

## Shifty asymmetries: universals and variation in shifty indexicality\*

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Shifty indexicals draw their reference from an attitude event, rather than from the overall utterance. This paper takes up the analysis of indexical shift from a crosslinguistic point of view. Not all languages with indexical shift behave identically in terms of which verbs and indexicals are involved in indexical shift, how much optionality is attested in indexical shift, and whether shifty indexicals must be interpreted *de se*. I outline a constrained typology which aims both to capture known variation in these patterns and to make testable predictions about its ultimate limits. The resulting account models variation both within and across languages using tools drawn from Anand and Nevins's (2004) shifty operator view. I enrich this view with two innovations: stacking of shifty operators, and shifty operators that fall outside the scope of centered modal quantification. The first innovation facilitates a constrained approach to partial indexical shift (wherein some types of indexicals shift whereas others do not); the second allows for a constrained theory of shifty indexicals that lack *de se* requirements. Finally, I take steps to distinguish shifty indexicals from distinct but surface-similar phenomena involving logophors (and other bound elements) and quotation, aiming to clarify the controls that are needed in order to test the constrained typology on new data sets.

### 1 Introduction

Indexicals are a class of linguistic items identifiable by the particular way in which their reference depends on a speech event. This characteristic is so inherent to this lexical class that non-indexical paraphrases invariably fail to capture it, even when those paraphrases are themselves in some way context-dependent. So it is that when Anna and Berta watch a televised speech together, they may

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use definite expressions like *the speaker* or *the person talking* to form a coherent disagreement about the subject on screen:

(1) *A coherent disagreement*

Anna: The speaker / the person talking is in Washington.

Berta: No, the speaker / the person talking is not in Washington.

A version with the indexical *I*, on the other hand, fails not only in its attempt to refer to a third party; it does not even achieve the status of a coherent disagreement.<sup>1</sup>

(2) *Not a coherent disagreement*

Anna: I'm in Washington.

Berta: No, I'm not in Washington.

The well-formed disagreement in (1) demonstrates that even descriptions like *the speaker* and *the person talking* can, in principle, be used to refer to the same individual regardless of who it is that utters them. *I*, on the other hand, has no such option. It simply cannot refer to the same person when used by Anna as when used by Berta. This basic fact undergirds the celebrated direct reference theory of indexicals, where, as Kaplan put it: "The speaker refers to himself when he uses *I*, and no pointing to another or believing that he is another or intending to refer to another can defeat this reference" (1989).

The examples above are presented in English, but it is probably fair to say that this contrast could be replicated in every language. Typologists have after all found no language lacking a first person (Cysouw, 2003, 83). Yet this finding should not lure us into thinking that semantic variation is excluded in matters related to indexicality. In fact, it only takes a small modification to the pattern to see a rather different cross-linguistic picture emerge, bringing with it a challenge to the core Kaplanian theory. The modification involves embedding indexical expressions under attitude verbs. This manipulation, of course, has no effect on the facts in standard English. Discourse (3) is no more coherent than (2): English *I* is just as utterance-dependent in attitude reports as in matrix clauses.

(3) *Still not a coherent disagreement*

Anna: Casey said that I'm in Washington.

Berta: No, Casey didn't say that I'm in Washington.

In contrast to the behavior of unembedded indexicals in (2), this behavior of embedded indexicals is not universal. Suppose that the first person pronoun, embedded in an attitude context, could refer to the author of the attitude context – the thinker, that is, with a verb of thought, or the speaker, with a verb of speech. This is clearly not possible in English, for if it were, then (3) would achieve coherency as a disagreement about Casey's statements about his own location. But this reading *is* possible in Zazaki sentences like (4), where the embedded first person pronoun may refer either to the utterance speaker (reading (a)) or to the attitude author (reading (b)).

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<sup>1</sup> In this particular example this is no doubt due to the anaphoricity of *no* (on which see for instance Krifka 2013); without *no*, however, Berta's remark is simply a non-sequitur in (2) (but not in (1)).

- (4) Heseni va ke ez dewletia.  
Hesen said that I rich.be-PRES

Zazaki

- a. Hesen said that I am rich.  
b. Hesen said that Hesen is rich.

(Anand and Nevins, 2004)

Crucially, reading (b) does not require quotation of the embedded clause (Anand and Nevins 2004; see further discussion in §7.3). Rather, independent of clausal quotation, the embedded indexical draws its reference from the attitude event, rather than from the overall utterance. This demonstrates the phenomenon of INDEXICAL SHIFT.

Over the past fifteen years, the study of indexical shift has come into its own as a major front in the investigation of natural language semantics. The empirical progress has been significant: the phenomenon has been reported for languages spanning five continents and at least nine language families.<sup>2</sup> Theoretical progress has been substantial as well, as new empirical discoveries have been mined for insights into the nature of indexicality, quantification, quotation, and context-dependence. As this progress has unfolded, the field has seen a steady accumulation of small discoveries about ways that indexical-shifting languages are different not just from standard English, but also from each other. Such discoveries reveal that the true theory of indexicality is responsible not just for a binary choice between languages like English and languages like Zazaki, but ultimately for a range of ways in which languages may allow or disallow indexical shift. This suggests that we may best appreciate how indexical shift works by better understanding the ways it does and does not vary across languages.

This is the project I take up in this paper. My central goal is to advance and justify a constrained typology of indexical shift – a picture of variation that is at once rich enough to capture the known facts and also restrictive enough to make predictions about currently unknown data points. This is in line with similar projects at the intersection of formal semantics and language typology in the

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<sup>2</sup> I am aware of reports accompanied by at least some formal analysis for the following languages: Amharic (Semitic; Leslau 1995, Schlenker 1999, Anand 2006), Ancient Greek (Maier 2012), Dhaasanac (Cushitic; Nishiguchi 2012, 2016), (nonstandard) English (Schlenker 2003 [though cf. Anand 2006, 92], Anderson 2015), Japanese (McCready 2007, Sudo 2012, Maier 2014a), Korean (Park 2016), Laz (Kartvelian; Demirok and Öztürk 2015), Malayalam (Dravidian; Anand 2006), Matses (Panoan; Munro, Ludwig, Sauerland, and Fleck 2012), Mishar Tatar (Turkic; Podobryaev 2014), Navajo (Athabaskan; Platero 1974, Schaubert 1979, Speas 2000), Nez Perce (Penutian; Deal 2014), Slave (Athabaskan; Rice 1986, 1989, Anand and Nevins 2004), Tamil (Dravidian; Sundaresan 2011, 2012), Tsez (Nakh-Dagestani; Polinsky 2015), Turkish (Gültekin Şener and Şener 2011, Özyıldız 2012), Uyghur (Turkic; Sudo 2012), and Zazaki (Indo-Iranian; Anand and Nevins 2004, Anand 2006), along with a long list of sign languages (Zucchi 2004, Quer 2005, 2013, Herrmann and Steinbach 2012, Schlenker To appear b, To appear c), though on this last point cf. Davidson (2015) and Maier (2016, 2017) (and discussion in section 7.3). A number of additional languages have been discussed in the descriptive and typological literature in potentially similar terms, but require further attention before conclusive proposals can be made; these include Aghem (Bantu; Hyman 1979), Kobon (Trans-New Guinea; Davies 1981), Havyaka Kannada (Dravidian; Bhat 2004, p. 58), Manambu (Ndu; Aikhenvald 2008), and Wan (Mande; Nikitina 2012a). I will venture some hypotheses about languages from this last group throughout the discussion.

domains of bare nominals (Chierchia, 1998), generalized quantifiers (Matthewson, 2013), and degree constructions (Beck et al., 2009), among other areas. To achieve this goal for shifty indexicals it will be necessary to answer three questions:

- Q1. What are the major dimensions of variation in indexical shift?
- Q2. What theory of indexical shift can account for both commonalities and variation across the set of languages instantiating the phenomenon?
- Q3. What are the natural seams that separate indexical shift from surface-similar phenomena?

I will say at once that these questions must be approached in the knowledge that large gaps remain in our understanding of embedded indexicals across a wide variety of languages. The goal is that the predictions from this study will be testable in additional languages in future work, where perhaps they will be disconfirmed in favor of some improved alternative. In the meantime, the (eternal) absence of fully exhaustive data cannot excuse us from theorizing. By outlining a constrained typology now, we prepare to more quickly grasp the import of new language types that may (or may not) ultimately be discovered in the future.

In the rest of the paper I address the questions above one by one. The next section begins by outlining four dimensions of variation in indexical shift, along with corresponding initial generalizations about the crosslinguistic patterns. This section draws most extensively on studies of seven languages (Matses, Navajo, Nez Perce, Slave, Tamil, Uyghur, and Zazaki) which instantiate patterns also found in numerous others. To integrate the findings into a constrained theoretical picture, some background assumptions will be necessary. To this end, section 3 introduces and briefly justifies the operator-based theory of indexical shift, building on much prior work (esp. Anand and Nevins 2004, Anand 2006, Sudo 2012, Deal 2014, Shklovsky and Sudo 2014, Park 2016). What follows is the theoretical core of the paper in section 4. Here I propose, first, that languages allowing shift of multiple types of indexicals (e.g. first person, second person, locative) may allow multiple shifty operators to stack in the left periphery of finite clauses; stacking is regulated by standard syntactic constraints on functional structure in a way that explains of several of the generalizations of section 2. Second, the semantic contributions of these operators may vary, in a way that explains a core generalization about indexical shift and interpretation *de se*. With the basic proposal on the table, sections 5 and 6 elaborate the theory in two further dimensions. In section 5, I extend the account to temporal indexicals, drawing on evidence from Korean and a non-standard variety of English. In section 6, I discuss lexical “bundling” of shifty operators (to borrow a term from Pylkkänen 2008), i.e. cases where a shifty operator forms a single lexical unit along with another operator or other material, drawing on case studies of second person indexicals in Uyghur (Sudo, 2012) and adverbial indexicals in Korean (Park, 2016). Finally, in section 7, I contrast indexical shift with several surface-similar phenomena (most notably logophoricity, sign language Role Shift, and free indirect discourse) with the goal of clarifying the controls that are needed in order to test the constrained typology on new data sets.

## 2 Dimensions of variation

A full theoretical or descriptive account of any particular instance of indexical shift requires attention to four components: the attitude verb, the indexical itself, the question of optionality in indexical shift, and the question of interpretation *de se*. These matters require attention because

they vary across languages. That is, indexical shift is subject to at least the following four dimensions of variation:

1. Which verbs are involved in shifting
2. Which indexicals shift (with which verbs)
3. How much optionality is permitted in indexical shift
4. Which indexicals must be read *de se* when shifted

These dimensions are listed in approximate descending order of the previous attention that has been paid to them. Dimension 1 is widely recognized as a point of cross-linguistic variation; dimensions 2 and 3 slightly less so; dimension 4 is not only scarcely recognized, but indeed contravenes the typical assumption that shifty indexicals simply belong under heading of *de se* phenomena (Schlenker 1999, 2003, 2011, Anand 2006, Bittner 2014, Roberts 2015). In assembling the evidence of variation along the four dimensions, I will demonstrate that, in spite of significant variability, substantial generalizations are nevertheless possible in these areas. Indeed, it will turn out that dimensions 2-4 are in fact regulated by the very same hierarchy – a finding that will form the core of the account to be given in section 4.

### 2.1 Which verbs are involved in shifting

Languages allowing indexical shift vary in which verbs allow indexicals to shift in their complements. A first split in this dimension falls between languages that allow shifting only with speech verbs, versus those that are more liberal. In the first class are languages like Zazaki (Indo-Iranian), Tamil (Dravidian), and perhaps also Wan (Mande; Nikitina 2012a). The following Zazaki pair shows that the shiftiness of *εz* ‘I’ under *va* ‘say’ cannot be reproduced under *termine* ‘think/believe’:

- (5) a. Hεseni va [ kε εz dεwletia ]. Zazaki  
 Hesēn said [ that I rich.be-PRES ]  
 Hesēn said that { I am, Hesēn is } rich. (Anand and Nevins, 2004, (4))
- b. Hεsen termine keno [ kε εz newεsha ].  
 Hesēn believe does [ that I sick.be-PRES ]  
 Hesēn believes that { I am, \*Hesēn is } sick. (Anand and Nevins, 2004, fn. 3)

In the second class are languages of two further types. In one, shift is limited to the complements of speech verbs and verbs of cognition, to the exclusion of verbs of knowledge. In Navajo, for instance, shift is possible in the complements of *ní* ‘say’, (6a), and *nízin* ‘want/think’,<sup>3</sup> (6b), (as well as *yó’ní* ‘expect’) but not *shił bééhózin* ‘know’.<sup>4</sup>

<sup>3</sup> On the semantics of *nízin* ‘want/think’, see Bogal-Allbritten (2016).

<sup>4</sup> I follow here the descriptions by Platero (1974, 214) and especially Schaubert (1979). In later work on Navajo, Speas (2000) reports a ‘say’-only pattern. These findings remind us that talk of “languages” is loose talk; it is *grammars* we generalize over, and several grammars may be active in one speech community. It should be clear that this variation poses no problem for the overall pattern regarding attitude verbs, for both grammars of Navajo demonstrate expected possibilities.

- (6) a. Jáan [ *pro* chidi nahatnii' ] ní. Navajo  
 John [ 1SG car 3.1.P.buy ] 3.say  
 John<sub>i</sub> says he<sub>i</sub> bought a car.
- b. Bíl [ *pro* béégashii deeshtoh ] nízin.  
 Bill [ 1SG cow 3.1.F.rope ] 3.think  
 Bill thinks he will rope a cow.
- (Schauber, 1979, 19)

Further examples of this class are Slave, where Rice (1986, 1989) demonstrates that shifting is possible under ‘say’, ‘tell’, ‘ask’, and two verbs glossed ‘want/think’, but not ‘know’; Laz, where Demirok and Öztürk (2015) demonstrate that shifting is possible under ‘say’ and ‘think’, but not ‘know’; Korean, where Park (2016) demonstrates shifting under ‘say’ and ‘think’, but where it is impossible under ‘know’ (Yangsook Park, p.c.; similar facts hold in Japanese, per Sudo 2012 and Yasu Sudo p.c.); Matses, where Munro et al. (2012) demonstrate shifting under ‘say’, ‘tell’ and ‘suppose mistakenly’, but there is no dedicated verb ‘know’ (Fleck, 2006, §4); and plausibly also Uyghur, where Sudo (2012) demonstrates shifting under a large set of verbs, including those glossed as ‘say’, ‘think’, ‘hear’ ‘brag’, ‘dream’ and ‘believe/know’ (assuming, given the disjunctive gloss, that the last of these is not a dedicated verb of knowledge).<sup>5</sup>

In the final class of languages, indexical shift is possible in the complements of verbs of speech, thought, and also knowledge. This is the case in Nez Perce, where shift occurs in the complements of *hi* ‘say/tell’, *neki* ‘think’, and *cukwe* ‘know’:

- (7) Angel { hi-hi-ne / hi-neki-se / hi-cukwe-ce } Nez Perce  
 Angel { 3SUBJ-say-TAM / 3SUBJ-think-TAM / 3SUBJ-know-TAM }  
 [ *pro* tḁc̥ 0-pay-no' ].  
 [ 1SG soon 1SUBJ-arrive-FUTURE ]  
 Angel<sub>i</sub> said/thinks/knows she<sub>i</sub> will soon arrive. (field notes)

These three language types should be contrasted with various logically possible options that are not attested. No language allows shift under verbs of thought and/or verbs of knowledge without also allowing it under verbs of speech. No language allows shift under verbs of knowledge without also allowing it under verbs of thought and speech. This is to say that the various possibilities form an implicational hierarchy. This hierarchy constitutes the first of four generalizations to be advanced in this section.

(G1) **A generalization about verbs**

Verbs of speech are more likely to allow indexical shift in their complement than are verbs of thought, which in turn are more likely to allow indexical shift in their complement than are verbs of knowledge.

	Shift takes place under verbs of . . .		
	Speech	Thought	Knowledge
Nez Perce	✓	✓	✓
Navajo, Slave, Uyghur	✓	✓	–
Tamil, Zazaki	✓	–	–

<sup>5</sup> An additional plausible example of this class is Amharic, where Anand (2006, 76) demonstrates shifting under ‘say’ and ‘think’ but does not discuss other verbs.

This pattern has been previously discussed most directly by Sundaresan (2011, 2012) (building on remarks by Anand 2006 and Oshima 2006) and in section 4.2, I will not deviate far from her analysis.

## 2.2 Which indexicals shift (with which verbs)

Languages allowing indexical shift vary in which classes of indexicals shift. In this area the empirical basis for generalization is slightly narrower than for the previous dimension, as many studies of indexical shift in particular languages have not reported full data beyond person indexicals. Given the state of the empirical literature, I will focus here and in the next two sections on first person, second person, and locative indexicals, as data on these indexical types is available for relatively many of the languages for which indexical shifting has been most extensively described. Temporal indexicals will come back into the picture in section 5, in connection with an additional well-described indexical shifting language (Korean).

The shifting possibilities for locative and person indexicals conform to three basic patterns. First, some languages allow shifting of first person, second person, and locative indexicals such as ‘here’. The following examples demonstrate these three indexical classes one by one for Zazaki.

- (8) Heseni va [ kɛ ɛz newɛsha ]. Zazaki  
 Hesen.OBL said [ that I be-sick-PRES ]  
 Heseni said that he<sub>i</sub> was sick. (Anand, 2006, 77)
- (9) Heseni va Ali-ra [ kɛ ti newɛsha ].  
 Hesen.OBL said Ali-to [ that you be-sick-PRES ]  
 Hesen said to Ali<sub>i</sub> that he<sub>i</sub> was sick. (Anand, 2006, 77)
- (10) Waxto kɛ o London-de bime Pierri va [ kɛ o ita rindeka ].  
 when that he London-at be-PAST Pierre.OBL said [ that it here be-pretty-PRES ]  
 When he was in London<sub>i</sub>, Pierre said that it is pretty there<sub>i</sub>. (Anand, 2006, 80)

A parallel range of shifting possibilities obtains in Korean (Park, 2016), Matses (Munro et al., 2012), Turkish (Özyıldız, 2012), and Nez Perce (Deal, 2014).

The second possibility is more restricted: first and second person indexicals may shift, but locatives may not. This is the situation in Uyghur (Sudo, 2012). The following example shows that the same clause that allows shifting of *men* ‘I’ disallows shifting of *bu jer* ‘here’.

- (11) Context: This summer, I went to UCLA and met Muhemmet there. He told me, “I’m going to study here from this September.” Now I’m back in Cambridge, MA, talking to Ahmet.
- a. Men UCLA-gha bar-dim. Uyghur  
 1SG.NOM UCLA-to go-PAST.1SG  
 I went to UCLA.
- b. Muhemmet manga [ toqquzinji ay-din başla-p (men) ]  
 Muhemmet 1SG.DAT [ 9th month-from start-ing 1SG.NOM  
 {u jer-de / #bu jer-de} uqu-imen ] di-di.  
 {there-LOC / #here-LOC} study-IMPERF.1SG ] say-PAST.3  
 Muhemmet told me that he would study there/#here from September.

(Sudo, 2012, 244)

The same goes in Laz (Demirok and Öztürk, 2015), Tsez (Polinsky, 2015), and potentially Navajo (Speas, 2000) and Dhaasanac (Nishiguchi, 2016).<sup>6</sup> Languages like Zazaki and Nez Perce, by contrast, show no similar prohibition on locative shifting either in general or in the company of a person indexical.<sup>7</sup>

The final possibility is even more restrictive. Among languages in which only person indexicals are known to shift, we find two patterns out of a logically possible three. One of these is exemplified by languages like Uyghur in which both first and second persons shift (Sudo, 2012). We have seen first person shift in Uyghur (11); second person shift is exemplified in (12).

- (12) Ahmet Aygül-ge [ *pro* kim-ni jaxshi kör-isen ] di-di? *Uyghur*  
Ahmet Aygül-DAT [ 2SG who-ACC well see-IMPERF.2SG ] say-PAST.3  
Who did Ahmet tell Aygül<sub>i</sub> that she<sub>i</sub> likes? (Sudo, 2012, 230)

The final option is exemplified by languages like Tamil, in which only first persons shift (Sundaresan 2011, 2012). Sentence (13) demonstrates shifting of embedded first person,<sup>8</sup> the impossibility of second person shifting is demonstrated in (14).

- (13) Raman Krishnan-kittæ *Tamil*  
Raman.NOM Krishnan-ALL  
[ taan paris-æ çej-čč-een-nnü ] so-nn-aan.  
[ ANAPH.NOM.SG prize-ACC win-PAST-1SG-COMP ] say-PAST-3MSG  
Raman<sub>i</sub> told Krishnan that he<sub>i</sub> had won the prize. (S. Sundaresan, p.c.)
- (14) Raman Krishnan-kittæ  
Raman.NOM Krishnan-ALL  
[ nii/\*taan paris-æ çej-čč-aaj-ünnü ] so-nn-aan.  
[ 2SG/\*ANAPH.NOM.SG prize-ACC win-PAST-2SG-COMP ] say-PAST-3MSG  
Raman told Krishnan<sub>j</sub> that you/\*he<sub>j</sub> had won the prize. (Sundaresan, 2012, 271)

Various other logical possibilities are not attested. There is no clear case of a language in which locative indexicals shift but person indexicals do not. There is no clear case of a language in which

<sup>6</sup> Speas demonstrates in particular that locative deictics glossed ‘this here’ and ‘that there’ do not shift, but person indexicals do. For Dhaasanac, Nishiguchi’s examples should be taken as preliminary as they do not fully control against clausal quotation.

<sup>7</sup> See Deal (2014, (23)) for Nez Perce and Anand (2006, 99) for Zazaki. The same presumably holds in Matses, given the generalizations set forth by Munro et al. (2012), but is not directly exemplified in their paper.

<sup>8</sup> The Tamil data have the complication that the shifty indexical is clearly seen in agreement only, rather than as an ordinary pronominal argument of the embedded clause. Sundaresan argues that the anaphor *taan* is not itself indexical, but that a covert indexical pronoun is nevertheless present on the edge of the clause. By contrast, on Anand’s (2006) approach to closely related Malayalam, *taan* is indeed a first person shifted indexical. The reader is referred to these works for fuller discussion; see also Messick (2016a) on related patterns in Telegu. In the text, I assume the correctness of Sundaresan’s analysis.

second persons shift but first persons do not.<sup>9</sup> This suggests an implicational relationship between the shifting of locative indexicals and the shifting of indexical persons, and likewise between the shifting of second person and the shifting of first person. The possibility of locative shift implies the possibility of person shift. The possibility of addressee shift implies the possibility of author shift. These data support the following implicational generalization about shift by indexical class:

(G2) **A generalization about indexicals, across languages**

Across languages, the possibility of indexical shift is determined by the hierarchy 1st > 2nd > HERE. A language allows indexicals of a certain class to shift only if it allows indexicals of classes farther to the left to shift as well.

