

# Uncentered attitude reports

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*Abstract.* I argue for a semantic distinction between two classes of attitude predicates. One class is best modeled as quantifying over possible worlds compatible with what the attitude holder believes/says, in the tradition of Hintikka 1969. The other is best modeled as quantifying over centered worlds representing the *de se* perspective of the attitude holder, in the tradition of Chierchia 1989 (in turn inspired by Lewis 1979). Much recent work has assumed that all attitude predicates are to be treated semantically in this second manner (Schlenker 1999, Anand 2006, Grønn and von Stechow 2010, Pearson 2015, i.a.). I refer to this hypothesis as *Uniformity*. Uniformity predicts that all attitude complements should be equally semantically able to host elements that must refer *de se*, such as shifted first person indexicals or relative tenses. Drawing on new evidence from Nez Perce, I demonstrate that this prediction is false, and argue that the best explanation for the distribution of dedicated *de se* elements comes from variation in whether attitude predicates quantify over worlds, or centered tuples.

## 1 Introduction

Studies of attitude reports in a variety of languages have uncovered elements that require interpretation *de se*, e.g. controlled PRO (Morgan 1970, Chierchia 1989), logophors (Schlenker 1999, Anand 2006, Haida 2009, Bimpeh To appear; cf. Pearson 2015), certain shifty indexicals (Anand 2006, Sudo 2012, Deal 2019c), and relative tenses (Heim 1994, von Stechow 1995, Abusch 1997). Approaches to these phenomena standardly feature a revision to the Hintikkan picture of attitudes as involving quantification merely over possible worlds, and the corresponding standard assumption that complement clauses express propositions (sets of worlds). Rather, attitude predicates involve quantification over *centered* worlds, which can be modelled as tuples  $\langle x, t, w \rangle$  of an individual, a time, and a world; complement clauses denote sets of such tuples. A sample centered analysis for *believe* is given in (1).<sup>1</sup> In the complement of such a verb, an element will be read *de se* if it is translated with a variable bound by the quantification over individuals or times. A dedicated *de se* element is one that must be translated in this way.

- (1)  $\llbracket \text{believe} \rrbracket^{c,i} = \lambda P_{\langle e \times i \times s, t \rangle} . \lambda e . \lambda x . \forall \langle y, t', w' \rangle \in \text{DOX}(x, \tau(e), w_i) : P(\langle y, t', w' \rangle) = 1$   
Where  $\langle y, t', w' \rangle \in \text{DOX}(x, t, w)$  iff  $x$  believes in  $w$  at  $t$  that she might be  $y$  in  $w'$  at  $t'$ .

<sup>1</sup> Here and throughout I make use of a double-indexed semantics featuring interpretation with respect to a context and an index (in addition to a variable assignment, usually omitted); I spell out further assumptions related to this implementation below. I also assume that the attitude verb has an event argument. It should be emphasized that the basic notion of centered attitude predicates in no way depends on these particular choices. See e.g. Grønn and von Stechow 2010, Pearson 2015 for versions in terms of only object-language variables over worlds and times, and without events.

The argument for recognizing dedicated *de se* elements of natural language – and accordingly, centering – comes from a familiar mix of linguistic data and inference to the best explanation. The data come from interpretations of, say, shifty indexicals or relative tenses, and the inference comes from ruling out, say, special restrictions on *de re* semantics that would allow us to capture the *de se*-only pattern without specific appeal to individual and temporal centers (as per Boër and Lycan 1980, Reinhart 1990; see discussion in Chierchia 1989, Anand 2006, Percus and Sauerland 2003).

Once these arguments for verb meanings like (1) are adopted, questions arise about their scope. A natural hypothesis is *Uniformity*:

(2) Uniformity

Attitude predicates always involve centered quantification, whether or not they contain visible *de se* elements. Attitude complements always denote sets of centered tuples, never merely sets of worlds.

Works that suggest a commitment to Uniformity include, among others, Schlenker (1999), Ogihara (1999), von Stechow (2003), Anand (2006), Grønn and von Stechow (2010), and Pearson (2015). The following passages are illustrative: “Let us assume that attitude predicate complements are sets of centered worlds, which are triples of individuals, worlds, and times, corresponding to the attitude-holder’s *de se* coordinates” (Anand, 2006, 11). “An attitude verb (e.g., *think*) or an indirect discourse verb (e.g., *say*) denotes a relation between individuals and properties (i.e., sets of world-time-individual triples) . . . Then when someone says “I believe  $\phi$ ,” this utterance is understood to mean that the speaker self-ascribes the property denoted by  $\phi$ ” (Ogihara, 1999, §3.1). It should be pointed out that all of the authors just cited discuss multiple predicates in multiple languages; no restriction on the scope of Uniformity only to certain predicates (or certain languages) is implied. To the contrary, these works suggest that, at the limit, if a complement contains no *de se* elements at all, quantification over individuals and times as in (1) is harmlessly vacuous. It simply happens that nothing references the relevant bound values.

In this paper I take up the question of Uniformity as a potential empirical universal about attitude semantics. I begin with a point of concurrence with the authors just cited: Uniformity is an excellent null hypothesis. However, it is considerably less attractive as a dogma. We ought to be open to evidence that bears on the question of whether indeed all attitude reports are centered. Of course, given the possibility of vacuity just mentioned, it may seem that arguing for centered reports is much more straightforward than arguing for uncentered ones: to show that an attitude report is centered, we look for the presence of familiar obligatorily *de se* elements (e.g. shifty indexicals), but the *absence* of these elements in a given attitude report does not show us that a centering hypothesis should be abandoned. I aim to show, nevertheless, that the cause is not hopeless. Just as in the case of centering, arguments from a mix of linguistic evidence and inference to the best explanation are available in the case of uncentered attitudes as well. In particular, I will argue that for certain attitude reports expressed in a natural language, the best explanation for the systematic absence of multiple types of dedicated *de se* elements comes from the attitude report remaining uncentered. In this respect, I conclude, there is variation: while some attitude complements indeed are best treated as sets of centered tuples, others are best treated in the original Hintikka style as sets of possible worlds. Dedicated *de se* elements are available in complements of the former class, but not the latter class.

This conclusion partially reprises ideas from Chierchia’s (1989) discussion of predicate types and subcategorization. For Chierchia, the attitude predicates of English vary in whether they re-

quire centering. Certain attitude predicates always take properties (in our terms: centered propositions, or sets of centered tuples) as their arguments. These are the predicates that compose with nonfinite complements, the subject of which must be *de se* PRO. By contrast, English *that*-clause attitude reports are ambiguous: the clausal complement may express either a property (if it contains a pronoun read *de se*) or a proposition (if it contains no pronoun, or only pronouns read *de re*). Accordingly, attitude predicates that combine with such clauses are themselves ambiguous. They may either compose with a centered complement, as in (1), or an uncentered one. In the latter case, a natural assumption is that the doxastic alternativeness relation reverts to a version much closer to that envisioned by Hintikka 1969 (in reference to whom I indicate the relation here as  $DOX^h$ ):

$$(3) \quad \llbracket believe_{uncent} \rrbracket^{c,i} = \lambda P_{\langle s,t \rangle} . \lambda e . \lambda x . \forall w' \in DOX^h(x, \tau(e), w_i) : P(w') = 1 \quad (v.1)$$

Where  $w' \in DOX^h(x, t, w)$  iff  $w'$  is compatible with what  $x$  thinks in  $w$  at  $t$ .<sup>2</sup>

It should be clear that (3) violates Uniformity, both as relates to the predicate and as relates to its complement. A ready alternative, of course, violates Uniformity as it relates to the semantics of complements, but observes it as relates to the quantification expressed by the verb itself (with the help of vacuous quantification over individuals and times):

$$(4) \quad \llbracket believe_{uncent} \rrbracket^{c,i} = \lambda P_{\langle s,t \rangle} . \lambda e . \lambda x . \forall \langle y, t', w' \rangle \in DOX(x, \tau(e), w_i) : P(w') = 1 \quad (v.2)$$

The present proposal might be approached by considering what would happen if an attitude predicate were *unambiguously* to have a semantics like (3) or (4). Let us call such a hypothetical predicate *believe\**. Consider the different predictions that arise for centered *believe* vs. uncentered *believe\** in cases where the complement contains a dedicated *de se* element – a shifty first person indexical, for instance, required to be bound by centered quantification over individuals, or a relative tense, required to be bound by centered quantification over times. (Here I assume, in keeping with the works cited above and data to be given below, that both types of elements require interpretation *de se*.) If English had such elements, we would expect them to happily occupy the complement of *believe*, producing centered propositions with no vacuous binding, as in (5).

$$(5) \quad \llbracket that I_{shifty} am_{relative} late \rrbracket^{c,i} = \lambda \langle y, t', w' \rangle . y \text{ is late at } t' \text{ in } w'$$

But *believe\** is a different creature. Whether we adopt (3) or (4), its complement is merely propositional, and thus there is no abstraction over individuals or times to bind an individual or temporal variable. If shifty first person indexicals and relative tenses must be so bound, we expect them to be strictly absent from complements of *believe\**:

$$(6) \quad * \text{ Tara believed* that } I_{shifty} \text{ am}_{relative} \text{ late.}$$

It is this inability to host dedicated *de se* devices that would provide our evidence for uncentered attitude reports – and thus our best route to an empirical argument against Uniformity.

