst-Dec
kulena soy-ka napcakha-ci anh-ta.
but metal-Nom flat-Comp Neg-Dec
(lit.) 'John hammered the metal flat, but the metal is not flat.'
= 'John hammered the metal$_j$ to make it$_j$ flat, but it$_j$ is not flat.'

b. John-i soy-lul napcakha-key **ilpwule**/ **wuyenhi**
John-Nom metal-Acc flat-Key intentionally/ accidently
twutulki-ess-ta.
hammer-Pst-Dec
'John intentionally/ accidently hammered the metal flat.'

The cancellation in (4a) suggests that the construction has the purposive reading; since *accidently* is not compatible with a purposive reading, the construction in (4b) has the normal resultative reading. In these two interpretations, the main verb meaning corresponds to the causing subevent of the construction's event structure and it must be entailed in the construction with a secondary predicate.

The two crucial differences between purposive and resultative readings in terms of event cancellation and adverb modification can be illustrated as in (5).

(5)

	Purposive reading	**Resultative reading**
Cancellation of relevant result state	*Yes*	*No*
Modification by 'accidently'	*No*	*Yes*

If a resultative reading manifests itself in the context of the modification of *wuyenhi* 'accidently', then we can predict that the construction with the adverb cannot allow the result cancellation. This is confirmed in the following:

(6) John-i soy-lul napcakha-key **wuyenhi** twutulki-ess-ta.
John-Nom metal-Acc flat-Key accidently hammer-Pst-Dec
#**kulena** soy-ka napcakha-ci anh-ta.
but metal-Nom flat-Comp Neg-Dec
'John accidently hammered the metal flat, #but the metal is not flat.'

In sum, the Korean constructions that have generally been considered as resultatives are actually ambiguous between purposive and resultative readings. This is a common property of structures that can entail a result state in Korean, and in some constructions one or the other reading of the structure is ruled out. With this background, I now turn to Korean *light verb constructions* (LVCs).

3 Qualia Light Verb *ha* 'do'

In this section, I show that the light verb *ha* in an LVC can have a specific meaning according to its common noun object. Then based on the properties of purposive and resultative readings discussed in the previous section, I argue that if the light verb *ha* is interpreted as having the meaning of a change-of-state verb, the change-of-state meaning of *ha* also has purposive and resultative readings.

In the following minimal pair in (7), we see that the light verb *ha* receives its specific meaning depending on its common noun object (cf. Im and Lee 2004 and see Lee 2011, 2012).

(7) Yenghi-ka **khephi**-lul/ #**mwul**-ul hay-ss-ta.
Yenghi-Nom coffee-Acc/ water-Acc do-Pst-Dec
'Yenghi brewed/ drank the coffee.'

In (7), when the object is *khephi* 'coffee', *ha* is interpreted as having the meaning of *brew* or *drink*. However, the unacceptability with *mwul* 'water' shows that it is not that every common noun can appear as the object of the construction.

If the light verb can have the meanings of associated predicates, we can predict that the different interpretations of *ha* should behave differently regarding aspect. This is verified in the following sentences with *maney* 'in':

(8) Yenghi-ka pap-ul/ khemphuthe-lul **han sikan maney** hay-ss-ta.
Yenghi-Nom rice-Acc/ computer-Acc one hour in do-Pst-Dec
'Yenghi cooked the rice in an hour.' (telic or ingressive reading)
'Yenghi used the computer in an hour.' (ingressive reading)

Thus certain common nouns have information about their related predicates. Pustejovsky (1991) refers to this relation as cospecification; just like a verb can select for its argument type (e.g. *kick* selects its argument like *ball*, but not *happiness*), an argument also can select its particular associated predicates (e.g. *ball* may select its predicate like *kick*, but not *read*). The associated predicate information is then included in the Qualia Structure of a lexical item (Pustejovsky 1991). In the Qualia Structure, the Telic Role has values about purpose and function of object (e.g. *read* for novel), and the Agentive Role has values on factors involved in the origin of an object (e.g. *write* for novel).

Building on qualia structure, I suggest that Korean common nouns have the dual semantic components, the first of which is the meaning of the common noun itself (e.g. rice relation for *pap* 'rice') and the second of which is the associated predicate meanings (e.g. cook relation for *pap* 'rice') (see Copestake and Briscoe (1995) for qualia roles in feature structure). However, the common nouns like *mwul* 'water' have no value for their qualia roles. Although the predicate *masi*- 'drink' appears to be a good candidate for the telic role of *mwul* 'water', there seems to be no grammatical evidence to verify if *masi*- 'drink' is really used in grammar as a telic role for *mwul* 'water'; *masi*- 'drink' seems to not yet be conventionalized as an associated predicate of *mwul* 'water'.

When the light verb *ha* is interpreted as having an associated predicate (e.g. *brew*), it can have the relevant purposive reading as in (9a) in addition to the usual resultative reading as in (9b).

(9) a. Yenghi-ka achim-ey **khephi**-lul hay-ss-ta.
Yenghi-Nom morning-in coffee-Acc do-Pst-Dec
kulena khephi-ka mantul-e ci-ci anh-ass-ta.
but coffee-Nom make-Comp Pass-Comp Neg-Pst-Dec
'Yenghi tried to brew a coffee, but a coffee was not made.'

b. Yenghi-ka achim-ey **wuyenhi** **khephi**-lul hay-ss-ta.
Yenghi-Nom morning-in accidently coffee-Acc do-Pst-Dec
#**kulena** khephi-ka mantul-e ci-ci anh-ass-ta.
but coffee-Nom make-Comp Pass-Comp Neg-Pst-Dec
'Yenghi accidently brewed a coffee, #but a coffee was not made.'

In syntax, an adverb can appear in between the common noun object and the light verb as shown in (8), which indicates that the verb phrases of the qualia-*ha* constructions should be analyzed syntactically rather than lexically.

4 Causative Light Verb *ha* 'do'

In this section, I discuss a use of *ha* 'do' as marking causative constructions like the use of *make* in English causative constructions, and the ambiguity of the secondary predicate in the causative constructions.

Causative constructions are normally classified into two types: lexical causative and periphrastic (syntactic) causative (see Comrie 1981, Song 1996, among others). For instance, the Korean lexical causative in (10) (where the causative dependent morpheme *-i* is attached to the verb stem) describes an event of direct causation: i.e. the subject is necessarily the agent who dried the clothes by e.g. operating a drying machine or hanging the clothes on a drying rack. In contrast, the periphrastic causative with the result XP in (10) does not entail a direct causation, although the interpretation of a direction causation is possible; Tom can make someone else dry the clothes (i.e. an indirect causation). In this paper, I focus on the direct causation reading of the Korean periphrastic causative construction.

(10) Tom-i caki os-ul **mal-i-**ess-ta/ **malu-**key **hay**-ss-ta.
Tom-Nom self clothes-Acc dry-Caus-Pst-Dec/ dry-Key do-Pst-Dec
'Tom$_i$ dried his$_i$ clothes.'/
(lit.) 'Tom$_i$ did his$_i$ clothes dry.' = 'Tom$_i$ made his$_i$ clothes dry.'

If the periphrastic causative sentence in (10) can be interpreted as its purposive reading, we can predict that the construction should allow the relevant result state cancellation. Also if it is interpreted as its resultative reading with the modification of *accidently*, it is predicted that the cancellation is not allowed. These two predictions are borne out in (11a) and (11b), respectively.

(11) a. Tom-i caki os-ul **malu-**key **hay**-ss-ta.
Tom-Nom self clothes-Acc dry-Key do-Pst-Dec
kulena os-i malu-ci anh-ass-ta.
but clothes-Nom dry-Comp Neg-Pst-Dec
'Tom$_i$ tried to make his$_i$ clothes dry, but they were not dry.'

b. Tom-i **wuyenhi** caki os-ul **malu-**key **hay**-ss-ta.
Tom-Nom accidently self clothes-Acc dry-Key do-Pst-Dec
#**kulena** os-i malu-ci anh-ass-ta.
but clothes-Nom dry-Comp Neg-Pst-Dec
'Tom$_i$ accidently made his$_i$ clothes dry, #but they were not dry.'

One interesting similarity of the light verb *ha* in the periphrastic causative construction to the light verb *ha* in the qualia-*ha* construction is that they get their meaning from their complement. As already shown in section 3, the specific meaning of *ha* of qualia-*ha* construction is determined by the common noun object (e.g. *cook* from rice object). The meaning of *ha* of periphrastic causative construction (i.e. use as *make*) is determined by the existence of a secondary predicate (e.g. *malu-key* 'dry-Key'); while the exact meaning of *ha* cannot be identified unless it can be inferred from the wider context in which the construction appears, *ha* here corresponds to the unspecified causing subevent in the event structure of the construction. In the event structure, the unspecified causing subevent necessarily occurs; what contributes to the ambiguity of the construction is the ambiguity of the secondary predicate between realized result state (in resultative reading) and intended result state (in purposive reading).

5 Qualia-Causative Light verb *ha* 'do'

The Korean light verb *ha* is very ambiguous, as shown above. It can be either qualia light verb, as discussed in section 3, or causative light verb, as shown in section 4, each of which then has its purposive and resultative readings. In this section, I discuss a sort of mixed use of the light verb (namely, qualia-causative light verb *ha*) in a single construction, and then its theoretical implication for the syntactic analysis of the construction in question.

In (12), the light verb *ha* 'do' can be the normal causative light verb or the qualia-causative light verb (the quasi-depictive reading with the telic role *drink* 'Jane drank the coffee hot' is not discussed in this paper).

(12) Jane-i **khephi**-lul **ttukep-**key **hay**-ss-ta.
Jane-Nom coffee-Acc hot-Key do-Pst-Dec.
'Jane made the coffee hot/ tried to make the coffee hot.'
'Jane brewed a coffee hot/ tried to brew a coffee hot.'

In the normal causative reading of (12), the only relevant result is that the coffee becomes hot. However, in the qualia-causative reading, two results are involved (i.e. the creation of a coffee and creation of the property of being hot). Here the qualia-causative light verb *ha* gets its meaning from both the common noun object and the XP; the light verb *ha* corresponds to the combination of the event of brewing a coffee and the unspecified causing subevent of making the object hot. In the event structure of the construction, if the associated results are all realized, then the sentence has the resultative reading, but if some result is not realized, but only intended, the sentence has the purposive reading (roughly corresponding to 'Jane tried to brew a coffee hot') with the following three possible situations: i) a cold coffee was made, ii) a hot tea was made, and iii) a cold tea was made. In any case, the result of the construction (i.e. a hot coffee) is not realized.

According to small clause analysis of periphrastic causative construction, the object and the secondary predicate are syntactically grouped together to form a small clause (i.e. a predication), and then the causative verb combines with the small clause. This analysis seems to have no problem for the normal causative reading of the sentence (12).

However, for the sentence (12) with the qualia-causative interpretation, the small clause analysis appears to be not perspicuous relatively (although it is not impossible) since the XP (i.e. the head of the small clause) should "transmit" the qualia meaning from the common noun object (i.e. the complement of XP) up to the light verb *ha* when the light verb *ha* combines with the small clause in syntax. Rather than this transmission mechanism of the small clause analysis, it is more perspicuous for the light verb *ha* to combine directly with the NP and XP in syntax, and thus gets its qualia meaning directly from the NP. For the sake of a theoretical consistency, it is also better to analyze the construction (12) with the normal causative interpretation in much the same way.

In the next section, the causative construction (12) is then combined with an SVC (resulting in causative SVC). This combination creates an interesting restriction on the possible interpretations of the light verb in the causative SVC.

6 Causative SVC

The core concept of an SVC is to serialize the events of component verbs of the construction and thus to conceptualize the component events as a single, unified event, as exemplified in (13a) (see more e.g. in Collins (1997), Aikhenvald (2006), Kim (2010)). SVCs are generally under the iconicity constraint: i.e. the subevent of the first verb (V1) must occur before the subevent of the second verb (V2). So, the sequential order of the component verbs and their corresponding subevents are basically parallel. The iconicity constraint leads (13b) to be ungrammatical.

(13) a. kunye-ka kheik-ul **cip**-e mek-ess-ta.
she-Nom cake-Acc pick.up-Comp eat-Pst-Dec
'She picked up the cake$_j$, and then ate it$_j$/ tried to eat it$_j$.'

b. *kunye-ka kheik-ul **mek**-e **cip**-ess-ta.
she-Nom cake-Acc eat-Comp pick.up-Pst-Dec
(int.) 'She picked up the cake$_j$, and then ate it$_j$/ tried to eat it$_j$.'

The meaning of picking up a cake which is already eaten is implausible. The world knowledge is, however, based on the assumption that the SVC in (13b) is iconic-constrained. If the iconicity constraint is not relevant (so it is possible for the first verb to represent the subevent that happens after the subevent of the second verb), the SVC should be fine, and must have the intended reading; but it cannot. Thus the iconicity constraint is an underlying property of SVCs; by contrast coordinations are not under the iconicity constraint.

Another important fact of SVC is that although the usual change-of-state verbs in Korean do not necessarily entail their relevant result states (or result objects), Korean SVCs do not allow the cancellation of the result state(s) related to the first verb event (more generally, non-final verb events); but the event of the final verb of an SVC can be cancelled just like the normal change-of-state verbs.

The following two constructions in (14) have the two fundamental properties of SVC (iconicity constraint and no cancellation of result state(s) associated with V1), which strongly indicate that they are really a type of SVC in Korean. The result state of the secondary predicate related to V1 is not cancellable, either. Moreover, only the agentive role *brew* is appropriate for the meaning of the V1 light verb *hay* suggesting that a light V1 in an SVC can only take on the agentive reading (not telic reading) for its object (see Lee 2011, 2012):

(14) a. Mary-ka **khephi**-lul **hay** **mek**-ess-ta.
Mary-Nom coffee-Acc do.Comp eat-Pst-Dec
'Mary brewed the coffee$_j$, and then ate it$_j$/ tried to eat it$_j$.'

b. Mary-ka **khephi**-lul **ttukep**-key **hay** **mek**-ess-ta.
Mary-Nom coffee-Acc hot-Key do.Comp eat-Pst-Dec
'Mary made/brewed the coffee$_j$ hot, and then ate it$_j$/ tried to eat it$_j$.'

The SVC (14b) is the causative SVC which is the combination of the causative construction in (12) and the SVC in (14a) (cf. Aikhenvald, 2006: 16). In the next section, I formalize the semantic analysis of the multiple interpretations of the causative SVC.

7 A formal analysis

First, resultative and purposive meanings (i.e. CONTENTs) of the change-of-state verb *tha*- 'brew' can be declared like the following:

(15) a. Resultative CONTENT of 'brew':

$$\begin{bmatrix} \textit{resultative} \\ \text{RELS} < \begin{bmatrix} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3} \end{bmatrix}, \begin{bmatrix} \textit{\_action\_of\_brewing\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1 } i \\ \text{ARG2 } j \end{bmatrix}, \\ \begin{bmatrix} \textit{\_become\_rel} \\ \text{LBL h5} \\ \text{ARG0 e3} \\ \text{ARG1 h6} \end{bmatrix}, \begin{bmatrix} \textit{\_brewed\_rel} \\ \text{LBL h7} \\ \text{ARG0 e4} \\ \text{ARG1 } j \end{bmatrix} > \\ \text{HCONS} < \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h2} \\ \text{LARG h4} \end{bmatrix}, \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h3} \\ \text{LARG h5} \end{bmatrix}, \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h6} \\ \text{LARG h7} \end{bmatrix} > \end{bmatrix}$$

b. Purposive CONTENT of 'brew':

$$\begin{bmatrix} \textit{purposive} \\ \text{RELS} < \begin{bmatrix} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3} \end{bmatrix}, \begin{bmatrix} \textit{\_action\_of\_brewing\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1 } i \\ \text{ARG2 } j \end{bmatrix}, \\ \begin{bmatrix} \textit{\_purpose\_rel} \\ \text{LBL h5} \\ \text{ARG0 e3} \\ \text{ARG1 h6} \end{bmatrix}, \begin{bmatrix} \textit{\_become\_rel} \\ \text{LBL h7} \\ \text{ARG0 e4} \\ \text{ARG1 h8} \end{bmatrix}, \begin{bmatrix} \textit{\_brewed\_rel} \\ \text{LBL h9} \\ \text{ARG0 e5} \\ \text{ARG1 } j \end{bmatrix} > \\ \text{HCONS} < \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h2} \\ \text{LARG h4} \end{bmatrix}, \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h3} \\ \text{LARG h5} \end{bmatrix}, \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h6} \\ \text{LARG h7} \end{bmatrix}, \begin{bmatrix} \textit{\_qeq\_rel} \\ \text{HARG h8} \\ \text{LARG h9} \end{bmatrix} > \end{bmatrix}$$

The purposive CONTENT (15b) is specified as having [*_purpose_rel*] in its REL(ATION)S.

As for common nouns, it is claimed that they include the QUALIA-ST(RUCTURE) in CONT(ENT), which in turn has the AGENTIVE and TELIC attributes, and the QUALIA list is also posited whose value is the sum of the values of the AGENTIVE and TELIC attributes (see Lee 2011, 2012). For instance, the common noun *khephi* 'coffee' can have the following feature structure:

(16) *khephi* 'coffee':

$$\begin{bmatrix} \textit{cn} \\ \text{PHON} < \textit{khephi} > \\ \text{CONT} \begin{bmatrix} \text{HOOK} < \begin{bmatrix} \text{LTOP h1} \\ \text{INDEX } j \end{bmatrix} > \\ \text{RELS} < \begin{bmatrix} \textit{\_coffee\_rel} \\ \text{LBL h1} \\ \text{ARG0 } j \end{bmatrix} > \\ \text{HCONS} < \quad > \\ \text{QUALIA-ST} \begin{bmatrix} \text{AGENTIVE } \boxed{A} < \left[\text{RELS} < [\textit{\_cause\_rel}], [\textit{\_action\_of\_brewing\_rel}], ... >\right] > \\ \text{TELIC } \boxed{B} < \left[\text{RELS} < [\textit{\_cause\_rel}], [\textit{\_action\_of\_drinking\_rel}], ... >\right] > \\ \text{QUALIA } \boxed{A} \oplus \boxed{B} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

In (16), *khephi* 'coffee' has one agentive role (i.e. [RELS <[_*cause_rel*], [_*action_of_brewing_rel*]…>]), and one telic role (i.e. [RELS <[_*cause_rel*], [_*action_of_drinking_rel*],…>]). These two qualia roles are underspecified with respect to resultative or purposive CONTENT; thus for example either of (15) can be the value of the AGENTIVE attribute.

The core meaning of the light verb *ha* in a qualia-*ha* construction comes from a qualia role of the common noun object as represented in (17a). The qualia light verb *ha* in (17a) should have the corresponding V1 form in (17b), which is used in an SVC.

(17) a. The qualia *ha*-1 in non-SVC:

$$\begin{bmatrix} \textit{tr-light-v} \\ \text{PHON} < \textit{ha}-1 > \\ \text{ARG-ST} < \text{NP}_i, \text{NP}_j \left[\text{QUALIA-ST} \left[\text{QUALIA} < ..., \boxed{1}, ... >\right]\right] > \\ \text{CONTENT } \boxed{1} \end{bmatrix}$$

b. The qualia *hay*-1 in SVC:

$$\begin{bmatrix} \text{PHON} < \textit{hay}-1 > \\ \text{FORM } -\textit{e} \\ \text{SUBJ} < \text{NP}_i > \\ \text{COMPS} < \text{NP}_j \left[\text{QUALIA-ST} \left[\text{AGENTIVE} < \boxed{1}[\textit{resultative}] >\right]\right] > \\ \text{CONTENT } \boxed{1} \end{bmatrix}$$

In (17a), a value of the QUALIA of the object NP_j is structure-shared with the value of the CONTENT of the light verb *ha*. In other words, the light verb requires an object that has at least one value for QUALIA. This requirement prevents common nouns like *mwul* 'water' from appearing as an object of the light verb. Since the non-final light verb in SVC should have a resultative agentive role, *hay*-1 in (17b) requires a common noun object that has a resultative value for the AGENTIVE of the QUALIA-ST.

Also secondary predicates can have purposive or resultative reading, which is reflected in the two feature structures below:

(18) a. *ttukep-key*-1 'hot-Key':

$$\begin{bmatrix} \text{PHON} < \textit{ttukep}-\textit{key}-1 > \\ \text{CONT} \begin{bmatrix} \text{HOOK} < \begin{bmatrix} \text{LTOP h1} \\ \text{INDEX e1} \\ \text{XARG } j \end{bmatrix} > \\ \text{RELS} < \begin{bmatrix} \_\textit{become}\_\textit{rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \end{bmatrix}, \begin{bmatrix} \_\textit{hot}\_\textit{rel} \\ \text{LBL h3} \\ \text{ARG0 e2} \\ \text{ARG1 } j \end{bmatrix} > \\ \text{HCONS} < \begin{bmatrix} \_\textit{qeq}\_\textit{rel} \\ \text{HARG0 h2} \\ \text{LARG1 h3} \end{bmatrix} > \end{bmatrix} \end{bmatrix}$$

b. *ttukep-key*-2 'hot-Key':

$$\begin{bmatrix} \text{PHON} < \textit{ttukep}-\textit{key}-2 > \\ \text{CONT} \begin{bmatrix} \text{HOOK} < \begin{bmatrix} \text{LTOP h1} \\ \text{INDEX e1} \\ \text{XARG } j \end{bmatrix} > \\ \text{RELS} < \begin{bmatrix} \_\textit{purpose}\_\textit{rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \end{bmatrix}, \begin{bmatrix} \_\textit{become}\_\textit{rel} \\ \text{LBL h3} \\ \text{ARG0 e2} \\ \text{ARG1 h4} \end{bmatrix}, \begin{bmatrix} \_\textit{hot}\_\textit{rel} \\ \text{LBL h5} \\ \text{ARG0 e3} \\ \text{ARG1 } j \end{bmatrix} > \\ \text{HCONS} < \begin{bmatrix} \_\textit{qeq}\_\textit{rel} \\ \text{HARG0 h2} \\ \text{LARG1 h3} \end{bmatrix}, \begin{bmatrix} \_\textit{qeq}\_\textit{rel} \\ \text{HARG0 h4} \\ \text{LARG1 h5} \end{bmatrix} > \end{bmatrix} \end{bmatrix}$$

A lexical rule can be posited to license (18b) from (18a), which can also be derived by another lexical rule taking *ttukep* 'hot' as the input.

The heavy verbs used as V2 (generally, the final verb) of an SVC should have different lexical items from those used in non-SVCs:

(19) a. lexeme *mek*-1 'eat' in non-SVC:

$$\begin{bmatrix} \text{PHON} < \textit{mek}-1 > \\ \text{ARG-ST} < \text{NP}_i, \text{NP}_j[\textit{acc}] > \\ \text{CONT} \begin{bmatrix} \text{HOOK} \begin{bmatrix} \text{LTOP h1} \\ \text{INDEX e1}\end{bmatrix} \\ \text{RELS} < \begin{bmatrix} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3}\end{bmatrix}, \begin{bmatrix} \textit{\_action\_of\_eating\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1 } i \\ \text{ARG2 } j \end{bmatrix}, \ldots > \end{bmatrix} \end{bmatrix}$$

b. lexeme *mek*-2 'eat' as V2 in SVC:

$$\begin{bmatrix} \text{PHON} < \textit{mek}-2 > \\ \text{ARG-ST} < \boxed{1}\text{NP}_i, \boxed{2}\text{NP}_j[\textit{acc}], \text{V}\begin{bmatrix} \text{HEAD [FORM } -e] \\ \text{SUBJ} < \boxed{1}\text{NP}_i > \\ \text{COMPS} < \boxed{2}\text{NP}_j, \ldots > \end{bmatrix} > \\ \text{CONT} \begin{bmatrix} \text{HOOK} \begin{bmatrix} \text{LTOP h1} \\ \text{INDEX e1}\end{bmatrix} \\ \text{RELS} < \begin{bmatrix} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3}\end{bmatrix}, \begin{bmatrix} \textit{\_action\_of\_eating\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1 } i \\ \text{ARG2 } j \end{bmatrix}, \ldots > \end{bmatrix} \end{bmatrix}$$

Both the verbs in (19) can have resultative or purposive meaning, as represented with the underspecified feature [RELS<[_*cause_rel*], [_*action_of_eating_rel*],…>]. A main difference is that the accusative object of the V2 in (19b) is shared by the V1 which is in the ARG(UMENT)-ST(RUCTURE) of the V2.

The following phrase structure rule for the combination of component verbs of SVC is proposed (see Lee 2011, 2012). In (20), the V1 is one of the complements of the V2, and accusative object is shared by the V1 and V2. This shared object and the possible non-shared complements (i.e. $\boxed{A}$ and $\boxed{B}$) are passed up to the resulting combination, where the constructional meaning (C-CONT) is added. Now the VP (i.e. [NP [*hay* V2]]) of (14a) can be analyzed like (21).

(20) Head-Obj-Share-SVC:

$$\begin{bmatrix} \textit{hd-obj-share-svc} \\ \text{SUBJ} \langle \boxed{2} \rangle \\ \text{COMPS} \langle \boxed{4} \rangle \oplus \boxed{A} \oplus \boxed{B} \\ \text{CONT} \begin{bmatrix} \text{HOOK } \boxed{3} \\ \text{RELS } \boxed{G} \oplus \boxed{C} \oplus \boxed{D} \\ \text{HCONS } \boxed{H} \oplus \boxed{E} \oplus \boxed{F} \end{bmatrix} \\ \text{C-CONT} \begin{bmatrix} \text{HOOK } \boxed{3} \begin{bmatrix} \text{LTOP h4} \\ \text{INDEX e3} \end{bmatrix} \\ \text{RELS } \boxed{G} \left\langle \begin{bmatrix} \textit{\_lead\_to\_rel} \\ \text{LBL h4} \\ \text{ARG0 e3} \\ \text{ARG1 h5} \\ \text{ARG2 h6} \end{bmatrix} \right\rangle \\ \text{HCONS } \boxed{H} \left\langle \begin{bmatrix} \textit{qeq} \\ \text{HARG h5} \\ \text{LARG h1} \end{bmatrix}, \begin{bmatrix} \textit{qeq} \\ \text{HARG h6} \\ \text{LARG h2} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \rightarrow \boxed{1} \begin{bmatrix} \textit{nonstative-v} \\ \text{FORM } \textit{-e} \\ \text{SUBJ} \langle \boxed{2} \rangle \\ \text{COMPS} \langle \boxed{4}[\textit{acc}] \rangle \oplus \boxed{A} \\ \text{CONT} \begin{bmatrix} \text{HOOK [LTOP h1]} \\ \text{RELS } \boxed{C} \\ \text{HCONS } \boxed{E} \end{bmatrix} \end{bmatrix}, \mathbf{H} \begin{bmatrix} \textit{nonstative-v} \\ \text{SUBJ} \langle \boxed{2} \rangle \\ \text{COMPS} \langle \boxed{4} \rangle \oplus \boxed{B} \oplus \langle \boxed{1} \rangle \\ \text{CONT} \begin{bmatrix} \text{HOOK [LTOP h2]} \\ \text{RELS } \boxed{D} \\ \text{HCONS } \boxed{F} \end{bmatrix} \end{bmatrix}$$

(21) [[*khephi-lul*]$_{\text{NP}}$ [*hay mek-ess-ta*]$_{\text{Head-Obj-Share-SVC}}$]$_{\text{hd-comp-ph}}$

$$\begin{bmatrix} \textit{hd-comp-ph} \\ \text{PHON} \langle \textit{khephi-lul hay mek-ess-ta} \rangle \\ \text{SUBJ} \langle \boxed{1} \rangle \\ \text{COMPS} \langle \; \rangle \\ \text{DTRS} \langle \boxed{2}, \boxed{6} \rangle \\ \text{HD-DTR} \boxed{6} \begin{bmatrix} \textit{hd-obj-share-svc} \\ \text{PHON} \langle \textit{hay mek-ess-ta} \rangle \\ \text{SUBJ} \langle \boxed{1} \rangle \\ \text{COMPS} \langle \boxed{2} \rangle \\ \text{DTRS} \langle \boxed{3}, \boxed{5} \rangle \\ \text{HD-DTR } \boxed{5} \begin{bmatrix} \textit{nonstative-v} \\ \text{PHON} \langle \textit{mek-ess-ta} \rangle \\ \text{SUBJ} \langle \boxed{1}\text{NP}_i \rangle \\ \text{COMPS} \left\langle \boxed{2}\text{NP}_j, \boxed{3} \begin{bmatrix} \text{PHON} \langle \textit{hay-1} \rangle \\ \text{FORM } \textit{-e} \\ \text{SUBJ} \langle \boxed{1}\text{NP}_i \rangle \\ \text{COMPS} \left\langle \boxed{2}\text{NP}_j \begin{bmatrix} \text{RELS } \boxed{C} \left\langle \begin{bmatrix} \textit{\_coffee\_rel} \\ \text{LBL h1} \\ \text{ARG0 } j \end{bmatrix} \right\rangle \\ \text{QUALIA-ST} \begin{bmatrix} \text{AGENTIVE} \left\langle \boxed{4} \begin{bmatrix} \textit{resultative} \\ \text{RELS } \boxed{A} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{CONT } \boxed{4} \end{bmatrix} \right\rangle \\ \text{CONT} \begin{bmatrix} \text{RELS } \boxed{B} \left\langle [\textit{\_cause\_rel}], \begin{bmatrix} \textit{\_action\_of\_eating\_rel} \\ \text{LBL h5} \\ \text{ARG0 e2} \\ \text{ARG1 } i \\ \text{ARG2 } j \end{bmatrix}, \ldots \right\rangle \end{bmatrix} \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \text{RELS} \langle [\textit{\_lead\_to\_rel}] \rangle \oplus \boxed{A} \oplus \boxed{B} \end{bmatrix} \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \text{RELS} \langle [\textit{\_lead\_to\_rel}] \rangle \oplus \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \end{bmatrix} \end{bmatrix}$$

The final CONTENT of the VP in (21) means that the subject's action of brewing a coffee caused the creation of a coffee (i.e. the subject brewed a coffee), and then ate the coffee (i.e. resultative reading) or tried to eat the coffee (i.e. purposive reading).

Now, in addition to the normal causative light verb *ha*-2 in (22a) for the VP (i.e. [NP [XP [*ha*]]]) of the non-SVC causative construction, the causative V1 light verb *hay*-2 in (22b) is required for the VP (i.e. [NP [XP [*hay* V2]]]) of the causative SVC having the normal causative interpretation.

(22) a. The causative *ha*-2 in non-SVC:

$$\left[\begin{array}{l} \textit{tr-light-v} \\ \text{PHON} < \textit{ha}-2 > \\ \text{ARG-ST} < \text{NP}_i,\ \text{NP}_j, \text{XP}\left[\begin{array}{ll} \text{FORM} & -\textit{key} \\ \text{CONT} & \left[\text{HOOK}\left[\begin{array}{l}\text{LTOP h1}\\ \text{XARG}\,j\end{array}\right]\right] \end{array}\right] > \\ \text{CONT}\left[\begin{array}{l} \text{HOOK}\left[\begin{array}{l}\text{LTOP h2}\\ \text{INDEX e1}\end{array}\right] \\ \text{RELS} < \left[\begin{array}{l}\textit{\_cause\_rel}\\ \text{LBL h2}\\ \text{ARG0 e1}\\ \text{ARG1 h3}\\ \text{ARG2 h4}\end{array}\right], \left[\begin{array}{l}\textit{\_causal\_eventuality\_rel}\\ \text{LBL h5}\\ \text{ARG0 e2}\\ \text{ARG1}\ i\\ \text{ARG2}\ j\end{array}\right] > \\ \text{HCONS} < \left[\begin{array}{l}\textit{\_qeq\_rel}\\ \text{LARG h3}\\ \text{HARG h5}\end{array}\right], \left[\begin{array}{l}\textit{\_qeq\_rel}\\ \text{LARG h4}\\ \text{HARG h1}\end{array}\right] > \end{array}\right] \end{array}\right]$$

b. The causative *hay*-2 in SVC:

$$\left[\begin{array}{l} \text{PHON} < \textit{hay}-2 > \\ \text{FORM}\ \ -\textit{e} \\ \text{SUBJ} < \text{NP}_i > \\ \text{COMPS} < \text{NP}_j,\ \text{XP}\left[\begin{array}{ll} \text{FORM} & -\textit{key} \\ \text{CONT} & \left[\begin{array}{l}\textit{resultative}\\ \text{HOOK}\left[\begin{array}{l}\text{LTOP h1}\\ \text{XARG}\,j\end{array}\right]\end{array}\right] \end{array}\right] > \\ \text{CONT}\left[\begin{array}{l} \text{HOOK}\left[\begin{array}{l}\text{LTOP h2}\\ \text{INDEX e1}\end{array}\right] \\ \text{RELS} < \left[\begin{array}{l}\textit{\_cause\_rel}\\ \text{LBL h2}\\ \text{ARG0 e1}\\ \text{ARG1 h3}\\ \text{ARG2 h4}\end{array}\right], \left[\begin{array}{l}\textit{\_causal\_eventuality\_rel}\\ \text{LBL h5}\\ \text{ARG0 e2}\\ \text{ARG1}\ i\\ \text{ARG2}\ j\end{array}\right] > \\ \text{HCONS} < \left[\begin{array}{l}\textit{\_qeq\_rel}\\ \text{LARG h3}\\ \text{HARG h5}\end{array}\right], \left[\begin{array}{l}\textit{\_qeq\_rel}\\ \text{LARG h4}\\ \text{HARG h1}\end{array}\right] > \end{array}\right] \end{array}\right]$$

Also in (23a), the qualia-causative light verb for [NP [XP [*ha*]]] is presented, and in (23b) the V1 qualia-causative light verb for [NP [XP [*hay* V2]]] is posited.

(23) a. The qualia-causative *ha*-3:

$$\left[\begin{array}{l} \textit{tr-light-v} \\ \text{PHON} < \textit{ha}\text{–3} > \\ \text{ARG-ST} < \text{NP}_i, \text{NP}_j \left[\begin{array}{l} \text{AGENTIVE} <..., \left[\begin{array}{l} \text{RELS}\,\boxed{A} < \left[\begin{array}{l} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3} \end{array}\right], ...> \\ \text{HCONS}\ \boxed{B} \end{array}\right], ...> \end{array}\right], \\ \qquad \text{XP}\left[\begin{array}{ll} \text{FORM} & \textit{-key} \\ \text{CONT} & \left[\text{HOOK}\ [\text{LTOP h5}\ ]\right] \end{array}\right] > \\ \text{CONT}\left[\begin{array}{l} \text{HOOK}\ [\text{LTOP h1}] \\ \text{RELS}\ \boxed{A} \oplus < \left[\begin{array}{l} \textit{\_causal\_} \\ \textit{eventuality\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1}\ i \\ \text{ARG2}\ j \end{array}\right] > \\ \text{HCONS}\ \boxed{B} \oplus < \left[\begin{array}{l} \textit{\_qeq\_rel} \\ \text{LARG h2} \\ \text{HARG h4} \end{array}\right], \left[\begin{array}{l} \textit{\_qeq\_rel} \\ \text{LARG h3} \\ \text{HARG h5} \end{array}\right] > \end{array}\right] \end{array}\right]$$

b. The qualia-causative *hay*-3:

$$\left[\begin{array}{l} \text{PHON} < \textit{hay}\text{–3} > \\ \text{ARG-ST} < \text{NP}_i, \text{NP}_j \left[\begin{array}{l} \text{AGENTIVE} <..., \left[\begin{array}{l} \textit{resultative} \\ \text{RELS}\,\boxed{A} < \left[\begin{array}{l} \textit{\_cause\_rel} \\ \text{LBL h1} \\ \text{ARG0 e1} \\ \text{ARG1 h2} \\ \text{ARG2 h3} \end{array}\right], ...> \\ \text{HCONS}\ \boxed{B} \end{array}\right], ...> \end{array}\right], \\ \qquad \text{XP}\left[\begin{array}{ll} \text{FORM} & \textit{-key} \\ \text{CONT} & \left[\begin{array}{l} \textit{resultative} \\ \text{HOOK}\ [\text{LTOP h5}] \end{array}\right] \end{array}\right] > \\ \text{CONT}\left[\begin{array}{l} \text{HOOK}\ [\text{LTOP h1}] \\ \text{RELS}\ \boxed{A} \oplus < \left[\begin{array}{l} \textit{\_causal\_} \\ \textit{eventuality\_rel} \\ \text{LBL h4} \\ \text{ARG0 e2} \\ \text{ARG1}\ i \\ \text{ARG2}\ j \end{array}\right] > \\ \text{HCONS}\ \boxed{B} \oplus < \left[\begin{array}{l} \textit{\_qeq\_rel} \\ \text{LARG h2} \\ \text{HARG h4} \end{array}\right], \left[\begin{array}{l} \textit{\_qeq\_rel} \\ \text{LARG h3} \\ \text{HARG h5} \end{array}\right] > \end{array}\right] \end{array}\right]$$

In (23a), each of the agentive role and the XP can have either purposive or resultative meaning, but in (23b), the agentive role and the XP are restricted to resultative meanings. Equipped with the lexical items and the phrase rule (20), we can analyze the VP (i.e. [NP [XP [*hay* V2]]]) of the causative SVC with the qualia-causative reading, as in the following:

(24) [[*khephi-lul*]$_{\text{NP}}$ [[*ttukep-key*] [*hay mek-ess-ta*]$_{\text{Head-Obj-Share-SVC}}$] $_{\text{hd-comp-ph}}$]

$$
\left[\begin{array}{l}
\textit{hd-comp-ph} \\
\text{PHON} \langle \textit{khephi-lul ttukep-key hay mek-ess-ta} \rangle \\
\text{SUBJ} \langle \boxed{1} \rangle \\
\text{COMPS} \langle\ \rangle \\
\text{DTRS} \langle \boxed{2}, \boxed{7} \rangle \\
\text{HD-DTR}\boxed{7} \left[\begin{array}{l}
\textit{hd-comp-ph} \\
\text{PHON} \langle \textit{ttukep-key hay mek-ess-ta} \rangle \\
\text{SUBJ} \langle \boxed{1} \rangle \\
\text{COMPS} \langle \boxed{2} \rangle \\
\text{DTRS} \langle \boxed{4}, \boxed{6} \rangle \\
\text{HD-DTR}\boxed{6} \left[\begin{array}{l}
\textit{hd-obj-share-svc} \\
\text{PHON} \langle \textit{hay mek-ess-ta} \rangle \\
\text{SUBJ} \langle \boxed{1} \rangle \\
\text{COMPS} \langle \boxed{2}, \boxed{4} \rangle \\
\text{DTRS} \langle \boxed{3}, \boxed{5} \rangle \\
\text{HD-DTR}\boxed{5} \left[\begin{array}{l}
\textit{nonstative-v} \\
\text{PHON} \langle \textit{mek-ess-ta} \rangle \\
\text{SUBJ} \langle \boxed{1}\text{NP}_i \rangle \\
\text{COMPS} \left\langle \boxed{2}\text{NP}_j \left[\begin{array}{l}
\text{PHON} \langle \textit{khephi-lul} \rangle \\
\text{RELS}\ \boxed{E} \langle [\textit{\_coffee\_rel}] \rangle \\
\text{AGENTIVE} \left\langle \left[\begin{array}{l} \textit{resultative} \\ \text{RELS}\ \boxed{A} \langle [\textit{\_cause\_rel}], \ldots \rangle \end{array}\right] \right\rangle
\end{array}\right], \boxed{3} \left[\begin{array}{l}
\text{PHON} \langle \textit{hay-3} \rangle \\
\text{SUBJ} \langle \boxed{1}\text{NP}_i \rangle \\
\text{COMPS} \left\langle \boxed{2}\text{NP}_j, \boxed{4} \left[\begin{array}{l} \text{PHON} \langle \textit{ttukep-key} \rangle \\ \text{CONT} \left[\begin{array}{l} \textit{resultative} \\ \text{RELS}\ \boxed{D} \end{array}\right] \end{array}\right] \right\rangle \\
\text{CONT} \left[\text{RELS}\ \boxed{A} \oplus \boxed{B} \left\langle \left[\begin{array}{l} \textit{\_causal\_} \\ \textit{eventuality\_rel} \end{array} \right] \right\rangle \right]
\end{array}\right] \right\rangle \\
\text{CONT} \left[\text{RELS}\ \boxed{C} \langle [\textit{\_cause\_rel}], [\textit{\_action\_of\_eating\_rel}], \ldots \rangle \right]
\end{array}\right] \\
\text{CONT} \left[\text{RELS} \langle [\textit{\_lead\_to\_rel}] \rangle \oplus \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \right]
\end{array}\right] \\
\text{CONT} \left[\text{RELS} \langle [\textit{\_lead\_to\_rel}] \rangle \oplus \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \oplus \boxed{D} \right]
\end{array}\right] \\
\text{CONT} \left[\text{RELS} \langle [\textit{\_lead\_to\_rel}] \rangle \oplus \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \oplus \boxed{D} \oplus \boxed{E} \right]
\end{array}\right]
$$

The final CONTENT in (24) means that the subject's action of brewing a coffee and making it hot caused the creation of a hot coffee (i.e. the subject brewed the coffee hot), and then the subject's action of eating the hot coffee caused the result that the coffee became eaten (i.e. the resultative reading of the V2) or the result of eating the coffee is simply intended (i.e. the purposive reading of the V2).

8 Conclusion

The specific meaning of the qualia light verb *ha* in qualia-*ha* construction comes from a qualia role (e.g. *brew* or *drink*) of common noun object. In the causative construction, the qualia-causative light verb *ha* has the mixed meaning of a qualia role and the causative light verb (whose meaning is influenced by the XP); the common noun object of the causative construction can be directly predicated of by the causal verb. In the context of SVC, the meaning of the qualia light verb *hay* is restricted to the resultative meaning of an agentive role. Finally, in the causative SVC, the qualia-causative light verb *hay* has the mixed meaning of the causative light verb and the resultative interpretation of an agentive role. The semantic analysis provided here may be applied to other complex predicates in Korean and other languages (e.g. Tamil, Japanese, and Chinese) that allow some kinds of event cancellation.

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Lexical Effects in Phonemic Neutralization in Taiwan Mandarin

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1. Neutralization of Sibilant Onsets and Nasal Codas in Taiwan Mandarin

Colloquial Taiwan Mandarin has deviated from Guoyu [National language] or Standard Chinese in pronunciation, vocabulary, and even syntax. Such changes come from the linguistic contact with Taiwan Southern Min or natural diachronic linguistic drift (Kubler, 1985; Tung, 1994; Tsao, 2000). This new form of Taiwan Mandarin has become a lingua franca among speakers of the different backgrounds in Taiwan and a creole for new generations to acquire as their mother tongue (Her, 2009). One of the most noticeable segmental changes in Taiwan Mandarin is the merging of alveolar sibilants [ts, ts^{h}, s] and retroflex sibilants [tʂ, tʂ^{h}, ʂ]. The other one in Taiwan Mandarin is the neutralization of alveolar nasal coda [n] and velar nasal coda [ŋ].

Taiwan Mandarin consonant inventory consists of three sets of voiceless coronal sibilants, including unaspirated affricates, aspirated affricates, and fricatives (Chen, 1973). All of the sibilants occur only in the onset position. Among them, the alveolopalatal sibilants [tɕ, tɕ^{h,} ɕ] only precede the high medial vowels [i, y], whereas alveolar sibilants [ts, ts^{h}, s] and retroflex sibilants [tʂ, tʂ^{h}, ʂ] precede the other medial or nucleus vowels in common. Many previous studies on Taiwan Mandarin have found that the retroflex sibilants are approximating to the alveolar sibilants (Kubler, 1985; Wu, 1985; Li, 1986; Yao, 1987; Chen, 1991; Luo, 1991; Yeh, 1991; Rau and Li, 1994; Tung, 1994; Tse, 1998; Tsao, 2000; Chung, 2006). Tung (1994) explicitly illustrated six retroflex sibilant productions in Taiwan Mandarin whose fricative constrictions occurred variably in the coronal places of articulation, depending on the individuals' dialect backgrounds and the following vowels. Chung (2006) also described the variability of retroflex realizations in Taiwan Mandarin as "The degree of tongue (tip) retraction may vary considerably (as it does in Beijing Mandarin too, although a different range is covered), from highly retracted, through the palate-alveolar area [tʃ], [tʃ^{h}], [ʃ], all the way to dentals that are indistinguishable from the dental/apical *z*- [s̪], *c*- [ts̪^{h}], *s*- [s̪] series" (Chung, 2006:200).

Various studies suggested that the neutralization of retroflex sibilants and alveolar sibilants in Taiwan Mandarin was conditioned by multiple factors. Phonologically speaking, unaspirated affricated sibilants enhanced neutralization relative to the two other sibilants (Tse, 1998). Rounded back vowels following retroflex sibilants (Rau and Li, 1994) or alveolar sibilants (Jeng, 2006) tended to increase retroflex sibilant productions. Sociolinguistic studies (Chen, 1991; Luo, 1991; Rau and Li, 1994; Tse, 1998; Jeng, 2006) revealed that individual and contextual factors influenced the usage frequency of retroflex sibilants in Taiwan Mandarin. Women, youth, highly educated people, and those who used Taiwan Mandarin (not Taiwan Southern Min) at home tended to use prescriptive retroflex pronunciations. Formal speech styles and serious speech content also induced more frequent occurrences of prescriptive retroflex pronunciations. Ma (2006) experimentally investigated the perceptual awareness of attributing retroflexion to higher socioeconomic status among Taiwan Mandarin speakers. Chung (2006) also observed that full retroflexing was socially marked as compared to the intermediate forms which were the default covert prestige forms for all groups of speakers in daily conversations. Hypercorrection (i.e., the incorrect substitution, in a prescriptive sense, of retroflex sibilants for the corresponding alveolar sibilants) is not uncommon in Taiwan Mandarin, which indicates speakers' conscious association with interlocutors and social registers in the speech community (Kubler, 1985; Chung, 2006).

Taiwan Mandarin rimes contain only alveolar or velar nasal codas in the closed syllables (Chen, 1973). Even though both of nasal codas follow nearly all kinds of nuclei in common, some Taiwan Mandarin phonological rules change the surface realizations of the vowel-nasal combinations in the rimes. First, the low nucleus /a/ is raised to [ɛ] between a front vowel /i/ or /y/ and an alveolar nasal coda /n/. Second, the rounded high nucleus /u/ is lowered to [o] when preceded by a velar nasal coda /ŋ/. Third, the rounded high nucleus /y/ is diphthongized to [io] when preceded by a velar nasal coda /ŋ/. Fourth, the low nucleus /a/ is backed to [ɑ] when preceded by a velar nasal coda /ŋ/. In addition, there is a phonological gap of rimes as /*yaŋ/.

By observing that place distinction of nasal codas is frequently dropped in Taiwan Mandarin, researchers have shown intensive interests in determining the direction of nasal coda neutralization in Taiwan Mandarin, as other dialectal and historical linguists used to debate the same issue when they attempted to reconstruct nasalization processes in Chinese history (Chen, 1973; Zee, 1985; Hess, 1990). Some researchers argued for a single unidirectional merging direction [ŋ] > [n], regardless of the preceding vowels (Kubler, 1985; Tse, 1992; Chiou, 1997; Yang, 2007). Still others claimed that nasal codas tended to be alveolarized before a mid vowel [ə], but velarized before a high vowel [i] (Wu, 1985; Chen, 2000; Lin, 2002; Hsu and Tse, 2007; Lai, 2009). Among the studies which proposed bidirectionality of nasal coda neutralization, they even differed in whether alveolarization or velarization is the leading trend in Taiwan Mandarin.

Regarding the influencing factors of nasal coda neutralization in Taiwan Mandarin, researchers have investigated phonological, stylistic, and sociolinguistic variables. Phonologically speaking, Chiou (1997) found that the following coronal consonants enhanced alveolarization of nasal codas, even though the tone values and the prosodic boundaries barely influenced nasal coda neutralization. Tse (1992) experimentally investigated that nasal coda neutralization was more frequent when pronounced in the phrases or sentences than in the minimal-pair word lists. Sociolinguistic studies also observed that nasal coda neutralization in Taiwan Mandarin was conditioned by the age, gender, social status, education level, and ethnicity in an intertwining way (Kubler, 1985; Chen, 1991; Tse, 1992; Yueh, 1992). However, a latest study by Hsu and Tse (2007) found that those sociolinguistic variables previously claimed to influence nasal coda neutralization in Taiwan Mandarin have been leveled out today.

2. Effects of lexical frequency and neighborhood density

In a great deal of psycholinguistic studies, the factors related to the organization and activation of the words in the mental lexicon have been shown to influence speech perception and speech production. One factor is lexical frequency that counts how often words are used (e.g., *buy* and *goal* are more frequent than *bough* and *foal*). Common words are both recognized (Oldfield and Wingfield, 1965; Luce and Pisoni, 1998) AND produced (Geffen and Luszcz, 1983; Dell, 1990; Jescheniak and Levelt, 1994; Bonin and Fayol, 2002) faster than rare words. Rare words are more susceptible to speech errors than common words (Dell, 1990; Stemberger and McWhinney, 1986).

The other factor relevant to lexical frequency is neighborhood density that counts how many other words that are phonologically similar to the target words (e.g., *cat* and *lick* have more lexical neighbors than *quiz* and *purge*). Words from dense neighborhoods are recognized more slowly and less accurately than those from sparse neighborhoods (Goldinger, Luce, and Pisoni, 1989; Luce, 1986; Luce and Pisoni, 1998; Vitevitch and Luce, 1998, 1999). Nevertheless, neighborhood density has provided contradictory evidence in speech production. Some studies found that dense neighborhoods made speech production more accurate and faster than sparse neighborhoods (Gordon, 2002; Gordon and Dell, 2001; Harley and Brown, 1998), whereas other studies showed that spare neighborhood words were produced more quickly and with shorter durations than dense neighborhood words (Luce and Pisoni, 1998, Vitevitch and Luce, 1998).

Furthermore, lexical effects have been found to influence phonetic variation. While high lexical frequency words or phrases are more subject to reduction processes (Zipf, 1935; Balota, Boland, and Shields, 1989; Bybee and Hopper, 2001; Pierrehumbert, 2002; Myers and Li, 2009), dense neighborhoods cause speech production to move toward the canonical or even exaggerated forms as compared with sparse neighborhoods (Munson and Solomon, 2004; Wright, 2004; Munson, 2007).

Given the lexical influences in spoken word processing, our study attempts to explore how lexical factors affect two Taiwan Mandarin neutralization patterns during speech production in. Furthermore, the examination of lexical factors in neutralization also aims at explicating the cognitive mechanism underlying neutralization. One way to account for neutralization during speech production is based on the assumption that phonetic variability is the product of phonological processes transmitting continuous articulatory parameters into overt speech actualization (Bybee, 2001). Thus for frequent words and sparse neighborhood words, proper speech preparation can increase articulatory velocity which in turn can yield a larger amount of reduced realizations in speech production. Alternatively, phonetic variability can be the result of lexical selection that bypasses phonological planning processes; speakers can select an exemplar of a word from memory, and then use it, averaged with similar exemplars, as a goal for speech production (Pierrehumbert, 2002). Since frequent words and sparse neighborhood words contain more memories of reduced traces, as speakers have accumulated from prior speech experiences, those words naturally surface with more reduction. To investigate these hypotheses behind neutralization in Taiwan Mandarin, we thus conducted a production experiment as in the next section.

3. A production experiment

3.1 Participants

Twenty-four undergraduates from National Chung Cheng University participated in this experiment by receiving a reasonable fee. A half of them were women. In each gender, a half of them spoke Taiwan Mandarin as home while other half spoke Taiwan Southern Min at home. Ages of participants ranged from 19 to 23 (*M*=20.7, *SD*=1.5). All of participants were fluent Taiwan Mandarin speakers by self-evaluation.

3.2 Stimuli

The stimuli were 705 monosyllables with 308 pronounced with one of six sibilant onsets [ts, ts^h, s, tʂ, tʂ^h, ʂ] and 527 pronounced with one of two nasal codas [n, ŋ]. Some of the monosyllables contained both of a sibilant onset and a nasal coda. All of the monosyllables were presented in Chinese characters as the majority of 80 pretest participants chose the first instances among the homophones upon seeing the Romanization forms (zhuyin fufao). An equal amount of monosyllables not pronounced with those sibilant onsets and nasal codas were also prepared as the fillers.

3.3 Procedure

The experiment took place in a double-walled sound-attenuated room for approximately 30 minutes. The visual stimuli were presented on a 17-inch monitor. Participants were instructed to respond to a microphone on a stand at the moment when a response-triggering tone appeared. The experiment was preceded by a familiarization section of ten trials. Each participant had to read aloud the Chinese characters either concurrent with a response-triggering tone or 1000 ms before a response-triggering tone. The immediate-response and delayed-response conditions were counterbalanced by both of stimuli and participants. The experiment always advanced trials two seconds after the tone appeared. The experiment was processed by the DMDX program (Forster, 2009). The program also recorded production latency from the onset of Chinese characters to the initiation of participants' responses; the responses were simultaneously digitized at a sampling rate of 22 kHz with 16-bit quantization.

3.4 Data Preparation

The data were segmented and transcribed using Praat (Boersma and Weenink, 2009). The segmentation procedure was machine-made with an aid of Praat built-in segmentation function which tracked syllabic and segmental boundaries automatically. The boundaries were then readjusted manually by the author. For the sibilant onsets, the acoustic measurements comprised the information from the fricative noises (spectral moments, peak/slope parameters, duration, and average intensity) and the adjacent vowels (the first three formant frequencies on the onset of following adjacent vowels). For the nasal codas, the acoustic measurements comprised the information from the nasal consonants (amplitude differences of the nasal formant and the first formant, nasal duration, and average nasal intensity) and adjacent vowels (the first three formants at the offsets of the preceding nucleus vowels).

4. Statistical analyses

In order to maximize the power of our analysis, we entered all the acoustic measurements (after orthogonalized by Principal Component Analysis) into a linear mixed-effects model (LME; Baayen, 2008). The LME model also enhances statistical sensitivity by allowing us to include both of random variables (participants and items) among the other fixed variables in the model. The current likelihood ratio test revealed that by-participant-and-item model always fitted the dataset better than by-participant-only model or by-item-only model. The tool that we used for modeling the LME analysis was the *lmer* function in the *lme4* package (Bates, Maechler, and Dai, 2008) in R (R Development Core Team, 2012). The *p* values from the LME model were simulated by means of Markov

Chain Monte Carlo (MCMC) sampling 10,000 times using the *pvals.fnc* function in the *languageR* package (Baayen, 2008).

4.1 Predictors

In this subsection, we report the predictor variables that may influence Taiwan Mandarin neutralization.

4.1.1 Lexical Variables: Lexical Frequency and Neighborhood Density

As the most important predictor variables we were concerned with, we calculated lexical frequency and neighborhood density of all the monosyllabic stimuli. Lexical frequency was the calculation of the occurrences from two Chinese spoken corpora: *SUBTLEX-CH*: *Chinese Word and Character Frequencies Based on Film Subtitles* (Cai and Brysbaert, 2010) and *Taiwanese Putonghua Speech and Transcripts in the Linguistic Data Consortium* (Duanmu, Wakefield, Hsu, Qui, and Cristina, 1998). For a particular Chinese character, lexical frequency was the sum of occurrences from both of spoken corpora. As following the single segment edit distance metric (Luce, 1986; Luce and Pisoni, 1998), a phonological neighbor was defined as any syllable derived by substituting, deleting, or inserting a single segment or tone. Given the spoken corpora yielded the frequencies of all homophonic Chinese characters, neighborhood density of a monosyllable was the sum of occurrences of all the neighboring homophones from both of the spoken corpora. Lexical frequency (**logFreqSpoken**) and neighborhood density (**logFreqSpoken**) were logarithm normalized before being input to statistical analyses.

4.1.2 Orthographic Variables: Familiarity of Characters and Zhuyin Fuhao

As in previous studies, orthography tended to preserve phonetic differences in the neutralization process of two segments (Fourakis and Iverson, 1984; Jassem and Richter, 1989; Warner, Jongman, Sereno, and Kemps, 2004; Warner, Good, Jongman, and Sereno, 2006). Apart from that, the orthographic variables hereby functioned factoring out the prelexical visual identification process, once it confounded with spoken word processes, during the present production task. We assessd orthographic influences by conducting two sets of thermometer judgment tasks to obtain the familiarities of Chinese characters and Romanization forms (zhuyin fuhao). Both familiarity scores for Chinese characters (**logFamChar**) and zhuyin fuhao (**logFamZhu**) were logarithm normalized before being input to statistical analyses.

4.1.3 Competence-Based Variables: Accuracy of Spelling out Monosyllables

An assumption related to pronunciation variability from prior sociolinguistic Taiwan Mandarin studies is that speakers might produce canonical or deviant forms biased from their prescriptive knowledge about the pronunciation of an orthographic form. Failure to produce the canonical forms might therefore be due the lack of prescriptive knowledge of the canonical forms. For instance, Taiwan Mandarin speakers might mispronounce retroflex or alveolar sibilants simply because they never took note of the prescriptive pronunciations of retroflex or alveolar sibilants during the period that they learned Chinese characters. Accordingly, we assessed the prescriptive knowledge by asking participants to spell out the pronunciations of the Chinese character stimuli using the Romanization forms (zhuyin fuhao). Accuracy ratio (**charMatchZhu**) was averaged across participants, i.e., the proportion of whether participants spelled out the target sibilants or nasals of the stimuli accurately.

4.1.4 Contextual Variables: Features of Segments and Adjacent Vowels

Previous Taiwan Mandarin studies have observed that the occurrences of segmental neutralization coordinated with neighboring segmental features. Acoustic properties of retroflex and alveolar sibilants in Taiwan Mandarin varied with their co-present aspiration and affrication (Tse, 1998; Jeng, 2006). Previous studies in Taiwan Mandarin also showed that lowness or highness of the preceding vowels influenced nasal coda neutralization to differential extents (Kubler, 1985; Wu, 1985; Chen, 1991; Tse, 1992; Chiou, 1997; Lin, 2002; Hsu and Tse, 2007). We thus took the contextual variables into account to prevent these variables from confounding with the lexical variables in affecting neutralization. For coding the contextual features of sibilant onsets, we specified the features of **retroflexion**, **aspiration** and **affrication** of the sibilant onsets and the highness of the following vowels (**vHigh**). For coding the contextual features of the nasal codas, we specified the **alveolar** places of articulation of the nasal codas and the lowness of the preceding vowels (**vLow**).

4.1.5 Processing Variables: Production Latency and Response Duration

One of the present goals in our study is to examine whether lexical influences in neutralization come from real-time planning processes or lexically selective processes. Previous studies have shown that lexical frequency affected access of lexical items (Dell, 1990; Jescheniak and Levelt, 1994; Bonin and Fayol, 2002) and the lexical effects could be extended to postlexical pronunciation processes (Balota and Chumbley, 1985; Goldinger, Azuma, Abramson, and Jain, 1997). Some other studies also have found that high lexical frequency reduced response duration (Wright, 1979; Geffen and Luszcz, 1983, Kawamoto, Kello, Higareda, and Vu, 1999; Jurafsky, Bell, Gregory, and Raymond, 2001; Munson and Solomon, 2004). Moreoever, neutralization can be the consequence of duration-dependent undershoot or overshoot; for instance, Moon and Lindblom (1994) found that shorter vowels tended to be produced closer to the Euclidian center of the F1/F2 space than longer vowels. Such being the case, neutralization can be the accumulation of a sequential temporal transition from lexical access, phonological processes, to articulation during speech production. Accordingly, we specified two processing variables: production latency or reaction times (**RT**) and syllable duration (**sylDur**) that roughly indicated the processes of speech preparation and speech actualization, respectively.

4.2 Dependent Measurements

To deal with multidimensional acoustic measurements (3.4), statistical technique of Principal Components Analysis (PCA) maximizes the explanation of the variances while shrinking down the dimensions of the variances in the dataset to very few crucial ones (Baayen, 2008). The output of PCA is a transformed matrix with the reduced number of uncorrelated principal components. In practice, we only selected the first principal components (PC1) which accounted for 81% of the variances of the sibilant measurements or 70% of the variances of the nasal measurements, respectively. Pearson's product-moment correlation tests showed that all of the acoustic measurements significantly correlated with the first principal components, proving that the first principal components were realizably representative of all of the acoustic measurements.

4.3 Results

The production experiment on twenty-four subjects yielded a total of 7,392 sibilant tokens (308 words × 24 subjects) and 12,648 nasal tokens (308 words × 24 subjects). Prior to analysis, 330 (4.5%) sibilant errors and 386 (1.0%) nasal errors were discarded due to mispronunciations and non-responses in the trials. As initializing the analysis of the dataset, we performed linear mixed-effects (LME) models for the immediate-response condition and the delayed-response condition separately.

4.3.1 Sibilant Onset Neutralization

In the immediate-response condition where speakers read the stimuli simultaneously with the response cues, the main effects in the LME model (1) indicate that the contextual (retroflexion, aspiration, and vocalic highness), orthographic (familiarity of zhuyin fuhao), and lexical variables (neighborhood density) influenced the way that speakers pronounced sibilants. Retroflexion, aspiration, vocalic highness, and higher neighborhood density increased retroflex productions, while higher familiarity of zhuyin fuhao increased alveolar productions.

To assess the neutralization of sibilant onsets, we cared more about the interactions of retroflexion with the other predictors in the LME model. For the contextual variables, affrication, aspiration, and vocalic highness enhanced neutralization by increasing retroflex productions. For the orthographic variable, higher familiarity of zhuyin fuhao raised neutralization by increasing retroflex productions. For the processing variables, faster reaction times caused more neutralization by increasing alveolar productions. No interactions of retroflexion with the other predictors, including those with lexical variables, were found. The partial effects of the lexical variables and the processing variables of two sibilant onsets (with 95% confidence intervals) are illustrated in (3).

(1) Linear mixed-effects regression model of the predictors for PC1 on sibilant onsets in the immediate-response condition.