	Shifty 1st	Shifty 2nd	Shifty HERE
Zazaki	✓	✓	✓
Uyghur	✓	✓	–
Tamil	✓	–	–
English	–	–	–

This hierarchy partially follows one formulated by Anand (2006, 110), as well as typological remarks by Oshima (2006, ch. 8). I return to Anand’s particular implementation in section 4.4.

**2.3 How much optionality is permitted in indexical shift**

Languages allowing indexical shift vary in the extent to which indexical shift is optional.<sup>10</sup> This optionality extends along two closely related dimensions. First, languages differ in whether or not indexical shift is required when it is permitted by the verb. In Matses, for instance, Munro et al. (2012) document that indexical shift occurs in the complements of the verbs *que* ‘say’, *ca* ‘tell’ and *dan* ‘suppose mistakenly’. In these complements, indexical shift is obligatory; non-shifted interpretations for indexicals are unavailable.<sup>11</sup> Thus sentence (15) has only a shifted interpretation for indexicals *cun* ‘my’ and *nu* ‘I’.<sup>12</sup>

<sup>9</sup> Some factors that can obscure these generalizations are discussed in connection with logophors, free indirect discourse, and Role Shift in section 7.

<sup>10</sup> Here and throughout I concentrate on optionality within particular grammars, rather than sociolinguistic or other variation within speech communities. Thus I do not consider the situation in Navajo described in footnote 4, for instance, to constitute optionality of the relevant sort.

<sup>11</sup> A consequence is that the speaker/addressee of the context of utterance may not be referred to by 1st/2nd person in the complement clause; Munro et al. (2012) suggest that third person would have to be used for any individuals that do not participate in the reported attitude event. See their examples (19)-(20). Navajo exemplars of the same pattern are reported in Speas (2000, (2)).

<sup>12</sup> *Nu* is in fact a portmanteau of first person subject marking with some type of intention-related content; see Fleck (2003, 435-438). Note that interpretation (15b) is noted as impossible by Fleck; the interpretations in (15c) are not explicitly discussed, but are incompatible with the generalizations by Fleck and especially Munro et al. (2012). (For consistency, I present Matses material in the practical orthography used in Fleck’s (2003) grammar of Matses.)

- (15) Cun papa [ cun ] chido [ debi [ nid-nu ] ] que-o-sh ] que-o-sh ] que-o-sh.  
 1GEN father [ 1GEN wife [ Davy [ go-INTENT:1 ] say-PAST-3 ] say-PAST-3 ] say-PAST-3  
 a. My father<sub>i</sub> said that his<sub>i</sub> wife said that Davy<sub>j</sub> said that he<sub>j</sub> is going. *Matses*  
 b. NOT: My<sub>k</sub> father said that my<sub>k</sub> wife said that Davy<sub>j</sub> said that he<sub>j</sub> is going.  
 c. NOT: My father<sub>i</sub> said that his<sub>i</sub> wife<sub>k</sub> said that Davy<sub>j</sub> said that (s)he<sub>i/k/m</sub> is going.  
 (Fleck, 2003, 1173)

Similar facts have been noted for person indexicals in Laz (Demirok and Öztürk, 2015), Navajo (Schauber 1979, Speas 2000), and Uyghur (Sudo 2012; see further discussion in section 3.2), and for indexicals of all classes in Kobon (Davies, 1981). In Zazaki, by contrast, indexical shift is optional, and thus sentences like (16) have either of two distinct interpretations. Interpretation (a) involves indexical shift for εZ ‘I’ and *to* ‘you’, whereas interpretation (b) does not.

- (16) Vizeri Rojda Bill-ra va [ ke εZ to-ra miradiša ]. *Zazaki*  
 Yesterday Rojda Bill-to said [ that I you-to angry.be-PRES ]  
 a. Yesterday Rojda<sub>i</sub> said to Bill<sub>j</sub> that she<sub>i</sub> is angry at him<sub>j</sub>.  
 b. Yesterday Rojda<sub>i</sub> said to Bill<sub>j</sub> that I am angry at you.  
 (Anand and Nevins, 2004, (13))

Zazaki thus allows, internal to one language, the union of the indexical-shift possibilities presented by Matses and by standard English: either all indexicals shift (as in Matses), or none do (as in English).

What Zazaki does not allow is partial indexical shift, i.e. shift of one type of indexical without shift of another (Anand and Nevins, 2004). Cross-linguistic differences in this respect lead us to a second type of optionality-related variation. We have seen an initial case of partial indexical shift in Uyghur, where person indexicals shift but locative indexicals do not (see (11)). Partial indexical shift intersects with questions about optionality in languages where one kind of indexical shift determines the possibility of another kind of shift. This is the situation in Nez Perce, for instance, where (like in Zazaki) person and locative indexicals may optionally be shifted. The examples below demonstrate optional shift of first person (17), second person (18), and ‘here’ (19).

- (17) Isii-ne A. hi-i-caa-qa *Nez Perce*  
 who-ACC A 3SUBJ-say-IMPERF-REC.PAST  
 [ cew’cew’inis-ki *pro* ’e-muu-ce-∅ \_ ]?  
 [ phone-with 1SG 1SUBJ/3OBJ-call-IMPERF-PRES \_ ]  
 Who did A<sub>i</sub> say { she<sub>i</sub> / I } was calling? (Deal, 2014, (3))
- (18) Manaa we’nikt ’uus haama-nm, ke ko-nya T.-nm pee-∅-ne R.-ne,  
 how name has man-GEN C RP-ACC T-ERG 3/3-tell-TAM R-ACC  
 [ ’ee ’o-opayata-yo’qa \_ ]?  
 [ 2SG 1SUBJ/3OBJ-help-MODAL \_ ]  
 What is the name of the man that T told R<sub>i</sub> that { he<sub>i</sub> / you } should help? (field notes)

(19) Context: Elicited in Lapwai, ID. Lewiston is the closest major city.

Miniku cew'cew'in'es *pro* hi-i-caqa Simiinikem-pe  
 which phone 3SG 3SUBJ-say-TAM Lewiston-in

[ \_ hi-muu-no'qa ki-nix

[ \_ 3SUBJ-call-MODAL here-from

met'u weet'u \_ hi-muu-no'qa ko-níx ] ?

but not \_ 3SUBJ-call-MODAL there-from ]

a. Which phone did they say in Lewiston<sub>i</sub> can call from there<sub>i</sub> but not from here<sub>j</sub>?

b. Which phone did they say in Lewiston<sub>i</sub> can call from here<sub>j</sub> but not from there<sub>k</sub>?

(Deal, 2014, (5))

By contrast to Zazaki, Nez Perce allows clauses in which person indexicals shift but *kine* 'here' does not. The pattern of indexical shift in (20) is as in Uyghur (11b).<sup>13</sup>

(20) Context: my friend is calling me on his cellphone and describing his location. He is trying to make it to Lapwai, but he is lost.

*pro* hi-hi-ce- $\emptyset$  [ *pro* kíne  $\emptyset$ -paay-ca ], *Nez Perce*

3SG 3SUBJ-say-IMPERF-PRES [ 1SG here 1SUBJ-arrive-IMPERF ]

met'u weet'u *pro* hi-paay-ca- $\emptyset$  kíne.

but not 3SG 3SUBJ-arrive-IMPERF-PRES here

He<sub>i</sub> says he<sub>i</sub> is arriving here, but he is not arriving here. (Deal, 2014, (25))

In contrast, Nez Perce does not allow contra-Uyghur clauses, i.e. clauses in which *kine* 'here' shifts but person indexicals do not. If the shifted interpretation of the locative is held constant, shift of the person indexical becomes obligatory.

(21) 'In-lawtiwaa-nm Boston-pa hi-nees- $\emptyset$ -n-e *pro* *Nez Perce*  
 my-friend-ERG Boston-LOC 3SUBJ-O.PL-say-IMPERF-REM.PAST 3PL

[ *pro* weet'u kíne  $\emptyset$ -wees kii kaa ].

[ 1SG not here 1SUBJ-be.PRES right now ]

My friend<sub>i</sub> in Boston<sub>j</sub> told them that { he<sub>i</sub> is / \* I am } not there<sub>j</sub> right now. (Deal, 2014,

(28))

Nez Perce thus allows, internal to one language, the union of the indexical-shift possibilities presented by Matses, Uyghur, and standard English: either all indexicals shift (as in Matses), only person indexicals do (as in Uyghur), or none do (as in English).

The possibility of describing optionality effects in Zazaki and Nez Perce in this way reveals a tight connection between variation across languages and within them. The pattern internal to Nez Perce reproduces the implicational relationship between locative and person indexical shifting discussed in section 2.2. In Slave, another language allowing partial indexical shift, it is the implication about shift of first and second person that is reproduced grammar-internally. The possibility

<sup>13</sup>Two other interpretations of this string are set aside here, being strongly disfavored pragmatically in this particular case: one on which both indexicals are shifted (in which case the reported proposition is trivially true), and one on which neither indexical is shifted (in which case the reported proposition is irrelevant in context).

of indexical shift is determined by the verb in this language: both first and second persons shift with *édedi* ‘tell/ask’, showing a pattern like in Uyghur:

- (22) [ Segha ráwǝdí ] séǰǰi yǰlé. Slave  
 [ 1SG.for 2SG.will.buy ] 2SG.tell.1SG PAST  
 You told me to buy it for you. (Rice, 1986, 51)

But only first person shifts with *hadi* ‘say’ and *yeniǰe / hudeli* ‘want/think’, showing a pattern like in Tamil. I exemplify here for *hadi* ‘say’; note that the second person argument in the complement clause remains unshifted.

- (23) Simon [ rásereyineht’u ] hadi. Slave  
 Simon [ 2SG.hit.1SG ] 3SG.say  
 Simon said that you hit him. (Rice, 1986, 53)

The absence of parallel cases of second-person-only shifting (perhaps with a predicate like ‘teach’, or with a near synonym of *édǰǰi* ‘tell/ask’<sup>14</sup>) suggests the gap is principled; first and second person shifting stand in an implicational relationship.

These data support an expansion of G2 to within-language optionality. In the table below, the symbol → in a language column indicates the shifting patterns, by row, that occur in that language.

(G3) **A generalization about indexicals, within languages**

Within languages, the possibility of indexical shift is determined by the hierarchy 1st > 2nd > HERE. Indexicals of a certain class undergo shift in a particular verbal complement only if indexicals of classes farther to the left undergo shift as well.

<i>Nez Perce</i>	<i>Slave</i>	<i>Zazaki</i>	Shifty 1st	Shifty 2nd	Shifty HERE
→		→	✓	✓	✓
→	→		✓	✓	–
	→		✓	–	–
→	→	→	–	–	–

The core observation here is that languages allowing multiple patterns of indexical shift still remain within the overall class of possibilities attested on a crosslinguistic basis. The patterns that hold for whole languages also hold for individual verbal complements.

#### 2.4 Which indexicals must be read *de se* when shifted

Languages allowing indexical shift vary in which classes of indexicals must receive *de se* interpretations when shifted. In making this claim some years after Schlenker (2003) and Anand (2006) put shifty indexicals firmly on the agenda of *de se* theorists (and vice versa), I contend that the empirical basis has grown sufficiently to permit us to discern significant generalizations both about the indexicals that must be read *de se* and about those that need not.

<sup>14</sup>Rice documents that Slave does possess various verbs (including one glossed ‘teach’) that embed clausal complements, but fail to shift first person; these all fail to shift second person as well. See Rice (1986, 49).

Regarding necessarily *de se* indexicals, a first pattern is (for the moment) clear: in every language where first person indexicals shift, shifty first person indexicals impose a *de se* requirement. This pattern is exemplified below for Zazaki. These data show that the sentence containing a first person shifty indexical cannot be used in just any context in which the shifty indexical refers to a counterpart of the attitude holder. Rather, it must refer to an individual that the attitude holder *identifies* as a counterpart of himself. Thus, (24) is acceptable in context (a) but not in context (b).

- (24) Heseni va [ kε [εZ] newəsha ]. Zazaki  
 Hesen.OBL said [ that I be-sick-PRES ]  
 Hesen said that he was sick.
- a. ✓ Hesen says, “I am sick today.”  
 b. # Hesen, at the hospital for a checkup, happens to glance at the chart of a patient’s blood work. Hesen, a doctor himself, sees that the patient is clearly sick, but the name is hard to read. He says to the nurse when she comes in, “This guy is really sick.”

(Anand, 2006, 79)

Parallel data are reported for shifty first person in Amharic (Anand, 2006, 79), Korean (Park, 2016, (26)), Malayalam (Anand, 2006, 155), Mishar Tatar (Podobryaev, 2014, 87-88), Nez Perce (Deal, 2014, (38)), Turkish (Gültekin Şener and Şener, 2011), and Uyghur (Sudo, 2012, 224-5).

When we move past first person, variation emerges. Second person shifty indexicals require addressee *de se* (*de te*) interpretations in Amharic (Anand, 2006, 79), Japanese (Sudo, 2012, 239), Korean (Park, 2016, (27)), Mishar Tatar (Podobryaev, 2014, 88), Nez Perce (Deal, 2014, (38)), and Zazaki (Anand 2006: 80): shifty second must refer to an individual that the attitude holder identifies as a counterpart of his addressee. A Zazaki example is provided in (25). Again, the sentence contains a shifty indexical and is acceptable in context (a) but not in context (b).

- (25) Heseni va Ali-ra [ kε [ti] newəsha ]. Zazaki  
 Hesen.OBL said Ali-to [ that you be-sick-PRES ]  
 Hesen said to Ali that he was sick.
- a. ✓ Hesen says to his patient Ali, “You are sick today.”  
 b. # Hesen is examining two twins, Ali and Ali-baba, at the same time, though in different rooms. He walks into Ali’s room to talk to him about his results, and starts explaining the results, but then thinks that he’s actually in the wrong room, talking to Ali-baba. He apologizes, and just before leaving tells Ali, “Well, I shouldn’t have told you all that, but, in summary, Ali is sick.”

(Anand, 2006, 80)

In Uyghur, on the other hand, no such requirement on shifty second is imposed. The following context is akin to (25b) in that the attitude holder (Muhemmet) does not identify the person he is actually addressing (John) as a counterpart of his addressee. Nevertheless, the shifty second person indexical is licit.

- (26) Context: Muhemmet is hosting a party. He hears that a certain waiter named John is being a nuisance. Muhemmet tells the nearest waiter, “John should go home.” Unbeknownst to him, he’s talking to John.

Muhammad John-gha [ *pro* öy-ge kit-sh-ing kirek ] di-di. *Uyghur*  
 Muhammad John-DAT [ 2SG home-DAT leave-GER-2SG should ] say-PAST.3  
 Muhammad told John<sub>i</sub> that he<sub>i</sub> should go home. (Sudo, 2012, 225)

Recall, meanwhile, that only first and second person indexicals shift in Uyghur, and first person shifty indexicals impose *de se* requirements.

Variation also emerges in the sphere of locative indexicals. Just as for person indexicals, shifty locative indexicals require locative *de se* (*de hic*) interpretation in Zazaki (Anand 2006) and Korean (Park, 2016, (28)): shifty ‘here’ must refer to a location that the attitude holder identifies as a counterpart of his location. A Zazaki example – again good in the (a) context, but bad in the (b) context – is provided in (27).

- (27) Waxto kε o London-de bime Pierri va [ kε o ita rindeka ]. *Zazaki*  
 when that he London-at be-PAST Pierre.OBL said [ that it here be-pretty-PRES ]  
 When he was in London, Pierre said that it is pretty there.
- a. ✓ Pierre says in London, "It is pretty here."  
 b. # Pierre is walking around London, which is drab and rather disappointing. He says, "I wish I were in Londres. Londres is pretty."  
 (Anand, 2006, 80)

The contrast in this case is with Nez Perce, in which no such requirement is imposed on shifty ‘here’ (Deal, 2014). For the following context, we can specify three distinct locations: the utterance location (Lapwai), the thinker’s location (Clarkson), and the thinker’s self-ascribed location (Asotin). The shifty indexical refers to the thinker’s actual location (Clarkson), not to the place that she takes as a counterpart of her location (Asotin).

- (23) Context (elicited in Lapwai): Costco is a prominent store in Clarkston. Everyone knows where it is.
- ’Aayat hii-wes Clarkston-pa, *Nez Perce*  
 woman 3SUBJ-be.PRES Clarkston-LOC  
 The woman is in Clarkston<sub>i</sub>,
- met’u *pro* hi-neki-se-∅ Asootin-pa,  
 but 3SG 3SUBJ-think-IMPERF-PRES Asotin-LOC  
 but she thinks (she is) in Asotin,
- kaa *pro* hi-neki-se-∅ [ Costco hii-wes kine ].  
 and 3SG 3SUBJ-think-IMPERF-PRES [ Costco 3SUBJ-be.PRES here ]  
 and she thinks Costco is here<sub>i</sub>. (field notes)

Like in Uyghur, this behavior contrasts with that of other classes of indexicals internal to the language; first and second person shifty indexicals require *de se* interpretation in Nez Perce.

At this point I wish to make two conjectures. First, we will find other languages where true shifty indexicals do not impose *de se* requirements.<sup>15</sup> That is to say that *de se* interpretation is not an inherent property of indexical shift. Accordingly, the special behavior of Uyghur second

<sup>15</sup>This point will prove relevant to the discussion of non-standard English temporal indexicals in section 5; Anderson (2015) observes that these do not require *de se* interpretations.

person and Nez Perce ‘here’ should not be chalked up to some special property of these elements themselves, as for instance on a potential analysis that treats them otherwise than as pure indexicals (perhaps à la Sudo 2012). On an analysis of Nez Perce *kine* ‘here’ as an ordinary description (‘the location of the speaker/thinker’), rather than as an indexical, for instance, we would fail to account for the basic property of unembedded indexicals with which this paper began. Outside of attitude clauses, *kine* ‘here’ behaves exactly like its English counterpart: it must always refer to the utterance location, and cannot be bound by a quantifier. In the following example, the consultant changes *kine* ‘here’ to *kona* ‘there’ in order to support a bound interpretation.

- (24) # Ke mine Obama hi-c’iiq-tetu-Ø, Nez Perce  
 wherever Obama 3SUBJ-speak-HAB.SG-PRES  
 ’il̄nii-we **kíne** hi-wsiix titooqan.  
 many-HUMAN there 3SUBJ-be.PRES.PL person  
 Wherever Obama speaks, many people are here.  
 Consultant: “I don’t think you say *kíne* [here]... you’re saying *ke mine*, ‘wherever’, so I think you have to say *koná* [there].” (Deal, 2014, ex (10))

Second, I conjecture that the cases of non-*de se* indexical shift that are already known are not arbitrarily distributed. In fact the distribution of *de se* requirements seems to track the same implicational hierarchy that we found for variation in which classes of indexicals shift, within and across languages:

(G4) **A generalization about *de se***

Shifty first person is always *de se*. Requirements for *de se* interpretation conform to the hierarchy 1st > 2nd > HERE.

	1st always <i>de se</i>	2nd always <i>de se</i>	HERE always <i>de se</i>
Zazaki, Korean	✓	✓	✓
Nez Perce	✓	✓	–
Uyghur	✓	–	n/a

This hierarchy suggests that it is not an accident that it is second person that is free from *de se* strictures in Uyghur, rather than first person; likewise, it is no accident that ‘here’ is similarly liberated in Nez Perce, in contrast to person indexicals.

Of course, the ultimate status of these conjectures will have to be assessed by the fruits they bear, both in terms of crosslinguistic predictions and in terms of the insight afforded to the cases at hand. Over the next two sections, I will lay out a theory of indexical shift that can at once predict the existence and the constrained distribution of non-*de se* shifty indexicals.

### 3 Operator-based indexical shift

The crosslinguistic explorations of the previous section have yielded several criteria of adequacy for a general theory of indexical shift. The theory must explain how there can be variation in the verbs that allow shifty complements, the classes of indexicals that shift, the optionality with which shift occurs, and the requirements for *de se* interpretation; and it must explain the generalizations G1-G4 that constrain variation in these areas. These, of course, are not the only known constraints on the theory of indexical shift. It is the goal of this section to lay out a theoretical framework that



the indexical, be interpreted with respect to a context  $c'$  such that the speaker function applied to  $c'$  yields the author of the reported attitude, in this case person A. This delivers the shifted reading.

$$(27) \quad \llbracket \text{pro.1SG} \rrbracket^{c',i} = \text{Speaker}(c') = A.$$

How does the operator effect this change? How is  $c'$  determined? The original proposal from Anand and Nevins (2004) takes advantage of the fact that shifty operators occupy attitude complements. Anand and Nevins assume that attitude verbs quantify over indices, which they take to be rich enough to recapitulate the structure of contexts; i.e. indices are author-addressee-location-time-world tuples. The attitude verb restricts the quantification to centered indices whose coordinates are drawn in part from the circumstances of the attitude. A predicate like *tell*, for instance, can be given the following syncategorematic denotation (cp. Anand and Nevins 2004, §5.1.1., Anand 2006, 109, and esp. Sudo 2012, 233):<sup>16</sup>

$$(28) \quad \llbracket \text{TELL } \alpha \rrbracket^{c,i} = \lambda x. \forall i' \in R_{\text{tell}}(x, i) \llbracket \alpha \rrbracket^{c,i'}$$

where  $i' \in R_{\text{tell}}(x, i)$  iff

- a.  $w_{i'}$  is compatible with what  $x$  says in  $w_i$
- b.  $\text{auth}_{i'}$  is an individual in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of herself
- c.  $\text{addressee}_{i'}$  is an individual in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her addressee
- d.  $\text{loc}_{i'}$  is a location in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her spatial location
- e.  $\text{time}_{i'}$  is a time in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her temporal location

The accessibility relation introduced by this predicate ensures that the only indices relevant for the interpretation of its complement will be those that match both what is said (in terms of the world parameter) and the self-locating perspective of the attitude holder (in terms of other parameters). The latter will play a crucial role in determining *de se* interpretations under indexical shift.