In the rest of this paper, I present an argument of exactly this type. So far I have spoken of hypothetical variants of English which, in addition to the fictional verb *believe\**, contain shifty person indexicals and relative tenses; English itself lacks these. Therefore, my argument will not come from English. It will come from Nez Perce, a language with *de se* shifty person indexicals

<sup>2</sup> A more Lewis-style statement is also possible here, based on the idea of self-location in logical space:  $w' \in DOX^h(x, t, w)$  iff  $x$  thinks in  $w$  at  $t$  that she might be in  $w'$ .

and relative tenses – but only in certain attitude complements, not others. In the next two sections, I first introduce a split between two kinds of complement clauses, together with a pair of dedicated *de se* phenomena, namely shifty person indexicals and relative tenses (§2). I then show that these phenomena are confined to one kind of complement clause only (§3). In sections 4 and 5, I show how this distribution can be captured by recognizing two classes of attitude predicates and complements in Nez Perce: a centered class, which obeys Uniformity, and an uncentered class, which does not. In section 6, I argue against two alternative, Uniformity-obeying analyses of the Nez Perce data: one which attributes the difference between attitude predicates that allow and disallow *de se* phenomena strictly to the syntax of the attitude complement, without any relevant difference in the semantics; and one which treats factivity, not centering, as the core semantic property responsible for regulating the distribution of *de se* phenomena. In section 7, I present a brief conclusion.

There are two small notes to be made before turning to these arguments. First, before leaving the discussion of English entirely, it should be noted that the arguments given above do not amount to an endorsement of Chierchia’s (1989) claims concerning the attitudinal lexicon of English. While I do adopt from Chierchia the central idea that attitude reports may differ in whether they involve centering, I do not see a clear way to assess his particular hypothesis that English finite attitude complements sometimes, but not always, feature centering. This is because the sole dedicated *de se* device in English, PRO, is not available in finite clauses. Thus while a case may be made that pronouns in finite complements in English may indeed be bound by centered quantification over individuals (see esp. Percus and Sauerland 2003), there is no ready way to assess whether this centered quantification is present *always* (as Uniformity would have it) or merely *sometimes*, just in the cases where it is useful semantically (as per Chierchia). Regardless of centering, PRO will be unavailable in finite clauses for syntactic reasons – presumably at least in part the same reasons that restrict it, in non-finite clauses, to subject position. If we had only evidence from English, then, we would have no way to empirically assess Uniformity. So much more the reason to look to a language with a richer array of dedicated *de se* phenomena.

Second: it might be thought that the postulation of uncentered attitude predicates runs afoul of argumentation from the philosophical literature on *de se*, in particular Lewis 1979, given Lewis’ well-known argument that all attitudes are indeed attitudes *de se*. But this worry would be misplaced. Lewis himself is careful to distinguish between attitudes themselves (which he seeks to analyze) versus the semantics of attitude reports (which he does not); see Lewis 1979, 541 as well as similar remarks in Stalnaker 1981, Schlenker 1999, 71, among others. In view of this distinction, it should be emphasized that Uniformity, the topic of this paper, is a semantic claim about attitude predicates and their complements. No contradiction arises for those who wish to adopt Lewis’ conclusion about attitudes themselves while rejecting Uniformity as a claim about attitude semantics.

Now, to the main event.

## **2 Background on complement type and *de se* phenomena in Nez Perce**

In this section I introduce a split between two types of complementation patterns in Nez Perce, a Sahaptian language indigenous to the Columbia Plateau region of Idaho, Washington, and Oregon, USA. Unless otherwise cited, the data in this paper come from original fieldwork conducted on the Nez Perce Reservation in Lapwai, Idaho, with two native speaker consultants. Elicitation

protocols were designed following Matthewson 2004 and Tonhauser et al. 2013, with the primary data collection methods being felicity judgment tasks, inference tasks, translation between English and Nez Perce, and production tasks. (Data points obtained via various of these methodologies are indicated below.) This work builds on prior research describing various aspects of Nez Perce grammar, including general descriptive background in Aoki 1970, 1994, Rude 1985 *et seq.*, Crook 1999, and Deal 2010b *et seq.*; research specifically addressing Nez Perce attitude verbs and complementation patterns, including Deal 2009, 2017a, 2018a, 2019c; and research specifically addressing Nez Perce *de se* phenomena – in particular, shiftiness indexicals – including Deal 2009, 2014, 2017b, 2019c. Here, I introduce basic data on complementation patterns (§2.1) and *de se* phenomena (§2.2, §2.3), building on this prior work, before turning to their new data concerning their interaction in §3.

## 2.1 Two finite complementation strategies

Nez Perce allows two main types of finite complement clauses, with the choice between them determined by the embedding verb (Deal, 2018a). The first type is simply a matrix-like clause with no distinctive morphosyntactic marks for subordination, (7a); note identical morphosyntax in the matrix clause version (7b). Complements of this type are found with the verbs *neki* ‘think’, *hi* ‘say/tell’, and *cuukwe* ‘know’. I will refer to this complementation type as *simplex embedding*.

- (7) a. Beth hi-neki-se- $\emptyset$  [ Jill-nim pee-siw’e-nu’ Matt-ne ].  
Beth.NOM 3SUBJ-think-IMPRF-PRES [ Jill-ERG 3/3-not.recognize-PROSP Matt-ACC ]  
Beth thinks that Jill won’t recognize Matt.
- b. Jill-nim pee-siw’e-nu’ Matt-ne.  
Jill-ERG 3/3-not.recognize-PROSP Matt-ACC  
Jill won’t recognize Matt.

The second type features two obligatory, distinctive morphemes that must appear at the left edge of the complement clause: *yo $\hat{x}$*  and *ke*. Both elements are familiar from relative clauses, where *yo $\hat{x}$*  is a (nominative) relative pronoun and *ke* is a complementizer (Deal, 2016a). This type of complement clause thus strongly resembles a relative clause in its morphological marking. Following Caponigro and Polinsky (2011), I will refer to this complementation strategy as *relative embedding*.<sup>3</sup> Compare the marking of the attitude report in (8) to the relative clause in (9).

- (8) Watiisx Meeli hi-llooy-ca-qa [ yo $\hat{x}$  ke kine picpic  
1.day.away Mary.NOM 3SUBJ-be.happy-IMPERF-REC.PAST [ RP.NOM C here cat.NOM  
hi-pnim-sa-qa ].  
3SUBJ-sleep-IMPERF-REC.PAST ]  
Yesterday Mary was happy that the cat was sleeping here.

<sup>3</sup> It appears to be at least somewhat common crosslinguistically for certain embedded clauses to share embedding morphology with relative clauses; see e.g. Aboh 2005, Arsenijević 2009, and especially Caponigro and Polinsky 2011 (the last of which is the only one to provide a semantic analysis). Relative embeddings in Nez Perce differ syntactically from their Adyghe counterparts discussed by Caponigro and Polinsky 2011, as will be discussed at various points in this section; whether they differ semantically (esp. in terms of centering) is not yet clear.



hi-we'npi-se- $\emptyset$  ]  
 3SUBJ-sing-IMPERF-PRES ]  
 S/he<sub>\*i/j</sub> is happy Mary<sub>i</sub> is singing.  
 Consultant: "Someone else is happy that Meeli is singing."

A second syntactic remark about relative embeddings is that they show signs of lacking any nominal superstructure. Rather, the complement appears to be simply a CP.<sup>6</sup> One important difference with NP/DP objects concerns simple selection: most verbs that allow relative embeddings do not allow NP/DP objects. This is shown below for *tim'neenek* 'be worried/anxious'.

- (11) *pro* hi-tim'neenek-se- $\emptyset$  [ yo $\hat{x}$  ke *pro* hi-pa-paay-n- $\emptyset$  ]  
 3SG 3SUBJ-be.worried-IMPERF-PRES [ RP.NOM C 3PL 3SUBJ-S.PL-arrive-P-PRES ]  
 She's worried that they arrived.
- (12) \**pro* tim'neenek-se- $\emptyset$  tamtaayn  
 1SG be.worried-IMPERF-PRES news.NOM  
 Intended: I'm worried about the news.<sup>7</sup>

Relatedly, it is not possible to prefix a noun to a relative embedding:

- (13) *pro* hi-llooy-ca- $\emptyset$  (\*tamtaayn) [ yo $\hat{x}$  ke Angel  
 3SG 3SUBJ-be.happy-IMPERF-PRES (\*news.NOM) [ RP.NOM C Angel.NOM  
 hi-wehye- $\emptyset$ -m- $\emptyset$  ]  
 3SUBJ-arrive-P-CIS-PRES ]  
 S/he is happy (intended: about the news) that Angel will arrive.

A final point on the syntax of relative embeddings is that, despite sharing some morphology with relative clauses, they do not appear to be ordinary relative clauses in terms of their internal syntax. As discussed in detail in Deal 2016a, Nez Perce relative clauses systematically, and without semantic consequence, allow variation in the relative order of the relative pronoun and the complementizer *ke*. (This variation does not correspond to restrictiveness vs. non-restrictiveness, for instance, as shown in Deal 2016a.)

- (14) *pro* wewluq-se- $\emptyset$  picpic [<sub>RelClause</sub> { yo $\hat{x}_2$  ke / ke yo $\hat{x}_2$  } *t*<sub>2</sub>  
 1SG want-IMPERF-PRES cat.NOM [ { RP.NOM C / C RP.NOM }  
 hii-wes ta'c cepeqick-e'weet laqaas-na ].  
 3SUBJ-be.PRES good catch-AGT mouse-ACC ]  
 I want a cat that is a good mouse-catcher. (Any such cat would do.)