N = 3,580	*Estimate*	*Std. Error*	*t*	*p* (MCMC)
(Intercept)	3270.844	1001.977	3.264	.0011*
retroflexion	-2552.969	1216.873	-2.098	.0360*
aspiration	-724.143	135.099	-5.360	<.0001*
affrication	-214.078	149.037	-1.436	.1510
vowelHigh	-900.795	112.082	-8.037	<.0001*
logFamChar	-1040.302	580.659	-1.792	.0733
logFamZhu	921.863	407.140	2.264	.0236*
charMatchZhu	-627.475	537.757	-1.167	.2434
RT	55.846	211.218	.264	.7915
sylDur	116.548	460.869	.253	.5131
logFreqSpoken	-60.480	79.635	-.759	.4476
logNeighborSpoken	-452.595	147.447	-3.070	.0022*
retroflex:aspiration	386.662	181.510	2.130	.0332*
retroflex:affrication	328.911	193.611	1.699	.0894
retroflex:vowelHigh	787.099	152.001	5.178	<.0001*
retroflex:logFamChar	1642.838	841.622	1.952	.0510
retroflex:logFamZhu	-1166.230	541.713	-2.153	.0314
retroflex:charMatchZhu	546.838	711.415	.769	.4421
retroflex:RT	587.293	224.423	2.617	.0089*
retroflex:sylDur	576.691	519.161	1.111	.2667
retroflex:logFreqSpoken	66.338	101.419	.654	.5130
retroflex:logNeighborSpoken	269.856	182.930	1.475	.1400

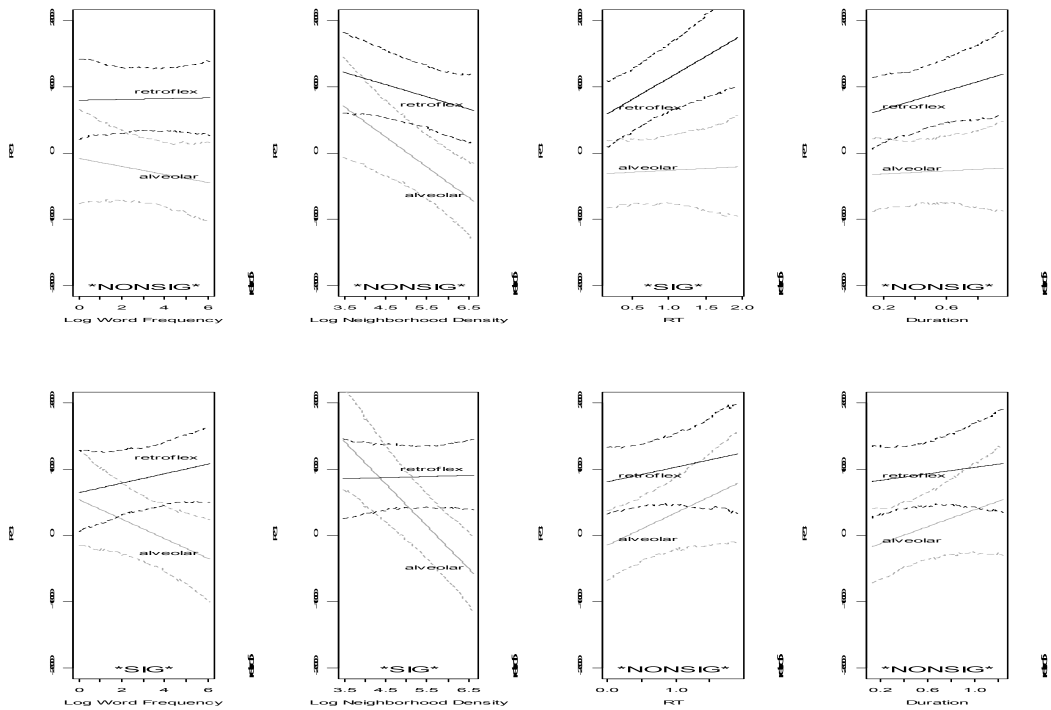
In the delayed-response condition where speakers read the stimuli 1000 ms before the response cues, the main effects in the LME model (2) indicate that aspiration, vocalic highness and higher neighborhood density increased retroflex productions, while higher reaction times increases alveolar productions.

To investigate the neutralization of sibilant onsets, we further pay attention to the interactions of retroflexion with the other predictors in the LME model. It was found that vocalic highness promoted neutralization by increasing retroflex productions; lower lexical frequency and lower neighborhood density enhanced neutralization by either drawing two sibilant productions closer to the intermediate place of articulation or increasing retroflex productions. No interactions of retroflexion with the other predictors, including those with the processing variables, were found.

(2) Linear mixed-effects regression model of the predictors for PC1 on sibilant onsets in the delayed-response condition.

N = 3,482	*Estimate*	*Std. Error*	*t*	*p* (MCMC)
(Intercept)	3675.528	1028.004	3.575	.0004*
retroflexion	-2141.342	1260.294	-1.699	.0894
aspiration	-691.939	139.564	-4.958	<.0001*
affrication	-267.813	152.313	-1.758	.0788
vowelHigh	-1212.547	116.661	-10.394	<.0001*
logFamChar	-404.249	604.561	-.669	.5038
logFamZhu	731.679	425.119	1.721	.0853
charMatchZhu	-473.301	556.543	-.850	.3951
RT	488.371	240.589	2.030	.0424*
sylDur	640.689	446.787	1.434	.1517
logFreqSpoken	-147.514	82.871	-1.780	.0752
logNeighborSpoken	-147.514	1260.294	-4.119	<.0001*
retroflex:aspiration	290.663	188.437	1.542	.1230
retroflex:affrication	373.439	199.685	1.870	.0615
retroflex:vowelHigh	1158.213	158.144	7.324	<.0001*
retroflex:logFamChar	-705.450	875.063	-.806	.4202
retroflex:logFamZhu	-899.734	566.769	-1.587	.1125
retroflex:charMatchZhu	1283.677	740.876	1.733	.0832
retroflex:RT	-268.211	242.727	-1.105	.2692
retroflex:sylDur	-395.124	499.334	-.791	.4288
retroflex:logFreqSpoken	219.038	105.365	2.079	.0377*
retroflex:logNeighborSpoken	650.389	190.798	3.409	.0007*

(3) Partial effects of the lexical variables and processing variables on two sibilant onsets in the immediate- (upper) and delayed- (lower) conditions. An interaction of retroflexion with the other variable is marked *SIG* in the bottom of the graph.



4.3.2 Nasal Coda Neutralization

The results from the immediate-response condition (4) show no main effects in general nasal coda productions. Nevertheless, we found a number of interactions of alveolar (place of articulation) with the other predictors in the LME model. Non-low vowels enhanced neutralization by increasing alveolar productions. The processing variables i.e., slower reactions times and shorter response duration enhanced neutralization by increasing alveolar productions. The lexical variables i.e., higher lexical frequency and higher neighborhood density raised neutralization by drawing two sibilant productions closer to the immediate place of articulation. The partial effects of the lexical variables and the processing variables of two nasal codas (with 95% confidence intervals) are illustrated in (6).

(4) Linear mixed-effects regression model of the predictors for PC1 on nasal codas in the immediate-response condition.

N = 6,190	*Estimate*	*Std. Error*	*t*	*p* (MCMC)
(Intercept)	86.784	350.465	.248	.7804
alveolar	-358.572	540.859	-.663	.5074
vowelLow	46.052	23.695	1.944	.0520
logFamChar	120.178	126.120	.953	.3407
logFamZhu	-36.811	168.936	-.218	.8275
charMatchZhu	78.445	189.835	.413	.6795

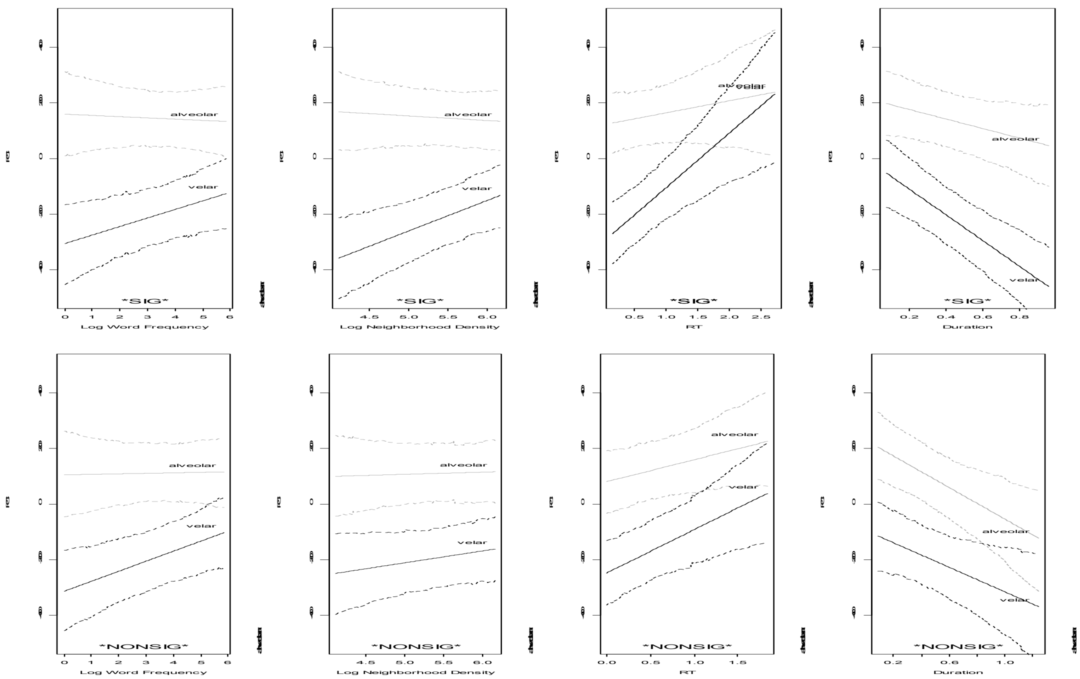
RT	43.350	48.838	.888	.3748
sylDur	-172.259	99.699	-1.728	.0841
logFreqSpoken	-4.484	17.951	-.663	.8027
logNeighborSpoken	-16.662	38.976	-.427	.6690
alveolar:vowelLow	86.439	35.863	2.410	.0160*
alveolar:logFamChar	-130.621	179.703	-.727	.4673
alveolar:logFamZhu	-287.167	268.304	-1.070	.284
alveolar:charMatchZhu	-155.273	333.413	-.466	.6414
alveolar:RT	153.075	55.061	2.780	.0055*
alveolar:sylDur	-292.660	122.414	-2.391	.0168*
alveolar:logFreqSpoken	135.248	24.370	2.446	.0048*
alveolar:logNeighborSpoken	127.061	56.116	2.264	.0236*

The results from the delayed-response condition (5) show the main effects of the contextual variable i.e., vocalic lowness and the processing variable i.e., response duration, indicating that vocalic lowness and longer response duration induced more velar productions. Crucially to our analysis, no interaction of alveolar (place of articulation) with the other predictors, including the lexical variables and the processing variables was found in the LME model.

(5) Linear mixed-effects regression model of the predictors for PC1 on nasal codas in the delayed-response condition.

N = 6,071	*Estimate*	*Std. Error*	*t*	*p* (MCMC)
(Intercept)	-40.676	338.431	-.120	.9043
alveolar	31.903	525.416	.061	.9516
vowelLow	68.909	23.139	2.978	.0029*
logFamChar	-66.050	123.003	-.537	.5913
logFamZhu	160.893	165.127	.974	.3299
charMatchZhu	54.227	184.033	.295	.7683
RT	78.703	50.472	1.559	.1190
sylDur	-284.552	95.243	-2.988	.0028*
logFreqSpoken	1.871	17.490	.107	.9148
logNeighborSpoken	7.977	38.034	.210	.8339
alveolar:vowelLow	16.211	34.914	.464	.6424
alveolar:logFamChar	112.244	174.211	.644	.5194
alveolar:logFamZhu	-495.013	261.706	-1.891	.0586
alveolar:charMatchZhu	-146.411	324.715	-.451	.6521
alveolar:RT	76.951	56.543	1.361	.1736
alveolar:sylDur	63.200	120.182	.526	.5990
alveolar:logFreqSpoken	34.308	23.715	1.447	.1480
alveolar:logNeighborSpoken	35.019	54.521	.642	.5207

(6) Partial effects of the lexical variables and processing variables on two sibilant onsets in the immediate- (upper) and delayed- (lower) conditions. An interaction of alveolar with the other variable is marked *SIG* in the bottom of the graph.



5. Discussion

This section discusses the findings from the production experiment. First, for retroflex sibilant neutralization, most of predictors (including the three contextual variables and neighborhood density) approximated neutralization to retroflex productions, while lexical frequency made neutralization close to the intermediate place of articulation between two sibilant onsets, but reaction times brought about neutralization for alveolar productions. For nasal coda neutralization, vocalic lowness, reaction times, and response duration activated alveolar productions during neutralization, while lexical frequency and neighborhood density triggered neutralization close to the intermediate place between two nasal codas. The present patterns were not inconsistent with the previous Taiwan Mandarin studies. Even though neutralization was usually expected to converge on the unmarked alveolar (vs. retroflex or velar) places of articulation, retroflex sibilant neutralization exhibited hypercorrection, i.e., the substitution of retroflex sibilants for alveolar sibilants, probably due to sociolinguistic awareness of Taiwan Mandarin speakers.

Second, higher lexical frequency and higher neighborhood density were correlated with higher nasal coda neutralization, whereas lower lexical frequency and lower neighborhood density were correlated with higher sibilant onset neutralization. The contrast was here found across the neutralization patterns, which differed from previous research in that higher lexical frequency enhanced reduction processes while higher neighborhood density induced hyperarticulated speech (e.g., Bybee and Hopper, 2001; Munson and Solomon, 2004; Wright, 2004; Munson, 2007). One of the explanations for this is that speakers' sociolinguistic awareness made sibilant onset neutralization likely to occur in infrequent words and dense neighborhood words since speakers tended to adopt hypercorrect retroflex productions in facing the uncertainty and ambiguity of the prescriptive pronunciations in those words. The other explanation is based on the finding that speakers were rather insensitive to response duration and reaction times in sibilant onset neutralization. In both of immediate- and delayed- response conditions, speech actualization as measured by response duration did not affect neutralization at all. Speech preparation as measured by reaction times in the immediate-response condition affected neutralization but in a contrary direction to lexical effects in neutralization processes. This plausibly implied that lexical effects in sibilant onset neutralization were neutral to or different from the prediction of lexical effects on ordinary reduction processes in previous studies. By contrast, nasal coda neutralization was compatible with the account of the real-time processing mechanism. Speakers spent more time in accessing neutralized words (consistent with lexical effects in yielding more alveolar productions) probably due to self-monitoring of lexical ambiguity during speech preparation. As speakers began to initialize speech implementation, neutralization increased with shorter response duration, suggesting that speakers indeed condensed nasal coda productions in facing time restriction.

Third, lexical effects in sibilant onset neutralization occurred only in the delayed-response condition, while lexical effects in nasal coda neutralization occurred only in the immediate-response condition. The common findings across two neutralization patterns were no processing effects (reaction times and response duration) in neutralization in the delayed-response condition where speakers were under less time restriction to set up speech production. Lexical effects in sibilant onset neutralization were thus a case in which speakers did not utilize real-time processing to realize neutralization since the lexical effects only occurred in the delayed-response condition; instead, lexical effects in sibilant onset neutralization were likely a selective process of realized forms directly from the mental lexicon. By contrast, nasal coda neutralization was lexically processed only in the immediate-response condition; as temporal pressure decreased in the delayed-response condition, lexical effects in neutralization, which required an intermediate time-driven phase to realize neutralization, thus disappeared.

Overall, the contrast between two neutralization patterns is expected if we assume that two neutralization patterns are subject to different processing mechanisms. Nasal coda neutralization is gradually constructed via the transition of articulatory processes by time. Sibilant onset neutralization is a consciously selective process during speech preparation in that speakers are aware of the relationship of lexical idiosyncrasy and hypercorrect retroflex productions. The lexical effects in sibilant onset neutralization are not incompatible with previous diachronic changes that began with infrequent words for a socio-cognitive reason (Bybee, 2000; Phillips, 2006). The present findings encourage us to explore more diverse processing mechanisms of phonetic patterns even if they might look not different at first glance.

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How Semantics is Embodied through Visual Representation: Image Schemas in the Art of Chinese Calligraphy*

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Introduction

This study aims to investigate abstract reasoning and embodied cognition through the analysis of image schemas and conceptual metaphors in the interplay of art and language.

Chinese calligraphy is noteworthy due to its unique embodied characteristics and image-schematic representations of visual art and language. The art of Chinese calligraphy not only represents the visual forms of Chinese characters but also conveys meanings, emotion, and style, demonstrating the aesthetics of language and art.

By analyzing image schemas and metaphors in classical works of art, this paper shows how semantics is conceptualized and embodied through visual representation of Chinese calligraphy. In this study, we examine how semantics is visualized within the topological structure of cognitive mechanisms of a CONTAINER schema, the crucial image schema that structures the conceptualization of spatial relation concepts. This paper proposes that the CONTAINER schema, the BALANCE schema, the FORCE schema, as well as the metaphors SIGNIFICANCE IS SIZE and MIND IS A BODY, which may motivate the calligrapher's creative process, underlie the art of Chinese calligraphy.

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Our findings show that the semantics in Chinese calligraphy is construed through the visual forms of Chinese characters, whereas the layout and spatial distribution between the characters express the pragmatics, including emphatic functions, rhetorical readings, and informative purposes. How viewers interpret the art of Chinese calligraphy is based on the most salient images, such as sizes of characters, degrees of boldness, and spatial balance. Viewers use the visual cues as the cognitive anchors to get their interpretation based on primary metaphors and schemas. In this study, we provide an analysis to explore how such primary cognitive mechanism links visual perception and semantic/pragmatic recognition.

1 Background

The main tenet of Conceptual Metaphor Theory (Lakoff and Johnson 1980, 1999) is that conceptual mechanisms arising from our sensorimotor experience and neural structures, including image schemas, metaphors, and other embodied imaginative structures, help us conceptualize and experience our world. The mechanisms of image schemas operating with conceptual metaphors enable human beings to employ the logic of our sensory-motor experience to perform high-level cognitive operations for abstract entities and domains (Johnson 2005: 26). As previous studies on cognitive science show, the process of image-schematic and metaphor-based understanding has been demonstrated for concepts in different fields, including mathematics (Lakoff and Nuñez 2000), law (Winter 2001), morality (Johnson 1993), analogical problem solving (Craig, Nersessian and Catrambone 2002), scientific causality (Lakoff and Johnson 1999), psychology (Fernandez-Duque and Johnson 1999; Gibbs and Colston 1995).

However, few researches focused on abstract reasoning and theorizing in the interface between art and language, therefore, this study aims to bridge the gap by providing an explanation for abstract reasoning and embodied cognition in the field of art and language based on image-schematic and metaphor-based analysis. In the next section, we will introduce the data we focus on in this paper.

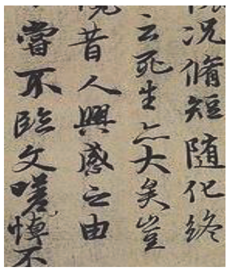
2 Data

The data is selected from two classical pieces of art by calligrapher Master Wang Xi-zhi (303-361 AD, Jin Dynasty) whose works have been studied as examples to learn and practice the art of calligraphy.

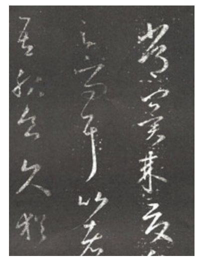
The two representative styles of Master Wang are the frame script, *Lantingjixu* (lit., 'Preface to the Poems Composed at the Orchid Pavillon'), and the cursive script, *Shiqitie* (lit., 'The Seventeenth Script'), as shown in Figure 1.

Frame script is characterized for its neatness, equal balance, and clearness of each stroke. In contrast, cursive script is famous for its running stroke and simplified structure of characters. A comparison of the two distinct styles in terms of visual cues can help us better capture what roles primary schemas and metaphors play.

Figure 1: Excerpts of the two representative styles of Master Wang



The Frame script: *Lantingjixu*



The Cursive script: *Shiqitie*

Lantingjixu is the introduction to a collection of poems written by several poets in a summer gathering at a place called *Lanting*. Master Wang described the time, location, and purpose of the Spring festival, revealing his viewpoints about life, and lamenting the fast passing of time.

As for *Shiqitie,* it is a letter correspondence with a friend written by Master Wang. He recoded the current status of himself and his family, and included his own thoughts on life in this correspondence.

In the next section, we will discuss how semantics and pragmatics are embodied through visual representation in the two classical pieces of art in Chinese calligraphy.

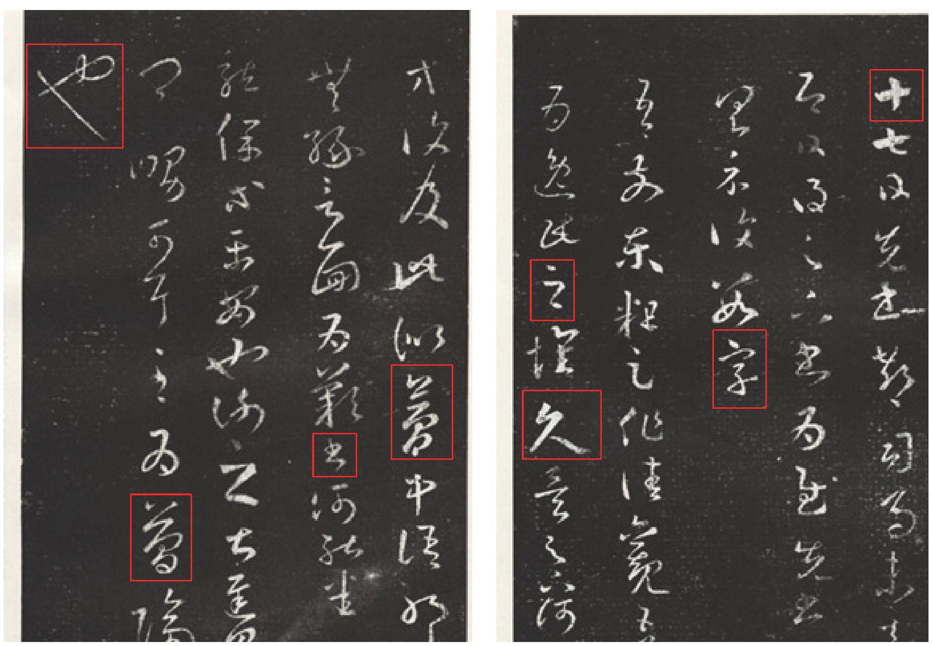
3 Connection between image schemas, metaphors, and Chinese calligraphy

In this study, we suggest that the visual form and meanings of Chinese calligraphy are conceptualized and visualized through the CONTAINER schema, having the gestalt structure of an interior, an exterior, and a boundary. The visual form that consists of lines and brush strokes is construed as the boundary, the semantics is construed as the interior, and the space allocation is construed by the exterior of visual forms. Specifically, the semantics is construed within the interior, while the pragmatic function, such as emphatic functions, rhetorical readings, and informative purposes, are reached by the spatial allocation of the exterior of each visual form. In the following analysis, we will examine the schematic characteristics with examples.

3.1 The link between the CONTAINER schema and semantics

In Chinese calligraphy, different sizes of visual forms reveal topological characteristic of the CONTAINER schema. Our analysis shows that when the interior of the CONTAINER schema is significant, the boundary is enlarged. In other words, the size of a visual form can be larger when the meaning or pragmatic function of the interior is significant, for example, when there is a key word with core semantics in the paragraph or a pragmatic marker with important discourse function in the context. As shown in Figure 2, the characters marked in the red square are those with significant meanings, important grammatical functions, or emphasized contents. For example, the character at the left-top corner, *ye*, the grammatical word with pragmatic functions, is enlarged to emphasize the end of a statement with a pause of the emotion.

Figure 2: Excerpt of cursive script from *Shiqitie*

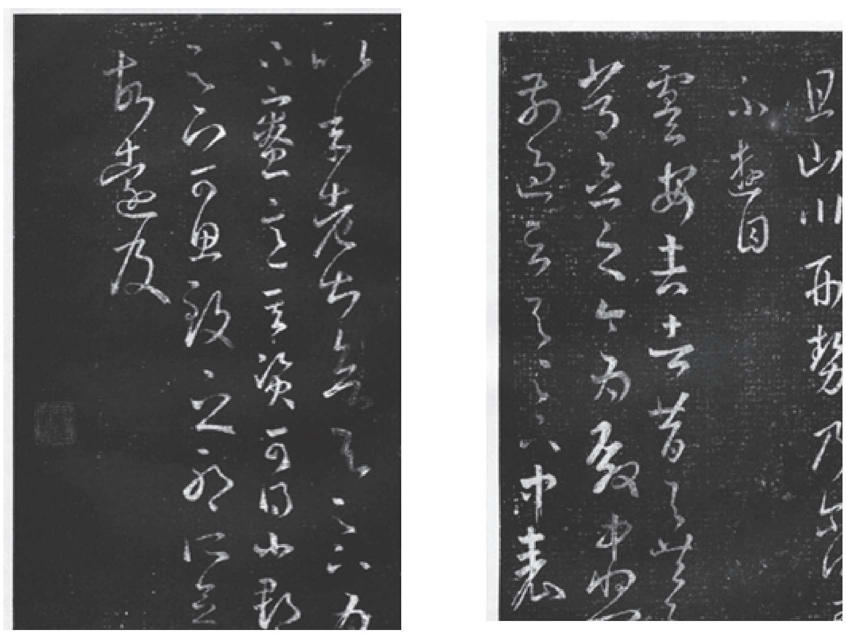


We claim that the primary metaphor, SIGNIFICANCE IS SIZE, motivates the visualization of topological characteristic in Chinese calligraphy, which strengthens the natural flow in cursive script. However, some free variations of size are found in cursive script as well.

3.2 Visual cues construed by the BALANCE schema

As previously mentioned, the space allocation of visual forms is construed by the exterior of CONTAINER schema in Chinese calligraphy. The space allocated in the exterior creates the scale and the atmosphere in the art work. We propose the BALANCE schema that involves “a symmetrical or proportional arrangement of forces around a point or axis (Johnson 1987: 85-98)” is incorporated in the exterior to keep the visual cues, including ‘visual weight’ and ‘visual force,’ in balance while sustaining the natural flow in the art of Chinese calligraphy.

Figure 3: Excerpt of cursive script from *Shiqitie*



As Figure 3 shows, the curving lines in the exterior, a natural segment of emotion of the calligrapher, not only connect the visual forms to maintain the coherence and balance but also reveal the speed and flow of the visual force. The curving lines and forms in the cursive script are connected depending on the coherence and rhythm in the context. The stylistic forms and natural flow of the atmosphere visually represent the indivisible and context-dependent features of cursive script.

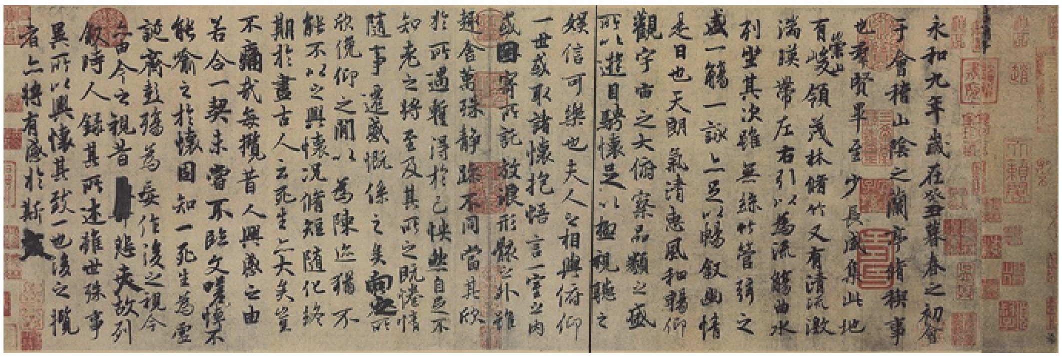
3.3 The FORCE schema and embodiment of emotion

While examining bold visual forms in Chinese calligraphy in Section 3.1 and 3.2, we also claim that FORCE schema is involved in the process of creation. They motivate different degrees of boldness in the lines and strokes. The writing process of Chinese calligraphy requires great control of the force from the wrist, arm, and body. As a result, the boldness of lines and strokes can be viewed as the representation of 'visual force' in the BALANCE schema, which indicates strong intensity of force as the calligrapher is writing. Our data shows that the bolded visual forms are mostly 'emotion words' that express the calligrapher's personal feelings and attitudes, for example, the bolded words for 'painful' and 'sigh with grief,' as indicated by the arrows in Figure 4.

Figure 4: Excerpt of frame script from *Lantingjixu*

The erasing trace and revising marks left with the emotion words, 'painful', 'sad', 'sigh with grief', 'feelings' shown in the circles in Figure 4 is another crucial feature that may reflect calligrapher's emotion during the creation process. As Figure 5 shows, the content of the right part (divided by the line in Figure 5) focused more on objective description, such as, time, location, and participants in the festival, while the left part focused more on Master Wang's comments and personal feelings. More erasing traces and revising marks are found in the left part where calligrapher Master Wang was expressing his feelings and philosophy of life. In comparison, very few erasing traces and revising marks are found in the right part where the content mainly describes the event.

Figure 5: The whole script of *Lantingjixu*



Subjective emotion/ comment Objective description

Our analysis shows that the emotion and feelings of Master Wang have been visualized through boldness, erasing trace, and revising marks in his art works. As the layout of characters reflects the force from a physical body movement, our finding suggests that the metaphor, MIND IS A BODY, motivate such representation of 'visual force,' which demonstrates vividly how mind and emotion can be conceptualized as body movements of the creating process in Chinese calligraphy.

In this section, our analysis highlights the correlation between visual representation and semantics in Chinese calligraphy. We propose that the complex conceptual structure of the CONTAINER SCHEMA, the BALANCE SCHEMA, the FORCE SCHEMA, and metaphors, SIGNIFICANCE IS SIZE, MIND IS A BODY, underlie the art of Chinese calligraphy.

4 Discussion and Conclusion

This study shows how the conceptualization of a calligrapher's emotion and feelings are visualized through different schemas and metaphors in the embodied art work. The embodied experience of the Chinese calligrapher represented visually in art has provided us new insights on abstract thinking and reasoning in the interface between art and language. This study concludes that the topological conceptual structure of the CONTAINER schema, the BALANCE schema, the FORCE schema, and the metaphors, SIGNIFICANCE IS SIZE, MIND IS A BODY, which underlie the art of Chinese calligraphy, may motivate the visual representations and creating process. We propose that the embodiment of abstract concepts and meanings through visualization can be demonstrated in the art of Chinese calligraphy. The focus of this paper is on the connection between visual representation and semantics in Chinese calligraphy. What bridges the two is primary cognition mechanism including image schemas and primary metaphors. Chinese characters can be conceptualized as the CONTAINER schemas, which function as a salient perceptual cue for viewers to get the emphasis of the contents. The spatial allocation also plays a role to provide pragmatic inferences for viewers. These primary metaphors and schemas can be viewed as cognitive anchors for viewers to transfer their visual perception to meaning interpretation. Besides the visual effects based on Chinese characters, the representation of Chinese calligraphy also embodies and captures calligraphers' subjective viewpoints and emotions via the FORCE schema. Our analysis indicates that the interpretation of Chinese calligraphy involves a set of primary cognition mechanism from both viewers and artists.

From the perspective of a cognitive linguistic analysis, this paper highlights the correlation between visual perception and semantics, hoping to contribute to a body-based theory of conceptualization and reasoning in the field of language, art, and cognition. Through this study, we hope to shed light on the cross-modal features of image schema and provide a better understanding of abstract inferential structure in different modes.

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The Many Ways to Find the "Right" and the "Left": On dynamic projection models in the encoding of spatial relations

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1 Introduction

Since early work by Talmy (1975, 1985), linguistic representation of space has been at the center of research in lexical typology, cognitive linguistics, and psycholinguistics (see, inter alia, the various approaches represented in Slobin (2000), Levinson (2003), Beavers et al. (2010)). Some of the central aspects of spatial representation, however, have remained largely understudied. Particularly poorly understood is the distinction between dynamic and static spatial expressions and the ways that distinction is drawn by speakers of different languages. On the one hand, speakers often choose not to encode a dynamic relation explicitly, even though they have at their disposal a specialized means for unambiguous encoding of a goal or a source of motion (Nikitina 2008, Tutton 2009 for English). On the other hand, speakers sometimes choose to encode a static relation by means of a specialized dynamic expression, even in the absence of any perceivable motion.

This paper focuses on the latter aspect of the problem: the use of dynamic expressions for the encoding of static locations. Such use is especially common with expressions encoding a spatial relation for which no specialized adposition exists, including expressions for "right" and "left". Examples (1-2) present alternative ways of encoding the same relation with a static or a specialized dynamic (directional) expression in English and German.

(1) a. *On the left of the waterfall*, most of the way up, are wet boggy areas full of bright green sphagnum moss. (BNC)
 b. A big storage chest stood *to the left of the door*. (BNC)

(2) a. Die Grazien *auf der Linken des Apollon von Delos* sind bei Ps.-Plutarch <…> überliefert. (V. Mertens, *Die drei Grazien…*)
 'The Graces on the left of Apollo of Delos are mentioned by Ps.-Plutarch.'

b. *Zu Linken des Mars* befindet sich ein ovaler Schild.
(M. Mattern, *Römische Steindenkmäler*)
'To the right of Mars an oval shield is found.'

The use of directional expressions with a static meaning, as in (1b) and (2b), is described by Talmy in terms of *access paths* – as a "depiction of a stationary object's location in terms of a path that some other entity might follow to the point of encounter with the object" (1996:242; see also Talmy 2000:136-137).

In some other Indo-European languages, and especially in ancient ones, the situation is considerably more complex, and static spatial relations can be described not only by locative and directional expressions, but also with expressions that normally introduce a source of motion. In (3a,b), from Latin and Ancient Greek, localization on the right of the reference object is described by a prepositional phrase with an ablative meaning (the complement of the preposition 'from' is in the ablative case in Latin, and in the genitive case in Ancient Greek).

(3) a. Latin (cf. Sävborg 1941)

tunc	*dicet*	*rex*	*his*	*qui*	***a***
then	say:FUT.3SG	king:NOM	them:DAT	who:NOM.PL	from

dextris	***eius***	*erunt*	(Jerome's Vulgate, Matt. 25:34)
right:ABL.PL	him:GEN	be:FUT.3PL	

'Then the king will say to those who are on his right hand…'

b. Ancient Greek

ek	***deksiâs***	***d'***	***autôn***	*Leukádioi*	*kaì*
from	right:GEN	PRT	they:GEN	Leukadians:NOM	and

hoi	*álloi*	*bárbaroi*	(Thuc. 2.81.3)
ART.NOM.PL	other:NOM	barbarians:NOM	

'and on their right [were] Leukadians and other barbarians' (literally, "from their right")

This paper discusses the encoding of localization on the "right" and on the "left" of a reference object in Ancient Greek. I discuss, first of all, the competition between two different types of dynamic expression: combinations of preposition and case that are commonly associated with sources of motion (the "ablative" strategy) and combinations that typically describe goals of motion (the "allative" strategy). I argue that the two competing expressions are not distributed randomly, but are used according to a fixed reference frame that can be described in terms of a consistent system of spatial projections. The competition between the two strategies is not attested in English or German, and many other modern Indo-European languages have no equivalent of the sophisticated system of Ancient Greek.

2 The ablative strategy in ancient Indo-European languages

This study focuses on the productive use of dynamic expressions, represented in Ancient Greek by allative and ablative prepositional phrases. Before turning to such constructions, however, it is important to address expressions that cannot be analyzed – at the synchronic level – as instances of the dynamic strategy, but rather attest to a productive use of such a strategy at an earlier time. Especially common are synchronically non-decomposable expressions with an ablative origin. The selection in (4)-(5) illustrates this phenomenon for Latin and French: the static expressions derive from ablative prepositions or forms with ablative suffixes (further examples from a number of Indo-European languages are discussed in MacKenzie 1978).

(4) Latin
  a. adverbs in -*tus*: *intus* 'inside', *subtus* 'below' (cf. *caelitus* 'from heaven')
  b. adverbs in -*ā* (from the ablative adjectives modifying *parte* 'part' or *via* 'way'): *intrā* 'inside' (<**interā parte*), *suprā* 'above' (< **superā parte*)
  c. adverbs in *dē*-: *dēsuper* '(from) above', *dēsub* '(from) below'

(5) French
  a. *dedans* 'inside'< OF *denz* 'inside', *de* + *denz* 'from inside' < Vulg. Latin *de-intus* 'from inside'< *intus* 'inside'
  b. *derrière* 'behind'< VL *de-retro* 'behind'/'backwards'
  c. *devant* 'before' (*de* + *avant*), *dehors* 'outside' (*de* + *hors*), *dessus* 'above' (*de* + *sus*), *dessous* 'underneath' (*de* + *sous*), etc.

A common path of development of such expressions can be described as an ablative-to-locative cycle, illustrated in (6): expressions that originally encoded sources of motion (e.g., *intus* 'from inside' in early Latin) are recruited for the encoding of static relations (Step I), and may even become a synchronically non-analyzable locative expression (cf. *intus* 'inside' in Classical Latin). The new form can then be used as a component of another ablative expression (Vulgar Latin *de intus* 'from inside'), and that expression may subsequently undergo the same type of change and develop into a new locative marker (Steps II, III).

(6) Step I: Early Latin *in-tus* 'from inside' (ablative) > Classical Latin *intus* 'inside' (static)
  Step II: Vulgar Latin *de intus* 'from inside' (ablative) > Old French *denz* 'inside' (static)
  Step III: Old French *de* + *denz* 'from inside' > Modern French *dedans* 'inside' (static)

The ablative-to-locative transfer is characteristic of ancient Indo-European languages, including Ancient Greek (Skopeteas 2002: §7.3). The example in (7) illustrates the static use of an ablative expression for 'behind' – the combination of an ablative preposition with the noun *ópisthen* 'rear', which itself derives from an originally ablative (and later, locative) adverb (Nikitina and Spano forthcoming; Nikitina in prep.).

(7) *apoteikhioûntas* *aû* *ek* *toû* *ópisthen*
raise.wall:PTCP.FUT.ACC.PL PRT from ART:GEN.SG rear
autoùs *hêi* *proelēlúthesan* (Thuc. 7.79.5)
them:ACC where advance:PPRF.3PL
'[Gylippus and the Syracusans sent part of their army] to block them with a wall at their back, where they had advanced'

The very fact that the cycle is so commonly attested suggests that the ablative-to-locative transfer results from systematic use of ablative encoding for static relations, rather than from occasional reinterpretation of individual expressions in specific ambiguous contexts (as suggested in MacKenzie 1978). The data discussed in the following sections substantiates this conclusion, as it shows that multiple types of dynamic expression were used systematically in Ancient Greek to encode spatial relations in unambiguously static contexts, which cannot be interpreted as involving motion. The distribution of such expressions points to an underlying system of fixed projected relations – or *access paths* –that were used to localize objects in space.

3 The projection frame of Ancient Greek

3.1 The distribution of the allative and the ablative strategies

The study is restricted to the encoding of relations of "right" and "left" in two subcorpora of *Thesaurus Linguae Graecae* (http://www.tlg.uci.edu/): Homeric epic (representing archaic poetic usage), and the prose of Herodotus, Thucydides, and Xenophon (representing Classical prose). In the relevant periods, the notions of "right" and "left" were encoded by three major types of lexical item:

– by the adjectives *deksiós* 'right' and *aristerós* 'left', which typically modify body part terms or terms for internal parts of objects ('hand', 'side', etc.);
– by the nouns *deksiá* 'right (hand)' and *aristerá* 'left (hand)', in the singular, which could refer to (i) the right and the left hand, (ii) the right and the left side, (iii) by extension, areas of space adjacent to the right and the left side of a reference object;
– by the nouns *deksiá* 'right (side)' and *aristerá* 'left (side)', in the plural

(neuter gender), referring to (i) the right and the left side of a reference object, and (ii) areas of space adjacent to these sides.

All three types of lexical item appear in static and dynamic prepositional phrases. This study ignores static prepositional phrases and focuses instead on two types of dynamic expression used to describe static location: prepositional phrases normally associated with goals of motion (the allative strategy), and prepositional phrases associated with sources (the ablative strategy). Both are attested with all three types of lexical item. Their distribution, however, is not random but follows the patterns summarized below.

The distribution is related to the distinction between expressions referring to internal parts of a reference object vs. expressions referring to external areas of space. The two meanings are often difficult to distinguish, since in Ancient Greek, nouns referring to the right and the left side can also refer to the adjacent areas. In some contexts, however, the reference is unambiguous. Possessive constructions, for instance, normally refer to internal parts ('x's left [side]'); the same interpretation is associated with expressions consisting of terms for internal parts modified by adjectives (e.g. 'x's left hand'). Such unambiguous contexts restrict the choice of a dynamic expression to just one of the strategies.

First of all, only ablative expressions are attested in descriptions of localization next to an internal part of a reference object, i.e. in an area of space adjacent to a specific part. In (8), localization is defined relative to a body part (left hand), and features an ablative preposition *ek(s)* 'from'. The notion of "left" is encoded by an adjective modifying a body part noun.

(8) *dúnatai* *dè* *toûto* *tò* *épos* *katà*
signify:PRES.3SG PRT this:NOM ART:NOM.SG word:NOM following
tḕn *hellḗnōn* *glôssan* *hoi* *eks*
ART:ACC.SG Greeks:GEN language:ACC ART:NOM.PL from
aristerês *kheiròs* *paristámenoi* *basiléï* (Hdt. 2.30.1)
left:GEN hand:GEN stand.by:PTCP.PRES.NOM.PL king:DAT
'This word means in Greek "those standing on the left hand of the king".'

Example (9) features the same body part noun *kheìr* 'hand', but this time localization is defined relative to an internal part of an inanimate reference object (the army's left side, literally, 'the left hand of the army').

(9) *légetai* *pareónta* *tòn* *Thalên* *en*
say:PRES.PASS.3SG be:PTCP.PRES.ACC ART:ACC.SG Th.:ACC in
tōi *stratopédōi* *poiêsai* *autôi* *tòn*
ART:DAT.SG camp:DAT make:INF.AOR him:DAT ART:ACC.SG
potamòn *eks* *aristerês* *kheiròs* *hréonta*
river:ACC from left:GEN hand:GEN flow:PTCP.PRES.ACC
toû *stratoû* *kaì* *ek* *deksiês* *hrein* (Hdt. 1.75.4-5)
ART:GEN.SG army:GEN and from right:GEN flow:INF.PRES
'It is said that Thales, being in the encampment, made the river, which flowed on the left of the army, also flow on the right.'

In (10), the possessive construction ('the road's left [side]') suggests that localization is defined relative to an internal part of an inanimate reference object (since possessive constructions do not in general refer to external areas of space).

(10) *éstasan* *dè* *Pérsai* *mèn* *ek* *deksiâs,*
stand:AOR.3PL PRT Persians:NOM PRT from right:GEN
hoi *dè* *álloi* *súmmakhoi* *eks* *aristerâs*
ART:NOM.PL PRT other:NOM allies:NOM from left:GEN
tês *hodoû* (Xen. *Cyrop*. 8.3.10)
ART:GEN road:GEN
'The Persians stood on the right side, their allies, on the left side of the road.'

Secondly, localization inside the reference object implies the use of the allative strategy. In (11), the Figure is located within the Ground, in the left part of the battle. The localization is described by a directional prepositional phrase, consisting of the preposition *epì* 'on' and an accusative noun phrase.

(11) *epeí* *hra* *mákhēs* *ep'* *aristerà* *márnato*
since PRT battle:GEN on left:ACC fight:IMPF.3SG
pásēs *ókhthas* *pàr* *potamoîo* *Skamándrou* (Hom. *Il*. 11.498)
all:GEN banks:ACC beside river:GEN S.:GEN
'for he was fighting on the left of the entire battle by the banks of the Scamander river'

Similarly, examples (12)-(13) involve localization in internal parts of the Ground and make use of the same directional prepositional phrase. In (12), the prepositional phrase localizes the Figure in the left part of the space occupied by the ships; in (13), the Figure is located on the right side of the head.

(12) *Héktōr d' ouk epépusto Diḯ fílos, oudé*
H.:NOM PRT not learn:PPRF.MP.3SG Z.:DAT dear and.not
ti ḗdē hóttí hrá hoi nēôn
anything:ACC know:PPRF.3SG that PRT ART:NOM.PL ships:GEN
ep' aristerà dēïóōnto laoì hup' Argeíōn
on left:ACC slay:IMPF.MP.3PL men:NOM by Argives:GEN
(Hom. *Il*. 13.675)
'but Hector, dear to Zeus, had not heard nor knew anything of how on the left of the ships his men were being slain by the Argives'

(13) *hoi tà epì deksià tôn kefaléōn*
they:NOM ART:ACC.PL on right:ACC ART:GEN.PL heads:GEN
komôsi, tà d' ep' aristerà
let.hair.grow:PRES.3PL ART:ACC.PL PRT on left:ACC
keírousi (Hdt. 4.191.1-2)
shave:PRES.3PL
'They let their hair grow long on the right side of their heads and shave the left.'

Example (14) is somewhat special in not localizing the Figure exactly inside an internal part of the Ground. Rather, the Figure is described as a piece of apparel in contact with the Ground's part. The location is encoded by a combination of the preposition *pròs* 'toward' and an accusative noun phrase; that combination instantiates the same allative strategy as in the previous examples.

(14) *Arábioi dè zdeiràs hupezdōménoi*
Arabians:NOM PRT garments:ACC undergird:PTCP.PRF.NOM.PL
êsan, tóksa dè palíntona eîkhon
be:IMPF.3PL bows:ACC PRT bent.backward:ACC hold:IMPF.3PL
pròs deksiá, makrá (Hdt. 7.69.1)
toward right:ACC long:ACC
'The Arabians were undergirded with skirts, and they had at their right side long bows curving backwards.'

In cases of ambiguous reference, on the other hand, both the ablative and the allative strategy are attested. These are the contexts that offer no independent evidence for the interpretation of the terms for "right" and "left" as referring to an internal part of the Ground vs. an external area adjacent to that part: the notion of "left"/"right" is encoded by a noun that is not associated with a genitive possessor. Even in such cases, however, the choice of a strategy does not seem to be random. In particular, the allative strategy tends to be used with distant Grounds and seems to be the only available option in constructions defining a viewpoint.

In (15) and (16), for example, the term for "right" could in principle be interpreted as referring either to an internal part of some reference object ('the right [side of x]') or to an external area extending from that part ('[the area of space projected from] the right [side of x]'). Localization is defined relative to an explicit viewpoint – a hypothetical observer introduced by a participial construction in the dative case: '(on the right) to one sailing into the Euxine' and '(on the right) to one entering the temple'. The construction with an explicit viewpoint requires the use of the allative strategy.

(15) *arksaménē* *dè* *hē* *Thráikē* *haútē*
start:PTCP.AOR.MID.NOM PRT ART:NOM.SG T. this:NOM
estìn *apò* *toû* *stómatos* *toû*
be:PRES.3SG from ART:GEN.SG mouth:GEN ART:GEN.SG
Póntou *mékhri* *Hērakleías* *epì* *deksià* *eis*
Euxine:GEN as.far.as H.:GEN on right:ACC into
tòn *Pónton* *eispléonti* (Xen. *Anab*. 6.4.1-2)
ART:ACC.SG Euxine:ACC sail.in:PTCP.PRES.DAT.SG
'This [portion of] Thrace begins at the mouth of the Euxine [and extends] as far as Heracleia, [being] on the right to one sailing into the Euxine.'

(16) *tôn* *ho* *mèn* *khrúseos* *ékeito*
ART:GEN.PL ART:NOM.SG PRT golden:NOM.SG lie:IMPF.MP.3SG
epì deksià *esiónti* *es* *tón* *nēón,*
on right:ACC enter:PTCP.PRES.DAT.SG into ART:ACC.SG temple:ACC
ho *dè* *argúreos* *ep'* *aristerá* (Hdt. 1.51.1-2)
ART:NOM.SG PRT silver:NOM.SG on left:ACC
'[Of the craters] the golden one stood on the right to one entering the temple, the silver one, on the left.'

A different tendency is observed in examples with shorter distances to the reference object and in the absence of an explicit viewpoint, as in (17).

(17) *eîkhon* *d'* *hupèr* *deksiôn* *khōríon* *hoîon*
hold:IMPF.3PL PRT above right:GEN.PL place:ACC such:ACC
khalepṓtaton *kaì* *eks* *aristerâs* *állon* *potamón*
most.difficult:ACC and from left:GEN another:ACC river:ACC
(Xen.*Anab*. 4.8.2)
'They had above their right a most difficult bit of ground, and on the left, another river…'

Example (17) describes two different localizations using two different types of expression: one description features a static prepositional phrase ('above their right [side]'), the other, an ablative prepositional phrase ('from the left'). The fact that a static and a dynamic description are juxtaposed in the same example supports the view that the use of dynamic expressions is indeed a productive strategy for describing static locations, and is by no means restricted to contexts with a static vs. dynamic ambiguity.

So far the restrictions on the choice of a dynamic strategy (ablative vs. allative) in particular types of context were presented as arbitrary. In the next section, I try to make sense of these patterns and suggest that they are derived from a system of fixed spatial projections – or *access paths* – that are used to define, in a consistent way, the relation between the Figure and the Ground.

3.2 A "centrifugal" model of spatial projections

As described in the previous section, the choice between the allative and the ablative strategy depends on two factors: the localization of the Figure (within vs. outside the Ground), and the nature of the reference point (an internal part of the Ground vs. an external area). With unambiguously Ground-internal reference areas, the ablative strategy is used to describe Figures outside the Ground (8-10), and the allative strategy is reserved for Figures that are contained in the Ground or located in contact with it (11-14). In contexts where the reference area cannot be interpreted unambiguously as referring to an internal part or an external area, both strategies are attested, and other factors – such as the presence or absence of an explicit viewpoint or distance from the Figure to the Ground – may play a role in the choice of a particular expression.

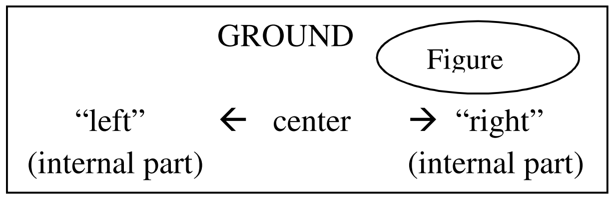
The distribution of the strategies can be accounted for in terms of a model of spatial projections that is represented in (18). In this "centrifugal" model, all spatial relations are directed from the center of the Ground toward external areas.

(18) The "centrifugal" model of spatial projections

		GROUND		
← "left" ← (external area)	"left" ← (internal part)	center	→ "right" (internal part)	→ "right"→ (external area)

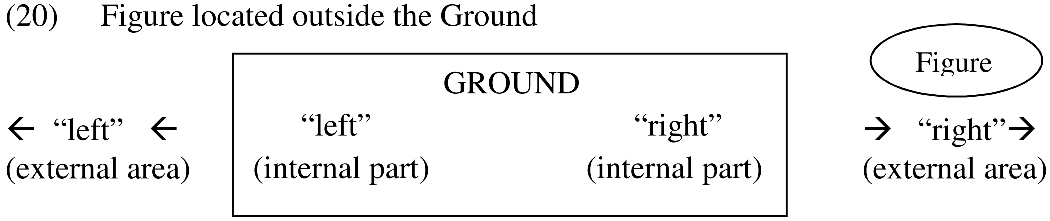
The direction of the projections is predicted by Talmy's concept of *access paths*: the model describes static locations in terms of trajectories that can be used to arrive at a specific localization, starting from the Ground's center. When the Figure is located within the Ground (11-14), the localization is described by the allative strategy, with reference to the Ground's internal parts, as shown in (19).

(19) Figure located within the Ground



When the Figure is located outside the Ground, the relation can be described in one of two ways (cf. the representation in (20)): (i) by the ablative strategy, if reference is made to internal parts of the Ground ('from the internal part'); (ii) by the allative strategy, if reference is made to external areas ('toward the external area'). Option (i) is attested in all cases of unambiguous reference to internal parts (examples 8-10), i.e. with possessive constructions ('the left of x') and with explicit mentions of the part in question ('the left hand of x'). Both options are attested in cases of ambiguous reference, consistent with the model's predictions.

(20) Figure located outside the Ground



The table in (21) summarizes the choice of a strategy according to the two factors.

(21) Choosing between the allative and the ablative strategy

Localization:	Figure inside the Ground	Figure outside the Ground
Relative to internal part	allative	ablative
Relative to external area	not attested	allative or ablative

4 The "centrifugal" model in other languages

The same "centrifugal" model – or vestiges thereof – is attested in some other languages, such as modern Russian (discussed in detail in Nikitina in prep.). Outside of the Slavic branch, however, modern Indo-European languages seem to provide no evidence for a consistent model of spatial projections of the Ancient Greek type. Modern descendants of languages that had been using such models at a previous stage no longer resort to both the allative and the ablative strategies.

Thus, Modern Greek no longer offers a special allative strategy for the encoding of static relations, since it no longer has a distinct allative preposition. It has retained, however, a marginal option of using an ablative construction (Bortone 2010: 345). The example in (22) is the only dynamic option for the encoding of a static spatial relation in Modern Greek. The noun phrase *aristerá apó to aftokínito* 'left of the car' refers to an external area; the model in (23) represents the surviving elements of the Ancient Greek system that make such encoding possible.

(22)	*to*	*podílato*	*ine*	*apó*	*aristerá*	*apó*	*to*	*aftokínito*
	DEF	bicycle	is	from	left	from	DEF	car

'The bicycle is to the left of the car.'

(23) Vestiges of a centrifugal model in Modern Greek

← "left" (external area)	GROUND	"right" → (external area)

The transition from Early to Modern Standard Italian illustrates the loss of the dynamic strategies in Romance languages. In early Italian, ablative expressions are widely attested in descriptions of static relations with terms for internal parts (Poppe 1963), as in example (24) from Dante (Purg. iii, 88-90):

(24)	*Come*	*color*	*dinanzi*	*vider*	*rotta*		
	as.soon.as	those	before	saw	broken		
	la luce	*in terra*	*dal*	*mio*	*destro*	*canto*	
	the light	at ground	from.the	my	right	side	

'As soon as those in front saw broken
The light upon the ground at my right side…'

In modern Italian, the ablative strategy has become obsolete (see, inter alia, De Felice (1954) on the history of *da*), and the same relation must be encoded with a general-purpose locative/allative preposition (cf. *alla mia destra* 'on my right'). Due to the loss of specialized allative prepositional phrases, modern Romance languages no longer show evidence for the use of the allative strategy.

English and German display a different combination of dynamic options for the encoding of static relations: while the allative strategy is attested in examples such as (1b) and (2b), no ablative strategy seems to survive.

The systems of these languages are impoverished compared to the systems of Ancient Greek or Latin (the latter is not discussed here, but appears to show similar properties). The gradual simplification of the original models is not restricted to the loss of the allative strategy, which is in turn related to the loss of specialized allative markers (as in Romance or Greek). The Italian example suggests that the ablative strategy may go out of use independently of any other change in the system of spatial encoding (since no specific cause is discernible behind the change).

It appears that the gradual decline of the dynamic model of spatial projections affects independently various Indo-European languages. It is possible that the decline is related to the diminishing role of directional adverbs in the encoding of spatial relations. Directional adverbs were a common source of spatial prepositions in ancient Indo-European languages, but no longer play such a prominent role in their modern descendants. In particular, adverbs with allative and ablative semantics are believed to be at the origin of many basic spatial prepositions of Ancient Greek and Latin (cf., e.g., Lejeune (1939) for Ancient Greek ablative adverbs in *-then*). The development of markers for static relations from allative and ablative adverbs is related to the use of dynamic models of spatial projections, where static relations are specified in terms of an *access path* – a path of hypothetical motion.

As the languages gradually developed rich systems of spatial prepositions, directional adverbs were losing their prominence as a means of encoding static relations. In many modern Indo-European languages, new spatial relators tend to develop from combinations of a basic preposition and a noun referring to an internal part of a reference object (cf., for example, Aurnague (1996) for French). The reorganization of the system of spatial reference – and in particular, the development of rich inventories of spatial prepositions – may have led, in some of the languages, to a gradual decline in the use of dynamic projection models.

This hypothesis finds indirect support in the fact that across languages dynamic strategies are most commonly used for the encoding of relations for which no basic adposition exists. While allative and ablative strategies are commonly attested with complex relations, such as with ‘on the right/left’, they are rarely employed for basic relations such as ‘in’ or ‘on’. This tendency suggests that the presence of a basic preposition specialized for the encoding of a particular relation excludes the use of a dynamic strategy.

5 Conclusion

The use of dynamic projection models is a poorly understood aspect of linguistic representation of space. This study is but a first step toward a systematic investigation of this phenomenon, which aims at exploring the ways systems of spatial encoding develop over time. Its most important implications can be summarized as follows.

First of all, the wide and consistent use of the allative and the ablative strategies for the encoding of static relations suggests, pace MacKenzie (1978), that such use cannot be explained merely in terms of case syncretism or reanalysis of individual expressions in ambiguous contexts. On the contrary, allative and ablative expressions are a major means of encoding relations for which no basic preposition exists.

Secondly, the distribution of the allative and the ablative strategies is not random and points to a special system of spatial projections, which I described in terms of a "centrifugal" model. In this type of model, dynamic projections point away from the Ground's center to its sides and further toward external areas. The model provides an account of certain restrictions that otherwise remain unexplained; in particular, it predicts which relations restrict the choice of expression to one of the two dynamic relations (ablative vs. allative) and which allow for both.

The centrifugal model is consistent with Talmy's concept of *access path*: the projections correspond to paths of fictive motion that start at the Ground (more precisely, at the Ground's center) and lead to the Figure. One of the questions further research has to address is whether this model is indeed universal, as Talmy's concept of access path seems to predict, or whether languages can be found where spatial relations are projected consistently in other directions (toward the Ground or toward the Ground's center).

Finally, the impoverished system of dynamic projections in modern Indo-European languages (with the exception of Slavic, see Nikitina in prep.) stands in sharp contrast with the wide use of dynamic expressions in Ancient Greek or Latin. The decline of the dynamic model may be related to a reorganization of systems of spatial representation, in which prepositions gain a more important role over time, while directional adverbs become less prominent (cf. Coleman 1991, Nikitina and Spano forthc., inter alia). Correspondingly, directional adverbs are no longer involved to the same extent in the encoding of static spatial relations, leading to a simplification of the original sophisticated dynamic projection models and a greater prominence of the dynamic vs. static distinction in the modern languages (cf., for example, Papahagi (2002) on French). To test this hypothesis, a more systematic investigation is required of the dynamic types of encoding attested across languages with various spatial relations.

More generally, the development described in this study demonstrates once again that the distinction between dynamic and static expressions is not as straightforward as some accounts seem to suggest (cf. the discussion in Nikitina 2009). Further research is needed to assess the prominence of dynamic projection models in other languages and identify factors that lead to their development.

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Abbreviations

ABL – ablative; ACC – accusative; AOR – aorist; ART – article; DAT – dative; DEF – definite marker; GEN – genitive; FUT – future; IMPF – imperfect; INF – infinitive; MID – middle; MP – medio-passive; NOM – nominative; PASS – passive; PL – plural; PPRF – pluperfect; PRES – present; PRF – perfect; PRT – particle; PTCP – participle; SG – singular

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Iconicity, Implicature, and the Manner Interpretation of Coordination Structure: Through Comparison of English and French

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Introduction

This paper discusses conditions under which a VP-coordination structure ('Subj. VP_1 and VP_2') may conversationally implicate a manner relation between the two described events, based on data from English and French. It will be pointed out that two factors affect the availability of the manner interpretation. First, the principle of iconicity dictates that, other things being equal, subordination structure is more suitable than coordination structure in describing two actions standing in the manner relation. Second, whether the VP-coordination structure in a given language allows the manner interpretation at all or not is determined by its 'niche', i.e., its standing in the network of constructions.

Section 1 illustrates basic data and two 'puzzles' concerning the manner interpretation of coordination structure. It will be shown that in English, the VP-coordination structure with *and* allows a manner interpretation but under limited conditions (the problem of intra-linguistic requirement), and that in French, the corresponding structure with *et* does not allow a manner interpretation at all (the problem of cross-linguistic variation). Section 2 points out that the manner interpretation of the English VP-coordination structure is blocked when the two described events stand in a whole-part relation, and argues that this is an effect of the principle of iconicity. Section 3 discusses why the French VP-coordination structure, unlike its English counterpart, does not allow the manner interpretation at all. It will be argued that the difference between them can be attributed to the fact that the former has a strong rival construction (namely the gérondif) which preempts the use of the coordination construction.

1 Two Puzzles

It is widely known that conjunctive coordination structure[1] (e.g., *S_1 and S_2*) tends to undergo semantic enrichment, due to Gricean conversational implicature. Levinson (2000) illustrates this phenomenon, known as *conjunction buttressing*, with examples like the following (the symbol +> is read as 'conversationally implicates'; +/> means 'does not conversationally implicate').

(1) John turned the key and the engine started.
+> 'p and then q' (subsequence)
+> 'p therefore q' (causal connectedness)
+> 'A did X to cause q' (teleology, intentionality)
(adapted from Levinson 2000:117)

The English VP-coordination construction (*Subj. VP_1 and VP_2*) allows what can be loosely called the manner interpretation, where the action/event described by the first conjunct is understood as the manner in which the action/event described by the second conjunct took place. Examples are given below (assume that the function of the button referred to in (2a) is to operate the door, rather than just to unlock it):

(2) a. David pressed the button and opened the (automatic) door.
+> Pressing the button is the manner of opening the door.
b. David poured hot water on the ice and melted it.
+> Pouring hot water is the manner of melting the ice.

Such sentences can be paraphrased with a free adjunct construction (among other possibilities), as shown in (3):

(3) a. David opened the door pressing the button.
b. David melted the ice pouring hot water on it.

The VP-coordination constructions given in (4), however, do not implicate, and actually implicates the absence of, the manner relation (# indicates the unavailability of the intended interpretation).[2]

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[1] Throughout the paper, I will use the term coordination structure (construction) to refer to the *conjunctive* coordination structure (construction), and thus exclude disjunctive coordination structure with *or*, etc.

[2] With appropriate contextualization and some modification, a sentence like (4a) would allow the manner interpretation (thanks to Eve Sweetser to point this out):

(i) Paul has hidden David's fork to stop him from eating the fried noodles. David, however, used chopsticks and ate the noodles.

(4a) still contrasts with (2a,b), which allow the manner interpretation without much contextualization.

(4) a. #David used chopsticks and ate fried noodles.
+/> Using chopsticks is the manner of eating fried noodles.
+> Using chopsticks is not the manner of eating fried noodles.
b. #David shook his head and danced.
+/> Shaking one's head is the manner of dancing.
+> Shaking one's head is not the manner of dancing.

The manner interpretation can be expressed (perhaps implicated) by the corresponding free adjunct constructions shown in (5); thus, (5) cannot be taken as paraphrases of (4) in the way (3) can of (2).

(5) a. David ate fried noodles using chopsticks.
b. David danced shaking his head.

This contrast constitutes our first puzzle, the problem of language-internal requirement: under what conditions does a coordinating construction allow the manner interpretation? One may hypothesize that only the relation of means-end (or instrumentality), which is a special subtype of the manner relation, can be expressed by coordination structure. While this generalization correctly predicts the unavailability of the manner interpretation for (4b), it does not account for the case of (4a), where David's using chopsticks is obviously the means of his eating fried noodles. In fact, the intended interpretation of (4a) can be expressed with explicit markers of the means-end relation, such as *by* and *in order to*, although such sentences may sound somewhat awkward.

(6) a. David opened the door by pressing the button.
b. David melted the ice by pouring hot water on it.
c. (?)David ate fried noodles by using chopsticks.
d. #David danced by shaking his head.

(7) a. David pressed the button in order to open the door.
b. David poured hot water on the ice in order to melt it.
c. (?)David used chopsticks in order to eat fried noodles.
d. #David shook his head in order to dance.

Besides, while it may be the case that non-instrumental manner relations cannot be expressed by coordination structure, it is yet to be explained why this must be the case.

Turning now to a second puzzle, VP-coordination structures in some other languages do not (easily) allow the manner interpretation. Kortmann (1991:164, citing Pusch (1980)), notes that languages such as French and Italian "lack instrumental conjunctions." Thus, the French coordinating constructions in (8) do not implicate the manner relation between the two events, despite the fact that they are fairly faithful translations of (2).[3]

(8) a. #David a appuyé sur le bouton et a
David Aux press(PstPrt) on the button and Aux
ouvert la porte.
open(PstPrt) the door
'David pressed the button and opened the door.'

b. #David a versé de l' eau chaude sur la glace
David Aux pour(PstPrt) P.Art water hot on the ice
et l' a fait fondre.
and it Aux make(PstPrt) melt
'David poured hot water on the ice and melted it.'