Among the material in the scope of the attitudinal quantification is the shifty operator. The operator's function is to overwrite the context parameter of interpretation for its complement with the (bound) index parameter. Anand and Nevins propose that this overwriting may be total, yielding Stalnaker's (1978) diagonal operator. This operator is defined syncategorematically in (29) (following Anand and Nevins), but may equally well be defined categorically as in (30a), provided the rule of Monstrous Function Application in (30b).<sup>17</sup> (I will largely stick to categoric

<sup>16</sup>Such a predicate may ultimately compose with its complement via Intensional Function Application (Heim and Kratzer, 1998) or via ordinary Function Application, depending on whether abstraction over indices is accomplished independently within the complement. See Park (2016) for discussion of the second possibility in connection with the binding of logophoric pronouns. I take no position on this issue here.

<sup>17</sup>This is a small touch-up of the original in Anand (2006, 72). For simplicity, I ignore variable assignments. I assume, following Anand, that indices and contexts have the same structure, and represent both as being of type  $\kappa$ . I take both to be tuples  $\langle x, y, l, t, w \rangle$ , where  $x$  and  $y$  are individuals (or  $\emptyset$ , as discussed in section 6),  $l$  is a location,  $t$  is a time, and  $w$  is a world. Interpretation is therefore a function  $\llbracket \cdot \rrbracket^{c,i}$ , where  $c, i \in D_\kappa$ . Following standard notation for variable assignments, I will when necessary represent modified contexts, e.g.  $c$  modified only so as to substitute  $x$  for the original value of coordinate  $\alpha$ , as  $c^{x/\alpha}$ .

presentation below, and assume that composition of a shifty operator and its complement proceeds via rule (30b).)

$$(29) \quad \llbracket \text{OP}_{\forall} \alpha \rrbracket^{c,i} = \llbracket \alpha \rrbracket^{i,i}$$

$$(30) \quad \text{a. } \llbracket \text{OP}_{\forall} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} . p(i)(i)$$

b. *Monstrous Function Application*

If  $\alpha$  is a branching node and  $\{\beta, \gamma\}$  the set of its daughters, then for any context  $c$  and index  $i$ : if  $\llbracket \beta \rrbracket^{c,i}$  is a function whose domain contains  $\lambda c' . \lambda i' . \llbracket \gamma \rrbracket^{c',i'}$ , then  $\llbracket \alpha \rrbracket^{c,i} = \llbracket \beta \rrbracket^{c,i}(\lambda c' . \lambda i' . \llbracket \gamma \rrbracket^{c',i'})$

Overwriting may also be partial, affecting some parameters of context but not others. The operator in (31) overwrites only the author parameter. Because all indices quantified over by the attitude verb have an author coordinate which is a (*de se*) counterpart of the attitude holder, this operator ensures that first person indexicals in its scope will refer to the attitude holder, rather than the utterance speaker.

$$(31) \quad \llbracket \text{OP}_{\text{AUTH}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} . p(i)(c^{\text{Author}_i/\text{Author}})$$

Note that the operator defined in (31) may cause its complement to be evaluated with respect to an “improper context”, i.e. one that does not correspond to any actual circumstance of utterance or attitude-holding (cp. Kaplan 1989, 509, Schlenker To appear a). The author parameter has shifted but the rest of the context has not. This will prove crucial in capturing cases of partial indexical shift of the type demonstrated in (11) for Uyghur, (20) for Nez Perce, and (23) for Slave.

### 3.2 Evidence for operators

This account delivers one set of purely semantic generalizations about indexical shift and one set of generalizations at the syntax-semantics interface. In the first set are the generalizations formulated by Anand (2006) as *Shift Together* and *No Intervening Binder*, presented here in lightly edited form.

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There is a rich philosophical literature on context and index structure that I will not enter into here, confining myself to two small clarifications of working assumptions. First, note that *context* is a technical term, as in any formal theory of indexicality; in particular, I do not assume that contexts need correspond to possible occasions of language use. Thus, for a context  $\langle x, y, l, t, w \rangle$ , no constraint is imposed that  $x$  speaks to  $y$  at  $l$  at  $t$  in  $w$ . (For discussion of some formal options for the modeling of contexts, see Schlenker To appear a.) Second, on the consequences of index structure for theories of truth, I follow MacFarlane (2012) in assuming that the presence of individual coordinates does not the theory relativist make: “the presence of outlandish parameters of the index (taste, information state, etc.) does not itself make a semantic theory ‘relativist’ in any philosophically interesting sense. It does not prevent the theory from assigning truth values to sentences at contexts, or making absolute judgments of the accuracy of assertions.” The careful reader will find that the only first of these assumptions is crucial for the project of this paper.

(32) *Shift Together*<sup>18</sup>

If one indexical of class  $\Psi$  picks up reference from context  $c$ , then all indexicals of class  $\Psi$  within the same minimal attitude complement must also pick up reference from context  $c$ . The following are classes of indexicals: 1st person, 2nd person, person, locative, temporal

(33) *No Intervening Binder*

A shiftable indexical  $\text{ind}_1$  of class  $\Psi$  cannot pick up reference from a context  $c$  if there is an intervening context  $c'$  which another indexical  $\text{ind}_2$  of class  $\Psi$  picks up reference from.

These generalizations relate to the way that shifted interpretations of one indexical correlate with those of another indexical, either within or across clauses. Generalization (32) records that multiple indexicals of the same class must either all shift, or all not shift, within a simple attitude report. This is demonstrated for Slave in (34): either both embedded first persons shift, or neither does.

- (34) [ (OP) Sehlégé segha goníhkie rárule ] yudeli. *Slave*  
[ 1sg.friend 1sg.for slippers 3sg.will.sew ] 3sg.want.4sg
- a. She<sub>i</sub> wants her<sub>i</sub> friend to sew slippers for her<sub>i</sub>. (OP present)  
b. She<sub>i</sub> wants my friend to sew slippers for me. (OP absent)  
c. ✗ She<sub>i</sub> wants my friend to sew slippers for her<sub>j</sub>.  
d. ✗ She<sub>i</sub> wants her<sub>i</sub> friend to sew slippers for me.
- (Rice 1986, 56, Anand 2006, 99)

Obedience to the shift together constraint is reported for Korean (Park, 2016, §2.3.1), Laz (Demirok and Öztürk, 2015, §5), Nez Perce (Deal, 2014, §3), Tsez (Polinsky, 2015, §4.3), Uyghur (Sudo, 2012, 222), and Zazaki (Anand, 2006, §2.5.1).<sup>19</sup> The constraint follows from the semantics of indexicals and shifty operators. All first person indexicals (for instance) depend on the author parameter of context, and the shifty operator overwrites this parameter for the interpretation of its entire complement. An embedded first person indexical can pick up reference from a shifted context  $c'$  only if an author-shifting operator is present at the edge of the clause. The presence of this operator in turn forces all other first person indexicals within the local complement clause to

<sup>18</sup>Anand's (2006) formulation is simply that "all shiftable indexicals within an attitude-context domain must pick up reference from the same context" (p. 100). Without reference to distinct classes of indexicals, this will prove inadequate for partial indexical shift. Similar remarks apply to the original formulation of No Intervening Binder, as well as to the formulation of a Shift-Together style constraint by Oshima (2006, 192). I take the reformulation to be a friendly amendment, as Anand's theory predicts only the narrower versions in (32) and (33).

<sup>19</sup>The constraint presumably also holds in Matsigenka (Munro et al., 2012) and Kobon (Davies, 1981), where indexical shift is obligatory (see section 2.3). Quer (2005) discusses cases of putative partial indexical shift in Catalan Sign Language (LSC) that challenge Anand's original version of the Shift Together constraint (see fn. 18) but do not challenge the version used here; see fn. 65 for further discussion of LSC. Finally, an apparent counterexample in Amharic, discussed by Anand (2006, 100-103), is taken up in section 7.2.

have shifty readings. For Slave example (34), the presence of the operator yields reading (a); its absence yields reading (b); no other readings can be derived.

No Intervening Binder, generalization (33), requires that when one attitude complement is embedded inside another, shift in the innermost clause depends on shift in the medial clause. This is demonstrated for Nez Perce in (35) and (36). In (35), there is no indexical shift in the medial clause, and the first person indexical in the innermost clause may have an unshifted reading. By contrast, in (36), the medial clause contains a first person indexical. If this indexical receives a shifty reading, then the indexical in the innermost clause must receive a shifty reading as well.<sup>20</sup>

- (35) Katie hi-hi-ce- $\emptyset$  Nez Perce  
 Katie 3SUBJ-say-IMPERF-PRES  
 [ *pro* hi-neki-se- $\emptyset$  [ [ 'iin ]-k'u  $\emptyset$ -wees kine ] ].  
 [ 3SG 3SUBJ-think-IMPERF-PRES [ 1SG-too 1SUBJ-be.PRES here ] ]  
 Katie<sub>i</sub> says she<sub>i</sub> thinks that I am also here.
- (36) Katie hi-hi-ce- $\emptyset$   
 Katie 3SUBJ-say-IMPERF-PRES  
 [ (OP) *pro* [  $\emptyset$  ]-neki-se- $\emptyset$  [ [ 'iin ]-k'u  $\emptyset$ -wees kine ] ].  
 [ 1SG 1SUBJ-think-IMPERF-PRES [ 1SG-too 1SUBJ-be.PRES here ] ]
- a. Katie<sub>i</sub> says she<sub>i</sub> thinks she<sub>i</sub> is also here. (OP present)
  - b. Katie says I think I am also here. (OP absent)
  - c. ✗ Katie<sub>i</sub> says she<sub>i</sub> thinks I am also here.
  - d. ✗ Katie<sub>i</sub> says I think she<sub>i</sub> is also here.

Similar facts obtain in Zazaki (Anand and Nevins 2004, Anand 2006, §2.5.2) and Korean (Park 2016, §3.3).<sup>21</sup> This constraint, too, follows from operator semantics. In particular, it follows from the fact that shifty operators *overwrite* contextual information, rather than adding to it. If an operator is present and shifts the first person parameter of context away from the original utterer, all first persons that depend on that operator for their choice of context will receive shifty readings. Information about the original context, once overwritten, is unrecoverable. For Nez Perce example (36), the presence of the operator in the medial clause yields reading (a); its absence yields reading (b); readings (c) and (d) cannot be derived. Each of the unavailable readings would require that an operator be present on the edge of the medial clause, overwriting the author coordinate of context with the matrix attitude holder (Katie), but that one of the indexicals within the scope of

<sup>20</sup>Note that no additional reading of the first person is generated if a second OP is included in the structure, on the edge of the innermost clause. Because the medial verb has a first-person subject, it does not introduce a new value which could be used to overwrite the Author parameter.

<sup>21</sup>The sentences required to test this generalization are quite complex, which explains why the set of languages in which it has been investigated is quite small. One apparent counterexample is found in Slave; see Anand (2006, §2.7.1) and Bittner (2014) for discussion. Schlenker (2003, 68) discusses another, based on temporal expressions in English. See Anand (2006, 92) for an empirical argument that the temporal expressions in question are not in fact indexical, but rather anaphoric.

this operator nevertheless draws its reference from the original context. The semantics of shifty operators rules out this possibility.<sup>22</sup>

The ability of the shifty operator view to explain these facts differentiates it from various competitors. At the most basic level, constraints on shift of one indexical in view of shift of another prove difficult for any view on which indexical shift is essentially an “every indexical for itself” type of affair. On the partial quotation view from Maier (2007), for instance, indexical shift results from quotation of individual indexical elements (and perhaps their associated agreement). No connection between the shifting behavior of pairs of indexicals is expected (a point that seems to have convinced Maier 2016). Likewise, on the binding analysis from von Stechow (2003), shift results from deletion of indexical features under binding at LF, and constraints on the co-shifting of indexicals presumably results in some way from the binding theory. For Nez Perce, Deal (2014) demonstrates that bindable elements in attitude clauses do not require the kind of “binding together” behavior that presumably would have to underlie Shift Together on this type of view.<sup>23</sup> Finally, the facts are problematic for any version of a pronoun-based analysis that allows individual indexical pronouns to optionally reference the shifted context. For instance, on Schlenker’s (1999, 2003, 2011) analysis, the denotations of indexical elements include variables over contexts, which may be bound by attitude verbs or left free to pick out the utterance context. In a language like Nez Perce, where indexical shift is optional, this means individual indexicals are free to make either choice. Again, the expectation – contrary to fact – is that shift of one indexical should have no bearing on whether any other indexical undergoes shift.<sup>24</sup> (For further discussion of these

<sup>22</sup>Similar remarks apply to the closely related facts that Schaubert (1979) reports for Navajo. Sentence (37) features only one first person indexical, embedded under two indexical shifting verbs. This indexical may only refer to the most local attitude holder (Mary), not the matrix attitude holder (John) or the overall utterer.

(37) Jáan [<sub>CP<sub>1</sub></sub> OP Mary [<sub>CP<sub>2</sub></sub> OP *pro* chidí nahideeshnih ] nízin ] ní. Navajo  
 John [        Mary [        1SG car 3.1.F.buy    ] 3.want ] 3.say  
 John says Mary wants for Mary/\*John/\*me to buy a car. (Schauber, 1979, 22)

This fact is explained if shifty operators are obligatory in the complements of the attitude verbs *nízin* and *ní*, in keeping with Schaubert’s claim that indexical shift is obligatory in these complements (p. 25). The operator in CP<sub>1</sub> overwrites the author coordinate of context with the matrix attitude holder (John); the operator in CP<sub>2</sub> subsequently re-overwrites this same coordinate with the embedded attitude holder (Mary). In the scope of the operator in CP<sub>2</sub>, the only value available for the shifted indexical is the “local” one – Mary. Previous values, once overwritten, are no longer available.

<sup>23</sup>See Anand (2006, §2.6.1) for additional discussion of diacritics that would need to be added to the von Stechow view in order to account for the Zazaki and Slave data.

<sup>24</sup>Schlenker (2011) suggests a repair to the pronouns-based theory (credited to Ede Zimmermann): Shift-Together effects reflect binding of a distinguished context variable *c\**. In a language where all indexicals depend on *c\**, and *c\** is bound in attitude reports, all indexicals will shift together. While this view is adequate for the Zazaki facts from Anand (2006) (where indeed *all* indexicals shift together), it cannot explain (for instance) the Nez Perce facts presented by Deal (2014). In a clause like Nez Perce (20), not all indexicals are shifted, which shows, in Schlenker’s system, that *c\** is not bound. On Schlenker’s theory, given that person indexicals optionally shift without

theories and these challenges, see Anand (2006), Sudo (2012), Deal (2014), and Park (2016).)

We turn now to the predictions of the shifty operator approach for the syntax-semantics interface. On this count it proves crucial that shifty operators are present in syntactic representations, but distinct from attitude verbs. These properties underlie two additional generalizations that arise most directly from the work of Sudo (2012) and Shklovsky and Sudo (2014):<sup>25</sup>

(38) *Finite Complements Only*

Indexical shift is restricted to finite complement clauses.

(39) *Height Matters*

The shiftability of an indexical correlates with its syntactic position inside the attitude complement, such that lower positions are subject to indexical shift but higher positions are not.

We have already seen that languages may make it optional whether a shifty operator is present at the edge of a given attitude complement, as in Slave (34) and Nez Perce (36). This follows from the fact that context shift is accomplished by an operator separate from the attitude verb itself, together with the fact that the verbs in question allow both the presence and the absence of this operator in their complement. Generalization (38) records that optionality of this type may be correlated with the finiteness of the complement clause, visibly so for those verbs that allow both finite and non-finite complements. This is demonstrated for Uyghur in (40). The Uyghur verb *de* ‘say’ allows both finite and non-finite (nominalized) complements. Indexical shift is possible only in complements that are finite.

- (40) a. Tursun Muhemmet-ke [ *pro* xet jaz-ding ] di-di. *Uyghur*  
 Tursun Muhemmet-DAT [ 2SG letter write-PAST.2SG ] say-PAST.3  
 Tursun told Muhemmet<sub>i</sub> that he<sub>i</sub> wrote a letter. (finite complement)
- b. Tursun Muhemmet-ke [ *pro* xet jaz-ghan-lik-ing-ni ] di-di.  
 Tursun Muhemmet-DAT [ 2SG letter write-REL-NML-2SG-ACC ] say-PAST.3  
 Tursun told Muhemmet<sub>i</sub> that you/\*he<sub>i</sub> wrote a letter. (non-finite complement)
- (Shklovsky and Sudo, 2014, 383)

Similar alternations are reported in Japanese (Sudo, 2012, 238), Tsez (Polinsky, 2015, (29)) and Turkish (Gültekin Şener and Şener 2011, Özyıldız 2012). A related phenomenon holds in languages like Navajo, where the effect of finiteness interacts with (G1), the generalization about verbs. Individual Navajo verbs strictly require either finite or non-finite (nominalized) complements; shifting is allowed only in those complements that are finite (Schauber, 1979).<sup>26</sup> Korean,

binding of  $c^*$  in a clause like (20), Nez Perce person indexicals must be flexible about whether they depend on  $c^*$  or on a bound context variable. This predicts that person indexicals should not be required to shift together with other person indexicals in Nez Perce, which is false (Deal, 2014).

<sup>25</sup>The names of these generalizations are my own.

<sup>26</sup>The facts in Slave (a fellow Athabaskan language) are quite similar to those in Navajo; in particular, Rice (1986) demonstrates that verbs whose complements feature overt “complementizers” resist indexical shift. It may be that the putative complementizers are in fact markers of nominalization, though Rice (1989, ch 42) presents some challenges for this view.

likewise, requires nominalized complements to the verb ‘know’, and indexical shift in this complement is ruled out (Yangsook Park, p.c.). This overall body of facts follows from the syntax of shifty operators, in particular the fact that these operators belong to the finite C system. Anand (2006, 109) and Sudo (2012, 216) each consider the idea that operators may instantiate (finite) C. I will work to flesh out this proposal, in slightly modified terms, in sections 4.3 and 6.

Height Matters, (39), records another way that indexical shift may be variable with a given attitude verb. A language may allow indexicals to occupy multiple positions inside the attitude complement, such that they shift in the lower position but not the higher one. This is demonstrated for Uyghur in (41) and (42). Uyghur allows embedded subjects to be realized either in the nominative or the accusative case. Both types of subjects, Shklovsky and Sudo (2014) demonstrate, are base-generated inside the attitude complement and may be interpreted there (they may receive *de dicto* opaque readings). However, accusative subjects occupy a higher position inside the attitude complement than nominative subjects do. Accusative (high) subject indexicals disallow shift, (41a), whereas nominative (low) subject indexicals require it, (41b).

- (41) a. Ahmet [ **meni** ket-ti ] di-di. Uyghur  
 Ahmet [ 1SG.ACC leave-PAST.3 ] say-PAST.3  
 Amhet<sub>i</sub> said that I/\*he<sub>i</sub> left.
- b. Ahmet [ **men** ket-tim ] di-di.  
 Ahmet [ 1SG.NOM leave-PAST.1SG ] say-PAST.3  
 Amhet<sub>i</sub> said that he<sub>i</sub>/\*I left.
- (Shklovsky and Sudo, 2014, 386)

Likewise, any indexical to the left of (i.e. higher than) an accusative subject cannot shift, but any indexical to the right of (i.e. lower than) a nominative subject must shift. This is shown for second person dative object *sanga* in (42).

- (42) a. Ahmet Aygül-ge [ *sanga* **meni** xet ewet-ti ] di-di. Uyghur  
 Ahmet Aygül-DAT [ 2SG.DAT 1SG.ACC letter send-PAST.3 ] say-PAST.3  
 Ahmet told Aygül<sub>i</sub> that I sent a letter to you/\*her<sub>i</sub>. (Shklovsky and Sudo, 2014, 396)
- b. Ahmet manga [ **men** *sanga* xet ewet-tim ] di-di.  
 Ahmet 1SG.DAT [ 1SG.NOM 2SG.DAT letter send-PAST.1SG ] say-PAST.3  
 Ahmet<sub>i</sub> told me that he<sub>i</sub> sent a letter to me/\*you. (Shklovsky and Sudo, 2014, 395)

Potentially similar facts in support of Height Matters obtain in Manambu (Aikhenvald, 2008). This constraint follows from the syntactic location of the operators along with their scope-taking behavior. An indexical in the scope of a shifty operator must shift (provided the operator targets the relevant parameter of context), but one that interpreted outside the scope of any operator cannot. For Uyghur (41)-(42), indexicals *in situ* inside the embedded clause are accordingly forced to shift, but those that have scrambled to the clause edge are immune from shifting. Crucially, because shifty operators are syntactically independent of attitude verbs, arguments that are outside the scope of shifty operators may nevertheless remain in the scope of attitudinal quantification. Accordingly, while accusative subjects may not undergo indexical shift in Uyghur (if they contain indexicals), they may be read *de dicto* (if they contain descriptions).

These interface generalizations again distinguish the shifty operator view from its competitors. Neither partial quotation nor binding is expected to show sensitivity to finiteness; partial quotation likewise should be possible equally well for indexicals high in the embedded clause and those

lower down. The relevance of syntactic factors is also challenging for presupposition- or anaphora-based approaches such as Hunter and Asher (2005), Bittner (2014), and Roberts (2015), according to which indexicals (or the associated presuppositions) may be linked to discourse representations for either the matrix or the embedded context. These views tie the introduction of these representations to attitude verbs, leaving no obvious room for finiteness or the position of the indexical in determining linking possibilities.

## 4 Deriving the asymmetries

Having now seen how the shifty operator view works, and what ground it already covers, we take up the core task of explaining the four generalizations from section 2. This project begins with two elaborations on the grammar of shifty operators, in the service of explaining the generalizations about indexicals (G2/G3) and about verbs (G1). It rounds off with a new proposal about semantic variation in the field of shifty operators, in the service of explaining the generalization about *de se* (G4). The main proposal presented, I turn to some potential objections and alternatives at the section's close.

### 4.1 Regulating which indexicals shift

We begin with a combined generalization about what indexical classes may shift in an attitude complement:

#### (G2/G3) A generalization about indexicals

The possibility of indexical shift is determined by the hierarchy 1st > 2nd > HERE

		Shifty 1st	Shifty 2nd	Shifty HERE
(a)	Matses	✓	✓	✓
(b)	Uyghur	✓	✓	–
(c)	Tamil	✓	–	–
(d)	English	–	–	–

We have seen in sections 2.2-2.3 that variation of this type holds both within languages and across them. Nez Perce provides examples of rows (a), (b), and (d); Slave provides examples of rows (b), (c) and (d). For Slave, we may generalize that if an attitude complement has addressee shift, it has author shift. For Nez Perce, we may generalize that if an attitude complement has locative shift, it has person shift. In the latter case, for instance, this means that while some attitude complements in Nez Perce require the calculation of  $\llbracket XP \rrbracket_{\langle Author_i, \dots, Loc_c \rangle, i}$  (where  $c$  is the utterance context,  $i$  is a bound index, and  $XP$  is some embedded constituent), none require the calculation of  $\llbracket XP \rrbracket_{\langle Author_c, \dots, Loc_i \rangle, i}$ . What accounts for this asymmetry?