Relative embeddings, on the other hand, do not allow this order variation. They rigidly begin with *yo $\hat{x}$*  followed by *ke*.

<sup>6</sup> Since relative embeddings are quite understudied crosslinguistically, I will point out that this conclusion is quite different from Caponigro and Polinsky's (2011) conclusion regarding relative embeddings in Adyghe. Note, however, that the facts described just below are markedly different from the patterns in that language.

<sup>7</sup> This example features a nominative/nominative case frame. Nez Perce transitives also allow ergative/accusative case frames; the change of case does not rescue this type of example. The same applies to (13). On Nez Perce case, see Deal 2010a,b.

- (15) *pro* lilooy-ca- $\emptyset$  [Complement { yo $\hat{x}$  ke / \*ke yo $\hat{x}$  } *pro*  
 1SG be.happy-IMPERF-PRES [ RP.NOM C / C RP.NOM 3PL  
 hi-we'np-siix- $\emptyset$  ]  
 3SUBJ-sing-IMPERF.PL-PRES ]  
 I'm happy that they are singing.

In view of this difference, as well as the absence of any nominal superstructure, I will not attempt to assimilate relative embeddings to true relative clauses in this paper. I will treat relative embeddings as a type of CP complement and largely (modulo a few brief remarks in section 5) remain agnostic on the question of why this complement type shares morphology with nominal modifiers.

## 2.2 Indexical shift

Nez Perce attitude complements may contain two types of elements which require interpretation *de se*: shifted first (and second) person pronouns, and relative tenses. Notably, the language also allows shifty locative indexicals, but these impose no *de se* requirement (Deal 2014, 2019c).<sup>8</sup> As we will see below, there is a clear interaction between dedicated *de se* phenomena and complement type: simplex embedding allows *de se* phenomena and relative embedding does not. In this section and the next, I introduce indexical shift and relative tense patterns in simplex embedding only, in preparation for discussion of the interaction with complement type in section 3.

The basic behaviors of indexical shift in Nez Perce are documented in Deal (2009, 2014, 2019c). This work establishes the following generalizations. First, both first person pronouns and locative adverbial indexicals may shift.<sup>9</sup> Shift of a first person pronoun, 'iin, is demonstrated in (16). (Shift of a null first person pronoun, where the first person status of the missing argument is indicated by verbal inflection, is demonstrated in (23) and (25).) Shift of a locative adverbial indexical, *kine* 'here', is demonstrated in (17).

- (16) kii hii-wes 'iniit [RelClause yo $\hat{x}_1$  ke Jack  
 this.NOM 3SUBJ-be.PRES house.NOM [ RP.NOM C Jack  
 hi-neki-se- $\emptyset$  [ 'iin  $\emptyset$ -hani- $\emptyset$ -ya  $t_1$  ] ]  
 3SUBJ-think-IMPERF-PRES [ 1SG.NOM 1SUBJ-make-P-REM.PAST ] ]

This is the house that Jack<sub>*i*</sub> thinks he<sub>*i*</sub> (lit: 'I') built

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

Miniku cewcewin'es<sub>2</sub> *pro* hi-i-caa-qa Simiinikem-pe [  $t_2$   
 which phone.NOM 3SG 3SUBJ-say-IMPERF-REC.PAST Lewiston-LOC [  
 hi-muu-no'qa kinix met'u weet'u  $t_2$  hi-muu-no'qa konix ] ?  
 3SUBJ-call-MODAL from.here but NEG 3SUBJ-call-MODAL from.there ] ?

Which phone did they say in Lewiston can call from Lewiston (lit. 'here') but not from Lapwai (lit. 'there')?

<sup>8</sup> Nez Perce is not unique in allowing shifty indexicals that lack a *de se* requirement. See Sudo (2012), Nishiguchi (2017), and the typological discussion in Deal (2019c, §3.1.4).

<sup>9</sup> So too may second person pronouns, though I set these aside here. See Deal (2019c) for discussion. Observe that temporal adverbial indexicals are left off of this list. Deal (2014) demonstrates that Nez Perce lacks truly indexical temporal adverbs.



Second, as these examples also show, clauses that host indexical shift may be the origin site of *wh*-movement and relativization, unlike clausal quotations.

Third, indexical shift shows the pattern that Anand and Nevins (2004) call ‘Shift Together’: within a given attitude report, either all clausemate first person pronouns shift, or none do. On the most natural reading of sentence (18), both instances of embedded first person are shifty (and thus refer to my sister). Also possible is a reading where neither is shifty, and thus both simply refer to me. But it is entirely impossible for one to be shifty while the other remains unshifted.<sup>10</sup>

- (18) Ne-’níc-em                    pee-∅-n-e                    ’in-haama-na,  
 1SG-older.sister-ERG 3/3-say-P-REM.PAST 1SG-husband-ACC  
 [ ’iin-im    ciq’aamqal hi-twehkey’k-∅-e                    ’iin-e    ].  
 [ 1SG-GEN dog(ERG) 3SUBJ-chase-P-REM.PAST 1SG-ACC ]  
 a. My sister<sub>s</sub> told my husband<sub>h</sub> that her<sub>s</sub> dog chased her<sub>s</sub>.  
 b. ? My sister<sub>s</sub> told my husband<sub>h</sub> that my dog chased me.  
 c. ✗ My sister<sub>s</sub> told my husband<sub>h</sub> that my dog chased her<sub>s</sub>.  
 d. ✗ My sister<sub>s</sub> told my husband<sub>h</sub> that her<sub>s</sub> dog chased me.

The same holds for pairs of locative indexicals. Because both locative indexicals in (19) must refer to the same location, the only reading of the sentence is one where it reports the utterance of a contradiction (namely, that a single place is hotter than itself):

- (19) # ’in-lawtiwaa-nm paasxa-pa    hi-hi-n-e                    *pro*, [ *kine* hii-wes                    qetu  
 my-friend-ERG    Boise-LOC 3SUBJ-tell-P-REM.PAST 1SG [ here 3SUBJ-be.PRES more  
 ’iyeeqis kin-ix    ].  
 hot    here-from ]  
 a. ✗ My friend in Boise told me it was hotter here than there.  
 b. ✗ My friend in Boise told me it was hotter there than here.

We return to the question of a Shift Together effect holding between person and locative indexicals around (23) below.

Fourth, shifty first person, but not shifty locative *kine* ‘here’, must be read *de se*. In the case of first persons, the mere fact of reference to the attitude holder within the attitude report is not sufficient to license the use of the shifty indexical. When this is purely reference *de re*, shifty first person is rejected. (This fact is parallel to data reported on shifty first person indexicals in a diverse range of languages, including Amharic (Anand, 2006, 79), Korean (Park, 2016, (26)), Uyghur (Sudo, 2012, 224-5) and Zazaki (Anand, 2006, 79).)

<sup>10</sup> Nez Perce speakers often prefer shifty interpretations in cases where they are pragmatically possible; this preference is perhaps especially strong in speech reports. Note that, in spite of this preference, there is a clear distinction in consultant reactions to fully unshifty interpretation (18b) (which is possible, though dispreferred) versus mixed interpretations (18c)/(18d), which are entirely unavailable.

- (20) Context: A lady gets very sick and then recovers. Her recovery is so miraculous that they mention it on TV. They show the lady in a very ill condition; she looks awful. She sees this TV report later and she doesn't even recognize herself, she was so sickly at that time.<sup>11</sup>

# 'aayat hi-neki-se- $\emptyset$  [ *pro*  $\emptyset$ -k'oomay-ca- $\emptyset$  ]  
 woman.NOM 3SUBJ-think-IMPERF-PRES [ 1SG 1SUBJ-be.sick-IMPERF-PRES ]  
 Intended: The woman<sub>i</sub> thinks she<sub>i</sub> is sick.

For shifty locative indexicals, however, no such requirement is in place. Reference to the attitude location *de re* is sufficient to license indexical shift. 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 herself to be located (Asotin). (For an additional example of this type, see Deal 2014, (40).)

- (21) Context (elicited in Lapwai): Costco is a prominent store in Clarkston. Everyone knows where it is.

'Aayat hii-wes Clarkston-pa, met'u *pro* hi-neki-se- $\emptyset$   
 woman 3SUBJ-be.PRES Clarkston-LOC but 3SG 3SUBJ-think-IMPERF-PRES  
 Asootin-pa, kaa *pro* hi-neki-se- $\emptyset$  [ Costco hii-wes kine ].  
 Asotin-LOC and 3SG 3SUBJ-think-IMPERF-PRES [ Costco 3SUBJ-be.PRES here ]  
 The woman is in Clarkston<sub>i</sub>, but she thinks (she's) in Asotin, and she thinks Costco is here<sub>j</sub>.

It does not seem likely that the acceptance of such sentences reflects confusion about the scenario, as no amount of reminding consultants about relevant aspects of the context changed their acceptance of this type of sentence. I therefore conclude that shifty locative indexicals in Nez Perce do not impose *de se* requirements—a finding that puts them in the company of a small group of indexical elements attested across various languages; see Sudo (2012), Nishiguchi (2017), Deal (2019c, §3.1.4) for discussion of other cases.

Fifth, shift is optional both for indexical pronouns and for locatives, but the choice to shift or not shift indexical pronouns affects whether locative shift is possible. The optionality of shifting first persons is shown in (18a,b), repeated below. Speakers prefer but do not require the shifted interpretation of embedded first person.