The intended manner interpretation can be naturally expressed with the gérondif construction, which is reminiscent of the English present-participial free adjunct in terms of both form and function.

(9) a. David a ouvert la porte en appuyant sur
David Aux open(PstPrt) the door in press(PrsPrt) on
le bouton.
the button
'David opened the door by pressing the button.'

b. David a fait fondre la glace en y
David Aux make(PstPrt) melt the ice in there
versant de l' eau chaude.
pour(PrsPrt) P.Art water hot
'David melted the ice by pouring hot water on it.'

The French sentences corresponding to (4), presented in (10), likewise do not allow the manner interpretation; the versions with the gérondif, given in (11), do.[4]

(10) a. #David a utilisé des baguettes et a
David Aux use(PstPrt) I.Art chopsticks and Aux
mangé des nouilles sautées.
eat(PstPrt) I.Art noodles sautéed
'David used chopsticks and ate fried noodles.'

b. #David a secoué la tête et a dansé.
David Aux shake(PstPrt) the head and Aux dance(PstPrt)
'David shook his head and danced.'

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[3] The abbreviations in the glosses are: Acc = accusative, Aux = auxiliary verb, Dcl = declarative, Ger = gerund, I.Art = indefinite article, Inf = infinitive, P.Art = partitive article, PrsPrt = present participle, Pst = past, PstPrt = past participle.

[4] (11a) sounds prolix and less natural than the version with the preposition *avec* 'with', i.e., *David a mangé des nouilles sautées avec des baguettes* 'David ate fried noodles with chopsticks'.

(11) a. (?)David a mangé des nouilles sautées en
David Aux eat(PstPrt) I.Art noodles sautéed in
utilisant des baguettes.
use(PrsPrt) I.Art chopsticks
'David ate fried noodles using chopsticks.'
b. David a dansé en secouant la tête.
David Aux dance(PstPrt) in shake(PrsPrt) the head
'David danced shaking his head.'

The manner interpretation becomes available for sentences like (8) if an adverbial like *ainsi* 'in this way' is inserted after the connective *et* 'and', as in (12).

(12) a. David a appuyé sur le bouton et ainsi a ouvert la porte.
'David pressed the button and thus opened the door.'
b. David a versé de l'eau chaude sur la glace et ainsi l'a fait fondre.
'David poured hot water over the ice and thus melted it.'

It becomes available also when it is contextually understood that the subject did not have an intention to cause the second event; thus, (8a) can felicitously describe a situation where a toddler named David pressed the button out of curiosity, without knowing that it was an operating switch of the door.

Where does this cross-linguistic difference stem from? In other words, what divides languages into two groups, ones where coordination constructions allow a manner interpretation (besides English, German and Russian apparently belong to this group), and ones where they do not (French, Italian, etc.).[5] This is our second puzzle, the problem of cross-linguistic variation. The following sections will seek solutions to the two presented puzzles.

2 Language-Internal Requirement

The contrast between (2) and (4), repeated below as (13) and (14), can be attributed to iconic motivation, i.e., tendency and preference for the relation between linguistic forms to somehow reflect the relation between these forms' contents (Haiman 1980).[6]

(13) a. David pressed the button and opened the door.
b. David poured hot water on the ice and melted it.

[5] It is possible that this contrast is related in some way to the verb-framed vs. satellite-framed distinction. (Thanks to Oana David for bringing this point to my attention.)

[6] A paradigmatic example of iconic motivation is that of temporal sequence: other things being equal, the order in which clauses or statements are arranged corresponds to the order of the events they describe (see (1)). Another well-known example is reduplication, which conveys such information as intensity, plurality, and repetition.

(14) a. #David used chopsticks and ate fried noodles.
b. #David shook his head and danced.

In coordinating structure, two clauses, VPs or constituents of some other grammatical category of equal status, are conjoined together by a connective. The relation between the two conjuncts can be characterized as 'symmetric' and 'distinct,' and can be schematized as in Figure 1. In subordinating structure in contrast, one clause is embedded under and dependent on another clause. Here, the relation between the two clauses can be characterized as 'asymmetric' and 'fused,' and schematized as in Figure 2.Figure 1: Coordination structure

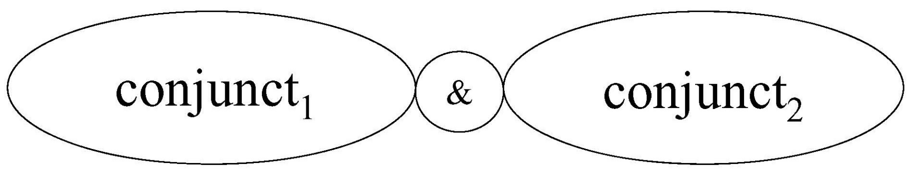
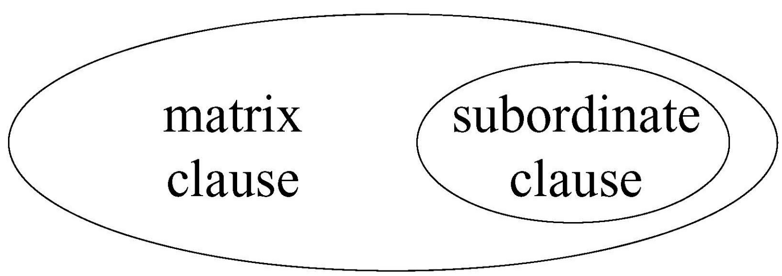


Figure 2: Subordination structure



Let us now turn to the side of content. There has been much debate in the philosophical and linguistic literature as to how events and actions are ontologically and cognitively individuated, and under what conditions two actions/events are considered to stand in anidentity or part-whole relation (Pfeifer 1989; Zucchi 1993; Casati and Varzi 2010). The philosopher Anscombe asks the following question:

> Are we to say that the man who (intentionally) moves his arm, operates the pump, replenishes the water supply, poisons the inhabitants, is performing *four* actions? Or only one? (Anscombe 1976:45)

One may likewise ask whether the two conjuncts in (13a, b) are descriptions of two distinct actions, or rather are of a single action. Is David's pressing the button to be regarded as the same action as his opening the door? Is his pouring hot water the same action as his melting the ice? My aim here is not to argue for either view, but is to highlight the fact that in such sentences the two described actions have largely overlapping extents so that they may reasonably be argued to be identical or near-identical. In the situations of (14a, b), in contrast, the first-clause action constitutes only a proper subpart of the action described in the second clause. Not using chopsticks alone, but a combination of it and other actions such as opening one's mouth, chewing, and swallowing constitute eating. Also, shaking one's head alone does not count as dancing, but it needs to be coordinated with motions of other body parts. The situations described in sentences like (13a, b) can be labeled as 'manner as the whole action' and schematized as in Figure 3. The situations which sentences like (14a, b) fail to describe – and for which subordination constructions like (5a, b) are suitable – can be labeled as 'manner as part of the action' and schematized as in Figure 4.

Figure 3: Manner as the whole action

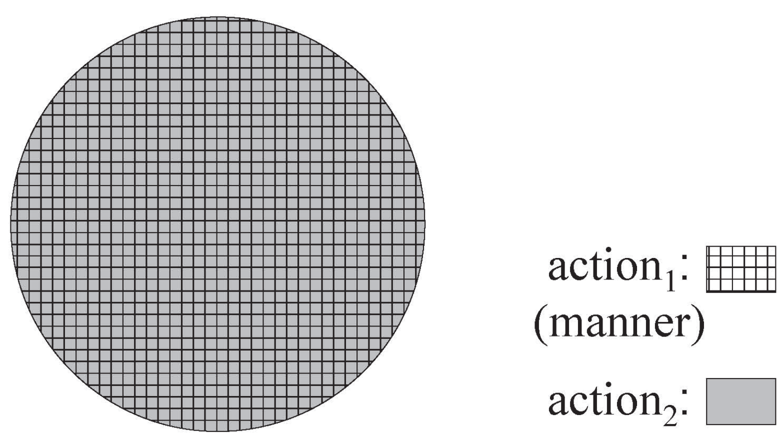
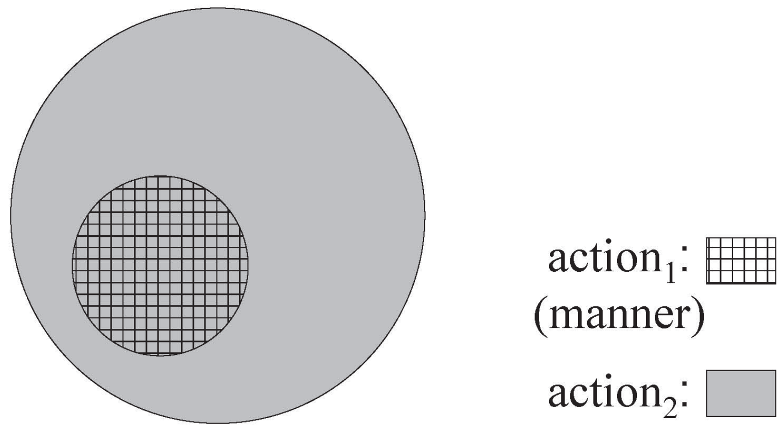


Figure 4: Manner as part of the action



Comparing the two ‘form’ schemes and the two ‘content’ schemes, one would immediately notice the similarity between subordination structure and the manner-as-part-of-the-action configuration; in both, the two (main) components are asymmetric and fused. Iconic motivation thus dictates that, other things being equal, subordination structure is more suitable to describe the manner-as-part-of-the-action situation than coordination structure is. The manner-as-the-whole-action configuration, on the other hand, resembles subordination structure in that the two components are fused together, but resembles coordination structure in that they are symmetric. This explains why, in contrast to the manner-as-part-of-the-action configuration, it is compatible either with subordination or coordination structure.

3 Cross-Linguistic Variation

Let us now turn to the issue of cross-linguistic variation, illustrated above with examples (2) and (8) repeated below.

(15) a. David pressed the button and opened the door.
b. David poured hot water on the ice and melted it.

(16) a. #David a appuyé sur le bouton et a ouvert la porte.
b. #David a versé de l’eau chaude sur la glace et l’a fait fondre.

The contrast between the two pairs of sentences is puzzling, given that they are arguably truth-conditionally synonymous, and also that universality is one of the hallmarks of conversational implicature (e.g., Huang 2007:34–35).[7]

[7] To give an example, just as the English sentence ‘Some books are interesting’ implicates that not all books are interesting, so do its translations in other languages.

The key to solve this puzzle is the difference in 'niche' between the English and French coordinating constructions. Although the two constructions have analogous structures and share the same literal meaning, they have slightly different niches, or positions in the network of constructions which they are part of. I propose that the manner interpretation of the French coordinating construction is blocked because it has a strong competitor, namely the gérondif construction; that is, upon hearing sentences like (16), the hearer makes the inference: 'If the speaker had meant to convey that the manner relation holds between the two described actions, she would have used the more suitable gérondif,' and concludes that it is not the case that (the speaker believes that) the manner relation holds between the two actions.

Why, then, is the gérondif more suitable than the coordination structure to express the manner interpretation? The reason is three-fold. First, there is iconic motivation. Above I discussed that the manner-as-the-whole-action configuration, where two actions are 'fused' but 'symmetric,' resembles subordination structure to a lesser degree than the manner-as-part-of-the-action configuration does. This 'partial resemblance,' however, still serves as the reason that, other things being equal, subordination structure is at least as suitable as coordination structure to express the manner relation.

Second, the French gérondif is less marked than its counterparts in English. The question at issue can be restated as follows: why is it that in French the speaker has to choose the subordination (gérondif) construction over the coordination construction to describe the manner-as-the-whole-action configuration, while in English the coordination construction too is a viable option in the same situation, as summarized inTable 1?

Table 1: Availability of the manner interpretation

	construction type	manner interpretation
French		
VP_1 *et* VP_2	coordination	unavailable
[$_{VP}$ V ... [*en* V-*ant* ...]]	subordination	available
English		
VP_1 *and* VP_2	coordination	available
[$_{VP}$ V ... [V-*ing* ...]]	subordination	available
[$_{VP}$ V ... [*by* V-*ing* ...]]	subordination	available

Comparing first the English free adjunct and the French gérondif, they differ considerably as to stylistic markedness. Regarding free adjunct (and absolute) constructions, Río-Rey makes the following remark (see also Kortmann 1991):

> The received opinion in the literature is that free adjuncts and absolutes are stylistically marked constructions. Thus, both structures are more likely to occur in formal, written, and narrative texts than in informal, oral (or at least speech-based) and non-narrative ones [...] (Río-Rey 2002:313)

The gérondif does not share this characteristic.

Comparing next the *by* V-*ing* construction and the gérondif, the former can be regarded as formally more marked than the latter. Although both constructions consist of a preposition (*by*/*en*) and a present participle potentially followed by complements/modifiers, the role that the preposition plays in each construction is different. In the *by* V-*ing* construction, the semantic contribution of *by* is straightforward; it indicates the relation of means-end. The preposition *en* (which typically translates as *in* or *to*) occurring in the gérondif, on the other hand, does not convey a specific meaning. The gérondif, to some extent analogous to the free adjunct, may indicate a wide range of semantic relations such as 'manner,' 'simultaneity,' 'reason,' and 'condition' (taxonomies vary among scholars), and *en* does not have a straightforward connection with these interpretations. On this ground, scholars like Halmøy (2003) and Kleiber (2007) maintain that *en* occurring in the gérondif is not to be considered an independent preposition, but rather is part of a discontinuos expression (*en* …-*ant*). Thus, while the *by* V-*ing* construction minimally consists of two units with (relatively) specific meanings (*by* and a verb in its present participial form, marked by -*ing*), the gérondif minimally consists of only one (a verb in its 'gérondif form,' marked by [*en* …-*ant*]). It would be fair to say that this makes the former more prolix, and therefore formally more marked, than the latter.

Furthermore, one may argue that the coordinating constructions in English and French are not of equal standing. In the literature, it has been pointed out that languages differ with regard to their preferences as to clause linking patterns. Cosme's (2008) corpus-based contrastive study reveals that, in accordance with previous claims in the contrastive research (e.g., Vinay and Darbelnet 1958), French has a stronger orientation toward hypotaxis (subordination) than English, and conversely, English has a stronger orientation toward parataxis (coordination) than French. Comparing texts with the same contents from the two languages (e.g., a French text and its translation in English), one tends to find cases where an English coordinating construction corresponds to (is translated to or serves as a translation of) a French subordinating construction (such as a gérondif structure or relative clause), whereas the reversed pattern is relatively rare. This implies that the 'standing' of the French coordination construction is somewhat lower than that of the English one.

The aforementioned factors, in conjunction, account for the patterns summarized in Table 1. In French, (i) the relative unmarkedness of the gérondif (in comparison to the corresponding constructions in English), and (ii) general preference for subordination both favor the use of the gérondif in describing two actions standing in the manner relation, leading the hearer to make the inference: 'If the manner relation held between the two actions, the speaker would have used the gérondif.' In English, on the other hand, the markedness of the free adjunct and the *by* V-*ing* construction and general preference for coordination provide a reason to choose coordination structure, leading the hearer to infer: 'The speaker may choose coordinating structure even if the manner relation holds between the two actions.'

Finally, the observation made in Section 2 that in French a coordination construction allows the manner interpretation when the result-action is unintentional can be accounted for by Levinson's (2000) M-principle, which, in a simplified form, can be put as: 'What is said in an abnormal way indicates an abnormal situation' or 'Marked messages indicate marked situations.' On the form side, (in French) the coordination structure is not a normal means to indicate, though is not semantically incompatible with, the manner relation. On the content side, a situation where an action typically carried out with intention (e.g., opening a door) is done without intention, as in the case of the curious toddler accidentally opening the door, is marked (not normal). I suggest that the markedness on both sides gives rise to the exceptional manner interpretation of the coordination construction.

4 Conclusion

This paper examined conditions under which the VP-coordination structure implicates the manner relation between the two conjuncts. In languages like English, the manner interpretation is available, but due to the effect of iconic motivation, it is restricted to cases where the two described actions have largely overlapping extents (the manner action ≈ the modified action). In other languages like French, the VP-coordination construction does not allow the manner interpretation, due to the presence of a construction that is by far more suitable to express the manner relation.

The proposed analysis accounts for the presented facts in English and French, but whether it also applies to a wider range of languages is left open to the future research. It may be of interest, however, to present here some relevant observations on two East Asian languages, Korean and Japanese.

In Korean, a typical way to express the manner relation is the subordinate clause with the polysemous suffix -*ese*/*ase*. The coordination construction with -*ko*, on the other hand, does not easily allow the manner interpretation.[8] (Speakers' judgments on the interpretation of sentences like (17b) appear to be somewhat unstable.)

(17) a. Pethun-ul nwullese mun-ul yelessta.
button-Acc press.*ese* door-Acc open.Pst.Dcl
'Pressing the button, he opened the door.'
+> Pressing the button is the manner of opening the door.

b. Pethun-ul {nwulu/nwulless}-ko mun-ul yelessta.
button-Acc press/press.Pst-*ko* door-Acc open.Pst.Dcl

[8] A clause with -*ese*/*ase* is untensed; a clause with -*ko* (a non-final conjunct) can optionally be tensed (see, e.g., Lee and Tonhauser 2010).

‘He pressed the button and opened the door.’
+/> Pressing the button is the manner of opening the door.

(18) a. Ceskalak-ul sayonghayse pokkumkwukswu-lul mekessta.
chopsticks-Acc use.*ese* fried.noodles-Acc eat.Pst.Dcl
‘He ate fried noodles using chopsticks.’
+> Using chopsticks is the manner of eating fried noodles.

b. Ceskalak-ul {sayongha/sayonghayss}-ko pokkumkwukswu-lul
chopsticks-Acc use /use.Pst-*ko* fried.noodles-Acc
mekessta.
eat.Pst.Dcl
‘He used chopsticks and ate fried noodles.’
+/> Using chopsticks is the manner of eating fried noodles.

The situation in Korean is thus reminiscent of the one in French, and this suggests that the statuses (niches) of the {*e*/*a*}*se*-construction and the *ko*-construction are comparable to those of the gérondif and the *et*-coordination structure, respectively.

A similar pattern is found in Japanese too, where the manner relation can be expressed with semantically underspecified subordination structures where the subordinate clause is headed by a predicate in its infinitive form or gerund form (Oshima 2012),[9] but cannot be expressed by the coordination structure with the connective -*shi*.

(19) a. Botan-o {oshi/oshite} doa-o aketa.
button-Acc press.Inf/press.Ger door-Acc open.Pst
‘Pressing the button, he opened the door.’
+> Pressing the button is the manner of opening the door.

b. Botan-o oshita-shi doa-o aketa.
button-Acc press.Pst-*shi* door-Acc open.Pst
‘He pressed the button and opened the door.’
+/> Pressing the button is the manner of opening the door.

(20) a. Hashi-o {tsukai/tsukatte} yakisoba-o tabeta.
chopsticks-Acc use.Inf/use.Ger fried.noodles-Acc eat.Pst

[9] An infinitive form is also called *ren’yookei*, and a gerund form is also called *te*-form. Complex clauses where the preceding clause is headed by an infinitive or gerund form have sometimes been considered coordination constructions (see Oshima forthcoming, Lee and Tonhauser 2010, and references therein). This view, however, wrongly predicts that a phrase like the following would be unacceptable due to the the Coordinate Structure Constraint.

(i) [sensoo-ga {owari/owatte} _$_i$ kakki-o torimodoshita] machi$_i$
war-Nom end.Inf/end.Ger liveliness-Acc regain.Pst city
‘a city that regained its liveliness after the war ended’
cf. *a city$_i$ that [the war ended and _$_i$ regained its liveliness]

‘He ate fried noodles using chopsticks.’
+> Using chopsticks is the manner of eating fried noodles.

b. Hashi-o tsukatta-shi yakisoba-o tabeta.
chopsticks-Acc use.Pst-*shi* fried.noodles-Acc eat.Pst
‘He used chopsticks and ate fried noodles.’
+/> Using chopsticks is the manner of eating fried noodles.

It is worth noting that the *shi*-construction is marked in the sense that its use is relatively infrequent, and tends not to clearly implicate the interclausal relation of ‘subsequence’, ‘causality’, etc.

(21) a. Chichi-ga shoku-o {ushinai/ushinatte}, haha-ga mata
father-Nom job-Acc lose.Inf/lose.Ger mother-Nom again
hataraki-hajimeta.
work-begin.Pst
‘My father lost his job and my mother started working again.’
+> The mother started working again because the father lost his job.

b. Chichi-ga shoku-o ushinatta-shi, haha-ga mata
father-Nom job-Acc lose.Pst-shi mother-Nom again
hataraki-hajimeta.
work-begin.Pst
‘My father lost his job and my mother started working again.’
+/> The mother started working again because the father lost his job.

Korean and Japanese thus conform to the proposed account/generalization. They possess a semantically underspecified and stylistically unmarked subordination structure, and the manner interpretation of coordination structure is blocked.

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The Manner Interpretation of Coordination Structure

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Constructional Paradigm in Constraint-based Morphosyntax: A Case of Japanese Verb Inflection*

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Introduction

It is a well-known fact that tense, aspect and mood/modality (TAM) are encoded in morphosyntactically diverse ways across languages. Some languages realise them purely by verb inflectional morphology, while others express them periphrastically by a verb and auxiliary/copula complex. Since Japanese is one of the languages that exhibit a combination of those two strategies in rather complicated manners, it poses a serious challenge to any grammatical theory as to how lexical verbs, auxiliaries, copulas, particles and inflectional suffixes are located in morphosyntactic structures, and how they are related to TAM functions in relevant components of the grammar. In the frameworks that place syntactic derivation in the central component of the grammar such as Minimalist Program and its variant, particularly in the recent development of syntactic structure above the proposition level (Rizzi 1997, Cinque 1999), it is assumed that mood suffixes head Fin(ite) or Mood projection and modal expressions and sentence final particles head Mod(al) or Force projection above T(ense) and Asp(ect) (Hasegawa 2009, Endo 2007). Lexicalist frameworks, on the other hand, maintain the division between word-internal and word-external structures. TAM realisation below V^0-level, therefore, are operated

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independently from syntax and a string of formatives are constructed in the lexicon (Sells 1995). This paper aims to give an account of controversial behaviours of complex interaction of verb inflection, auxiliary/copula constructions in Japanese in a constraint-based lexicalist formalism, Lexical-Functional Grammar (LFG; Kaplan and Bresnan 1982, Bresnan 2001, Dalrymple 2001, Falk 2001). Building on the insight from a construction-based approach to morphosyntax, the present study proposes that multiple lexical items interact with each other to realise a set of TAM features, while maintaining their phrase-structural autonomy. Crucially, the proposal enables us to capture 'constructional' exponents realising a certain combination of morphosyntactic features in the inflectional paradigm as well as the internal structure of the construction, so that we can observe the emergent properties of the construction in the grammar.

1. Morphosyntax of TAM encoding

Japanese, like many other languages, utilises a diverse range of lexical items such as lexical verbs, auxiliaries, adnominals, adjectival modal expressions and copulas to realise tense, aspect, mood and modality features as well as polarity and politeness. The basic combinatorial characteristics of those items are divided into the following patterns: (i) synthetic inflection of a single lexical verb; (ii) an analytic expression of a combination of a lexical verb and an auxiliary; and (iii) an addition of an adnominal and a copula to (i) or (ii). When more than one lexical item are combined as in (ii) and (iii), the question arises as to what kinds of morphological restrictions are observed across the items and how the items are syntactically related to each other. The following part of this section presents a descriptive overview of the patterns as well as the morphological and syntactic characteristics of the forms.

1.1. Realisation patterns

The verbs primarily inflect for polarity and politeness. The negative form is derived by adding an adjectival ending *nai* to the stem, so the inflectional patterns of negative forms are identical to regular adjectives, although their syntactic behaviours are still distinctively verbs (cf. Kishimoto 2008, Spencer 2008). When the mood is unmarked, namely the form is in the indicative mood, a tense distinction between past and non-past is observed as in (1). But the verbs also shows a range of inflectional forms for other mood features such as conditional, hortative and conjunctive as illustrated in (2).

(1) a. *Taroo wa maiasa ringo o taberu.*
Taro TOPIC every morning apple ACC eat.NONPAST
'Taro eats an apple every morning.'

b. *Taroo wa kesa ringo o tabeta.*
Taro TOPIC this morning apple ACC eat.PAST
'Taro ate an apple this morning.'

c. *Taroo wa ringo o tabenai.*
Taro TOPIC apple ACC eat.NEG.NONPAST
'Taro doesn't eat an apple.'

d. *Taroo wa ringo o tabemasita.*
Taro TOPIC apple ACC eat.POLITE.PAST
'Taro ate an apple.'

(2) a. *maiasa ringo o tabereba, ...*
every morning apple ACC eat.COND, ...
'If you eat an apple every morning, ...'

b. *Taroo wa ringo o tabenaide ie o deta.*
Taro TOPIC apple ACC eat.NEG.CONJ home ACC leave.PAST
'Taro left home without eating an apple.'

c. *maiasa ringo o tabemasyoo.*
every morning apple ACC eat.POLITE.HORT
'Let's eat an apple every morning.'

In addition to synthetic single word inflection, the verbs can also be combined with an auxiliary such as *iru/aru* 'exist', *oku* 'put', *miru* 'see', *simau* 'end' and *yaru* 'give', all of which have lost their lexical meanings in this usage and simply encode a range of aspectual features. The lexical verb preceding an auxiliary must be in non-finite, non-polite, affirmative or negative form, and the finite auxiliary inflects for polarity, politeness, tense and mood in the same way as the finite lexical verbs. (3) exemplifies the sentences involving auxiliary verbs, *iru* and *oku*, preceded by non-finite affirmative and negative lexical verbs respectively.

(3) a. *Taroo wa ringo o tabete iru.*
Taro TOPIC apple ACC eat.NONFIN AUX.NONPAST
'Taro is eating an apple.'

b. *ringo wa tabenaide okimasyoo.*
apple TOPIC eat.NEG.NONFIN AUX.POLITE.HORT
'Let's not eat that apple.'

Furthermore, the verb complex can be extended by a copula. The copula can attach either to a finite lexical verb or to a finite auxiliary verb with the intervention of an adnominal[1] such as *no*, *hazu*, *yoo* and *tumori*, which signal various types of modality. This intervention of adnominals are mandatory, that is the copula cannot be immediately adjacent to a lexical verb or an auxiliary.[2] (4) illustrates that the combination of adnominal and copula follows the finite lexical and auxiliary verbs,

[1] The category term, adnominal, is taken from Martin (1975).
[2] Some adjectival modal items such as *rasii* 'seem (hearsay)' directly attach to the preceding finite verb.

in which the adnominals encode epistemic modality, and the copulas inflect for politeness and tense.

(4) a. *Taro wa ringo o taberu hazu datta.*
Taro TOPIC apple ACC eat.NONPAST ADN COPULA.PAST
'Taro was supposed to eat an apple.'

b. *Taro wa ringo o tabenaide oita yoo*
Taro TOPIC apple ACC eat.NEG.NONFIN AUX.PAST ADN
desu.
COPULA.POLITE.NONPAST
'It seems that Taro didn't try to eat an apple.'

Finally, a sentence final particle can be added after the verb complex. In (5), the particles, *ne* and *yo*, are added to the finite lexical verb and the verb complex respectively and represent the speaker's psychological attitude towards the propositions.

(5) a. *Taroo wa ringo o tabemasita ne.*
Taro TOPIC apple ACC eat.POLITE.PAST FPART
'Taro ate an apple, didn't he?'

b. *Taroo wa ringo o tabenaide oita yoo*
Taro TOPIC apple ACC eat.NEG.NONFIN AUX.PAST ADN
desu yo
COPULA.POLITE.NONPAST FPART
'It seems that Taro tried not to eat an apple.'

To summarise the distributional patterns of the verb complex, the following linear order is obtained:

(6) Linear order of Japanese verb complex
V_{lex}—V_{aux}—ADN—V_{copula}—F.Part

With regard to the morphological constraints, the auxiliary requires the preceding lexical verb to be in the non-finite form; while the adnominal and copula complex requires the preceding verb, regardless of whether it is a lexical or auxiliary verb, to be in the tensed form. Thus, any grammatical theory needs to capture not only the linear distributions of items, but also the morphological dependency relations across the components within a verb complex. Since final particles always appear sentence-finally, regardless of the category of the preceding phrase, they are treated as a clause-level, i.e. root, adjunction, and outside the scope of the present study.

1.2. Clausality

When more than one lexical item construct a verb complex, a question arises as to whether they constitute a single clause or not. In the case of a combination of lexical and auxiliary verbs, the clausal morphosyntactic features such as tense, negation and politeness are marked only once. Therefore, as shown in (3) above, tense and politeness are marked only once on the auxiliary verbs. Further, if the non-finite lexical verb is in the negative form, the negative polarity is not allowed to be marked doubly on the auxiliary as shown in (7). Thus, we can plausibly conclude that they constitute a single clausal unit.

(7) **Taroo wa ringo o tabenaide okanai.*
Taro TOPIC apple ACC eat.NEG.NONFIN AUX.NEG

The adnominal and copula complex, on the other hand, constitutes a separate clause from the preceding lexical verb or the lexical and auxiliary verb complex. This point can clearly observed in (4) above, where distinct tense markings are possible between the copula and the preceding part.

In addition to the feature distributional patterns, a further piece of evidence of mono-clausality of the lexical verb and auxiliary complex and bi-clausality between the copula and the preceding part comes from the behaviour of a verbal proform. (8) demonstrates that the A utterance can be a reply either to question Q_1 or Q_2. The adnominal and the copula complex take the verbal proform, *sono*, as its complement and that proform anaphorically refers to the phrase headed by a lexical verb like Q_1 or a lexical verb and auxiliary complex like Q_2. This anaphoric reference by a proform strongly suggests that the adnominal and the copula introduces a separate clause by taking the preceding part as a syntactic complement.

(8) Q_1: *Taroo wa ringo o tabeta no?*
Taro TOPIC apple ACC eat.PAST FPART
'Did Taro eat an apple?'

Q_2: *Taroo wa ring o tabete iru no?*
Taro TOPIC apple ACC eat.NONFIN AUX.NONPAST FPART
'Is Taro eating an apple?'

A: *Un, sono hazu/yoo da yo.*
yes PRO ADN COPULA.NONPAST FPART

The following conversational pairs in (9), on the other hand, illustrate that an anaphoric reference to the lexical verb by a proform, *sono*, is not possible ((9-A_1)); instead an adverbial *soo* 'so' and the non-finite form of suru 'do' must be used in such interpretation ((9-A_2)).

(9) Q: *Taroo wa ringo o tabete ita no?*
Taro TOPIC apple ACC eat.NONFIN AUX.PAST FPART
'Was Taro eating an apple?'

A_1: **Un, sono ita yo.*
yes PRO AUX.PAST FPART

A$_2$: *Un, soo site ita yo.*
yes so do.NONFIN AUX.PAST FPART

This impossibility of an anaphoric reference by a verbal proform indicates that the lexical verb does not constitute a clausal complement of the following auxiliary.

1.3. Constructional exponents

The analytic inflectional patterns we have looked at so far are compositional, in that morphosyntactic features of the verb complex are obtained by unification of the features each lexical item in the complex carries. However, the number of features one lexical item realises is not unlimited. For instance, Japanese has an idiosyncratic gap of the negative, polite, past form in the inflectional paradigm. Thus, to realise all of those features, they must be distributed across exponents in the analytic form.

(10) a. *tabenaide imasita*
eat.NEG.NONFIN AUX.POLITE.PAST

b. *tabemasen desita*
eat.NEG.POLITE COPULA.POLITE.PAST

c. *tabete imasen desita*
eat.NONFIN AUX.NEG.POLITE COPULA.POLITE.PAST

In (10a), the negative feature is encoded in the lexical verb and the remaining two features, polite and past, are realised by the auxiliary. However, if an auxiliary is absent in the verb complex, namely any aspectual feature that must be realised by an auxiliary is not involved, the verb complex is obligatorily extended in order to involve a copula, which encodes the remaining past tense feature as well as the doubly marked politeness feature, as in (10b) (cf. Otoguro 2007, Spencer 2008). Even with a presence of an auxiliary verb, the copula must be introduced if the lexical verb realises none of three features. This is due to the lack of a negative, polite, past form of an auxiliary. Hence, in (10c) the auxiliary realises the negative, polite features while the copula encodes the polite, past features.

The peculiarity of the analytic expression like (10b, c) is an absence of an adnominal item before the copula. In principle, the copula requires an adnominal item to intervene between the copula and the preceding finite verb as shown in (11) (see also (4)). In the case of periphrastic realisation patterns of negative, polite, past features, however, the adnominal must not appear between the lexical/auxiliary verb and the copula as shown in (12).

(11) a. *tabeta *(no) desu*
eat.PAST COPULA.POLITE.NONPAST

b. *tabenaide oita *(no) da*
eat.NEG.NONFIN AUX.PAST COPULA.NONPAST

(12) a. *tabemasen (*no) desita*
eat.NEG.POLITE COPULA.POLITE.PAST

b. *tabete imasen (*no) desita*
eat.NONFIN AUX.NEG.POLITE COPULA.POLITE.PAST

Further, the politeness value of a copula used in this pattern must be consistent with that of the preceding verb as illustrated by the ungrammaticality of (13a, b). Such consistency is not mandatory in regular patterns involving adnominals as show in (13c, d).

(13) a. **tabemasen datta*
eat.NEG.POLITE COPULA.PAST

b. **tabete imasen datta*
eat.NONFIN AUX.NEG.POLITE COPULA.PAST

c. *taberu no desita*
eat.NONPAST ADN COPULA.POLITE.PAST

d. *tabete iru no desita*
east.NONFIN AUX.NONPAST ADN COPULA.POLITE.PAST

The behaviours the periphrastic negative, polite, past expression exhibits clearly indicates that the copula and the preceding verb(s) constitute a single clausal unit. Moreover, the deviation from regular compositional patterns can be attributed to 'constructional' nature of this periphrastic exponents (Sadler and Spencer 2001, Ackerman and Stump 2004, Booij 2010, Ackerman et al. 2011). Thus, the grammar must be able to utilise this type of construction only when a certain set of morphosyntactic features are realised.

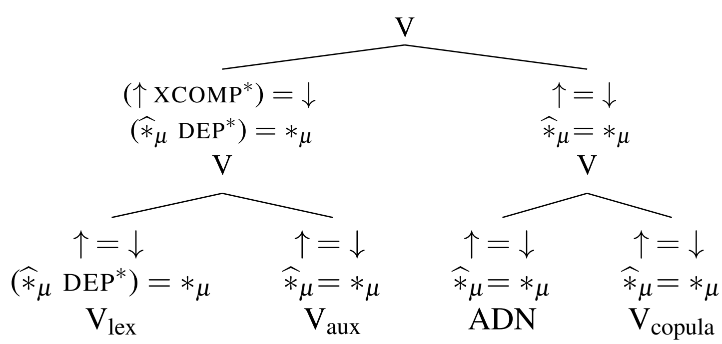
2. Analysis

Building upon the descriptive observation made in the previous section, I will present an analysis of the synthetic and analytic verb inflectional patterns in Japanese within a constraint-based grammar, LFG. The analysis is based on the recent development of the framework called projection architecture (Kaplan 1995, Butt et al. 1996), in which different types of linguistic information are represented in separate components of the grammar in a parallel fashion and the correspondence between the components is established by mapping functions. In the present study, the relevant components are c(onstituent)-structure, f(unctional)-structure and m(orphological)-structure. The essence of the analysis is to encode phrase-structural, morphological and syntactic complementations in separate components of the grammar, so that the diverse range of inflectional patterns found in the language is captured.

2.1. Projection architecture

The c-structure configuration of the entire verb complex is represented as in (14). As standardly assumed in LFG, each node is given annotations that define projections from the c-structure node to other structures. $\uparrow$ and $\downarrow$ are abbreviations of $\phi(M(*))$ and $\phi(*)$ respectively, in which ϕ is a function that maps a c-structure node to an f-structure, M maps a c-structure node to its mother node, and $*$ refers to the current c-structure node, i.e. the node to which the annotation is given. In a similar fashion, $\widehat{*}_\mu$ and $*_\mu$ are abbreviated functions of $\mu(M(*))$ and $\mu(*)$ respectively, in which μ is a mapping function from a c-structure node to an m-structure. Therefore, $\uparrow = \downarrow$ means that the syntactic features associated with the current node is mapped onto the same f-structure as those associated with the mother node. And similarly, $\widehat{*}_\mu = *_\mu$ states that the morphological features associated with the current node is mapped onto the same m-structure as those associated with the mother node. Since the lexical and auxiliary verb complex is a syntactic complement of the following adnominal and copula complex, the V node dominating those two verbs is given an annotation $(\uparrow \text{XCOMP}^*) = \downarrow$, which ensures that the syntactic features of the two verbs are mapped onto the value of XCOMP, an open complement, of the larger clause headed by the copula.[3] That is, the f-structure corresponding to this c-structure is bi-clausal. In terms of morphological dependency, the auxiliary selects a non-finite lexical verb, so $(\widehat{*}_\mu \text{DEP}^*) = *_\mu$ ensures that the morphological features associated with the lexical verb are mapped onto the value of DEP, a morphological dependent, of the auxiliary verb in the m-structure. The same relationship is established between the adnominal and copula complex and its sister V, so $(\widehat{*}_\mu \text{DEP}^*) = *_\mu$ is assigned to that node as well.

(14)



The morphological and syntactic features are lexically specified in the entries of the items of a verb complex, so that they are unified and mapped onto an f-structure and an m-structure according to the annotations given in the c-structure. For instance, the lexical entries (16) are given to the items of the verb complex, *tabete ita yoo desu* in (15):

[3] The kleene star (*) attached to XCOMP means that any number of XCOMP including zero can apply in this equation, as long as the relevant constraints are satisfied. The same mechanism applies to the kleene star attached to DEP.

(15) *Taroo wa ringo o tabete ita yoo*
Taro TOPIC apple ACC eat.NONFIN AUX.PAST ADN
desu.
COPULA.POLITE.NONPAST
'It seems that Taro was eating an apple.'

(16) a. *tabete* V_{lex} $(\widehat{*}_\mu\ \text{FORM}) = lex$
$(\widehat{*}_\mu\ \text{FIN}) = -$
$(\widehat{*}_\mu\ \text{NEG}) = -$
$(\widehat{*}_\mu\ \text{POLITE}) = -$
$(\uparrow\ \text{PRED}) = \text{`eat}\langle\text{SUBJ,OBJ}\rangle\text{'}$

b. *ita* V_{aux} $(\widehat{*}_\mu\ \text{FORM}) = aux$
$(\widehat{*}_\mu\ \text{FIN}) = +$
$(\widehat{*}_\mu\ \text{TENSE}) = +$
$(\widehat{*}_\mu\ \text{NEG}) = -$
$(\widehat{*}_\mu\ \text{POLITE}) = -$
$(\widehat{*}_\mu\ \text{DEP FIN}) =_c -$
$(\widehat{*}_\mu\ \text{DEP POLITE}) =_c -$
$(\uparrow\ \text{TENSE}) = \text{PAST}$
$(\uparrow\ \text{ASP}) = \text{PROG}$

c. *yoo* ADN $(\widehat{*}_\mu\ \text{LINK}) = +$
$(\uparrow\ \text{MODAL}) = \text{EPISTEMIC}$

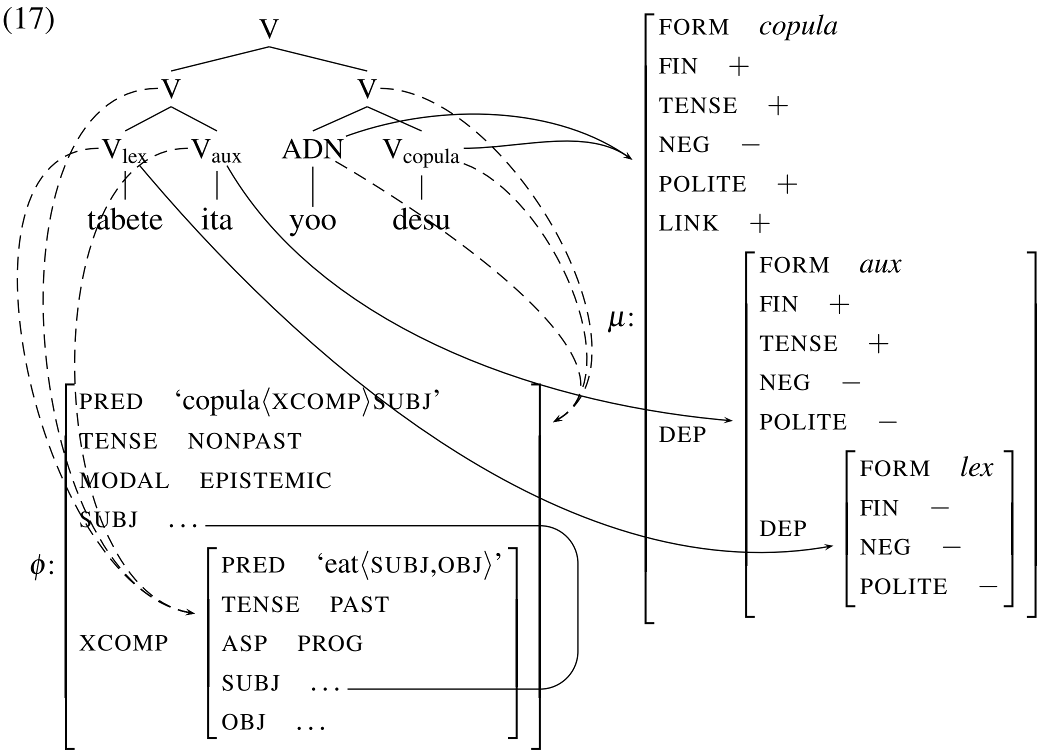
d. *desu* V_{copula} $(\widehat{*}_\mu\ \text{FORM}) = copula$
$(\widehat{*}_\mu\ \text{FIN}) = +$
$(\widehat{*}_\mu\ \text{TENSE}) = +$
$(\widehat{*}_\mu\ \text{NEG}) = -$
$(\widehat{*}_\mu\ \text{POLITE}) = +$
$(\widehat{*}_\mu\ \text{LINK}) =_c +$
$(\widehat{*}_\mu\ \text{DEP FIN}) =_c +$
$(\widehat{*}_\mu\ \text{DEP TENSE}) =_c +$
$(\uparrow\ \text{TENSE}) = \text{NONPAST}$
$(\uparrow\ \text{PRED}) = \text{`copula}\langle\text{XCOMP}\rangle\text{SUBJ'}$
$(\uparrow\ \text{XCOMP SUBJ}) = (\uparrow\ \text{SUBJ})$

The features mapped onto m-structure include FORM, FIN(iteness), TENSE, NEG(ative) and POLITE. The FORM specifies the type of an exponent as a *lex*(ical), *aux*(ilary) or *copula* verb. All the other features take boolean values, either $+$ or $-$. The LINK is an inherent feature of adnominals, which licenses the preceding finite verb to be a complement of the following copula. The constraining equation, $=_c$, requires a certain value to be externally specified for a given feature. For example, $(\widehat{*}_\mu\ \text{DEP FIN}) =_c -$ and $(\widehat{*}_\mu\ \text{DEP POLITE}) =_c -$ specified in the entry of the auxiliary, *ita*, in (16b) require its morphological dependent to provide a negative value both for the attributes FIN and POLITE, which essentially ensures that the preceding lexical verb is in the non-finite, non-polite form. In a similar way, the copula requires a positive value to be externally specified for the attribute LINK as stated in (16d), so that it cannot occur without an adnominal like (16c). In (16d), two additional constraining equations are defined, both of which enable the copula to select a finite, tensed verb as its morphological dependent.

With regard to syntactic features, the lexical verb and the auxiliary are mapped onto the same f-structure and the former provides the PRED while the latter TENSE and ASP(ect). Since the copula takes a syntactic complement and introduces a bi-clausal structure as argued in section 1.2, it is treated as a raising verb as in the last two equations in the entry (16d). That is, the value of PRED states that it requires a thematic subject, SUBJ outside the angled brackets, and an open complement, XCOMP, and the athematic SUBJ is identified with the SUBJ inside the XCOMP. Finally, the adnominal contributes a MODAL feature to the outermost f-structure.

Based on the c-structure configurations in (14) and the lexical entries (16), the m-structure, marked with μ, and the f-structure, marked with ϕ, for the verb complex in (15) are given as follows:[4]

(17)



In the m-structure, the non-finite lexical verb is mapped onto the most deeply embedded DEP, which functions as the morphological dependent of the auxiliary. The

[4] The arrows represent the mapping from c-structure nodes to m-/f-structures. For ease of exposition, the structures only for the verb complex are given and the annotations on c-structure nodes are omitted.

outer DEP corresponds to the finite auxiliary and functions as a morphological dependent of the the adnominal and the copula. The f-structure, on the other hand, is bi-clausal. Both the lexical verb and the auxiliary are mapped onto the value of XCOMP, namely they are syntactically a complement of the copula, so that the TENSE and ASP features of this clause come from the auxiliary while the PRED feature comes from the lexical verb. The TENSE and MODAL features associated with the adnominal and the copula are mapped onto the outer f-structure. Since the copula is treated as a raising verb, the athematic SUBJ in the outer f-structure is identified with the SUBJ in the XCOMP.

2.2. Periphrastic inflection

As argued in section 1.3, not all the analytic verb complex expressions are syntactically bi-clausal. When negative, polite, past features are distributed across the finite lexical/auxiliary verb and the copula, they constitute a single clausal unit. To account for this constructional exponents, the following lexical entries are postulated:

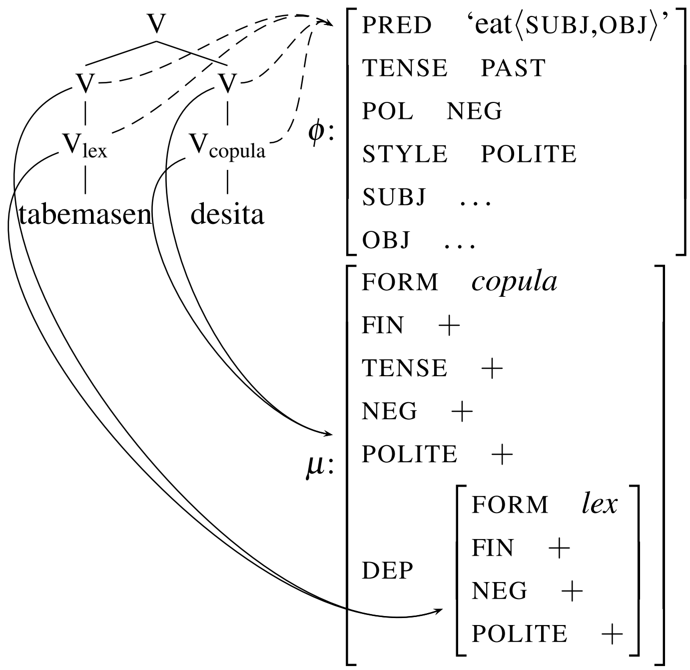
(18) a. *desita* $\mathrm{V}_{\text{copula}}$
$(\widehat{*}_\mu\ \text{FIN}) = +$
$(\widehat{*}_\mu\ \text{TENSE}) = +$
$(\widehat{*}_\mu\ \text{NEG}) = -$
$(\widehat{*}_\mu\ \text{POLITE}) = +$
$(\widehat{*}_\mu\ \text{LINK}) \neq +$
$(\widehat{*}_\mu\ \text{DEP NEG}) =_c +$
$(\widehat{*}_\mu\ \text{DEP POLITE}) =_c +$
$(\uparrow\ \text{TENSE}) = \text{PAST}$
$(\uparrow\ \text{STYLE}) = \text{POLITE}$

b. *tabemasen* V_{lex}
$(\widehat{*}_\mu\ \text{FIN}) = +$
$(\widehat{*}_\mu\ \text{NEG}) = +$
$(\widehat{*}_\mu\ \text{POLITE}) = +$
$(\uparrow\ \text{POL}) = \text{NEG}$
$(\uparrow\ \text{STYLE}) = \text{POLITE}$
$(\uparrow\ \text{PRED}) = \text{‘eat}\langle\text{SUBJ,OBJ}\rangle\text{’}$

Since the copula used in this construction is restricted to the polite, past form, *desita*, this form is given an entry as in (18a) in addition to the regular raising verb usage. Crucial in the entry are the negative equation for LINK feature and the two constraining equations for NEG and POLITE features of its DEP. The equation, $(\widehat{*}_\mu\ \text{LINK}) \neq +$, stops an adnominal that introduces a positive value for LINK attribute from intervening between the copula and the preceding finite verb. The constraining equations, on the other hand, ensures that this special type of copula can appear only with a negative, polite form. With regard to syntactic features, it only contributes PAST value for TENSE and POLITE value for STYLE to the f-structure. Note that the entry lacks a PRED feature and relevant equations normally assigned to a raising verb (cf. (16d)).

Those lexical items appear together in examples like (19), and the c-structure, m-structure and f-structure corresponding to the verb complex in the example are given as in (20):

(19) *Taroo wa ringo o tabemasen desita.*
Taro TOPIC apple ACC eat.NEG.POLITE COPULA.POLITE.PAST
'Taro didn't eat an apple.'

(20)


Since the annotation, $(\uparrow \text{XCOMP}^{*}) = \downarrow$ on the c-structure node in (14) allows the V node headed by the lexical verb to be mapped onto the same f-structure as the copula, i.e. $\uparrow = \downarrow$, the f-structure for the verb complex constitutes a well-formed mono-clausal unit. The m-structure for the verb complex, on the other hand, includes a DEP embedding, namely the lexical verb is a morphological dependent of the copula. Therefore, the projection architecture allows us to account for the fact that the lexical verb is morphologically and phrase-structurally a complement of the copula while syntactically they constructs a single unit.

3. Conclusion

This paper demonstrates that careful inspection of the verb inflectional patterns in Japanese reveals that the language utilises a range of lexical items to realise TAM features in the verb domain, and the morphosyntactic relations across the items are not monolithic; instead they exhibit different types of complementations in terms of phrase structure, morphological dependency and syntactic clausal relations. This descriptive observation can formally be captured by a parallel constraint-based framework of LFG, in which distinct levels of representations are adopted as projection architecture.

Crucially, the present study demonstrates that the feature realisation is not entirely compositional in Japanese, namely the distribution of the marked negative, polite, past features are constrained by construction as a whole. Such non-compositional nature of the exponents is widely observed across languages and often analysed by an explicit manifestation of construction types as found in recent work in Head-driven Phrase Structure Grammar (Sag 1997, Ginzburg and Sag 2000), Sign-based Construction Grammar (Boas and Sag to appear) and many others. Although this paper also attempts to account for the constructional exponents, the formalisation does not rely on an explicit reference to the construction itself; rather the concept of construction is formulated in such a way that it has emerged from regular compositional patterns of multiple lexical items. This type of formulation allows us to capture how construction is utilised in the grammar by maintaining the continuity with other part of the language.

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Future Reference in Hungarian

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1. Introduction

This paper provides a semantic analysis of future-referring expressions in Hungarian in which the available interpretations of such expressions follow from the interaction of their temporal properties with the aspectual properties of Hungarian predicates.

1.1. Future-referring expressions in Hungarian

In Hungarian there are three types of expressions that can give rise to future reference. These are the future copula, the auxiliary *fog*, and the non-past construction. The future copula, shown in (1), is a future form of the copula *van*, which has distinct past, present, and future forms, and inflects for person and number. It also has an imperative form, and can inflect for mood. The future form occurs only with adjectival predicates and locates states in the future of the speech time. The copula is the only verb in the language that has an inflected future form.

(1) a. *János magas* ***lesz***
john tall be.FUT.3SG
'John will be tall' *Future copula*

This paper deals mainly with the remaining two expressions that give rise to future reference. These are the *fog* and the non-past construction. The *fog* construction involves a future marker *fog* and gives rise to future reference obligatorily in all contexts. *Fog* is an auxiliary verb which conjugates for person and number and is followed by the infinitival form of a main verb, as in (2).

(2) *A bulí-ba* ***fog-unk*** *menni (ma este)*
the party-ILL *fog*-NPST.1PL.INDEF go.INF (today evening)
'We will go to the party (this evening)' [1] *fog construction*

The non-past construction can give rise to future reference without overt future marking, as shown in (3a). Non-past sentences involve a finite verb conjugated for subject person and number, and object definiteness. §2 shows that whether or not future-oriented readings are available is dependent on the aspectual properties of the predicate. When future-oriented readings are unavailable, the non-past gives rise to ongoing readings, as in (3b).

(3) a. *János meg-főz-i a csirkét ma este*
john PART-cook-NPST.3SG DEF chicken.ACC today evening
'John will cook the chicken this evening'

b. *János meg-főz-i a csirkét*
john PART-cook-NPST.3SG DEF chicken.ACC
'John is cooking the chicken'

1.2. Future reference

There has been a long-standing tradition of viewing expressions which can receive future-oriented interpretations as involving future tense. At its most basic, a tense is a grammatical marker which locates eventualities in time. The following are properties commonly attributed to the tenses on a generous view of what can be considered a tense.

(4) A tense is:

a. A systematically used grammatical marker, often involving verbal inflectional morphology, a particle, or auxiliary.
b. Obligatory in clauses that convey temporal information, at least in unmarked contexts.
c. Usually unable to co-occur with other tenses. (Smith (2008), Hayashi (2011))

The perspective that tense is generally responsible for the contribution of temporal reference and temporal location of events faces a serious empirical problem,

[1] I use the following notations for glosses in addition to standard person and number abbreviations: NPST = non-past construction, DEF = definite object marker, INDEF = indefinite object marker, INF = infinitive marker, PART = particle, ILL = illative case marker, TEM = temporal case, INE = inessive case marker, ACC = accusative case marker, DAT = dative marker, ADE = adessive case marker, ALL = allative case marker.

however. Cross-linguistically, future reference is commonly achieved through the use of expressions with no overt future marking. The Hungarian n non-past is just one such example(Lotz (1962), Papp (1989), Dahl (2000), Abondolo (1998)). In fact, it is possible that true future tense is cross-linguistically rare ..

Future reference without future marking has been a topic of growing interest in recent years, and increasing consideration has been given to the following frequently encountered forward-shifting mechanisms in languages where future reference occurs without grammaticalized future markers (Dahl (2000), Bittner (2005), Tonhauser (2009)).

(5) a. Forward-shifting grammatical and lexical aspect (especially prospective aspect)
b. Future-referring temporal adverbs
c. Future time contexts

As a result of the new perspectives offered by these works on the semantics of future reference, any analysis of future reference in any language should minimally grapple with the following three questions.

(6) a. How is future reference accomplished without future marking?
b. How do aspectual properties of the predicate and aspectual markers impact future reference?
c. How do other features of the language that impact future reference (such as context, temporal adverbs, and modals) work, and what effects do they have on the forward-shifting of events?

This paper focuses predominantly on the first two questions, providing an illustration of the main future-referring expressions in Hungarian and proposing a semantics for the elements involved, as well as for non-past and *fog* sentences with temporal adverbs.

1.3. Roadmap & Claims

§2 of this paper presents the Hungarian non-past and *fog* constructions in more detail and discusses the distributional patterns of future-oriented interpretations which proves relevant for this analysis. Specifically, I argue that aspectual properties of predicates interact with the meaning of the non-past construction to give rise to ongoing reading and future readings, and it is this interaction which is responsible for the distributional contrasts between the interpretations of the non-past and *fog* constructions. The forward-shifting of the event time in the *fog* construction, on the other hand, is part of the meaning of the morpheme *fog*. In §3 I present a semantics for *fog* and the non-past which gives rise to the expected restrictions on intepretations when it interacts with telic predicates and temporal adverbs.

2. The Hungarian facts

2.1. The *fog* construction

The *fog* construction, shown in (7) with a range of predicate types, obligatorily gives rise to future reference in all contexts.

(7) a. *János lak-ni* ***fog*** *NY-ban*
john live-INF fog.NPST.3SG.INDEF NY-INE
'John will live in NY' *State*

b. *János tv-t néz-ni* ***fog***
john tv-ACC watch-INF fog.NPST.3SG.INDEF
'John will watch tv' *Durative, Atelic (Activity)*

c. *A buli-ba* ***fog-unk*** *menni*
the party-ILL *fog*-2PL.INDEF go.INF
'We will go to the party' *Durative, Telic (Accomplishment)*

d. *Miklos el-felejteni* ***fogja*** *a leckét*
michael PART-forget.INF fog.NPST.3SG.INDEF DEF lesson.ACC
'Michael will forget the lesson' *Non-durative, Telic (Achievement)*

The fact that *fog* always gives rise to future reference means that sentences like that in (8) are unacceptable.

(8) *#**Tegnap** amikor haza-jöttem, Attila mond-ta*
yesterday when PART-come.PST.1SG.INDEF, attila this.ACC
hogy valamít ***fog*** *énekel-ni*
say-PST.3SG.DEF that something.ACC fog.NPST.3SG.INDEF sing-INF
#'Yesterday when I got home, Attila said that he will sing something'

If *fog* were a prospective aspect marker, locating the reference time in the future of the event time, we would expect such sentences to be possible. The fact that they are not rules out the possibility that *fog* is a prospective aspect marker.

There is no evidence of restrictions on the flavor of futurity with which *fog* can be used. (9a) shows *fog* with a scheduled future. (9b) shows an unscheduled prediction future. (9c) shows an intention future where the speaker is the agent of the action, and (9d) shows an intention future where the speaker is not the agent.

(9) a. *3-kor indul-ni* ***fog*** *a vonat*
3-at set.out-INF fog.NPST.3SG.INDEF DEF train
'The train will leave at 3' *Scheduled future*

b. *Es-ni* ***fog*** *az eső*
fall-INF fog.NPST.3SG.INDEF DEF rain
'It will rain' *Non-scheduled prediction future*

c. ***Fog-ok*** *haza-menni a buli után*
fog-NPST.1SG.INDEF PART-go.INF DEF party after
'I will go home after the party' *Speaker intention*

d. *Réka* ***fog*** *haza-menni a buli után*
réka fog-NPST.3SG.INDEF PART-go.INF DEF party after
'Réka will go home after the party' *Non-speaker agent intention*

2.2. The Non-past construction

Hungarian shows a prominent past/non-past tense distinction, which is obligatorily marked in finite clauses. The Hungarian past tense is marked with a suffix on the verb, the form of which varies considerably depending on the final sounds of the verb involved, the person and number of the subject, the definiteness of the object, and vowel harmony, as in (10).

(10) a. *Péter ve**tt** a könv-et*
peter buy.PST.3SG.INDEF DEF book-ACC
'Peter bought the book' *3sg subject, definite object*

b. *Ve**sztunk*** *egy új kocsít*
buy.PST.1PL.INDEF INDEF new car.ACC
'We bought a new car' *1pl subject, indefinite object*

c. *Zoltán fel-hív**ta*** *a Péter-t*
zoltan PART-call..PST.3SG.DEF DEF peter-ACC
'Zoltán called up Peter' 3sg subject, definite object

Morphologically, the non-past has no overt tense marking. Person and number of subject and definiteness of object are marked on the verb, as with the past tense. Non-past future-referring sentences often contain temporal frame adverbs, as in (11).

(11) a. *Péter alszik* ***ma este***
peter sleep.NPST.3SG.INDEF today evening
'Peter will sleep this evening'

b. ***Jövő év-ben*** *János lak-ik NY-ban*
next year-INE John live-NPST.3SG.INDEF NY-INE
'Next year John will live in NY'

The temporal frame adverbial *majd* is very often used with non-past future-referring sentences when the exact temporal location of the event is unknown or irrelevant. *Majd* has a variety of meanings, all of which are constrained to the future, some of which are similar to: 'soon' (as in (12)), 'then', 'presently', 'in time', and just simply 'in the future'.

(12) ***Majd*** *veszek* *neked* *egy biciklít*
In.the.future buy.NPST.1SG DAT.2SG a bicycle.ACC
'I will buy you a bicycle.'

2.3. Aspect and the non-past

As we have seen, the non-past construction is compatible with both a future and an event-in-progress reading. Note that in (13b), a future-oriented context would allow the sentence to give rise to a future reading. Without such a context, future-oriented readings are unavailable.

(13) a. *János zongorázik* *holnap* *délután*
john play.piano-NPST.3SG.INDEF tomorrow afternoon
'John will play the piano tomorrow afternoon' *Future*

b. *János zongorázik*
john play.piano-NPST.3SG.INDEF
'John is playing the piano' *Event-in-progress*

A closer look at the distribution of future-referring and event-in-progress readings of non-past sentences reveals that the availability of future referring interpretations with non-past sentences is crucially tied to the aspectual properties of the predicate.

Atelic non-past sentences (both stative and eventive) and non-durative non-past sentences produce event-in-progress readings, as in (14a), (14b), and (14c). In the presence of adverbs[2], these sentences obligatorily give rise to future reference, as seen above in (13a). Durative telic (accomplishment) non-past sentences, on the other hand, give rise to future readings even without temporal adverbs, as in (14d).

(14) a. *Magda szeret-i* *a* *Zolít*
magda love-NPST.3SG.DEF DEF zoli.ACC
'Magda loves Zoli' *Atelic (Stative)*

b. *Tanul-unk*
study-NPST.1PL.INDEF
'We are studying' *Atelic (Eventive)*

c. *János kap-ja* *az* *ajándék-ot*
john receive-3SG.NPST.DEF the present-ACC
'John is getting a present (currently)' *Non-durative Telic*

d. *Lilla el-olvas-ja* *a* *könyv-et*
Lilla PV-read-3SG.NPST.DEF the book-ACC
'Lilla will read the book' *Durative Telic*

[2] Future contexts have the same effect of eliminating the ongoing interpretation as temporal adverbs do.

Telicity is defined formally as in (15), following Krifka (1998).

(15) $\text{TELIC}(X) \longleftrightarrow \forall e, e'[X(e) \wedge X(e') \rightarrow \neg e' < e]$

For any 2 events, if they are in the predicate X, one cannot be a proper subevent of the other.

The pattern described above can be seen not only through speaker judgements, but also through the distribution of telic and atelic predicates with non-past and *fog* sentences in Hungarian texts. The table in (16) shows the percentages of telic and atelic sentences from a number of future-referring sentences gathered by hand from a variety of texts[3]. (16) shows that 84% of future-referring non-past sentences are telic, while only 16% of future-referring non-past sentences are telic. This is a significant numerical asymmetry, and warrants an explanation. I include the *fog* sentences to reflect that the asymmetry in the number of telic and atelic non-past sentences is not likely to be a fact about the language in general. With *fog* sentences, atelic predicates are significantly more common than telic predicates, providing further incentive to provide an explanation of future reference that explains the asymmetry between future-referring non-past sentences.

(16)

	Telic	Atelic
non-past (n=51)	**84%**	**16%**
fog[4] (n=101)	**37%**	**63%**

In short, the empirical claim of this section is that atelic and non-durative predicates give rise to event-in-progress readings with the non-past construction, while durative telic predicates give rise to future interpretations with the non-past. §3 provides a semantics which accounts for this distribution.

3. Analysis of the temporal components of the non-past (and *fog*)

In this section I propose a formal analysis of the temporal components of the *fog* and non-past construction. The distributional differences in future-referring interpretations between telic and atelic predicates with these constructions falls out from the interaction of telicity with the meaning of *fog* and the non-past.