We should first note that constraints on contexts (insofar as they are independently motivated) do not yield a full explanation. For instance, based on person asymmetries of the type in Slave, we might consider appealing to the fact that a shifted value is not always well-defined for the second person; thus, second person shifting has a more constrained distribution than first person shifting does (cf. Bittner 2014, p. 18). This type of explanation will not extend to the Nez Perce person/locative asymmetry, however. A shifted value is always well-defined for the locative indexical, since attitudes have locations, regardless of whether the person indexicals are shifted.

Thus the mere definedness of shift does not account for why locative shift requires person shift.<sup>27</sup> Similarly, we must resist an explanation in terms of a blanket constraint against improper contexts (cf. Bittner 2014, p. 20). Partial indexical shift does exist and seems to require contexts of this type, e.g. those in which first person is shifted but not second person (e.g. Slave (23)) or in which person indexicals are shifted but not locatives (e.g. Uyghur (11), Nez Perce (20)). Of course, it is relatively trivial to articulate a constraint on contexts tailor-made for the delivery of generalizations (G2/G3). Any such proposal should be evaluated against the proposal just below both on its ability to account for the present patterns and on how well it integrates into a larger picture of the workings of indexical shift. It is with this larger picture in mind that I propose an analysis based not in constraints on contexts but rather in the meaning and grammar of shifty operators.

We begin with variation inside a single language. Let us suppose that a language like Nez Perce contains not one but three shifty operators –  $OP_{LOC}$ ,  $OP_{ADDR}$ ,  $OP_{AUTH}$  – each responsible for a simple modification of context:<sup>28</sup>

(43) Nez Perce shifty operators (to be revised)

- a.  $\llbracket OP_{AUTH} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{Author_i/Author})$
- b.  $\llbracket OP_{ADDR} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{Addr_i/Addr})$
- c.  $\llbracket OP_{LOC} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{Loc_i/Loc})$

Insofar as it allows for multiple distinct operators within the lexicon of a single language, this proposal follows Anand (2006). Unlike Anand’s operators, however, those in (43) make non-interacting changes to the context against which their complement is evaluated. In order to model shift of both person and locative indexicals, multiple operators must occur together at the edge of the finite clause.

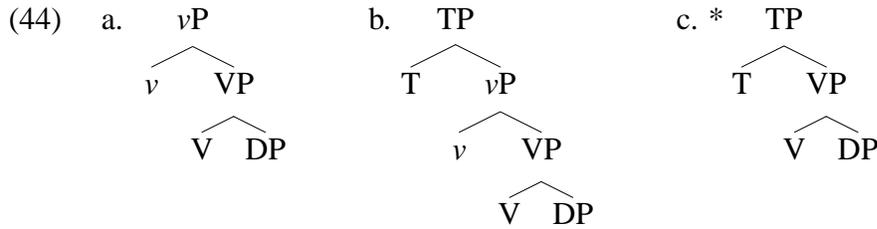
This raises a structural question. Shifty operators are not open-class lexical items. They are functional elements, i.e. elements of a type that decades of syntactic research has found to occupy rigid “functional sequences” requiring that one type of element asymmetrically command another type of element (Zamparelli 1995, Rizzi 1997, Cinque 1999). Given the prevalence of these sequences throughout the grammar, we should expect shifty operators to fit into one, in particular one that articulates the periphery of finite attitude complements. It could, in principle, universally be the case that  $OP_{ADDR}$  occurs higher in the CP domain than  $OP_{AUTH}$  when the two co-occur, or vice versa; this is an empirical question concerning the functional sequence.

It is precisely generalizations like (G2/G3) that allow such questions to be adjudicated. It has long been known about the syntax of embedded clauses that complement clauses come in different sizes (e.g. CP vs. TP (vs.  $\nu P$ ), or in earlier work  $\bar{S}$  vs. S; see Bresnan 1972, Rochette 1988 and much following work). Furthermore, clause size variation is generally monotonic; the difference is where in the sequence of projections upwards the embedded clause ends. Given that T occurs higher than  $\nu$  in the functional sequence, a clause may end at  $\nu P$ , including  $\nu$  and everything lower

<sup>27</sup>We return in section 6.1 to issues raised by the fact that a second person shifted value is sometimes undefined, in particular with verbs of mental attitude.

<sup>28</sup>This departs from the proposal for Nez Perce in Deal (2014), where author and addressee shift are accomplished together by an  $OP_{PERS}$  operator – a lexical bundle of  $OP_{AUTH}$  and  $OP_{ADDR}$ . I turn to questions raised by lexical bundling in section 6.

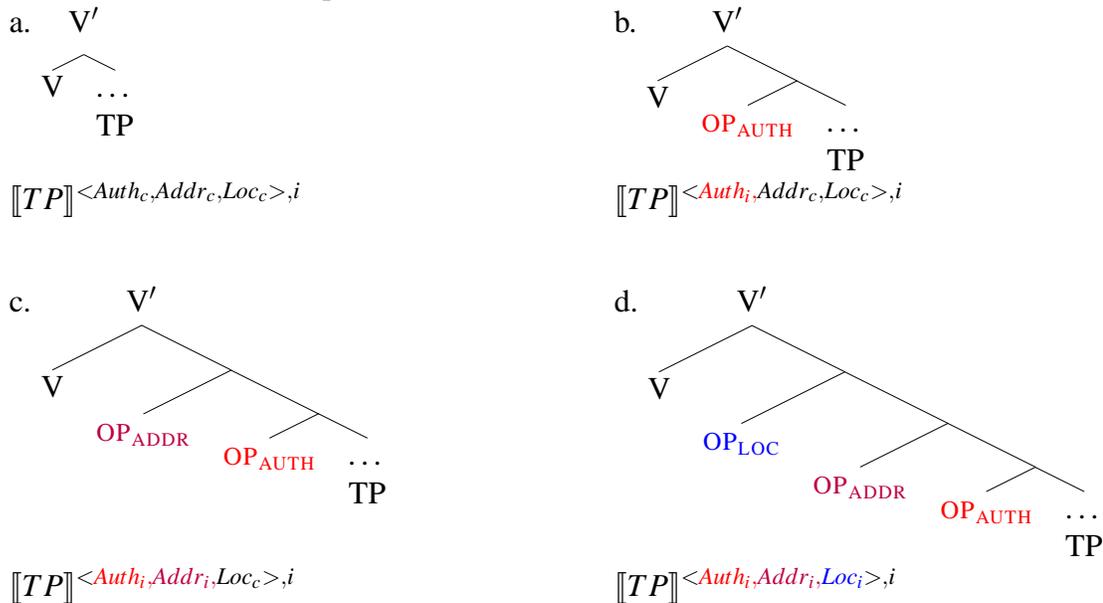
in the sequence (44a); it may end at TP, including T and everything in *vP* (44b); it cannot mix and match from different parts of the clause, containing TP but omitting *v* or *vP*, (44c), for example.<sup>29</sup>



Similarly, in the realm of shifty operators, we expect that a clause projected only up to  $OP_\alpha$  will show shift only with respect to  $\alpha$ , whereas a clause projected past  $OP_\alpha$  up to  $OP_\beta$  will show shift both with respect to  $\alpha$  and with respect to  $\beta$ . This is the pattern reported in (G2/G3), where  $\alpha$  is author and  $\beta$  is addressee, and likewise where  $\alpha$  is addressee and  $\beta$  is location. I conclude, therefore, that  $OP_{ADDR}$  occupies a higher position than  $OP_{AUTH}$ , and likewise that  $OP_{LOC}$  occupies a higher position than  $OP_{ADDR}$  (and, accordingly,  $OP_{AUTH}$  as well).

The implicational relationship between shifting of different classes of indexicals falls out from these syntactic facts together with variation in the precise size of the embedded clause. Given the operators in (43), an attitude complement may come in any of four varieties, differing in the extent to which they enforce indexical shift on material inside TP:<sup>30</sup>

(45) Four sizes of attitude complements



Both within and across languages, it is possible for attitude complements to include a full suite of operators, yielding total indexical shift (as found in Zazaki and Matses) in structure (45d). It is also possible for attitude complements to include  $OP_{ADDR}$  and  $OP_{AUTH}$  only, yielding shift of person indexicals but not locatives, (45c). This is the only option allowed in Uyghur finite clauses

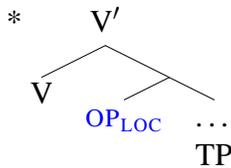
<sup>29</sup>Here I build on syntactic arguments that *vP* is always present, regardless of transitivity; see Legate (2003), Deal (2009).

<sup>30</sup>I use an ellipsis mark in these structures to abstract away, temporarily, from the position of C.

(recalling that Uyghur allows indexicals to avoid shift by moving outside the scope of shifting operators). In Nez Perce, this is a possibility that co-exists with structures (45d) and (45a). An additional possibility is that attitude complements include  $OP_{AUTH}$  only, yielding shift of first person indexicals only, (45b). This is the only option allowed in Tamil; in Slave it is a possibility that co-exists with structure (45c) (the choice being regulated, as discussed in the next section, by verb). The final option is simply one where no indexicals shift whatsoever, (45a).

By contrast, it is not possible (for instance) for attitude complements to include  $OP_{LOC}$  only, without any operators lower in the sequence. Similar remarks apply to further combinations involving the person shifters  $OP_{ADDR}$  and  $OP_{AUTH}$ . A shifter may only be present in a structure if those lower than it in the sequence are also present. This yields the hierarchy effect regarding which indexicals shift.

(46) *A structure in violation of functional sequencing.*<sup>31</sup>



## 4.2 The effect of verbs

One implication of the operator stacking view is that clauses with different degrees of indexical shift (including none at all) constitute syntactic objects of different sizes – or, equivalently, different categories. A clause with full indexical shift is an  $OP_{LOC}P$ ; one with person shift only is an  $OP_{ADDR}P$ . To explain the effect of verb choice on indexical shift, we will put this together with Rice’s (1986) proposal that variation by verb is a side effect of verbal subcategorization. Verbs that select for larger structures will allow a greater degree of indexical shift in their complements (Anand 2006, Sundaresan 2011, 2012). Given the hierarchy effect described in (G1), this suggests that verbs of speech must allow the syntactically largest complements, followed by verbs of thought, followed by verbs of knowledge.

### (G1) A generalization about verbs

Verbs of speech are more likely to allow indexical shift in their complement than are verbs of thought, which in turn are more likely to allow indexical shift in their complement than are verbs of knowledge.

	Shift takes place under ...		
	Speech verbs	Thought verbs	Knowledge verbs
Nez Perce,	✓	✓	✓
Navajo, Slave, Uyghur	✓	✓	–
Tamil, Zazaki	✓	–	–

The corresponding hierarchy of syntactic complement sizes is explicitly proposed by Sundaresan (2011, 2012), drawing on various types of typological findings. Finite complements, for instance,

<sup>31</sup>Crucial here is that the ellipsis mark conceals no shifty operators.

are generally taken to be syntactically larger than nonfinite ones or nominalizations,<sup>32</sup> and finite complementation does not occur with verbs of knowledge, for instance, unless it also occurs with verbs of speech and thought. English allows finite complements for *say*, *think*, and *know*; Korean allows finite complements only for ‘say’ and ‘think’ but requires nominalization for ‘know’ (Yangsook Park, p.c.); no language requires nominalized or otherwise nonfinite complements for ‘say’, while allowing full finite complementation for ‘think’ and/or ‘know’. Perhaps relatedly, the distribution of logophoric pronouns follows an identical hierarchy, favoring verbs of speech over verbs of thought, and verbs of thought over verbs of knowledge (Stirling 1993, Speas 2004, Oshima 2006, 208). Supposing that logophors require binding by operators in the left periphery, as Koopman and Sportiche (1989) and many others have proposed, this effect, too, suggests a hierarchy of complement size – a line of thinking pursued in influential work by Speas (2004). Speech complements are most likely to support indexical shift, finiteness, and logophoric elements because they are syntactically largest. As the syntactic size of the complement decreases, the likelihood of indexical shift, finiteness, and logophoric binding decreases accordingly.

The possible and impossible language types outlined by (G1) may thus be modeled as follows. In Nez Perce, verbs of speech, thought and knowledge all take complements large enough to constitute finite clauses containing indexical shifting operators. Accordingly, indexical shift is possible in complements of all three types.

- (47) a. SAY [ OP [ TP  
 b. THINK [ OP [ TP  
 c. KNOW [ OP [ TP

In Navajo, only verbs of speech and thought have complements large enough to host shifty operators; verbs of knowledge do not.

- (48) a. SAY [ OP [ TP  
 b. THINK [ OP [ TP  
 c. KNOW [ TP

In Zazaki, only verbs of speech have complements large enough to host shifty operators.

- (49) a. SAY [ OP [ TP  
 b. THINK [ TP  
 c. KNOW [ TP

By contrast, it is not possible (for instance) for a language to permit indexical shift only in complements of thought verbs without also allowing it in complements of speech verbs:

- (50) a. SAY [ TP  
 b. THINK [ OP [ TP  
 c. KNOW [ TP

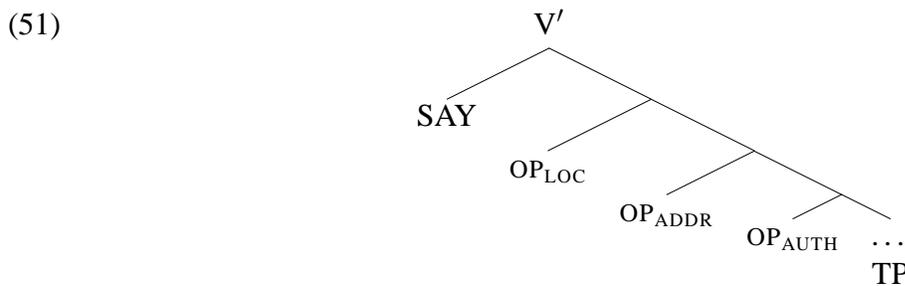
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<sup>32</sup>In the case of nominalizations, more properly it is the complement of the nominalizer that is clause-like but smaller than a full finite clause. See e.g. Borsley and Kornfilt (2000) for discussion of the role of verbal and nominal projections inside nominalizations.

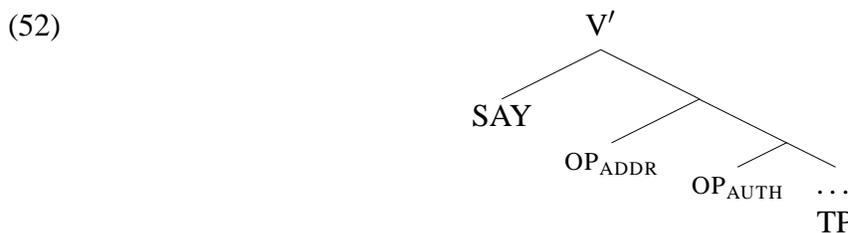
A language of this last type would need to allow thought complements to be systematically syntactically larger than speech complements – an option that language does not allow.<sup>33</sup>

### 4.3 Back to the *de se*

Before we move on, let us take stock by considering what can now be said about speech reports in three indexical-shifting languages: Nez Perce, Uyghur, and Zazaki. Zazaki, as we have seen, allows both person and locative indexicals to shift under ‘say’. This suggests the LF in (51) for Zazaki speech reports. An LF of this type will give rise to the calculation of  $\llbracket TP \rrbracket^{\langle Author_i, Addr_i, Loc_i \rangle, i}$ , where  $i$  is an index variable bound by modal quantification.



Uyghur, by contrast, does not allow locative indexicals to shift. This suggests that speech reports in Uyghur have a slightly less articulated LF than their Zazaki counterparts, giving rise to the calculation of  $\llbracket TP \rrbracket^{\langle Author_i, Addr_i, Loc_c \rangle, i}$ , where  $i$  is a bound index variable and  $c$  is the utterance context.



Finally, Nez Perce presents two options: either both person and locative indexicals shift, or only person indexicals do. This suggests that Nez Perce allows the union of the possibilities allowed by

<sup>33</sup>The word *systematic* is important here in view of the optionality of indexical shift in some languages. In Korean and Nez Perce, for instance, indexical shift is possible both with ‘say’ and ‘think’, but is not obligatory in either case. This means that these languages permit all of the following schematic structures:

- |     |    |     |   |    |   |    |  |     |       |   |    |   |    |
|-----|----|-----|---|----|---|----|--|-----|-------|---|----|---|----|
| (i) | a. | SAY | [ | OP | [ | TP |  | a'. | THINK | [ | OP | [ | TP |
|     | b. | SAY |   |    | [ | TP |  | b'. | THINK |   |    | [ | TP |

Such cases suggest that the Speas/Sundaresan hierarchy of complement sizes should be taken to describe the *maximum* size for a particular complement type: the maximum size of a thought complement is always no greater than the maximum size of a speech complement.

the other two languages – both (51) and (52) are well-formed Nez Perce LFs.<sup>34</sup>

It is useful to begin with this range of possibilities as we move to a final dimension of variation in indexical shift, namely variation in requirements of *de se* interpretation. For the particular languages just exemplified, there are two instances of semantic undergeneration that remain to be explained. Given the system outlined in section 3.1, we expect that the only possible shifted value for an indexical should be a *de se* value. This prediction is welcome for Zazaki and for a subset of the indexicals of Uyghur and Nez Perce. Something must be done, however, to explain the rest of the data, in particular the availability of Uyghur shifty second person indexicals and Nez Perce shifty locative indexicals in scenarios that do not support *de se* readings; and whatever is done about these particular cases must be connected back to generalization (G4).

(G4) **A generalization about *de se***

Shifty first person is always *de se*.

Requirements for *de se* interpretation conform to the hierarchy 1st > 2nd > HERE

	1st always <i>de se</i>	2nd always <i>de se</i>	HERE always <i>de se</i>
Zazaki, Korean	✓	✓	✓
Nez Perce	✓	✓	–
Uyghur	✓	–	n/a

This is to say that any full account will need to provide both an analysis of individual non-*de se* shifty indexicals and a source for the hierarchy effect in their distribution. The hierarchy effect in particular suggests that the source of non-*de se* shifty indexicals should in some way be connected to the hierarchy of shifty operators in the clause periphery. This connection is at the heart of the analysis I will propose.

Let us first remind ourselves how the account as developed thus far imposes *de se* requirements. One part of the explanation comes from the nature of attitudinal quantification; the other comes from the semantics of shifty operators. On the former count: modal quantification in attitude reports is quantification over centered tuples (indices), which pair a possible world with various coordinates that determine a perspectival center. On the latter count: given the semantics of shifty operators, it is elements of these tuples that are used to overwrite parameters of context. As laid out in section 3.1, the quantificational component in an attitude report comes from the attitude verb itself, as in (53), and shifty operator semantics are as exemplified in (54).

$$(53) \quad \llbracket TELL \alpha \rrbracket^{c,i} = \lambda x. \forall i' \in R_{tell}(x, i) \llbracket \alpha \rrbracket^{c,i'} \quad = (28)$$

where  $i' \in R_{tell}(x, i)$  iff

- a.  $w_{i'}$  is compatible with what  $x$  says in  $w_i$
- b.  $auth_{i'}$  is an individual in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of herself
- c.  $addr_{i'}$  is an individual in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her addressee
- d.  $loc_{i'}$  is a location in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her spatial location
- e.  $time_{i'}$  is a time in  $w_{i'}$  that  $x$  identifies in  $w_i$  as a counterpart of her temporal location

$$(54) \quad \llbracket OP_{AUTH} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle}. p(i)(c^{Author_i/Author}) \quad = (31)$$

<sup>34</sup>For present purposes I set aside the possibility of an operator-free structure in Nez Perce and Zazaki, but not Uyghur, deriving optional indexical shift; see the discussion around (45) above.

In the scope of attitudinal quantification, coordinates of the index are thus always *de se* coordinates. If only these *de se* coordinates can be used to determine contextual values, shifty indexicals cannot avoid *de se* interpretations. On the other hand, if contextual values could be overwritten with something *other* than a coordinate of the index, escaping the centering requirements imposed by attitudinal quantification, a non-*de se* shifty indexical would result. This would be the case, in particular, if shifty values could be drawn from information about the attitude event itself.

Implementing this type of picture requires a closer look at the composition of attitude complements. In this regard I follow a trail that has been blazed by Kratzer (2006), Anand and Hacquard (2008), and Moulton (2009, 2015). These authors capitalize on the idea that attitudes are a special type of eventuality, which is associated with propositional content. The content of a saying event is the set of worlds compatible with what is said. The content of a thinking state is the set of worlds compatible with what is thought. An attitude clause overall must introduce an eventuality, identify what type of attitude it is, provide its various arguments, and quantify over its content. Some of these types of information are more lexically variable than others: different types of attitude verbs introduce different types of eventualities, but the core modal quantification of attitude complements does not vary with the choice of attitude verb. This suggests that modal quantification may actually be contributed not by the attitude verb itself, but by the finite complementizer. The semantics of attitude verbs themselves then becomes quite slim, much of the work having moved to the interpretation of C:<sup>35</sup>

$$(55) \quad \llbracket \text{say} \rrbracket^{c,i} = \lambda e. \text{saying}(e)$$

$$(56) \quad \llbracket \text{think} \rrbracket^{c,i} = \lambda e. \text{thinking}(e)$$

$$(57) \quad \llbracket C^0 \alpha \rrbracket^{c,i} = \lambda e. \forall i' \in \text{RCON}(e) \llbracket \alpha \rrbracket^{c,i'}$$

where  $i' \in \text{RCON}(e)$  iff

- a.  $w_{i'}$  is a member of the content of  $e$
- b.  $\text{auth}_{i'}$  is an individual in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of herself
- c.  $\text{addr}_{i'}$  is an individual in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of her addressee, if any; otherwise  $\text{addr}_{i'}$  is  $\emptyset$
- d.  $\text{loc}_{i'}$  is a location in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of her spatial location
- e.  $\text{time}_{i'}$  is a time in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of her temporal location

---

<sup>35</sup>Here  $\text{EXT}(e)$  is a function that applies to an event and yields its external argument (roughly: agent or experiencer). Attitudes vary in whether or not they have addressees in addition to external arguments. Therefore, in view of the role of the addressee coordinate of the index in determining *de te* interpretation, any proposal for a single C head present in the complements of both speech and thought verbs must allow for an addressee coordinate of the index to receive a normal value in some cases but not others. Accordingly, in (57), I treat the *addr* coordinate as receiving defective value  $\emptyset$  when there is no addressee, leading to trivial truth or falsehood for sentences containing pronouns referencing this value. See section 6.1 for applications of this idea to Nez Perce and Uyghur.