- (22) Ne-'níc-em pee- $\emptyset$ -n-e 'in-haama-na,  
 1SG-older.sister-ERG 3/3-say-P-REM.PAST 1SG-husband-ACC  
 [ 'iin-im ciq'aamqal hi-twehkey'k- $\emptyset$ -e 'iin-e ].  
 [ 1SG-GEN dog(ERG) 3SUBJ-chase-P-REM.PAST 1SG-ACC ]  
 a. My sister<sub>s</sub> told my husband<sub>h</sub> that her<sub>s</sub> dog chased her<sub>s</sub>.  
 b. ? My sister<sub>s</sub> told my husband<sub>h</sub> that my dog chased me.

<sup>11</sup>This judgment holds regardless of whether the embedded verb bears present tense, as shown here, or past tense. Note that the first person status of the embedded subject is indicated here (as in numerous other examples) by the absence of third person morphology, notably the verbal prefix *hi-* (as well as the absence of second person clitics). On Nez Perce verb inflection, see Deal 2015b.

The optionality of shifting locatives may be seen by contrasting examples with shifty readings, as in (17) and (21), with examples such as (23), where the locative remains unshifted (though its clausemate first person indexical *is* shifted):

- (23) Context: I travel to the town where my dad grew up and I go to the address he said he grew up at. Someone sees me looking at the house and I explain:

na'-toot-am hi-i-cee-ne *pro* [ kine *pro* tew'yenik- $\emptyset$ -e ]  
 my-father-ERG 3SUBJ-say-IMPERF-REM.PAST 1SG [ here 1SG live-P-REM.PAST ]  
 My father told me he used to live here.

Examples like (23) show that there is no Shift Together-type requirement holding between locative and person indexicals. Person shift is possible regardless of whether or not locative indexicals shift.<sup>12</sup> However, this freedom does not hold in both directions: rather, locative shift requires person shift. As (24) shows, when the attitude complement contains an unshifty first person, locative shift is not possible.

- (24) Context: Harold is in Clarkston. I and my consultant are in Lapwai.

# pay's Harold hi-neki-se- $\emptyset$  [ *pro* wees kine Clarkston-pa ]  
 maybe Harold 3SUBJ-think-IMPERF-PRES [ 1SG be.PRES here Clarkston-LOC ]  
 Intended: Maybe Harold thinks<sub>i</sub> that I am here<sub>i</sub> in Clarkston<sub>i</sub>.  
 Consultant: "You could only say this if you were in Clarkston."

Finally, it should be noted that indexical shift is possible in the complements of all verbs that appear in a simplex embedding structure – *neki* 'think', *hi* 'say/tell', and *cuukwe* 'know'. We see shift in the complement of *neki* 'think' in (16) and (20)-(21) above, and in the complement of *hi* 'say/tell' in (17)-(19) above. Shift in the complement of *cuukwe* 'know' is shown in (25).

- (25) 'Isii-ne Meeli hi-cuukwe-ce- $\emptyset$  [ *pro* 'e-ex-nu' \_ ]?  
 who-ACC Mary.NOM 3SUBJ-know-IMPERF-PRES [ 1SG 3OBJ-see-PROSP ]  
 Who does Mary know she's going to see?

### 2.3 *Relative tense*

Nez Perce verb morphology is highly polysynthetic and includes inflectional marking for tense as well as viewpoint aspect. Three tense categories may be distinguished: recent past *-qa*, remote past *-ne*, and present (unmarked).<sup>13</sup> Note that the distinction between recent and remote past tense

<sup>12</sup>For an example showing shift of both person nor locative indexicals, see Deal (2014, (23)); for an example in which both remain unshifted, see Deal (2014, (24)).

<sup>13</sup>I will assume here that present tense features a covert present tense morpheme, though this is not crucial for the analysis; see e.g. Ogiwara 1999 for an analysis of similar facts wherein present tense is treated simply as the absence of any tense at all. Of course, absence-of-tense views require some means of differentiating a language where the absence of tense always has a present interpretation, as in Nez Perce, from more radically tenseless (or "optionally tensed") languages in which the absence of tense is compatible with a wider range of interpretations. See Bochnak, Hohaus, and Mucha (to appear) for relevant discussion and references.

is collapsed in certain verb forms, though these will not be our emphasis here. This is generally the case for the copula (the tense inflection of which is, in addition, morphologically irregular); it is also the case in certain aspects, notably the aspectual category Deal 2010b calls “P aspect” (for perfect/perfective). The examples below feature the imperfective aspect, where all three tense morphemes are possible.

- (26) ( \*waqiipa / \*watiisx / taaqc ) hi-weeqi-se- $\emptyset$   
 ( while.back / 1.day.away / same.day ) 3SUBJ-rain-IMPERF-PRES  
 It is raining (\*a while back / \*yesterday / today)
- (27) ( waqiipa / watiisx / \*taaqc ) hi-waaqi-sa-qa  
 ( while.back / 1.day.away / same.day ) 3SUBJ-rain-IMPERF-REC.PAST  
 It was raining (a short while back / yesterday / \*today)
- (28) ( waqiipa / \*watiisx / \*taaqc ) hi-weeqi-se-ne  
 ( while.back / 1.day.away / same.day ) 3SUBJ-rain-IMPERF-REM.PAST  
 It was raining (a long while back / \*yesterday / \*today )

As in many other languages, future marking is accomplished independent of the tense system proper. It is marked either via prospective aspect (*-(n)u'*) or via a “low future” suffix (*-tet'ee*) that nearly always attaches below imperfective aspect. (On the low future, see Deal 2010b, §1.7.4.3; on the prospective aspect, see Deal 2010b, ch 2-4 and note 14 below.)

Tense in simplex complement clauses replicates patterns familiar from non-sequence-of-tense languages such as Japanese (Ogihara 1989, 1995b, 1996, 1999; Kusumoto 1999; Kubota et al. 2009; Ogihara and Sharvit 2012). These patterns have not previously been documented, modulo some brief discussion in Deal 2009. Simultaneous readings must be conveyed with embedded present tense, regardless of whether the matrix tense is recent past (29) or remote past (30), or whether the matrix clause is future-marked with prospective aspect (31).

- (29) Context: On day 1, Mary says: “*pro* hi-weeqi-yuu-se- $\emptyset$  *pro*”  
 3SG 3SUBJ-rain-APPL-IMPERF-PRES 1SG  
 (It’s raining on me.)
- On day 2, I say to you:
- a. ✓ Meeli hi-i-caa-qa [ *pro* hi-weeqi-yuu-se- $\emptyset$  *pro* ]  
 Mary 3SBJ-say-IMPERF-REC.PAST [ 3SG 3SBJ-rain-APPL-IMPERF-PRES 1SG ]  
 (Mary said it was raining on her.)
- b. ✗ Meeli hi-i-caa-qa [ *pro* hi-weeqi-yuu-sa-qa *pro* ]  
 Mary 3SBJ-say-IMPERF-RC.PST [ 3SG 3SBJ-rain-APPL-IMPERF-RC.PST 1SG ]
- (30) *pro* hi-weeqi-se-ne met’u Meeli weet’u  
 3SG 3SUBJ-rain-IMPERF-REM.PAST but Mary NEG  
 hi-cuukwe-ce-ne [ *pro* hi-weeqi-se- $\emptyset$  ].  
 3SUBJ-know-IMPERF-REM.PAST [ 3SG 3SUBJ-rain-IMPERF-PRES ]  
 It was raining but Mary didn’t know that it was raining.
- (31) Weet’u Caan hi-cuukwe-nu’ [ *pro* hi-weeqi-se- $\emptyset$  ].  
 NEG John 3SUBJ-know-PROSP [ 3SG 3SUBJ-rain-IMPERF-PRES ]  
 (It will be raining but) John won’t know that it is raining.

Like in Japanese (Ogihara, 1999), but unlike in English, embedding present under past does not lead to a “double access” reading, whereby the embedded eventuality description must hold at both the attitude time and the present moment (Smith 1978, p 66; Ogihara 1995a; Abusch 1997). Sentence (29a), with present embedded under recent past, does not imply that it is raining at present. Similarly, sentence (32), with present embedded under remote past, may be appropriately said to someone who is known to be not currently pregnant.<sup>14</sup>

- (32) *pro* nek-see-ne [ 'ee wees 'iluutpe ]!  
 1SG think-IMPERF-REM.PAST [ 2SG.CLITIC be.PRES pregnant ]  
 I thought you were pregnant!

These data show that embedded present tense receives a purely relative reading. Similar facts hold for other embedded tenses, as well as prospective aspect.<sup>15</sup> That is, past tense embedded under past tense is interpreted as ‘backshifted’:

- (33) Watiisx Caan-im hi-i-caa-qa *pro* [ *pro*  
 1.day.away John-ERG 3SUBJ-say-IMPERF-REC.PAST 1SG [ 3SG  
 hi-k'oomay-ca-na / hi-k'oomay-ca-qa ]  
 3SUBJ-be.sick-IMPERF-REM.PAST / 3SUBJ-be.sick-IMPERF-REC.PAST ]  
 Yesterday, John told me he was sick.  
 a. ✓ He said, "I was sick."  
 b. ✗ He said, "I am sick."
- (34) Waqiipa Caan-im hi-i-cee-ne *pro* [ ciq'aamqal  
 while.back John-ERG 3SUBJ-say-IMPERF-REM.PAST 1SG [ dog  
 hi-k'oomay-ca-na / hi-k'oomay-ca-qa ]  
 3SUBJ-be.sick-IMPERF-REM.PAST / 3SUBJ-be.sick-IMPERF-REC.PAST ]  
 A while back, John told me the dog was sick.  
 a. ✓ He said, "The dog was sick."  
 b. ✗ He said, "The dog is sick."