3.1. The semantics of the *fog* construction

Instantiation of predicates with respect to a world and time is defined here in terms of the AT relation, adapted from Condoravdi 2002. This definition reflects that

[3] The tables are based on 152 future-referring non-past and *fog* sentences that were systematically gathered from from fables (*Minden napra egy mese* by T. Aszódi Éva), a novel (*Édes Anna* by Kosztolányi Dezső), blogs, web-based news sources, and biblical texts (http://spiritlessons.com/Documents/Bible/Hungarian_HTML_Bible/index.htm with English translations from the correlated online American Standard bible at http://www.htmlbible.com/asv/index.htm.

fog and the non-past can take either eventive predicates or temporal predicates, as shown in (17).

(17) $\textsc{at}(P,i) \;=\; \begin{cases} \exists e\,[P(e) \wedge \tau(e) \subseteq i] & \textit{Eventive} \\ P(i) & \textit{Temporal} \end{cases}$

As we have seen, the *fog* construction always gives rise to future reference. I take *fog* to be a simple existential quantifier over future intervals, as in (18).

(18) $[\![\textsc{fog}]\!] : \lambda P \lambda w.\forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \exists i[i > now \wedge AT(P,i)]]$

Fog takes eventive or temporal predicates and returns a set of propositions such that for every world in the modal base (MB) with respect to the evaluation world at the *now* of speech time, those worlds are also worlds in which the proposition holds at some interval after *now*.

A sample derivation of a *fog* sentence is given in (19). (19a) shows the Hungarian sentence and its English translation. In (19b) contains the eventuality description. (19c) shows FOG applied to the eventuality description and the steps and result of the application.

(19) a. *János fut-ni fog*
john run-INF FOG.NPST.3SG.INDEF
'John will run'

b. $[\![\text{john run}]\!] = \lambda e.\text{john-run}(e)$

c. $[\![\textsc{fog}(\text{john run})]\!] = \lambda P \lambda w.\forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \exists i[i > now \wedge AT(P,i)]](\lambda e.\text{john run}(e))$

$= \lambda w.\forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \exists i[i > now \wedge AT(\lambda e.\text{john run}(e), i)]]$

$= \lambda w.\forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \exists i[i > now \wedge \exists e.\text{john run}(e) \wedge \tau(e) \subseteq i]]$

In (19), the predicate holds of some interval *i* that is after *now*. In other words, 'john run' is true of some period of time that occurs after the time of speech.

Note that the telicity or atelicity of a predicate has no effect on the forward-shifting properties of *fog*. This is ideal. Though there was a distributional asymmetry between telic and atelic *fog* sentences (seen in (16) in §3), this is not a problem. Rather, the asymmetry is an epiphenomenon resulting from the interaction of the non-past with atelic predicates. Atelic predicates with the non-past give rise to an event-in-progress reading, meaning that in order to get a future reading with atelic predicates, either temporal adverbs or the *fog* construction is needed. This is not so with telic predicates, which give rise to future reference with the non-past. As a result, it is no surprise that the *fog* construction would be used more often with atelic predicates than with telic predicates.

3.2. The non-past with atelic predicates

I propose the following meaning for the non-past construction in Hungarian, which is compatible with both future and event-in-progress readings.

(20) $[\![\textsc{npast}]\!] = \lambda P \lambda w. \forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \textsc{at}(P, [now, \infty))]$

NPAST denotes a function from eventive or temporal predicates to a set of worlds in the modal base such that these worlds are all worlds where *P* holds in the interval extending from the *now* of speech time to infinitely in the future. A derivation of the atelic predicate 'john-run' is given in (21).

(21) a. *János fut*
john run.NPST.3SG.INDEF
'John runs'

b. $[\![\text{john-run}]\!] = \lambda e.\text{john-run}(e)$

c. $[\![\textsc{npast}(\text{john-run})]\!] = \lambda P \lambda w. \forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \textsc{at}(P, [now, \infty))](\lambda e.\text{john-run}(e))$

$= \lambda w. \forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \textsc{at}(\lambda e[\text{john-run}(e), [now, \infty)])]$

$= \lambda w. \forall w'[w' \in \textsc{mb}(w, now) \longrightarrow w' \in \exists e[\text{john-run}(e) \wedge \tau(e) \subseteq [now, \infty)]]$

In the denotation of NPAST given in (20), the AT relation holds between *P* and the interval $[now, \infty)$. This has the effect of restricting the time interval over which the predicate can hold to the interval starting from the speech time and extending infinitely into the future. Because the AT relation requires that the temporal trace of the *P* event must be a subpart of this larger interval, the temporal trace could have one of the following three relationships to now:

(22) 1. $\tau(e) \subseteq now$
2. $\tau(e) > now$
3. $\tau(e) \subseteq i \wedge now \subseteq_{ini} i$

Atelic predicates can hold in the interval $[now, \infty)$ in any of the three ways given in (22). Telic predicates, on the other hand, are restricted in how they can hold in $[now, \infty)$.

3.3. The non-past with durative telic predicates

(23) shows the derivation of a durative telic sentence with the non-past. (23a) shows the Hungarian sentence and English translation. (23b) gives the eventuality description, and (23c) shows the non-past applied to the eventuality description.

(23) a. *László fel-mossa* *a padlót*
laszlo PV-wash.NPST.3SG.DEF the floor.ACC
'Laszlo washes up the floor'

b. $[\![$laszlo-washes-up-the-floor$]\!] = \lambda e.$laszlo-washes-up-the-floor(e)

c. $[\![$NPAST(laszlo-washes-up-the-floor)$]\!] = \lambda w.\forall w'[w' \in$ MB$(w, now) \longrightarrow w' \in$ AT$(\lambda e[$laszlo-washes-up-the-floor$(e), [now, \infty))]]$

$= \lambda w.\forall w'[w' \in$ MB$(w, now) \longrightarrow w' \in \exists e[$laszlo-washes-up-the-floor$(e) \wedge \tau(e) \subseteq [now, \infty)]]$

We still need to derive the fact that durative telic non-past sentences give rise to future interpretations, not ongoing interpretations. In §2, the definition of telicity was provided, and is repeated here in (24).

(24) **TELIC**(X) $\longleftrightarrow \forall e, e'[X(e) \wedge X(e') \rightarrow \neg e' < e]$

For any 2 events, if they are in the predicate X, one cannot be a proper subevent of the other.

As shown in §2, telic predicates give rise to future interpretations with the non-past, and I argue that it is the interaction of telicity with the meaning of the non-past which produces this distribution. However, the definition of telicity in (24) is one which quantifies over events. This is incompatible with the AT relation, which deals with intervals. As a result, I introduce a version of (24) for intervals, called the Anti-subinterval Property. This is given in (25).

(25) **Anti-subinterval Property:** $\forall i, i' \exists e[$AT$(P, i) \wedge$ AT$(P, i')) \rightarrow \neg(i' \subset i)]$

The Anti-subinterval property is useful in understanding why durative telic predicates can't give rise future interpretations. I will show that durative telic predicates cannot hold over $[now, \infty)$ as in possibility 1 in (22). The result is that they cannot give rise to event-in-progress readings with the non-past, which accords with the data. The reasoning is as follows:

- Durativity of a predicate means that for some interval and some P event, the temporal trace of that event is equal to the interval. Formally, $\exists i \exists e[P(e) \wedge \tau(e) = i]$
- If the i in question (the i over which P is true) is ongoing at speech time, the moment of speech time is a subinterval of the interval over which P holds.
- Accomplishments (durative telic predicates), as in (23), have the Anti-subinterval Property.

- If P has the Anti-subinterval Property, then P holds of no proper subinterval of i, in particular, not *now*.
- Therefore, possibility 1 in (22) is not available for accomplishments.

Note that non-durative telic predicates can hold of the speech time as in (22a). Because of their punctuality, they can hold of *now* of any subsequent interval.

3.4. The non-past with temporal predicates

All predicates receive a future interpretation when they occur with temporal adverbs and the non-past. Temporal adverbs take eventive predicates and return temporal predicates (Abusch (1998), Condoravdi (2002), Deo (2009)). The meaning of 'tomorrow' is given in (27d):

(26) $[\![\text{TOMORROW}]\!] = \lambda P \lambda i.\text{AT}(P, i \cap tomorrow)$

(27) shows the derivation of an atelic predicate with the temporal adverb 'tomorrow'. In the derivation, the version of AT for temporal predicates is used, because when tomorrow is applied to the eventive predicate "john-run", a temporal predicate is returned. The non-past is then applied to this temporal predicate.

(27) a. *János fut*
john run.NPST.3SG.INDEF
'John runs'

b. $[\![\text{john-run}]\!] = \lambda e.\text{john-run}(e)$

c. $[\![\text{TOMORROW}]\!] = \lambda P \lambda i.\text{AT}(P, i \cap tomorrow)$

d. $[\![\text{TOMORROW}(\text{john-run})]\!] = \lambda P \lambda i.\text{AT}(P, i \cap tomorrow)(\lambda e.\text{john-run}(e))$

$= \lambda i.\text{AT}(\lambda e[\text{john-run}(e)], i \cap tomorrow)$

$= \lambda i \exists e[\text{john-run}(e) \wedge \tau(e) \subseteq i \cap tomorrow]$

e. $[\![\text{NPAST}(\text{TOMORROW}(\text{john-run}))]\!] = \lambda P \lambda w.\forall w'[w' \in \text{MB}(w, now) \longrightarrow w' \in \text{AT}(P, [now, \infty))](\lambda i \exists e[\text{john-run}(e) \wedge \tau(e) \subseteq i \cap tomorrow])$

$= \lambda w.\forall w'[w' \in \text{MB}(w, now) \longrightarrow w' \;\; \text{AT}(\lambda i \exists e[\text{john-run}(e)] \wedge \tau(e) \subseteq i \cap tomorrow), [now, \infty)]$

$= \lambda w.\forall w'[w' \in \text{MB}(w, now) \longrightarrow w' \in \exists e[\text{john-run}(e) \wedge \tau(e) \subseteq [now, \infty) \cap tomorrow]]$

The time at which the predicate holds is the intersection of tomorrow with the interval extending from now to infinity. This prevents ongoing or event-in-progress readings from arising with any predicates, regardless of their telicity. Only a future reading is available.

4. Conclusion

In Hungarian, overt future marking is not always required for future reference, and it is aspect rather than tense which contributes to the forward-shifting of the event in these cases. This paper has provided an initial analysis of the non-past and *fog* constructions in Hungarian. On this account, the asymmetry in the distribution of ongoing and future-referring interpretations of non-past sentences falls out from the interaction of the telicity of the predicate with the temporal properties of the non-past.

It may be possible in future work to account for cross-linguistic variation in the functions of non-past constructions through similar mechanisms, in which the aspectual categories distinguished in a particular language interact with the semantics of a general non-past to give rise to certain interpretations.

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Logical Complexity in Morphological Learning: effects of structure and null/overt affixation on learning paradigms

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1. Introduction

Language learning is to a large extent learning how to classify objects based on their properties (features). For instance, learning a morphological paradigm can be viewed as learning conditions for affix insertion, where the distribution of each affix is determined by morpho-syntactic features. Sometimes the distribution of an affix can be described simply in terms of a single conjunction of features (e.g., use -/z/ in [3rd person singular] contexts), but sometimes, due to syncretism, an affix has a heterogeneous distribution that is impossible to state as a simple conjunction of features. (For example, the form *are* of the verb "to be" occurs either in a plural context or in a 2p. singular context.) A natural hypothesis is that paradigms with simpler affix distributions should be acquired faster, with less errors, and, therefore, be less prone to historical change. However, what is the relevant metric of simplicity (or complexity) for the human learners? We address this question by way of artificial grammar learning experiments that provide a controlled setting for studying what factors affect pattern complexity. Similar types of experiments have a long history in psychology. In particular, there is an extensive literature on learning of artificial categories defined by visual features such as shape, color, size, and so on. The robust findings in this literature can serve as a starting point for

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identifying what linguistic patterns are more complex than others. Namely, we can test whether the results found for non-linguistic patterns extend to the linguistic domain. This line of inquiry not only lets us investigate complexity of linguistic pattern learning but also provides a way of addressing the hotly debated question of language-specialization: are there different learning mechanisms for learning of comparable linguistic vs. non-linguistic patterns?

This paper considers a morphological analogue of a psychological experiment on learning categories with the structure of Boolean connectives AND, OR, and XOR (exclusive OR). This experiment will test the effects of logical structure and the presence of null/overt affixes on paradigm complexity. The results are partially consistent with the previous psychological studies, however, they also differ in several ways from analogous non-linguistic experiments. At this point, it is unclear exactly what factors are responsible for these differences.

2. Complexity of Boolean categories

Some of the simplest types of categories are those that can be described with two binary features. There are four such non-isomorphic categories that have the logical structure of *affirmation* (AFF), a category that is defined by a presence or absence of a single feature-value, *conjunction* (AND), defined by a conjunction of two feature-values, *disjunction* (OR), defined by a disjunction of two feature-values, and *exclusive disjunction* (XOR), a category that is defined by a disjunction of two conjunctions. These four types are illustrated below in the order of their learning difficulty as found in numerous psychological studies on acquisition of artificial categories (Bruner *et al.* 1956, Neisser and Weene 1962, Gottwald 1971).

Table 1: Categories over two binary features: shape (triangle/circle) and color (black/white). Boxes pick out the examples that belong to the category.

(a) AFF circle	(b) AND circle AND black	(c) OR triangle OR white	(d) XOR/$\leftrightarrow$ (black AND triangle) OR (white AND circle)
$\boxed{\bullet}$ $\blacktriangle$	$\boxed{\bullet}$ $\blacktriangle$	$\bullet$ $\boxed{\blacktriangle}$	$\bullet$ $\boxed{\blacktriangle}$
$\boxed{\circ}$ $\triangle$	$\circ$ $\triangle$	$\boxed{\circ}$ $\boxed{\triangle}$	$\boxed{\circ}$ $\triangle$

Evidence from linguistic typology (see below) is consistent with the above complexity order suggesting that this order might be universal across domains. Some such evidence comes from recent typological studies into the syncretism of person/number marking (Cysouw 2003, Baerman and Brown 2005, Baerman *et al.* 2002). According to the data from the World Atlas of Language Structures on verbal subject agreement markers, 80 out of 140 languages in the sample that mark agreement have no syncretism (Baerman and Brown 2005). That is, in *at least* 57%

of languages, the distribution of every subject agreement affix can be described as a conjunction of morphosyntactic features. This number is just a lower bound since languages with syncretism can also have paradigms in which every affix is describable with a conjunction of features. This would happen if the syncretic cells formed a natural class. To get an estimate of how often that happens, Pertsova (2007) examined 88 subject agreement paradigms from 30 languages with syncretic verbal agreement markers. She found that 51% of these paradigms contained only those instances of syncretism that could be described either as a conjunction of several features or an affirmation (i.e., the syncretic cells formed a natural class). She also showed that the number of paradigms that would be expected to have at least one non-conjunctive affix by chance grows very fast with the size of a paradigm. For example, there are 4,140 possible partitions of an 8-cell paradigm over 3 binary features. Only 3% of these partitions are expected to involve exclusively conjunctive affixes. So, taken together these facts suggest that paradigms in which every affix is conjunctive (or, alternatively, has a 1-1 correspondence between form and meaning) occur more often than expected by chance: more than half of verbal agreement paradigms are 1-1.

Cysouw (2003) also looked at frequencies of different types of person/number syncretisms in personal pronouns and in verbal agreement markers. His sample was not fixed ahead of time and was intended to include as many different patterns of syncretism as possible (and, as a result, it was skewed towards the rarer patterns). The rarest types of syncretism in this sample were cases in which the syncretic cells did not form a natural class (1st sg.=2nd pl; 3rd sg.=2nd pl; 2nd sg.=1st pl), and among the most frequent types of syncretism were cases in which all singular or all non-singular persons were syncretic and cases in which either 1st and 2nd persons (participants in the discourse) or 2nd and 3rd persons (non speakers) were syncretic. This again suggests that syncretisms that can be described in terms of a simple conjunction of feature values are relatively more frequent than other types of syncretism.[1]

Similar findings have been reported with respect to phonological patterns: phonologically active classes typically involve a set of segments that can be described as a conjunction of feature values and rarer as a disjunction of a small number of such conjunctions (Mielke 2004). Moreton analyzed patterns from Mielke's database (P-base1.93, Mielke (2008)) to estimate exactly how many classes of phonological segments fall into one of the four patterns in table 1 (Moreton 2012). His results based on 2034 vowel classes and 5682 consonant classes (from 627 languages) support the ranking of the four categories reported above. Namely, conjunctions and

[1] These results of course depend on the kinds of features one adopts, and linguists commonly choose feature systems that make the description of linguistic patterns, including syncretism, simple. Nevertheless, the choice of features is also motivated by other factors such as semantics, facts about agreement, allomorphy, and so on. If a host of different factors all point to the same grouping of morpho-syntactic categories across different languages, we can be more sure that the simplicity effects we find in typological data are real.

affirmations are significantly overrepresented in the sample compared to chance, while XOR and OR are either underrepresented or similar to what one would expect by chance.

Based on the facts reported in this section, there are reasons to expect that learning artificial morphological paradigms in the lab would produce the same complexity ranking found in non-linguistic experiments and in linguistic typology. This result would not only strengthen our belief in the domain-independent nature of the ranking, but also suggest that the learning strategies subjects use in the lab are not vastly different from the strategies used in natural language acquisition (that is, strategies that affect typology).

3. Learning categories vs. learning paradigms

Notice, that in table 1 categories AND and OR are complements of each other and, therefore, are part of the same pattern. (In the rest of the paper, the term *pattern* refers to a partition of the feature space into several categories). Indeed, in terms of morphological paradigms there is a single AND/OR pattern: a paradigm in which one morph corresponds to the conjunctive category, and the other – to the disjunctive category. The morphological analogues of the three logically possible patterns are shown below.

Table 2: Syncretism in paradigms with two binary features

Hebrew V pres. subj. agreement			English past forms of *do*			Somali def. articles		
affirmation			AND/OR			XOR/$\leftrightarrow$		
	sg.	pl.		sg	pl		sg	pl
−part fem.	-et	$\boxed{\text{-ot}}$	−part	$\boxed{\text{does}}$	do	m.	-ta	$\boxed{\text{-ka}}$
+part fem.	-et	$\boxed{\text{-ot}}$	+part	do	do	f.	$\boxed{\text{-ka}}$	-ta

A few psychological studies (Peters and Denny 1971, Gottwald 1971) have investigated whether the difficulty of learning a pattern is affected by whether the same task is presented as (a) learning a distinction between examples that belong or do not belong to a category, or (b) learning the same pattern a distinction between two complementary categories A and B (similar to learning the distribution of two distinct affixes in a paradigm). Most relevantly for this paper, Gottwald (1971) considered learning of the four categories in table 1 in two conditions: *biased* labeling, in which instances were labeled as described in (a) above, and *neutral* labeling as described in (b) above. The stimuli were schematic bugs, with two relevant features being body shape and spot color. The measure of learning difficulty was the number of trials it took a subject to correctly categorize 16 instances (pictures of bugs) in a row.

Interestingly, the type of labeling showed an interaction with logical structure so that neutral labeling condition was harder for the XOR type, but of intermediate difficulty for the AND/OR type (the effect of labeling was not significant for AFF). Notice that there are two biased versions of the AND/OR pattern: one corresponding to the AND category in which instances that belong to the category have the distribution shown in table 1 (b), and one corresponding to the OR category in which instances that belong to the category have the distribution in 1 (c). Gottwald found the following order of learning difficulty (b stands for biased labeling and n for neutral labeling).

AFFn, AFFb $>$ ANDb $>$ AND/ORn $>$ XORb, ORb $>$ XORn

This order is consistent with the well-established rankings: ANDb $>$ ORb and ANDb $>$ XORb (as well as AND/ORn $>$ XORn), but it does not include the expected ranking ORb $>$ XORb. It also shows that the neutral category AND/OR, which differs from its biased counterparts in that all instances are positively labeled, is harder to learn than ANDb but easier to learn than ORb. Gottwald speculated that the "use of positive/negative labels focuses attention on the positive subset of stimuli and this would facilitate learning characteristics of these stimuli." (*Ibid.* p.32). However, it is not clear why focusing attention of the positive subset of stimuli should help, and, in particular, why a biased ORb category should be harder to learn than the neutral AND/ORn category given that in the neutral category all stimuli are effectively positive and, hence, there are two different categories to learn. One possible explanation for the observed order AND/ORn $>$ ORb is that in the neutral mode, where all labels are positive and equally frequent, subjects would quickly learn the conjunctive part of the pattern and treat the disjunctive part as the "elsewhere" case (the complement of the conjunctive part). On the other hand, in the biased OR mode subjects would not be (at least initially) inclined to analyze the disjunctive category as the complement of the conjunctive category (i.e., the negative instances) because they would not attend to negatively labeled stimuli as much as to positively labeled stimuli. For a concrete articulation of this proposal in terms of the learning mechanism that derives Gottwald's results see the proposal in Pertsova (2012).

4. Morphological experiment

In this section we discuss a morphological analogue of Gottwald's experiment that involved learning phrases in an artificial language rather than visual shapes. In this experiment, the difference between the neutral and biased labeling corresponded to the difference between realizing all morphological contrasts overtly (neutral labeling) vs. having no overt realization for one of the affixes (biased labeling). The rational behind treating overt/null marking as an analogue of the type of labeling was as follows: it is possible that when learning a paradigm in which one of the two affixes is null the learner will focus attention on learning the contexts for the overt affix assuming that no change (i.e., zero affix) occurs by default in all other contexts.

4.1. Stimuli and experimental conditions

The subjects had to learn the distribution of two suffixes in phrases of the form Prep + Noun-Suff as a function of two features: the type of the preposition ("above" / "beside" / "behind") and the type of the noun ("bird" / "fish" / "insect"). Two random values for each of the features were chosen as relevant for each subject, so that each feature was binary. The suffix can be seen as marking a kind of a locative case with allomorphy conditioned by a semantically determined inflectional class.[2] Additionally, the choice of features was constrained by the following three criteria: (1) both features had to be morphologically irrelevant in the subjects' native language (English) (2) the feature values for each feature had to be equally "marked"; that is, no feature value could be seen as somehow more basic, prior, or more frequent. The reason for the second constraint is the correlation between conceptual and morphological markedness (Battistella 1990). For instance, plural is considered to be more marked than singular and, correspondingly, there are many languages that only mark plural overtly, but almost no languages that only mark singular overtly and have null plural inflection throughout the lexicon (Croft 2003). Since we are interested in testing how presence of null morphs (the biased mode) would interact with the logical structure of a pattern, we want to abstract away from other factors that may favor null marking.

Two values for each feature were randomly chosen for each subject. There were five experimental conditions resulting from crossing two factors: the logical type of the paradigm (AND/OR vs. XOR) and the type of labeling (biased/neutral). These five conditions are summarized using schematic paradigms below.

Table 3: Experimental conditions: example paradigms

	neutral			biased (ANDb)			biased (ORb)		
AND/OR	F1\F2	bird	fish	F1\F2	bird	fish	F1\F2	bird	fish
	above	-B	-A	above	-A	-Ø	above	-Ø	-A
	beside	-A	-A	beside	-Ø	-Ø	beside	-A	-A
	neutral			biased					
XOR	F1\F2	bird	fish	F1\F2	bird	fish			
	above	-B	-A	above	-Ø	-A			
	beside	-A	-B	beside	-A	-Ø			

The artificial language (nonce roots, prepositions, and suffixes) were randomly

[2] There are many languages in which inflectional classes are at least partly determined by semantic factors such as animacy, mass/count distinction, animal/plant distinction and so on (e.g., Bantu languages).

generated for each subject. All roots had the shape CVCV, and all prepositions and suffixes had the form CV, where C was one of the following consonants {p, t, k, b, d, g, f, s, v, z}, and V was one of the following vowels {i, e, a, o, u}. Languages were designed not to contain any phrases with repetitions of identical syllables next to each other.

4.2. Procedure

The subjects were seated in front of a computer. They were told that they have to learn how to say simple phrases in another language, and that to do well in this task it is important to pay attention to the prepositions and the types of nouns they will see. They were told that they will encounter two of three possible prepositions "above," "beside," or "behind," and that nouns could refer to fish, insects, or birds. That is, the features and their values were explicitly introduced to the subjects.[3] Subjects then proceeded to a training phase which lasted for 64 trials. On each trial, they first saw a picture of an animal with an English label and its "translation" into the artificial language, which they were asked to read out loud. The next screen showed an English phrase using this noun (e.g., "beside the goldfish"), an illustrating picture (a goldfish with a black circle beside it), and two possible translations of this phrase that differed only in the choice of the suffix. The subject had to pick the translation they thought was correct and were given feedback in the form of a correct or incorrect beep. While this training procedure differs drastically from natural language learning, it is similar to most psychological studies of categorization that established the complexity ranking in question. The training phase was followed by a testing phase which consisted of 12 novel trials with no feedback.

4.3. Subjects

Sixty subjects (12 per condition) participated in the experiment. The subjects were recruited from the population of students and staff at the University of North Carolina at Chapel Hill. They were paid $7 for participation.

5. Results

The recorded measurements for each subject were the number of errors during the testing phase, and the number of trials it took to reach the learning criterion. The learning criterion was set to 19 correct responses on 20 consecutive trials. For subjects who did not reach the learning criterion, this number was set to the maximum number of trials, 64. For others, the number of trials to criterion marks the number of trials to the last of the 20 consecutive responses. The descriptive statistics for the collected data are summarized in the table below.

From this table, we can already see that the ANDb condition was the easiest (as expected). The hardest pattern to learn was the biased XORb while in Gottwald's experiment it was the neutral XORn.

[3] In a pilot experiment which did not introduce the features, subjects could not learn the patterns.

The data was analyzed using logistic mixed-effects regression with two factors, type of pattern (AND/OR vs. XOR) and type of labeling and a random intercept for each participant. The labeling factor had three levels: neutral, up, and down. The "up" and "down" conditions differ with each other with respect to which of the two subsets of the pattern was overtly labeled. Note that for the XOR condition, both subsets are of equal size, so the difference between "up" and "down" conditions is not really meaningful and was not expected to be significant. For the AND/OR condition, the "up" version corresponds to ANDb and the "down" version corresponds to ORb. The results of the regression run on correct/incorrect responses during the testing phase are reported in table 5. The model can be interpreted as follows. With the change from ORb (the intercept) to XORb, the log odds of a correct response go down significantly ($p = 0.02$). The same is true with the change from ORb to the neutral mode, AND/OR ($p = 0.06$, marginally significant). There is a slight and non-significant improvement in performance with change from ORb to ANDb, and a marginally-significant interaction between XOR and the neutral mode ($p = 0.09$), suggesting that the neutral XOR was easier than expected based on the other cells. This interaction is also noticeable from the descriptive statistics: in the AND/OR category, subjects did numerically better on the biased conditions, while in the XOR category subjects did numerically better on the neutral condition.

The pairwise comparisons of the five conditions using Mann-Whitney U test with the Bonferroni adjusted alpha level of 0.005 per test showed the following significant differences summarized in the table below. (The data for the two biased XOR conditions was pooled together since the two groups are structurally identical.)

Overall, the biased conditions ANDb and ORb were significantly easier to learn than all other conditions. This is consistent with the well-established ranking AND $>$ XOR, and with Gottwald's result ANDb $>$ AND/OR. However, there was no significant difference between ANDb and ORb, and the order AND/ORn $>$ XORb $>$ XORn observed in Gottwald's experiment was not replicated. Particularly surprising is the subjects' performance on the XORn condition which was better than

Table 4: Descriptive statistics

	Num. of people to reach crit. (out of 12)	Mean num. of errors on test trials (out of 12)	Mean trials to criterion
AND/OR			
AND/ORn	6	2.2	42.5
ANDb	10	0.7	29
ORb	8	1.3	28.2
XOR			
XORn	8	1.4	35.7
XORb	4	2.3	46.7

Table 5: Coefficients of logistic regression

	Coeff.	Std. error	p
(Intercept)	2.0519	0.286	8.03e-13
XOR	-1.096	0.481	0.02
neutral	-0.732	0.398	0.06
up	0.101	0.405	0.79
XOR $\times$ neutral	1.042	0.619	0.09
XOR $\times$ up	0.809	0.691	0.24
	Variance		
Random eff. - subj	0.823		
Log-likelihood	-2093.000		
Deviance	4184.001		
AIC	4199.001		
BIC	4244.897		
N	4560		
Groups	60		

Table 6: Pairwise comparisons of all groups (> indicates that the category in the column was better than the category in the row)

	ANDb	ORb	AND/OR	XORb
ORb	n.s.	–	–	–
AND/OR	>	>	–	–
XORb	>	>	n.s.	–
XORn	>	>	n.s	n.s.

expected as the results of the logistic regression suggest. This condition was virtually unlearnable in Gottwald's experiment: 6 out of his 8 subjects failed to learn this pattern after 256 trials. On the other hand, in the present study 8 out of 12 subjects learned this pattern after less than 64 trials. (See table 2 for a morphological example of this pattern involving definite articles in Somali.)

6. Discussion

The findings of this study indicate that paradigms with the logical structure of AND/OR in which one of the affixes is null are easier to learn than an isomorphic paradigm in which all affixes are overt (AND/ORn) or paradigms with the logical structure of XOR. These results are only partially consistent with the previous non-linguistic findings. One of the differences is that the current study found ORb to be easier than XORb while Gottwald's non-linguistic results show no significant differences between these two conditions. Another difference is that Gottwald established the ranking AND/ORn > XORb > XORn, while the current study found no differences among these three conditions. Finally, the most significant difference between this linguistic study and its non-linguistic analogue is the difference involving ORb and AND/ORn. In learning artificial paradigms, ORb was easier than AND/ORn, while Gottwald found the reverse (AND/ORn > ORb) in his study. In the rest of this section we discuss possible reasons for these divergences in the experimental results.

This study was concerned with two factors affecting learning difficulty, the logical structure of a pattern (AND/OR vs. XOR) and type of labeling (biased vs. neutral). We hypothesized that the presence of null marking in a paradigm would have a similar effect to biased labeling by way of focusing subjects' attention on the overtly marked contrasts. However, it is possible that this is not the case. In other words, it could be that while subjects pay less attention to the negatively labeled stimuli than positively labeled stimuli, they do not pay less attention to the zero affix compared to an overtly affix (especially in the absense of semantic or other reasons to treat one of the feature values as marked). This would explain the lack of difference between the two biased conditions, ANDb and ORb. If equal attention is paid to null and overt affixes, then our biased conditions should not be that much different from each other and from the neutral condition. It might still be somewhat easier to learn a biased pattern given that it places less burden on memory (one less new phonological string has to be memorized). This type of an explanation can be invoked for the found ranking ANDb, ORb > AND/OR. However, if this explanation is on the right track, we would also expect the biased XORb to be easier than the neutral XORn. Yet, the two were not statistically different, and, in fact, showed a trend towards the opposite order (XORb was the hardest condition to learn).

Another possibility is that the null/overt marking has a similar effect as biased/neutral labeling after all, and the differences between the findings of two experiments are due to other differences in how these experiments were conducted. In particular, the experiments differed in two crucial respects that can significantly affect learning difficulty: the number of irrelevant features, known to affect pattern learning (Kepros and Bourne 1966), and the probability distribution of the input data. In the present experiment there were no other features that were systematically varied across the stimuli, while in Gottwald's experiment there were two additional irrelevant features (so the morphological subjects were doing just "rule learning" while Gottwald's subjects were doing both "rule learning" and "feature identification"). Also, Gottwald used a response-balanced distribution of data, where each response label was correct on half the trials. We did not use this type of distribution because we found that it often led subjects to adopt an incorrect one-feature hypothesis when learning AND/OR paradigms. This is because when the stimuli is balanced to have equal number of each label (i.e., each affix), a one-feature hypothesis is correct on 5/6 of all AND/OR stimuli. Therefore, we used a distribution in which each cell in the paradigm had an equal probability of occurrence in the data. This meant that in the AND/OR conditions, one of the affixes was three times more frequent than the other. These details may have big consequences for the results.

Such consequences can only be estimated with respect to a concrete learning strategy. Different learning models are differently affected by the variations in the probability distribution of the data. It would be useful to simulate experimental conditions and compare different models' predictions to the empirical results obtained under such conditions. Taken together, the empirical data from artificial category learning experiments and predictions from learning models can help us to zero in on what factors affect pattern complexity, and whether these factors are different for linguistic vs. non-linguistic categories. Pertsova (2012) is a recent attempt to provide a learning model that predicts the differences between learning in the neutral vs. the biased mode. This model is largely consistent with Gottwald's results. Additionally, it makes somewhat different predictions for learning AND/OR and XOR patterns depending on the distribution of instances in the data. It predicts that ORb should be learned faster than XORb when truth-table cells are equally frequent (as in our experiment), but not when each response label is equally frequent. This prediction is consistent with the differences observed between the Gottwald's experiment and the present experiment. However, the same algorithm predicts the difficulty order AND/ORn $>$ ORb which was observed in Gottwald's experiment but the reverse was observed in the present experiment, as well as the order XORb $>$ XORn which, on the other hand, is similar to what was found in the present experiment but the opposite from the order observed in Gottwald's experiment.

In short, further work, both on the empirical and modeling front, is required to better understand the interplay of different factors contributing to pattern-learning complexity. The results reported here make the first steps in that direction. These results are promising because they replicate several biases found in learning of non-linguistic categories and in typological data. As discussed in this section, the differences between our results and previous findings may be due to additional factors that affect complexity (e.g., the probability distribution of the data). These factors may be particularly relevant for learning of linguistic categories where it is not uncommon to find unequal frequency distributions among different affixes.

7. Conclusion

We showed that learning morphological paradigms is subject to some of the same learning biases as learning of non-linguistic patterns. In particular, we replicated the well established complexity ranking AND, OR $>$ XOR with artificial morphology data. (This ranking is also predicted by majority of categorization models.) That is, paradigms with the logical structure of XOR (cf. Somali in table 2) exhibiting the so-called "polarity effects" are more difficult to learn than paradigms in which the overt affix occupies a natural class of cells (corresponding to a conjunctive category), or a set of cells that can be described as a complement of some natural class. The prevalence of conjunctive patterns is also evident in typological data for both morphological and phonological categories (see section 2). This fact lends support to the hypothesis that the biases discovered in the lab are similar to those that operate in natural language learning. We have also found that paradigms with null affixes are easier to learn than paradigms in which all affixes are overt if the paradigm has the AND/OR (but not the XOR) structure. The reasons for this finding are less clear and demand further investigation. Overall, effects of different learning factors interact in complex ways. Artificial grammar learning experiments and computational modeling provide tools for disentangling these interactions.

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Tense and Modality in two creoles: Capeverdean and Saamáka

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1 Introduction

In recent years, debates have revolved around the question whether epistemic modality can be in the scope of Tense. Some have argued that this is possible (see Eide 2003 for Norwegian, von Fintel & Gilles 2008 for English, Martin to appear for French); while others have argued the opposite (see Condoravdi 2002 for English). The focus of this paper is the interaction of Tense and Modality in two creoles; Capeverdean (CV)[1] and Saamáka (SM)[2]. This paper provides evidence for the claim that in certain languages epistemic modality can have both a past and a present modal anchor time (in the case of CV), while in other languages epistemic modality must have a present modal anchor time (in the case of SM). Additionally, in his Language Bioprogram Hypothesis, Bickerton (1981, 1984) claims that tense, aspect and modality is similar across creoles. We will demonstrate that this claim is only partially correct. The modality system of these two creoles is very similar: Both have a necessity modal which conveys obligation and epistemic readings, and a possibility modal which conveys ability, permissive and epistemic readings. Furthermore, both have a past marker. A difference occur s when the past marker co-occurs with the modals; in CV both the circumstantial and epistemic reading of the two modals surfaces, whereas in SM only the circumstantial reading surfaces, the epistemic reading is infelicitous. The present paper accounts for this on the grounds of some important distinct features between these

[1] Capeverdean is a Portuguese-based creole, spoken by the half a million inhabitants of the Cape Verde Republic. This archipelago, to the west coast of Senegal, was a Portuguese colony until 1975. The substrate languages are mainly from the Mande and Atlantic families, spoken by the slaves from the Guinea Rivers area that were taken to Santiago Island in the 15th century (Carreira 1982). The language is also the mother tongue of virtually all the estimated 1 million Capeverdeans in the diaspora (among others Portugal, The Netherlands, Switzerland, USA). Research for this work has been partly funded by FCT project Events and Subevents in Capeverdean (PTDC/CLE-LIN/103334/2008).

[2] Saamáka is an English/Portuguese-based creole spoken along the Suriname River, Suriname. The substrate languages are the Gbe languages and Kikongo (Smith 1987). The language was created by slaves who fled the plantations towards the end of the 17th century (Price 1983). Currently, the language has 50.000 speakers (Aboh et al. to appear) who reside on the banks of the Suriname River, in Paramaribo, in French Guiana, and in The Netherlands. In the literature, the language is also referred to as Saramaccan.

languages functional morphemes, which reflects in their respective functional structures. Evidence is provided that CV Past marker *-ba* is a temporal affix (situated in TP), whereas SM Past marker *bi* is a situational pronominal (situated in FinP). These facts bring a remarkable contribution to the debate around any possible default parameters regarding creoles. In other words, we assert that creoles do not necessarily behave alike (contra Bickerton).

The structure of the paper is as follows: Section 2 shows that CV and SM have some important similarities with respect to: (i) the necessity and possibility modals, and the way in which these may be interpreted; (ii) the temporal reading that circumstantial and epistemic modalities impose on the embedded eventualities, which depends on the aktionsart of these. Section 3 shows that there is a crucial distinction between the two languages: (i) in CV, both in their epistemic and circumstantial readings, the modals may combine with the past marker *-ba*; (ii) in SM, when the modals combine with the past marker *bi*, only the circumstantial reading surfaces. Section 4 presents our proposal, on the grounds of some important distinct features between these languages' functional morphemes. Evidence is provided that CV Past marker *-ba* is a temporal affix (situated in TP), whereas SM Past marker *bi* is a situational pronominal (situated in FinP). In Section 5 we present some final remarks.

2 Modals in Capeverdean and Saamáka: Some important similarities

CV and SM have a necessity modal (*debe* and *musu* respectively) and a possibility modal (*pode* and *sa* respectively) that are ambiguous between an epistemic and a circumstantial interpretation. This is illustrated for the necessity modals in (1) and (2) respectively[3].

(1) Context: Today is not a holiday, and when two friends that meet for dinner wonder about whether another friend has worked or not, knowing their friend's habits, one of them says:

CV	*Djon*	***debe***	*trabadja.*
SM	*Senni*	***musu***	*wooko.*
	D/S	MOD	work

'Djon/Senni must have worked.' [epistemic]

[3] Abbreviations: SG = singular; PL = Plural; MOD = modal marker; PST = Past interpretation; IMP = Imperfective; PROG = Progressive; PF = Perfect; NEG = Negation; BE = Copula; COMP = Complementizer; DET = Determiner; ART = Article;LOC = Locative; PREP = Preposition; Q = Question marker; NARR = narrative marker

(2) Context: A father and a son are arguing, and the son says something that the mother, listening to the discussion, finds truly disrespectful; the mother says to the boy:

CV	*Bu*	***debe***	*rispeta*	*bo pai.*
SM	*Yu*	***musu***	*lesipeki*	*di taata fii.*
	2SG	MOD	respect	your father

'You must respect your father.' [circumstantial]

A second similarities is the temporal orientation of the modal evaluation time[4] which correlates with the modal base and is aktionsart dependent. When epistemic modals embed a stative verb, the temporal orientation has a present interpretation, as illustrated in (3a) and (3b), whereas when they embed an eventive verb, the temporal orientation has a past interpretation, as illustrated in (3c) and (3d).

(3) a. **CV**

E	*ka*	*debe*	*sta*	*dretu*	*di*	*kabesa.*
3SG	NEG	MOD	be	well	of	head

'S/he must be out of his mind.'

b. **SM**

A	*musu*	*dé*	*a*	*wosu.*
3SG	MOD	BE	LOC	house

'S/he must be at home'.

c: **CV**

Djon	*debe*	*txiga*	*tardi*	*onti*	*noti*	*Dja*	*nen*	*N*
Djon	MOD	arrive	late	yesterday	night	already	NEG	1SG
ka	*obi-l*	*ta*	*entra.*					
NEG	listen-3SG	TA	get.in					

'Djon must have arrived late last night. I didn't even listen to him coming in.'

d. **SM**

Jacky	*musu*	*yasá*	*beée*	*tide*	*bigá*	*mi*	*sumée*	*feisi*
J	MOD	bake	bread	today	because	1SG	smell	fresh
beée	*dí*	*mi*	*pasá*	*neen*	*písi.*			
bread	when	1SG	pass	LOC.3SG	place			

'Jacky must have baked bread today, because when I passed her place I smelled fresh bread.'

When circumstantial modals embed a stative, the temporal orientation has a present/future reading, as illustrated in (4a) and (4b), while when they embed an eventive verb, the temporal orientation has a future interpretation, as illustrated in (4c) and (4d).

[4] A clause containing a modal has two time intervals; a temporal perspective and a temporal orientation (see Condoravdi 2002, Laca 2008). The former refers to 'time from which the modal background is accessed' i.e. modal anchor time. Temporal orientation refers to 'the time at which the temporal property is instantiated' (Laca 2008:4) i.e. modal evaluation time.

(4) a. **CV** *N tene txeu trabadju, N ka pode sta duenti.*
b. **SM** *Mi abi hia wooko, Me sa de siki.*
1SG have lot work 1SG NEG MOD BE sick
'I have lots of work, I am not allowed to be sick'
c. **CV** *Nu debe defendi nos prinsipiu ti fin.*
1PL MOD defend our principle until end
'We must defend our principles until the end.'
d. **SM** *Ée a ta kísi búnu móni nóo a musu woóko taánga.*
if 3SG IMP catch good money NARR 3SG MOD work hard
'If s/he receives good money, s/he is obliged to work hard'.

This difference in temporal orientation is due to the type of complement a modal embeds. Epistemic modals merge in a higher position (above TP) than circumstantial modals (above VP) (in the sense of Cinque 1999; Hacquard 2006). Consequently, epistemic modals embed Tense, while circumstantial modals do not embed Tense.

Additionally, we argue that both languages have a morphological null Perfect morpheme. This morpheme is obligatory in the underlying structure when the modal conveys an epistemic reading and embeds an eventide verb. In both languages Tense is momentary (i.e. expresses a moment) and is, therefore, restricted to embed a stative complement. Stative and eventive verbs are different in that the former are true at a moment, whereas eventive verbs need a subinterval of a moment to become true (in the sense of Taylor 1977, Bach 1981, Dowty 1979). Consequently in order to be able to combine with Tense, eventide verbs need to be modified by a state deriving functional head (this could be Perfect, Modals or some other operator, in the sense of Parsons 1990, Werner 2003). Epistemic modals embed a complement including Tense and Perfect. Perfect gives rise to the past interpretation. Since modals are also state deriving heads (Werner 2003), in their circumstantial reading, they also satisfy the stativity requirement placed by Tense on its complements. In these cases, the future interpretation is due to the modal itself (Condoravdi 2002, Werner 2003, Stowell 2004)[5].

3 Modals in the past: A crucial distinction

In CV, both in their epistemic and circumstantial readings, the modals may combine with the past marker *-ba*[6], as illustrated in (5)-(6) and (7) respectively.

(5) Context: A father discovers that the money his son brought home had been stolen from someone. Later, he told the police:

[5] We refer the interested reader to Pratas (2010) and van de Vate (2011) for discussion of the morphological null Perfect morpheme in CV and SM respectively.
[6] In CV, the past epistemic reading is only possible with stative verbs.

Nunka ka pasa-m pa kabesa ma dinheru podeba
never NEG get.through-1SG PREP head COMP money MOD:PST
ser furtadu.
be stolen
'It never occurred to me that the money might have been stolen.' [epistemic]

(6) Context: (from von Fintel & Gillies 2008, example (21)) Pedru is looking for some ice cream and checks the freezer. There is none in there. Asked why he opened the freezer, he replies:
Pamodi podeba ten jeladu.
because MOD:PST have ice.cream
'Because there might be ice cream.' [epistemic]

(7) Context: A student had a bad punctuation in an exam, and he strongly felt it was not fair. But he also knew that this was the kind of professor that you cannot argue with. Later, at dinner, he tells his mother:
N staba ku raiba di pursor, mas N ka podeba
1SG be:PST with rage of professor but 1SG NEG MOD:PST
faze nada.
do nothing
'I was furious at the professor, but I couldn't do anything.' [circumstantial]

However, in SM, when the modals combine with the past marker *bi*, only the circumstantial reading surfaces, the epistemic reading is infelicitous, as illustrated in (8).

(8) a. *Senni bi musu go a Botopasi.*
S PST MOD go LOC B
'Senni was obliged to go to Botopasi.' [circumstantial]
*Senni must have gone to Botopasi. [epistemic]
b. *Dí wómi bi musu súti dí píngo kíi.*
DET man PST MOD shoot DET wild.pig kill
'The man had to kill the wild pig.' [circumstantial]
(because it would have killed him otherwise)
*The man must have shot the wild pig. [epistemic]

In the next section we discuss the differences between the past markers in the two languages.

4 The different positions of the past markers: *-ba* in TP, *bi* in FinP

Before presenting our proposal, in Section 4.3, we describe some important differences between these languages' past morphemes. In Section 4.1, evidence is provided that CV

Past marker *-ba* is a temporal affix (situated in TP). In Section 4.2, we argue that SM Past marker *bi* is a situational pronominal (situated in FinP).

4.1 The interpretation of Capeverdean *-ba*

Evidence that CV past marker *-ba* merges on T comes from two different lines of argumentation; (i) Its clear temporal contribution; (ii) The fact that it is a postverbal affix.

If *-ba* were not a temporal morpheme, the following temporal contrast would be hard to explain.

(9) a. *N sata odja tilivizon.*
1SG PROG see television
'I'm watching tv.'
b. *N sata odjaba tilivizon.*
1SG PROG see.PST television
'I was watching tv.'

One could argue that this does not demonstrate anything about *-ba* being in T, since a past interpretation can also be the result of the morphological null Perfect morpheme (as well as of other operators). The null Perfect morpheme may occur in the absence of *–ba*, as illustrated in (10).

(10) *N ø odja tilivizon.*
1SG PF see television
'I have watched tv.'

The temporal ordering relation expressed by T in (10) is distinct from the one in (9b). In (10), Topic Time overlaps the Time of Utterance, i.e., TT O TU (in the sense of Klein 1994). This gives a present interpretation. Since Present Tense can only embed a stative predicate (see Section 2), eventive verbs are obligatory modified by a state deriving functional head. In the absence of an overt operator, as in (10), the presence of the morphological null Perfect morpheme is triggered in the underlying structure. The past interpretation of the eventuality in (10) is due to the semantics of the Perfect, i.e. TT O TU; TSit < TT. As a result, *e* is situated prior to TU. However in (9b), *-ba* sets Topic Time prior to Time of Utterance, i.e., TT < TU. This results in a past interpretation. In other words, in (10) T expresses Present, while in (9b) T expresses Past. To complete the story, (9a) contains the progressive morpheme *sata*. The temporal ordering relation in T gives rise to a present interpretation, i.e., TT O TU, while the temporal ordering relation under Aspect gives rise to a imperfective reading, i.e., TSit O TT (in the sense of Klein 1994). Please note that progressive is also a state deriving functional head (in the sense of Parsons 1990).

The sentence in (11) demonstrates that the morphological null Perfect and *-ba* can co-occur. This gives rise to a past-before-past interpretation (or Past Perfect), i.e., TT < TU;

TSit < TT.

(11) *N* *ø* *odjaba* *tilivizon.*
1SG PF see.PST television
'I had watched tv.'

The second line of argumentation in favor of *-ba* situated in T is that, when a verb is marked by *-ba*, the object clitic is forbidden and we must have a free pronominal form, as illustrated in (12).

(12)
a. *N odja.* 'I saw'.
b. *N odja-**l**.* 'I saw him/her'.
c. *N ta odja**ba**.* 'I used to see'.
d. **N ta odja**ba-l***
e. *N ta odja**ba el**.* 'I used to see him/her'.[7]

This shows that *-ba* affixes to the verb before the object clitic. This postverbal affixed position is the result of lowering of *-ba* to the verb (Pratas 2007, see also Bobaljik´s (1995) proposal for *-ed* in English).

4.2 The interpretation of Saamáka *bi*

The morpheme *bi* conveys a simple past reading, as exemplified in (13) and (14) and a past-before-past reading, as exemplified in (15) and (16). These readings are not influenced by *Aktionsart*.

(13) Context: A girl was late for school this morning and therefore she had to run to be on time.
A *bi* *kulé* *gó* *a* *sikóo.*
3SG PST run go LOC school
'She ran to school'.

[7] Pratas & Salanova (2005) have explained the above restriction on the object clitics in the following way: the stress of CV words always fall on the penultimate mora; in a. we have '*ódja'*, which is ok; in c. the temporal affix changes the stress of the word, and we get '*odjába'* - this is ok, since the stress still falls on the verb root; then, we have another phonological fact in the language, which is: the final clitic counts as moraic in the phonological word that it forms with the verb; so, it also changes the stress of the word; in b. '*odjá-l'*, this is ok, since the stress still falls on the verb root; the problems come when we have both the affix and the clitic - for the phonological rule to apply, we would have the stress on the affix (* '*odjabá-l'*), and this is bad. So, in this case we must have a free pronominal, which a different word and, thus, does not interfere with the stress of the verb + affix.

(14) *Lathoya bi suáki ma a béte.*
L PST ill but 3SG better
'Lathoya was ill, but she is better now'.

(15) *Dí mi doú éside ndéti a wósu nóo mi sísa*
when 1SG arrive yesterday night LOC house NARR 1SG sister
bi skífi tú biífi kabá kaa
PST write two letter finish already
'When I arrived home yesterday evening, my sister had written two letters already'.

(16) *Éside Senni bi ta woóko. Dí wíki dí bi pasá de*
yesterday S PST IMP work DET week DET PST pass there
a bi suáki.
3SG PST ill
'Yesterday Senni was working. The week before, he had been ill'.

Interestingly, it is possible to omit the morpheme *bi* in a narrative context[8].

(17) Context: In May 2006, the Suriname River was flooded due to the rain fall in Brazil. Several villages along the Suriname river were flooded by water. Houses and vegetable gardens were destroyed.

a. *Yoó dá u to?*
3SG.MOD give 1PL right
F: 'You will give us something, right?'

b. *Únfa dí gaánwáta bigí u kó únfa i dú.*
how DET flood start FU come how 2SG do
F: 'When the flood started to come, what did you do?'

c. *Mé bi dé akí.*
1SG.NEG PST BE here
S: 'I was not here.'

d. *Oh yá bi dé akí?*
oh 2SG.NEG PST BE here
F: 'Oh, you were not here?'

e. *Mi dé a Semoisi.*
1SG BE LOC S
S: 'I was in Semoisi.'

f. *Oh yá bi dé akí nó?*
oh 2SG.NEG PST BE here RQ
M: 'Oh, you were not here?'

[8] Abbreviations: F = Fonteni, guide and interpreter; S = Sina, an elderly monolingual woman and main narrator; M = Marleen. Please note that the Saamáka of the author is that of a second language learner. This interview was recorded in March 2009 in Pikin Slee, Suriname

g. *Nóno mi dé a Semoisi. Di a kó a dóu té.*
no 1SG BE LOC S when 3SG come 3SG arrive until
S: 'No, I was in Semoisi. When it came, it reached up to there. ....'

This extract demonstrates that from line (17b), the whole conversation is temporally located at the time of the flood in 2006 i.e. *e* < TU. Additionally, stative verbs, which have a present interpretation when they are unmarked and require *bi* to express a past interpretation, can be not marked by *bi* and still convey a past time reference reading, as illustrated for the copula *dé* in (17e) and (17g). From this we conclude that the presence of *bi* is discourse sensitive, i.e., its occurrence depends on certain features of the discourse context.

The omission of *bi* in SM is also demonstrated in clausal structures. In (18) and (19) two events take place which are both marked with the imperfective morpheme *ta*. In both examples, the eventualities are interpreted as occurring simultaneously and are located prior to Time of Utterance.

(18) a. *Senni bi ta bebe te hen Lathoya ta nya beée.*
S PST IMP drink tea NARR L IMP eat bread
'Senni was drinking tea and Lathoya was eating bread'.
b. e1 ○ e2 < TU

(19) a. *Di muyee ta naai kosu nóo a bi ta konda wan*
DET woman IMP sew cloth NARR 3SG PST IMP tell ART
sondi a dee sembe.
thing LOC DET.PL person
'The woman was sewing cloth(s) while she was telling something to the others'.
b. e1 ○ e2 < TU

Another characteristic of *bi* is that anchoring of a narrative can only occur when a storyline is not interrupted by a different storyline, as demonstrated in (20)[9].

(20) a. *U woóko i féndi dí móni dí wáta de kaa ku hén*
1PL work 2SG find DET money DET water BE already with 3SG
u tooná bái lái ku séti wósu butá ku ma fa
1PL return buy thing with set house put with like manner
a dé baka.
3SG BE back

[9] The following abbreviations are relevant for this extract. L = Laurens, guide and interpreter; Y = Yeye, an elderly monolingual woman and main narrator. President Venitiaan was at that moment of the flood in 2006 the president of the Republic of Suriname, and still was when this conversation was recorded in March 2008. Vinije is Yeye's grandson who lives in Wageningen, The Netherlands. After the flood in 2006, he visited his family in Pikin Slee.

L: 'We worked and found money, the water went down. With the money, we bought things again and decorated our houses again'.

b. *Ú dí tén de táa de o tyá móni kó. De*
which DET time 3PL COMP 3PL MOD carry money come 3PL
á tyá dí móni kó yéti.
NEG carry DET money come yet
Y: 'In those days, they said that they would bring money. They have not brought the money yet'.

<u>Line (a) and (b) refer to storyline A → Flood 2006</u>

c. . ………….

d. *Kuma fá dí u Botopasi de. Fá a dé a Botopasi de*
like DET FU B there like 3SG BE LOC B there
nóo u Seei akí musu ábi tú.
NARR FU P here MOD have also
L: 'Like the one in Botopasi. Like it is in Botopasi, we of Pikin Slee must have one too'.

<u>Line (c) and (d) refer to storyline B</u>

e. *Dí Venitiaan bi kó akí a dí a bi dú dá*
when V PST come here LOC when 3SG PST do give
u a Seei akí a dí lío déndu.
1PL LOC P here LOC DET river in(side)
L: 'Venitiaan came here and he gave help to us in Pikin Slee'.

f. *Á heépi ná wán wee sondí. Vinije kó a dí*
3SG.NEG help NEG ART at.all thing V come LOC DET
kónde ta daamá ta butá sondí a di kónde ta
village IMP walk around IMP place thing LOC DET village IMP
lóntu
round
Y: 'He helped us with nothing. Vinije came to the village en was walking around in the village'.

<u>Line (e) and (f) refer to storyline A → Flood 2006</u>

This extract demonstrates that when a new temporal past discourse topic is introduced, the first predicate(s) is marked by *bi* . Secondly, when a sequence of eventualities is interrupted by a different storyline, the anchor time of the first storyline has to be re-established when the speaker continues with the first storyline. Thirdly, an anchor time must locally bind its antecedent(s)

To summarize, the morpheme *bi* has the following characteristics. The morpheme conveys a past time reference reading and it anchors an eventuality to some past time which is inconsistent with past from a future perspective. The eventuality embedded by *bi* is not necessarily anchored to Time of Utterance. The morpheme is insensitive to aktionsart. Finally, *bi* is discourse sensitive; the presence of *bi* is sometimes omitted

To explain these characteristics of *bi*, we argue that *bi* is a discourse marker which has the role of a temporal pronominal (in the sense of Partee 1984, Kratzer 1998). We postulate that *bi* establishes the Anchor Time directly and that all eventualities are anchored to this Anchor Time. Moreover, *bi* is restricted to establish an Anchor Time prior to Time of Utterance. We argue that *bi* is located in Fin in the syntactic structure (in the sense of Enç 1987)[10].

4.3 A past epistemic reading

4.3.1 The felicity of a past epistemic interpretation in |Capeverdean

The following two lines of assumptions may seem incompatible. First, epistemic modals merge in a higher position (above TP) than circumstantial modals (above vP) (in the sense of Cinque 1999; Hacquard 2006). Consequently, epistemic modals embed T, while circumstantial modals do not embed T. Second, *-ba* is situated in T. Under these two assumptions, it might seem difficult to explain why in CV the epistemic reading is felicitous, as illustrated in (21) which is repeated below.

(21) *Dinheru podeba ser furtadu.*
money MOD:PST be stolen
'The money might have been stolen.' [epistemic]

This is the crucial distinction between CV and SM that we are trying to account for. The question that needs to be answered is: How can this reversed order with regards to the semantic interpretation be explained, i.e., modification of epistemic modality by T. Interestingly, these type of sentences do not occur in out-of-the-blue contexts; they must be either inserted in a context that already has past interpretation, or embedded under a past clause. Stative verbs are modified by *-ba*, while eventive verbs are modified by the morphological null Perfect morpheme, as illustrated in (22a) and (22b) respectively.

(22) a. *Si pai staba prokupadu pamodi dinheru podeba ser furtadu.*
his father be:PST worry because money MOD:PST be stolen
'His father was worried because the money might have been stolen.' [epistemic]
b. *Pulisia fla ma dinheru podeba ser furtadu.*
police say COMP money MOD:PST be stolen
'The policeman said that the money might have been stolen.' [epistemic]

We argue that tense marking on the embedded epistemic modal is not a real tense. It is not relevant to anchoring the embedded clause in time (in the sense of Iatridou 1990). If this is

[10] For a detailed discussion of the semantic and syntactic characteristics of *bi*, we refer the interested reader to van de Vate (2011).

on the right track, we have the set of predictions below.

(i)	matrix past + embedded past epistemic modal	**ok**	see (22)
(ii)	matrix present + embedded past epistemic modal	**odd**	see (23)
(iii)	matrix past + embedded past circumstantial modal	**ok**	see (24)
(iv)	matrix present + embedded past circumstantial modal	**ok**	see (25)

(23) ??*Pulisia sata fla ma dinheru podeba ser furtadu.*
police PROG say COMP money MOD:PST be stolen
'The policeman is saying that the money might have been stolen.' [epistemic]

(24) a. *Si pai staba prokupadu pamodi dinheru podeba furtada.*
his father be:PST worried because money MOD:PST be.stolen
'His father was worried because the money could have been stolen.' [circumstantial]

b. *Pulisia fla ma dinheru podeba furtada.*
police say COMP money MOD:PST be.stolen
'The policeman said that the money could have been stolen.' [circumstantial]

(25) a. *Djon sta prokupadu pamodi Pedru debeba trabadja ti tardi.*
Djon be worried because Pedru MOD:PST work until late
'Djon is worried because Pedru was obliged to work until late.'[circumstantial]

b. *Djon sata fla ma Pedru debeba trabadja ti tardi.*
Djon PROG say COMP Pedru MOD:PST work until late
'Djon is saying that Pedru was obliged to work until late.' [circumstantial]

The fact that epistemic modals marked for past can only embed eventualities either with stative verbs or with an eventive marked by the progressive, as in (26), is crucial for this hypothesis. These types of statives are the ones that necessarily have a temporal reading simultaneous to the matrix past.

(26) *Maria ka faze raboliso pamodi. E podeba sata durmi.*
Maria NEG make noise because 3SG MOD:PST PROG sleep
Maria didn't make any noise because he might be sleeping.'

The prohibition of the Perfect, which also gives a past interpretation of the eventuality, is accounted for by arguing that it would bring a shifted reading, which, in CV, is forbidden in these contexts.

4.3.2 The infelicity of a past epistemic interpretation in Saamáka

Given the syntactic structure (i.e. *bi* being situated in FinP), it would be expected that the combination of *bi* and a modal morpheme would also give rise to a past epistemic interpretation. However, as (27) illustrate, which is repeated here, this reading is infelicitous.

(27) *Dí wómi bi musu súti dí píngo kíi.*
DET man PST MOD shoot DET wild.pig kill
'The man had to kill the wild pig.' [circumstantial]
(because it would have killed him otherwise)
*'The man must have shot the wild pig'. [epistemic]

To account for this, we argue that modals in their epistemic reading cannot combine with *bi* because they are obligatorily anchored to Time of Utterance (in the sense of Hacquard 2006). Since *bi* establishes an Anchor Time prior to Time of Utterance, there is a mismatch regarding the temporal interpretation between *bi* and the epistemic modals. This temporal mismatch results in the infelicity of an epistemic reading with a past modal anchor time in SM (van de Vate 2011).

5 Conclusion

This paper discussed the interaction of tense and modality in Capeverdean and in Saamáka. It was shown that the modal system in these languages is very similar. Both have a necessity and possibility modal which can convey a circumstantial and an epistemic interpretation. The interpretation of the modal base correlates with temporal orientation and *Aktionsart*. In the circumstantial reading, the modal evaluation time has a future orientation. In the epistemic reading the temporal orientation is *Aktionsart* dependent: Stative verbs give rise to a present orientation of the modal evaluation time, while eventive verbs give rise to a past orientation. We argued that the future orientation of circumstantial modals is due to the modal itself, while the past orientation of epistemic modals is due to the presence of the morphological null Perfect morpheme in the underlying structure of the clause. The languages differ with regard to the semantic and syntactic characteristics of their past markers. It was shown that CV has a Past Tense marker, *-ba*, which is situated in TP, while SM has a situational pronominal which establishes a past Anchor Time, *bi*, which is situated in FinP. Another difference is the possible readings that surface when modals combine with these past markers. In CV both the circumstantial and epistemic interpretation is available (for stative verbs, not for eventive verbs), while in SM only the circumstantial reading is available. Whether these differences are due to influence of the substrate languages (Mande for CV, and Gbe and Kikongo for SM) is left for future research.

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From Demonstrative to Nominalizer: The Suffix -*gai* in Northern Tepehuan[1]

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Introduction

Nominalization is an area of morphosyntax which has attracted interest in recent years as data from an increasing number of languages have become available. Comrie and Thompson (2007:334) define nominalization as the process of "turning something into a noun". The same scholars propose that two types of nominalization can be found across languages: (i) lexical and (ii) clausal. The former refers to the creation of lexical nouns from verbs or adjectives and the latter to turning a complete clause into a noun phrase.

Linguistic studies have focused on the description of different types of nominalization and the means for creating them. However, what is known about the sources of nominalizing morphemes is still limited.

In this paper, I examine clause nominalization in Northern Tepehuan (NT hereinafter), particularly the source of the nominalizer -*gai* that occurs in complement and adverbial clauses. I propose that this suffix originates from the demonstrative *ɨgai*, which also functions as 3SG/PL pronoun. Evidence comes from the examination of word order in clauses when this demonstrative acts as a personal pronoun, which led to the reanalysis of this element into a suffix. I test the hypothesis by also showing a similar path of grammaticalization with the suffix -*go*. The data from NT used in this paper comes from my own fieldwork as well as from Bascom (1982) and Rinaldini (1994). Data from Pima Bajo (Hale 2002; Estrada, In Press) is used as well.

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This paper is structured as follows. Section 1 provides a very brief typological description of NT. Section 2 describes lexical and clausal nominalization in NT and other Uto-Aztecan languages spoken in Mexico. Section 3 shows the path of grammaticalization of the suffix *-gai* in NT, and section 4 summarizes the conclusions.

1 Grammatical Aspects of NT

NT, a language pertaining to the Tepiman branch of the Uto-Aztecan family (Dakin 2004), is spoken in the southern area of Chihuahua, Mexico. There are currently three recognized dialects, which are located in the regions of Nabogame, El Venadito, and Baborigame. The dialect from the latter region is described in this paper, particularly from 'El Túpure'.