This picture does not perturb the analysis of *de se* shifty operators from section 3.1, provided the operators in question attach in the scope of C. Along with the author shifter in (54), we can posit a *de se* locative shifter of this type for languages like Zazaki, and a *de te* shifter of this type for languages like Nez Perce.

(58) Zazaki locative shifter

$$\llbracket \text{OP}_{\text{LOC}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{\text{Loc}_i/\text{Loc}})$$

(59) Nez Perce addressee shifter

$$\llbracket \text{OP}_{\text{ADDR}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{\text{Addr}_i/\text{Addr}})$$

What would happen if a shifty operator attached outside the scope of C? In this environment, information about the attitude event cannot be recovered from the index, but it can be recovered from the event argument. I propose, therefore, that non-*de se* shifters directly use the event argument associated with the attitude to overwrite the context. For the proposals in (60)-(61), let LOC and ADDR be predicates that combine with an event argument and retrieve, respectively, the associated location or addressee.<sup>36 37</sup>

(60) Nez Perce locative shifter (non-*de se*)

$$\llbracket \text{OP}_{\text{LOC}} \rrbracket^{c,i} = \lambda P \in D_{\langle s, \langle \kappa, \kappa t \rangle \rangle} \cdot \lambda e. P(i)(c^{\text{LOC}(e)/\text{Loc}})(e)$$

(61) Uyghur addressee shifter (non-*de se*)

$$\llbracket \text{OP}_{\text{ADDR}} \rrbracket^{c,i} = \lambda P \in D_{\langle s, \langle \kappa, \kappa t \rangle \rangle} \cdot \lambda e. P(i)(c^{\text{ADDR}(e)/\text{Addr}})(e)$$

Because these shifters draw directly on the attitude event, they impose no requirement of *de se* identification. In the scope of locative shifter (60), a locative indexical will refer to a counterpart of the attitude location, regardless of whether the attitude holder self-locates there. Likewise, in the scope of addressee shifter (61), a second person pronoun will refer to a counterpart of the addressee of the embedding attitude, regardless of whether the attitude holder identifies this individual as such. This makes for a contrast with the corresponding shifters in (58) and (59), which overwrite only with *de se* location and addressee values as determined by the restriction on quantification in (57).

The hierarchy effect in *de se* requirements arises as a consequence of the way the two types of operator denotations relate to the contribution of C. C introduces both the attitude event argument and quantification over centered indices. In order to have access to the indices quantified over, *de se* shifters must occur below C. (Above it, they are vacuous.) In order to have access to the event

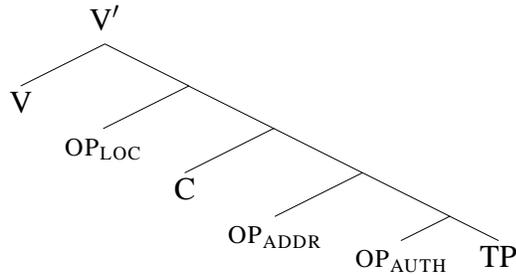
<sup>36</sup>This follows Deal (2014). Compare the similar move made by Bittner (2014) in Update with Eventuality Centering, where values for indexicals are functionally dependent on eventualities, including speech acts.

<sup>37</sup>These denotations call for a straightforward extension of Monstrous Function Application beyond the formulation in (30b):

- (i) If  $\alpha$  is a branching node and  $\{\beta, \gamma\}$  the set of its daughters, then for any context  $c$  and index  $i$ : if  $\llbracket \gamma \rrbracket^{c,i} \in D_{\langle s, t \rangle}$  and  $\llbracket \beta \rrbracket^{c,i}$  is a function whose domain contains  $\lambda e. \lambda c'. \lambda i'. \llbracket \gamma \rrbracket^{c',i'}(e)$ , then  $\llbracket \alpha \rrbracket^{c,i} = \llbracket \beta \rrbracket^{c,i}(\lambda e \lambda c'. \lambda i'. \llbracket \gamma \rrbracket^{c',i'}(e))$

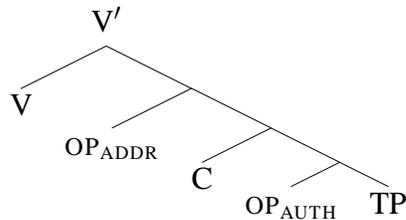
argument, non-*de se* shifters must occur above C. (Below it, they pose a type mismatch.) If C sits in the middle of the sequence of operators, all those below it will impose *de se* requirements, but none of those above it will. For Nez Perce, this suggests that C is located between  $OP_{LOC}$  and  $OP_{ADDR}$  in a maximally articulated attitude complement. The structure in (62) gives rise to the calculation of  $\llbracket TP \rrbracket \langle Auth_i, Addr_i, LOC(e) \rangle, i$ , where  $i$  is an index variable bound by centered modal quantification and  $e$  is an event variable restricted by the attitude verb.

(62)



Thus shifty locatives in a Nez Perce attitude report need not be read *de se*, but their person indexical counterparts must. For Uyghur, second person shifty indexicals need not be read *de se*, but first persons must. So, C must be located between  $OP_{ADDR}$  and  $OP_{AUTH}$  in this language:

(63)



This structure gives rise to the calculation of  $\llbracket TP \rrbracket \langle Auth_i, ADDR(e), Loc_c \rangle, i$ , where  $i$  is an index variable bound by centered modal quantification,  $e$  is an event variable restricted by the attitude verb, and  $c$  is the utterance context. By interleaving C between two distinct shifty operators in Uyghur, the theory succeeds in modeling the language's three-way distinction among indexical types: first persons shift and require *de se* interpretations (since  $OP_{AUTH}$  is projected below C), second persons shift but do not require *de te* interpretations (since  $OP_{ADDR}$  is projected above C), and locatives do not shift (since  $OP_{LOC}$  is not projected).

The final piece of generalization (G4) concerns the apparently universal *de se* requirement on first person indexical shift. This piece follows if  $OP_{AUTH}$ , if present, is always below C (or in other terms, the lowest possible attachment site for C is above  $OP_{AUTH}$ ). (We return to this constraint in light of evidence from temporal indexicals in section 5.) Otherwise, C may appear anywhere in the sequence of shifters  $OP_{LOC} > OP_{ADDR} > OP_{AUTH}$ . All shifters below C impose *de se* requirements – index parameters, bound by centered quantification, overwrite context – and all shifters above C do not – event parameters overwrite context, free of any such constraint.<sup>38</sup>

<sup>38</sup>A syntactic consequence of this analysis concerns the status of C. If C, as defined in (57), is a head in the functional spine of finite clauses, we do not expect it to remain present in clauses where the next head down in the functional sequence is absent, in keeping with the monotonicity of structural impoverishment. Yet various languages that allow indexical shift also allow for attitude complements without any indexical shift at all (e.g. Nez Perce), and in such complements the semantic

#### 4.4 Objections and alternatives

At the heart of this proposal is a reduction of the facts on indexical shift to more general facts in the theory of grammar. The patterns concerning which indexicals shift, and with which verbs, reduce to a familiar type of functional sequencing effect, coupled with familiar variation in the size of the complements that attitude verbs allow. The pattern concerning *de se* interpretation ties back to the role of event arguments in grammar, together with an independently-proposed style of analysis for the finite complementizer. I will remark just briefly on two potential objections, along with several potential alternative analyses aimed at one or more of the loci of variation discussed in this section. We will see that these analyses do not allow a full account of (G1)-(G4), whether individually or jointly, and thus on empirical grounds do not constitute a viable alternative to the picture just presented.

A first objection concerns the etiology of the syntactic mechanisms to which I have appealed. While I have stated a hierarchy for indexical shifters, (45d), I have not explained why the hierarchy should be this way. Fair enough; but we must remind ourselves that the problem is much more general. Both in the clausal domain and in the nominal domain, as a scientific community, we do not know *why* functional sequences exist, but we know that they *do* exist. The absence of a known explanation for the known facts should be met with a research project, not with empirical denial. And indeed, promising work has begun on the ultimate explanation for functional sequences (e.g. Hacquard 2006, Scontras, Degen, and Goodman To appear) which can be expected to prove fruitful well into the future. Similar remarks may be made in response to the same objection in the case of the hierarchy of verb complement sizes, where functional explanations are already under development (e.g. Cristofaro 2003 and references there).

A second objection: the account is abstract. It involves inaudibilia.<sup>39</sup> This is true; it is also to a certain degree unavoidable. We have seen in the Uyghur facts in (41) and (42) that context shift is accomplished by some operation whose scope is properly smaller than that of an attitude verb. (Indeed this is the major conclusion of Shklovsky and Sudo 2014.) Yet do we need *multiple* such operators in individual attitude reports? Anand (2006) outlines a proposal according to which we do not – a first potential alternative to the proposal just presented. Instead of stacking shifty operators, shifting of multiple coordinates of context is accomplished on Anand’s account by individual operators with increasing control over contextual parameters:

- (64) a.  $[[\text{OP}_{\text{AUTH}}]]^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{\text{Auth}_i/\text{Auth}})$   
 b.  $[[\text{OP}_{\text{PERS}}]]^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{\text{Auth}_i/\text{Auth}, \text{Addr}_i/\text{Addr}})$   
 c.  $[[\text{OP}_{\forall}]]^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{\text{Auth}_i/\text{Auth}, \text{Addr}_i/\text{Addr}, \text{Loc}_i/\text{Loc}, \dots})$

contribution of C remains necessary for sentence interpretability. An intriguing possibility compatible with these facts is that the C element defined in (57) is, in syntactic terms, an adjunct, according it more flexibility in its placement across languages and a greater ability to survive impoverishment of its complement. On this view the obligatoriness of C results not from its syntax but from its semantics; attitude complements lacking C would be grammatical but uninterpretable. I must leave this as a speculation here for the time being.

<sup>39</sup>There is of course no prediction that operators *must* be silent, simply the allowance that they *can* be. For a language which makes operators overt, see Demirok and Öztürk (2015) on Laz.

On this view, at most one shifting operator is present on the edge of a clause with indexical shift. Given this, the hierarchy in (G2/G3) must ultimately follow from a constraint on the lexicon: a language may simply not contain an operator that shifts location, for instance, without that same operator also shifting person. The following must be impossible lexical items (and we should search for an understanding of why they are impossible):

- (65) a.  $\llbracket \text{OP}_{\text{ADDR.ONLY}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} . p(i)(c^{Addr_i/Addr})$   
 b.  $\llbracket \text{OP}_{\text{LOC.ONLY}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} . p(i)(c^{Loc_i/Loc})$   
 c.  $\llbracket \text{OP}_{\text{NON.AUTH}} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} . p(i)(c^{Addr_i/Addr, Loc_i/Loc})$

The predictions of this “single operator” approach differ from operator stacking approach along several empirical dimensions. Among these is the possibility of mixed indexical shift by verb: the operator stacking approach, but not the single operator view, predicts that a language that allows shift in the complement of both speech and thought verbs may allow more shifty parameters with speech verbs than with thought verbs, but not vice versa. This follows on the operator stacking view because an increase in syntactic structure facilitates an increase in operators, which in turn increases the number of shifty parameters. We will see some evidence for this situation in section 5. (Indeed, in connection with that discussion, in section 6 we will see reason to think that complex operators of the type exemplified in (64b) may indeed exist, but that the existence of such operators does not preclude operator stacking.)

The single operator view as outlined by Anand (2006) also differs from the operator stacking approach in that it disallows non-*de se* shifty indexicals (which, after all, have been discovered after 2006). The various alternative treatments of non-*de se* shifty indexicals that might be appealed to at this point do not explain the hierarchy effect in (G4). For the contrast between Uyghur second person and its necessarily *de te* counterpart in Zazaki and Nez Perce, for instance, Sudo (2012, §18.4) appeals to semantic variation in the meaning of second person pronouns: in Zazaki and Nez Perce they are pure indexicals, but in Uyghur they are concealed definite descriptions. A version of this proposal for Uyghur second person pronoun *sen* versus Nez Perce second person pronoun *'iim* is shown in (66).

- (66) a. Uyghur:  $\llbracket \textit{sen} \textit{'2sg} \rrbracket^{c,i} = \text{the individual that } Author(c) \text{ is talking to in } w_i$   
 b. Nez Perce:  $\llbracket \textit{'iim} \textit{'2sg} \rrbracket^{c,i} = Addressee(c)$

By localizing the source of non-*de se* indexicality in the shifty elements themselves, this proposal opens the door to non-*de se* readings of potentially any type of indexical in any language. In particular, it predicts that a language may have non-*de te* second person but fully shiftable *de se* locative indexicals, in violation of (G4). Similar remarks apply on the proposal from Pearson (2015), which is aimed at accounting for non-*de se* readings of logophoric pronouns. Pearson proposes that an inherently *de se* element (a logophor, in her study) may occur as the argument of a concept generator variable, giving rise to a *de re* reading rather than a *de se* reading. If applied to shifty indexicals, this type of mechanism predicts even greater freedom in which indexicals receive *de se* interpretations, as two indexicals of the same type in the same clause could potentially differ in whether they are read *de se* or *de re*. Finally, no greater constraint would be imposed by a picture that ties variation in *de se* requirements to variation in the centered-ness of attitudinal quantification, for instance by treating Uyghur  $\llbracket C \rrbracket$  as imposing no *de te* requirement:<sup>40</sup>

<sup>40</sup>This possibility was suggested in discussion by Pranav Anand, p.c. (2012).

(67)  $\llbracket C^0 \alpha \rrbracket^{c,i} = \lambda e. \forall i' \in \text{RCON}_{Uyghur}(e) \llbracket \alpha \rrbracket^{c,i'}$

where  $i' \in \text{RCON}_{Uyghur}(e)$  iff

- a.  $w_{i'}$  is a member of the content of  $e$
- b.  $auth_{i'}$  is an individual in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of herself
- c.  $addr_{i'}$  is an individual in  $w_{i'}$  **who is a counterpart of the addressee of  $e$**
- d.  $loc_{i'}$  is a location in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of her spatial location
- e.  $time_{i'}$  is a time in  $w_{i'}$  that  $\text{EXT}(e)$  identifies in  $w_e$  as a counterpart of her temporal location

This type of change in the modal accessibility relation can in principle be made for any coordinate(s) of the index, with no prediction that non-*de te* second persons should in any way correlate with the interpretations available to other shifty indexicals.

These remarks serve to illustrate how the core proposals of this section rest, fundamentally, on empirical claims. The argumentation just given can be defeated, empirically, by the demonstration of non-*de se* shifty indexicals which, in the context of the full set of indexicals in their language, fail to obey the hierarchy in (G4). Likewise, the argument for operator stacking can be defeated, empirically, by the demonstration of a language where indexicals do not shift in finite clauses with a richer left periphery but do shift in those with a more impoverished left periphery.

## 5 Temporal indexicals

One piece still missing from the picture thus far is a treatment of temporal indexicals. Temporal elements in embedded clauses are extremely well-studied, of course, insofar as they constitute tense systems; yet the connection of embedded tenses to indexical shift is at best murky, given the availability of binding-based analyses of embedded tenses (e.g. von Stechow 1995, Abusch 1997, Kusumoto 2005). Independent temporal adverbials, like their counterparts in the locative domain, furnish an alternative source of evidence on temporal indexical shift—provided, that is, that we can rule out non-indexical analyses for *these* items.

This turns out to be a much more pressing issue crosslinguistically than in the case of indexical persons. Unlike in the case of person, pairs of temporal adverbial translation equivalents across languages are not always identical in terms of indexicality. In Nez Perce, for instance, the adverbial *watiisx* is typically translated with an English indexical element, ‘yesterday’ or ‘tomorrow’. Yet *watiisx* behaves sharply different from these elements, and more in line with non-indexical translation ‘the next/previous day’, in the scope of temporal quantification, (68). Similar remarks apply to other Nez Perce temporal adverbials, such as *kii taaqc* ‘today/the same day’ (Deal, 2014).<sup>41 42</sup>

<sup>41</sup>The facts are quite different for the Nez Perce locative adverbial *kine* ‘here’, which behaves as a true indexical; see (24).

<sup>42</sup>Seth Cable (p.c.) points out that facts like (68) are compatible with an indexical analysis of *watiisx/kii taaqc* on the assumption that an  $\text{OP}_{\text{TIME}}$  element may occur outside of attitude contexts. Provided the temporal quantifier quantifies over indices, an (Anand 2006-style) indexical shifter in its immediate scope would lead to indexical shift. On this analysis, the difference between Nez

- (68) Kex mawa *pro*  $\emptyset$ -sapak'ayx-tato- $\emptyset$  'aatamooc, Nez Perce  
 whenever-1 *pro* 1SUBJ-wash-HAB.SG-PRES car  
 kaa **watiisx** hi-weqi-yo'qa.  
 then 1.day.away 3SUBJ-rain-MODAL  
 Whenever I wash my car, the next day (#tomorrow) it rains. (Deal, 2014, (18))

This behavior suggests that *watiisx* and *kii taaqc* are not indexical elements, but rather (contain) bindable temporal anaphors. Why are they translated with indexicals in English, then? Pragmatic competition in English furnishes an explanation. In English, simplex expression *tomorrow* blocks complex expression *the next day* from referring to  $t^*+I$  in matrix contexts. Speakers wishing to refer to  $t^*+I$  must therefore use *tomorrow* and not *the next day* in English, even when translating from a language that lacks competition of this type. Thus *watiisx* receives a 'tomorrow' translation in (69), for instance, even though 'the next day' is more true to the Nez Perce original.<sup>43</sup>

- (69) **Watiisx** *pro*<sub>subj</sub> ciq'aamqal-niin 'itamyaanwas-x  $\emptyset$ -pe-ki-yu'.  
 1.day.away *pro* dog-with town-to 1SUBJ-S.PL-go-PROSP  
 Tomorrow I'm going into town with my dog. (Deal, 2014, (18))

The upshot, empirically, is that languages vary in whether they contain truly indexical temporal adverbials, and methodologically, that translation with an indexical element furnishes a poor diagnostic for indexicality. The fact that a word is translated as 'today' or 'tomorrow' does not mean it is actually indexical.

These concerns have the consequence of significantly narrowing the range of evidence available on temporal indexical shift across languages. Evidence bearing on the existence and location of an  $OP_{TIME}$  head can only come from languages where we can confirm that temporal adverbials are truly indexical. Two contributions that meet this criterion come from recent work on Korean and on a dialect of (American) English. These studies provide initial evidence that temporal indexicals do indeed shift in natural language, while at the same time allowing us to pinpoint the location of  $OP_{TIME}$  in the functional sequence. In stark contrast to  $OP_{LOC}$ , this element occupies a very low position in the sequence, one below even  $OP_{AUTH}$ . Shifting of temporal indexicals is therefore possible even when person indexicals do not shift, and in complements of verbs that do not support other types of indexical shift.

A first example comes from work on Korean by Park (2016). Park demonstrates that a class of temporal expressions in this language cannot be bound by temporal quantifiers, just as we expect for true indexicals. Thus *cikum* 'now' contrasts with *palhwa sikaney* 'at the speech time', (70); similar contrasts obtain for other temporal expressions such as *ece* 'yesterday' (vs. *palhwail cen nal* 'the day before the day of speech'), *onul* 'today' (vs. *palhwa tangil* 'the day of speech'), *nayil* 'tomorrow' (vs. *palhwail taumnal* 'the day after the day of speech') (Park, 2016).

Perce and English would lie in the distribution of shifters (which Nez Perce, but not English, allows in quantificational contexts), rather than in the denotations of temporal adverbs. This analysis contrasts with the non-indexical analysis in that it predicts that temporal adverbials should show Shift Together effects in Nez Perce. See Deal (2014, (19)) for evidence that Shift Together does not apply to Nez Perce temporal adverbials; this fact supports the analysis given in the text.

<sup>43</sup>For other cases where translation is affected in a way significant for semantic theory by pragmatic concerns in the language being translated into, see Deal (2015).

(70) Obama-ka malhal ttyaymyun, Korean  
 Obama-NOM speaks when  
 When Obama speaks, ...

- a. manhun salamtul-i palhwa sikan-ey pakswuchinta  
 many people-NOM speech time-at clap  
 ... many people clap at the speech time.
- b. # manhun salamtul-i cikum pakswuchinta.  
 many people-NOM now clap  
 ... many people clap now.

(Park, 2016, (14))

Yet these elements can optionally shift in attitude complements, including those that are clearly not clausal quotations. (In (71), for instance, the embedded *wh*-word has matrix scope.)

(71) Context: It is January 8th.

Cinan cwu-ey Mary-ka [ nwuka nayil ttenanta-ko ] malhayss-ni? Korean  
 Last week-in Mary-NOM [ who-NOM tomorrow leave-C ] said-Q  
 Who did Mary say a week ago would leave on January {2nd / 9th}? (Park, 2016, (19b))

Korean temporal indexicals obey Shift Together, Park observes (2016, §2.3.1), as predicted on the shifty operator approach. They must be interpreted *de nunc* (temporal *de se*):

(72) John-i cinancwu welyoil-ey [ Mary-ka onul ttenanta-ko ] malhayssta. Korean  
 John-NOM last.week Monday-on [ Mary-NOM today leave-C ] said  
 John said last Monday<sub>i</sub> that Mary would leave that day<sub>i</sub>.

- a. ✓ Last Monday John said, “Mary is leaving today.”
- b. # John knew that Mary was going to leave on Monday last week. On that day, John somehow thought it was Sunday rather than Monday, and said, “Mary leaves tomorrow, on Monday.”