<sup>14</sup> Additionally, present under prospective aspect, as in (31), also produces no inference concerning rain at the time of utterance; this type of fact also holds for present-under-future sentences in English. In English, a simultaneous reading of present-under-future is possible both in complement clauses and in relative clauses. In Nez Perce, by contrast, prospective aspect does not license simultaneous readings of present tense without an attitude verb, e.g. in relative clauses:

- (i) kii pit'iin pamawa hi-haamany-o' naaqc haama [*RelClause* ke 'ip-nim  
 this girl someday 3SUBJ-marry.a.man-PROSP one man [ C 3SG-ERG  
 pee-hetew'y-u' / # pee-hetew'i-se-∅ ]  
 3/3-love-PROSP / 3/3-love-IMPERF-PRES ]  
 This girl will someday marry a man who loves her.  
 Consultant comment on *peehetew'ise*: “[He] loves her now.”

<sup>15</sup> These facts (parallel to Mucha’s (2015) discussion of graded embedded tense in Medumba) challenge Cable’s (2015) generalization that “graded” tense systems resist purely relative readings.

And prospective aspect embedded under past tense is interpreted as ‘forward-shifted’:

- (35) Meeywi tak’aynas-pa *pro* hi-i-caa-qa [ hi-weeqi-yu’ ]  
 morning TV-on 3SG 3SUBJ-say-IMPERF-REC.PAST [ 3SUBJ-rain-PROSP ]  
 This morning they said on TV it would be raining (now)
- (36) T. naaqc k’aayx-pa hi-i-cee-ne [ *pro* cicyuuk’is hi-’np-u’  
 T one week-LOC 3SUBJ-say-IMPERF-REM.PAST [ 3SG sugar 3SUBJ-buy-PROSP  
 watiisx ]  
 1.day.away ]  
 Last week T. said he would buy sugar the next day.

The overall generalization is that all tenses, as well as prospective aspect, are interpreted in simplex complement clauses as indicating a temporal relation between a time associated with the embedded eventuality description and a time associated with the reported attitude.

What is this latter time? As has frequently been noted in the description of other languages, Nez Perce embedded tenses (in simplex complements) are relative not to the actual time of the attitude itself – i.e. the time that thinking or saying takes place – but rather to the ‘internal now’ of the attitude holder, i.e. the time at which the attitude holder self-locates (von Stechow 1995, Abusch 1997, Kratzer 1998, Grønn and von Stechow 2010, among many others). Relative tense thus falls under the general heading of *de se* phenomena. Accordingly, the mere fact of reference to the actual attitude time in the complement clause is not enough to license embedded present tense. This restriction is parallel to the restriction on shifty first person documented in (20).<sup>16</sup>

- (37) Naaqc hi-neki-se- $\emptyset$  [ *pro* hii-wes halxpaawinaqit ], metu’ *pro*  
 one 3SUBJ-think-IMPERF-PRES [ 3SG 3SG-be.PRES Monday ] but 3SG  
 hii-wes piilepti-pe ka’aw-pa, kaa *pro* hi-neki-se- $\emptyset$  [ kii taaqc  
 3SG-be.PRES four-LOC day-LOC and 3SG 3SUBJ-think-IMPERF-PRES [ this same.day  
 hii-wes ’iyeeqis ]  
 3SUBJ-be.PRES hot ]  
 Someone thinks it’s Monday, but it’s Thursday, and he thinks that today is hot.
- a. ✓ He thinks: “Today is hot.”  
 b. ✗ He thinks: “Thursday was/will be hot.”

Further evidence of the *de se* restriction on embedded present tense is shown in (38). This example contrasts two embedded clauses, ‘the post office is closed’ and ‘the post office is open’. If embedded present tense could indicate overlap with attitude time, ‘the post office is open’ should be an

<sup>16</sup>Note that the source of the *de se* restriction in (37) is not the embedded adverbial *kii taaqc* ‘today’, as we see in (i). Here *kii taaqc* ‘today’ refers to the utterance day *de re*, the original report presumably having been of the form ‘I will go to Lewiston next week’. The embedded prospective aspect, however, remains relative to the internal now of the attitude report.

- (i) *pro* hi-i-cee-ne [ *pro* Simiinikem kiy-u’ kii taaqc ]  
 3SG 3SG-say-IMPERF-REM.PAST [ 1SG Lewiston go-PROSP this same.day ]  
 He said (last week) he was going to go to Lewiston today.

appropriate embedded clause: the post office is open on Saturday, which is when the attitude is held. But this clause is not felicitous. What is felicitous is a complement that holds of the time at which the attitude holder self-locates, viz ‘the post office is closed’.

- (38) Context: One time, it was Saturday and I thought it was Sunday. I know that the post office is open on Saturday but closed on Sunday.

*pro* nek-see-ne, [ tiim'es-nim 'iniit hii-wes ✓ wak'alpin' /  
 1SG think-IMPERF-REM.PAST [ letter-GEN house 3SUBJ-be.PRES closed /  
 ✗ waʔalpin' ]  
 open ]

I thought the post office was ✓ closed / ✗ open.

### 3 The interaction of complement type and *de se* phenomena

The behavior of (shifty) first person indexicals and (relative) tenses in simplex embedding provides support for a treatment of simplex embedding complements in terms of individually and temporally centered propositions (at least  $\langle e \times i \times s, t \rangle$ ). Shifty first person indexicals must refer to the individual center; the temporal relations expressed by relative tenses must be calculated with respect to the temporal center. The facts from simplex embeddings thus present no challenge to Uniformity. Indeed, the general expectation to which Uniformity points is that all complements in the language should behave as simplex embedding complements do in terms of dedicated *de se* phenomena.

In this section, we review the evidence that this prediction is wrong. Relative embeddings behave sharply unlike simplex embeddings as far as dedicated *de se* phenomena are concerned: indexicals can receive only unshifted, *de re* readings, and tenses must receive (free) *de re* readings. I will show in section 5 how these behaviors receive a semantic explanation on a view of relative embedding that departs from Uniformity.

#### 3.1 No first person indexical shift in relative embedding

The first difference between relative and simplex embedding concerns embedded first person indexicals and the expression of classic attitudes *de se*. Unlike in simplex embedding, where shifty readings of first person pronouns are freely available (and indeed preferred, where pragmatically appropriate), shifty readings of first person pronouns are unavailable in relative embeddings. Only unshifty readings are permitted. This restriction is in place regardless of whether the first person pronoun is overt or null, and is insensitive to its syntactic position within the embedded clause. Thus the (b) interpretations are entirely unavailable for (39) and (40).<sup>17</sup>

<sup>17</sup>These examples show inflection on the complementizer particle *ke*. This inflection is found in all environments in which *ke* appears, including relative clauses and questions, and is obligatory; first and second persons are overtly indexed. See Deal 2015a, 2016a.

- (39) *pro* hi-llooy-n-a [ yô ke-x *pro* 'iyaâ-n-a *pro*  
 3SG 3SUBJ-be.happy-P-REM.PAST [ RP.NOM C-1 1SG find-P-REM.PAST 1SG.GEN  
 siloo'ayn ]  
 glasses.NOM ]  
 a. ✓ She was happy I found my glasses.  
 b. ✗ She was happy she found her glasses.
- (40) *pro* hi-'etqew-ce-∅ [ yô ke-x 'iin wîne-tet'ee-se-∅ ]  
 3SG 3SUBJ-be.sad-IMPERF-PRES [ RP.NOM C-1 1SG leave-LOW.FUT-IMPERF-PRES ]  
 a. ✓ He's sad that I'm going to leave.  
 b. ✗ He's sad that he's going to leave.

Whatever allows for a reading other than this unshifted, *de re* reading of first person indexicals (viz., the shifty *de se* reading) is not available in relative complements. With first person shifty indexicals no longer an option, reference to the attitude holder within the complement clause requires third person:

- (41) *pro* hi-'etqew-ce-∅ [ yô ke *pro*  
 3SG 3SUBJ-be.sad-IMPERF-PRES [ RP.NOM C 3SG  
 hi-wîne-tet'ee-se-∅ ]  
 3SUBJ-leave-LOW.FUT-IMPERF-PRES ]  
 He's sad that he's leaving.
- (42) *pro* hi-llooy-ca-∅ [ yô ke *pro* hi-'yaâ-n-a  
 3SG 3SUBJ-be.happy-IMPERF-PRES [ RP.NOM C 3SG 3SUBJ-find-P-REM.PAST  
*pro* picpic ]  
 3SG.GEN cat.NOM ]  
 She's happy that she found her cat.