NT is characterized typologically as an agglutinative and head-marking language with a nominative-accusative case system. The language lacks morphological case markers in nouns; however, its nominative-accusative nature is manifested through two sets of pronouns, namely, subjects and non-subjects as it is shown in Table (1).

Table (1). Pronominal paradigm in NT.

Person	Subject pronouns	Non-subject pronouns	Pronominal clitics	Reflexive pronouns	Possesive pronouns	Ponouns in posposition
1SG	aanɨ	gin-	=nɨ	gin-	gin-	gin-
2SG	aapi	gɨ-	=pi	gɨ-	gɨ-	gɨ-
3SG	ɨgai	Ø	Ø	gɨ-	-dɨ	Ø
1PL	aatɨmɨ~ aatɨnɨ	gɨr-	=ɨr =tɨnɨ	gɨr-	gɨr-	gɨr-
2PL	aapimu	gɨn-	=pimu	gɨn-	gɨn-	gɨn-
3PL	ɨgai	Ø	Ø	gɨn-	-dɨ	Ø
Non-specific	Ø	ga-	Ø	Ø	-ga (objects & animals)	Ø

The use of this set of pronouns is illustrated in the examples below. The subject of an intransitive clause as well as an agent of a transitive clause is encoded by independent subject pronouns like the subject *aapimu* '2PL.SBJ' in (1a) and the agent *ɨgai* '3SG.SBJ' in (1b). The patient, on the contrary, takes a non-subject pronoun that prefixes into the verb, like *gɨr-* '1PL.NSBJ' in (1b).

NT has a primary object system manifested by the marking of recipients or beneficiaries with non-subject prefixes in ditransitive clauses. This is exemplified in (1b) and (1c) where the non-subject pronoun *gɨr-* ‘1PL.NSBJ’ marks a recipient argument in the latter while in the former the same non-subject pronoun is used to encode a patient.

(1) a. **aapimu** kokoso.
2PL.SBJ sleep.PRS
‘You sleep.’[2]

b. ɨgai **gɨr**-gɨgɨ.
3SG.SBJ 1PL.NSBJ-hit.PFV
‘He hit us.’

c. ɨgai **gɨr**-ootosi tuminsi.
3SG.SBJ 1PL.NSBJ-send.PFV money
‘He sent us money.’

A simple clause in NT is normally constituted by a verb and a noun phrase or pronoun. In the intransitive clauses, the unmarked word order is SV as in (2a), while in a transitive clause is AVP as in (2b). However, word order may be relatively free (*Cf*. Bascom 1982).

(2) a. gwana suaka-i.
John cry-PRS
‘John cries.’

b. maria guikoma yoosigai.
Mary cut.PFV flower.PL
‘Mary cut flowers.’

2 Nominalization in NT

2.1 Lexical nominalization

NT has three main derivational suffixes that create lexical nouns out of verbs: -*kami*, -*dami*, and -*gami*. The items derived with these suffixes act syntactically as

[2] Abbreviations: 1=first; 2=second, 3=third; APPL=applicative; CONJ=conjunction; CONT=continuous; CONTI=continuative; COP=copula; DET=determiner; DEM=demonstrative; DIR=directional; DUB=dubitative; FUT=future; INSTR=instrumental; INT=intensive; IRR= irrealis; LIN=linker; LOC=locative; NMLZ=nominalization; NSBJ=non-subject; PART=particle; PFV=perfective; PL=plural; POS=possessive; PROB=probable; PRS=present; PST=past; QUOT=quotative; REL=relativizer; RDP=reduplication; SBJ=subject; SBR=subordinator; SG=singular; ST=stative; VR=verbalizer.

nouns since they can appear with the determiner *go*, can be reduplicated to indicate plural, and act as arguments of verbs. Examples with -*dami* are shown in (6), with -*kami* in (7), and with -*gami* in (8).[3]

(6)	oha-**dami**	mi=nia-**dami**	duduad^{y}a-**dami**	duu-ku-**dami**
	write-NMLZ	NEG=see-NMLZ	heal-NMLZ	rain-ku-NMLZ
	‘teacher.’	‘blind.’	‘healer.’	‘thunder.’

(7)	maatɨ-**kami**	koko-**kami**	mi=d^{y}u-**kami**	mi=kɨɨ-**kami**
	know-NMLZ	get_sick-NMLZ	NEG=d^{y}u-NMLZ	NEG=hear-NMLZ
	‘soothsayer.’	‘sick.’	‘orphan.’	‘deaf.’

(8)	tuminsi-**gami**	soiti-**gami**	duad^{y}i-**gami**
	money-NMLZ	soiti-NMLZ	heal-NMLZ
	‘rich.’	‘poor.’	‘remedy.’

The suffix -*kami* is also attested in the formation of adjectives that function as attributives when they follow the noun they modify. Bascom (1982:298) shows examples where -*gami* is used for the same purpose as in (10).

(9)	bɨɨgi-**kami**	yosia-**kami**
	red-NMLZ	flower-NMLZ
	‘something that is red.’	‘something that is flowered.’
	ɨgo-**kami**	tɨbɨdu-**kami**
	sour-NMLZ	get_tired-NMLZ
	‘sour.’	‘tired.’

(10)	parɨ-**gami**	omali-**gami**
	lazy-NMLZ	bad-NMLZ
	‘lazy person.’	‘bad person.’

Another nominalizer that has been attested in the language is -*karo* ‘INSTR’, which creates nouns out of verbs as in (11). In very few cases, -*gai* ‘NMLZ’ is also found as in (12).

(11)	boisi-**karo**	nɨid^{y}a-**karo**	oha-**karo**
	broom-INSTR	see-INSTR	write-INSTR
	‘broom.’	‘mirror.’	‘pencil.’

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3 See Bascom (1982:297) for an explanation on their differences.

(12) kuagai 'eat.PRS' > kuada-**gai** 'food, what is eaten.'
gaatadui 'work.PFV' > aduind^{y}a-**gai** 'job, what is worked.'
toñi 'hot.' > toind^{y}a-**gai** 'have fever.'

2.2 Clausal nominalization in NT

Before describing the way this language nominalizes clauses, I will first describe the behavior of verbal finite clauses to observe the differences.

The agglutinative nature of the language allows the identification of some of the morphemes that encode finite events: *-i* 'PRS', *-tadai* 'PST.CONT', *-mu* 'FUT.PROB', *-to* 'PFV'. Some of them are illustrated in (13) and (14). The participants of the event are expressed as noun phrases or pronouns that either precede or follow the verb. As mentioned in section 1, NT marks case only with non-subject pronouns attached to the verb.

(13) gwana mɨra-**i**.
John run-PRS
'John runs.'

(14) aapi mɨrai-**tadai** dai gin-nɨid^{y}i-**tadai**.
2SG.SBJ run-PST.CONT CONJ 1SG.NSBJ-see-PST.CONT
'You were running and looking at me.'

Other verbs do not have tense or aspect morphemes attached to them. Instead, they present a non-marked form that encodes present tense as in (15). Some others undergo reduplication to indicate aspectual events as in (16) or suppletion to indicate number as in (17).

(15) aanɨ **koso**.
1SG.SBJ sleep.PRS
'I sleep.'

(16) maria **ka~kaɨsɨ-i** radio.
Mary RDP.CONTI~listen-PRS radio
'Mary listens to the radio.'

(17) a. go gogósi **muaa** taakuku.
DET dog kill.SG.PFV hen
'The dog killed the hen.'

b. go gógosi **kooda** tatako.
DET dog.PL kill.PL.PFV hen.PL
'The dogs killed the hens.'

Clausal nominalization in NT occurs in subordination with complement or adverbial clauses in which one clause or event is dependent of the other in semantic and morphosyntactic terms. In this sense, the clause loses tense-aspect morphology, *-gai* 'NMLZ' is attached to the verb, and in few cases the determiner *go* is included. Although NT is not isolating in nature, few morphosyntactic characteristics are found. According to Koptjevskaja-Tamn (1993:88), this degree of analyticity favors clausal nominalization. Some examples are shown in (18) with object complement clauses and in (19) with adverbial clauses. In (18a), the verb *tɨhai* 'order' takes a subordinate clause indicated by *is=* 'SBR'. The verb of the dependent clause is modified by the suffix *-gai*. In (18b), the verb *imɨi* 'walk' has the suffix *-gai* and is still modified by the adverb *kaban* 'a lot'. A similar situation is illustrated in (19) with the adverbial clauses in which *oogisda* 'forgive' and *bagai* 'to water' present the suffix *-gai*.

(18) a. ruisi tɨhai mara-dɨ is=nɨɨd^{y}a-**gai** urid^{y}i.
Luis order.PRS son-3SG.POS SBR=see-NMLZ grandmother
'Luis ordered his son to visit her grandmother.'(Carrillo 2011:66)[4]

b. galtada=nɨ kaban imɨi-**gai**.
regret=1SG a_lot walk-NMLZ
'I regret walking a lot.'

(19) a. buana ootosi yoosigai maria is=oogisd^{y}a-**gai**.
John send.PRS flower Mary SBR=forgive-NMLZ
'John sends flowers to Maria so that she forgives him.'

b. sɨkɨa=nɨ baga-**gai** yosigai kaban gɨli-mo-go.
SBR=1SG water-NMLZ flower a_lot grow-FUT.PROB-NMLZ
'When I water the plants, they will grow up a lot.'

Verbs in the nominalized clause preserve their arguments as it is shown in (20) and (21) where *muaa* 'to kill' takes the patient *pipisuri* 'chicken' and *iyai* 'drink' takes *sudagi* 'water', both encoded with noun phrases.

(20) galtadatua=nɨ mua-**gai** go **pi~pisuri**.
regret=1SG kill-NMLZ DET RDP.PL~chicken
'I regretted killing the chicken.'

4 Glosses of examples taken from other sources are changed from the original.

(21)

rupa	ɨpɨlid^{y}i	iya-**gai**	**sudagi**.
Lupe	think	drink-NMLZ	water

‘Guadalupe decided to drink water.’

More evidence that shows that this is clausal nominalization is illustrated in (22) in which the nominalized verb *ipɨliɨgai* can still take a dependent clause with the subordinator *is*=.

(22)

gin-dada	hii	misa-na	tui	**ipɨliɨ-gai**
1SG.NSBJ-mother	go.PFV	mass-LOC	because	think-NMLZ

is=ma~matul-d^{y}a	**mara-dɨ**.
SBR=RDP~pray-APPL	son-3SG.POS

‘My mother went to mass because she wanted to pray for his son.’

Subject complement clauses in NT present nominalized clauses as well. However, I consider that they are in a more advanced degree of nominalization because the clause can be possessed or the determiner *go* can be used, but both are still optional as examples (23) and (24) illustrate.

(23)

(**go**)	pasaria-gai	chiguaguama-ko	kɨ=baitada-tu.
DET	travel-NMLZ	Chihuahua-DIR	good=feel_well-PFV

‘The trip to Chihuahua was good.’

(24)

(**gin**-)imiya-gai	hermosiyɨ-rɨ	ɨr	ibimuda-gai.
1SG.NSBJ-go-NMLZ	Hermosillo-LOC	COP	get_tired-NMLZ

‘Going to Hermosillo was tiring.’

Bascom (1982:295-7) in his grammatical sketch describes that there are a series of morphemes that derive lexical nouns from verbs such as *-gai, -dagai,* and *-ragai*. The last two result from the combination of *-da* ‘VR’ + *-gai* and *-ra* + *-gai*.[5]. Only in one case, the suffix *-dagai* seems to serve the function of a lexical derivational morpheme as in *aduind^{y}agai* ‘job’. Nonetheless, in the other examples that he provides, I consider them as having the function of clausal nominalizers as illustrated in (25) with an adverbial clause in which the nominalized verb is still negated, and in (26) with a complement clause in which the nominalized verb *ivaragai* follows the finite verb *maatigi*.

[5] Bascom (1982) does not provide the meaning of the suffix *-ra*.

(25)	s=aidyɨ	asñítyu	mai	**imí-d^{y}aga**	gakíñi-ka-tai.
	QUOT=then	donkey	NEG	go-NMLZ	skinny-ST-because

‘And the donkey does not go fast, because he’s skinny.’

(26)	maati-gi	iva-**ragai**	aliɨsi	amaityi	tuminsi.
	know-IRR	play-NMLZ	very.INT	earn	money

‘If he knew how to play an instrument, he’d really make money.’

Bascom and Molina (1998) even provide lexical entries of verbs with the suffix -*gai* with meanings such as ‘what is V’ like *xikuanaragai* ‘what is plowed’ or *kɨɨdaragai* ‘withcraft, to witchcraft, what is witchcrafted’, which gives the sense of clausal nominalizations.

2.2.1 Clausal nominalization in other Uto-Aztecan languages

Some Uto-Aztecan languages nominalize clauses by using a suffix that creates lexical nominalizations. Such languages are Yaqui (Guerrero 2005), Tarahumara (Burguess 1984), Pima Bajo (Estrada 2010), Ópata (Ramírez 2010), Warijio (Felix 2005), and Nevome (Shaul 1982; Villalpando 2009). The strategies used by these languages are summarized in Table (2).

Table (2). Nominalizing suffixes in Uto-Aztecan languages.

Language	**Nominalizing suffix**	**Clause type**	**Characteristics**
Yaqui (Guerrero 2005)	*-me* *-‘u*	Relative and Complement	*-me* is the preferred suffix to derive lexical nouns.
Tarahumara (Burguess 1984)	*-ame* ~ *-me*	Relative and adverbial	*-me* is also used to derive lexical nouns.
Pima Bajo (Estrada 2010)	*-dam*	Relative and adverbial	*-dam* is used to create lexical nouns.
Ópata (Ramírez 2010)	*-ca*, *-came* *-mui* and *-sari*	Relative and complement	*-mui* and *-sari* create lexical nouns. *-ca* or *-came* nominalize clauses.
Warijio (Felix 2005)	*-(a)me*	Relative, complement, and adverbial	*-(a)me* also derives lexical nouns.
Nevome (Shaul 1982; Villalpando 2009)	*-cama* *-cugai*	*-cama*: Relative *-cugai*: Complement, Adverbial	*-dama, -cama*, *-parha*, *-daga*: derive lexical nouns. *-cama* and *-cugai*: nominalize clauses.

3 Path of grammaticalization of the suffix *-gai* in NT

Section 2.2.1 shows that most of the Uto-Aztecan languages spoken in Mexico, namely Yaqui, Pima Bajo, Ópata, Nevome, Tarahumara, and Warijio tend to nominalize clauses with the same suffix that derives lexical nominalizations. Bascom (1982:379) provides some examples from NT in which the suffix -*kami* is suffixed to a relative clause as in (27). Nonetheless, in recent data, NT does not generally use the suffixes -*kami*, -*dami*, or -*gami* for clausal nominalization. Instead, the suffix -*gai* occurs in complement and adverbial clauses. In relative clauses, verbs tend to be finite as in (28) with the verb *nɨɨyi* 'sing.PRS'.

(27) maatɨ=mi aapimi uurugi gii kii-iri odi^y^a-**kami**.
know=2PL 2PL.SBJ bird big house-LOC live-NMLZ
'You know the bird that lives in the big house.' (Bascom 1982:379)

(28) go kɨɨli siankɨ **nɨɨd^y^i** bɨɨs tasai ɨr in-tatali.
DET man SBR sing.PRS all sun COP 1SG.NSBJ-uncle
'The man who sings everyday is my uncle.'

Nevome (Villalpando 2009) is the only language that shares a cognate suffix -*cugai* with NT for nominalizing clauses.

By looking at Nevome and NT and the difference in clausal nominalizing patterns from other Uto-Aztecan languages, a question arises: What is the source of this suffix? My hypothesis is that the possible source of this item is the demonstrative *ɨgai*. The idea that a nominalizer may come from a demonstrative or determiner is attested (LaPolla 2006; Simpson 2008). Therefore, the propose path of grammaticalization for NT is the following: *ɨgai*: 'DEM'> 3SG/PL> -*gai* 'NMLZ'. Grammaticalization in this paper is understood as the process whereby lexical items in certain contexts become more grammatical or a grammatical item becomes even more grammatical. But this process is seen as gradual so that transitions lead sometimes to coexistence of elements or overlaps (Lehmann 1988; Heine et al. 1993; Heine and Kuteva 2002; Hopper and Traugott 2003).

The demonstrative *ɨgai* generally denotes distant location from the point of view of the speaker and always precedes the noun. See examples (29) and (30).

(29) **ɨgai** ɨr go kɨɨli.
DEM COP DET man
'That is the man.'

(30) tumaasi id^y^i **ɨgai**.
what this DEM
'What is it?' (Bascom 1982:391)

The demonstrative *ɨgai* also serves the function of 3SG/PL pronoun when the speaker refers to a human entity as it is shown in examples (31) and (32). In this function, it can precede or follow the verb as the other personal pronouns in the language.

(31) ɨɨgi gɨ-gɨɨgɨ **ɨgai**.
alone 2SG.NSBJ-hit.PFV 3SG.SBJ
'He hit himself.' (Bascom 1982:274)

(32) **ɨgai** gɨn-botɨbɨ-i suudia-na.
3PL.SBJ 1PL.NSBJ-swim-PRS agua-LOC
'They swim in the water.'

This free word order may have been the cause for the reanalysis of the demonstrative as a suffix for nominalization in subordinate clauses. To test this hypothesis, I will briefly explain the behavior of participants in dependent clauses in the following paragraphs.

In a few complement clauses, the patient participant of the verb is placed within the main clause, that is, before the subordinator, especially if a proper name is used. In this case, *ɨgai* occurs in the dependent clause with a co-referential function. This is illustrated in (33).

(33) go aamudɨ **maria** aagɨgɨ is=ɨɨmia **ɨgai** vavɨlɨ-ri.
DET boss Mary order.PFV SBR=ir DEM town-DIR
'Mary's boss ordered her to go to town.' (Carrillo 2011:67)

Probably, the use of *ɨgai* as a strategy for indicating co-referential participants was common. Generally, in complement clauses where personal pronouns are used, a subject clitic is attached to the verb in the subordinate clause with a co-referential function as in (34). Nonetheless, additional data show that although a sentence has a proper name, only the suffix -*gai* occurs and not the demonstrative *ɨgai* as in (35) and (36).

(34) **gɨ-**agihia=nɨ is=gin-gagald^{y}a=**pi** go kabayo.
2SG.NSBJ-say=1SG SBR=1SG.NSBJ-sell=2SG DET caballo
'I asked you to sell the horse to me.'

(35) aapi nɨid^{y}a-gi gwana is=imɨ-**gai**.
2SG.SBJ see-IRR John SBR=walk-NMLZ
'You will see John walk.'

(36) aapi tɨtɨdai maria is=imia-**gai**.
2SG.SBJ say.PFV Mary SBR=go-NMLZ
'You asked Mary to go.'

The complete grammaticalized stage of the demonstrative is shown in examples (37) in which although there are only personal pronouns, the suffix -*gai* still manifests itself.[6]

(37) aanɨ baiga is=aata-**gai**.
1SG.SBJ can SBR=tell-NMLZ
'I can speak.'

Another path of grammaticalization that is worth mentioning is a possible nominalizer that is emerging in NT and that has been attested in only a few cases: -*go*. It seems that this suffix is following a similar path: *gobai* 'distant DEM'> *go* DET> 3SG/PL> -*go* 'NMLZ'. Example (38) illustrates *gobai* as 3SG/3PL, (39) the use of *go* as DET, and (40) -*go* as nominalizer in a complement clause.

(38) a. **gobai** bɨskɨrɨ gin-tanɨ-i taskali.
3PL.SBJ always 1SG.NSBJ-ask_for.PRS tortilla
'They always ask me for tortillas.'

b. Ø=si=ɨɨs-kɨdɨ imi-mu **goo**.
he=DUB=how_much-with go-FUT.PROB he
'When will he go.' (Bascom 1982:292)

(39) a. **go** gogosi
DET dog
'The dog.'

b. baityoma mai maatɨ-mu **goo(bai)** aana iñ=ɨlidi.
almost NEG know-FUT.PROB DEM 1SG.SBJ I=think
'I think you are probably not going to know (guess that).' (Bascom 1982:390)

(40) a. gwana agihi maria is=sabɨda-**go** go kabayo.
John say.PFV María SBR=buy-NMLZ DET horse
'John told Mary to buy a horse.'

[6] Sometimes, when a proper name is used, there is no suffix -*gai* but research still needs to be done. This paper will not describe it.

b. id^{y}ui-ñi is=d^{y}ibia-**go** gɨ-kɨɨ-yɨ-rɨ.
make.PFV-1SG.SBJ SBR=come.PFV 2SG.NSBJ-house-POS-DIR
'I made him come to your house.' (Carrillo 2011:68)

In fact, in (40a) it can be observed that *-go* and *go* coexist in the same environment, which means that they have different functions in the same clause.

More evidence about the possible path of grammaticalization of the suffix *-gai* is observed in the *Arte de la Lengua Tepeguana* written by Rinaldini (1994:7). He said that *uggue* 'demonstrative' was used as a 'relativizer' along with the particle *na* as in (41). By looking at the example that he provides, it seems that *cugge* is acting as the nominalizer of the verb *jimoe* 'come' in this relative clause.

(41) iddi na ia jimoe-**cugge**.
DEM PART close come-DEM
'this who come close.'

Finally, the last evidence is observed in Pima Bajo. According to Hale (2002) and Estrada (In Press), this language has a relative clause marker *-kɨg* shown in (42). Both scholars state that this may have originated from the demonstrative *hɨgam* + the stative *-ka*. Moreover, Estrada (In Press) mentions that this relative clause marker is evolving into a clause linker because it also appears not directly attached into the verb but into the oblique noun or postpositional phrase as it is illustrated in (43). Although NT shows a similar path of grammaticalization as the one proposed by these scholars, it seems that the suffix in NT developed a different function in complex constructions.

(42) huaan **hɨg** am dah-kɨg.
John 3SG.SBJ LOC be_sit.SG.PFV-REL
'John is the one that is sitting there.'

(43) aan ko'ag taatar tɨɨpar-ta**-kɨg** aap in=hɨvga-di.
1SG.SBJ firewood cut.PFV ax-ta-LIN 2SG.SBJ 1SG.NSBJ=lend-APPL
'I cut the firewood with the ax you lend me.

4 Conclusions

In this paper, I described and analyzed clausal nominalization patterns in NT as well as in other Uto-Aztecan languages spoken in Mexico. All of them present suffixes that create nouns out of verbs, i.e. they serve the function of lexical nominalizers. The same particles nominalize clauses in all these languages except for NT. Instead, NT has a suffix *-gai* that mainly appears in complement and adverbial clauses. In this paper, I proposed that the possible source of this suffix is the demonstrative *ɨgai*. This hypothesis was tested by illustrating that when the demonstrative serves the function of 3SG/PL pronoun, it behaves as the other personal pronouns by preceding or following the main or subordinate verb. The fact that this demonstrative in dependent clauses has a co-referential function in a few cases may have caused the reanalysis of this item, and therefore, turned it into a nominalizing suffix. More evidence that proves this hypothesis is the presence of the suffix *-go* as well as NT data from Rinaldini (1994) and data from Pima Bajo (Hale 2002; Estrada, In Press).

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Code Switching and Mixed Language Genesis in Tiwi

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Introduction

A central issue in the study of mixed languages is the nature of their relationship to other language contact phenomena. Some scholars, notably Bakker (2003), have adopted the position that mixed languages are the result of autonomous processes of language mixing which operate independently of borrowing and code switching. However, McConvell and Meakins (2005) argue for the opposite view, demonstrating that the mixed language Gurindji Kriol has most plausibly arisen from grammaticization of pervasive code switching in a multilingual community. Building on this work, McConvell (2008) develops a "centre of gravity" model of mixed language genesis whereby some grammatical subsystems of a language are more robust than others and less likely to undergo replacement by morphemes from another language. A head-marking language will tend to retain its verbal subsystem in code-switched utterances, whereas a dependent-marking language will tend to retain its nominal subsystem. These patterns can be gramm aticized, leading to the emergence of so-called "Noun-Verb" (N-V) mixed languages with different sources for their nominal and verbal grammatical systems. This is contra Bakker, who maintains that typological considerations play very different roles in code switching and mixed language genesis (2003:130-132).

McConvell (2008) develops the center of gravity model most convincingly in light of data from mixed languages of northern Australia, noting that patterns of code switching for unmixed varieties would provide crucial evidence for or against his theory. However, he also acknowledges that only "limited data" on code switching is currently available for many of these languages. The present study is an attempt to shore up this empirical gap for one of McConvell's test cases. Data from the transcript of a public meeting are used to examine patterns of code switching in Tiwi, a head-marking polysynthetic language of northern Australia where an N-V mixed language has emerged among younger speakers (Lee 1987, McConvell 2008). McConvell's theory predicts that code switching behavior should reflect the same center of gravity principles as found in the resulting mixed language. In particular, a head-marking language like Tiwi should most commonly provide the verbal part of code-switched utterances. Although the corpus used here is too small to draw definitive conclusions, the data do not support the supposed connections between morphological typology, code switching, and mixed language genesis. Reasonable interpretations of the data show no preference for code switching that retains Tiwi's verbal subsystem, as predicted by McConvell's center of gravity model.

The paper is structured as follows. Section 1 provides a more detailed overview of McConvell's theory and the arguments he develops to support it. Section 2 summarizes the Tiwi language situation and the data used in the present study. Section 3 considers certain analytical problems the data present – especially distinguishing code switching from borrowing and the use of a mixed language – and the solutions adopted to deal with them. Section 4 presents the main results of the study and considers the extent to which they are consistent with the predictions of the center of gravity model. Section 5 discusses the theoretical significance of the results.

1 Code Switching and Grammatical Centers of Gravity

McConvell's center of gravity theory originates in observations about Gurindji Kriol (McConvell and Meakins 2005). This mixed language has developed only recently, in parallel with McConvell's documentation of language use in Gurindji communities since the 1970s. It combines elements of the Pama-Nyungan language Gurindji and Kriol, an English-lexified creole spoken across much of northern Australia. An N-V mixed language, the nominal grammar is supplied by Gurindji and the verbal grammar by Kriol. This is illustrated in example (1), where the main verb inflected for continuative aspect is from Kriol but the noun phrases and case morphology are from Gurindji:[1]

(1) *Ngali* plei-bat *nyawa-ngka*
1SG.INCL play-CONT this-LOC
'You and me can play here.' (McConvell and Meakins 2005:11)

McConvell and Meakins argue that this state of affairs resulted from grammaticization of earlier code switching between traditional Gurindji and Kriol, as in example (2), where the tense morphology and main verb are drawn from Kriol:

[1] Some glosses have been modified slightly to conform to the Leipzig Glossing Rules (Comrie, Haspelmath, and Bickel 2008). Non-conforming glosses used in this paper include HAVING for the Gurindji proprietive suffix, CONT for continuative aspect, and EMPH for the Tiwi emphatic prefix.

(2) ail av-im *kungulu-yawung*
I'll have-TR blood-HAVING
'I'll have the bloody meat.' (McConvell and Meakins 2005:18)

Their analysis of data from the 1970s showed that 60% of the clauses with code switching had Kriol as the Matrix Language (in the sense of Myers-Scotton), whereas only 28% had Gurindji as the Matrix Language.[2] They suggest that the contemporary mixed language arose through grammaticization of the code switching patterns of the previous generation. Their argument is essentially one of plausibility: there are simply too many similarities between the code switching patterns in the 1970s and the grammatical split in the contemporary mixed language for other explanations to be likely.

McConvell's (2008) center of gravity theory addresses the question of why some languages in mixed language genesis contribute their nominal systems (like Gurindji in the development of Gurindji Kriol), while others contribute their verbal systems (like Cree in the development of Michif). McConvell suggests that a language can open up to 'turnover,' or replacement or of its systemic grammatical elements with morphemes from a new language, initially via code switching but eventually by grammatical convention.[3] Left unchecked, the end result of turnover is presumably language shift (if there is concurrent replacement of open-class lexical items), or perhaps a mixed language with a grammar-lexicon split like Media Lengua. If the process of turnover is interrupted, however, grammatical elements from both languages are retained. According to McConvell, at least some N-V mixed languages are the result of incomplete turnover, the crystallization of code switching patterns before all of a language's system morphemes have been replaced.

The key claim of the center of gravity theory is that turnover is not carried out willy-nilly. Rather, morphemes belonging to weak or less salient subsystems of the grammar are subject to replacement relatively early on. Strong subsystems – those closer to the language's grammatical center of gravity – are affected later. According to this model, which subsystems resist replacement is determined by the head-marking versus dependent-marking typological parameter (Nichols 1986). In a dependent-marking language like Gurindji, the nominal case marking system is the center of gravity so verbal categories like tense, aspect, and mood are the elements most likely to be drawn from another source. In head-marking languages, by contrast, the verbal grammar is the center of gravity and will be retained, while the nominal system is subject to replacement. The outcome in both cases is a mixed language with a split between the nominal and verbal grammati-

[2] The remaining 12% were ambiguous with respect to matrix language.

[3] The distinction between the endogenous or 'old'language of a community versus an exogenous 'new' language is crucial: it is the center of gravity of the old language that resists replacement.

cal systems, but in one case the endogenous nominal system is retained, in the other the endogenous verbal system. McConvell's theory is appealing first of all because it provides a straightforward mechanism (code switching) for the development of mixed languages, and also because it invokes a reasonably well-understood structural-typological parameter to predict which language contributes which part of the grammar in N-V mixed language genesis.

2 Language Background and Data Source

2.1 Traditional and Modern Tiwi

McConvell (2008) compares the transition from Gurindji to Gurindji Kriol with the case of Tiwi, a language isolate spoken on Melville and Bathurst Islands, situated 65 km north of Darwin off the coast of mainland Australia. Over the course of the 20th century, Tiwi-speaking people had extensive contact with Australian English and regional English-lexified contact languages.[4] Most Tiwi people developed some degree of proficiency in English, many through the mission school located at present-day Nguiu. During this period there does not seem to have been a policy of actively discouraging the use of Tiwi (Lee 1987:327), and Osborne (1974:3-4) reported as many as 1400 first-language Tiwi speakers. Nonetheless, by the late 20th century the seeds of Tiwi endangerment had been sown: Osborne noted a decline in proficiency in younger generations and a threat from increased use of English in a number of official domains.

Lee (1987) describes an emergent mixed language she calls Modern Tiwi (MT) that has "amalgamated into a new code" (p. 340) using elements from Traditional Tiwi (TT), Pidgin English, and Standard Australian English.[5] While the verbal system of MT has undergone major modifications from the TT system (noun incorporation and object agreement having been lost), subject marking and aspect morphology remain largely intact. Moreover, one of the main changes in the verbal system has been the expansion of a construction in which an uninflected main verb is accompanied by a light verb inflected with TAM morphology (Lee 1987:16). Thus (3) in TT is replaced with (4) in MT, where the Kriol main

[4] Lee calls the local English contact language 'Pidgin English' and treats it as a style of a 'Tiwi English' (TE) code; she is uncertain about its relationship to other contact varieties of English/Kriol spoken in northern Australia (1987:16-17). I will sidestep this issue below, generally referring to any language whose lexicon is derived primarily from English as 'English,' whether or not it may in fact be an English-lexified contact language.

[5] The situation is in fact much more complex than this, with four partially overlapping codes at play in the community: TT, MT, Tiwi English, and Standard Australian English, with additional stylistic and developmental gradations as well. The boundaries between the codes are quite fluid, making identification of code switching challenging. This problem is discussed in more detail in section 3 below.

verb *kilim* occurs with the Traditional Tiwi light verb *jimi* (McConvell 2008:199):

(3) *yi-pirni*
3SG:3SG-hit
'She hit him.' (TT)

(4) kilim *ji-mi* *arra*
hit 3SG-did 3SG
'She hit him.' (MT)

The upshot is that relexification of Tiwi verbs with English-derived forms retains Tiwi TAM marking, i.e., they have preserved Tiwi's grammatical center of gravity.[6]

The comparison between Modern Tiwi and Gurindji Kriol is especially apt since the history of language contact in the two cases is roughly similar: groups with similar cultural practices – according to Lee (1987:3), Tiwi culture is "fundamentally that of mainland Aborigines" – entered into contact with similar varieties of English (or English-lexified contact languages) during approximately the same period in history and under similar circumstances. While it would be a mistake to ignore entirely the micro-histories of contact in the two cases, it is nonetheless plausible that the main difference in the development of Gurindji Kriol versus Modern Tiwi is a typological one: Tiwi is a head-marking polysynthetic non-Pama-Nyungan language, whereas Gurindji is largely dependent-marking.

If center of gravity effects in N-V mixed language genesis are due to a typological constraint on code switching, the next question is whether Traditional Tiwi with code switching favors retention of Tiwi TAM marking as well. Although Lee (1987:337-342) includes discussion of code switching, she notes that there is "insufficient data to give many examples" (p. 341). Thus, while McConvell's claim that the Modern Tiwi light verb construction is the result of code switching patterns grammaticized before complete "turnover" to English is plausible, it is unclear whether patterns of language mixing found in MT are in fact attributable to patterns of code switching involving TT and English.

[6] McConvell does not discuss the MT nominal system, but his theory predicts that it should have undergone a relatively large amount of morphological replacement. Lee (1987:77-120, 317-318) outlines a number of changes in the nominal and pronominal systems which have shifted in the direction of English/Kriol, although this seems to be mainly at the semantic-functional level via simplifications to the TT system. Interestingly, Lee (1987:319) concludes that "there are relatively few changes in the structure of the Noun Phrases."

2.2 Data

Code switching data bearing on this issue are found in the transcript of a public meeting held at Nguiu in 1989 (Legislative Assembly of the Northern Territory 1996:335-362), a decade after Lee's fieldwork. The meeting was part of a process of community consultation undertaken by the Northern Territory government to discuss issues surrounding the possibility of becoming a full-fledged Australian state. The majority of the transcript is in English, with Aboriginal community members discussing matters with monolingual English-speaking government representatives. However, there are also stretches where three of the participants address their communities using a combination of English and Tiwi. It is clear from the rest of the transcript that all three speakers are fluent in a variety very close to Standard Australian English, so their use of Tiwi cannot be due to an inability to express themselves in English.

This transcript has the primary advantage of having a high degree of ecological validity. Although the speakers were aware that they were being recorded, their primary purpose was to communicate with members of their community, not to produce specimens of an authentic Tiwi language of yesteryear for linguists. Hence they were free to use whatever language they felt would best express what they wanted to say, including social-indexical meanings related via choice of linguistic code. The transcript can plausibly be taken as a sample of code switching behavior as it might commonly occur in the community, although this assumption will be problematized in section 5 below.

This data source has several disadvantages, however, two of which are especially vexing. First, the overall quantity of usable data is hardly overwhelming. There are only 76 clauses (or clause-like units) with both Tiwi and English elements, roughly half as many as McConvell and Meakins (2005) considered in their study of Gurindji Kriol. Of these, just over a mere half are clearly code switches, with most examples coming from a single speaker in an extended monologue relatively early in the meeting. Second, no information is provided about the speakers or the audience other than a list of names on the first page (although their genders are known from their titles). Thus, information is lacking that would permit inferences about which varieties of Tiwi and English the speakers and audience might be expected to know, or about the speakers' likely motivations for switching between Tiwi and English. Despite these flaws, some data is better than no data, and therefore this transcript can nonetheless be taken as evidence, albeit imperfect, bearing on the center of gravity theory.[7]

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[7] Other problems with the data are less dire, but are mentioned for completeness. First, the transcriber is anonymous and thus the validity of the transcription might in some cases be suspect. In particular, it is unclear whether words rendered in English orthography may in fact be normalized tokens of an English-lexified contact variety. Regrettably, it has not been possible to obtain a

3 Coding

As noted in the introduction, a recurrent theme in the literature on language contact is the extent to which various phenomena interact and overlap with one another. This issue is no less problematic in analyzing the Tiwi code switching data. Lee describes the basic problem in the following passage:

> Because of the number of loan words and structures from English or Pidgin English in MT, it is difficult to tell where mixing ends and internal switching begins… [T]here is no clear cut boundary between mixing and switching and hence no clear-cut boundary between MT and TE. (Lee 1987:340)

To evaluate the center of gravity theory's predictions, code switching must be distinguished from borrowing on the one hand and from single-code mixed language utterances on the other. It is therefore necessary to establish specific criteria for treating clauses with elements from multiple sources as code switching rather than something else and for identifying the Matrix Language of code-switched utterances. This section makes explicit the decisions made in this regard.

3.1 Code Switching vs. Borrowing

Winford (2003:40-41) discusses two kinds of lexical borrowing that must be distinguished: highly conventionalized borrowing that does not vary much from speaker to speaker, and nonce borrowing, which may be unique to a particular situation or conversation. Winford points out that "nonce borrowing is similar to code switching, which varies according to convention as well," and that "borrowing in the strict sense and code mixing in bilingual situations must be viewed as potentially quite different phenomena, governed by separate dynamics" (2003:41). Teasing these two phenomena apart in the Tiwi data is crucial, since many of the potential cases of code switching involve single lexical items. In order to accurately assess the distribution of grammatical elements in clauses which contain code switching, it must be clear that they are really code switches rather than borrowings.

The following heuristics have been employed to help distinguish code switches from borrowings. When a clause has a shift in language corresponding to a multi-word constituent, it is counted as an embedded language island code switch, as in (5):

recording to check it against. Second, translations for the Tiwi sequences are given as a chunk at the end of each conversational turn (and sometimes not at all), so the alignment between the text and the translation is sometimes imperfect.

(5)	*nimarra*	*nyi-rra-ami*	*ngaji*	once every three
	talk	2PL.NPST-EMPH-do	there	

or four months. Amongst yourselves.
'Meet together every three or four months amongst yourselves and talk about it.'

However, multi-word items which are arguably lexicalized single units, such as *fishing license* or *write down*, are not automatically counted as code switches but instead are treated in the same way as single-word switches.

Unsurprisingly, classifying single-word shifts is most problematic. Most have been coded as borrowings, since many are introduced concepts and lack equivalents in Traditional Tiwi (at least, none is given in Lee 1987 or Osborne 1974). Examples include *committee*, *payday*, *airstrip*, *constitution*, and *parliament*. Two others occur multiple times and with more than one speaker, even though TT equivalents can be found in Osborne (1974), suggesting they might be established borrowings as well: *understand* and *meeting*. Three words – *properly* (often in combination with *understand*), *come back,* and *look* – can be considered borrowings because they occur multiple times in the Traditional Tiwi texts recorded by Osborne (1974), and thus were already an established part of the language as spoken by elders in the early 1970s.[8] According to these criteria the following is considered a Tiwi sentence with two borrowed words:

(6)	*Api*	*ajuwanga*	properly understand	*nyi-rra-ami*	*awarra*
	so	??		2PL.NPST-EMPH-do	that

'Try and understand.'

Treating most single-word shifts to English as borrowings rather than code switches excludes from consideration at least five instances of the Tiwi light verb construction exemplified in (4) above. This deflates the number of code switches with Tiwi as Matrix Language and hence is disadvantageous for the center of gravity theory. Therefore, the results presented in section 4 will also consider the consequences of an alternative coding in which some single-word elements are treated as code switches instead of borrowings.

[8] This ignores the possibility that the elderly speakers Osborne worked with might have been code switching (perhaps for his benefit), but this seems unlikely insofar as the vast majority of the English-derived vocabulary in those texts are single words – there are only four cases of multi-word English sequences. Moreover, there is a fair degree of uniformity in the texts – many of the same English elements occur repeatedly, and thus appear to be established borrowings rather than nonce insertions.

3.2 Code Switching vs. Mixed Language

Another problematic issue is distinguishing code switching between Tiwi and English from the ordinary use of Modern Tiwi (a mixed language considered as a unitary code). This is due to the fuzzy boundaries separating Traditional Tiwi from Modern Tiwi on the one hand, and Modern Tiwi from Tiwi English on the other. Nonetheless, there is a fair amount of evidence that, on the whole, the Tiwi language found in the data is Traditional Tiwi, and hence that the sentences with elements from more than one language should be considered instances of code switching.

First, there are several alternational code switches in the corpus with entire clauses that are uniquely English or uniquely Tiwi, as in (7) and (8):

(7) You've got to be all taken there, about courts, how they elect government.

(8)

nimarra	*wu-ri-mi*	*tuwawanga*	*ngini*
talk	3PL.NPST-COM-do	again	if/when/because

nuwa	*nyimpi-timarti*	*awarra*
2PL	2PL.NPST-want	that

'They will talk to you about what you need to know.'[9]

Although an examination of the MT texts in Lee (1987:400-405) reveals some clauses with no trace of English elements at all, the reverse is not true: one does not find unbroken stretches of English-derived vocabulary. Thus, these inter-clausal switches, and some of the longer English sequences in sentences with intra-clausal code switches, suggest that the speakers are maintaining Tiwi and English as distinct codes to some extent.

Second, Lee (1987) identifies a number of phonological and grammatical criteria as being typical of TT but not MT. Individually, these would not be convincing, since many of them are tendential rather than categorical. However, all three speakers show clusters of these properties, including in sentences mixed with English, making the language seem much closer to TT than to MT. These properties are summarized as follows:

- **Retention of post-alveolar consonants**:[10] TT post-alveolar consonants tend to merge with the plain alveolar series in MT (Lee 1987:34-35). There is a preponderance of post-alveolar consonants in the speech of all three speakers in the data. Where Lee lists a difference between TT and MT (1987:367-92), the speakers consistently match the TT form. Examples include *arnapa* 'wait,'

[9] The translation is misaligned in the original transcript, so the one given here is approximate.

[10] Post-alveolars are transcribed as digraphs whose first member is <r>: <rt>, <rn>, <rl>.

yingarti 'lots,' and *karluwu* 'no, not.'

- **Retention of word-initial /ŋ/**: Word-initial /ŋ/ (transcribed <ng>) is generally lost in MT (Lee 1987:39-41). There is a preponderance of word-initial velar nasals in the data, found with all three speakers. Examples include *ngamamanta* 'our friends,' *ngini* 'if,' and *ngarra* 'here.'
- **Imperatives**: Plural imperatives in TT are formed by prefixing a subject agreement marker *nyi-* to the singular imperative form of the verb (Osborne 1974:67, Lee 1987:187). Lee (1987:200) points out that these plural imperatives are exceedingly rare in MT, where the TT singular imperative is generally used for both singular and plural imperatives. The transcript contains numerous tokens of the plural imperative form.
- **Object agreement**: Object agreement prefixes do not occur in spontaneous MT, although younger people occasionally produce them in elicitation (Lee 1987:181-82). There are two certain cases of the object agreement prefixes in the data, and some other likely candidates as well.
- **Locatives**: TT has a set of locative words, glossed as 'here' and 'there,' which have a three-way contrast: close to speaker, close to hearer, and close to neither speaker nor hearer. In MT, this has collapsed to a simple two-way contrast. According to Lee (1987:129), the 'medial' (close to hearer) form *ngaji* is never found in MT, but there are several tokens in the data.
- **Non-contracted forms**: The lexicon in Lee (1987:367-392) includes many TT words that have undergone contraction in MT (apparently with some phonological regularities – Lee 1987:44-48). Contracted forms are sometimes optional in TT, but non-contracted forms are found only in TT. There are numerous examples of non-contracted forms in the data, including *tuwawanga* 'again' (MT *tuwanga*), *awungarruwu* 'there (distal)' (MT *awarruwu*), *awungaji* 'there (close to addressee)' (MT *awaji*), *murrakupupuni* 'country' (MT *murrakupuni*), *nginingawula* 'ours (emphatic)' (MT *angawula*).
- **Lexical items**: Many TT lexical items have been replaced by an English-sourced word in MT (Lee 1987:367). There are several examples of these TT forms in the data, including *-mamula* 'to call' (MT *kolim*), *punkaringini* 'paper' (MT *peypa*) and *-pawumi* 'to cook' (MT *kukim*).

By contrast, very few features in the data would identify the language in the transcript as MT rather than TT. Some candidates include:

- One speaker produced three tokens of the MT reduced form *ka* of the locative preposition *kapi* (but the full form more frequently).
- All three speakers use the future tense marker *wiyi* instead of *nguyi*, which Lee says is more typical of MT. However, a future tense marker *wi* (not *nguyi*) is included in Osborne's (1974) lexicon. Lee points out that "[e]ven for older speakers *nguyi*…is being replaced by *wiyi*" (1987:133), suggesting that it was

a change already far advanced in TT, and thus not diagnostic of MT per se.

- Two speakers use a form *-mirampi* 'children,' intermediate between TT *-mamirampi* and MT is *-mirapi* (Lee 1987:371), the latter with denasalization of the TT intervocalic stop.
- The light verb construction discussed by McConvell (2008; cf. ex. 4 above) is common in the data, generally with English-sourced non-inflecting verbs. However, other verbal constructions are also found, and the light verbs that do occur are in sentences containing other TT properties discussed above, notably several examples of the plural imperative construction. The same construction, often with English non-inflecting verbs, is reasonably common in Osborne's (1974) collection of TT texts. Thus, their occurrence in the meeting transcript might simply be the code switching precursor of the construction that becomes so prevalent in MT.

While a closer analysis of the transcript might reveal more unambiguously MT features, it seems that these are in the minority. All three speakers appear to have been using a mixture of two distinct codes: Traditional Tiwi and some variety of English. Thus, the data can be treated as switching between distinct codes rather than as a unitary mixed code.

3.3 Finding the Matrix

For each clause (or clause-like discourse unit) in the data coded as a plausible code switch, the Matrix Language was identified as either Tiwi or English. As noted by Winford (2003:141), there is no widely accepted way of doing this. To ensure some degree of comparability of results, the same criteria used by McConvell and Meakins (2005) for Gurindji Kriol were used: the language supplying a clause's TAM and agreement morphology is the Matrix Language.[11] Thus, Tiwi is the ML in (9a) because it provides the future tense marker *wiyi*, whereas English is the ML in (9b) because it supplies the modal auxiliary *might*:

(9a)	Everything	*ngawa*	*wiyi*	look	*karrikamini*	left.
		1PL	FUT		nothing	

(9b)	We might go back	*ngaji*	fifty or twenty, thirty years ago.
		there	

'We might end up with nothing left like fifty, twenty, or thirty years.'

In (10), Tiwi is again the ML because it supplies the tense marker for the matrix

[11] "As a rule of thumb, those clauses with Kriol tense-aspect-mood elements such as the past auxiliary 'bin' have Kriol ML and those with Gurindji auxiliaries, pronominal enclitics and TAM inflections on the verb have Gurindji ML" (McConvell and Meakins 2005:18-19).

clause:

(10) But before that comes in *ngaji* convention *wiyi*
there FUT
'Before this happens we will have a convention.'

Clauses with an uninflected Kriol or English main verb only, as in (11), unless identified as an established borrowing are considered to have English as the ML, the rationale being that null marking is a property of the English TAM paradigm.

(11) *kiyi* ask them *tuwawanga* question
then again
(untranslated in original: probably 'Then ask them questions again.')

Finally, some parts of the transcript are ambiguous with respect to Matrix Language. This is sometimes because there are possible TAM morphemes that haven't been identified, because the transcript is incomplete, or because a unit lacks a verb altogether. Some of this last group are not clauses at all, and hence may be irrelevant to the center of gravity theory, but others involve what could be analyzed as null copular constructions, as in (12):

(12) *ngarra* different *awarra*
this that
'They are different.'

Such ambiguous cases were coded separately, but as with borrowings alternative codings are considered in section 4.

4 Results

Applying the criteria discussed in section 3, the results of the study are summarized in the following table:

	Code switch	Borrowing
Tiwi ML	12	25
English ML	28	0

The table is to be interpreted as follows. The column labeled "Code switch" identifies the number of clauses that were coded as having unambiguous cases of code switching. The column labeled "Borrowing" identifies clauses with material derived from both languages, but where the material was identified as a potential borrowing. There were in addition 11 clause-like units coded as having an ambiguous Matrix Language, not counted in the table.

Considering the unambiguous code switches alone, a clear majority of clauses (28/40, 70%) have English as the ML. This runs counter to the predictions of the center of gravity model: since Tiwi is a head-marking language, it is expected that most instances of code switching should retain Tiwi verbal system morphemes.

As noted above, it is likely that the number of code switches with Tiwi as Matrix Language is in fact somewhat higher: perhaps some of the 'borrowings' could be re-classified as 'nonce borrowings' and hence as some sort of code switch. This is almost certainly incorrect for most such cases, for the reasons outlined in section 3.1 – the borrowings are well-established in all varieties of Tiwi and are not possible loci for switching. Supposing as many as half of them were reclassified, however, Tiwi would still be the Matrix Language less than half the time (still setting aside the ambiguous cases): (12+13)/65 or 38%. If all 11 ambiguous cases were considered to have Tiwi as Matrix Language (if, for example, null copular clauses are considered to be paradigmatically a feature of Tiwi rather than English), clauses with Tiwi as Matrix language would still be in the minority: (12+13+11)/76 or 47%.

Perhaps an even higher proportion of the borrowings could be recoded to have Tiwi as Matrix Language, but even so it seems unlikely that the total would approach the 60% vs. 28% that McConvell and Meakins found for Kriol ~ Gurindji code switching in the 1970s. Thus, even under a fairly generous coding of the data, no preference for Tiwi as Matrix Language emerges in Tiwi ~ English code switching.

5 Discussion and Conclusions

While some ambiguities in the data remain, the patterns of Tiwi code switching examined here do not conform to the predictions of McConvell's center of gravity model. TAM marking in clauses with code switching is just as likely, if not more so, to be supplied by English (or Kriol) as it is by Traditional Tiwi. If this is representative of code switching input that led to the emergence of Modern Tiwi, there would be no reason to suspect that a mixed language retaining Tiwi verbal system morphology would emerge. This would seem to support Bakker's position that typological factors have very different effects in code switching versus mixed language genesis: if the head-marking/dependent-marking typology was at all relevant in the emergence of MT, it must have been by means of some mechanism other than code switching.

It could be argued that the code switching found in the public meeting transcript considered here is not, in fact, representative of code switching in the Tiwi community at large. Tiwi speakers might have used more English-framed clauses because they were in the presence of monolingual English speakers and were engaging with them in English to discuss political issues associated with Anglo-Australian culture. This scenario was suggested by Lee (1987), who observed at community meetings that "[t]he English may have been mainly for the benefit of the Europeans and mixed-race people present" (p. 334), and more generally that "[t]he presence of a European, even though not an active participant in the conversation, may influence the amount of English used" (p. 339). Such considerations could make data from this public meeting irrelevant to mixed language genesis.

Note, however, that this objection presupposes that the head-marking versus dependent-marking typological parameter does not *in general* determine patterns of code switching, which are instead highly dependent upon social context. Indeed, a more general finding of Lee's study of language use in Tiwi communities is that contextual factors such as setting (work, home, ceremonies, and so on) and the status of interlocutors play a crucial role in determining which linguistic code speakers are likely to use (1987:329-342). One of the codes Lee identified was a child-directed Tiwi Baby Talk, and it is there, she suggests, that salient features of MT must have originated (1987:355-356). From this perspective, the structural-typological constraint seems to play only a secondary role in code switching – and hence in mixed language genesis under McConvell's theory – insofar as it is so easily overridden by speakers' knowledge of their social world.[12] If head-marking vs. dependent-marking centers of gravity are at play in N-V mixed language genesis, research moving forward must address the issue of why the typological parameter is active in some social contexts but inactive in others, especially child- vs. adult-directed speech.

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[12] Lee's account of Tiwi Baby Talk is discussed by O'Shannessy (2012) in her study of the emergent mixed language known as Light Warlpiri, spoken in the mainland Australian community of Lajamanu. Light Warlpiri is an N-V mixed language with many of the same properties as Gurindji Kriol. O'Shannessy argues that in adult-to-adult code switching involving (traditional) Warlpiri and English, "there is not the verb-noun grammatical dichotomy seen in the code-switching patterns of child-directed speech" (2012:327). That is, the patterns found in code switching vary depending primarily on interlocutor, not on the structural properties of the language involved.

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Cross-linguistic Analysis of Metaphorical Conceptions of *душа/dusza/duša* ('soul') in Slavic Languages (Russian, Polish, and Croatian)[1]

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Introduction

The idea that an individual is made up of various elements – some physical and some spiritual, and that soul is the distinguishing mark of living things seems to be universally present in all philosophical and spiritual systems since ancient times. The broader meaning of a soul as not only animating the body but being morally, cognitively and intellectually significant (responsible for functions like thought, perception, desire, and moral qualities) was already firmly established in the fifth century Greek usage. The concept of the *soul* was of primary concern to various Pre-Socratic thinkers, and to ancient philosophers like Plato, Aristotle, Epicurus, and the Stoics. Their theories of soul have shaped later theoretical developments in the writings of Plotinus and other Platonists, Thomas Aquinas, and Immanuel Kant, among others. Our inner life has remained the subject of research of various different contemporary approaches as well.

The concept of soul serves as a cue to revealing and understanding existential representation of human immaterial nature in different cultures, thus being one of the basic elements which forms the linguistic picture of the world fixed in national mentality. A great body of research is based on the idea that the concept of soul concerns several key issues in human life: the source of life, cognition and emotion, personality traits, social relationships, and human destiny. The concept of soul has been actively studied from mythological, religious, philosophic,

[1] This work has largely benefited from George Lakoff's and Eve Sweetser's insightful comments and ideas and from the work of the Metaphor Seminar at the Berkeley Linguistic Department. We are also thankful to the participants in The 38th Annual Meeting of the Berkeley Linguistics Society for their questions and comments.

cognitive, sociological and psychological perspectives. A number of authors have analyzed the concept of soul from the point of view of its linguistic representation in different languages: Wierzbicka (1989; 1992); Shmelev (1997); Mikheev (1999); Vardanyan (2007); Kolesnikova (2011); Tszin (2010); Uryson (1999); etc. Our research differs from the previous ones in the sense that it is cross-linguistic, corpus-based and cognitive in nature. This paper is an attempt to carry out a cross-linguistic, corpus-based and cognitive analysis of the concept in question in three Slavic languages: Russian (East Slavic), Polish (West Slavic), and Croatian (South Slavic).

The Slavic words for soul are derived from Proto-Slavic **duxъ* with suffix *-j-a* (Proto-Indo-European **dhousiā*), and the meaning is connected with breathing and blowing, which is common in many Indo-European languages, and hence refers to the vital breath, the animating principle.

The fact that the Russian word *dusha* ('soul') has much wider range of use and much higher frequency than the English word *soul* has been noticed and extensively analyzed by Wierzbicka (1989). Since in other Slavic languages *dusha* has a similar range of use and frequency as its equivalent in Russian, we assume that the relevant conceptual structure is not just Russian but pan-Slavic. To see what that conceptual structure actually looks like we will provide a detailed corpus-based analysis of linguistic manifestations of the conceptual metaphors and metonymies for *душа/dusza/duša* ('soul') as the target domain in Polish, Russian and Croatian corpora[2].

The basis of our theoretical and methodological approach is Conceptual Metaphor Theory as presented in Lakoff and Johnson (1980), and then further developed and applied in Lakoff (1987), Sweetser (1987), Grady (1997), Lakoff and Johnson (1999), Kövecses (2000; 2010), Feldman (2006), and Lakoff (2009), among many others

Lakoff and Johnson (1999) and Sweetser (2004) have presented an extensive analysis of the metaphorical conceptions of our internal structures and the embodiment of spiritual experience. Our analysis is largely based on their results.

The research corpus consists primarily of Russian National Corpus, Polish National Corpus and Croatian Language Repository.

[2] We are well aware of the fact that data collected by corpus-based analysis does not represent linguistic reality – it is a "corpus reality filtered through subjectivity of intuitive judgments (Žic-Fuchs 2009:98)." Therefore we have combined a corpus-based analysis with our judgments as native speakers and with the *systematic introspection* (as defined by Wierzbicka 1980:21). Nevertheless, we think that the corpus reality filtered through intuitive judgments is more suitable as a research tool than just intuitive judgments which are not confirmed in the corpus reality.

1 Conceptual Structure of *душа/dusza/duša* ('soul') in Russian, Polish, and Croatian

> "What we have called variously the Subject or the disembodied mind is called in various religious traditions the Soul or Spirit. In spiritual traditions around the world, the Soul is conceptualized as the locus of consciousness, subjective experience, moral judgment, reason, will, and, most important, one's essence, which makes a person who he or she is."
> (Lakoff and Johnson's 1999:563)

The concept of soul is tightly connected with religion, spirituality and philosophy, and this apect has been the focus of the linguistic analysis of that concept in Slavic languages so far. We will not entirely neglect this perspective, but will be more interested in the *embodied* experience behind the conceptual structure of *dusha*.

Lakoff and Johnson (1999:267-289) have revealed that we have a "system of different metaphorical conceptions of our internal structure" and there are a "small number of source domains that the system draws upon: space, possession, force and social relationships." Their analysis of the metaphorical conceptions of our inner lives is based on fundamental distinction between the Subject and one or more Selves, which was first introduced by Andrew Lakoff and Miles Becker (1992). Lakoff and Johnson (1999) have shown that metaphors for conceptualizing our inner lives are grounded in universal experiences and that we conceptualize the Subject as being person-like, with an existence independent of the Self. As they have pointed out, those metaphoric conceptions have a hierarchical structure with the general Subject-Self metaphor (conceptualization of person as bifurcated) at the first level and many more specific instances on other levels. They further point out (1999:562) that the natural concomitant of this metaphor is the metaphorical concept of mind separated from the body. This metaphor is crucial for our analysis.

In the Slavic languages in question, this conceptualization of the soul is indeed present, and there are linguistic expressions of conceptual metaphors of *dusha* as the locus of consciousness, reason, emotions, will, etc. This conceptualization is often bound with other conceptual metaphors in interesting ways (e.g., with conceptualization of a soul as either a person or a thing) and with other conceptual metaphors from other domains, as we shall see.

Very often in these languages the specific cases of Subject-Self metaphors (listed in Lakoff and Johnson 1999:269-289) are manifested too.[3] And sometimes some other loci of reason, emotions, will, etc. are expressed in language, as for example Heart As The Locus Of Emotions, Head/Brain As The Locus Of Reason,

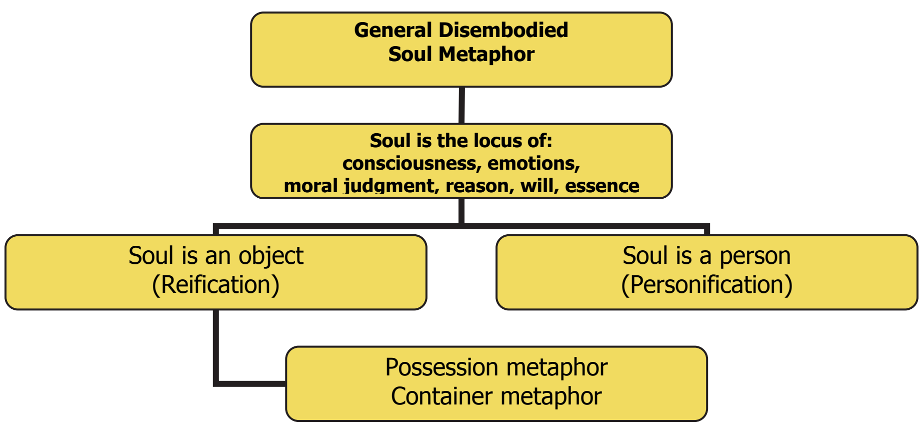
[3] These metaphors will not be of our interest in this article, but we will list a few Croatian examples to illustrate this*: Suzdržao sam se da ga ne udarim* ('I held myself back from hitting him'); *Izvan sebe sam* (literally: 'I am out of myself'); *Rastresena sam danas* (literally: I am scattered today); *Saberi se!* ('Pull yourself together!') etc.

Mind As The Locus Of Consciousness, etc. These other metaphors will not be subject to examination in this article.

2 General Disembodied Soul Metaphor

The concept of a disembodied Soul, like that of a disembodied Mind, is metaphorical: it arises from embodied experiences that we have throughout our life.[4] And this requirement of the Soul (and Mind) being embodied is "no small matter" because it contradicts the crucial beliefs of many religions around the world based on transmigrations of souls and reincarnation, as Lakoff and Johnson (1999:563) pointed out. But being aware of the fact that "metaphors may create realities for us, especially social realities" as stated repeatedly in Lakoff and Johnson (1980:156) it is not surprising that in many languages, including the three Slavic languages in question, disembodied Mind and/or Soul is a religious and social reality which is very well reflected in language as well.

This metaphor is combined with the conceptions of soul as being either the locus of emotions, moral judgment, will, essence or reason. Depending on the type of locus and combining these metaphors with either reification or personification we get many specific levels manifested by numerous linguistic metaphors as we shall see in the examples.



[4] Lakoff and Johnson (1999: 565): "The embodied mind is part of the living body and is dependent on the body for its existence. The properties of mind are not purely mental: They are shaped in crucial ways by the body and brain and how the body can function in everyday life (...). The mind is not merely corporeal but also passionate, desiring and social. It has a culture and cannot exist culture-free. It has a history, it has developed and grown, and it can grow further. It has unconscious aspect, hidden from our direct view and knowable only indirectly. Its conscious aspect characterizes what we take ourselves as being. Its conceptual system is limited; there is much that it cannot even conceptualize, much less understand. But its conceptual system is expandable: It can form revelatory new understandings."

3 Soul Is A Physical Object Metaphor – Reification

3.1 Possession Metaphor

In addition to the general metaphor of disembodiment, the possession metaphor (PARTS ARE POSSESSIONS) is at least equally pervasive underlying all other metaphorical conceptions of soul. Within the cognitive model of a person[5], the soul is conceptualized as being a part of a person, and therefore we get the metaphor: A PERSON POSSESSES A SOUL (which *lives* in *his/her* body). A person is the "owner" of a body and a soul (we say *my* body, *my* soul). The *owner* and *his/her* soul usually both live *in* the body, which is other metaphor and we will go back to it later. The PARTS ARE POSSESSIONS metaphor is most probably universal, based on existing cross-linguistic empirical evidence. The linguistic manifestations of most other specific cases of conceptual metaphors are often bound with this metaphor.

This means that regardless of weather the soul is conceptualized as a person or a thing (and more specifically, what kind of a person and what kind of a thing), it always *belongs* to somebody. That possessive meaning is always grammaticalized with possessive pronouns or case markers.

> PARTS ARE POSSESSIONS + cognitive model of a person where Soul and Body are parts of a person = **A PERSON POSSESSES A SOUL (WHICH *LIVES* IN *HIS/HER* BODY)**
> CRO: *moja* duša ('my soul'); *tvoja* duša ('yours soul'); *njegova* duša ('his soul'); RUS: наша душа ('our soul'); моя душа ('my soul'); POL: nasza dusza ('our soul'); moja dusza ('my soul'); jego/jej dusza ('soul of his/her');
>
> PARTS ARE POSSESSIONS + PSYCHOLOGICAL PAIN IS PHYSICAL PAIN =
> **SOUL IS A PHYSICAL PART OF THE BODY THAT CAN HURT**
> CRO: I samoga me duša boli! ('My soul hurts'); zar vas ne boli duša? ('Doesn't your soul hurt?'); RUS: Что-то у меня душа болит за него. ('I don't know why but my soul hurts because of him'); Что делать, не знаю…душа болит, любовь умирает. ('I don't know what to do … my soul hurts and my love is dying').