(Park, 2016, (29))

These facts suggest that the language contains an  $OP_{TIME}$  operator that sits inside the scope of C. Further clues to the relative location of this operator come from the selectional behavior of verbs. Verbs of speech in Korean allow not only temporal indexical shift, (71), but also person shift:

(73) Mary-ka [ nwuka na-lul coahanta-ko ] malhayss-ni? Korean  
 Mary-NOM [ who I-ACC like-C ] said-Q  
 Who did Mary<sub>i</sub> say likes {me / her<sub>i</sub>}? (Park, 2016, (18a))

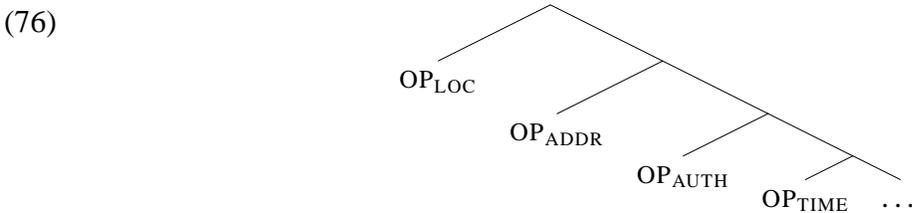
Yet verbs of thought allow only temporal indexicals to shift, (74), not person indexicals, (75).

(74) Context: It is January 8th.

Cinan cwu-ey Mary-ka [ nwuka nayil ttenanta-ko ] sayngkakayss-ni? Korean  
 Last week-in Mary-Nom [ who-Nom tomorrow leave-C ] said-Q  
 Who did Mary think a week ago would leave on January {2nd / 9th}? (Park, 2016, fn. 10)

- (75) Mary-ka [ nwuka na-lul coahanta-ko ] sayngkakayss-ni?  
 Mary-Nom [ who I-Acc like-C ] thought-Q  
 Who did Mary<sub>i</sub> think likes { me/ \*her<sub>i</sub> }? (Park, 2016, (30b))

The availability of temporal indexical shift but not person indexical shift in the complement of *sayngkakayss* ‘think’ suggests that the complements to this verb may contain  $OP_{TIME}$  but no other shifters. This means that the hierarchy of shifty operators should be articulated as in (76), where  $OP_{TIME}$  occupies the bottom-most position.



Additional evidence for the low position of  $OP_{TIME}$  comes from work on an indexical-shifting dialect of English by Anderson (2015). Based on both consultant judgments and numerous examples from corpora, Anderson reports a pattern wherein temporal adverbials cannot be bound by a temporal quantifier, (77), but nevertheless can shift in (non-quoted) attitude complements, e.g. (78). I will refer to the dialect that permits these patterns as “Anderson English.”

- (77) # Whenever you wash your car, it rains tomorrow.

- (78) % When I saw Kate a week ago, she said that she’d seen Star Wars yesterday. (acceptable in Anderson English)

In this dialect, like in Korean, temporal adverbials obey Shift Together; furthermore, like in standard English, person and locative embedded indexicals remain unshifted (Anderson, 2015). Like complements to the Korean verb *sayngkakayss* ‘think’, shifty attitude complements in Anderson English must therefore contain  $OP_{TIME}$  but no other shifters. This possibility is made available by the very low position of  $OP_{TIME}$  in the functional sequence.

Anderson English also provides a final example of shifty indexicals that need not be interpreted *de se*, and in doing so, cast new light on the constraint on the location of C posited at the end of section 4.3. In order to capture the generalization that first person shifty indexicals require *de se* interpretations in Amharic, Korean, Malayalam, Mishar Tatar, Nez Perce, Turkish, Uyghur, and Zazaki, I have proposed that  $OP_{TIME}$ , if present, is always below C. Given hierarchy (76), this predicts that  $OP_{TIME}$  will also be always below C, and accordingly, that shifty temporal indexicals must always be interpreted *de nunc*. Yet Anderson English imposes no such constraint, as the felicity of (79) shows.

- (79) Context: John is confused on Thursday and thinks the date is the 23rd, when it is really the 24th. On Thursday, John tells Sarah, “I’m coming on the 24th.” But he doesn’t show up until Saturday. A week later, Sarah is telling Bill what happened. She says:

- % Last Thursday, John said that he was going to come over tomorrow, but he showed up on Wednesday instead! (acceptable in Anderson English)

The absence of a *de nunc* requirement calls for a treatment of shifty *say* complements in this dialect where C attaches below the bottom-most possible shifter:

(80)



Adoption of this structure requires that we remove the stipulation on the placement of C adopted in section 4.3, and in so doing, leads us to predict that languages may exist in which shifty first person indexicals actually do not require *de se* interpretation. Further empirical work is required to assess the success of this prediction. In the meantime, this prediction stands as an illustration of the way that empirical discoveries about one type of shifty indexical yield expectations for the behavior of another type, given the framework outlined in the previous two sections.

## 6 Lexical bundling

The account now before us regulates variation in terms of three interrelated dimensions:

(81) Dimensions of variation

- a. Which operators are present in the language
- b. Where C fits into the sequence of operators
- c. Which structures particular verbs select for

Independent of any particular language, dimension (a) is constrained by the hierarchy of operators, (76); dimension (b), given the reasoning of the previous section, is plausibly totally free; dimension (c) is constrained by the hierarchy of complement size. Internal to a particular language, behaviors along different dimensions are constrained by one another in straightforward ways. A language that lacks shifty operators (such as standard English) cannot contain verbs that select for them. A language lacking  $OP_{LOC}$  (such as Uyghur) cannot contain verbs selecting for  $OP_{LOC}P$  nor require that C sit above  $OP_{LOC}$ . In terms of operator denotations, a language where C sits below  $OP_{ADDR}$  cannot make use of a *de te* addressee shifter as in (82), and likewise a language where C sits above  $OP_{ADDR}$  cannot make use of a non-*de te* addressee shifter as in (83).

$$(82) \quad \llbracket OP_{ADDR} \rrbracket^{c,i} = \lambda p \in D_{\langle \kappa, \kappa t \rangle} \cdot p(i)(c^{Addr_i/Addr}) \quad = (59)$$

$$(83) \quad \llbracket OP_{ADDR} \rrbracket^{c,i} = \lambda P \in D_{\langle s, \langle \kappa, \kappa t \rangle \rangle} \cdot \lambda e \cdot P(i)(c^{ADDR(e)/Addr})(e) \quad = (61)$$

Shifty operators themselves vary in two different ways: in terms of which parameter of context they modify and in terms of how they make this modification. In this section, I will propose a third and final way that shifty operators vary across languages. I will propose, returning to ideas from Anand (2006), that operators may vary in how many parameters of context they modify. The recognition of this final dimension of variation will allow for an account of the variable behavior of second person pronouns in complements of verbs of cognition (a point of variation highlighted by Sudo 2012), as well as a series of facts about temporal and locative indexicals in Korean (as highlighted by Park 2016), building on the treatment of Korean temporal indexicals laid out in the previous section.

## 6.1 Verbs of cognition and the second person

It is a common observation that verbs' selectional behavior is at least in part correlated with their meaning. In a theory where selectional behavior determines the possibilities for indexical shift in verbal complements, this observation suggests a potential constraint on selection by verbs of cognition. Cognition, unlike conversation, is at most a one-participant state; verbs of thinking and knowing lack addressees. Such verbs should therefore select for a constituent containing no shifters beyond  $OP_{AUTH}$ . Given that there is no addressee,  $OP_{ADDR}$  (if present) would cause the Addressee parameter of context to be overwritten with  $\emptyset$  – an outcome that serves no plausible communicative goal.

This expectation is borne out in Slave. In the complement of *yenıwe* 'want/think', first person optionally shifts, while second person always remains unshifted (Rice, 1989, 1280-1289). This indicates that  $OP_{AUTH}$  is optionally present in these complements, but that  $OP_{ADDR}$  is not permitted; the complement of *yenıwe* 'want/think' is at most (modulo  $CP^{44}$ ) an  $OP_{AUTH}P$ .

- (84) [ Sacho nınaohjá ] yenıwe. Slave  
 [ tomorrow 1SG.OPT.return ] 3.want  
*Shifted interpretation:* She wants to come back tomorrow. (Rice, 1989, 1281)
- (85) Denexare [ wojı ] yenıwe.  
 sister [ 2SG.OPT.sing ] 3.want  
 Sister wants you to sing. (Rice, 1989, 1281)

Yet a rather different pattern is attested in Nez Perce. In this language, on one hand, first person arguments optionally shift in the complement of *neki* 'think', suggesting that  $OP_{AUTH}$  is optionally present:

- (86) Kii hiiwes 'iniit yoŋ ke Jack hi-neki-se- $\emptyset$ , Nez Perce  
 this is house REL.PRON C Jack 3SUBJ-think-IMPERF-PRES  
 [ 'iin  $\emptyset$ -haanii- $\emptyset$ -ya \_ ].  
 [ I 1SUBJ-make-P-REM.PAST \_ ]
- a. This is the house that Jack thinks I built.  
 b. This is the house that Jack<sub>i</sub> thinks he<sub>i</sub> built.  
 (Deal, 2014, (4))

On the other hand, first person shifting becomes impossible when a second person argument is present within the complement.

- (87) Lori hi-neki-se [ 'ee  $\emptyset$ -wees qetu kuhet 'in-im-x ]. Nez Perce  
 Lori 3SUBJ-think-TAM [ you 2SUBJ-be.PRES more tall 1SG-GEN-to ]
- a. Lori thinks that you are taller than me.  
 b. ✗ Lori<sub>i</sub> thinks that you are taller than her<sub>i</sub>.  
 (Deal, 2014, (13))

<sup>44</sup>As information on the *de se* requirements of shifty indexicals is not available for Slave, no determination can be made regarding the location of C in this language.

This pattern suggests that a Nez Perce thought complement contains  $OP_{AUTH}$  iff it also contains  $OP_{ADDR}$ . In a thought complement that lacks any second persons, such as (86), the work of  $OP_{ADDR}$  may take place with no harm done; the Addressee parameter of context may be set to a defective value, but this value is not invoked. When a second person is present, though, as in (87), it is crucial that  $OP_{ADDR}$  not be present, in order to avoid the defective value. Given the biconditional relationship between  $OP_{AUTH}$  and  $OP_{ADDR}$ , this means that Author shift must be avoided as well.

How can we model this relationship between  $OP_{ADDR}$  and  $OP_{AUTH}$  in Nez Perce, and the difference between Nez Perce and Slave? The work can be done by selectional fiat, though at a cost. That is, the lexicon of Nez Perce could simply declare, as a matter of selectional features recorded in the verb’s lexical entry, that the complement of *neki* ‘think’ either contains  $OP_{ADDR}$  or it contains no shifters at all. Slave is different in that its verbs of cognition select at most  $OP_{AUTH}$ . The cost of this approach is that we give up on verb meaning as a functional source of constraint in determining selectional features. In Nez Perce, the  $OP_{ADDR}$  head does nothing but create a defective contextual value in the complement of *neki* ‘think’—but the verb selects for it all the same.

A more promising approach to these facts models the relationship between different types of person indexicals by reviving a crucial piece of Anand’s (2006) single operator view. Instead of distinct  $OP_{ADDR}$  and  $OP_{AUTH}$  heads, we might treat Nez Perce as containing a unified  $OP_{PERS}$  operator, optionally present in the complement of the verb *neki* ‘think’ (Deal, 2014). The denotation for this operator reflects function composition of  $OP_{AUTH}$  and  $OP_{ADDR}$ :

$$(88) \quad \llbracket OP_{PERS} \rrbracket^{c,i} = \lambda p \in D_{\langle K, Kt \rangle} . p(i)(c^{Auth_i/Auth, Addr_i/Addr})$$

The data in (86)-(87) fall out if *neki* ‘think’ optionally selects this single operator. If the complement contains a second person, the operator must be absent, in order to avoid the defective value. Otherwise, the operator may be present and facilitate first person shift. Indeed, it is its ability to shift the Author parameter that presumably justifies the presence of the operator in the complement of ‘think’ in the first place. Shifting of the Addressee parameter is a side effect that comes from the fact that  $OP_{ADDR}$  and  $OP_{AUTH}$  have been bundled together in one lexical item.

These observations suggest that crosslinguistic variation in the semantics of shifty operators extends to *how many* parameters of context a single operator shifts – that is, the extent of lexical bundling. Shift of first person, second person, and locative indexicals in Nez Perce is accomplished with two operators,  $OP_{PERS}$  and  $OP_{LOC}$ , rather than three. As a lexical bundle of  $OP_{ADDR}$  and  $OP_{AUTH}$ ,  $OP_{PERS}$  presumably inherits its position in the functional sequence from its atomic components; it sits below  $OP_{LOC}$ . This accounts for the fact that locative shift requires person shift in Nez Perce, but that person shift does not require locative shift (Deal, 2014): a clause may be projected up to  $OP_{PERS}P$ , shifting only person indexicals, or up to  $OP_{LOC}P$ , shifting both persons and locatives.

This first example of lexical bundling features two shifty operators bundled together. Could shifty operators be bundled together with other types of material – in particular, with C? Indeed this possibility offers a ready analysis of a pair of distinctive facts about indexical shift in Uyghur noted by Sudo (2012) and Shklovsky and Sudo (2014). In this language, on the proposal in (63), C sits between a *de se*  $OP_{AUTH}$  head and a non-*de te*  $OP_{ADDR}$  head. Let us now suppose that the Uyghur lexicon bundles these three pieces together into a single piece, COP. Appealing again to function composition for the meaning of a lexical bundle,  $\llbracket COP \rrbracket^{c,i} = \llbracket OP_{ADDR} \rrbracket^{c,i} \circ \llbracket C \rrbracket^{c,i} \circ \llbracket OP_{AUTH} \rrbracket^{c,i}$ , and thus syncategorematically (where  $\mathbb{RCON}$  is defined as in (57)):

$$(89) \quad \llbracket COP \alpha \rrbracket^{c,i} = \lambda e . \forall i' \in \mathbb{RCON}(e) \llbracket \alpha \rrbracket^{c^{Author, i'/Author, ADDR(e)/Addr, i'}}$$

Given the semantic necessity of C in an attitude complement, this lexical bundling explains why indexical shift is obligatory in Uyghur (modulo scrambling, as seen in section 3.2): since the contribution of C cannot be omitted, the contribution of shifty operators cannot be omitted, either. At the same time, it accounts for a curious constraint on Uyghur verbs of cognition: second person pronouns in the complements of these verbs are unacceptable. As Sudo (2012) writes, “It should be emphasized here that the second person pronouns in [(90b) and similar examples] are completely infelicitous/ungrammatical, and there is no felicitous interpretation where they are construed as the current hearer or somebody else” (p. 231).

- (90) a. Ahmet [ *pro* kim-ni jaxshi kör-imen dep ] bil-du? *Uyghur*  
 Ahmet [ *pro* who-ACC well see-IMPERF.1SG C ] believe-IMPERF.3  
 Who does Ahmet believe that he likes?
- b. \* Ahmet [ *pro* kim-ni jaxshi kör-isen dep ] bil-du?  
 Ahmet [ *pro* who-ACC well see-IMPERF.2SG C ] believe-IMPERF.3

(Sudo, 2012, 231)

These facts are precisely as expected in a language where not just  $OP_{ADDR}$  and  $OP_{AUTH}$ , but also C, are bundled together. Since C is part of the bundle, the language does not have the option of simply omitting all context shifting material when a second person pronoun is present in a cognition complement. (The contrast here is Nez Perce (87).) The result is that second person pronouns are simply not interpretable in these complements. Context shift is obligatory both for first person and for second person – regardless of whether this forces second person to receive a defective value – as a consequence of lexical bundling.<sup>45</sup>

<sup>45</sup>A similar case is found in Laz, another language with obligatory indexical shift. Demirok and Öztürk (2015) show that Laz allows two types of finite complementizers, *ya/ma* and clitic *na=*, in complements of speech and thought verbs. Indexical shift is obligatory in *ya/ma* complements but forbidden in *na=* complements. (*Ya/ma* clauses need not be quotations; see Demirok and Öztürk 2015, §3.2.)

- (i) Arte-k [ma noseri vore] **ya** {iduşun-am-s / t’k’-u}. *Laz*  
 Arte-ERG 1SG smart be.1SG C {think-IMPF-3SG / say-PST.3SG}  
 Arte<sub>i</sub> {thinks/says} that he<sub>i</sub>/\*I is smart. (Demirok and Öztürk, 2015, 51)
- (ii) Arte-k [ma noseri **na=vore**] {iduşun-am-s / t’k’-u}.  
 Arte-ERG 1SG smart C=be.1SG {think-IMPF-3SG / say-PST.3SG}  
 Arte<sub>i</sub> {thinks/says} that I/\*he<sub>i</sub> am smart. (Demirok and Öztürk, 2015, 51)

This pattern suggests that the Laz lexicon contains both an unbundled C item, pronounced *na=*, and a bundled C+OP item, pronounced *ya/ma*. The bundling of C with shifty operators explains why the general purpose C head is missing in shifty complements. (On *na=* as a general purpose complementizer in Laz, see Lacroix 2012.) The expectation is that second persons will be forbidden when thought verbs take complements containing *ya/ma*, though Demirok and Öztürk do not discuss this.

## 6.2 Temporal/locative bundling in Korean

These observations on lexical bundling in Nez Perce and Uyghur allow for two initial generalizations about lexical bundles to be made. First, as seen in Uyghur, a lexical bundle is obligatory if any atomic part thereof is necessary for semantic composition. Since C is semantically obligatory, any bundle containing it is obligatory as well. Second, as seen in Nez Perce, the attachment site of a lexical bundle in the functional sequence is inherited from the attachment sites of its atomic parts. Since  $OP_{ADDR}$  and  $OP_{AUTH}$  attach below  $OP_{LOC}$ , the lexical bundle containing these two pieces attaches below  $OP_{LOC}$  as well. These observations could be thought of as semantic and syntactic aspects of the same generalization: lexical bundles inherit their properties from their atomic parts.

This generalization constrains the way we might think about the behavior of lexical bundles of operators that do not occupy structurally adjacent positions in structure (76). Suppose, for instance,  $OP_{LOC}$  and  $OP_{TIME}$  were lexically bundled in a particular language; we might call the bundle  $OP_{ADV}$ . Where would this element attach? If the syntactic behavior is inherited from the atomic parts, either a very high position (inherited from  $OP_{LOC}$ ) or a very low position (inherited from  $OP_{TIME}$ ) could be justified. If  $OP_{ADV}$  could freely attach in either location, we expect a language containing it to demonstrate a pattern rather different from the Nez Perce pattern of person and locative indexicals discussed in section 2.3. In Nez Perce, locative shift requires an  $OP_{LOC}$  head which is present only if  $OP_{PERS}$  is also present;  $OP_{LOC}$  always attaches higher than  $OP_{PERS}$ . In an  $OP_{ADV}$  language, on the other hand, locative shift could be accomplished in clauses without any person shift (if  $OP_{ADV}$  were associated to in its low position) and person shift could be accomplished in clauses without any locative shift (if  $OP_{ADV}$  were associated to its high position).

This is precisely the pattern of indexical shift that Park (2016) documents in Korean. Her observations come against a backdrop of Shift Together effects between locative and temporal indexicals in Korean, suggesting that both are indeed sensitive to the same shifty operator ( $OP_{ADV}$ ):

(91) Context: John and Mary are having a conversation in Boston on July 3rd. John says:

- Tom-i ece cenyek New York-eyse Korean  
 Tom-NOM yesterday night New York-at  
 [Sue-ka **ece** **yeki**-ey wassta-ko ] malhayssta.  
 [Sue-NOM yesterday here-at came-C ] said  
*Lit.:* Tom said in New York last night that Sue came here yesterday
- |    |  |                       |
|----|--|-----------------------|
| a. | ‘here’ (= Boston), ‘yesterday’ (= July 2nd)                | (No shift)            |
| b. | ‘here’ (= New York), ‘yesterday’ (= July 1st)              | (Both shift)          |
| c. | <del>X</del> ‘here’ (= New York), ‘yesterday’ (= July 2nd) | (Location shift only) |
| d. | <del>X</del> ‘here’ (= Boston), ‘yesterday’ (= July 1st)   | (Time shift only)     |
- (Park, 2016, (25))

Reading (a) arises if  $OP_{ADV}$  is absent, leaving both *ece* ‘yesterday’ and *yeki* ‘here’ to draw on the utterance context; reading (b) arises if  $OP_{ADV}$  is present, shifting parameters of context relevant to both indexicals; readings (c) and (d), in the absence of specialized  $OP_{LOC}$  and  $OP_{TIME}$  shifters in the lexicon, cannot be derived. Given the reasoning above, this bundling effect immediately explains why example (92), containing both a person and a locative indexical, is four-ways ambiguous, rather than just three:

(92) Context: John and Mary are having a conversation in Seoul. John says:

Tom-i New York-eyse [ **nay**-ka **yeki**-eyse thayenassta-ko ] malhayssta. *Korean*

Tom-NOM New York-at [ I-NOM here-at be.born-C ] said

*Lit.:* Tom said in New York that I was born here.

- a. 'I' = John, 'here' = Seoul (No shift)
- b. 'I' = John, 'here' = New York (Location shift)
- c. 'I' = Tom, 'here' = Seoul (Person shift)
- d. 'I' = Tom, 'here' = New York (Both shift)

(Park, 2016, (32))

Park argues independently for a bundled  $OP_{PERS}$  shifter in Korean, parallel to that proposed for Nez Perce above; I adopt this proposal here. In these terms, reading (a) arises if no shifter is present; reading (b) arises if only  $OP_{ADV}$  is present (occupying a low position); reading (c) arises if only  $OP_{PERS}$  is present ( $OP_{ADV}$  having been postponed until its higher attachment site); reading (d) arises if both  $OP_{PERS}$  and  $OP_{ADV}$  are present (in either order). Full four-way ambiguity follows here because  $OP_{ADV}$  may associate to a position either above or below  $OP_{PERS}$ , having derived its attachment site from the union of those of its pieces  $OP_{LOC}$  and  $OP_{TIME}$ . Internal to Korean, lexical bundling thus provides a unified explanation for temporal/locative Shift Together effects as in (91) and locative/person independence as in (92); crosslinguistically, it explains the difference between Korean (where person and locative shift are logically independent of one another) and Nez Perce (where locative shift implies person shift).

## 7 Indexical shift in typological context

The theory now before us makes several novel, testable predictions highlighted at the end of section 4.4, as well as various others of crosslinguistic scope that we may now put forward. These draw from the initial generalizations of section 2 as refined by the investigations of sections 5 (on time) and 6 (on lexical bundling), and are in addition to those laid out in the previous work reviewed in section 3.2 (i.e. Shift Together, No Intervening Binder, Finite Complements Only, Height Matters). In this final section, I first review the range of empirical predictions, and then discuss controls that must be in place in order to test them cross-linguistically. The second part of this section situates indexical shift in typological context by reference to the ways in which it differs from surface-similar phenomena – that is, by focusing on the natural seams that divide indexical shift from its close functional kin.