Note that this restriction is in place even though sentences (41) and (42) are most naturally interpreted (absent some explicit contextual information to the contrary) as describing attitudes *de se*. In terms of attitudes *de se*, what is different between simplex and relative embedding is not whether the attitude may be reported, but whether a dedicated *de se* device may be used to express it. The third person reporting strategy that must be used is certainly compatible with the report of an attitude *de se*, as in (41) and (42), but may also be used to report a non-*de se* attitude:<sup>18</sup>

<sup>18</sup>It is also possible to use embedded third person pronouns to report attitudes *de se* in simplex attitude reporting, as we see for the embedded third person object in (i):

- (i) Context: a student complains to the teacher that another student has hit him. The teacher approaches the accused and says: *Is it true that you hit this person?* ...  
 'etke ki-nm hi-hí-n-e *pro* [ 'ee 'e-pt'é-∅-ye *pro* ]  
 because this.one-ERG 3SUBJ-tell-P-REM.PAST 1sg [ you 3OBJ-hit-P-REM.PAST 3sg ]  
 Because this one told me you hit him.

A shifty first person indexical in fact cannot be used in this case, due to the fact that shifty first person and unshifty second person indexicals cannot be clausemates. See Anand and Nevins 2004;



- (43) Context [same as (20)]: A lady gets very sick and then recovers. Her recovery is so miraculous that they mention it on TV. They show the lady in a very ill condition; she looks awful. She sees this TV report later and she doesn't even recognize herself, she was so sickly at that time.

'aayat hi-neki-se- $\emptyset$  [ *pro* hi-k'oomay-ca- $\emptyset$  ]  
 woman 3SUBJ-think-IMPERF-PRES [ 3SG 3SUBJ-be.sick-IMPERF-PRES ]  
 The woman<sub>i</sub> thinks she<sub>i</sub> is sick.

The overall range of interpretations of embedded third persons is readily captured on a view where embedded third person pronouns must always be read *de re*, and therefore allow *de se* readings as a special case (Boër and Lycan 1980; Reinhart 1990; Anand 2006).

### 3.2 No relative tense in relative embedding

The second difference between relative and simplex embedding concerns embedded tense. A parallel generalization holds in this domain: relative interpretation of tense – a dedicated *de se* phenomenon found in simplex embedding – is not available in relative embeddings. To express a simultaneous reading with a past tense matrix clause, matching tenses must be used, rather than embedded present tense. As the following examples show, this is true both for recent and remote past tense.

- (44) *pro* hi-weeqi-se-ne met'u Meeli weet'u  
 3SG 3SUBJ-rain-IMPERF-REM.PAST but Mary.NOM NEG  
 hi-cciwaay-n-a [ yo $\hat{x}$  ke *pro* ✓ hi-weeqi-se-ne /  
 3SUBJ-be.surprised-P-REM.PAST [ RP.NOM C 3SG 3SUBJ-rain-IMPERF-REM.PAST /  
 ✗ hi-weeqi-se- $\emptyset$  ].  
 3SUBJ-rain-IMPERF-PRES ]

It was raining but Mary wasn't surprised that it was raining.

- (45) Watiisx Meeli hi-llooy-ca-qa [ yo $\hat{x}$  ke *pro*  
 1.day.away Mary.NOM 3SUBJ-be.happy-IMPERF.REC.PAST [ RP.NOM C 3SG  
 ✓ hi-waaqi-sa-qa / ✗ hi-weeqi-se- $\emptyset$  ]  
 3SUBJ-rain-IMPERF-REC.PAST / 3SUBJ-rain-IMPERF-PRES ]

Yesterday Mary was happy that it was raining (she was enjoying the rain).

A similar consequence of the absence of relative readings may be seen in the interpretation of past-under-past, thanks to the language's distinction between recent and remote past tense. For simplex embeddings, we saw above that either past tense may be embedded under the other, resulting in a backshifted reading. Notably, recent past tense may be embedded under remote past tense, (34). This possibility is not available in relative embeddings. Occurrence of a complement clause event slightly before a remote past matrix attitude is not sufficient to license the use of recent past tense:

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Anand 2006; Deal 2014, 2017b, 2019c for discussion and analysis of this type of first+second person 'Shift Together' effect.

- (46) Kismis-pe kuleewit-pe, Meeli hi-llooy-ca-na [ yôx  
 Christmas-LOC evening-LOC Mary.NOM 3SUBJ-be.happy-IMPERF-REM.PAST [ RP.NOM  
 ke meeywi-pe miy'ac ✗ 'a-llooy-ca-qa /  
 C morning-LOC child.NOM 3GEN-be.happy-IMPERF-REC.PAST /  
 ✓ 'a-llooy-ca-na ].  
 3GEN-be.happy-IMPERF-REM.PAST ]  
 On Christmas night, Mary was happy that her kid had been happy on Christmas morning.

Such data indicates that recent past tense, like present tense, cannot receive a relative reading in relative complements.

These differences in the expression of simultaneous and relatively-recent readings stand out amid properties of the tense system which otherwise remain insensitive to the choice among relative and simplex embeddings. For instance, like in simplex embeddings, relative complements also allow a backshifted reading for past-under-past (modulo the case of recent past under remote past, discussed just above):

- (47) *pro* hi-llooy-ca-qa [ yôx ke *pro* ciq'aamqal weet'u  
 3SG 3SUBJ-be.happy-IMPERF-REC.PAST [ RP.NOM C 3SG dog NEG  
 'a-wahoo-ca-qa ]  
 3POSS-howl-IMPERF-REC.PAST ]  
 She was happy her dog hadn't been howling.
- (48) Context: I lost my extra key for a long time and then one day I found it!  
*pro* timiipni-se-ne [ yôx ke *pro* 'e-'peewi-se-ne ]  
 1SG remember-IMPRF-REM.PAST [ RP.NOM C 1SG 3OBJ-look.for-IMPRF-REM.PAST ]  
 I remembered I had been looking for it. (So I put it somewhere safe.)

And prospective aspect embedded under past tense remains interpreted as 'forward-shifted':

- (49) Hal̂paawit-pa *pro* lilooy-ca-qa [ yôx ke-x lepwey-pe *pro*  
 Sunday-LOC 1SG be.happy-IMPERF-REC.PAST [ RP.NOM C-1 Lapwai-to 1SG  
 paay-no' piilepti-pe ka'aw-pa ]  
 come-PROSP four-LOC day-LOC ]  
 On Sunday I was happy that I would come to Lapwai Thursday.

This body of data could in principle be approached in either of two ways. A first way would appeal to an optional sequence of tense (SOT) rule that either semantically deletes the embedded past tense (Ladusaw 1977, Ogihara 1989 *et seq*; von Stechow 1995, 2003; Sharvit 2014, 2018) or allows an embedded morphological past tense to be licensed without contributing anteriority (Stowell 1996; Kratzer 1998; Schlenker 1999; Kusumoto 2005; Klecha 2016), in either case in the context of a matching matrix past tense.<sup>19</sup> A second way would appeal to the idea that tenses may be interpreted *de re*, much as ordinary pronouns and other referential expressions may be (Heim

<sup>19</sup>This is a simplification of the contextual specification for SOT. See von Stechow (1995) and Ogihara (1996, ch 4). For recent discussion of the need for SOT rules in natural language in general, see Altshuler and Schwarzschild (2013) and Sharvit (2018).

1994; Abusch 1997; Ogihara and Sharvit 2012; Altshuler and Schwarzschild 2013; Sharvit 2014, 2018; Cable 2015; Bochnak et al. to appear, among others).

There are two immediate advantages to this second type of view. A first is that it makes for a clear connection between the behavior of tenses and of first person pronouns in relative vs. simplex embeddings, respecting the generalization alluded to above. We have seen that both relative tenses and shifty first person indexicals in simplex embeddings are dedicated *de se* phenomena. In relative embeddings, while first person pronouns are permitted, they must receive unshifted, *de re* readings. On the *de re* analysis, essentially the same pattern holds of embedded tenses. The overall generalization is thus:

(50) *Relative embedding generalization*

Tenses and indexical pronouns in relative embeddings cannot be read *de se*.

By contrast, on an SOT analysis, a *de se* semantics for embedded tense would remain in place across both types of complements; the semantics of embedded tense is simply obscured, in relative complements only, by LF deletion or uninterpreted morphological past tense.

A second advantage to the *de re* view concerns the way the facts relate to previous discoveries about embedded tense and language variation. A standard assumption holds that sequence of tense phenomena are either available or unavailable for complement clauses on a language-wide basis, in keeping with a ‘Sequence of Tense Parameter’ (Grønn and von Stechow 2010; Zagona 2014; Sharvit 2014; Bochnak et al. to appear, i.a.). In the languages with SOT, it is not constrained only to certain types of complements – as one would need to posit for Nez Perce – but rather holds for all complements in which tense marking is possible. The unavailability of simultaneous readings for past-under-past in simplex embeddings suggests that Nez Perce is a [-SOT] language. As many have noted, simultaneous readings of past-under-past may nevertheless be possible in [-SOT] languages with the help of mechanisms for *de re* interpretation (Grønn and von Stechow 2010; Ogihara and Sharvit 2012; Cable 2015; Bochnak et al. to appear). Deriving the behavior of Nez Perce embedded tenses in simplex and relative embeddings requires two types of constraints on *de re* tense interpretation, both of which have been independently proposed for other languages. First, for simplex embeddings, *de re* readings must be ruled out. This is in line with treatments of embedded tense in Japanese (e.g., Ogihara and Sharvit 2012). Second, for relative embeddings, (free) *de re* readings must be required. This is in line with Cable’s (2015) treatment of embedded tenses in Gĩkũyũ, Chishona, Luganda, and South Baffin Inuktitut. (I return to the question of how these requirements may be enforced in the next sections.) Overall, then, an analysis of relative complement tense as obligatory *de re* tense preserves standard notions of an SOT parameter while building on previous proposals concerning limitations and requirements of *de re* status for tense.