A less common version of this metaphor is that A PERSON POSSESSES A SOUL (which *lives* in some other person's body). This metaphor is a very specific instantiation of the possession metaphor used in conceptualizing love

[5] Figurative conceptions of *dusha* are tightly related to cognitive model or models of a person. One cognitive model of a human being is dual. According to that model, human beings consist of two entities: body and soul. A body is a visible, physical part, and a soul includes the whole inner life of a human being (or referring again to Lakoff and Jonson's citation: consciousness, subjective experience, moral judgment, reason, will, and one's essence). There is also another cognitive model of a human being within which the soul does not have such a broad meaning since its 'tasks' are assigned to other 'parts' of a person: this model includes at least *body* (the visible, physical part), *heart* (the locus of emotions), *mind* (the locus of reason and counciousessness), *self* and *soul*.

relationships. Its experiential bases might be connected with the cultural frame of bringing one's material possessions into one's interpersonalrelationship (marriage), which then become the material possessions of your partner as well (shared property).[6]

Since the Soul is metaphorically conceptualized as being a Possession, it can also be shared with the partner in a love relationship. This linguistic metaphor is probably bound with the conceptualization of the SOUL AS THE LOCUS OF ONE'S ESSENCE. It is not only two people in love who share one soul, but also larger social groups united by some important (nonphysical) property.

> PARTS ARE POSSESSIONS + SOUL IS THE LOCUS OF ESSENCE + Cultural frame of sharing possessions while being in a love relationship = **A PERSON POSSESES A SOUL (WHICH *LIVES* IN SOMEONE ELSE'S BODY)**
> CRO: moja duša je tvoja ('My soul is all yours'); njegova duša tvoja duša ('His soul is your soul'); RUS: Моя душа - теперь твоя душа ('My soul is now yours'); POL: Kiedy w moich najskrytszych marzeniach roiłem o duszy, która będzie moją, kiedy czułem, że dusza taka istnieje, nie znałem Cię ('When in my most secret dreams I longed for the soul, which would be *mine* when I felt that such soul exists, I did not know you');

> SOUL IS THE LOCUS OF ESSENCE + metonymy Sharing A Soul/Possession stands for Intimacy = **CLOSE SOCIAL/RELIGIOUS/NATIONAL GROUP SHARE ONE SOUL**
> CRO: Mnoštvo vjernih jedno su srce i jedna duša. ('People who believe in God are one soul and one heart'); Kad slušaš ove pjesme, shvatiš što znači slavenska duša, to drugi narodi nemaju ('When you listen to these songs, then you can understand what the Slavic soul means, other nations don't have something like that'); POL: ... dowiem się czegoś o stanie, w jakim znajduje się dusza naszego Narodu. ('I'll know something about the state of our Nation's soul').

3.2 What Kind of an Object is Soul?

Conceptualizing the Soul as being an Object (reification) is very common and very general. Reification is an ontological metaphor by its cognitive function, which means that it does not provide much cognitive structuring for the target domain (Lakoff and Johnson 1980:25-33; Kövecses 2010:38). This metaphor is almost always bound with other metaphors, to provide more structure for this abstract target domain by means of structural or more specific metaphors. As a result of the binding of different conceptual metaphors, and sometimes of cultural frames as well, we get many specific cases of linguistic metaphors where Soul is conceptualized as different kind of objects: a valuable object, a brittle object, a hot, cold or burning object, etc. We will now go through the examples and see what conceptual metaphors determine the properties of an Object/Soul on the

[6] Sweetser (2004:38): "Marriage makes a permanent metaphorical and spiritual link out of the temporary physical joining of sexual intercourse."

linguistic level:

> SOUL IS THE LOCUS OF ESSENCE + ESSENCE IS VALAUBLE + SOUL IS AN OBJECT = **SOUL IS A PRECIOUS/VALUABLE OBJECT (THAT CAN BE LOST, STOLEN OR SOLD)**
> CRO: duša zlata vriedi ('his soul is as valuable as gold'); RUS: Продать душу ('to sell your soul');
>
> SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) + EMOTIONAL VULNERABILITY IS PHYSICAL FRAGILITY + SOUL IS AN OBJECT = **SOUL IS A BRITTLE OBJECT**
> RUS: … когда-то в детстве моя душа хрустнула под тяжестью огромного альбома, посвящённого давно исчезнувшей культуре охотников за мамонтами ('at some point in my childhood my soul cracked under the weight of a huge German album, devoted to the mammoth hunters culture.'); CRO: U podsvijesti se nalazi sve što se u vašu dušu urezalo i što nosite sa sobom, što može biti bol, patnja, traume, a može se raditi i o nečemu što se zove slomljena duša ('In your subconscious, there is everything that has been engraved in your soul and that you carry with you, it can be suffering, pain, traumas, and it can as well be what we call broken soul');
>
> SOUL IS THE LOCUS OF REASON (MEMORY) + MEMORIZING IS WRITING + SOUL IS AN OBJECT= **SOUL IS A PHYSICAL OBJECT MADE OF A SOLID SUBSTANCE (SO YOU CAN ENGRAVE ON IT)**
> CRO: Sve to je vrlo kratko trajalo, a duboko nam se u *dušu urezalo* ('all that did not last long, but it was deeply engraved into our soul');
>
> SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) + Image Metaphor SOUL IS A FLOWER[7] = **EMOTIONS ARE NUTRITION FOR THE SOUL**
> RUS: душа вянет ('soul is wilting'); POL: Moja dusza rozkwitła obok Cię. ('My soul is blooming when I am next to you');
>
> SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) + EMOTIONS ARE FLUIDS + SOUL IS A CONTAINER + KNOWING IS SEEING =
> **SOUL IS A RIVER/SEA[8]**
> CRO: da duša moja, na istočišće stvora teče ('my soul flows towards the spring of being'); dirala ga u dno duše ('she touched him to the bottom of his soul'); RUS: душа его — вот тот самый невидимый колодец, который стал пуст, сух, а теперь потихоньку вбирает в себя воду. ('His soul is a kind of invisible well, which became dry and empty, and now is absorbing water little by little').

A very common specific case of the Reification metaphor in all languages in

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[7] This metaphor is connected with our experience and knowledge about plants and flowers: we are well aware that if a flower lacks essential nutrition, it wilts, and when the nutrition is of a good quality, flower is blooming. Whatever soul is wilting for, it used to be something essential for it.

[8] The concept of a soul as a river or sea is bound with the primary metaphor KNOWING IS SEEING in a sense that what is on the surface of a river/sea is easily accessible by vision/knowledge, and what is at the bottom of a sea/soul is something that is usually accessible only by applying considerable amount of additional effort.

question is the one of the Soul being an entity with different degrees of warmth (it can be cold, warm, hot or burning), depending on the intensity of emotions and passions (this is an instantiation of the primary metaphors EMOTIONAL IS WARM, RATIONAL IS COLD). The intensity of emotions is expressed by the degree of warmth, which is conceptualized by a scalar image schema (Feldman 2006:138) and the SOUL IS THE LOCUS OF EMOTIONALITY metaphor.

AFFECTION IS WARMTH; RATIONALITY IS COLD + SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) + SOUL IS AN OBJECT + SCALE IMAGE SCHEMA = **SOUL IS A WARM/HOT/BURNING/COLD OBJECT**
RUS: Знаешь, что у нас есть *тёплое*? Судьба и сердце, жизнь и *душа*. И тем более свет от Бога. (‘Do you know what *warmth* we have? Fate and heart, life and *soul*. And the light from God’); CRO: Bio je on neobično darovit i uman mladić, a njegova *vruća i zanosna duša* nosila je u svemu biljeg Bogom odabrana pravoga pjesnika (‘He was an exceptionally talented and smart young man, and his hot and ecstatic soul carried the mark of a real poet chosen by God’); POL: kiedy dusza jest jeszcze rozpalona i jest obdarzona dobrem i resztkami minionego pocieszenia (‘yet when the soul is still burning up and is blessed with the good and the remnants of the last consolation); CRO: Hladnu dušu imaju oni koji su nevoljeni od drugih i nesposobni podijeliti osjećaje i najdublje duševne strune s drugima (‘Those who are not being loved by others and who are not able to share their feelings and the deepest strings of their souls with others, they have a cold soul’);

SOUL IS THE LOCUS OF MORALITY + MORALITY IS PURITY + SOUL IS AN OBJECT = **SOUL IS A CLEAN OBJECT**
CRO: Moja je duša čista (‘My soul is clean’); RUS: Когда он про себя писал - душа моя чиста - это было истинной правдой. (‘When he wrote - My soul is pure- it was true’).

3.3 Container Image Schema: SOUL IS CONTAINED WITHIN A BODY; SOUL IS A CONTAINER

Conceptualization and experience of a body as a container is inherent to human beings as Lakoff and Johnson (1980, 1999) and Johnson (1987) have shown and the experiential basis for this conceptualization is obvious: we fill and empty our digestive tract and our internal organs are contained inside the surface of our skin, flash and bones. The concept of soul being contained within the body is probably universal, and it is widely used in Slavic languages as well. It is very common that we conceptualize all our nonphysical experiences as being a part of our *inner* life, and *inner* means, of course, *in the body*.

BODY IS A CONTAINER FOR THE SOUL
CRO: Duša prebiva u mojem tijelu (‘My soul dwells in my body’); POL: Jak niemowlę u swej matki, jak niemowlę – tak we mnie jest moja dusza (‘As an infant in his mother –as is my soul in me’).

In the Slavic languages in question this general metaphor is very often linguistically expressed, but there are also many more and very interesting specific cases of this metaphor which, taken together, form a complex image in which the *soul* is metaphorically conceptualized as a person living in a house/body. The soul can move within that house, and it can even leave that house and move to another. Usually it rests in the upper and central part of the body (most often soul is visible in someone's eyes), but under the influence of fear or other uncontroled event it can move to the peripheral parts of the body (heels) and then it can "come to its place again." The mouth is understood as being an opening to the container (door to the house) and when soul leaves the house, it leaves through mouth (There is an expression in Croatian: *Duša mi je bila na jeziku* 'My soul was on my tongue'), which means being very close to death. This means that a soul can be in its normal location, it can go out of a normal location and then go back to it. We defined this specific metaphor as NORMAL STATE OF THE SOUL IS THE NORMAL LOCATION OF THE SOUL(which is connected with the primary metaphor STATES ARE LOCATIONS).[9] These are all examples of the specific cases of the general BODY IS A CONTAINER FOR THE SOUL metaphor:

BODY IS A CONTAINER FOR THE SOUL (inference: soul can vacate from one container /body and move to another)
CRO: Ako se moja duša poslě smèrti, polag pojamah dušoselbe, u tělo kojeg kurira preseli, to će bit za me pravi pakao ('If according to the concept of reincarnation my soul after my death moves to the body of some courier, it is going to be real hell for me'); POL: Prawdopodobnie moja dusza zamknięta była w ciele człowieka, który spadł z tej kamienicy. Moje koszmary to wspomnienia z poprzedniego wcielenia. ('Probably my soul has been enclosed in the body of a person who fell from that building. My nightmares are the memories of the previous incarnations');

BODY IS A CONTAINER FOR THE SOUL (inference: soul is visible in person's eyes)
POL: Z jej oczu promieniuje dusza spokojna i subtelna, jak ów niebieski dymek unoszący się znad filizanek kawy na jej obrazach ('Her soul radiates from her eyes calm and subtle, like the blue smoke/vapour floating above the coffee cups on her paintings'); RUS: душа смотрит из карих Таниных глаз. ('her soul was looking at me from Tanja's brown eyes');

SOUL IS CAPABLE OF MOVING WITHIN BODY
RUS: От некоторого внутреннего центра душа движется вовне … к материальному миру, в котором, по предположению, все процессы представляют собой нечто автоматическое" ('From some inner center the soul is moving towards the material world where supposedly all the processes are something automatic'); CRO: Sva mi je duša sišla u pete. ('My whole sole descended to my heels');

[9] In Lakoff and Johnson (1999: 274) the Location Self metaphor is described, but there the control of Subject over Self was conceptualized as being in a normal location. However, it seems that in our examples control is not crucial, altough it is often the case that the unusual state is caused by something external over which the Subject has no control.

TO HAVE YOUR SOUL ON YOUR TONGUE IS TO BE CLOSE TO DEATH
CRO: Duša mi je bila na jeziku, a život na tankoj niti. ('His soul was on his toungue, and his life was hanging on a very thin fibre');

STATES ARE LOCATIONS and **NORMAL STATE OF THE SOUL IS NORMAL LOCATION OF THE SOUL**
RUS: Душа не на месте ('Soul is not in its place'); POL: Jedno zimne piwko i dusza wróci na swoje miejsce ('One cold beer and the soul will be back in its place'); CRO: treba mi tvoj oproštaj da mi duša bude na mjestu ('I need your forgiveness so that my soul can go back to its place').

Another very general conception of a soul is that of a SOUL itself being a CONTAINER. This conception is bound with metaphor PROTECTION IS CONTAINMENT, as described in Sweetser (2004:30), who points out that the important purpose of physical containment is to protect contents. As she argues, the experiential basis for this metaphorical mapping is the fact that our vital organs are protected by being contained within our body by flesh and bones, but also our everyday experience of putting something fragile in a box, or store something in a drawer, or locking a door, etc. There are special cases of this metaphor where SOUL IS A CONTAINER FOR EMOTIONS, and given the fact that the exposure of emotions in Western cultures is seen as vulnerability, the need to *close* those emotions in the *container* and make them *invisible* to others is logical. This concept involves primary metaphor KNOWING IS SEEING as well; that is why the soul container may be OPENED or CLOSED, or LIGHT or DARK in our examples. As Sweetser states, "in the understanding of Self, we see our strongest emotions as a source of vulnerability; anyone who affects them has an important (and potentially dangerous) effect on our whole psyche. We therefore try to allow only trusted people to affect these essential feelings, hoping they will not 'hurt' us psychologically." This need to control and hide emotions is not universal; it is typical of (modern) Western cultures. Aspects of control are very well described in Kövecses (2003). Sweetser's model of SELF as a CONTAINER in the above described sense includes these metaphors: ESSENTIAL, EMOTIONAL SELF IS THE (FRAGILE, VULNERABLE) CONTENTS OF A CONTAINER; PROTECTIVE SOCIAL RESERVE IS A CONTAINER; TRUSTED FRIENDS ARE PEOPLE ALOWED TO OPEN THE CONTAINER; FEARED EMOTIONAL HURT IS FEARED DAMAGE OR LOSS OF CONTAINER'S CONTENTS. All of the latter are relevant for the CONTAINER metaphorical concept of SOUL in Slavic languages.

Given that SOUL is conceptualized as a CONTAINER, it is not surprising that it can contain other souls as well, in some cases. This concept is used to describe a very close relationship, usually a love relationship. This conceptual metaphor is manifested in all Slavic languages in question. The concept of one soul being contained within another has the inference of not only protection, but also of tight closeness:

SOUL IS A CONTAINER
RUS: Кинó— э́то здóрово, но настоя́щая любóвь живёт не в кинó, а в душé. ('Movies are great, however real love doesn't live in a movie, but in the soul'); POL: a tu taki psalm zaczyna wdzierać się w dusze jak robak. ('and here such psalm begins to penetrate the soul like a worm'); CRO: Ljubica rad tog poljubca nije samo ćutila njeki osobiti stid u duši svojoj, nego je također od tog časa sasvim drugu privrženost i nagnuće osjećala prama Petru ('Ljubica not only felt some special kind of shame in her soul but also, from that moment, she felt some other kind of attachment and affection towards Petar.');

SOUL IS A CONTAINER + SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) + SOUL IS A CONTAINER FOR EMOTIONS + EMOTIONS ARE FLUID CONTENT OF A CONTAINER = **SOUL OF AN EMOTIONAL PERSON IS A FULL CONTAINER; SOUL OF AN EMOTIONLESS PERSON IS AN EMPTY CONTAINER**
CRO: Njihova je duša prazna ko smijeh bludnica, a smijeh beživotan ko slovo zakona ('Their soul is empty like a prostitute's laugh, and their laughing is lifeless like the letter of the law'); POL: pożywamy Chrystusa, a dusza napełnia się łaską i otrzymuje zadatek przyszłej chwały ('we receive Christ, and the soul is filled with grace and receives a pledge of future glory');

SOUL IS A CONTAINER FOR EMOTIONS + KNOWING IS SEEING = **A VISIBLE SOUL'S CONTENT IS IN THE OPEN CONTAINER; AN INVISIBLE SOUL'S CONTENT IS IN THE CLOSED CONTAINER**
CRO: njena duša se otvara za prvi put; njena put je još svježa, ('Her soul is opening itself for the first time, her skin is still fresh'); duša im je oboma bila zatvorena za onoga drugog ('both their souls were closed one for another'); RUS: Вы общительны — открыты навстречу миру и людям, у вас "душа нараспашку" ('You're so sociable, open to the world and people, your soul is always unbuttoned');

AN INVISIBLE SOUL'S CONTENT IS IN THE DARK CONTAINER
RUS: В общем, не знаю, чужая душа, как известно - потёмки. ('In short, I don't know it, as someone else's soul is darkness'); CRO: Možda ću jednom shvatiti mračnu noć tvoje duše ('I might one day be able to understand dark night of your soul').

4 Soul Is A Person metaphor – Personification

Personification is one the most pervasive conceptual metaphors in general, and that is the case with the concept of SOUL in Slavic languages as well. General ontological SOUL IS A PERSON metaphor has many special cases in which the personified soul has a great variety of human properties which, taken together, form an interesting image. Pervasively in the corpora the SOUL IS A PERSON conceptual metaphor is bound with SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY), which reflects in linguistic metaphor SOUL IS A PERSON THAT FEELS: Fear, Shame, Pain, Sorrow, Joy, Passion, Desire, Lust, etc. Uncommonly, the SOUL IS A PERSON conceptual metaphor is bound with SOUL IS THE LOCUS OF REASON which gives the linguistic metaphor SOUL IS A PERSON THAT THINKS, UNDERSTANDS, REMEMBERS, etc. Sometimes personification is bound with SOUL IS THE LOCUS OF MORALITY. These are the examples:

SOUL IS A PERSON + SOUL IS THE LOCUS OF REASON = **SOUL IS A PERSON THAT REASONS, THINKS, UNDERSTANDS, REMEBERS**
RUS: Мужская ... душа помнила о тайности. Она, душа моя, ждала ублаготворения и в то же время пужалась его. (‘This man’s soul remembered those secrets and was waiting for gratification, but at the same time it was afraid of it.’); POL: dusza nasza rozróżnia wyobrażenie samej siebie od wyobrażeń innych przedmiotów (‘Our soul distinguishes the idea of itself from the idea of images of other objects’); Dzieła Twoje są przedziwne, i wie o tym dusza moja (‘your works are wonderful, and my soul knows that’); CRO: ova moja duša je: mislila, osjećala ('This soul of mine was thinking and feeling');

SOUL IS A PERSON + SOUL IS THE LOCUS OF SUBJECTIVE EXPERIENCE (EMOTIONALITY) = **SOUL IS A PERSON THAT FEELS: FEAR/SHAME/SORROW/JOY/LUST**
CRO: Duša mi osjeća strah (‘My soul feels fear’); RUS: И христианская её душа, несмотря на роскошь отдыха, испытывала лёгкий стыд. (‘And her Christian soul felt some slight shame, despite the luxurious rest she was having’.); POL: Smutna jest moja dusza aż do śmierci; zostańcie tu i czuwajcie (‘My soul is sorrowful until death comes: stay here and watch.’); RUS: Особенно ежели день солнечный — душа поет от радости! (‘Especially when the day is sunny, the soul sings with joy’); CRO: Duša mi je tako vesela (‘My soul is so happy’); duša ti se smije (‘Your soul is laughing’);
Sva duša izgarala joj od želje za dragim (‘All her soul was burning with desire for her dear love’); Često, prečesto nije se mogao, dakako, nadjačati da mu krv ne usplamti i da mu sva duša i sve tijelo silno ne požudi posjed krasnoga mladoga stvora što ga je gledao (‘Often, very often he could not prevent his blood from burning and his whole soul from strongly desiring to posses this beautiful, young creature he was looking at’);

SOUL IS A PERSON + SOUL IS THE LOCUS OF MORALITY = **SOUL IS A PERSON THAT IS MORAL/IMMORAL**
CRO: Oprosti mojoj griješnoj duši (‘Forgive my sinful soul’); Ta se opaka ropska duša drznu igrati se kralja. (‘That evil, servile soul dared to impersonate a King’); RUS: Ведь у него не твоя подлая душа, чтобы за деньги продать любовь свою! (‘Indeed, his soul is not evil as yours is, so that he could sell his love for money’).

5 Soul metonymies

Conceptual metonymy is a cognitive process in which one conceptual entity, the vehicle, provides mental access to another conceptual entity, the target, within the same domain, or cognitive model.[10] Within the cognitive model of a Person, which consists of a Body and a Soul (and possibly some other properties as well), the Soul often serves as the vehicle that provides mental access to the Person as a whole. This PARS PRO TOTO (part-for-whole) metonymic concept is very basic and common, and it is a part of the ordinary way we think and act as well as talk (Lakoff and Johnson 1980:37). Not surprisingly, its manifistations appeared very often in the corpora used in our research. Here are some examples:

[10] For more about conceptual metonymy, see for example in Lakoff and Johnosn (1980); Kövecses (2010), Lakoff (1987), Lakoff and Turner (1989), Langacker (1991, 1993), Gibbs (1994) etc.

PARS PRO TOTO
SOUL FOR THE PERSON
CRO: Niti duša se nigdě neukaza. ('There was not a single soul there'); Vode mi dajte ako je koja duša ovdje. ('If some soul is here, please bring me some water'); POL: Kolejna dusza zgnieciona pięścią alkoholu ('Another soul got crushed by alcohol').

As was the case with the examples illustrating conceptual metaphors, in the linguistic expressions of the conceptual metonymy the metaphor SOUL IS THE LOCUS OF EMOTIONALITY plays a crucial role, and in this case SOUL IS THE LOCUS OF MORALITY is important as well, for PARS PRO TOTO metonymy is often bound with one of these metaphors. As a result of the former binding we get the linguistic realization SOUL FOR THE EMOTIONAL PERSON, and the result of the latter metaphor is SOUL FOR THE MORAL PERSON.

SOUL FOR THE PERSON metonymy + SOUL IS THE LOCUS OF MORALITY metaphor= **SOUL FOR THE MORAL PERSON**
CRO: Kata je inače dobra duša; ali sada izpod tvoga dostojanstva. ('Kata is usually a kind soul, but now below her dignity'); No vi ste posve nevina duša. ('You are a completely innocent soul');
SOUL FOR THE PERSON metonymy + SOUL IS THE LOCUS OF EMOTIONALITY metaphor = **SOUL FOR THE EMOTIONAL PERSON**
POL: tyś jedna dusza, co odczuła ojcowskie strapienie i ból nie do stłumienia. ('you are the only soul, that felt his father's heartache and irrepressable pain'); RUS: Вы не знаете моего Сему. Это же такая душа! Нежный, чувствительный… ('You don't know my son Sema. He is such a good soul. Affectionate, sentimental...').

6 Conclusion

The analysis showed that the cultural model of *dusha* is indeed very similar in Russian, Polish and Croatian, and that it integrates bodily and cultural (especially religious) experiences.

In Russian, Croatian and Polish several very general conceptual metaphors are crucial for conceptualizing soul: the Disemebodied Soul metaphor, SOUL IS THE LOCUS OF EMOTIONALITY, Reification (with Posession metaphor and Container Image schema) and Personification. The Disembodied Soul Metaphor and The SOUL AS THE LOCUS OF SUBJECTIVE EXPERIENCE (emotionality) metaphors are the most important and pervasive in the conceptualization of SOUL in Slavic languages in question and we can infer that the "Slavic soul" is primarily *the locus of emotionality*.

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Perceiving pitch accent in the absence of F0

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1 Introduction

In Tokyo Japanese[1], the suprasegmental property of fundamental frequency (F0) is used to distinguish words in addition to segmental information. For example, the phoneme sequence of /ame/ means 'rain' when its first syllable is on a high pitch and its second syllable is on a low pitch.[2] By contrast, it means 'candy' when its first syllable is on a low pitch and its second syllable is on a high pitch. When there is a pitch fall as observed in from the end of the first syllable into the second syllable of 'ame,' the syllable immediately preceding the fall is said to have pitch accent. While studies to date have shown that the F0 is the most dominant cue for pitch accent, it is not certain if secondary cues exist. Past production studies measured duration, and properties related to amplitude and devoicing (e.g. Beckman 1986, Kaiki, Takeda, and Sagisaka 1992, Lovins 1976, Weitzman 1970, Yoshida 2002), but their results as a whole do not present a consistent picture as to whether secondary cues exist. Perception studies that used naturally produced whispered speech suggest that listeners can perceive accent information even when words are produced without vocal fold vibration. Sugito, Higashiyama, Sakakura, and Takahashi (1991) found that listeners were able to identify the words produced in whisper with roughly 90 percent accuracy. In a similar vein, Liu and Samuel (2004) found that monosyllabic Mandarin words produced in whisper were identified fairly accurately. However, this study also found that when Mandarin speakers spoke the words in whisper, they had a tendency to enhance secondary cues compared to when they produced the words normally. Liu and Samuel's findings are informative when one tries to examine secondary cues to pitch accent. While most studies that examined secondary prosodic cues dealt with Indo-European languages that have stress-accent, Liu and Samuel's study showed that secondary cues can exist in a tone language as well. In addition, their findings show that the properties that are present in whispered speech are not necessarily present in speech produced normally. In other words, one cannot examine whispered speech to determine the existence of secondary cues in normal speech. For this reason, the present

[1] Tokyo Japanese is a variety of Japanese which is often associated with standard Japanese. Since this study deals with only Tokyo Japanese, it will be simply referred to as Japanese hereafter.

[2] Although F0 and pitch are not the same, the terms F0 and pitch will be used interchangeably in this paper.

study investigates secondary cues to pitch accent by using speech stimuli whose F0 had been artificially removed from words produced normally and replaced by white noise.

2 Method

2.1 Stimuli

The target words were minimal pairs of final-accented words and unaccented words that differ only in accent, such as /haná/, which means 'flower' and /hana/, which means 'nose.'[3] Two words from a minimal pair have the same phoneme sequence and the pitch pattern of low-high. The only difference between them is that, at least at the phonological level, while final-accented words have accent on its final syllable, unaccented words have no accent. Using an electronic dictionary (Amano & Kondo, 1999), minimal pairs analogous to <hana>[4] were thoroughly searched, resulting in 14 minimal pairs.[5] See Appendix for a complete list of words.

The original speech stimuli were produced by a female speaker who grew up in the Tokyo area and whose parents were also from the area. The target words were spoken in the following carrier sentence:

(1)	*Kare*	*wa*	___ *ga*	*ii.*
	he	TOIPC	NOMINATIVE	good

"he wants ___ ." or "he has a sensitive ___ ."

The sentence can have either of the two meanings indicated in (1) above depending on the meaning of the target word embedded in the sentence.

Twenty-eight words were naturally produced twice in the carrier sentence, which were used as the natural speech stimuli in the perception experiment. They were recorded to disk on a computer at the sampling rate of 44.1 kHz with 16-bit resolution and then normalized for peak amplitude. Based on these natural speech stimuli, "whispered"[6] speech stimuli were generated by running a script on the Praat speech analysis software (Boersma & Weenink, 2011). The default parameter settings for LPC analysis-resynthesis were used with the window length of 25 ms, and the time step of 5 ms. The periodicity of the F0 in the

[3]The symbol " ´ " indicates that the syllable is accented.

[4]Angled brackets "< >" are used here to refer to both of the words from a minimal pair which has the same phoneme sequence indicated between them.

[5]Originally, 20 minimal pairs were found by searching disyllabic minimal pairs that had a relatively high familiarity rating in (Amano & Kondo, 1999). However, six pairs were removed from the list because they are usually used as a part of compound words and do not occur by themselves.

[6]The term "whispered" is in double quotation marks here because the stimuli used in this study are not real whispered speech produced by a human. Rather, as already explained, they were whisper-like stimuli that were created artificially by replacing the F0 in natural speech by random noise. This nature of stimuli should be emphasized for reasons discussed in Introduction. However, for the sake of simplicity, the term will be used without quotation marks hereafter.

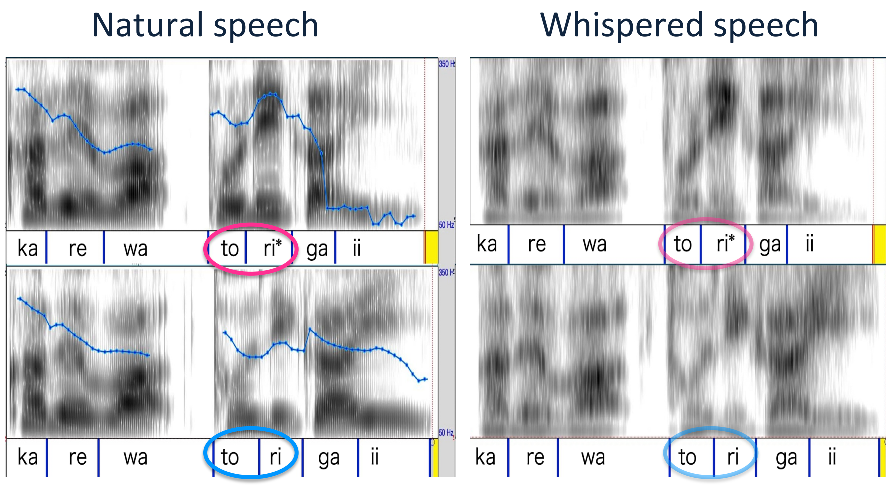

Figure 1: Spectrograms of the final-accented word /torí/(an upper panel) and the unaccented word /tori/(a lower panel) produced in the carrier sentence. In the annotation below the spectrograms, the target words are circled and accented syllables are marked with asterisks. The circles in pink indicate accented words and those in blue indicate unaccented words.

original natural speech was removed and replaced with white noise. Figure 1 shows snapshots of spectrograms on Praat. The two snapshots on the left are original normal utterances of the final-accented word /torí/ 'the last person to perform on the stage'(an upper panel) and the unaccented word /tori/ 'bird'(a lower panel) spoken in the carrier sentence. The two snapshots on the right are their whispered versions. As seen in the figure, while blue lines with dots that track F0 can be confirmed in the original speech, they are not present in their whispered counterparts.

2.2 Listeners

The listeners were twenty-two native speakers of Tokyo Japanese who were between 18 and 21 years old. They were recruited at Keio University in Yokohama. The participants grew up in the Tokyo area where Tokyo Japanese is spoken. In addition, both of their parents were also from the Tokyo area. None of them reported any history of a hearing or speaking disorder. The experiment lasted about for an hour for each listener.

2.3 Procedure

Each listener was run individually in a quiet room. The stimuli were presented using the SuperLab stimulus presentation software on a MacBook Pro, to which a Cedrus response pad RB-730 and SONY MDR-CD900ST headphones were connected. The stimuli were played at a comfortable listening level.

Before the actual trials started, the participants were shown flash cards on which the target words that would be presented to them were written. The words were written in Chinese characters, in *hiragana*, a Japanese syllabary[7], or in a combination of the two, depending on how they were commonly written in Japanese. Even though all the words were familiar to Japanese speakers, the subjects went through them, as many Chinese characters can be read in more than one way. In order for the target words to make minimal pairs, they had to be read in a certain way. In the actual experimental trials, the listeners' task was to identify the words they heard from the two alternatives provided (forced choice). At each trial, two alternatives, a final-accented word and its unaccented counterpart, appeared on the computer screen. One alternative appeared on the right side of the screen and the other appeared on the left side of the screen. After the presentation of an audio stimulus, the listeners pressed a button that corresponded to the word they think they heard. When a subject failed to respond within four seconds, the trial was treated as a missed trial and the next stimulus was presented.

Each listener received eight blocks of natural speech stimuli and eight blocks of whispered speech stimuli. Half the listeners heard eight blocks of natural speech first and then heard eight blocks of whispered speech. The remaining half heard eight blocks of whispered speech first and then heard eight blocks of natural speech. One block consisted of 28 words (14 pairs) of either natural speech or whispered speech presented in a random order. In presenting two alternatives on the computer screen, two versions were created. For one version, a final-accented word appeared on the right side of the screen and its unaccented counterpart appeared on the left. The sides on which the two alternatives appeared on the screen were switched for the other version. In addition, in order to avoid any idiosyncratic properties of a given stimulus token to affect the listeners' judgment, two repetitions of the same word were used. Since two tokens of a word were presented twice with two versions of presenting the alternatives ($2\times2\times2$), the listeners heard a total of eight tokens for each word.

3 Results and discussion

The data for one listener were omitted from the analysis. It turned out after the data were collected that neither of his parents was from the Tokyo area and the listener himself spent a few years of his childhood in an area where a variety other than Tokyo Japanese was spoken.

[7]Strictly speaking, not all *hiragana* characters correspond to one syllable. However, it will be sufficient to say so for the purpose of the present study.

Each listener heard a total of 448 trials (28 words$\times$2 tokens$\times$4 repetitions=224 tokens each of both natural and whispered speech). Out of 9408 trials (448 trials$\times$21 listeners), 25 trials had no responses, of which eight were from natural speech stimuli and 17 were from whispered speech. In terms of percentage, the number of missed trials accounted for only 0.3 percent of all trials presented. In addition, these missed trials did not concentrate on certain words or listeners. Based on the responses of 9383 trials, the mean accuracy was computed for each pair of words separately for natural speech and whispered speech. The listeners' accuracy of word identification for natural speech provides an informative baseline in interpreting their performance on the whispered speech stimuli. As Table 1 shows, the listeners' accuracy exceeded 90 percent for all pairs, except <moti>, with which the accuracy was below 60 percent. Since it is difficult to interpret the whispered stimuli data when the accuracy is so low for the natural speech stimuli, <moti> was be left out of further analysis. For the rest of the words, final-accented words and unaccented words were identified fairly well for natural speech with the mean accuracy of 94.4 percent. In fact, many of the pairs were over 95 percent correct, indicating that the final-accented words and unaccented words were quite intelligible, even though they differ only in accent. Not surprisingly, whispered speech had much lower accuracy with the mean of 64.8 percent. However, the fact that the accuracy was over 50 percent for all the pairs suggests that the listeners' performance was not at random. In other words, there was some acoustic information in the whispered stimuli that the listeners utilized as cues to pitch accent.

Once the accuracy was computed for each word in the whispered speech, a planned one-sample t-test was conducted to determine if final-accented and unaccented words were identified reliably better than chance. In order to conduct the analysis, first, the mean accuracy was calculated for the final-accented words and unaccented words for each listener as shown in Table 2. Then, the mean accuracy for each pair of words was compared against the chance level of 50 percent. The t-test found a significant result ($t(20) = 7.58$, $p < 0.001$), indicating that the listeners' performance on whispered speech was reliably above chance.[8] As explained earlier, the whispered stimuli used in the present study were created artificially by removing only the periodicity in the original natural speech. Since the remaining acoustic properties were preserved, the result strongly suggests that some acoustic properties other than the F0 were present in the stimuli, which enabled the listeners to distinguish final-accented and unaccented words.

The data collected were further assessed with a repeated measures ANOVA. The factors examined were accent (accented words *vs.* unaccented words), speech style (natural speech *vs.* whispered speech), and order (whether the listeners heard natural speech first or whispered speech first). The first two factors were within-subjects factors and the third was a between-subjects factor. As expected, the analysis revealed a significant main effect of speech style, F(1,19)

[8]When a t-test was conducted including the pair <moti>, the result was still significant ($t(20) = 7.47$, $p < 0.001$).

Table 1: Correct responses (%) of each pair heard in natural and whispered speech (standard errors in parentheses)

Words	Natural speech	Whispered speech
<haji>	95.7 (1.85)	64.1 (2.57)
<hana>	96.4 (1.59)	66.4 (2.84)
<hane>	99.1 (0.65)	65.0 (3.59)
<hasi>	94.0 (1.90)	62.5 (3.05)
<hati>	98.2 (0.76)	54.1 (2.65)
<mame>	97.4 (1.02)	62.9 (2.74)
<moti>	58.4 (7.80)	50.4 (4.04)
<nami>	89.6 (3.88)	66.3 (4.41)
<nori>	95.5 (1.37)	69.3 (3.11)
<osu>	97.0 (1.59)	65.5 (3.41)
<sita>	94.6 (1.69)	66.8 (2.77)
<tama>	92.2 (2.55)	64.1 (4.75)
<tori>	96.3 (1.26)	77.3 (3.02)
<tume>	95.1 (1.92)	59.3 (2.40)

Table 2: Accuracy (%) of final-accented and unaccented words in whispered speech by each listener (standard error in parentheses)

	Final-accented	Unaccented		Final-accented	Unaccented
1	40.4 (4.93)	76.5 (5.68)	11	55.8 (7.83)	43.5 (7.15)
2	75.0 (4.93)	47.6 (4.67)	12	83.7 (3.58)	31.7 (6.88)
3	57.3 (7.65)	75.7 (4.79)	13	59.6 (8.39)	66.0 (8.54)
4	78.8 (7.67)	78.8 (7.41)	14	53.5 (5.18)	62.5 (6.00)
5	72.1 (4.51)	56.7 (6.58)	15	70.2 (5.40)	71.6 (7.11)
6	62.5 (6.17)	80.8 (5.59)	16	54.8 (5.21)	65.4 (4.93)
7	87.5 (4.90)	64.4 (8.11)	17	56.7 (7.02)	60.6 (4.87)
8	57.7 (6.87)	84.6 (6.03)	18	51.9 (5.81)	63.5 (5.91)
9	42.3 (7.69)	68.0 (7.44)	19	60.6 (4.66)	70.2 (5.40)
10	51.9 (7.05)	97.1 (1.52)	20	84.6 (4.93)	82.7 (5.01)
			21	51.5 (9.33)	59.8 (7.01)

= 462.8, $p < 0.001$, indicating that subjects were more accurate with natural speech than whispered speech. The interaction between order and speech style was also reliable, $F(1{,}19) = 8.5$, $p < 0.01$. The other factors produced no main effects or interactions. There was no main effect of either accent or order, $F(1{,}19) = 2.4$, $p > 0.10$; $F(1{,}19) = 0.4$, $p > 0.10$ respectively, and neither were there significant interactions between accent and order or accent and speech style, $F(1{,}19) = 1.3$, $p > 0.10$; $F(1{,}19) < 0.1$, $p > 0.10$ respectively. There was no three-way interaction of accent, order and speech style either, $F(1{,}19) = 1.2$, $p > 0.10$.[9] The effect of speech style can be seen in Figure 2, where the accuracy was close to 100 percent for natural speech (the two boxes on the left side) while the accuracy was clearly lower for whispered speech (the two boxed on the right side).

Because the interaction between order and speech style was reliable, two-way repeated measures ANOVAs were conducted separately for the listeners who heard natural speech first and those who heard whispered speech first. The factors analyzed were speech style (natural speech *vs.* whispered speech) and accent (final-accented *vs.* unaccented words). For the group of listeners who heard natural speech first (the natural speech group), there was a significant main effect of speech style, $F\ (1,\ 9) = 300.4$, $p < 0.001$, while the effect of accent was not significant, $F\ (1,\ 9) = 2.5$, $p > 0.10$. There was no interaction between speech style and accent, $F\ (1,\ 9) = 0.77$, $p > 0.10$. The results were similar for the group of listeners who heard whispered speech first (the whispered speech group). While the main effect of speech style was significant, $F\ (1,\ 10) = 218.6$, $p < 0.001$, the effect of accent was not significant, $F\ (1,\ 10) = 0.20$, $p > 0.1$. The interaction of speech style and accent was not significant, $F\ (1,\ 10) = 0.36$, $p > 0.1$. The analyses of the natural speech group and the whispered speech group indicate that, within each group, the type of stimuli (natural speech or whispered speech) was the only factor that had a consistent effect on the listeners' performance. As already mentioned, word identification was much better for natural speech than whispered speech. In addition, the listeners' performance appears to have varied to a greater extent for whispered speech than natural speech. In Figure 2, the data values are more widely distributed for whispered speech than for natural speech. It suggests that, in the absence of the primary cue to pitch accent, some listeners were better at picking up secondary cues to pitch accent than others.

Since accent had no main effect or interaction, the effects of order and speech style were further assessed with a repeated measures ANOVA with the factor of accent collapsed. The analysis found a significant main effect of speech style

[9] Because the set of words used in this study are a unique and exhaustive set of words that met the criteria discussed in the stimuli section, items analysis is not necessary. However, a three-way ANOVA was performed with words as repeated measures only for this analysis in order to ensure that the results of two types of analyses do not diverge substantially. The results were similar, except, in addition to significant main effect of speech style and interaction of speech style and order ($F(1{,}12) = 316.7$, $p < 0.001$; $F(1{,}19) = 24.9$, $p < 0.001$ respectively), which were also observed in the subjects analysis, the main effect of order and the three-way interaction of accent, order and speech style also became significant ($F(1{,}12) = 5.9$, $p < 0.05$; $F(1{,}12) = 8.9$, $p < 0.05$ respectively).

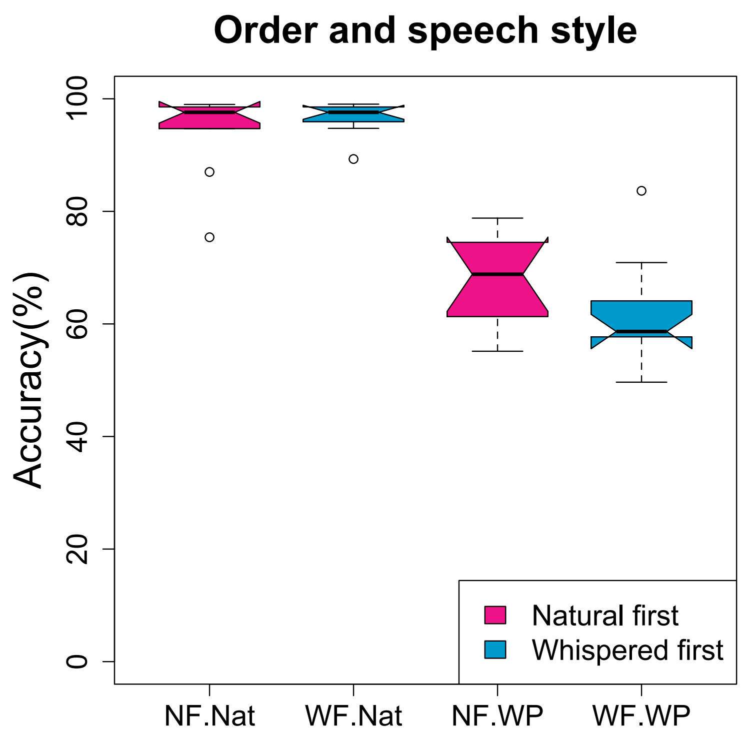

Figure 2: Accuracy for listeners who heard natural speech first and for listeners who heard whispered speech first. In the horizontal axis, “Nat” stands for natural speech and “WP” whispered speech.

and a significant interaction of order and speech style, $F(1,19) = 462.8$, $p < 0.001$; $F(1,19) = 8.5$, $p < 0.01$, respectively. The main effect of order did not reach significance, $F(1,19) = 0.40$, $p > 0.10$. The results indicate that listeners' performance was affected not only by the type of speech stimuli but also by whether they heard natural speech first or whispered speech first. Regardless of whether the listeners heard natural speech or whispered speech first, both speech groups seem to have taken advantage of the experience of being exposed to the first type of stimuli, whichever that may have been, when they heard the second type, although the extent to which they exploited the experience of perceiving the first type of stimuli seems to vary between the groups. Admittedly, the difference is very small, but the whispered speech group did slightly better on natural speech than the natural speech group. Similarly, the natural speech group did better on whispered speech than the whispered speech group. The whispered speech group did not show much improvement on natural speech probably because of a ceiling effect. On the other hand, an exposure to the natural speech stimuli seemed to have helped the natural speech group perform their task with the whispered speech stimuli.

4 Conclusions

The present study aimed at examining whether or not acoustic properties other than the F0 exist in normal speech as secondary cues to Japanese pitch accent. The method adopted in the study ensured that the only difference between natural and whispered speech would be the presence or absence of periodicity in F0. The results of whispered speech found that the listeners were able to distinguish final-accented and unaccented words reliably better than chance, which supports the evidence of secondary cues to Japanese pitch accent. It also suggests that previous studies were not able to identify secondary cues because they manifest themselves in forms other than duration, devoicing, or intensity. In addition, further analysis found that the listeners' performance with whispered speech was better when they were first exposed to natural speech than when the first stimuli they received was whispered speech. Further research is needed to understand exactly what aspects of hearing natural speech facilitated the listeners to perceive pitch accent in whispered speech. In addition, acoustic analysis needs to be done in order to determine what acoustic property in the whispered stimuli served as cues for the listeners to distinguish final-accented and unaccented words.

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Appendix

		Final-accented	**Unaccented**
1.	/haji/	恥 'shame'	端 'edge'
2.	/hana/	花 'flower'	鼻 'nose'
3.	/hane/	跳ね 'jump'	羽 'feather'
4.	/hasi/	橋 'bridge'	端 'edge'
5.	/hati/	八 'eight'	蜂 'bee'
6.	/mame/	豆 'bean'	まめ 'hardworking'
7.	/moti/	持ち 'durability'	餅 'rice cake'
8.	/nami/	波 'wave'	並 'mediocre'
9.	/nori/	海苔 'seaweed'	乗り 'ride'
10.	/osu/	雄 'male'	お酢 'vinegar'
11.	/sita/	舌 'tongue'	下 'below'
12.	/tama/	玉 'ball'	たま 'infrequent'
13.	/tori/	取り 'share'	鳥 'bird'
14.	/tume/	詰め 'stuffing'	爪 'nail'

Precisely speaking, the symbol "r" is a tap "ɾ". However, "r" is used instead in this paper.

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Epistemicity and Deixis: Perspectives from Central Alaskan Yup'ik

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1. Introduction

The demonstrative system of Eskimo languages is known to show one of the most complicated systems in deictic reference among languages worldwide (Fotescue 1988, Rukeyzer 2005). The aim of this paper is, employing Central Alaskan Yup'ik (an Eskimo language) as an example, to characterize one vital portion of the complicated system from the perspective of Cognitive Linguistics (Bybee 2010, Croft 2002, Langacker 1991). As outlined in the next section, Central Alaskan Yup'ik (CAY) has some 30 different sets of demonstratives, and they constitute a single formal category (Jacobson 1984a).[1] In his staggering research on spatial reference, Levinson (1996, 2003) employs a feature of angular specification as a primary criterion for his hierarchical classification of spatial expression, and the demonstratives (i.e. deictic expressions) are grouped as spatial expressions working in the non-coordinate system (i.e. no angle specified); on the other hand, spatial concepts and their forms such as *in front of* or *north of* are classified as that functioning in the coordinate system (i.e. angle specified). Rukeyzer (2005) suggests that Levinson's framework on spatial typology may not work for the Eskimo demonstratives because they indicate some information on angular specification such as *up* or *down* as well as no inherent information on orientations such as *this* or *that*. For this reason, Rukeyzer (2005) proposes an alternative classification for the CAY demonstratives that does not rely on angular properties. While Rukeyzer's analysis has advanced the characterization of each Yup'ik demonstrative, however, it is still open to the questions of what characteristics Eskimo demonstratives share with those in other languages and of how unique they are when compared to those in other languages.

This article suggests that the property of angular specification that works well

1 All the data and basic observations on CAY are courtesy of Caan Toopetlook. I would also like to acknowledge the extensive works of Steven Jacobson as the primary source of my knowledge on CAY. The orthography of CAY employed in this article follows Jacobson (1995).

for typological descriptions of spatial expressions is still crucial for Eskimo spatial expressions, but the property makes a difference in Eskimo languages when it is applied as demonstrating gradience rather than dichotomy as shown in Levinson (1996, 2003). We argue that when the angular specification as a gradient concept is extended to the description of CAY demonstratives, it would illuminate a unique character of Eskimo demonstratives: the functions of Eskimo demonstratives are semantically stratified in terms of the degree of angular specification between degenerate cases like English *this* or *that* that do not constitute a frame of reference and highly specified cases that are close to typologically prototypical coordinate spatial expressions like *north of* or *inside of*. The gradience observed is theoretically characterized (i) with a semantic map (Croft 2001) that shows well how the demonstratives are stratified, and (ii) with subjectification (Langacker 1990), which motivates the continuation between spatial expressions prototypically described in the coordinate system and those in the non-coordinate system.

In what follows, basic features of the CAY demonstrative are briefly outlined in section 2, and the properties crucial to the discussion on angular specification are exemplified in section 3 with the review of Levinson's (2003) spatial typology. Furthermore, in section 4, one vital portion of demonstrative usage is characterized with the property of angular specification that illuminates a stratified relationship between the CAY demonstratives. Section 5 provides theoretical motivations for the analysis of section 4. Section 6 is for concluding remarks.

2. Basic Characteristics of CAY demonstratives

Jacobson (1984a, 1995:Ch.6) provides an excellent classification on how the CAY demonstratives are distributed in terms of spatial reference, employing the three parameters of (i) directivity, (ii) indicativity, and (iii) accessibility; this tripartite classification is now a standard tool for describing Eskimo demonstrative systems (Fortescue 1988). Table 1 below is a summary of the classification. The vertical column on the left indicates the classifications with the parameter of directivity, and the horizontal law is for the classifications of indicability, and the information on accessibility is attached under each category of directivity.

	extended	restricted	obscured
(1) **Close to Speaker**			
(a) More accessible (near speaker)	man'a	una	imna
(b) Less accessible (near listener)	tamana	tauna	
(2) **Up from speaker**			
(a) More accessible (up the slope, same plane)	paugna	pingna	pamna
(b) Less accessible (up above, further plane)	pagna	pikna	pakemna
(3) **Away from speaker on level**			
(a) More accessible (over)	augna	ingna	amna
(b) Less accessible (across barrier)	agna	ikna	akemna
(4) **Down from speaker**			
(a) More accessible (down below, down the slope)	un'a	kan'a	camna
(b) Less accessible (toward exit, downriver)	unegna	ugna	cakemna
(5) **Inside/outside from speaker**			
(a) More accessible (inside)	qaugna	kiugna	qamna
(b) Less accessible (outside)	qagna	keggna	qakemna

(made based on Jacobsen (1984b:654, 1995:76) and Fortescue (1988:25))

7

Table 1. Central Alaskan Yup'ik's Demonstrative System
(3rd person singular, absolute case form employed)

To get a feel for how demonstratives work, let us consider examples from (2b) in the table. Suppose that a bird is up on a branch of a tree and you can see it, and you tell someone with you. In that case, you would say, "Atam (look!) *pikna* (that) yaqulek (bird)." The reason why *pikna* is chosen among the three demonstratives in the law is because the bird is not moving and is perceived in a single glance as a static object: it is regarded as restricted. If the bird is flying above you, you would employ the "extended" counterpart *pagna* rather than *pikna*: "Atam (look!) *pagna* (that) yaqulek (bird)," because the bird is moving, and you need a couple of glances to capture the trajectory. Moreover, if you can only hear a bird call from up in the tree, (i.e. you cannot see it), you would choose the "obscure" counterpart, and say "Atam (listen!) *pakemna* (that) yaqulek (bird)." One essential difference between (a) and (b) laws (i.e. accessibility) lies in whether or not you can reach the referent. In these cases, you cannot reach the bird or walk to it, and you are required to choose a demonstrative from (2b) rather than from (2a). Finally, the reason why (2) is chosen from the five categories (1) to (5) is because the speaker's neck is in an up position rather than just because the target is above the ground. For example, if the tree is further away and you could see the bird on the level without changing your neck position, you may employ a different demonstrative, *ingna* from (3a). By the same token, if the bird is sitting on the ground and it is close to you, you would describe it as *kan'a* (that) *yaqulek* (bird) from (4a), because you are now looking down. However, if it is away and you can see it with your normal neck position, the bird is described as *ingna yaqulek*.

3. Levinson's (2003) Typology of Spatial Expressions and the CAY Demonstrative System

Now, while reviewing Levinson's (1996, 2003) typology on spatial expressions, let us further consider the characteristics of the CAY demonstrative system and discuss why the property of angular specification as a gradient concept is preferable to that of dichotomy. As mentioned in section 1, Levinson (1996, 2003) puts an emphasis on the parameter of angular specification for the typological classification of spatial expressions: whether or not an expression invokes a coordinate system when it is used. Examples (6) and (7) represent typical examples of spatial expressions in the non-coordinate system and in the coordinate system, respectively, and Levinson's accounts of the two groupings follow each set of the examples. Figure 1 below is an auxiliary diagram for (7) that is depicted following a Cognitive Grammar format (Langacker 1991), and the dotted arrow therein indicates that the speaker and the ground object for reference can be coincidental.

(6) Non-coordinate System Employed (angle not specified):
- a. The orange is here. (deictic)
- b. The orange is in the bowl. (contiguity)
- c. John is at the office. (named location)

> [I]t is important to appreciate that deixis itself does not constitute a frame of reference. This is because deictic specifications of location merely use the deictic centre as a special kind of ground, and they do not themselves contribute to angular specification of the kind that constitute coordinate systems. (Levinson 2003:71)

(7) Coordinate System Employed (angle specified):
- a. The statue by Giambologna is in front of the cathedral. (intrinsic)
- b. The orange is to the left of the bowl. (relative)
- c. Amsterdam is north of Utrecht. (absolute)

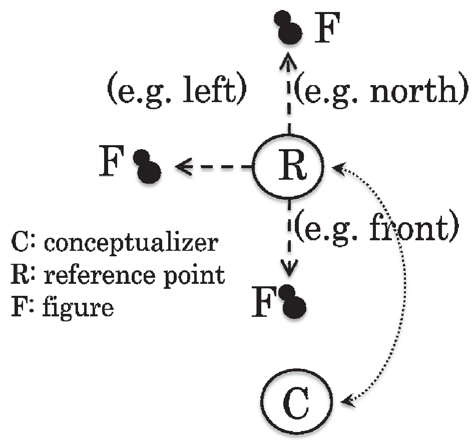

Figure 1. [The strategy is] to choose a prominent ground object at some remove from the figure or object to be located, and then to specify a search-domain from the ground by specifying an angle from that landmark,… (Levinson 1996:356)

Levinson's bilateral distinction for spatial expressions that results from the examinations of the spatial expressions of various languages highlights one unique characteristic of the CAY demonstrative: while most of the CAY demonstratives may show some angular specification, they are hardly employed for such cases of intrinsic, relative or absolute reference as in (7). In other words, the landmark that specifies an angle must be implicitly construed in exactly the same manner as the deictic center in the case of (6a). As mentioned in section 1, it is true, as Rukeyzer (2005) points out, that the CAY demonstratives shown in Table 1 should be considered as invoking some angular concepts except for (1: close to the speaker): (2: *up* from the speaker), (3: away from the speaker *on level*), (4: *down* from the speaker), and (5: *inside*/*outside* from the speaker). However, when CAY speakers employ a "prominent" ground object for the identification of a referent as in the coordinate cases like (7), they do not use a demonstrative, but choose a positional noun (Caan Toopetlook p.c.). Consider the examples below:

(8) a. Estuulu-m aci-(ng)a iqa-uq.
desk-erg space.under- 3rdposs dirty--ind.3rd.sing
'The space under the table is dirty.' (Jacobson 1995:99)
b. Inar-ten aqui-gut elitnaurvi-im **kete-nga**-ni (ketiini)
child-your play-ind.3rd.pl. school-erg front-3rdposs-loc
'Your children are playing in front of the school.'

As shown in examples (8), when a prominent ground object is invoked for a target reference like *estuulu-m* 'of desk' in (8a) or *elitnaurvi-im* 'of school' in (8b), CAY speakers choose a spatial expression from a set of positional nouns rather than from a set of demonstrative pronouns. (9) below is a partial list of the CAY positional nouns, and observe that same sort of spatial concepts as those in Table 1 are also included in the set of positional nouns.

(9) Positional Nouns: (shown in 3rd person possessed form)
(a) acia 'the space under it' (b) akia 'the space across it' (c) cania 'the space beside it' (d) elatii 'the space outside it' (e) Ilua 'the space inside it' (f) qulii 'the space above it' (g) ketii 'the area in front of it (h) qainga 'its top' etc. (see Jacobson 1995:99 for the whole list)

The following grammatical difference between the positional nouns and the demonstratives, furthermore, supports our semantic observation that the landmark that specifies an angle must be implicitly construed in the usage of the demonstrative pronouns: as shown in (8) and (9), positional nouns usually have to be realized in possessed form (Jacobson 1995:99) whereas "the demonstratives are not marked for possessor" (Jacobson 1984:653). In Eskimo languages, nominal inflection indicates information on case, person, number, and possessor (and its person and number). And the possessor itself is marked by ergative case as shown in (8). For example, the inflectional suffix of *–ka*, which indicates that the possessor is the first person singular, can attach to the root morpheme of (9f), and produces an acceptable form, *qulka* 'the space above me.' However, if it attaches to a demonstrative, say, the root morpheme of *pikna* (2b: up from the speaker), unacceptable forms like **pi'ka* or **piknaka* are created (Caan Toopetlook p.c.). This grammatical difference between *qulka* 'the space above me' and *pikna* 'up from the speaker' suggests that in contrast to coordinate spatial expressions exemplified in (7), the CAY demonstratives cannot conform their deictic center to a "prominent" landmark as shown in the dotted arrow in Figure 1. In sum, the CAY demonstratives preserve a crucial deictic nature: the point of reference should not be linguistically coded, even though they may invoke a coordinate system.

What Levinson (1996, 2003) does not put a focus on is the case in which coordinate systems may not always work together with an explicit reference point, which prevents us from characterizing Eskimo demonstratives beyond a mere aberration of the typological classification (cf. Levinson 2003:70). Our proposal, which suggests a stratified relationship should we dare to apply the notion of angular specification to the description of the CAY demonstrative system, is supported by the following two fundamental ideas of Cognitive Linguistics: (i) "it is important not to view the regularities as primary and the gradience and variation as secondary; rather the same factors operate to produce both regular patterns and the derivations," (Bybee 2010:6) and (ii) "the symbolic units of a language are heterogeneous,.... [T]heir distribution along these parameters is essentially continuous and does not offer any principled basis for dividing them into discrete components" (Langacker 1991:3). With these ideas and the observation above, we employ the property of angular specification as a gradient concept, and furthermore, the difference between coordinate and non-coordinate systems is supposed as continuous rather than distinct.

4. A Stratified Relationship among the CAY Demonstratives

When the CAY demonstrative system is analyzed in terms of the angle to a referent, we may find that some thirty CAY demonstratives are not evenly (or randomly) distributed as to the speaker's orientation to a target referent, but they can be arranged as those that narrow down the potential orientation of the speaker: it ranges from non-specified cases like English *this or that* that can be used in 360 degrees (i.e. no angle specified) to highly fixed cases that are close to the semantic configuration depicted in Figure 1 above. Table 2 below depicts the way in which the potential orientation to the referent gets specified gradually. Portions in gray are intended to show a potential location of a referent. In what follows, we exemplify each layer in order, and its implication is discussed in the next section.[2]

While the relationship between Layer I and II is shown in the next section, Layer I indicates the case of anaphoric use of a demonstrative. At this layer, the physical location of the referent does not matter, or has already been identified by the speaker and listener. For this function, CAY speakers utilize a demonstrative, *imna* (1a in Table 1), as shown in (10) below:

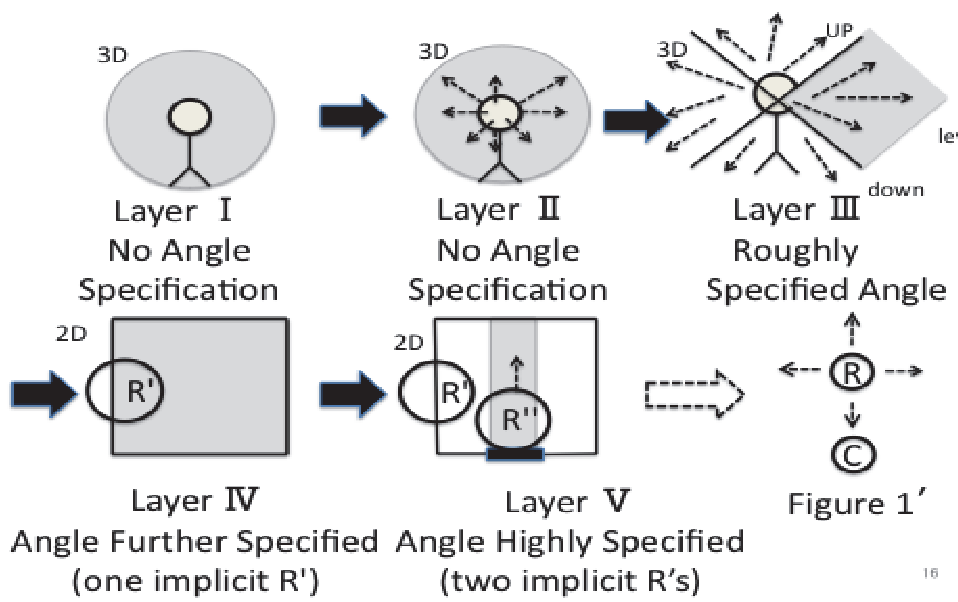

Table 2. A Stratification of the Potential of the Referential Function

(10) Payugte-llru-an=qaa **imna** akuta-mek.
give-past-ind.tran.2nd.sing=Q that.aforementioned ice cream-abl.mod
'Did you give that person Eskimo ice cream?'

---

[2] Note that for the sake of a space constraint, the demonstratives in the column of "restricted" in Table 1 are essentially used as examples, but the same idea as to the speaker's orientation can be applied to the demonstratives in the other two subcategories.

This usage shows one prototypical function of definiteness, and the reference point is considered as being implicitly placed at the speaker.[3]

Layer II indicates the stage where typologically prototypical functions of non-coordinate deictic expressions like (6a) are realized. The essence of this stage is that while the demonstratives of this layer may show an indicative function that accompanies some distance specification (e.g. proximal vs. distal), it does not limit the speaker's orientation (i.e. no angle specified). For this function, CAY speakers employ a demonstrative, *una* or *tauna* (1, in Table 1), depending on the distance from the speaker, as shown in (11):

(11) a. **Una** calisuut-ngu-nrit-uq. 'This isn't a tool.'
this (near the speaker) tool-be-not-indi.3rd.sing
b. **Tauna**=qaa pissurcuut-ngu-uq.
that (away from speaker)=Q hunting.tool-be- indi.3rd.sing
'Is that one for hunting?'

Because the up-level-down distinction is introduced, the demonstratives working at Layer III are considered as being restricted in terms of angular specification compared to those in Layers I and II.

(12) a. **Ingna** yaqulek tenge-sciiga-tuq
that.over.there bird fly-cannot-ind.3sing.
'That bird can't fly.'
b. Tangerr-sugna-an=qaa **pikna** tengssuun?
see-can-ind.tran.2sing=Q that.up.there airplane
'Can you see that airplane?'
c. Tugu-sciigat-aa **kan'a** neqa.
pick.up-cannot-ind.tran.3sing that.down.below fish
'He can't pick up that fish (on the ground).'