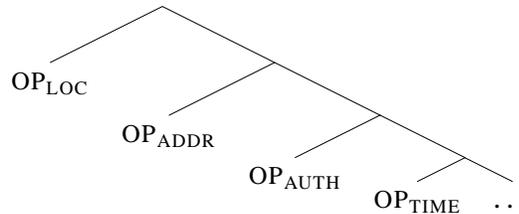
### 7.1 Summary of predictions

First, indexical shift is constrained by (G1): it is possible in the complements of knowledge verbs in a particular language only if it is also possible in the complements of thought verbs in that language; it is possible in the complements of thought verbs in a particular language only if it is also possible in the complements of speech verbs in that language. The structural explanation for this generalization (which follows Sundaresan 2012) predicts that syntactic diagnostics of complement size will correlate with the shiftability of indexicals. Clauses that allow more embedded root phenomena (cp. Heycock 2006) will be more likely to allow indexical shift in the first place, and

more willing to allow multiple types of indexicals to shift, than their counterparts that allow fewer embedded root phenomena or disallow these phenomena altogether.

Second, indexical shift is constrained in three different ways by the functional hierarchy of shifty operators (93). (These ways are initially articulated in (G2)-(G4).)

(93)



The first effect of the hierarchy concerns Shift Together effects among classes of indexicals. Within and across languages, indexicals of a certain class undergo shift only if indexicals of classes farther down on the hierarchy defined by (93) undergo shift as well (cp. (G2) and (G3)). Exceptions may arise only in case of lexical bundling of non-adjacent operators (e.g.  $OP_{LOC}$  and  $OP_{TIME}$ ); any such case should be diagnosable by Shift Together effects between indexicals of the relevant types, as shown for Korean in (91). Thus a language with shifty author indexicals and shifty temporal indexicals will always have temporal shift in clauses with author shift, except if temporal indexicals are required to shift together with addressee or locative indexicals.<sup>46</sup>

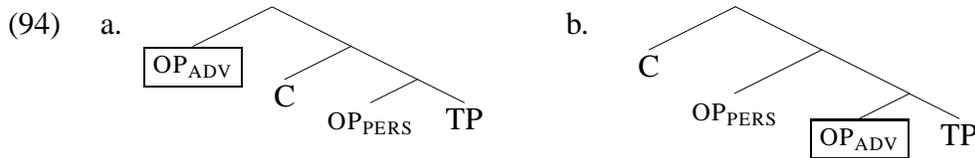
The second effect of the hierarchy concerns requirements of *de se* interpretation. Within a particular language, the range of shifty indexicals that are required to have *de se* interpretations can be picked out only by a contiguous portion of hierarchy (93) that begins from the bottom. Thus a language may, for instance, impose this requirement on temporal and author indexicals, but nothing else; on temporal, author and addressee indexicals, but nothing else; or on all indexicals.<sup>47</sup> It is not possible for a language to impose the requirement on a non-contiguous segment of the hierarchy or on a segment that does not begin from the bottom. Thus a language with both temporal and author indexicals may not impose *de se* requirements only on author indexicals but not on temporals.

This prediction differs from its counterpart regarding Shift Together in that no caveat regarding lexical bundling is necessarily in order, on the assumption that bundled elements may be given unified (i.e. unambiguous) denotations while nevertheless inheriting their attachment site from the attachment sites of their atomic parts. Consider now the case of a hypothetical language where

<sup>46</sup>I highlight this particular prediction because it is not *obviously* correct. For Slave, for instance, Rice (1989) provides examples wherein a first person pronoun but not a word glossed ‘tomorrow’ shifts (e.g. Rice 1989, p. 1279, example (37)). This suggests either that ‘tomorrow’ in Slave is not indexical, in line with the situation in Nez Perce (see (68)), or that Slave possesses a lexically bundled  $OP_{ADV}$  element of the type discussed for Korean (see (91)/(92)). The former predicts that temporal elements in Slave may not be “shiftable” at all in attitude complements (as this depends on the availability of binding, rather than actual indexical shift), but should show covariation under temporal quantification as in (68); the latter predicts that temporal and locative indexicals should be optionally shiftable in Slave, but that the two types of indexicals should have to shift together.

<sup>47</sup>Note that the prediction for the interpretation of temporal indexicals in Nez Perce is fulfilled vacuously, as the language does not have true temporal indexicals. Similar remarks may apply to Uyghur, though Sudo (2012) does not discuss temporal elements. A language with *de se* requirements on all indexicals is Zazaki; see Anand (2006, p 80).

shifty author indexicals but not shifty temporal indexicals require interpretation *de se*. In order to account for this via lexical bundling, we would need to posit structure (94a), where temporal indexicals are shifted by an  $OP_{ADV}$  head in a high position. Because lexical bundles inherit their attachment sites, such a language should also allow structure (94b), where  $OP_{ADV}$  occupies its low position. Yet no unified denotation for  $OP_{ADV}$  is possible here. It must be index-based (*de se*) in (94b), but event-based (non-*de se*) in (94a). If shifty operators are not ambiguous in this way, then lexical bundling will not offer a way around the generalization about the hierarchy effect in *de se* interpretation.



A third way the hierarchy constrains indexical shift relates to the interaction between Shift Together effects, optionality, and interpretation *de se*. If the meanings of lexical bundles are derived by function composition, then *de se* and non-*de se* shifters are not suitable for bundling: where  $OP_1$  is an event-based (non-*de se*) shifter, and  $OP_2$  is an index-based (*de se*) shifter,  $\llbracket OP_1 \rrbracket^{c,i} \circ \llbracket OP_2 \rrbracket^{c,i}$  is not defined.<sup>48</sup> These elements may only be bundled together if C is also part of the bundle; this predicts that the bundle should not be optional.<sup>49</sup> Thus languages with Shift Together effects between indexical class  $\alpha$  and indexical class  $\beta$ , where shift of  $\alpha$  and  $\beta$  is optional, will always be uniform in the imposition of *de se* requirements across these classes. If one must be interpreted *de se*, both must be.<sup>50</sup>

In general, the role of a functional hierarchy in constraining indexical shift predicts that the same type of constraints discussed above will extend to any new type of indexical shift beyond those discussed thus far – e.g. shift of a ‘judge’ parameter, as in McCready (2007) and Deal and O’Connor (2011), building on Lasersohn (2005) and Stephenson (2007). Shift of any new type raises the immediate question of where the corresponding operator should sit in the functional sequence. Particular hypotheses in this regard will now yield immediate predictions regarding verb subcategorization, shift together effects, and *de se* interpretation across the range of indexicals present in a given language.

## 7.2 Controlling for non-indexical elements

Any real test of the predictions above starts from the hypothesis that a particular phenomenon indeed instantiates indexical shift. The status of such a claim as a testable empirical hypothesis must be underlined, since several types of factors may give the impression of indexical shift while nevertheless showing distinctive characteristics of other types of phenomena. Indexical shift, that is,

<sup>48</sup>Proof: by the definition of function composition,  $(\llbracket OP_1 \rrbracket^{c,i} \circ \llbracket OP_2 \rrbracket^{c,i})(\llbracket TP \rrbracket^{c,i}) = \llbracket OP_1 \rrbracket^{c,i}(\llbracket OP_2 \rrbracket^{c,i}(\llbracket TP \rrbracket^{c,i}))$ . If  $OP_2$  is an index-based shifter, then  $\llbracket OP_2 \rrbracket^{c,i}(\llbracket TP \rrbracket^{c,i}) \in D_t$ . If  $OP_1$  is an event-based shifter, then it cannot compose with an argument of this type.

<sup>49</sup>This is the situation in Uyghur; see fn. 45 for a caveat.

<sup>50</sup>Korean instantiates the ‘both’ option for  $OP_{ADV}$ , as shown by Park (2016): all shifty indexicals require *de se* interpretation in Korean, revealing that C attaches quite high in that language (like in Zazaki).

has look-alikes. Controls for such look-alikes are necessary in order to avoid significant confounds in testing our predictions.

First, any test of proposals about indexical shift requires attention to what is actually indexical. We have seen variation in this respect even among translation equivalents in comparing Nez Perce and English temporal adverbials in section 5. Locative adverbials are ripe for exploration along similar lines: a language where locatives seemingly shift but not person indexicals do not (and where locative and temporal elements do not show the shift together behavior noted for Korean in section 6.2) may well be a language in which locative adverbials are not indexical. Just like in the case of temporal adverbials, we are well-acquainted with non-indexical locative adverbials in the form of items like *there*. As discussed in connection with (69), the caution is that elements that are translated by speakers with indexical words like English *here* may nevertheless have bindable, non-indexical meanings.

For person, we must be careful to distinguish true first person indexicals from other distinguished elements that may refer to the attitude holder in an embedded context. The major potential confounds in this respect come from logophoric pronouns.<sup>51</sup> As many have noted, these elements have in common with shifty indexicals that they are typically interpreted *de se* (Schlenker 2003, Adesola 2006, Anand 2006, Haida 2009, though cp. Pearson 2015 for an exception). Yet they crucially differ from shifty indexicals in that they inherit features from a nominal antecedent, or alternatively, impose conditions on what features their antecedent may have. This pattern is seen in the requirement, found in many languages, that the antecedent be 3rd person (or even 3rd person singular; see the typological discussion in Hyman and Comrie 1981 and von Roncador 1992). This is shown in (95) for Ewe logophor *yè*.

- (95) a. Kofi xɔse [ be yè nyi sukuvi nyoe de ]. *Ewe*  
 Kofi believe [ C LOG COP student good ART ]  
 Kofi<sub>i</sub> believes that he<sub>i</sub> is a good student.
- b. \* { M / o } xɔse [ be yè nyi sukuvi nyoe de ].  
 { 1SG / 2SG } believe [ C LOG COP student good ART ]  
 Intended: { I / you } believe that { I am / you are } a good student.
- (Pearson, 2015, 110)

Such a condition would be quite surprising if *yè* were a shifty indexical, given the absence of any formal connection between the main clause “antecedent” and the embedded indexical in the theory defended above.<sup>52</sup> The presence of a shifty OP depends only on the selectional properties of the

<sup>51</sup>Also of relevance are “fake indexicals” of the type studied in English and German by Kratzer (1998, 2009) and Rullmann (2004). These elements differ both from logophors and from shifty indexicals of the type studied in this paper in that they are not restricted to attitude contexts. I suggest, therefore, that at least an initial test for distinguishing a language with shifty indexicals from one with merely fake indexicals involves assessing the possibility of bound readings outside of attitude environments. Unfortunately the data needed to run this test outside of Germanic is not presently available. (The one exception of which I am aware is Mishar Tatar, discussed below, for which Podobryaev’s (2014) data suggest an analysis involving binding rather than shifty indexicality.)

<sup>52</sup>Matters are of course different for different theories of the indexicals treated prior to this section. For instance, von Stechow (2003) proposes an analysis of embedded indexicals fully in terms of binding, without recourse to context shift. In this section I will lay out a view that carries over

verb; the reference of an embedded indexical depends only on the presence of the corresponding OP. Facts like (95) suggest instead that logophors participate in a system of binding in a way that formally links them to their antecedents, e.g. by linking the logophor to an operator in the periphery of the embedded clause, which in turn is linked to the antecedent. Indeed, this is the overwhelming consensus of the literature on logophoric syntax (Koopman and Sportiche 1989, Speas 2004, Safir 2004, Adesola 2006, Baker 2008, i.a.). I will adopt this proposal for any language with effects like (95), and, to fix some terminology, will reserve the term ‘logophor’ for non-indexical bindable elements.<sup>53</sup> (This has the possible consequence that some elements traditionally called logophors might actually be indexicals, and vice versa; see Anand (2006).)

What sorts of factors can confound the diagnosis of a particular form as indexical vs. logophoric? A first factor concerns agreement. In various languages with logophoric pronouns, logophors trigger a special form of agreement; in languages with ‘first person logophoricity’ (Curnow, 2002), the form of this agreement is the same as first person agreement in matrix clauses. This is the case in Donno So (Dogon family), for instance, as shown in (96a) (Culy, 1994). Note that logophors in Donno So show sensitivity to the person of their main-clause antecedent, (96b,c).

- (96) a. Wo [ inyemε yogo      bojεm            ] gi. *Donno So*  
           3SG [ LOG    tomorrow go.PROG.1SG ] said.3SG  
           He<sub>i</sub> said that he<sub>i</sub> will leave tomorrow.
- b. \*Mi [ inyemε yogo      bojεm            ] gi.  
       1SG [ LOG    tomorrow go.PROG.1SG ] said.3SG  
       Intended: I said that I will leave tomorrow.
- c. \*U [ inyemε yogo      bojεm/bojeu                    ] gi.  
       2SG [ LOG    tomorrow go.PROG.1SG/go.PROG.2SG ] said.3SG  
       Intended: You said that you will leave tomorrow.

(Culy, 1994, 114)

Meanwhile, in Donno So, first person singular pronouns embedded in clauses that license logophors *cannot* trigger this ostensibly first person singular form. Rather, a first person subject occurs with an uninflected form of the verb, (97a) – here *boli* instead of *bolum*. As Culy writes, “first person inflection acts as logophoric inflection when it occurs in indirect discourse” (1994, p. 123).

- (97) a. Oumar [ ma jεmbɔ      paza boli ] miñ      tagi. *Donno So*  
           Oumar [ 1SG sack.DEF drop left ] 1SG.OBJ informed  
           Oumar informed me that I had left without the sack.
- b. Oumar [ inyemε jεmbɔ      paza bolum ] miñ      tagi.  
           Oumar [ LOG    sack.DEF drop left.1SG ] 1SG.OBJ informed  
           Oumar<sub>i</sub> informed me that he<sub>i</sub> had left without the sack.

(Culy, 1994, p. 123)

certain of von Stechow’s ideas, but that treats binding-based mechanisms as existing alongside operator-based indexical shift. For critique of a fully binding-based approach, see Anand (2006).

<sup>53</sup>Note that the implication from facts like (95) goes only in one direction: I will not insist that all logophors obey restrictions like (95), so long as some diagnostic of the formal link to an antecedent may be found. Several possible diagnostic properties are discussed below.

This pattern in Donno Sɔ varies by verb, such that verbs that allow logophors in their complement show pattern (97), whereas verbs outside this class allow embedded first person singular subjects to control first person singular agreement (Culy, 1994, pp. 123-124). If, accordingly, we suppose with Koopman and Sportiche (1989) and others that logophoric binding is mediated by an operator – henceforth  $OP^{log}$  – which (like indexical shifters) occupies the left periphery and is subject to selectional effects,<sup>54</sup> then this pattern suggest that  $OP^{log}$  in Donno Sɔ has the special property of licensing *-Vm* ‘AGR.1SG’ with non-author reference in its clause (provided agreement is controlled by a logophor) while also antilicensing it with author reference.<sup>55</sup> The verbs *tagi* ‘inform’ and *gi* ‘say’ require  $OP^{log}$  in their complements. A consequence is that *tagi* and *gi* clauses with null embedded subjects are unambiguous: those with third person matrix subjects and ostensibly first person singular embedded agreement can only have logophoric embedded subjects.

- (98) Oumar [<sub>CP</sub> *pro*<sub>log</sub> [<sub>DP</sub> *minne inyeme mɔ̃* ] *gɛndɛzɛm* ] *gi*. *Donno Sɔ*  
 Oumar [ [ field LOG POSS ] *regard.PROG.1SG* ] said  
 Oumar<sub>i</sub> said that {he<sub>i</sub>/\*I} will look at his<sub>i</sub> field. (Culy, 1994, 123)

In isolation from the facts in (96)-(97), of course, sentence (98) gives the impression of containing a shifty indexical (viz. first person singular *pro*).

A second potentially confounding factor, related to the first, concerns null pronouns. The nature of the pattern in (98) from Donno Sɔ is most clearly revealed in connection with (97), where null pronouns are replaced with their overt counterparts. What would happen in a language where logophoric pronouns were *always* silent?<sup>56</sup> An example of this type is furnished by Mishar Tatar. In this language, overt pronouns never shift in attitude complements. This is like in Donno Sɔ; let us assume that these languages lack indexical shift.

- (99) Alsu [ *min kaja kit-te-m diep* ] at'-tɣ. *Mishar Tatar*  
 Alsu [ 1SG where go.out-PST-1SG C ] say-PAST  
 Which place did Alsu<sub>i</sub> say {I/\*she<sub>i</sub>} went? (Podobryaev, 2014, 84)

<sup>54</sup>See e.g. von Stechow (2003), Speas (2004), Safir (2004), Adesola (2006), Anand (2006), Baker (2008), Pearson (2015), Park (2016).

<sup>55</sup>Semantically,  $OP^{log}$  serves as a variable binder. Syntactically,  $OP^{log}$  operators vary crosslinguistically in whether they affect agreement; in some languages no effect on agreement is seen at all, whereas in others,  $OP^{log}$  affects the agreement of logophors only or both logophors and first person indexicals. An effect on logophors only is seen in Amharic, discussed below; see Messick (2016a) for a potential analysis of agreement in languages of this type.

<sup>56</sup>This is, in essence, Gültekin Şener and Şener’s (2011) proposal for Turkish: the language possesses a null pronoun restricted to *de se* interpretation, which triggers first person agreement. Turkish is like Mishar Tatar (discussed in the text below) is showing apparent shifting only for null pronouns, not for overt ones. Assuming that these data sets involve logophors rather than true shifty indexicals, and given that logophoric pronouns are bound by a logophoric operator, these facts connect with a larger body of work showing that null pronouns are more susceptible to binding than are their overt counterparts (Messick 2016b). Of course, since various languages do allow binding of overt pronouns, the same analysis could in principle be extended to a language where logophoric pronouns and first person indexicals are both (at least optionally) overt, but homophonous; this is Lillo-Martin’s (1995) analysis of Role Shift in American Sign Language. See however Davidson (2015) and section 7.3 for evidence that Role Shift involves quotation rather than logophoricity.

Null pronouns, however, are more flexible. This leads to an ambiguity in (100).

- (100) Alsu [ *pro* kaja kit-te-m diep ] at'-tʁ. *Mishar Tatar*  
 Alsu [ where go.out-PST-1SG C ] say-PAST  
 a. Which place did Alsu<sub>i</sub> say I went?  
 b. Which place did Alsu<sub>i</sub> say she<sub>i</sub> went?  
 (Podobryaev, 2014, 84)

Let us suppose that the verb *at'* 'say' allows but does not require  $OP^{log}$  in its complement; furthermore, when present, this element has precisely the same effect on agreement below it as does its counterpart in Donno Sɔ. Reading (a) arises if  $OP^{log}$  is absent and the embedded subject is a silent first person pronoun. Reading (b) arises if  $OP^{log}$  is present and embedded subject is a silent logophor. If the effect of  $OP^{log}$  on agreement is felt throughout its complement clause, we have an immediate prediction for the behavior of embedded clauses with multiple silent pronouns controlling ostensible first person agreement: either all must be ordinary first person pronouns (if  $OP^{log}$  is absent) or all must be logophors (if  $OP^{log}$  is present). This prediction, reminiscent of a Shift Together effect, is correct.

- (101) Marat [ [ *pro* sestra-m ] [ *pro* brat-ɣm-nɣ ] sü-ä diep ] kurk-a.  
 Marat [ [ sister-1SG ] [ brother-1SG-ACC ] love-IMPERF C ] be.afraid-IMPERF  
 a. Marat is afraid that my sister loves my brother. *Mishar Tatar*  
 b. Marat<sub>i</sub> is afraid that his<sub>i</sub> sister loves his<sub>i</sub> brother.  
 c. ✗ Marat<sub>i</sub> is afraid that my sister loves his<sub>i</sub> brother.  
 d. ✗ Marat<sub>i</sub> is afraid that his<sub>i</sub> sister loves my brother.  
 (Podobryaev, 2014, 105)

If  $OP^{log}$  may be present in a Mishar Tatar clause without that clause actually containing a logophoric pronoun, we also expect that ordinary 1sg pronouns should be able to occur in such complements without their normal agreement suffix, *-m*. This is correct as well; contrast the non-agreeing verb form in (102) with the agreeing form in (100) above.<sup>57</sup>

- (102) Roza [ min kit-te dip ] bel-ä. *Mishar Tatar*  
 Roza [ 1SG go.out-PST C ] know-IMPERF  
 Roza knows that I left. (Podobryaev, 2014, 106)

Finally, because no indexical shift has actually taken place in this language, we predict that null logophors controlling ostensible first person agreement may share a clause with ordinary overt first person pronouns, provided the latter control no agreement. This, too, is so:

- (103) Alsu [ *pro*<sub>log</sub> ber kajčan da miña bag-m-a-s-mɣn diep ] bel-ä.  
 Alsu [ never.NPI 1SG.DAT look.at-NEG-ST-POT-1SG C ] know-IMPERF  
 Alsu<sub>i</sub> knows that she<sub>i</sub> would never look at me. (Podobryaev, 2014, 86) *Mishar Tatar*

<sup>57</sup>Podobryaev (2014, 108) further shows that this type of 'disagreement' is barred in cases where the matrix subject is first person; this is as expected, given that  $OP^{log}$  requires feature transfer from a third person attitude holder. For a parallel effect in Donno Sɔ, see Culy (1994, (21c)).

Podobryaev (2014), analyzing the null subject of clauses like (103) as a true first person pronoun, uses facts of this type to argue that Mishar Tatar does not obey Shift Together (at least so far as combinations of overt and null pronouns are concerned), and therefore that indexicals in that language cannot be given a standard Kaplanian treatment. Instead, he proposes a theory of indexical shift which makes significantly weaker predictions for Shift Together effects crosslinguistically than does the proposal developed in this paper. The possibility of a logophoric analysis, as we have now seen, constitutes a significant confound for this argument.

Having now seen how logophors may confound the diagnosis of shifty indexicals, we turn to two diagnostics developed by Anand (2006) for distinguishing indexicals from what he calls “local logophors”. The first relates to a generalization about the structural position of logophors and other bound *de se* elements with respect to nominals read *de re*. Reference to binding in this generalization, (104), is crucial: the constraint applies, Anand argues, to bound *de se* pronouns in dream reports in English (Percus and Sauerland 2003, Pearson and Dery 2013) as well as logophors in Yoruba (Anand 2006, 56; see also Adesola 2006), but not to shifty indexicals in Zazaki (Anand, 2006, 111). This follows if the effect is explained in terms of mechanisms related to binding theory (Anand, 2006) or movement (Percus and Sauerland 2003), as these tools are relevant only where a formal link between bound pronouns and binders or antecedents must be established.

(104) *De Re Blocking*

Every bound *de se* element must be *de re* free.