Empirical support for the idea that relative complements feature obligatorily *de re* readings of tense, as opposed to an SOT rule, comes from complex embedding structures featuring future (or more properly, in Nez Perce, prospective aspect) under past tense. In an SOT language, such as English, such structures allow embedded clauses describing (potential) future events or states to surface with past tense. This is the case for the bolded verb forms in (51).

- (51) a. John decided a week ago that in ten days at breakfast he would say to his mother that they **were** having their last meal together. (Abusch, 1988, 1997)  
b. A week ago he said that in ten days he would buy a fish that **was** still alive. (von Stechow 1995; Ogihara 1996)

Because the most embedded clauses in these examples do not describe past events, their past marking must be attributed to a SOT rule, rather than to a *de re* reading of past tense (Abusch 1997; see discussion in Sharvit 2018). In a language which uses only *de re* mechanisms to derive simultaneous readings of past-under-past, we expect that clauses that describe only (potential) future eventualities should not be able to host past morphology. Ojihara and Sharvit (2012) and Sharvit (2018) show that this prediction is borne out for Hebrew. Examples (52) and (53) show that it is borne out in Nez Perce relative complements as well. Example (52), like Abusch’s “breakfast” example in (51a), features three levels of clausal embedding; the matrix clause bears a past tense and the most embedded clause describes a (possible) future state. Unlike in English, past tense cannot be used in the most embedded clause. Instead, present is used (as the most embedded clause receives a simultaneous reading with respect to the simplex attitude clause that immediately embeds it.)

- (52) Context: Tommy is a little kid who loves bouncy castles, the kind only little kids can jump on. Right now he’s small enough for that, but he’s afraid that he will grow and next year he will be too big.

Watiisx Tommy hi-tim’neenek-sa-qa [ yo̘ ke naaqc taayam *pro*  
 1.day.away Tommy 3SUBJ-worry-IMPERF-REC.PAST [ RP.NOM C one summer 3PL  
 hi-pa-a-no’qa, [ tamawin himeeq’is ’ee ✓ wees / ✗ weeke ]].  
 3SUBJ-S.PL-say-MODAL [ too big 2SG.CLITIC be.PRES / be.PAST ]]  
 Yesterday Tommy was worrying that next summer they would tell him he was too big.

Example (53), modeled on the Ojihara/von Stechow “live fish” example in (51b), features a relative clause in a future (properly: prospective aspect) clause under a past tense matrix clause. Again, in English, the tense in the relative clause can be past even though the relative clause eventuality is located entirely in the (possible) future; this is not possible in Nez Perce. Instead, prospective aspect must be used. (Note that Nez Perce prospective aspect, unlike the English future, does not shift the evaluation time of present tense in relative clauses. See fn 14.)

- (53) *pro* hi-tmiiipni-sa-qa [ yo̘ ke watiisx *pro*  
 3SG 3SUBJ-remember-IMPERF-REC.PAST [ RP.NOM C 1.day.away 3SG  
 hi-nee-sepex-nu’ mamayas-na naaqc naco̘̘ [ *RelClause* yo̘<sub>3</sub> ke t<sub>3</sub>  
 3SUBJ-O.PL-show-PROSP children-ACC one salmon [ RP.NOM C  
 ✓hi-wek-u’ / ✗ hi-weeke waaq’is ] ]  
 3SUBJ-be-PROSP / 3SUBJ-be.PAST alive ] ]  
 He remembered that tomorrow he would show the kids a fish that was (still) alive.

I conclude that tense in relative complements in Nez Perce must be read *de re*.

### 3.3 *The intermediate status of locative indexical shift in relative embedding*

We come now to the third and final difference between relative embedding and simplex embedding, which concerns locative indexical shift. We saw in (21) that locative indexical shift is not a dedicated *de se* phenomenon in Nez Perce. Accordingly, if the main restriction on relative embedding is simply that dedicated *de se* devices are unavailable, we might expect locative shift to

remain possible in relative embedding. We have also seen, however, that locative shift in simplex embedding is only available in cases in which first person also shifts. Given that first person cannot shift in relative embedding, we might expect locative shift to be impossible in relative embedding. The facts are that locative shift has an intermediate status in relative embedding: speakers accept shifty readings of locative indexicals in relative complements about half the time.

- (54) % 'Inlawtiwaa hi-llooy-ca- $\emptyset$  DC-pa [ yo $\hat{x}$  ke Obama kine  
my.friend 3SUBJ-be.happy-IMPERF-PRES DC-in [ RP.NOM C Obama here  
hi-tew'ye-ce- $\emptyset$  ]  
3SUBJ-live-IMPERF-PRES ]  
My friend in DC<sub>i</sub> is happy that Obama lives here<sub>i</sub>. [elicited in Idaho]

I will model this variation by assuming that speakers internally represent two grammars (Yang, 2000, 2004), one of which allows locative shift in relative embedding and one of which does not.

#### 4 Simplex embeddings as centered attitude reports

An account of the three differences just reviewed requires three parts: first, an account of the behavior of shifty first person indexicals, relative tense, and shifty locative indexicals in simplex embedding; second, an account of the Relative Embedding Generalization, repeated below; and third, an account for the mixed behavior of shifty locative indexicals in relative embedding.

(55) *Relative embedding generalization*

Tenses and indexical pronouns in relative embeddings cannot be read *de se*.

Let us begin with an overview of the relevant factors relating to indexical shift in simplex embedding, following previous work (Deal, 2014, 2017b, 2019c). A first assumption – necessary on any approach to embedded tense or indexical shift, given the *de se* data reviewed in section 2 – is that simplex embedding verbs feature centered quantification. Thus, to a first pass, the simplex embedding verb *neki* ‘think’ may be treated semantically exactly as in (1):

- (56)  $\llbracket neki \text{ ‘think’ } \rrbracket^{c,i} = \lambda P_{\langle e \times i \times s, t \rangle} . \lambda e . \lambda x . \forall \langle y, t', w' \rangle \in DOX(x, \tau(e), w_i) : P(\langle y, t', w' \rangle) = 1$   
Where  $\langle y, t', w' \rangle \in DOX(x, t, w)$  iff  $x$  believes in  $w$  at  $t$  that she might be  $y$  in  $w'$  at  $t'$ .  
(v. 1)

This denotation is given relative to a context and an index (though it depends only on the latter). For present purposes, I assume that contexts and indices are tuples  $\langle y, l, t, w \rangle$ , where  $y$  is an individual,  $l$  a location,  $t$  a time, and  $w$  a world.<sup>20</sup> No constraint is imposed that  $x$  speaks or otherwise holds an attitude at  $l$  at  $t$  in  $w$  (i.e. ‘improper contexts’ are allowed). The formally identical treatment of indices and contexts follows von Stechow (2003), von Stechow and Zimmermann (2005), and Anand (2006). I will represent tuples of this form as being of type  $\kappa$ .

Given this setup, the quantification expressed by the attitude verb is very similar to full quantification over indices (or, for that matter, contexts). The parallel becomes exact if we allow the *de se* perspective encoded by the attitude verb to extend to locations as well as individuals and times:

<sup>20</sup>As above, I ignore second person; see Deal (2019c) for a fuller treatment.

- (57)  $\llbracket neki \text{ 'think'} \rrbracket^{c,i} = \lambda P_{\langle \kappa, t \rangle}. \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : P(\langle y, l, t', w' \rangle) = 1$   
 Where  $\langle y, l, t', w' \rangle \in DOX(x, t, w)$  iff  $x$  thinks in  $w$  at  $t$  that she might be  $y$  in  $w'$  at  $t'$  at  $l$ .  
 (v. 2)

An advantage of the proposal in (57) is that a very simple composition rule can be stated that allows the verb to compose with its clausal complement by means of abstraction over indices:<sup>21</sup>

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

One consequence of this setup is that any individual or temporal value drawn from the index within the scope of the attitude verb will be a *de se* value.<sup>22</sup>

To capture indexical shift, I begin with the standard Kaplanian assumption that indexicals express functions on context:

- (59) For any index or context  $\langle y, l, t, w \rangle$ , let  $auth_{\langle y, l, t, w \rangle} = y$  and  $loc_{\langle y, l, t, w \rangle} = l$   
 a.  $\llbracket 1SG \rrbracket^{c,i} = auth_c$   
 b.  $\llbracket kine \text{ 'here'} \rrbracket^{c,i} = loc_c$

To handle shiftiness, I assume (following the argumentation in Deal 2014, 2017b, 2019c) that the Nez Perce lexicon contains two shifty operators, i.e. operators that modify the context of interpretation relative to which their complement is interpreted (Anand and Nevins, 2004). A semantics for the two operators is given syncategorematically in (60).<sup>23 24</sup>

- (60) a.  $\llbracket OP_{auth} \alpha \rrbracket^{c,i} = \llbracket \alpha \rrbracket^{c^{auth_i/auth}, i}$   
 b.  $\llbracket OP_{LOC} \alpha \rrbracket^{c,i} = \lambda e. \llbracket \alpha \rrbracket^{c^{LOC(e)/loc}, i}(e)$

Both of these operators effect a contextual modification by overwriting a contextual coordinate. However, the details of this overwriting differ in two ways. First, the two operators modify separate coordinates of a contextual tuple  $\langle y, l, t, w \rangle$ :  $OP_{auth}$  modifies the individual coordinate, which is referenced by first person indexicals, and  $OP_{LOC}$  modifies the location coordinate, which

<sup>21</sup>This is a technical convenience. Since there are no dedicated *de se* locative devices in Nez Perce, an alternative, equally empirically adequate possibility would involve adopting the verb semantics in (56) and modifying the composition rule to ignore locatives. And of course it is equally possible, given either (56) or (57), to handle abstraction via syntactically represented  $\lambda$  operators.