As mentioned in section 2, the angle of the speaker's neck affects their choice of the demonstratives in this layer (see Jacobson 1984a). Though the diagram for this layer in Table 2 is for cases like (12a), *ingna* (3a in Table 1), of course, can be employed if the speaker turns around to refer to an object: it does not limit the speaker's orientation insofar as the speaker's neck is kept on the level.[4]

With the introduction of the implicit referential schema of enclosure, the demonstratives working at Layer IV are regarded as being more restricted in di-

3 Jacobson (1995) provides the following definition for *imna*: "the aforementioned one known to both speaker and listener', obscured, but not located in any place where it can be conveniently referred to on the basis of its location." (p.80)

4 If the speaker wants to refer to something behind him/her without turning around, the obscured counterpart *amna* (3a) will be employed for that purpose. The same observation can also be applied to *pikna* and *kan'a*, and the obscure counterparts, *pakemna* (2b) and *camna* (4a), are used in such a case, respectively.

rection than those at Layer III. As shown in the diagram for this layer, only the horizontal plane is concerned with the judgment of whether or not a referent is in an enclosure. In other words, while the search domain exercised at Layers II and III is three-dimensional, it becomes substantially two-dimensional at Layer IV. The opposition between the demonstratives at this layer is from (5a) and (5b) in Table 1. While anything can be invoked as an enclosure if CAY speakers regard it as so (Rukeyzer 2005), one typical instance of enclosure that is implicitly understood is a house, and it is natural to think, for instance, that examples (13a) and (13b) are uttered when the speaker is at the entrance door (Caan Toopetlook p.c.); both *kiugna* and *keggna* are restricted (i.e. visible).

(13) a. **Kiugna** qavar-tuq
that.inside sleep.-ind.3rd 'That person is sleeping (in the house).'
b. **Keggna** qimugta nere-uq neqe-mek.
that.outside dog eat-ind.3sing fish-abl.mod.
'That dog is eating fish now outside.'

Finally, with the introduction of a point on the enclosure invoked at Layer IV, the criterion to employ a demonstrative becomes one-dimensional: the crucial factor in the usage of the demonstrative working at Layer V lies in whether a target referent is on a line or not. With the diagram for Layer V above, let us consider the following examples.

(14) a. **Ugna** neqerrluk Tegu-u.
that.near.exit dried.fish pick.up-optative.
'Take that (near the door) dried fish.'
b. **kiug**-ku-t yuut sayuu-it-ut.
That.further.inside-ku-pl. Person-pl. tea-lack-ind.3pl.
'Those people (in the back of the room) don't have tea.'

When the enclosure invoked is a house, its exit serves as the point to create an implicitly construed line, (i.e. the straight line between the exit and the back). Jacobson (1995:80) provides for *ugna* and *kiugna* the following definitions respectively: "the one further toward the exit than the speaker" and "the one further in the house from the exit than the speaker." When these demonstratives are employed to refer to an object, the speaker's orientation will be highly fixed because the location of the target is limited on the line invoked. Though the same point is repeated, the enclosure and the point invoked on it must be implicit. For instance, if the door (*amiik*) is explicitly expressed (or perceived as the reference point like Figure 1), the positional noun *ketii* (9g) should be utilized.[5]

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[5] This schematic configuration with the enclosure and point is also applied for an entire village to figure out the directions in the village: the river in the village corresponds to the straight line and its mouth the exit (Fortescue 1988). One important thing is that even in such an extended

5. A Semantic Map for Demonstratives and its Theoretical Motivation

The layers described above can be arranged as a semantic map (Croft 2002) as in Table 3 below. The arrows indicate how much languages develop their use of demonstratives as to the degree of angular specification.[6] Let us now consider a typological implication and a theoretical motivation. Note that like English *this* or *that*, the Japanese demonstratives (*a*-, *ko*-, and *so*-) can show anaphoric and indicative uses, but they cannot be employed for the distinctions of Layers III to V.

	Prototypical Function of Definiteness					**Prototypical Function of Reference Point**
	Layer I	II	III	IV	V	VI (Figure 1′)
CAY						
English						
Japanese						

Table 3. A Semantic Map for Demonstratives

The gradience is expressed in the semantic map that places a prototypical function of definiteness (epistemicity) and prototypical function of reference point at both ends. Layers I and II are realized by the demonstrative systems of a number of languages, and the relationship between I and II has been pointed out in the literature; for instance, the English definite article, *the*, has historically developed to the definite marker through the stages of I and II (e.g. Croft 2002:246).[7] On the other hand, following Rijkhoff (2002), it is reported that some languages (e.g. Samoan) may strictly distinguish between layers I and II. They may group Layers II to VI together in contrast to the grouping of Eskimo languages. In addition, languages with the demonstrative system that develops to IV, or V may be described. What Table 3 suggests is that we can regard not as exceptional or deviant, but as a matter of degree, demonstrative systems that do not realize layers I and II as a single unit (i.e. only non-angular demonstratives) like English and Japanese.

Finally, the continuation between Layers I and VI may be motivated with the notion of subjectification developed by Langacker (1991). To grasp the idea, let us consider *be going to* as an example. While the phrase indicates a sense of future, Langacker (1991) suggests that the future sense is derived through the process in which the prominent part of the subject's physical motion observed in the original sense of going is semantically bleached away (i.e. subjectified) so that the implicit part of temporal progress inherent in the physical motion is left. Langacker (1991) argues that the phenomenon of semantic bleaching is ubiquitous in such a process

usage, a river or the mouth of a river is not utilized as an explicitly construed reference point like (7b) and (7c) (Caan Toopetlook p.c., and cf. Levinson 2003:109).

6 This map does not imply any historical development. I thank Eve Sweetser for the clarification at my presentation.

7 Rijkhoff (2002:92) also suggests that "the demonstrative has lost its deictic function and has in fact turned into a definite article."

as grammaticization or the formation of polysemous structure, synchronically and diachronically, examining prepositions, auxiliaries, and a number of grammatical constructions observed in English and other languages. The gradient relationship between Layers I to VI can also be regarded as reflecting the degree of subjectification, though the map is not intended to have any historical development. In the last section, we observed that the more the layer advances from I to V, the more complicated the deictic center, though implicitly construed, becomes in its schematic configuration. To put it the other way around, the configuration to restrict the angular specification gets simpler (i.e. bleached away) as the layer proceeds from VI to I.

6. Concluding Remarks

This article has suggested that while the property of angular specification for typological descriptions of spatial expressions is still crucial, it makes a difference in Eskimo languages when it is applied as showing gradience rather than dichotomy. We argued that when the angular specification as a gradient concept is extended to the description of CAY demonstratives, it clearly reveals a unique character: the functions of the Eskimo demonstratives are semantically stratified in terms of the degree of angular specification between non-specified cases that do not constitute a frame of reference and highly specified cases that are close to prototypical coordinate spatial expressions. The gradience observed is theoretically characterized with a semantic map and with subjectification, which motivates the continuation between spatial expressions prototypically described in the coordinate and non-coordinate systems. The importance of the property of angular specification as a typological parameter is further enhanced as we showed that it plays a crucial role in accounting for both of the systems.

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Weak Generic Sentences: Partitioning and Comparison

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1 Introduction

This paper addresses the question of what is the exact interpretation of weak generic sentences that take a bare plural subject and that are of the form *As are P*. Different from "regular" generic sentences like (1-2), the property denoted by the predicate *P* in such a weak generic sentence holds true of proportionally rather few individuals from the set denoted by the subject. The most famous example of this type of generic sentences is probably the Port Royal Puzzle (PRP) sentence in (3): the sentence expresses a true proposition (or at least so when it first appeared in the late 17th century), even though most Dutchmen do not know how to sail, not to mention being good at sailing. Similarly, the sentence in (4) is perceived (by some people) to be true despite the fact that most Bostonians drive carefully.

(1) Lions have manes.
(2) Dogs are mammals.
(3) Dutchmen are good sailors.
(4) Bostonians are careless drivers.

The interpretation of weak generic sentences of the form *As are P* is qualitatively different not only from that of "regular" generic sentences, but also from that of weak generic sentences whose predicate is a regular, non-copular verb phrase (e.g., (5-6)) (Cohen 1999, 2001, Nickel 2013, cf. Carlson 1977). Acknowledging these distinctions, in this paper I specify the precise meaning of weak generic sentences of the form *As are P*. I will use the PRP sentence in (3) to represent all such weak generic sentences. During the discussion, I do not concern myself with the syntactic representation of the sentence. Rather, my focus is to address two important questions concerning the sentence, given in (Q1-Q2):

(5) Frenchmen eat horsemeat.

(6) Anopheles mosquitoes carry malaria.

Q1: Which sub-group of Dutchmen is relevant for evaluating the sentence?
Q2: How good at sailing should the sub-group be so as to verify the sentence?

The paper is organized as follows. My analysis of weak generic sentences makes reference to the *GEN*(eric) operator. But weak generic sentences have been taken in the literature as classic evidence against quantificational approaches to generic sentences. In Section 2, I show that the most crucial argument cited in such literature does not guarantee the intended conclusion. In Section 3, I review two prominent analyses of weak generic sentences, by Cohen (1999, 2001) and by Nickel (2013). The two analyses complement each other: one analysis's merits remedy the other's flaws. In Section 4, I offer a *hybrid* analysis that makes use of the analytic insights from Cohen and Nickel. Before concluding the paper, I discuss how my analysis avoids the shortcomings in the two scholars' analyses.

2 The generic quantifier

It was argued, most notably by Carlson (1977), that the interpretation of generic sentences should not make reference to the *GEN* operator. A crucial piece of evidence that Carlson cited has to do with the entailment pattern of weak generic sentences. In this section, I show that Carlson's argument receives a more adequate alternative explanation and actually does not guarantee his conclusion.

According to Carlson (1977), if the PRP sentence involves a covert quantificational operator, its LF would be something like (7), which involves a covert *GEN* operator. The LF is reminiscent of (8), which involves overt quantifiers and corresponds to the sentences in (9). Carlson claimed that the sentences in (9) entail the corresponding sentences in (10). He further claimed that the PRP sentence should similarly entail (11), if (7) is indeed the LF for the PRP sentence. However, the entailment from the PRP sentence to (11) does not hold. Carlson (1977) took the absence of this entailment relation as evidence that generic sentences, including weak generic sentences, resist a quantificational analysis.

(7) *GEN*{x: x is a Dutchmen}[x is a good sailor]
(8) ALL/MOST/SOME{x: x is a Dutchmen}[x is a good sailor]
(9) All/Most/Some Dutchmen are good sailors.
(10) All/Most/Some Dutchmen are sailors.
(11) Dutchmen are sailors.

Carlson's (1977) argument hinges on an assumption which seems correct at first glance. However, close scrutiny would suggest otherwise. Carlson took the sentences in (9) to entail the corresponding sentences in (10). The entailment, however, does not necessarily go through (Menendez-Benito 2007, Larson 1998). This point is best illustrated by the lack of entailment between the sentences in (12) and (13). Although the majority of chisels can function as good screwdrivers, chisels are by no means screwdrivers.

(12) Most chisels are good screwdrivers.
(13) Most chisels are screwdrivers.

What is at issue for the lack of entailment between (12) and (13) appears to be that two distinct senses of the word *screwdriver* are used. The most natural reading of (12) expresses the presumably true proposition that most chisels can serve as good screwdrivers. The word *screwdriver* is used intensionally in this sentence and denotes the functions/characteristics of a screwdriver. However, the same word in (13) refers to the physical hand tool that happens to be called "a screwdriver." The former use of nouns is anything but rare. For example, the word *teacher* in (14) makes reference to properties that make a (good) teacher, not (necessarily) to individuals who take a teaching job.

(14) Everyone in the medical field is a born teacher, so just keep your ears and mind open.

When the word *screwdriver* is controlled to have the same meaning in a pair of sentences similar to (12-13), the entailment holds. For example, the word is used intensionally in both (15) and (16), and the former sentence entails the latter.

(15) Most chisels can function as good screwdrivers.
(16) Most chisels can function as screwdrivers.

The above discussion predicts that the entailment relation between the PRP sentence and the sentence in (11) would go through when the meaning of *sailor* is held constant. The actual situation is complicated by other factors, however. The word *sailor* in the PRP sentence (under the weak generic reading) makes reference to the skills and qualities that make a person able to sail. The sentence would not allow the weak generic reading when *sailor* is interpreted as one in the sailing profession. The absence of a weak generic reading of the sentence in (17) confirms this claim. By contrast, for the sentence in (11), the most natural meaning of the word *sailor* denotes individuals of the sailing profession. This discrepancy in the lexical meanings of *sailor*, I think, is responsible for the lack of entailment between the PRP sentence and the one in (11).

(17) Dutchmen are good sailors by profession.

Thus, the lack of entailment should not be taken as a solid argument against a quantificational analysis of (weak) generic sentences. The conclusion is important: my analysis to be laid out in Section 4 makes use of the *GEN* quantifier.

3 Previous analyses and their problems

There are several proposals regarding the exact interpretation of weak generic sentences. The studies by Cohen (1999, 2001) and Nickel (2013) are two recent attempts. The merits of one proposal can solve the problems of the other, and they constitute primary motivations for the analysis that I will pursue in this paper.

3.1 A probabilistic approach

Cohen (1999, 2001) took a mathematical probabilistic approach to generic sentences. He divided them into two categories: absolute and relative generic sentences. Absolute generic sentences are illustrated in (1-2). Cohen's "relative generic sentences" corresponds to "weak generic sentences" in this paper.

According to Cohen, the interpretation of a generic sentence of the form *Ks P* requires computing the set of alternatives to the property denoted by *P* (ALT(*P*)). This applies to the interpretation of both absolute and relative/weak generic sentences. However, absolute generic sentences do not, and relative ones do, require the computation of the set of alternatives to *K* (ALT(*K*)). Take the absolute generic sentence in (18a) as an example. The set of alternatives to the predicate *bear-live-young* contains all means of reproduction: {*bear-live-young*, *lay-eggs*, *undergo-mitosis*}. Although probably less than half of all mammals give birth to live young, more mammals give birth to live young than laying eggs or undergoing mitosis. The sentence still holds true. More generally, Cohen (2001) defined the probabilistic semantics of absolute generic sentences as in (19):

(18) a. Mammals bear live young.
b. ALT(*bear-live-young*) = {*bear-live-young*, *lay-eggs*, *undergo-mitosis*}

(19) An absolute generic sentence *Ks P* is true iff the probability that a randomly chosen K that satisfies at least one of the properties in ALT(*P*) has the property P is greater than .5.

The semantics in (19), however, cannot account for the truth conditions of relative/weak generic sentences. The PRP sentence expresses a true proposition, but its truth clearly does not require that more than 50% of Dutchmen who have a non-zero level of sailing skills ("Dutch sailors" henceforth, with the word *sailor* being used in an intensional sense) are good at sailing. According to Cohen's (1999, 2001) analysis, the interpretation of relative/weak generic sentences of the form *Ks P* makes reference not just to ALT(*P*), but also to ALT(*K*):

(20) A relative/weak generic sentence *Ks P* is true iff the probability that a randomly chosen A that satisfies at least one of the properties in ALT(*P*) has the property P is greater than the probability that a randomly chosen alternative that satisfies one of the members of ALT(*K*) and one of the members of ALT(*P*) has the property P.

Under this interpretation mechanism for relative/weak generic sentences, the PRP sentence is true if and only if the probability of a randomly selected Dutch sailor being good at sailing is greater than the probability of a randomly selected international sailor being good at sailing.[1]

3.2 Problems with the probabilistic approach

Overall, Cohen's (2001) analysis is too permissive. First, according to Cohen, the PRP sentence is true, as long as the proportion of good Dutch sailors (i.e., Dutchmen with good sailing skills) to the entire Dutch sailor population exceeds the corresponding proportion for the contextually relevant alternative nationalities. What matters is the number of **good** sailors relative to the number of sailors of any non-zero level of sailing skills, both for the Dutch population and for the international population. Cohen did not consider the skill distribution of those sailors whose sailing skills fall below the contextual standard of good sailing skills. Furthermore, Cohen assumed that this contextual standard is the same for the Dutch sailor population and for the international sailor population. A problem arises here. Take the scenario schematized in Figure 1: 30% of Dutch sailors exceed the contextual standard of good sailing skills, and the rest have bad sailing skills. Somehow, no Dutchman has "OK" sailing skills that fall between "good" and "bad." On the other hand, 15% of international sailors are good at sailing, and the other 85% are either OK or bad. With Cohen's analysis, the sailing skills of Dutch sailors are evaluated by the same standard as for international sailors. Can this scenario verify the PRP sentence? The answer depends on the distribution of the sailing skills of those international sailors whose sailing skills are OK or bad. If most of them belong to the "OK" category such that a significant number of international sailors outperform Dutch sailors, the PRP sentence is most likely false. If most of the 85% "OK" and "bad" international sailors belong to the "bad" category so that a significant number of Dutch sailors outperform international sailors, the sentence may be true.[2] Cohen's analysis wrongly predicts the PRP

[1] Whether the alternative set to an element H (say, "Dutch sailor") contains the denotation of H itself does not matter for the purpose of this paper. Therefore, the reader can understand "international sailor," being alternative to "Dutch sailor," as including either non-Dutch sailors **and** Dutch sailors, or just non-Dutch sailors alone.

[2] The careful reader may notice that I am talking rather loosely here. Exactly what I mean by "a significant number of" will be explicated in Section 4.

sentence to be necessarily true in the scenario in Figure 1, because the proportion of good Dutch sailors among all Dutch sailors (i.e., 30%) exceeds the corresponding proportion for the international sailor population (i.e., 15%).

Figure 1: Extreme skill distribution among Dutch sailors

Dutch	30% good	70% bad
Alternative	15% good	85% OK or bad

Second, Cohen's analysis would predict that two contradictory propositions can have the same truth value in certain cases. This occurs when the probability of a randomly chosen Dutch sailor being a good sailor and the probability of a randomly chosen Dutch sailor being a bad sailor both exceed the corresponding probability for the international sailor population. Imagine a scenario where 30% of Dutch sailors are good at sailing, 40% OK, and 30% bad (Figure 2). Among the international sailor population, the figures are 20%, 60%, and 20%, respectively. Cohen's analysis predicts the PRP sentence and the sentence *Dutchmen are bad sailors* to be both true in the scenario.

Figure 2: Similar distribution of good and bad sailors

Dutch	30% good	40% OK	30% bad
Alternative	20% good	60% OK	20% bad

Third, weak generic sentences are systematically available for relative gradable predicates (21). They are also consistently available for fixed, non-maximum standard gradable predicates like *wet, dirty, lemon,* and *suicidal*. The claim is verified by the availability of a weak generic reading of the sentences in (22).[3] By contrast, weak generic sentences are not available for maximum standard gradable predicates like *full* and *transparent* or for non-gradable predicates like *locked* and *6-feet tall*. The two sentences in (23), for example, do not allow a weak generic reading (cf. Nickel 2010). Cohen's analysis does not offer any insight into this lexical restriction, and as such, is insufficient.

(21) a. Luxury cars are expensive.
b. Europeans are tall.

(22) a. Shoes worn by football players are dirty after a game.

[3] That *suicidal* is a fixed standard gradable predicate can be seen from the infelicity of using "pick the suicidal one" in cases where two individuals have significantlly varied tendencies to commit suicide (Kennedy 2007, Syrett et al. 2010). Moreover, the standard associated with predicates like *wet, dirty, lemon,* and *suicidal* is not the maximum value on their scale. Hence, the name "fixed, non-maximum standard gradable predicates."

b. Students in the university are suicidal.

(23) a. Buses in the city are full of passengers.

b. Americans are 6-feet tall.

3.3 A distributive approach

Nickel (2013) postulated that weak generic sentences of the form *As are P* should be interpreted similarly to the distributive reading of degree sentences like (24a). The distributive reading of (24a) does not require every member of John's family to be taller than a single common contextual standard. Rather, the sentence is true when every member is tall with respect to the standard for the comparison class s/he belongs to (adult men, adult women, and six-year-olds). The idea is represented in (24b), in which the subscript *i* indicates the comparison class that an individual belongs to, and "Deg_{height}" stands for the height scale.

(24) a. Everyone in John's family is tall.

b. $[\forall x_i\text{: Member-of-John's-Family}(x_i)](Deg_{\text{height}}(x_i) > \text{STND}(x_i))$

Extending the idea to weak generic sentences, Nickel (2013) proposed that evaluating the PRP sentence requires considering how each sub-group of Dutch sailors do in comparison to the contextual standard of sailing skills appropriate for that sub-group. In order for the PRP sentence to be true, there need to be *GEN*-many Dutchmen in each sub-group whose sailing skills exceed the contextual standard of sailing skills for that sub-group:

(25) $[GEN(x_i)\text{: Dutch.sailor}(x_i)]\ (Deg_{\text{good.sailor}}(x_i) > \text{STND}(x_i))$

3.4 Problems with the distributive approach

Nickel's analysis requires evaluating every partition of the population denoted by the bare plural subject of a weak generic sentence with respect to a contextual standard for that partition. The requirement makes predictions that are too strong. For more accessible intuition, let us take the contemporary weak generic sentence in (26). Presumably, many Brazilians play soccer. It is likely that though the top five partitions (out of six) of those Brazilians who can play soccer ("Brazilian soccer player" henceforth) have better skills than their respective international counterpart, Brazilian soccer players whose soccer skills fall in the very bottom partition somehow underperform their international counterparts. Nickel's analysis would predict the sentence in (26), intended for a weak generic reading, to be false in this scenario. However, the sentence is judged to be true (by some speakers), or at least not necessarily false (by some others), especially when the bottom partition does not account for a big proportion of Brazilian soccer players. The truth of the sentence only requires that **a good number** (to be specified in Section 4) of Brazilian soccer players outperform their international counterparts.

(26) Brazilians are good soccer players.

Second, Nickel did not specify how to partition Dutchmen with respect to their sailing skills. His analysis allows the partitioning to be very coarse or very fine-grained. This lack of specification invites a potential problem. That is, when there is a big variation in terms of sailing skills within some coarse partition of Dutch sailors, the coarse partitioning of the Dutch sailor population and of its international counterpart may verify the PRP sentence, but a finer partitioning where the internal variation stands out would falsify it. This amounts to saying, undesirably, that the PRP sentence does not have consistent truth conditions.

Third, absolute gradable predicates (*full* and *dirty*) and non-gradable predicates (*locked* and *six feet tall*) do not have contextual standards that can co-vary with a higher binding *GEN* operator. Nickel's (2013) analysis would predict that non-gradable and absolute standard gradable predicates cannot license a weak generic reading. The prediction is only partially borne out. Although it holds for non-gradable predicates and maximum standard absolute gradable predicates (*full* and *flat*), it does not hold for non-maximum standard absolute gradable predicates (*dirty* and *suicidal*) (22).

4 Partitioning and degree comparison

Despite the insufficiencies discussed above, Cohen's and Nickel's analyses have their own analytical strengths. More importantly, the strengths of one analysis can remedy the problems of the other. Cohen's proposal rightly makes reference to two alternative sets: (i) the set alternative to the denotation of the bare plural subject of a weak generic sentence, and (2) the set alternative to the denotation of the predicate of a weak generic sentence. The use of alternative sets in analyzing weak generic sentences nicely captures the well-accepted observation that these sentences "[distinguish] the subject referent from other entities that might belong to the same category" (Krifka et al. 1995: p.83). Evaluating the PRP sentence requires considering not just how well Dutch sailors sail, but also how well international sailors sail, as well as how sailing skills within each sailor population are distributed. Nickel's analysis, on the other hand, takes recourse to the insight that the interpretation of weak generic sentences involves degree comparison. Association with different degrees of satisfying the predicate is precisely what "distinguishes the subject referent from other entities that might belong to the same category" (ibid). The evaluation of the PRP sentence needs to compare how well (partitions of) the Dutch sailor population sail to how well (the corresponding partitions of) the international sailor population sail.

The analysis that I would like to pursue precisely combines the merits of the two proposals, by making use of degree comparison in the context of alternative sets. To begin with, I follow Nickel (2013) to assume that weak generic sentences are subject to the same general tripartite interpretation scheme as "regular" generic sentences (27). When this tripartite structure is taken as given, the issue of interpreting weak generic sentences narrows down to addressing the question of which part(s) of the structure contribute(s) the weak interpretation ("weakness" for short) of weak generic sentences.

(27) *GEN* (x_1, x_2, … x_n) [restrictor] (matrix)

Among the three constituents in the structure (the *GEN* operator, restrictor, and matrix), it is most obvious that *GEN* should not be responsible for the "weakness" of weak generic sentences; for, if so, we would have to assume there to be a weak *GEN* and a "regular" *GEN*. Doing so would invite many conceptual and empirical problems. Here are two most pressing ones. What determines whether *GEN* associated with a particular generic sentence is weak or strong? Why are generic sentences not always ambiguous between weak and strong readings?

Then, can the matrix be responsible for the "weakness" of weak generic sentences? The answer is also negative. The interpretation of weak generic sentences involves degree comparison between (partitions of) the population denoted by the subject and (the corresponding partitions of) the contextually relevant alternative population. Degree comparison does not give rise to "weakness." The sentence in (28), for example, involves degree comparison but clearly lacks a weak generic interpretation. As the matrix is the only constituent that can specify degree comparison, this amounts to saying that the matrix does not contribute the weak interpretation of weak generic sentences.

(28) Lions are bigger than wolves.

Now that the *GEN* operator and the matrix are ruled out as being responsible for the "weakness" of a weak generic sentence, I argue the "weakness" is contributed by the restrictor. The analytic intuition is as follows. As the quantificational domain for the *GEN* operator, the restrictor specifies an appropriate subset of the individuals from the denotation of the subject, and the corresponding subset from the alternative set to the denotation of the subject. The degree comparison relation specified by the matrix holds true of the two restricted subsets of individuals in a generic manner. The restricted subsets and the degree comparison relation, however, are available from nowhere in the surface form of a weak generic sentence. They are present only in the LF of the sentence. Moving from the semantic interpretation to the surface form involves widening the quantificational domain from a restricted subset of the subject denotation to the whole set. This domain widening is responsible for the weak reading of weak generic sentences.

Thus, interpreting weak generic sentences comes down to determining which proper subset of the subject denotation is the actual quantificational domain of for the *GEN* operator. For example, take the PRP sentence again. The restricted Dutch population to be quantified by *GEN* cannot be the intersection of the set denoted by *Dutchmen* and the set denoted by *sailor*. For the PRP sentence to be true, Dutch sailors are not required to generally sail better than international sailors or better than some standard of sailing skills associated with the international sailor population. Otherwise, we would predict the sentence in (29) to have exactly the same weak generic meaning as the PRP sentence, and the same prediction, mutatis mutandis, would hold true between the sentence in (30) and the weak generic sentence in (4). However, neither prediction is borne out.

(29) Dutchmen who know how to sail are good sailors.
(30) Boston drivers are careless drivers.

Hence, the relevant Dutch population in the quantificational domain should be an even smaller set than the set of all Dutch sailors. The linguistic contexts in the PRP sentence specify only one possible means to derive this subset, viz., based on the standard of good sailing skills. The *GEN* operator quantifies over Dutchmen whose sailing skills are good with respect to the comparison class containing all Dutch sailors. This Dutch population can be defined by using (31), where STND(good Dutch sailor) is the standard of good sailing skills within the Dutch sailor population. When determining whether or not a Dutcman is a good sailor among his compatriots, it is wrong to use the whole Dutch population as the comparison class, because every Dutchman who can sail at all may be considered to have good sailing skills when compared to Dutchmen with no sailing skills at all. Whether a Dutchman is considered a good Dutch sailor should be evaluated with respect to the Dutch *sailor* population, not to the whole Dutch population.

(31) $\text{Dutch sailor}(x) \wedge Deg_{\text{good sailor}}(x) > \text{STND}(\text{good Dutch sailor})$

The next task is to decide to what the sailing skills of Dutch sailors in the quantificational domain are compared. Conceptually, there are two most likely possibilities for the comparison item: (i) the standard of good sailing skills among the international sailors (Xie 2011), or (ii) the sailing skills of corresponding international sailors. The option in (i) produces too weak truth conditions for the PRP sentence and should be dismissed. Unless Dutchmen with good sailing skills within the Dutch sailor population are outliers, there are always *GEN*-many Dutch sailors who are good relative to the Dutch standard of good sailing skills. Then, when the corresponding international standard is identical to or lower than the Dutch standard, it is necessarily the case that *GEN*-many Dutch sailors sail better than the international standard. Thus, the (i) option would predict the PRP sentence to be always true when the Dutch standard of good sailing skills equals or exceeds the corresponding international standard. This prediction cannot be right, because it amounts to saying that what is at stake for evaluating the PRP sentence is whether the Dutch standard of good sailing skills is higher than the international standard. In what sense is the sentence still a generic sentence? Thus, I adopt the (ii) option and conclude that the sailing skills of good Dutch sailors should be compared to the sailing skills of good international sailors.

Given the above discussion, the PRP sentence requires comparing the two populations in (32a-b) with respect to their sailing skills. The two populations are quantified by the *GEN* operator and can be represented more formally as in (33a-b). The degree comparison relation specified by the matrix is given in (34).

(32) Domains of quantification:
  a. Dutchmen whose sailing skills are good with respect to the Dutch-internal standard of good sailing skills
  b. International population whose sailing skills are good with respect to the international standard of good sailing skills

(33) a. $\text{Dutch sailor (x)} \wedge Deg_{\text{good sailor}}\text{(x)} > \textsc{stnd}\text{(good Dutch sailor)}$
  b. $\text{Int'l sailor (y)} \wedge Deg_{\text{good sailor}}\text{(y)} > \textsc{stnd}\text{(good int'l sailor)}$

(34) $Deg_{\text{good sailor}}\text{(x)} > Deg_{\text{good sailor}}\text{(y)}$

By filling the components in (33-34) in the corresponding slots in the general interpretation structure for generic sentences (i.e., (27)), the precise meaning of the PRP sentence is given in (35). The PRP sentence is true if and only if good sailors within the Dutch sailor population generally sail better than good sailors within the international sailor population. It is clear that only a subset of the Dutch sailor population is directly relevant for evaluating the sentence. Compared to the entire Dutch population, this subset is presumably small. This is where the "weakness" perceived in the PRP sentence comes from. The matrix component in (35) involves degree comparison, which is inspired by Nickel's (2013) analysis.

(35) $GEN\text{(x, y) [Dutch sailor (x)} \wedge Deg_{\text{good sailor}}\text{(x)} > \textsc{stnd}\text{(good Dutch sailor)} \wedge \text{int'l sailor (y)} \wedge Deg_{\text{good sailor}}\text{(y)} > \textsc{stnd}\text{(good int'l sailor)] (}Deg_{\text{good sailor}}\text{(x)} > Deg_{\text{good sailor}}\text{(y))}$

The notion and use of an "alternative set," coming from Cohen's (1999, 2001) analysis, can provide a more formal definition of *Dutch sailor* and *international sailor*. For the PRP sentence, the alternative set to the subject denotation, ALT(Dutchmen), contains the Dutch population and the poulation of other nationalities relevant in the context. The alternative set to the predicate *good sailor*, ALT(good sailors), contains all individuals with a non-zero level of sailing skills. More formally, it is something like {x: x is a good sailor, an OK sailor, or a bad sailor}. People who do not know how to sail at all are excluded from the alternative set. The denotation of the subject *Dutchmen* can conjoin with ALT(good sailors) to yield a set that contains all Dutchmen sailors. ALT(Dutchmen) can conjoin with ALT(good sailors) to yield the set that contains all international sailors. *Good Dutch sailor* and *good international sailor* can be formally defined in a similar fashion. Replacing *Dutch sailor*, *international sailor*, and so on in (35) would yield the final formal definition of the semantics of the PRP sentence, which I skip due to space consideration.

5 Theoretical advantages of my analysis

In this section, I show how my analysis avoids the problems with Cohen's (1999, 2001) and Nickel's (2013) proposals noted in Section 3. Cohen used the same standard of good sailing skills for the Dutch population as for the international population. Moreover, he did not consider how exactly sailing skills are distributed within each individual population. In my analysis, the Dutch-internal standard and the international standard of good sailing skills are determined relative to two different comparison classes. The distribution of sailing skills of Dutch sailors and the distribution of sailing skills of international sailors both matter for deciding on the respective standard. When Dutch sailors who sail badly (in Cohen's sense, i.e., with respect to the common standard for Dutch sailors and international sailors) account for a big proportion of Dutch sailors, the Dutch-internal standard of good sailing skills is dragged low. In this case, Dutch sailors who are considered good at sailing within the Dutch sailor population do not necessarily sail better than the international counterparts. When the number of such Dutch sailors is contextually large, there may be no *GEN*-many good Dutch sailors who sail better than good international sailors, rendering the PRP sentence false.

In Section 3, I argued that Cohen's analysis wrongly predicts the PRP sentence to be necessarily true in the scenario depicted in Figure 1. According to my proposal, whether the sentence is true, at least in part, depends on the distribution of the sailing skills of Dutch sailors and how it compares to the distribution of the sailing skills of international sailors. If international sailors of the "OK" category account for only a small percentage, say 10%, of all international sailors, such that *GEN*-many Dutch sailors whose sailing skills are good with respect to their fellow Dutch sailors sail better than their international counterparts, then the PRP sentence is true. This scenario is illustrated in Figure 3. On the other hand, international sailors of the "OK" category may account for a big percentage, say 75%, of international sailors, such that the international standard of good sailing skills is elevated beyond the Dutch standard. In such cases, there may be no *GEN*-many good Dutch sailors whose sailing skills exceed those of their international counterparts. If this is indeed the case, the PRP sentence would be false (Figure 4).

Figure 3: A small % of "OK" sailors in the int'l population

Dutch	30% good		70% bad
Alternative	15% good	10% OK	75% bad

Figure 4: A big % of "OK" sailors in the int'l population

Dutch	30% good	70% bad	
Alternative	15% good	75% OK	10% bad

Second, in my analysis, the semantic interpretation of weak generic sentences makes reference to the *GEN* operator. According to von Fintel (1997: p. 33), *GEN* "is lexically specified to trigger a Homogeneity Presupposition." The use of *GEN* signals the presupposition that individuals in the quantificational domain behave uniformly with regard to the property specified in the matrix. Moreover, von Fintel argued that generic bare plural sentences obey the principle of the Excluded Middle (36) (adapted from von Fintel's (76)).

(36) *GEN* [p](q) iff ~*GEN* [p](~q).

With this independently proposed theorem, my analysis, which involves the same tripartite interpretation structure as in (36), can explain why the sentence *Dutchmen are bad sailors* cannot be true when the PRP sentence is true. *Dutchmen are bad sailors* entails that Dutchmen are not good sailors. By the Excluded Middle principle in (36), the latter generic sentence further entails that it is not the case that (generically) Dutchmen are good sailors. This contradicts the assumption that the PRP sentence is true. Hence, *Dutchmen are bad sailors* must be false.

Third, Nickel's analysis requires partitioning all Dutch sailors based on their sailing skills. Evaluating the PRP sentence makes reference to every partition. In addition, Nickel did not specify how to partition Dutch sailors with respect to their sailing skills. The partitioning can be very coarse or very fine. The first two problems that I noted in Nickel's analysis in Subsection 3.4 arise exactly from the requirement of exhaustive partitioning and the lack of specification for how to partition. My analysis neither requires exhaustive partitioning, nor allows random partitioning. As such, it avoids the first two problems in Nickel's analysis.

Fourth, different from Nickel's proposal, my analysis does not involve a standard that co-varies with a higher operator. What matters most is the ">" relation between the sailing skills of good Dutch sailors and the sailing skills of their international counterpart. My analysis predicts weak generic sentences to be available for predicates whose semantics is compatible with the ">" relation. Such predicates include relative gradable predicates (e.g., *bad* and *expensive*) and fixed, non-maximum absolute standard gradable predicates (e.g., *wet*, *suicidal*, and *lemon*). Maximum standard absolute gradable predicates are not compatible with the ">" relation and should not be able to license a weak generic reading for sentences of the form *As are P*. Non-gradable predicates also cannot license a weak generic reading, but for a different reason: they do not involve standards to begin with. The predictions are all borne out in my analysis, as confirmed by the sentences in (22-24).

6 Concluding remarks

Weak generic sentences have received considerable attention in the literature. In this paper, I reviewed two important recent proposals: Cohen (1999, 2001) and Nickel (2013), both of which face empirical challenges and theoretical flaws. My analysis makes use of alternative sets and degree comparison. The semantics of the PRP sentence requires that *GEN*-many Dutch sailors whose sailing skills are good relative to their fellow Dutch sailors sail better than international sailors whose sailing skills are good relative to other international sailors.

My discussion above is limited to weak generic sentences of the form *As are P*. As already said, there is another type of generic sentences that also appear to have a weak reading, but is not subject to the same interpretation mechanism ((5), (6), (37)). Generic sentences of this second type predicate a potentiality or ability of the referent of the subject (Nickel 2010). A viable paraphrase of (37b), for example, is that a "normal" seed germinates in some possible world or another. Factoring in this extra layer of modality, the interpretation of (37) would be the same as that of "regular" generic sentences. The weak generic reading of (37) comes from pragmatic consideration of how things really are in the actual world.

(37) a. Sharks attack bathers.
b. Seeds germinate.

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The Cluster-internal Ordering of Clitics in Kavalan (East Formosan, Austronesian)

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Kavalan is an endangered language with fewer than one hundred speakers remaining (Chang 1997:21) and belongs to the Northern branch of East Formosan, itself a primary subgroup of Austronesian (Blust 1999:45-47). We investigate one part of Kavalan grammar: the relative order of adverbial and pronominal clitics.[1]

Of typological and theoretical import is the order within certain clusters of clitics. *Transitive* ordering has been defined, for a sequence of three morphemes—call them *X*, *Y*, and *Z*—as *XY*, *YZ*, *XZ*, and *XYZ* (Ryan 2010:785). By contrast, *nontransitive* ordering, involving the same three items, would be a situation where "(a) morpheme X must precede Y, (b) Y must precede Z, but (c) X must follow (or optionally follows) Z" (Ryan 2010:780). Whereas Kavalan does not attest the aforementioned kind of nontransitivity, this language does show another kind: *XY*, *YZ*, and *XZ*, but either *XYZ* or *XZY*. The transitive order *XYZ* is apparently in free variation with the nontransitive order *XZY*.

We organize this study as follows. Section 1 begins by introducing several adverbial clitics and one paradigm of clitic pronouns. Next, section 2 shows how various sequences of clitics are ordered, with particular attention devoted to the intricate internal ordering of an ABS-case pronoun relative to two adverbial clitics.[2] Section 3 then proposes an Optimality-theoretic analysis of this cluster-internal ordering, proposing a constraint against certain clitic sequences.

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2 We use these abbreviations: ABS absolutive, EXCL exclusive, FUT future, IMP imperative, INCL inclusive, NEG negation, OBL oblique, PCA phase-change aspect, PL plural, RS realis, RTA restriction of temporal alternatives, SG singular, TAM tense-aspect-modality, TR transitive, and 1/2/3 first/second/third person. In the literature, our labels ABS, OBL, RS, and TR are often called, respectively, *nominative*, *accusative*, *Actor voice/focus*, and *Patient/Locative voice/focus*. In the

1 Establishing the Inventory Clitics with Phrasal Positioning

Two types of clausal clitics are attested in Kavalan: adverbial and pronominal. This section exemplifies these types and demonstrates that each is a clitic.

We begin by introducing a closed set of nonpronominal, adverbial clitics: (i) FUT /=pa/, (ii) IMP /=ka/, (iii) PCA /=ti/, (iv) HEDGE /=ma/, and (v) RTA /=pama/. Each is listed in (1) through (5), where the clitic follows the initial verb in the (b) example but must precede the verb in its negated (a) counterpart. This promiscuity of attachment is a crucial test of clitichood (Anderson 2005:31). In (2a) /assi/ is the allomorph of NEG /mai/ used only immediately before IMP /=ka/.

(1)	a.	mai	**=pa**	uzan	llan	zau	
		NEG	=FUT	rain	sky	this	
		'It will not rain.'					(cf. *mai uzan**=pa** llan zau)
	b.	uzan**=pa** llan zau					
		'It will rain.'					(Li and Tsuchida 2006:33, 219)

(2)	a.	assi	=**ka**	qan	tu	βaut	
		NEG	=IMP	eat	OBL	fish	
		'Don't eat fish!'					(cf. *{assi/mai} qan**=ka** tu βaut)
	b.	qan**=ka** tu βaut					
		'Eat fish!'					(Li and Tsuchida 2006:115, 259)

(3)	a.	mai	**=ti**	q<m>an	tu	χaq	ti	aβas	
		NEG	=PCA	<RS>eat	OBL	alcohol	PROPER	Abas	
		'Abas does not drink alcohol anymore.'							(cf. *mai q<m>an**=ti** …)
	b.	q<m>an**=ti** tu χaq ti aβas							
		'Abas has drunk alcohol.'							(all based on Yeh 2005:73)

(4)	a.	mai	**=ma**	q<m>an	tu	χaq	ti	aβas	
		NEG	=HEDGE	<RS>eat	OBL	alcohol	PROPER	Abas	
		'Abas does not drink alcohol much.'							(cf. *mai q<m>an**=ma** tu χaq …)
	b.	q<m>an**=ma** tu χaq ti aβas							
		'Abas drinks alcohol a little.'							(all based on Yeh 2005:75)

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examples below, other works' glosses are translated (with phonemic transcription following the IPA) without commenting on each change. We've added interlinear glosses to any examples from Li and Tsuchida (2006:63-530) as well. Our analysis of Kavalan actancy is now ergative (as in, e.g., Liao 2002), with /(-)m-/ analyzed as a marker of RS mood rather than voice. As such: each of (10b), (15), and (17) is TR, with an ABS-case Undergoer (but, due to IMP mood, the Actor is inaudible in each); in the remaining examples the ABS case encodes the clause's only core argument—but of these, (3) through (6), (8d), (10c), and (13), are furthermore antipassives (namely, with a peripheral-argument, OBL-case Undergoer). However, this paper's analysis does not hinge on these ergative assumptions. Examples without a source indicated come from our data.

(5) a.

mai	=**pama**	q<m>an	tu	χaq	ti	aβas
NEG	=RTA	<RS>eat	OBL	alcohol	PROPER	Abas

‘Abas hasn’t drunk alcohol yet.’ (cf. *mai q<m>an=**pama** tu χaq …)

b. q<m>an=**pama** tu χaq ti aβas
‘Abas still drinks alcohol.’ (all from Yeh 2005:75)

We follow the spirit of Tsuchida (1993:94-95)—and in turn Lin (1996:25), Lee (1997:59-66), and Yeh (2005:61)—in glossing the verbal affix in (3a-b), (4a-b), (5a-b), (6a-b), (8b, d), (10c, e), and (13) as RS mood. In addition to this infix, a prefixal allomorph is selected by other verbs, as in (8c), (10d), and (16a-b) below. The co-occurrence of this RS affix with various TAM clitics has not been fully sorted out in the literature (but see Huang and Sung 2008:162-164; Lee 1997:107-113, 127-129; Yeh 2005:55-60). In some of our examples removing or inserting this affix is possible; we haven’t checked all the combinations.

In terms of their semantics, FUT /=pa/ and IMP /=ka/ in (1) and (2) clearly encode tense and modality, respectively. Lin proposes that /=ti/ expresses a turning point between adjacent events or states, marking “phase-change aspect” (1996:48, 78-83), as in (3). Moreover, /=ma/ in (4) marks hedged epistemic modality and /=pama/ in (5) is translated into English as ‘still’, or—in polar contexts—‘yet’ (Yeh 2005:56). We gloss /=pama/ as “restriction of [… temporal] alternatives” (Krifka 2000:404). As such, all five adverbial clitics fall within the TAM semantic domain.[3] Comparing the (a) and (b) pairs in (1) through (5)—in which the same TAM clitic is used in each—the (a) examples are NEG-initial, whereas their affirmative (b) counterparts begin with the verb. This comparison shows clearly that the TAM markers are positioned as clitics: hosted by the clause-initial free element, not always belonging to the same lexical category (Anderson 2005:31).

Having demonstrated that FUT /=pa/, IMP /=ka/, PCA /=ti/, HEDGE /=ma/, and RTA /=pama/ constitute a natural morphosyntactic and semantic class, we call this the *TAM clitics*. We know of no other TAM markers positioned in this way.[4]

As in (1) through (5), ABS-case bound pronouns display clitic positioning:

(6) a.

mai	=**iku**	q<m>an	tu	χaq
NEG	=ABS.1SG	<RS>eat	OBL	alcohol

‘I don’t drink alcohol.’ (Yeh 2005:74)

b. q<m>an=**iku** tu χaq
‘I {drank/drink} alcohol.’

[3] Etymologically, /=pama/ may be the fusion of FUT /=pa/ in (1) and HEDGE /=ma/ in (4), but its RTA meaning does not follow from a combination of FUT plus HEDGE. For this reason, synchronically this disyllabic form must be stored lexically apart from both /=pa/ and /=ma/.

[4] There are also clause-final TAM markers: for example, hortative /=ka/, distinct from IMP /=ka/ in allowing Actors that are (i) overt and (ii) [+me, +you] (Lee 1997:82; Li and Tsuchida 2006:115). Other TAM markers—e.g., the RS morpheme above on this page—are affixes.

Unlike TAM clitics, which *must* precede the verb in a negated clause, ABS-case clitic pronouns have another option: being hosted by the verb regardless of whether another free form (e.g., NEG) precedes the verb (Yeh 2005:31-34, contra Chang 1997:111-113/1999). Thus, /mai q<m>an**=iku** tu χaq/ is possible (Yeh 2005:73), in apparently free variation with (6a). In addition, a second pronominal paradigm exists: ergative (in a TR clause, used to encode the Actor). That bound paradigm is invariably positioned right after the verb (contra two examples in Huang et al. 1999:195). Numerous studies (including Chang 1997:117-120/1999, 2000:92-93; Lee 1997:41; Yeh 2005:32) analyze this ergative paradigm as affixes and markers of agreement (rather than pronouns and clitics, resp.). In this study, we consider only clitic clusters that follow NEG and precede the verb: unambiguously clitic positioning. (After an initial verb, an ergative-case pronominal must precede any of the clitics discussed in this paper. In any event, we have verified that the co-occurrence of an ergative pronominal does not affect the order of two TAM clitics and an ABS-case clitic pronoun relative to each other—the main issue below in this paper. Space limitations do not allow us to list such data here.)

Table (7) lists the full paradigm of pronominal clitics relevant to this study.

(7) Inventory of Clitic Pronouns with Clausal Positioning

Glosses	1SG	EXCL1PL	INCL1PL	2SG	2PL
Formal Features	+me, –you, –pl	+me, –you, +pl	+me, +you, +pl	–me, +you, –pl	–me, +you, +pl
Forms	=iku	=imi	=ita	=isu	=imu

Clitic ABS.3 pronouns are inaudible (as in many nearby Austronesian languages).

To summarize section 1, there are only ten key morphemes relevant to this study: five TAM clitics and a five-member paradigm of ABS clitic pronouns. Each of these follows the clause's first free element. In all our data, this clause-initial free element is either NEG (realized as either /mai/ or /assi/) or the verb.

2 The Ordering Facts

We now discuss how two or more clitics are ordered relative to each other within a cluster. Recall that there are two kinds of ordering: *transitive* and *nontransitive*.

If TAM clitics co-occur, their ordering is shown in (8a-d).

(8) a. mai **=pa** **=ti** qainəp ti aβas anuqaχaβi
NEG =FUT =PCA sleep PROPER Abas tonight
'Abas won't sleep tonight.' (cf. *mai**=ti=pa** qainəp ti aβas …)

b. assi **=ka** **=ti** q<m>an
NEG =IMP =PCA <RS>eat
'Don't keep {eating/drinking}!' (cf. *{assi/mai}**=ti=ka** q<m>an)

c. mai **=ti** **=ma** m-issi ti aβas
NEG =PCA =HEDGE RS-fat PROPER Abas
'Abas is no longer very fat.'
(cf. *mai**=ma=ti** m-issi ti aβas; both based on Yeh 2005:60)

d. assi **=ka** **=pama** q<m>an tu χaq
NEG =IMP =RTA <RS>eat OBL alcohol
'Don't keep drinking alcohol!' (cf. *{assi/mai}**=pama=ka** q<m>an …)

Only these four orders are acceptable. (We have neither found in the literature nor successfully elicited clusters with more than two TAM clitics.) These ordering facts and co-occurrence restrictions are summarized in the following table.

(9) Co-occurring TAM Clitics

	FUT =pa	IMP =ka	PCA =ti	HEDGE =ma	RTA =pama
FUT =pa		A *=pa=ka	B **=pa=ti**	C *=pa=ma	D *=pa=pama
IMP =ka	E *=ka=pa		F **=ka=ti**	G *=ka=ma	H **=ka=pama**
PCA =ti	I *=ti=pa	J *=ti=ka		K **=ti=ma**	L *=ti=pama
HEDGE =ma	M *=ma=pa	N *=ma=ka	O *=ma=ti		P *=ma=pama
RTA =pama	Q *=pama=pa	R *=pama=ka	S *=pama=ti	T *=pama=ma	

As this table shows, we have also verified that (i) /=ti/ is semantically incompatible with /=pama/ (Yeh 2005:59), as in cells L and S; (ii) */=pa=ma/, without resulting in the distinct RTA meaning of /=pama/, in cell C; (iii) */=ma=pa/, in cell M; (iv) the incompatibility of either /=ma/ or /=pa/ with /=pama/ itself, in cells D, P, Q, and T; and (v) the unacceptability of /=ka/ co-occurring with either /=pa/ or /=ma/, in cells A, E, G, and N. Furthermore, cells I, J, O, and R list the unacceptable opposite cluster-internal orders of the four attested sequences in (8a-d).

Arithmetically, 120 combinations of the five TAM clitics are possible. Because of various co-occurrence restrictions, however, only four overt clusters are found, each with only two members. These four orders, as the following discussion will show, hold true regardless of whether a clitic pronoun is also present.

Next, (10a-e) show how a single TAM clitic is ordered relative to an ABS pronoun. In each example the TAM clitic must precede the ABS pronoun. This is true even if the verb hosts both these clitics, not exemplified here. (Recall as well from the preceding page that, even in a negated clause, an ABS clitic pronoun can be hosted by the verb. Such ordering is irrelevant to the current discussion.)

(10) a. mai **=pa** **=isu** qainəp χaβi zau
NEG =FUT =ABS.2SG sleep night this
'Won't you sleep tonight?' (cf. *mai**=isu=pa** qainəp χaβi zau)

b. assi **=ka** **=imi** pukun-an
NEG =IMP =ABS.EXCL1PL beat-TR
'Don't beat us!' (cf. *{assi/mai}**=imi=ka** pukun-an)

c. mai **=ti** **=iku** q<m>an tu χaq
NEG =PCA =ABS.1SG <RS>eat OBL alcohol
'I don't drink alcohol any longer.' (cf. *mai**=iku=ti** q<m>an tu χaq)

d. mai **=ma** **=iku** m-issi
NEG =HEDGE =ABS.1SG RS-fat
'I am not very fat.' (based on Yeh 2005:59; cf. *mai**=iku=ma** m-issi)

e. mai **=pama** **=iku** q<m>an
NEG =RTA =ABS.1SG <RS>eat
'I haven't eaten yet.'
(Li and Tsuchida 2006:221; cf. *mai**=iku=pama** q<m>an)

Thus, in a two-clitic cluster, the ordering follows a fixed pattern: any two TAM clitics (themselves in a rigid order) or any single TAM preceding an ABS pronoun.

If an ABS pronoun and *two* TAM clitics co-occur, rather than (transitive) =TAM=TAM=ABS the order can also be (nontransitive) =TAM=ABS=TAM. Data of this kind from the literature are shown in (11) through (13) and (16a).

(11) qainəp **=pa** **=ti** **=iku**
sleep =FUT =PCA =ABS.1SG
'I'm going to bed.' (Lin 1996:80, translation modified)

(12) a. qatiw **=pa** **=iku** **=ti** χi-βaut
go =FUT =ABS.1SG =PCA catch-fish
'I am going fishing.' (Chang 2000:56, our translation)

b. … qan **=pa** **=ita** **=ti**
eat =FUT =ABS.INCL1PL =PCA
'… we're about to eat.' (Li and Tsuchida 2006:34, 259, our translation)

c. qan **=pa** **=imu** **=ti**
eat =FUT =ABS.2PL =PCA
'Are you about to eat?' (Li and Tsuchida 2006:219, our translation)

(13) mai **=ti** **=ma** **=iku** q<m>nut timaizipna
NEG =PCA =HEDGE =ABS.1SG <RS>angry OBL.3SG
'I am no longer that mad at {her/him}.'
(Li and Tsuchida 2006:151, translation modified)

Lin lists (11) along with */qainəp**=ti=pa=iku**/ to show that FUT /=pa/ must precede PCA /=ti/ but does not discuss the order of /=iku/ relative to both TAM clitics. The various other sources list (12a-c), (13), and (16a) without pointing out the clitic ordering at all. None of these is discussed with regard to the order of the ABS pronoun relative to the TAM clitics. The only additional published tokens not repeated here—all with the same type as in (12b) above (namely, with the interpolating cluster /=pa=**ita**=ti/)—are listed in Li and Tsuchida (2006:86, 370, 375).

In (14) through (17), our informants accepted both =TAM=TAM=ABS in the (a) examples and =TAM=ABS=TAM in their (b) counterparts.

(14) a. mai **=pa** **=ti** **=iku** qainəp anuqaχaβi
NEG =FUT =PCA =ABS.1SG sleep tonight
b. mai**=pa=iku=ti** qainəp anuqaχaβi
'I will not sleep tonight.'

(15) a. assi **=ka** **=ti** **=imi** pukun-an
NEG =IMP =PCA =ABS.EXCL1PL beat-TR
b. assi**=ka=imi=ti** pukun-an
'Don't beat us!'

(16) a. mai **=ti** **=ma** **=iku** m-ɾi~ɾizaq
NEG =PCA =HEDGE =ABS.1SG RS-INTENSITY~happy
(Li and Tsuchida 2006:151; reduplication inserted, as in Lee 2009:138)
b. mai**=ti=iku=ma** m-ɾi~ɾizaq
'I am no longer very happy.' (our translation)

(17) a. assi **=ka** **=pama** **=imi** pukun-an
NEG =IMP =RTA =ABS.EXCL1PL beat-TR
b. assi**=ka=imi=pama** pukun-an
'Don't keep beating us!'

The variation between these (a) and (b) examples is not geographic as far as we can determine. All speakers from whom we elicited these data so far happen to be female. Nor have we detected variation based on the speakers' ages. If this language is in flux, we have no sense of this type of change's directionality: Amis, the only other extant member of the East Formosan primary subgroup of Austronesian (Blust 1999:45-47), attests no bound pronouns (Huang et al. 1999:167).

We assume that the (a) and (b) patterns represent separate grammars competing in the speaker's mind. In the (a) grammar the clitics are ordered transitively, with any TAM clitics preceding an ABS clitic pronoun. In the nontransitive, interpolating (b) grammar, an ABS clitic pronoun must follow at least one TAM clitic (if one is present) but must appear between co-occurring TAM clitics.

To summarize, we have shown that the co-occurrence of two TAM markers and an ABS pronoun can result in two orders: (i) transitive =TAM=TAM=ABS and (ii) nontransitive =TAM=ABS=TAM (also referred to here as interpolating).

3 Analysis

We now formalize the clitic-ordering facts using Optimality Theory (as surveyed, e.g., in McCarthy 2002). In this framework, grammars are differentiated by the ranking of a presumably common set of violable output constraints. The two grammars alluded to in the preceding section share four identically ranked constraints but differ only in the ranking of one other constraint relative to those four.

To begin, several constraints require various TAM clitics to be cluster-initial:

(18) a. FUT-1ST: If there's a FUT clitic, then it immediately follows its host.
b. IMP-1ST: If there's an IMP clitic, then it immediately follows its host.
c. PCA-1ST: If there's a PCA clitic, then it immediately follows its host.
d. TAM-1ST: If there's a TAM clitic, then it immediately follows its host.

Violation of these constraints is measured in terms of the number of morphemes separating this clitic from its host. In addition, because TAM-1ST can pertain to more than one clitic, multiple violations of it are also possible (for instance, if two TAM clitics are separated from the host by a clitic pronoun). Such gradient violation is evident in the three-clitic tableaux below in (25) and (26).

Before introducing our fifth constraint, we know the rankings in (19), from three (partially intersecting) *markedness subhierarchies* (also called *stringency relations* in McCarthy 2002:20, 44): violation of any of FUT-1ST, IMP-1ST, or PCA-1st entailing violation of TAM-1ST but the converse not necessarily true.[5]

(19) {FUT-1ST, IMP-1ST, PCA-1ST} » TAM-1ST

The first type of cluster we address is with only TAM clitics. Recall from (8a-b) above that FUT /=pa/ and IMP /=ka/ each precede PCA /=ti/. In order to

[5] The curly braces in (19) indicate that there is no ranking among FUT-1ST, IMP-1ST, and PCA-1ST relative to each other. However, each of these three constraints dominates TAM-1ST (where » is shorthand for 'dominates'). In each tableau below, the upper-left cell indicates the input: an unordered set of lexical representations. The constraint names are then arrayed along the remaining top-row cells. The various clitic orders—two each in (20), (21), and (23); six each in (25) and (26)—are listed as *candidates* (or competing outputs) in the remaining left-hand cells. The pointing-finger icon shows the optimal candidate. Each violation of a constraint is listed in the cell under the constraint name and to the right of the candidate. A *W* or *L* appears in a cell if the non-optimum candidate on that row violates a particular constraint more or less (resp.) than the optimum. A ranking is established in any row of cells with a single *W* and one or more *L*s, where the constraint above the *W* dominates any constraints above any *L* (McCarthy 2002:32-33; Prince 2002/2003). We address separately multiple-*W* rows in connection with (26) below.

force a violation of the PCA-1ST constraint, as tableaux (20) and (21) demonstrate, each of FUT-1ST and IMP-1ST must be ranked above PCA-1ST, respectively.

(20) [See (8a) above for the full example.]

FUT /=pa /, PCA /=ti/	FUT-1ST	IMP-1ST	PCA-1ST	TAM-1ST
☞ a. =pa =ti			*	*
b. =ti =pa	* W		L	*

The non-optimum candidate in (20b) violates FUT-1ST (because FUT /=pa/ doesn't immediately follow its host), whereas the optimum in (20a) violates PCA-1ST (because PCA /=ti/ isn't cluster-initial). Thus, tableau (20) demonstrates that FUT-1ST dominates PCA-1ST, which accounts for the order of /=pa/ before /=ti/.

(21) [See (8b) above for the full example.]

IMP /=ka /, PCA /=ti/	FUT-1ST	IMP-1ST	PCA-1ST	TAM-1ST
☞ a. =ka =ti			*	*
b. =ti =ka		* W	L	*

Similarly, tableau (21) demonstrates that IMP-1ST dominates PCA-1ST. The final ranking, common to both grammars, can thus be updated from (19) as follows.

(22) {FUT-1ST, IMP-1ST} » PCA-1ST » TAM-1ST

Incidentally, there is no need for constraints pertaining specifically to the HEDGE or RTA markers because (i) these never precede another TAM clitic, as table (9) above shows, and (ii) the generic TAM-1ST constraint is sufficient to assure that a TAM clitic precedes an ABS clitic pronoun in combinations of one of each kind of pronoun. Space limitations preclude listing tableaux corresponding to the remaining examples with two TAM clitics in section 2 above: (8c-d). These do not demonstrate any rankings because in each example the attested order fares (i) at least as well on every constraint as the opposite clitic order and (ii) better on at least one constraint. In such a situation, the optimum *harmonically bounds* the other candidate. For instance, in the tableau corresponding to (8c), /=ti=ma/ '=PCA=HEDGE' and */=ma=ti/ each (i) satisfy FUT-1ST, (ii) satisfy IMP-1ST, and (iii) violate TAM-1ST once (because in each order, one of the two TAM clitics is not cluster-initial). However, only */=ma=ti/ violates PCA-1ST. Similarly, in all of the data above with one TAM clitic and a clitic pronoun, the TAM-initial order violates no constraints, in (10a-e). The opposite order violates at least TAM-1ST. Tableau (23) below illustrates this idea: (23a) harmonically bounds (23b). We don't list *W*s or *L*s in harmonically bounded candidates. Though (23) establishes no ranking, it shows that TAM-1ST is needed to eliminate ABS-initial clusters.

(23) [See (10e) above for the full example.]

RTA /=pama /, ABS.1SG /=iku/	FUT-1ST	IMP-1ST	PCA-1ST	TAM-1ST
☞ a. =pama **=iku**				
b. **=iku** =pama				*

The same single violation of TAM-1ST is found in the tableau corresponding to (10d), not shown here. The tableaux corresponding to (10a-c), likewise not listed here, would incur violations, respectively, in the opposite order's candidate under FUT-1ST, IMP-1ST, and PCA-1ST (as well, of course, as under TAM-1ST itself).

We now present tableaux where the two grammars differ: with *three*-clitic clusters. The transitive, =TAM=TAM=ABS clusters make up the (a) grammar, whereas the interpolating, =TAM=ABS=TAM orders comprise the (b) grammar. In the preceding tableaux the only attested form is the optimum and vice versa. For each three-clitic cluster in (14) through (17), there are now *two* attested orders. The (a) order is the optimum in the (a) grammar, whereas its (b) counterpart is the (b) grammar's optimum. Thus, though there are multiple attested orders in all the data from this point forward, there is still only one optimum per tableau.

The constraints in (18a-d), as ranked in (22), are fully able to account for the (a) examples in (14) through (17). That is, adding the ABS clitic pronoun to the tail end of the cluster incurs no additional violations of any of these constraints. Due to space limitations, we cannot show tableaux corresponding to these four orders with only the four constraints so far—but see (25) below using all five constraints. We leave it to the reader to verify that (22) can generate the (a) examples. Clearly, however, (18a-d) and (22) fail to do the same for the (b) grammar's examples.

Next, we add our fifth and final constraint to differentiate the two grammars. We propose that nontransitive ABS-interpolation in the (b) grammar is captured by a constraint against adjacent TAM clitics, reminiscent of the Obligatory Contour Principle, which states that consecutive, phonologically identical elements are prohibited (where *contour* here means consecutive tones with different pitches). This idea is first proposed in Leben (1973/1980), where underlying representations containing adjacent identical segments on the tonal tier are excluded, and has then spread within phonology to areas outside tonology proper. Furthermore, Kornfilt (1986:72) has observed that Turkish morphology "precludes immediate sequences of 'similar' morphemes. The crucial notion of 'similarity' is not one of phonological identity, but rather refers to the category and function of the morphemes involved." Namely, Kornfilt's constraint rules out consecutive sequences of morphosematically identical agreement morphemes in Turkish.

In Kavalan's (b) grammar an ABS pronoun can interrupt two TAM clitics.[6] We attribute such positioning to the aforementioned prohibition on adjacent

[6] It is unlikely that the relevant identical property is the number of syllables. Four of the TAM clitics—FUT /=pa/, IMP /=ka/, PCA /=ti/, and HEDGE /=ma/—are monosyllabic (with only

elements with some identical morphosemantic property: being a TAM clitic. To account for the nontransitive grammar, we propose our only remaining constraint:

(24) OCP-TAM: Adjacent tense-aspect-modality clitics are prohibited.

Unlike (18a-d), this is a categorical constraint; no more than one violation per cluster can occur. If the cluster consists only of TAM clitics, then either order of the clitics violates this constraint. Adding an OCP-TAM column would show one violation per candidate in tableaux (20) and (21) above, none in (23). This constraint differentiates between candidates only where there is also a clitic pronoun.

Clearly, OCP-TAM is needed to generate interpolation adequately. Before proceeding to our analysis of the (b) grammar, however, we show how OCP-TAM fits into the hierarchy in (22) of the distinct (a) grammar. (If a constraint is proposed, it is useful to show how this constraint interacts with the other constraints not just in grammars where this new constraint is needed. The typological predictions of introducing a constraint to the hierarchy can be quite instructive.) In tableau (25) we show how OCP-TAM, if added to the hierarchy in (22) above, would function in the transitive, non-interpolating (a) grammar.

(25) [See (16a) above for the full example.]