A consequence of the *De Re* Blocking Effect is seen in clauses containing both a logophor and a non-shifted first person indexical. In Amharic, Anand proposes, logophors are null pronouns that control first person agreement. Unlike in Donno So and Mishar Tatar, however, ordinary first person *pro* may also control first person agreement even when a clausemate logophor is present. This means that (105), with “first person” subject and object agreement, has a parse where the embedded clause contains a logophor subject and an indexical object. This produces reading (a).

(105) John [ *pro* al-ittazzoza-ññ *pro* ] ala. Amharic  
 John [ NEG.1s-obey.mkimperf-1sO ] say.PERF.3sm

- a. John<sub>i</sub> said that he<sub>i</sub> will not obey me.  
 (John said that OP<sup>log</sup> *pro*<sub>log</sub> will not obey *pro*<sub>1sg</sub>.)
- b. ✗ John<sub>i</sub> said that I will not obey him<sub>i</sub>.  
 (\*John said that OP<sup>log</sup> *pro*<sub>1sg</sub> will not obey *pro*<sub>log</sub>.)

(Anand 2006, 101, lightly modified)

Reading (b), by contrast, is ruled out by the *De Re* Blocking Effect. Because the indexical first person *pro* is not shifted, it requires interpretation *de re*. But if an unshifted first person *pro* occupies the subject position, a logophoric *pro* is blocked from object position: the logophor is a bound *de se* element which would be bound by a *de re* element, in violation of (104). Furthermore, any parse where both *pros* are logophoric, or both first person, is ruled out by condition B. The sentence, accordingly, is unambiguous. A sentence with both a logophoric and a first person *pro* may be ambiguous only if the two elements do not stand in a c-command relationship, as in (106).

- (106) John [ [ *pro* lij-e ] ay-ittazzoza-ññ *pro* ] ala. Amharic  
 John [ [ *pro* son-my ] NEG.3s-obey.mkimperf-1sO *pro* ] say.PERF.3sm  
 a. John<sub>i</sub> said that his<sub>i</sub> son will not obey me.  
 (John said that OP<sup>log</sup> *pro*<sub>log</sub>’s son will not obey *pro*<sub>1sg</sub>.)  
 b. John<sub>i</sub> said that my son will not obey him<sub>i</sub>.  
 (John said that OP<sup>log</sup> *pro*<sub>1sg</sub>’s son will not obey *pro*<sub>log</sub>.)  
 (Anand 2006, 101, lightly modified)

Anand’s (2006) analysis makes sense of a situation in which, at first glance, Amharic has shifty first person indexicals that do not show Shift Together effects and that obey the precise opposite of Height Matters (though for some reason not in (106)). As for Donno So and Mishar Tatar, the analysis rejects the premise that ostensible first person morphology in a complement clause necessarily identifies the presence of a first person *pro*. If instead it identifies a logophoric element participating in a system of binding, we begin to understand why generalization (104), rather than Height Matters and Shift Together, are in force in Amharic. I suggest that similar reasoning extends to examples of apparent Shift Together violations in a number of Papuan languages – Dani, Dom, Gahuku, Golin, Manambu, and Usan – where, like in Amharic (105), “person deixis is calculated absolutely for the object slot and relatively for the subject slot” (Evans 2006, 101; see also Aikhenvald 2008, Nikitina 2012b).

An additional detail of the Amharic facts provides one final way that logophors and shifty indexicals may be distinguished. For logophors, the presence of a formal link to the binder or antecedent makes it possible to impose locality conditions on logophoric binding. A bound element may, for instance, require that its binder be found within a domain roughly equivalent to a clause (Chomsky, 1981). A condition of exactly this sort appears to be relevant in regulating the relationships between *pro*<sub>log</sub> and its binder, OP<sup>log</sup>, in both Amharic and Mishar Tatar.<sup>58</sup> Amharic example (107) features two verbs, ‘say’ and ‘think’, only the former of which licenses OP<sup>log</sup> in its immediate complement. As Anand notes, the impossibility of long-distance licensing for *pro*<sub>log</sub> explains the disappearance of apparent Shift Together violations in this example.

<sup>58</sup>A potential counterpart in the logophoricity literature comes from Yağ Dii, a Duru language of Cameroon. Bohnhoff’s (1986) discussion of binding in this language suggests that logophors from the primary logophoric series cannot be bound across intervening attitude verbs in Yağ Dii, and that (i) thus requires local binding of *biñ*. (Note that there is no gender encoding in this pronoun that would rule out ‘mother’ as a possible antecedent.)

(i) Nà’á Ø ’òd bà’á [ Múúsà bà Ø ’ò [ bà **biñ** híj llaálí kaalí ] ]. *Yağ Dii*  
 mother she says.to father [ Moses that he says [ that LOG want to.go town.to ] ]  
 Mother tells Father that Moses says that he (Moses) wants to go to town. (Bohnhoff, 1986, 118)

Bohnhoff (1986, §8.3) reports that Yağ Dii uses a distinct set of ‘deeper level logophoric’ forms to encode long binding. The Yağ Dii type of paradigm is, admittedly, quite rare among languages with overt logophors; further research is needed on why this might be.

- (107) Mary [CP John [CP [DP *pro* lij-e ] ay-ittazzo-NN *pro* ] *Amharic*  
 Mary [ John [ [ son-1SG ] NEG.3S-obey.IMPERF-1SO ] ]  
 yiSallig-all ] alaCC.  
 think.IMPERF-3SM ] say.PERF.3SF
- a. Mary said John thinks my son will not obey me.  
 (Mary said [ John thinks [ *pro*<sub>1sg</sub> 's son will not obey *pro*<sub>1sg</sub> ]])
- b. ✗ *Mary*<sub>m</sub> said John thinks her<sub>m</sub> son will not obey me.  
 (\*Mary said [ OP<sup>log</sup> John thinks [ *pro*<sub>log</sub> 's son will not obey *pro*<sub>1sg</sub> ]])
- c. ✗ *Mary*<sub>m</sub> said John thinks my son will not obey her<sub>m</sub>.  
 (\*Mary said [ OP<sup>log</sup> John thinks [ *pro*<sub>1sg</sub> 's son will not obey *pro*<sub>log</sub> ]])
- (Anand, 2006, 102)

The complement of ‘think’ cannot contain *pro*<sub>log</sub> on pain of violating the binding locality condition; readings (b) and (c) are excluded because *pro*<sub>log</sub> is too far from its OP<sup>log</sup> binder. Any first person inflection in the immediate complement of ‘think’ must therefore reflect a true first person indexical. This yields only reading (a).<sup>59</sup>

Similarly, in Mishar Tatar, (108) lacks a reading on which *pro*<sub>log</sub> is bound long distance.<sup>60</sup>

- (108) # Alsu [CP *pro* [CP *pro* mine sü-ä-m diep ] at'-x-r-lar diep ]  
 Alsu [ 3PL [ 1SG.ACC love-IMPERF-1SG C ] tell-ST-POT-PL C ]  
 kurk-a. *Mishar Tatar*  
 be.afraid-IMPERF  
 Intended: Alsu<sub>i</sub> is afraid that they will say that she<sub>i</sub> loves me. (Podobryaev, 2014, 108)

This locality condition on logophors recalls constraints on another obligatorily *de se* element, PRO, namely those that led to its classification as an element sensitive to condition A (Chomsky, 1981). Once again, the situation for shift indexicals is notably different. In Korean example (110), for instance, *na-lul* ‘me’ may find an antecedent two clauses up (among other possibilities discussed by Park 2016):

- (109) John-i Seoul-eyse [CP Bill-i yeki-eyse [CP Mary-ka na-lul *Korean*  
 John-Nom Seoul-at [ Bill-Nom here-at [ Mary-NOM I-ACC  
 cohahanta]-ko malhayssta]-ko malhayssta.  
 like-C said-C said  
 John<sub>j</sub> said in Seoul that Bill said {here / in Seoul} that Mary likes him<sub>j</sub>. (Park, 2016, (53))

While logophors, as bound elements, may vary in their binding domains, it should be emphasized that the absence of a locality effect on true indexical shift *could not be otherwise*, given the theory I

<sup>59</sup>A fourth reading discussed by Anand (2006) involves OP<sub>auth</sub> in the complement of ‘say’, and obeys Shift Together: ‘*Mary*<sub>m</sub> said John thinks her<sub>m</sub> son will not obey her<sub>m</sub>’. Note that the presence of OP<sub>auth</sub> in the language does not perturb the predictions discussed above, largely because the additional readings that it facilitates are ruled out by Condition B. See Anand (2006) for discussion.

<sup>60</sup>Note that a short-binding parse is ruled out here due to number feature clash between the (plural) intermediate subject and the (singular) logophor in the innermost clause. This explains the overall # diacritic provided by Podobryaev.

have proposed.<sup>61</sup> True indexicals are distinguished from logophors in that they enjoy no grammatical connection with the shifty operators that manipulate their interpretation. Locality constraints thus serve as a way that look-alike logophors may be teased apart from true shifty indexicals.

As a final note, while this discussion has focused on logophoric pronouns that must be bound by an attitude holder or reported speaker (as in the canonical cases of logophoricity discussed since Hagège 1974), it has also been observed that some languages dispose of a special set of pronouns that must be bound by the *addressee* of a speech verb. As Nikitina (2012b) observes, such ‘addressee logophors’ are found both in languages with distinguished ‘speaker’ logophors (i.e. logophors of the classic type; this is the case in Goemai, Hellwig 2006) and in languages without them (e.g. Pero; Frajzyngier 1989, 1996). The existence of such elements of course raises the prospect that certain instances of apparent shifty second person indexicals may also be better analyzed as logophoric.

Further research is certainly required to assess this hypothesis, but for now I will simply note that it makes it possible to explain the behavior of apparently shifty second person in Mishar Tatar (Podobryaev, 2014), which mirrors the behaviors of apparent first persons discussed above, as well as a set of facts on logophors and apparently shifty second persons in certain languages of Central and West Africa (Aikhenvald 2008, Nikitina 2012a, 2012b). This latter class can be exemplified by Wan, a language where reported speech featuring a classic logophor may also feature what are apparently optionally shifted second person indexicals, but may not feature first person indexical shift (Nikitina, 2012a). (Wan allows shifted first person indexicals only in clauses without logophors, and only under speech predicates.) A possible analysis of this situation involves homophony between addressee logophors and true second person pronouns, together with a ban on clausemate status for shifty person indexicals and logophors of any type (cp. Korean; Park 2016). On this analysis, clauses containing logophors in Wan would allow no shifty person indexicals at all, and the Wan facts pose no challenge to the claim that second person indexical shift requires first person indexical shift. (Indeed, the Wan facts cannot be taken as a simple counterexample to the hierarchy defended in this paper without an explanation for why the problematic pattern, i.e. shift of second person without shift of first person, depends on the presence of a logophor.) Of course, the crucial predictions of this approach – *de re* blocking and (potentially) locality effects – remain to be tested.

### 7.3 *Controlling for species of quotation*

A final potential confound in testing the predictions laid out in §7.1 concerns quotation. Quotation has in common with indexical shift that indexicals in its scope need not draw on the utterance context; yet quoted clauses differ from clauses with mere indexical shift along several key parameters. Most famous among these is opacity for such matters as *wh*-movement, NPI licensing, and descriptions *de re*.

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<sup>61</sup>That is, if predicates  $V_1$  and  $V_2$  both optionally allow indexical shift in their complement, an indexical  $i$  in the structure  $[\dots V_1 [CP_1 \dots V_2 [CP_2 \dots i \dots]]]$  may draw on the matrix context, a context modified by an operator at  $CP_1$ , or a context modified by an operator at  $CP_2$ . Of course, in a language where indexical shift is obligatory in the complement of  $V_2$ , no such freedom will be attested. A proper test for locality therefore requires establishing, as a precondition, that  $V_2$  does not require shift.

- (110) \* Who did Mary say, “I handed the bag to \_”?  
cf. Who did Mary say she handed the bag to \_?
- (111) # Mary never said “I handed the bag to anyone.” (unacceptable unless Mary has said something ungrammatical)  
cf. Mary never said she handed the bag to anyone.
- (112) Context: Mary said that Sue is walking around in the woods near her house. Unbeknownst to her, Sue is a secret agent.  
# Mary said, “A secret agent is walking around in the woods near my house.”  
cf. Mary said that a secret agent is walking around in the woods near her house.

These effects would be surprising if clausal quotation were treated simply as a form of indexical shift, given that indexical shift operators affect only the context against which their complement is interpreted. The possibility of *wh*-movement (overt or covert) thus serves as a control against quotative analyses in examples of indexical shift like Uyghur (12), Nez Perce (17)-(19), and Korean (71); evidence from NPI licensing and *de re* descriptions can play similar roles (see Anand (2006, 83) and Sudo (2012, 205) on NPIs in Zazaki and Uyghur, and Speas (2000) and Deal (2014) on descriptions *de re* in Navajo and Nez Perce).

The distinctive opacity of quoted clauses plausibly arises in connection with an aspect of quotative meaning that extends well beyond the interpretation of indexicals: quotations showcase not only what is said but *how* it is said, along both linguistic and extralinguistic dimensions. Quotations may thus feature a language or dialect distinct from that of the matrix clause; slips, disfluencies, errors, or simply idiosyncratic lexical or phonological properties; and (particularly outside of written language) distinctive tone or affective phonology conveying a range of emotional or physical states. In all these respects, quotations involve mention or demonstration of language, rather than simply use. The quoted material resembles the original utterance in certain relevant respects, in the maximal case repeating the original verbatim.<sup>62</sup>

(113) John said, “Comment ça va?”

(114) John said, “That, uh, ain’t raiiiight.”

In sign languages, demonstration or iconicity of this type is found in the Role Shift construction, “in which the signer breaks eye gaze with the addressee and may move his/her body slightly to signal that the words used belong to somebody else” (Davidson, 2015, 478). In both French Sign Language (LSF) and American Sign Language (ASL), non-linguistic material (such as a happy face) produced while signing a Role Shift clause is obligatorily attributed to the reported attitude holder, rather than just the overall utterer/signer (Schlenker To appear c; on the non-grammaticalized status of this material, see Liddell and Metzger 1998). This is parallel to the interpretation of non-standard phonological features in quotation in examples like (114). Moreover, in LSF, Role Shift clauses are clearly opaque for *wh*-movement, NPI licensing, and *de re* readings, and require that all indexical expressions be evaluated against the reported context.<sup>63</sup> This overall body of facts is

<sup>62</sup>On verbatim requirements on quotation, particularly outside of written language, see Clark and Gerrig (1990), Lillo-Martin (2012), and Davidson (2015).

<sup>63</sup>The ASL data, while overall quite similar, are perhaps complicated by the acceptability of some cases of *wh*-extraction (at least for Schlenker’s consultant; Lillo-Martin’s (1995, 164-5) *wh*-data

readily accounted for if Role Shift clauses in LSF and ASL are clausal quotations.<sup>64 65</sup>

What sorts of factors can confound the diagnosis of a particular form as involving quotation versus indexical shift? Perhaps the single largest confound concerns cases of partial or ‘mixed’ quotation, i.e. quotation of material other than a full clause. In (115), for instance, only the embedded verb is quoted, and in (116) only the embedded object is; extensive discussion of similar cases can be found in Cappelen and Lepore (1997, 2012, §4) and Maier (2014a, To appear a) among many others.

(115) Bush is saying that you and I “misunderestimated” him yesterday.

(116) He now plans to make a new, more powerful absinthe that he says [<sub>CP</sub> will have “a more elegant, refined taste than the one I’m making now” ]. (Cumming, 2003)

The challenge of such cases is that they resist application of the opacity diagnostics shown in (110)-(112). Material in the same clause as the quotation is clearly not opaque; in (116), for instance, the subject of the bracketed clause is relativized, but the object is quoted. Meanwhile, they may contain indexicals either outside (115) or inside (116) the quotation, in the latter case potentially giving the impression of indexical shift.

In the face of challenges for opacity tests, the primary diagnostic of quotation of this type is its imitative, iconic component. If the speaker adopts a special affect for the pronunciation of the word *misunderestimated* in (115), for instance, this affect is understood as representing Bush in some way. Just as for full clausal quotation, this effect is not explained if partial quotation is itself modelled in terms of pure context shift, at least given a standard understanding of contextual parameters (Maier 2016).

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are different, and evidence on dislocation from Lee et al. (1997) likewise suggests opacity of Role Shift clauses). See Schlenker (To appear b, To appear c), Davidson (2015) for discussion.

<sup>64</sup>This can be contrasted both with Lillo-Martin’s (1995) treatment in terms of logophoricity and Schlenker’s (To appear b, To appear c) recent proposal that Role Shift involves *both* indexical shift and iconicity requirements tantamount to quotation. See Lee et al. (1997), Davidson (2015) and Maier (2016, 2017) for critical discussion and arguments for a fully quotational analysis. An overview of the literature on Role Shift across sign languages can be found in Lillo-Martin (2012).

<sup>65</sup> The case for a pure indexical shift analysis of Role Shift could possibly be better in other sign languages, such as Catalan Sign Language (LSC; Quer 2005, 2013), Danish Sign Language (Engberg-Pedersen 1995), or German Sign Language (Herrmann and Steinbach 2012, Hübl 2013), given that not all elements must shift to the perspective of the reported speaker in these languages. Quer’s (2013) data are of particular interest in connection with the present proposal, in that he reports that certain temporal adverbs shift in LSC if and only if they are in non-clause-final position. This observation is reminiscent of Height Matters effects in Uyghur, assuming (in line with observations from *wh*-movement) that movement to the clause periphery is rightward in sign language, rather than leftward (Cecchetto, Geraci, and Zucchi, 2009). Note, though, that the relevant adverbials in LSC could be anaphoric, rather than indexical, with movement to the periphery interfering with binding rather than with context shift. Alternatively, the facts that Engberg-Pedersen (1995) describes in Danish Sign Language are reminiscent of ‘unquotation’, as discussed by Shan (2010) and Maier (2014a) for spoken language; on this approach see Maier (2017, To appear b). It is clear overall that further research is needed into sign languages of this class.

These considerations are relevant in assessing the extension of indexical shift analyses to free indirect discourse (FID), as proposed by Schlenker (1999), Sharvit (2008) and Eckardt (2014). Like the clauses in (115)-(116), FID possesses a mix of quotative and non-quotative properties. Locative and temporal indexicals cease to draw on the matrix context, like in quotation, (117); similarly, *de re* readings are ruled out (Sharvit, 2008). Unlike in quotation, though, person and tenses are calculated as though in an embedded clause. (See Sharvit (2008) for a review of quotation and non-quotation-like properties of FID, and Schlenker (2011) for a brief overview of existing analyses.)

(117) John pondered all that had transpired in the past year. After the move, he thought they'd be happy in Tulsa, but he'd been wrong, terribly wrong. Living **here**, in this house, was part of the problem! **Now** he had to reconsider all their options.

(lightly modified from Roberts 2015)

The crucial signature of quotation in FID – just like in Role Shift in ASL/LSF – comes from its component of language demonstration, rather than mere language use. Schlenker (2011) notes that FID clauses must be “faithful to the words used,” to the extent that (118a,b) are not mutually entailing:

- (118) a. Tomorrow Peter or Sam would come, Ann thought.  
b. Tomorrow Sam or Peter would come, Ann thought.

Likewise, Maier (2014b, To appear b) shows that FID may demonstrate extralinguistic aspects of an original thought or utterance, just as does quotation. Phonological features of a speaker's accent are seen in (119), while (120) displays a range of dialectal features in prosody, segmental phonology, and syntax.

(119) Ah well, her fathaire would shoorly help her out, she told John in her thick French accent.

(120) Most of the great flame-throwers were there and naturally, handling Big John de Conquer and his works. How he had done everything big on earth, then went up tuh heben without dying atall. Went up there picking a guitar and got all de angels doing the ring-shout round and round de throne. [Z.N. Hurston, *Their Eyes Were Watching God*, p. 187]

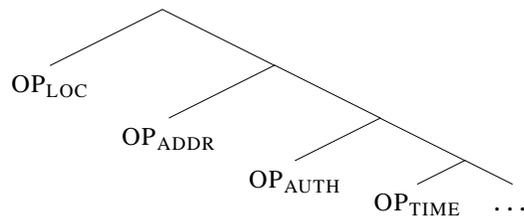
Both types of facts reveal the same sort of iconicity (again leading, at the limit, to a verbatim requirement) in FID as in straightforward quotation. Accordingly, on the analysis developed by Maier (2014b, 2015, To appear b), FID is, essentially, quotation; it is distinguished from more standard types of quotation only in that pronouns and tenses are unquoted, motivated by pragmatic ‘attraction’ to the prominent character and time of the story. The complex pragmatics required to effect this result presumably explain why FID is confined to a written, literary style, given the distinctive pragmatics of that genre. This stylistic restriction, together with the effects on interpretation that go beyond the strictly linguistic, serve to separate phenomena based on (partial) quotation from those attributable purely to indexical shift.

## 8 Conclusions

In this paper I have put forward a theory of indexical shifting which synthesizes ideas from the semantic literature on embedded clauses – viz that these clauses may host operators that overwrite

contextual parameters (Anand and Nevins 2004, Anand 2006, Sudo 2012, Deal 2014, Shklovsky and Sudo 2014, Park 2016), and that modal quantification is contributed by C (Kratzer 2006, Anand and Hacquard 2008, Moulton 2009, 2015) – with ideas from the syntactic literature on universals and variation – viz that natural languages draw from a restricted set of contentful primitives, constrained by functional sequences (Rizzi 1997, Cinque 1999, and much work following), that languages vary in how they bundle these primitives together into lexical items (Bobaljik and Thráinsson 1998, Pyllkkänen 2008, Grashchenkov and Markman 2008, Harley 2013), and in general that variation in the functional lexicon constitutes the primary, if not only, source of variation in grammar (Borer 1984, Ouhalla 1991, Chomsky 1995). At the heart of the proposal is a functional sequence of operators that shift locative, addressee, author, and time coordinates of context:

(121)



This sequence and the meanings of the operators in it provide an explanation for a series of implicational universals that touch on several distinct aspects of the grammar of embedding: verb selection, Shift Together effects, and interpretation *de se*. The theory is thus able to account for indexical shift patterns in a wide range of languages (e.g. Amharic, Korean, Laz, Matses, Navajo, Nez Perce, Slave, Tamil, Uyghur, and Zazaki) while at the same time delineating clear predictions for language types that could not be attested. Should further work bear these predictions out, we stand to gain a substantial example of ways that apparently purely semantic or even pragmatic variation may ultimately connect with variation in grammar.

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