PCA /=ti/, HEDGE /=ma/, ABS.1SG /=iku/	PCA-1ST	TAM-1ST	OCP-TAM
☞ a. =ti =ma **=iku**		*	*
b. =ti **=iku** =ma		** W	L
c. =ma =ti **=iku**	*	*	*
d. =ma **=iku** =ti	**	**	
e. **=iku** =ti =ma	*	***	*
f. **=iku** =ma =ti	**	***	*

The optimum (25a) harmonically bounds (25c), (25b) bounds (25d), and each of (25a-b) bounds each of (25e-f). Accordingly, (25[a~b]) demonstrates that TAM-1ST » OCP-TAM. Building on the hierarchy in (22) above, the final ranking for the (a) grammar is {FUT-1ST, IMP-1ST} » PCA-1ST » TAM-1ST » **OCP-TAM**.

Our last tableau demonstrates the position of OCP-TAM in the (b) grammar:

RTA /=pama/ being heavier). Moreover, all ABS clitics are disyllabic, at least in their citation forms; see table (7). However, in (14b) /=pa**=iku**=ti/, (15b) /=ka**=imi**=ti/, and (16b) /=ti**=iku**=ma/ each of the three clitics is monosyllabic; each pronoun's initial /i/ does not project a sonority peak. These surface respectively as [pa**j**.ku.ti], [ka**j**.mi.ti], and [**ti**.ku.ma]. In (14b) and (15b) this /i/ surfaces as a glide, [j], whereas in (16b) there is coalescence of /…i=i…/ into a single [i]. Furthermore, in (17b) /=ka**=imi**=pama/ the argument—about a monosyllabic clitic keeping disyllabic clitics apart—falls apart, because a monosyllabic pronoun separates TAM clitics with one and two syllables, respectively: [ka**j**.**mi**.pa.ma]. If anything, (17a), /=ka=pama**=imi**/ [ka.pa.ma**j**.**mi**], with a disyllabic clitic between monosyllabic clitics, is an argument *against* having interpolation.

(26) [See (14b) above for the full example.]

FUT /=pa/, PCA /=ti/, ABS.1SG /=iku/	OCP-TAM	FUT-1ST	PCA-1ST	TAM-1ST
a. =pa =ti **=iku**	* W		* L	* L
☞ b. =pa **=iku** =ti			**	**
c. =ti =pa **=iku**	* W	* W	L	* L
d. =ti **=iku** =pa		** W	L	**
e. **=iku** =pa =ti	*	*	**	***
f. **=iku** =ti =pa	*	**	*	***

Of primary importance here is that OCP-TAM » {PCA-1ST, TAM-1ST}, as (26[b~a]) demonstrates.[7] Combined with hierarchy (22) above, common to both grammars, we see that in the (b) grammar OCP-TAM is undominated. See (27b).

This section has formalized the relative ordering of an ABS clitic pronoun and one or more TAM clitics using an Optimality-theoretic approach. The position of OCP-TAM in the constraint hierarchy differentiates the two grammars. Building on (22) above, the final rankings for the two Kavalan grammars are as follows.

(27) a. The transitive grammar

FUT-1ST IMP-1ST
|
PCA-1ST
|
TAM-1ST
|
OCP-TAM

b. The ABS-interpolating grammar

OCP-TAM FUT-1ST IMP-1ST
|
PCA-1ST
|
TAM-1ST

If TAM-1ST dominates OCP-TAM, as in (27a), then an ABS pronoun follows both TAM clitics in the cluster: fully transitive ordering. However, if OCP-TAM dominates at least some of the other constraints, as in (27b), then an ABS pronoun interrupts the TAM clitics: nontransitive, interpolating ordering.[8] Two slightly

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7 Each of (26a-c) harmonically bounds (26e), and each of (26a, c-d) bounds (26f). In addition, (26[b~d]) demonstrates that FUT-1ST » PCA-1ST, corroborating a known ranking, from tableau (20) above. Finally, (26[b~c]) shows no new rankings (only that at least one of OCP-TAM and FUT-1ST dominates PCA-1ST and at least one of OCP-TAM and FUT-1ST dominates TAM-1ST). We also leave it to the reader to verify that (i) the tableau corresponding to (15b) also shows that OCP-TAM » {PCA-1ST, TAM-1ST} (among other, already established rankings) and (ii) tableaux corresponding to (16b) and (17b) each show only that OCP-TAM » TAM-1ST.

8 In Kavalan's (b) grammar it is impossible to rank OCP-TAM relative to either FUT-1ST or IMP-1ST (because at least one of the TAM clitics invariably precedes the ABS clitic pronoun and the FUT and IMP clitics never follow another TAM clitic). The rankings in (19) above, along with OCP-TAM, predict another grammar: {FUT-1ST, IMP-1ST, PCA-1ST} » **OCP-TAM** » TAM-1ST. Such a ranking—using Kavalan data—would predict interpolation only in (16b) and (17b).

differing constraint rankings capture the distinctions in how clitics are ordered relative to each other. In each of the two-candidate clusters, OCP-TAM does no real work, and the two grammars generate the same clitic ordering. Our two-grammar approach also accounts for the *variation* within three-clitic clusters.

4 Conclusion

Kavalan constitutes an important addition to the typology—primarily in the Austronesian languages—of how clitics are positioned. In Central Philippine (Bloomfield 1917:181 [337], Kaufmann 1916:37), Squliq—and possibly Mayrinax C'uli'—Atayal (Liao 2005:53-57, 60), and Hebrew (Hetzron 1972:253-254) the order of two pronouns relative to each other is determined by their (increasing) prosodic weight. Moreover, adverbial clitics in Central Philippine languages follow monosyllabic pronouns but precede heavier ones (Billings and Kaufman 2004:27; Schachter 1973). Such clitic pronouns thus usually sandwich any adverbial clitics. In Kavalan it is the adverbial (i.e., TAM) clitics that can sandwich a clitic pronoun. Once again we see exceptional ordering—known in the literature as *special syntax* (Zwicky 1977:4-5, 14; Anderson 2005:75-82)—within the clitic cluster, not found among morphosyntactically free elements.

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Prosody-Based Word Recognition for L2 Speakers

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0. Introduction

Previous studies in word recognition have attempted to explain how adults can recognize words or discriminate a word from other lexical alternatives quickly and accurately from speech signals (Grosjean 1980, Marslen-Wilson and Tyler 1980, Warren and Marslen-Wilson 1987). One of the most prevalent models, i.e., the "cohort model", proposes that word recognition involves two steps. First, when L1 listeners hear phonetic input through some duration of time, multiple words similar to such signals are activated. Next, as more segmental input induces listeners to select the appropriate word out of the candidate words. Under this model, left-to-right evaluation of segmental information is crucial to recognize words (Marslen-Wilson 1987). Recently, however, such segment-based lexical processing turned out to be insufficient for L1 adults' word differentiation. Thus an increasing number of studies have focused on the role of prosody in word recognition for L1 speakers.

As is emphasized under two major models on word recognition, i.e., the "cohort model" and the "neighborhood activation model", two controversial issues in the role of prosody in word recognition are: what prosodic cues are crucial for segmentation? And what the unit of perception is between syllables and phonemes? First, let us turn to the former issue. Listeners decode speech signals with reference to a variety of prosodic cues to detect word boundaries. For instance, listeners rely on intonation patterns to locate word boundaries (Taylor et al. 1998). Furthermore, the longer the portion of the word listeners hear, the more accurately they are able to segment it (Lee 1999, Hudson and Bergman 1985). Recently, a stress-based model has been in the spotlight for word identification (Cutler 1994, Cutler and Butterfield 1992, Cutler and Norris 1988). Nakatani and Schaffer (1978) show that English adult listeners assign word boundaries before stressed syllables. Cutler and colleagues show that even infant listeners segment words on the basis of stress cues.

Another issue as to the role of prosodic elements in word recognition centers on the unit of perception. That is, what is the basic unit when listeners recognize words? This tackles the question of whether the unit for lexical representation is a syllable or a phoneme. Cutler et al. (1986) report that French listeners are sensitive to syllables. Additionally, Pitt and Samuel's (1990) experiment reveals that

English listeners recognize the location of phonemes as well as stressed syllables within words. Pallier (1997) shows that even French listeners can recognize the exact location of a specific phoneme like English listeners. Combined with previous studies, this evidence suggests that L1 speakers' mental lexicon is equipped with syllabically-structured representations based on phonemes.

Compared to ample studies on word recognition by L1 speakers of English or French, there has been comparatively little focus on L2 listeners' sensitivity to stress for word identification in other target languages. Hence the current study explores whether Korean L2 (English) listeners can effectively differentiate or retrieve the original words on the basis of the initial syllable or foot containing primary or secondary stressed vowels. In effect, this study tests whether a bigger prosodic size than syllables can be the unit of word recognition.

1. Goals

The present study investigates whether and how Korean L2 learners of English recognize or differentiate a word from others on the basis of subtle stress differences in English. It also tests whether the principle of a cohort model applies to L2 listeners' word recognition.

The focus of this study is essentially to answer two questions. First, how do Korean L2 speakers produce primary- and secondary-stressed vowels in English? This study examines whether Korean speakers use three major phonetic correlates of stress, i.e., vowel duration, amplitude, and F0 to distinguish the delicate stress differences. If they produce different primary and secondary stressed vowels, it is highly likely that they might also be sensitive to acoustic signals enough to perceive such differences on the perception side. Furthermore, it might induce listeners to activate the source word solely on the basis of stress information. The present study was partially stimulated by Mattys' (2000) study conducted for native speakers of English. We would like to see if Korean speakers replicate similar results with an almost identical set of English stimuli for Korean L2 speakers.

The second question to be addressed is whether Korean L2 listeners restore or guess the original source words on the basis of stress differences between primary and secondary stressed syllables. This study aims to explore whether two effects found for native speakers of English are evident for Korean speakers of English (Mattys 2000): fragment size effect and stress degree effect. As for the fragment size effect, it is predicted that syllable length might contribute to the degree of restoration of English words since more segmental information coupled with foot information can lead to more accurate activation of words (e.g. [prɑ́] vs. 'prose' [[prɑ́sɪ] in 'prosecution' or 'prosecutor'). That is, the longer the fragment they hear, the faster and the more accurately they will identify the source words. Next, as for stress degree effect, it can be expected that Korean listeners have difficulty in accurately differentiating the source words solely on the basis of subtle stress cues without reference to full segmental information, probably due to lack of sensitivity to the stress system of English. Of course, the possibility cannot be excluded that their perceptual sensitivity might vary depending on individuals' stress knowledge.

2. Production and Perception Experiments

Subjects: Thirty-nine English-learning Korean speakers participated in the perception experiment. Twenty-four of thirty-nine participated in the production experiment. All were junior or senior undergraduates recruited at Daegu University with either an English major or minor. Twenty-four were females and fifteen were males. They ranged in age from 21 to 26 years, with an average age of 24. Their mean TOEIC scores were 665 points, and their self-rating of their own English proficiency was 5.5 out of 10 scales. On this basis, they were of approximately intermediate level in English. Before the experiment, they were asked to mark primary stress on the stimuli English words. The average score for females was 68% and for males 55%. They had an average 12 years of experience learning English with no known hearing or production problems. All the subjects were paid for participation.

Stimulus Materials: Because this study examines whether Korean L2 learners of English show native-like patterns of word recognition, test materials used are identical to those employed in Mattys (2000). Test stimuli consisted of 24 pairs with 4 syllables. One group of words has primary stress on the initial syllable and secondary stress on the third syllable as illustrated in (1a). The other group of words has secondary stress on the initial syllable and primary stress on the third syllable as exemplified in (1b). Both groups of words consisted of the identical segments within the first foot or the first two syllables, but they had different stress patterns. The first or second syllable was (C)(C)V(C) (e.g., *<u>pro</u>secutor, <u>de</u>legating, <u>con</u>sequently, <u>a</u>ggravating, re<u>pli</u>cating, ca<u>te</u>gory*). The vowels in the initial syllable were /ɪ, ɛ, æ, ɑ/. Additional twenty filler words were interpolated with target words. 10 pairs of words had primary stresses on the first syllable and vowel qualities were identical (e.g., *móment/mómentary, célibate/célibacy*, etc). A total of 696 tokens (24 pairs x 29 subjects) were taken for production and perception analyses.

(1) Test stimuli

a. Initial-Primary	b. Initial-Secondary
prósecùtor	pròsecútion
délegàting	dèlegátion
présidèncy	prèsidéntial
cátegòry	càtegórical
cónsequèntly	cònsequéntial
návigàtor	nàvigátion
víndicàting	vìndicátion

fábricáting	fàbricátion
ségregàting	sègregátion
réplicàting	rèplicátion
ággravàting	àggravátion
céremòny	cèremónial

Procedures: First, for a production experiment, each of the target tokens was placed in a carrier sentence "Please say __________" designed to elicit natural production of the real words. First, in order to see whether/how Korean speakers realize stress differences like native speakers of English, twenty four Korean learners were asked to read the carrier sentences with target words. To compare Korean speakers' production with English speakers' and to replicate previous findings, five native speakers of English also participated in the identical production experiment. The stimuli were presented in a random order. Subjects were recorded with PRAAT, and the sentences were digitized at 44kHz sampling rate. In order to explore usage of phonetic correlates of stress, three acoustic parameters were measured: vowel duration, F0 of stressed vowels, and amplitude of vowels. Vowels were measured from the beginning of the first formant to the end of the second formant in the spectrogram. F0 and the amplitude were measured roughly at the mid-point of the whole vowel in time dimension. Since stress differences were examined within subjects, durational and spectral measures were subjected to a one-way repeated-measures ANOVA through PAWS Statistics (SPSS) 18.

Second, the perception experiment proceeded in two blocks. To obtain listening stimuli, one native speaker's production of the stimuli in (1) were recorded. The listening stimuli were created by excising the first syllable ((C)(C)V(C)) or two syllables from the original source words. In one block, thirty nine Korean listeners were asked to listen to one syllable with primary or secondary stress (e.g., [prɑ́], [prɑ̀], [prɛ́], [prɛ̀], etc). Next, they saw two forced choices on the computer screen (e.g., ① prosecutor ② prosecution), and then they had to guess the original source and press 1 or 2 on the keyboard. With the forced choices, the items in column number one were the words with initial primary stress while those in column number two were those with initial secondary stress. In the second block, in order to see the effect of fragment size on word identification, the same subjects heard the first two syllables consisting of the primary stress and unstressed syllables or of the secondary stress and unstressed syllables (e.g., [prɑ́sɪ], [prɑ̀sɪ], etc.). On the basis of the first foot, they had to perform the same guessing task as in block I. They were instructed to press 1 or 2 when they saw the multiple choice (e.g., ① prosecutor ② prosecution).

Listening stimuli and randomizing stimuli were run using the software E-Prime. In both the blocks, stimuli were presented binaurally over headphones at a comfortable listening level. They were instructed to make fast and accurate responses by pressing the appropriate keys as soon as they had made a decision. A pause of 2000ms timeout after stimulus offset with a word "Next" on the screen. The test session began after 5 trials. Thus a total of 3744 responses were obtained and analyzed within these two blocks (24 pairs × 2 blocks × 39 subjects).

Accuracy and reaction times were measured and obtained through E-Prime, in order to see how accurately and how fast Korean listeners activate the source words on the basis of short or long fragments without the full segmental information. Those two parameters were evaluated within each block. Furthermore, since those were examined within subjects, accuracy and reaction times were subjected to repeated-measures ANOVA.

Statistical analyses examined two effects: (i) the effect of stress difference on the accuracy and reaction times, and, (ii) the effect of fragment size on the accuracy and reaction times.

3. Results

3.1. Korean and English speakers' production of stress in English

Table 1 shows average values of three phonetic correlates, i.e., duration, F0, and intensity of primary stressed and secondary stressed vowels produced by Korean learners. A one-way repeated-measures ANOVA with a factor of stress (primary vs. secondary) was performed. First, primary stressed vowels in word initial syllables were on average 9 ms longer than secondary stressed ones (e.g., [prɑ́] in 'prosecutor' vs. [prɑ̂], 89 ms vs. 78 ms). The difference statistically reached marginal significance (*F*(1,24)=3.6, p=.06). However, of interest is the finding that primary stressed vowels were 17 ms shorter than secondary stressed vowels in the third syllables as well (e.g., [kjʊ̀] in 'prosecutor' vs. [kjʊ́] in 'prosecution', 134 ms vs. 146 ms), and the difference between the durations of primary and secondary stressed vowels was also marginally significant (*F*(1,24)=3.69, p=.06). Furthermore, both the initial and the third syllables had the equal F0 between primary and secondary stressed vowels (initial, 178 Hz vs. 178 Hz, *F*(1,24)=0.01, p>0.05; third, 164 Hz vs. 162 Hz, *F*(1,24)=0.6, p>0.05). Finally, primary stressed vowels were as loud as secondary stressed ones in word-initial syllable (73 dB vs. 73 dB, *F*(1,24)=0.7, p>0.05), but the difference in the third syllable was highly significant (72 dB vs. 71 dB, *F*(1,24)=14.6, p=0.001).

Table 1. Korean speakers' production of stress differences

	1st syllable			3rd syllalbe		
	Pri.strs	Sec.strs	F & p-val	Pri.strs	Sec.strs	F & p-val
Dur. (ms)	89	78	F(1,24)=3.6 P=.06*	134	146	F(1,24)=3.6 P=.06*
F0 (Hz)	178	178	F(1,24)=.01 P>.05	162	164	F(1,24)=.6 p>.05
Int.(dB)	73	73	F(1,240=.7 p>.05	71	72	F(1,24)=1.6 P=.001***

In summary, in word-initial syllables, difference between primary and secondary stressed vowels was significant only in duration of the vowels, while the F0 and intensity differences were neutralized. Furthermore, primary and secondary stressed vowels were different in duration and intensity in the third syllables even though the latter had longer and higher intensity than the former unlike native speakers of English. These results indicate that durational difference was kept as a major stress cue for Korean learners unlike native speakers who use all three phonetic cues to differentiate the degrees of stress. They also seem to suggest that temporal properties like duration might be less marked for acquisition of English stress than spectral cues like F0 or amplitude. Mattys' (2000) preliminary production study shows that initial primary stressed vowels are higher in F0, longer and louder than initial secondary stressed vowels for native speakers of English. These differences have long been found to hold true between stressed vowels and unstressed vowels for native speakers of English (Beckman 1986, Fry 1958, Lehiste 1970). In a nutshell, it seems that Korean speakers use fewer cues than native speakers of English to differentiate subtle degree of stress in English on the production side.

In order to confirm and replicate previous results found for native speakers, the present study obtained 5 English native speakers' production. Table 2 shows mean durations, F0s, and intensity for primary and secondary stressed vowels. As illustrated, effects of all three cues are evident only in the initial syllable, but not in the third syllables. Specifically, primary stressed vowels were on average 5 ms longer than secondary stressed ones ($F(1,5)=8.8$, $p<0.05$) and were 5 Hz higher than secondary stressed one ($F(1,5)=14$, $p<0.05$). Furthermore, there was a significant difference in loudness ($F(1,5)=1.9$, $p<0.05$). This finding confirms stress-sensitive acoustic differences for native speakers of English.

Table 2. Vowel duration, F0, and intensity for native speakers of English

	1st syllable		3rd syllable	
	Pri.strs	Sec.strs	Pri.strs	Sec.strs
Dur. (ms)	91	86	118	123
F0 (Hz)	146	141	138	141
Int.(dB)	80	79	75	77

Putting together the results in Table 1 and 2, we see that vowel duration, F0, and intensity are crucial stress cues enough to judge whether a syllable is primary or secondary stress for native speakers of English, especially for the initial position, while primary vowel duration is employed as a potential cue for Korean speakers.

3.2. Korean Listeners' Word Restoration

Table 3 exhibits accuracy of restoration of the source words as a function of stress (primary vs. secondary) and size of auditory stimuli (mono- vs. di-syllables) obtained for thirty eight Korean L2 listeners. In order to determine whether stress and stimuli size on affects the accuracy of word restoration, a two-way repeated-measures ANOVA was conducted. Analysis found significant main effects of stress ($F(1,37)=7.826$, $p<.001$) and fragment size ($F(1,37)=5.643$, $p=0.02$), but interaction of stress and stimuli size reached no significance ($F(1,37)=0.846$, $p>0.05$). Specifically, as illustrated in Table 3, Korean L2 listeners identified the source words more accurately when they heard initial primary-stressed (one or two) syllables than when they heard secondary-stressed counterparts (55% vs 44%). This finding suggests that Korean listeners were sensitive to stress difference to some extent to distinguish primary and secondary stress and to restore words differently on the basis of stress cues. Next, accuracy of word identification was substantially higher when the auditory stimuli were initial two syllable feet than monosyllables (51% vs. 48%). This indicates that longer fragments might have contributed to the restoration of source words slightly more than shorter ones.

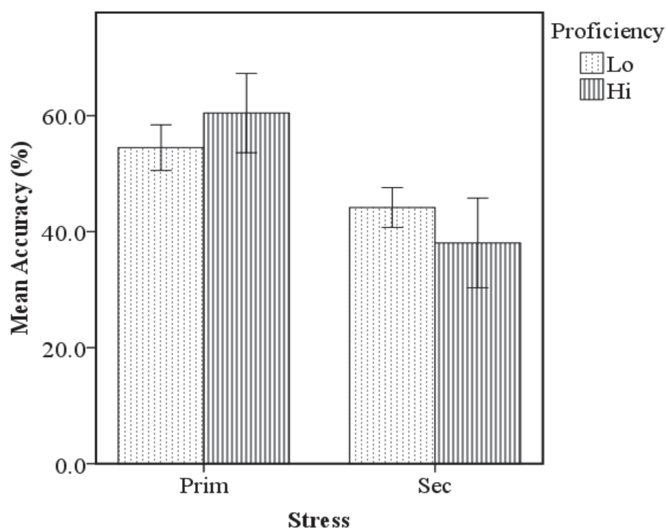
Table 3. Accuracy of identification of the source words as a function of stress pattern and stimuli size (%)

Stress	Initial-primary stress		Initial-secondary stress	
Fragment size	1st syl.	1st & 2nd sylls.	1st syl.	1st & 2nd sylls.
Females	56.2	54.8	43.1	48.9
Males	53.2	56.4	40.8	44.2
All	55.2	55.2	42.5	47.7

However, within initial primary stress condition, fragment size effects were not found ($F(1,37)=0.07$, $p>0.05$), whereas such effects were significantly marginal within secondary stress condition (42.5% vs. 47.7%, $F(1,37)=2.9$, $p=0.09$) as shown in Table 3.

In order to see whether L2 proficiency is related to Korean listeners' sensitivity to stress and/or word restoration, accuracy results were classified by dividing 30 participants into two groups (high-proficiency group with TOEIC scores higher than 700; low-proficiency group with less than 700). A two-way (proficiency × stress) repeated-measures ANOVA was performed. Analysis displayed no main effect of proficiency (49% vs. 49%, $F(1,14)=0.003$, $p>0.05$), but stress effect approached significance (57% vs. 41%, $F(1,14)=17.13$, $p=0.001$). Interaction of proficiency and stress reached marginal significance ($F(1,14)=3.324$, $p=0.09$). This result indicates that Korean learners' restorability of the source words was not affected by their L2 proficiency level characterized by TOEIC scores. In other words, whether more or less advanced learners, they were sensitive to stress difference and were able to identify the source words by way of primary stress cues rather than secondary stress cues. Figure 1 depicts the interaction between proficiency and stress.

Figure 1. Interaction between proficiency and stress



Finally, in order to see whether Korean listeners' restorability of the source words is affected by vowel quality of the initial primary- or secondary-stressed syllables, a one-way ANOVA was conducted. Analysis displayed no significant effect of vowel quality on the accuracy of word restoration ($F(3,155)=0.38$, $p>0.05$). Specifically, whether the stressed syllables varied among /ɪ, ɛ, æ, ɑ/ (e.g., [vɪ́ndɪ] 'vindication', [dɛ́lə] 'delegating', [nǽvɪ] 'navigator', [kɑ́nsɪ] 'consequently'), accuracy of word detection did not vary.

Table 4 exhibits reaction time when it took to judge the stimuli or restore the source words on the basis of initial one or two syllables by stress and stimuli size. To examine whether stress difference and stimuli size affect reaction time, a two-way repeated-measures ANOVA was performed. Analysis showed that there were no main effects of stress ($F(1,36)=0.0$, $p>0.05$) and no interaction of stress and fragment length ($F(1,36)=1.29$, $p>0.05$). However, the effect of fragment size reached significance ($F(1,36)=89.7$, $p<0.001$). First, these findings indicate that stress difference was not conducive to rapid judgment. Specifically, it took almost the same amount of time to identify the source words whether the stimuli contained primary- or secondary-stressed vowels. Second, they suggest that the longer the fragments were, the faster the source words were identified although fast reaction time did not contribute to more accuracy (e.g., [rέplɪ] vs. [rὲ] 'replicating' or 'replication', 2.9 sec vs. 3.7 sec).

Table 4. Reaction time for identification of the source word as a function of stress pattern and stimuli size

Stress	Initial-primary stress		Initial-secondary stress	
Fragment size	1st syl.	1st & 2nd sylls.	1st syl.	1st & 2nd sylls.
Females	3.8	3.8	3.7	3.0
Males	3.4	2.6	3.5	2.8
All	3.7	2.8	3.6	3.0

Such effect of fragment size on reaction time was found for stimuli with initial primary stress (e.g., [nǽvɪ] vs. [nǽ] 'navigator', 2.9 sec. vs. 3.7 sec., $F(1,36)=82.32$, $p=0.001$). It also took faster to judge longer fragments, i.e., initial foot with secondary-stressed vowels than shorter ones, i.e., initial monosyllables (e.g., [næ̀vɪ] vs. [næ̀] for 'navigation', 2.9 sec. vs. 3.7 sec., $F(1,36)=64.22$, $p<0.001$). Figure 3 clearly illustrates no interaction between stress and fragment size. The main effect of fragment size, no effect of stress and no interaction between those factors were found for both females and males (females, stress, $F(1,22)=0.11$, $p>0.05$; fragment size, 2.9 sec. vs. 3.7 sec., $F(1,22)=57$, $p<0.001$; interaction, $F(1,22)=0.94$, $p>0.05$: males, stress, $F(1,13)=0.39$, $p>0.05$; fragment size, 2.8 sec. vs. 3.6 sec., $F(1,13)=30.46$, $p<0.001$; interaction, $\mathrm{F}(1,13)=0.31$, $p>0.05$).

In summary, reaction time was significantly affected by fragment size, not by stress for Korean L2 listeners; however faster reaction times did not guarantee higher accuracy of source words.

3.3. Native English Speakers' Perception of stress

In order to compare the effects of stress and fragment size on accuracy of the source words and reaction time obtained for Korean L2 listeners with those of native English speakers, a two-way repeated-measures ANOVA was used. Analysis displayed a marginally significant main effect of stress ($F(1,3)=6.5$, $p=0.08$) and no main effect of fragment size ($F(1,3)=2.19$, $p>0.05$). Furthermore, interaction of stress × fragment size did not approach significance ($F(1,3)=0.53$, p>0.05). As illustrated in Table 5, stimuli with primary stress were restored to the source words more than those with secondary stress (77.7% vs. 27.7%). This shows that native English speakers tend to resort to primary stress more than secondary stress. However, accuracy was not significantly different regardless of shorter or longer fragments (50.6% vs. 54.8%).

Table 5. Mean accuracy for identification of the source words as a function of stress pattern and stimuli size (%)

Stress	Initial-primary stress		Initial-secondary stress	
Fragment size	1st syl.	1st & 2nd sylls.	1st syl.	1st & 2nd sylls.
	74.8	80.8	26.4	29
Average	77.7		27.7	

Next, in order to explore subject variation, accuracy was submitted to one-way ANOVA for stress or fragment size effect within each subject condition. As clearly demonstrated in Table 6, the initial one or two syllables with primary stress played a role as more reliable cues in restoring the source words than those with secondary stress for three out of four native speakers, i.e., E1, E2, and E3. As for E4, there was no significant effect of stress on accuracy. In addition, there were no significant differences in reaction time for fragment size for all four native English listeners. That is, longer stimuli did not contribute to higher accuracy of word detection. This finding suggests that the second syllable following the initial primary- or secondary-stress did not contain pivotal information enough to induce listeners to identify words and more segmental information alone does not guarantee more accurate word restoration.

Table 6. Mean accuracy for identification of the source words as a function of stress pattern and stimuli size (sec.)

	stress		Fragment size	
speakers	primary	secondary	1 syllable	2 syllables
E1	82	35	77	77
	F(1,32)=45.3, p<0.001***		F(1,57)=0.0, p>0.05	
E2	71	44	65	74
	F(1,34)=13, p=0.001**		F(1,72)=2.2, p>0.05	
E3	97	25	96	96
	F(1,24)=196, p<0.001**		F(1,47)=0.0, p>0.05	
E4	61	58	66	73
	F(1,44)=0.16, p>0.05		F(1,75)=1.4, p>0.05	

Next, in order to explore the effects of stress and fragments size on reaction time that took to identify the source words, a two-way repeated-measures ANOVA was performed. Analysis revealed that there were no main effect of stress ($F(1,3)=0.68$, $p>0.05$) and no interaction of stress and fragment size ($F(1,3)=1.34$, $p>0.05$). However, main effect of fragment size reached a marginally significant effect (F(1,3)=7.67, p=0.70). Specifically, although stress differences affect the accuracy, they did not influence how long it took to restore the source words for native speakers of English.

Effects of stress and fragment size on reaction time within each subject were explored by a two-way ANOVA. Analysis showed that only fragment size affected reaction time for three native speakers of English, i.e., E1, E2, and E3. Stress effect and interaction effect were not found for any native listeners. Specifically, for E1, E2, and E3, it took faster to judge longer fragments (i.e., initial two syllables, [sέrɪ] in 'ceremony') than shorter ones (i.e., [sέ] in 'ceremony').

In summary, despite a relatively small number of native speakers of English, overall, stress but not fragment size played a crucial role for word detection. That is, initial syllables or feet with primary stress were restored to the source word substantially more accurately than those with secondary stress (77.7% vs. 27.7%). On the other hand, not stress but fragment size alone influenced reaction time which took to judge the auditory stimuli. Specifically, it took faster to restore the source words from the longer fragments than from the shorter ones although the former did not guarantee higher accuracy over the latter (2.7 sec. vs. 3.4 sec).

Compared with the results obtained for Korean L2 listeners, native English listeners restored the source words even more accurately on the basis of initial primary-stressed signals than secondary-stressed ones, implying that they have perceptually greater sensitivity to stress differences than Koreans (77.7% vs. 55.2%). Similar to Korean listeners, native speakers also made judgments on the longer fragments faster than on the shorter ones (English 2.7 sec. vs. 3.4 sec; Korean 2.9 sec. vs. 3.7 sec.). Overall, stress effect was found for accuracy, and fragment size effect obtained for reaction time for both native speakers of English and Korean L2 listeners.

4. Discussion

This study investigated whether Korean L2 learners of English produce subtle differences between primary and secondary stressed vowels found for native speakers of English and whether they can restore the source English words solely on the basis of one or two-syllable fragments containing primary- and secondary-stressed vowels without reference to the full segmental information.

First, Korean L2 speakers produced primary-stressed vowels with longer duration than secondary ones, particularly in the first syllable but not in the third syllable. However, F0 and amplitude were differently realized enough to distinguish subtle stress differences. On the other hand, results obtained for five native speakers of English in the current study replicated previous findings (Beckman 1986, de Jong and Jawaydeh 2002, Lehiste 1970, Mattys 2000). That is, so-called three major phonetic correlates of stress, i.e., vowel duration, F0, and amplitude were all significantly different between primary- and secondary-stressed vowels, particularly in the first syllable but not in the third syllable. Furthermore, another difference is that difference in vowel duration was 5 ms for Korean speakers, while that was 11 ms for native English speakers. These findings provide several implications on the acquisition of English stress by Korean L2 speakers. First, from the fact that vowel duration is only a reliable indicator of stress degree for Korean speakers, it might be the case that temporal properties like duration is less marked for L2 acquisition than the other spectral cues like F0 and amplitude. Second, it implies that L2 learners seem to be at a stage of acquiring vowel duration as a phonetic cue of stress which does not exist as a phonemic entity in their L1 Korean, supporting Kuhl and Iverson (1995). Such differences in availability of phonetic cues of stress might account for differences in perceptual sensitivity to stress between Korean L2 and native English listeners.

Second, results in the current experiment showed that accuracy of restoration of the source words was affected by stress like native speakers of English employed in the current study as well as those in Mattys (2000). Specifically, the source English words were identified more accurately on the basis of initial primary-stressed than secondary-stressed syllables. However, in the present study, reliability of primary stress was much greater for native speakers of English than Korean L2 listeners. Interestingly, the accuracy for Korean listeners is similar to that for English listeners in Mattys' (2000) study. Comparing the current study with Mattys (2000), even native speakers did not show consistent patterns of perceptual sensitivity with regard to primary- and secondary-stressed syllables.

In any case, the results in our study provide interesting implications as to L2 word recognition. First, it seems that the first syllable or foot with primary stressed vowels plays a more crucial role in activating the source words than that of secondary stressed vowels even for L2 speakers, although their perceptual sensitivity is relatively lower than native speakers of English. Second, it suggests L2 speakers' mental lexicons contain representations with prosodic as well as segmental information. Finally, our results lend additional support to prosody-based word recognition even for L2 listeners in that they can differentiate the subtle nuance in English stress and identify the source words on the basis of such clues, being segmental information available equal (Mattys and Samuel 1997, Vroomen and de Gelder 1997). This is evidenced in that accuracy was significantly higher for primary-stressed than secondary-stressed signals, whereas longer fragments did not elevate the accuracy over shorter ones. Of course, longer fragments definitely assisted listeners to judge the stimuli and guess the source words faster than shorter ones. Nevertheless, more segmental information did not guarantee higher accuracy of restoration of the source words, implying that segmental information alone is not sufficient enough to activate the appropriate words for L2 listeners as well as L1 listeners. For that reason, it makes sense to infer that Korean L2 learners seem to be equipped with lexical representation containing stress as well as segmental information.

Third, it is worthwhile to interpret our results in terms of the cohort model for L2 listeners. As previously mentioned, under the cohort model (Grosjean 1980, Marslen-Wilson and Tyler 1980, Marslen-Wilson 1987), words can be recognized from partial acoustic input before all the segments of a word are heard. Listeners can discriminate a word from others as soon as available information is given. When listeners hear a portion of word in a left-to-right fashion, they activate multiple words on the basis of what they hear. As they hear more and more segments, they identify the words. This model for L1 listeners seems to accord with the results obtained for Korean L2 listeners. They can discriminate one word from another (e.g., 'navigator' vs. 'navigation'). Furthermore, the accuracy of identification increased as they heard longer fragments (e.g., for Koreans: [næ]'na' vs. [nævɪ] 'navi' => 48% vs. 51%). However, for native speakers of English, mere longer fragments did not significantly contribute to higher accuracy (50% vs. 54%). These findings suggest that the segmentally-based word recognition model, i.e., cohort model does not present a perfect account for word recognition for L1, but instead does more for L2 listeners. Thus, following Walley (1993), we adopt a revised version of the cohort model where listeners' lexical representation and processing may not be exclusively segmentally-based but rather holistic to handle both L1 and L2 listeners. That is, it might be the case that listeners incorporate segmental and prosodic information to identify and restore the speakers' intended words.

5. Conclusion

The current study showed that on the production side, only vowel duration was significantly different between primary- and secondary-stressed syllables for Korean L2 speakers. On the other hand, it replicated the previous findings for native speakers of English by showing that vowel duration, F0, and amplitude are reliable indicators of stress degrees for native speakers of English. On the perception side, subtle differences in stress played a crucial role as a perceptual cue to differentiate one word from another word with the same segmental information for Korean L2 listeners although their perceptual sensitivity was lower than native speakers of English. However, fragment size did not affect the accuracy of identification of the source words. Regardless of stress differences, fragment size affected the reaction time it took to judge the stimuli, showing that it took faster to judge the longer fragments than the shorter ones for both Korean and English speakers. These results suggest that a prosody-based word recognition model holds true for L2 learners as well as for L1 listeners. In addition, it is likely that L2 listeners activate words on the basis of segmental information coupled with prosodic information.

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Templates as affixation of segment-sized units: the case of Southern Sierra Miwok*

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1. Introduction

In this paper, I argue that certain templatic effects in Southern Sierra Miwok (SSM) follow from affixation of moras and underspecified segments. Such an analysis avoids the assumptions of syllabified X-Slots in the representation of morphemes that previous analyses for SSM argue for (Sloan 1991). In contrast, my optimality-theoretic analysis predicts the templatic restrictions over whole strings of segments through the affixation of segment-sized phonological elements.

In SSM (Broadbent 1964, Sloan 1991), suffixes can require the preceding stem to conform to a certain shape. Such instances of 'template-requiring affixes' are also attested in Yawelmani (Archangeli 1984, 1991). A first illustrating example is given in (1) where four different forms all based on the same verb stem 'to hunt' are given.[1] The stem is followed by different suffixes and it surfaces in a different shape in every context: It has a medial geminate in (1a), it has no geminate in (1b),

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[1] Broadbent (1964) uses some non-standard sound symbols. She uses *N* for the velar nasal, *T* for alveolar voiceless stops, and *y* for central high vowels. I replace those with the standard IPA symbols *ŋ*, *t*, and *ɨ* throughout. The symbol *Y* represents an *u* if the following syllable contains an *u* or an *o* and an *ɨ* elsewhere. It is the epenthetic default vowel of SSM but exists underlyingly as

it has a light open second syllable in (1c), and a long vowel in the second syllable in (1d). In the following, I use the term 'template' purely descriptively to refer to such fixed sequences of long/short vowels and consonants.

(1) *Templates in SSM* (Sloan 1991, 152-254)

a. halːik-iH-hːY-ʔ
'he used to hunt'

b. halik-meh-nY-haHk-te-ʔ
'I was hunting on my way'

c. halki-paH
'a good hunter'

d. haːlik-teː-nY
'to hunt along the trail'

Most verbal affixes in SSM are of this template-requiring type but there are also affixes that do not require the stem to conform to a certain templatic form. It is therefore very well possible to determine an underlying form for every stem. This distinguishes the template-effects in Miwok from templatic morphology in e.g. Semitic morphology (cf. e.g. Bat-El (2011)). In her investigation of syllable structure and templates in SSM, Sloan (1991) argues that three LH templates are particularly interesting since they require an analysis assuming (partly) syllabified X-Slots in the representation of morphemes. In contrast, I argue that the three LH templates are easily analysable in an analysis based on standard moraic theory. Such an analysis based exclusively on the independently motivated prosodic constituents of moras and segmental root nodes avoids the powerful enrichment of syllabified segmental positions as possible representations for morphemes. The paper is structured as follows: I begin with some necessary background assumptions about the phonology of SSM in section 2.1 and introduces the three LH templates in section 2.2. In section 3, I present my optimality-theoretic analysis for the three LH templates in SSM that is crucially based on the two theoretical mechanisms of moraic overwriting (section 3.1) and realization of underspecified segmental root nodes (section 3.2). I conclude in section 4.

2. The data: LH templates in Southern Sierra Miwok

Sierra Miwok is one of five moderately diverse Miwok languages (Penutian). It has the significant regional dialects of Northern, Southern, and Central Sierra Miwok. Southern Sierra Miwok was spoken over much of Maripose Country, in the foothills of the Sierra Nevada and has only a few semispeakers or passive speakers today

well. The symbol *H* marks either a preceding long segment, i.e. stands for ː if it is not followed by another consonant and a juncture or followed/preceded by a C-cluster (except VH+CH). The symbol *X* represents length as well but in slightly different contexts. It is realized as ː if a single consonant follows and none precedes the *X*. Otherwise it is not realized.

(Hinton 1994, Golla 2011). My data for Southern Sierra Miwok are mainly from Broadbent's 1964 grammar of SSM that is also the base for the theoretical work in Sloan (1991).[2] Up to now, I am aware of only one other theoretical analysis for templates in Southern Miwok and that is on the Central variety Bye and Svenonius (2011). Their analysis is quite similar to my own theoretical proposal based on the affixation of moras and root nodes, although the Central Sierra Miwok data they analyse is different from the three LH templates I focus on.[3]

2.1. Syllable structure and stress in SSM

SSM has a length contrast for vowels and for consonants and does not allow complex codas, onsets or clusters of identical vowels. Consequently, only the syllable types in (2) are possible in the language. Final consonants are taken to be extrametrical since CVC# syllables count as short and CVːC# syllables are only possible in final position.

(2) *Syllables in SSM*

a. Short: CV, CVC#

b. Long: CVC, CVCː, CVː, CVːC#

Syllable weight is crucial for determining stress in the language. Sierra Miwok is an often cited example for iambic lengthening (Callaghan 1987, Hayes 1995, Buckley 1998): Main stress is always on the first heavy syllable and must be on the first or second syllable. The relevant constraints predicting iambic lengthening are the standard constraints given in (3) whose effect is exemplified in tableau (4) for the abstract input CVCVCV. STRESS-TO-WEIGHT is the crucial constraint ensuring that only heavy syllables are stressable, excluding for example a iambic foot with two light syllables as in candidate (4c). Consequently, some phonological strategy ensures that one of the syllables is heavy. The choice between vowel lengthening in candidate (4e+f) and consonant epenthesis (4d) is decided in favor of the former due to high-ranked HAVEPLACE penalizing insertion of an epenthetic consonant.

(3) a. ALL-FOOT-LEFT (=AFL) (McCarthy and Prince 1993)
Assign a violation mark for every left edge of a foot that is not aligned with the left edge of a prosodic word.

b. STRESS-TO-WEIGHT (=STW) (Kager 1999)
Assign a violation mark for every stressed syllable that is not heavy (=2μ).

[2] Another source I rely on is Freeland (1951) (written in 1936) that focusses on Central Southern Miwok but contains informations on Northern and Southern Sierra Miwok as well.

[3] They analyse four different stem forms in the Central variety of Sierra Miwok. The fourth stem in Central Sierra Miwok is always CVC.CV, the third stem CVCːVC, and the second stem is either CVCC or CV.CVC. The first stem varies in shape but is restricted through various demands, e.g. the necessity to be bisyllabic and to contain at least one heavy syllable.

c. RHYMETYPE:IAMB (=RHT:I) (Kager 1999)
Assign a violation mark for every foot with non-final prominence.

d. PARSE-σ (=PRS-σ) (McCarthy and Prince 1993)
Assign a violation mark for every syllable that is not parsed into a foot.

e. HAVEPLACE (=HVPL) (Ito and Mester 1993, Padgett 1994)
Assign a violation mark for every segment without a place feature specification.

(4) *Iambic Lengthening in SSM*

CVCVCV	AFL	RHT:I	STW	HVPL	PARSE-σ
a. CV.CV.(CV́C)	*!*				**
b. (CV́ː.CV).CVC		*!			*
c. (CV.CV́).CVC			*!		*
d. (CV.CVʔ).CVC				*!	*
e. (CV́ː).CV.CVC					**!
☞ f. (CV.CV́ː).CVC					*

Another crucial restriction in SSM is the fact that verb stems are maximally bisyllabic. There are at least two major proposals for implementing such maximality restrictions inside OT.[4] I follow Ussishkin (2005) in assuming a version of Hierarchical Alignment (Ito *et al.* 1996) and the constraint given in (5) demanding that stems are maximally bisyllabic.

(5) SYLLABLE-PRWDALIGNMENT (Ussishkin 2005, 188)
$\forall\sigma\exists$ PrWd [PrWd $\supset$ σ and ALIGN (σ, PrWd)]
(=Assign a violation mark for every syllable that is not aligned with the edge of some prosodic word containing it.)

I assume in the following that stems are evaluated prior to morphological concatenation (Bermúdez-Otero 2007, Kiparsky 2000, Bermúdez-Otero in preparation). This earlier optimization cycle ensures that only fully prosodified stems conforming to the bisyllabic maximality restriction enter the following optimization cycles where affixes are attached to stems.
Finally, it is important that affixes in SSM are never stressed. There are various theoretical implementations for such a generalization (cf. for example Selkirk (2004) or Trommer (2005)) and I simply follow Trommer (2011) in assuming that an undominated ALIGNMENT constraint explicitly demands that foot boundaries must coincide with boundaries of lexical morphemes.

2.2. Three LH templates as a challenge for a theoretical analysis

In the following, I concentrate on three classes of suffixes requiring that the preceding stem conforms to an LH template but vary in the shape of the final syllable.

[4] For discussion cf. for example ch. 2.3 in Ussishkin (2000).

Affixes of class I require a closed final syllable as is illustrate in (6I) with the agentive suffix *–peH*. Class II affixes require a long final vowel as e.g. the suffix *-t* (6II). Stems preceding suffixes of class III are either CVC or CVː-final as can be seen in (6III).

(6) *Examples for LH-requiring affixes* (Sloan 1991, 172-177)

I. affix –peH 'agentive'			*II. affix –t 'do what is characteristic of . . . '*		
a.	halik-peH	'hunter'	e.	wɨliː-t	'to flash, of lightening'
b.	ʔokoj-peH	'a nurse'	f.	paTɨː-t	'to take, accept'
c.	liwaʔ-peH	'speechmaker'	g.	puluː-t	'to dip up'
d.	kotoʔ-peH	'guide'	h.	moliː-t	'shade'

III. affix –na 'benefactive'		
i.	kojow-na	'to tell for someone'
j.	juwal-na	'to stir for someone'
k.	hekaː-na	'to clean for someone'
l.	TeTɨː-na	'to gather for someone'

The variation in the stem forms preceding class III suffixes is bound to the number of underlying stem consonants. Three-consonantal stems as in (6i+j) surface as CV.CVC whereas stems with only two consonants in their underlying representation (6k+l) surface as CV.CVː. Interestingly enough, the three LH templates therefore result in only two different surface structures (CV.CVC and CV.CVV) that are distributed differently for two- and three-consonantal stems. The list in 7 makes it apparent that different phonological strategies apply to ensure that the stem conforms to these form requirements. Instances of *1.* CV-metathesis, *2.* realization of an additional ɨ, *3.* realization of an additional ʔ, *4.* V-shortening, *5.* C-deletion, *6.* V-lengthening and *7.* degemination can be found.

(7) *LH templates: examples*

	followed by:	class I affix	class II affix	class III affix
a.	liwːa	liwaʔ	liwaː	liwaː
b.	pelːe	peleʔ	peleː	peleː
c.	koːl	koluʔ	koluː	koluː
e.	wyliːp	wylip	wyliː	wylip
f.	halki	halik	haliː	halik
g.	wyks	wykys	wykyː	wykys

Sloan (1991) argues that the need to distinguish final CVC and CVː-syllables (class I and II) is strong evidence for an analysis where the three LH templates are represented as (partially) syllabified X-slots (Levin 1985). Sloan (1991) assumes a representation for the LH-templates where a light syllable with two X-Slots associated as onset and nucleus is followed by a heavy syllable with three X-Slots. The difference between class I and class II affixes is the association of the final X-Slot: it is associated to the rhyme node (=a coda consonant) or to the nucleus (=a long vowel). The alternating class III templates have a final X-slot that is not associated at all. This floating X-slot is associated with either the nucleus or the rhyme node: depending on whether a third root consonant is available on the melodic tier or whether all consonants are already associated.

I argue in the following that standard moraic theory is very well able to represent the three LH templates of SSM as well without the assumption of already syllabified morpheme representations. It is shown below how the ranking of standard faithfulness constraints penalizing the application of such phonological operations and the constraints ensuring moraic overwriting and the realization of defective phonological segments predicts the different phonological strategies that apply to ensure that the stems conform to the form requirements of the LH affixes.

3. Analysis

I argue that the three LH templates in SSM are the simple result of affixing segment-sized phonological structure, namely moras and underspecified segmental root nodes that are independently argued for in numerous analyses for non-conconcatenative morphology (e.g. Grimes (2002a), Davis and Ueda (2006), Seiler (2008), Trommer and Zimmermann (2010), Bermúdez-Otero (to appear)).

3.1. Moraic Prefixation

The most obvious generalization about the three LH templates is the fact that all consist of a light syllable followed by a heavy syllable. Given the stress system of the language, it is clear that the first part of the generalization is sufficient to describe the prosodic make-up of the templates: That the second syllable is heavy follows from general phonological demands of SSM if the first syllable is light. In this subsection, I show how this crucial part of all the LH templates is easily predicted from a standard device in phonology, namely affixation of a mora. I assume that in the context of every LH-requiring suffixes, a moraic prefix that is assumed to be part of the representation of the affix is added to the root. LH-requiring affixes are consequently circumfixes and consist of a mora that must be realised at the left edge of the stem and a segmental part that is realized at the right edge of the stem.[5] There are possible arguments for the alternative analysis that the moraic prefix is a morpheme on its own as well but for reasons of space I cant discuss those in any detail.

The mora in SSM is now assumed to result in an overwriting effect. It is integrated into the prosodic structure of the first syllable and makes all further moraic structure

[5] It is therefore taken for granted that every exponent is marked for whether it attaches to the left edge or the right edge of its stem and that circumfixes are split up into two exponents with different requirements for the edge to which they attach, i.e. are suffix and prefix at the same time (Spencer 1991, Sproat 1992, Anderson 1992, Marušič 2003).

in this syllable impossible. This overwriting follows from the constraint (8) that demands that every new association of a segment to a mora must be located at the right edge of a syllable. It is a modified DEP constraint for association lines referring to a specific syllabic position.

(8) DEPLINK-$\mu]_\sigma$ (=DL]) (e.g. Morén 1999 for DepLinkμ)
Assign a violation mark for every inserted association line between μ and a segment that is not at the right edge of a syllable.

The effect of DEPLINK-$\mu]_\sigma$ is illustrated in tableau (11). It derives the output for the stem *polat* to which the affix mora is added.[6] In the following tableaux, I notate the affixed mora as superscribed $^\mu$ whenever it associates to a vowel. If a vowel is associated to two moras in the output and one is the affixed mora, I distinguish between the representations V:$^\mu$ and $^\mu$V: to indicate whether the mora is the leftmost or the rightmost mora that is associated to the vowel.
Due to the standard markedness constraint *FLOAT (e.g. Kirchner (2007)), the mora cannot remain unassociated as in candidate (11a). The undominated constraint MAXμ_{AF} demands preservation of every affix mora and deletion of this affixed mora as in candidate (11b) is impossible as well. The affix mora must therefore be integrated into the prosodic structure of the base. Since it must be realized at the left edge of the stem, it must dominate the first vowel that is the leftmost possible host for a mora.[7] But association to this first vowel and the resulting lengthening in candidate (11c) is excluded from DEPLINK-$\mu]_\sigma$. The prefixed mora associates to a vowel that is already associated to an underlying mora. The association line to this the underlying mora is the rightmost association line in the syllable and the new association to the affix mora is the leftmost association in the syllable – the configuration that is penalized by DEPLINK-$\mu]_\sigma$.

(9) *Float (=*FL) (Kirchner 2007)
Assign a violation mark for every μin the output that is not prosodically integrated.
(=it is dominated by a syllable node and dominates a segment)

(10) MAXμ_{AF}
Assign a violation mark for every affix-μin the input without an output correspondent.

[6] Recall the assumption that stems are optimized prior to concatenation. From this it follows that all vowels and non-final coda consonants are moraic in the input. The affix is assumed to be underlyingly mora-less, but nothing hinges on this assumption and the very same result is predicted if a moraic affix (very well possible given the assumption of Richness of the Base) attaches.
[7] This implies that all moras are ordered with respect to each other on the moraic tier, irrespective of whether they are underlyingly associated or not.

(11) *Moraic Overwriting*

μ+ polat	*FL	MAXμ_{AF}	DL]
a. μ po.lat	*!		
b. polat		*!	
c. p$^{\mu}$oː.lat			*!
☞ d. po$^{\mu}$.lat			

It is clear that the moraic overwriting in such a context with a short first syllable does not result in any surface effect: the first stem syllable *po* was light underlyingly and it is light in the output. But if the moraic prefix attaches to a stem with an underlyingly heavy first syllable, a surface effect of shortening is expected. This is illustrated in the tableau (12) where the stem *hoːja* with a long vowel in the first syllable is optimized. As before, the prefixed mora must dominate the first vowel and it is the only possible mora in the first syllable. That the affix mora is simply added to the moras of the first syllable as in candidate (12b) – note that three-moriac syllables are generally impossible in SSM – is once again excluded from DEPLINK-$\mu]_{\sigma}$. Consequently, candidate (12c) seems to win the competition and the underlyingly long vowel is predicted to be realized as a short vowel.

(12) *Moraic overwriting with long first vowel*

μ+ hoːja	MAXμ_{AF}	DL]
a. hoː.ja	*!	
b. h$^{\mu}$oː.ja		*!
(☞) c. h$^{\mu}$o.ja		

But given the knowledge of the stress system of SSS, it is clear that candidate (12c) is no possible grammatical output. A short first syllable necessarily results in a heavy second syllable. The ranking that is responsible for this iambic lengthening was illustrated in tableau (4). Quite parallel to the competition there, the optimal output for the stem μ + *hoja* is *hojaː*. Vowel lengthening applies to ensure that only heavy syllables are stressed, cf. (13A). But not only vowel lengthening applies in the context of moraic overwriting. As is shown in the summarizing tableau (13), metathesis (13C), insertion of an epenthetic vowel (13D+E) and vowel shortening (13F) apply as well. This last stem *wyliːp* in (13F) is particularly interesting. Recall that CV:C syllables are only possible in final position in SSM. If a stem ending in a CV:C syllable is followed by a suffix that starts with an onset, such a syllable is expected medially: **wy.liːp.peH*. Such a structure is impossible in SSM and excluded from an undominated constraint, e.g. *$\mu\mu\mu$ banning three-moraic syllables.
Candidates excluded by STRESS-TO-WEIGHT, ALL-FOOT-LEFT, RHYMETYPE:-IAMB, and PARSE-σ or the constraints ensuring proper realization of the moraic prefix (MAXμ_{AF}, *FLOAT, and DEPLINK-$\mu]_{\sigma}$) are omitted in the tableau for reasons of space. At the end of section 3, a complete ranking of all constraints in SSM is given.

(13) *Class III suffixes*

	PRS-σ	HVPL	MAXC	LIN
A. *hoːja*				
☞ a. (ho$^{\mu}$.jáː).peH	*			
b. (ho$^{\mu}$.jáʔ).peH	*	*!		
B. *liwːa*				
☞ a. (li$^{\mu}$.wáː).peH	*			
b. (li$^{\mu}$.wáʔ).peH	*	*!		
C. *halki*				
a. (ha$^{\mu}$.líː).peH	*		*!	
b. (ha$^{\mu}$.líʔ).peH	*	*!	*	
☞ c. (ha$^{\mu}$.lík).peH	*			*
D. *wɨks*				
☞ a. (wɨ$^{\mu}$.k´ɨs).peH	*	*		
b. (wɨ$^{\mu}$.k´ɨː).peH	*	*	*!	
E. *koːl*				
☞ a. (ko$^{\mu}$.l´ɨː).peH	*	*		
b. (ko$^{\mu}$.l´ɨʔ).peH	*	**!		
F. *wɨliːp*				
☞ a. (wɨ$^{\mu}$.líp).peH	*			
b. (wɨ$^{\mu}$.líː).peH	*		*!	

Actually, the forms that are derived by moraic overwriting are already the forms that are observed in the context of class III affixes: the presence of a moraic prefix and the ranking of DEPLINK-$\mu]_{\sigma}$ and standard markedness constraints predicts that the first syllable is light and the second syllable is heavy. Whether this second syllable has a coda consonant or a long vowel is not specified but follows from the underlying number of stem consonants. Class III affixes are therefor assumed to be a affixes with a suffixing segmental representation and a moraic prefix.

3.2. Affixation of segmental root nodes

The crucial difference between class III suffixes on the one hand and class I and class II suffixes on the other hand is the fact that in the latter the second syllable is determined to be either consonant- or vowel-final. In this subsection, I argue that these restrictions are predicted from the affixation of underspecified segmental root nodes rather than from the existence of prespecified syllable positions. The affixation of root nodes is another independently motivated mechanism in analyses for non-concatenative morphology, assumed to predict instances of mutation, reduplication or insertion (Bermúdez-Otero to appear, Bye and Svenonius to appear). I assume that the segmental root nodes in SSM have a minimal feature specification characterizing them for being either an obstruents/sonorant/glide or a vowel. Only the former sounds are possible final segments preceding the segmental part of a class I affix and only the latter are possible in the context of a class II affix. I assume that the feature [±vocalic] in the definition given in (14) is the binary feature that distinguishes these classes in SSM. Vowels are the only [+vocalic] sounds and obstruents, sonorants, and glides are all specified for [–vocalic].

(14) [+vocalic] (Padgett 2007, Nevins and Chitoran 2008)
=Absence of a narrow constriction among the articulators

The resulting representation for a class I affix is given in (15). The fully specified segmental root nodes specifying the labial voiceless stop *p* and the vowel *e* are preceded by a segmental root node only specified for [-voc].
(Note that I omitted a representation for the alternating length of the *e* and the prefixing mora that is part of the affix as well.)

(15) *Example: Representation for suffix class I /–peH/*

•	•	•	abbreviated as:
	+cons	–cons	
	–son	+son	
-voc	–voc	+voc	$^{C}\bullet$ peH
	–cont	+cont	
	–nas	–nas	
	LAB	DORS	

Realization of a segmental root node that is only specified for the feature [±vocalic] violates various markedness constraints demanding full specification, e.g. the markedness constraint HAVEPLACE (3e). The only option for the underspecified segmental root node to receive a place feature specification is fusion with a preceding segment. This operation violates UNIFORMITY (16) demanding that every output element corresponds only to one input element.

(16) UNIFORMITY (=UNF) (McCarthy and Prince 1995)
Assign a violation mark for every output element that corresponds to more than one input element.

In some contexts, however, the underspecified segmental root nodes have no chance to fuse with a preceding stem segment and receive a place feature specification without violating higher-ranked markedness demands. One such context where the segmental root node remains radically underspecified and is realized as *ʔ* or *ɨ* respectively is exemplified in tableau (18) where a [–voc] segment precedes a vowel-final stem. The class I affix *-peH* is added to the root *hoːja*. The mora predicts that the optimal surface representation is necessarily LH as was already shown in the tableau (12). But in contrast to the context there, the choice between a second heavy syllable with a coda consonant or a long vowel is not due to high-ranked HAVEPLACE (cf. tableau A. in (13)) but is determined by the radically underspecified [–voc] segmental root node. As for the affixed mora, a faithfulness constraint specified for affix material ensures that the segmental root node cannot simply be deleted (MAXS$_{AF}$), cf. candidate (18a). Candidates (18b) and (18c) are possibilities to fuse the underspecified segmental root node with stem-segments. In (18b), the [–voc] root node fuses with another [–voc] segment, namely *j*. This possibility is excluded from O-CONTIGUITY (17) demanding that all elements of a morpheme must forma contiguous string if they were contiguous in the input.[8] The underspecified segmental root node at the right edge of the stem can therefor only undergo fusion with the stem-final segment.

(17) O-CONTIGUITY (=CNT) (Landman 2002)
Assign a violation mark for every instance where phonological portions in the output that belong to the same morpheme and form a contiguous string in the input do not form a contiguous string.
('No M-internal insertion.')

Fusion with the rightmost stem segment *a* in candidate (18c) avoids this violation but incurs a fatal violation of the faithfulness constraint IDENT[±VOC]. The optimal output is therefore candidate (18d) where the underspecified segmental root node remains underspecified and is realized as default *ʔ*.

(18) *Realization of a defective C*

μ + $h_1o_2j_3a_4$ + $^{C}\bullet_x$ $p_ye\!:_z$	MAXS$_{AF}$	CNT	ID[±V]	HVPL	UNF
a. ($h_1o_2{}^{\mu}$.j_3á$:_4$).p_ye_zH	*!				
b. ($h_1o_2{}^{\mu}$.$j_{3,x}$á$:_4$).p_ye_zH		*!			*
c. ($h_1o_2{}^{\mu}$.j_3á$:_{4,x}$).p_ye_zH			*!		*
☞ d. ($h_1o_2{}^{\mu}$.j_3á$_4$ʔ$_x$).p_ye_zH				*	

The derivation of class II affixes is absolutely parallel to the derivation of class I affixes we saw in (18). The underspecified segmental root node is specified for [+voc] rather than for [–voc] demanding that the stem must end in a vowel. In (19), a class II affix is attached to the same stem *hoːja*. In contrast to (18), where IDENT[±VOC] penalized a candidate where the defective segmental root node fused with the final stem segment, this fusion candidate in (19c) becomes optimal in (19). Since the final stem segment is [+voc], no violation of IDENT[±VOC] arises.

[8] The definition is slightly modified compared to the original formulation in Landman (2002). The fact that O-CONTIGUITY refers only to those portions of a morphemes that form a contiguous string in the input is necessary since class I and class II affixes are assumed to be circumfixes and I took it for granted that the different portions of a morpheme are inherently specified for being realized at the left or right edge of a stem.

(19) *Realization of a defective V*

μ + $h_1o_2j_3a_4$ + ${}^{V}\bullet_x$ t_y	MAXS$_{AF}$	CNT	ID[±V]	HVPL	UNF
a. $(h_1o_2{}^{\mu}.j_3\acute{a}{:}_4).p_ye_zH$	*!				
b. $(h_1o_2{}^{\mu}.j_3\acute{}\text{ɨ}{:}_x).p_ye_zH$				*!	
☞ c. $(h_1o_2{}^{\mu}.j_3\acute{a}{:}_{4,x}).p_ye_zH$					*

To summarize this analysis for the three different templates, the different representations for the three LH affixes are given in (20). All of them have in common that a mora attaches to the left edge of the stem[9] and results in moraic overwriting as was argued in section 3.1. Class I and class II affixes have an additional radically underspecified segmental root node that attaches to the right edge of the stem and is either specified for [+voc] or [–voc].

(20) *Representations for the three LH affixes*

class I: μ + + ${}^{C}\bullet$ peH
class II: μ + + ${}^{V}\bullet$ t
class III: μ +

The affixation of these independently motivated elements (moras, root nodes) together with the ranking of faithfulness and markedness constraints summarized in 21 correctly predicts the different phonological operations that apply to ensure that the stems conform to the templatic shape of a class I–III affix.

(21) *Full ranking of SSM*

AFL, RHT:I, STW
MAXμ_{AF}, MAXS$_{AF}$ $\gg$ HVPL, PRS-σ, MAXC $\gg$ LIN, UNF
*FL, DL], CNT, ID[±V]

4. Conclusion

In this paper I argued for an analysis of three classes of template-requiring suffixes in SSM that exclusively relies on the assumption of affixed moras and underspecified segmental root nodes. The analysis is couched in standard moraic theory and therefore falsifies the claim in Sloan (1991) that the existence of three different LH templates in SSM is only analysable in a theory assuming X-Slot theory and partly syllabified representations in the input. I argued that the template-requiring affixes are underlyingly circumfixes: they contain a moraic prefixal part and a segmental suffixal part that might contain radically underspecified segmental root nodes as well. I showed that the moraic prefix results in moraic overwriting and ensures that the first syllable is necessarily light. The stress system of SSM then predicts that the second syllable must be heavy. Stems that are concatenated with a class III

[9] The specification for attaching to either the left or right edge is notated by the following/preceding ‘+’.

suffix then choose between a closed syllable or a syllable with a long vowel. Class I and class II, however, demand that the second heavy stem syllable must be either consonant- or vowel-final. This restriction about the nature of the final stem segment follows from the presence of radically underspecified segmental root nodes in the representation of morphemes.

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