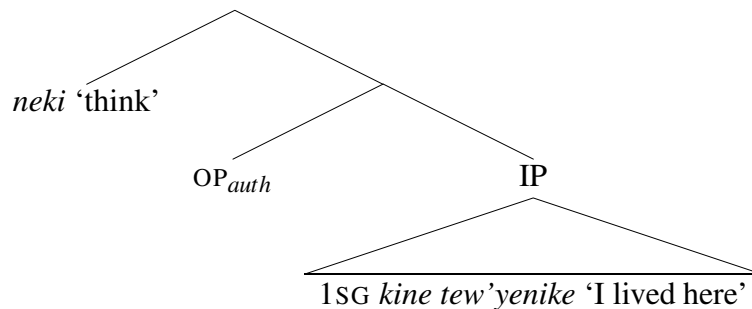
<sup>22</sup>For one potential caveat, see the discussion of bound *de re* below (68).

<sup>23</sup>Notation for context modification here is straightforwardly carried over from standard applications: Let  $c^{Val/Coord}$  be that context  $c'$  that is like exactly like  $c$  with the possible exception of the fact that  $Coord_{c'} \neq Coord_c$  (where  $Coord$  represents to some coordinate of contexts); and furthermore  $Coord_{c'} = Val$ . For a categorematic treatment of shifty operators, see Deal (2017b, 2019c).

<sup>24</sup>Deal 2014, 2019c in fact argues that Nez Perce uses an  $OP_{pers}$  operator that affects both author and addressee parameters of context. I simplify this proposal here, in keeping with the focus on first rather than second person.

is referenced by locative indexicals. Second, the information used for overwriting comes from separate sources for the two operators. For  $OP_{auth}$ , contextual information is overwritten with information from the index (as originally proposed by Anand and Nevins 2004 and Anand 2006). Syntactically, this operator attaches in the left periphery of a complement clause. It is therefore in the scope of the attitude verb, which expresses *de se* quantification over the index. In informal terms, the role of the operator is to transfer one of these *de se* values – the value which concerns individuals the attitude holder takes themselves to be – into the contextual tuple, with the result that any first person indexical in the scope of the operator ends up semantically bound by the *de se* quantification expressed by the attitude verb. This is shown for the composition of structure (61a), a small modification on (23) above.<sup>25</sup>

(61) a.



- b.  $\llbracket (61a) \rrbracket^{c,i} = \llbracket neki \rrbracket^{c,i}(\lambda i'. \llbracket OP_{auth} 1SG\ kine\ tew'yenike \rrbracket^{c,t'})$  (by CIFA)
- c.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : \llbracket OP_{auth} 1SG\ kine\ tew'yenike \rrbracket^{c, \langle y, l, t', w' \rangle}$   
 Where  $\langle y, l, t', w' \rangle \in DOX(x, t, w)$  iff  $x$  thinks in  $w$  at  $t$  that she might be  $y$  in  $w'$  at  $t'$  at  $l$ . (by lexical entry *neki*)
- d.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : \llbracket 1SG\ kine\ tew'yenike \rrbracket^{c^{y/auth}, \langle y, l, t', w' \rangle}$   
 (by lexical entry  $OP_{auth}$ )
- e.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : y$  lived at  $loc_c$  in  $w'$   
 (by remaining lexical entries)

This semantics delivers the *de se* restriction on shifty first person by using a value from the index to overwrite the context. For Nez Perce shifty locative indexicals, as we saw, there is no parallel restriction. Accordingly,  $OP_{LOC}$  effects a contextual change in a different way: it overwrites contextual information with location information drawn from the attitude predicate's event argument. Given that this argument is introduced by the attitude verb itself,  $OP_{LOC}$  must syntactically attach above the predicate for composition reasons.<sup>26</sup> In that high position, its complement provides a property of events, as required. Before turning to an example, let us recall the relationship

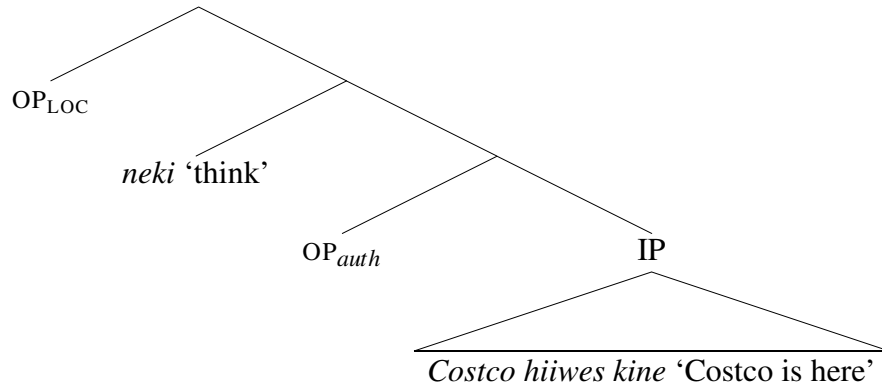
<sup>25</sup>The modification is simply that this example uses 'think' whereas (23) used 'say'. Accounting for the original example is uncomplicated and omitted here only for reasons of space. In this example I also ignore details related to the complement clause predicate, such as embedded tense, as well as complications related to *de re* readings, in this case for the embedded unshifted locative expression.

<sup>26</sup>This is a simplification of the proposal in Deal (2017b, 2019c). That work adopts a proposal from Anand and Hacquard (2008a) (closely related to proposals by Kratzer 2006 and Moulton 2015), according to which modal quantification is contributed compositionally by the finite  $C^0$  (not the attitude verb itself). The finite  $C^0$  also introduces an event argument; the role of lexical attitude verbs is to modify this event argument with information specific to the particular type of attitude

among locative shift and person shift discussed above in connection with (23) and (24). As we saw there, in simplex embedding, locative indexicals may shift only if their clausemate person indexicals shift as well. Deal (2014, 2017b, 2019c) proposes to account for this restriction syntactically, by reference to the notion of a functional sequence (Zamparelli 1995, Rizzi 1997, Cinque 1999, i.a.). The core idea is that  $OP_{LOC}$  attaches higher than  $OP_{auth}$  when both are present; the two form a sequence of operators  $OP_{LOC} > OP_{auth}$ . This sequence may be fully instantiated in a syntactic structure, meaning both operators are present; it may be fully absent, meaning no operators are present; or it may be partially instantiated. When a functional sequence is partially instantiated, elements higher in the sequence may be present only if those lower in the sequence are present as well. Thus the presence of  $OP_{LOC}$  syntactically requires the presence of  $OP_{auth}$ . Looking at data from a range of languages, Deal (2017b, 2019c) extends this proposal beyond person and locative indexicals, and argues that it yields superior empirical coverage compared to a purely semantic alternative – e.g. one that accounts for the relation between person shift and locative shift by giving locatives meanings comparable to *the location of auth<sub>c</sub>* (e.g. as in Harbour 2016). Here, we will see an additional reason to prefer the syntactic account when we turn to the behavior of locative indexicals in relative embedding (where, recall, person shift is impossible, but locative shift is sometimes possible – directly in contrast to the pattern in simplex embedding).

A consequence of this proposal is that an example like (21) must be analyzed as involving both a locative shifter and an author shifter – though the latter will be vacuous here, given that no first person element is present in the embedded clause.

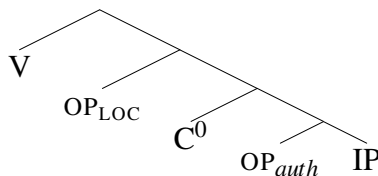
(62) a.



- b.  $\llbracket (62a) \rrbracket^{c,i} = \lambda e. \llbracket neki Costco hiiwes kine \rrbracket^{c^{LOC(e)/loc},i}(e)$  (by lexical entry  $OP_{loc}$ )  
 c.  $= \lambda e. [\lambda e'. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e'), w_i) : \llbracket OP_{auth} Costco hiiwes kine \rrbracket^{c^{LOC(e)/loc}, \langle y, l, t', w' \rangle}](e)$  (by lexical entry *neki*, CIFA)

(e.g. thinking, speaking). In this system, the two attachment sites of shifty operators are above and below  $C^0$ , not the lexical verb; all attachment sites for shifty operators are within the verb's complement clause, as in (i). As in the simplified version presented here,  $OP_{LOC}$  attaches outside the scope of centered modal quantification (above  $C^0$ ) and  $OP_{auth}$  attaches inside it (below  $C^0$ ).

(i)





- d.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : \llbracket OP_{auth} Costco hiiwes kine \rrbracket^{c^{LOC(e)/loc}, \langle y, l, t', w' \rangle}$   
( $\beta$ -reduction)
- e.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : \llbracket Costco hiiwes kine \rrbracket^{c^{y/auth, LOC(e)/loc}, \langle y, l, t', w' \rangle}$   
(by lexical entry  $OP_{auth}$ )
- f.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : Costco \text{ is at } LOC(e) \text{ in } w'$   
(by remaining lexical entries)

This system delivers the desired result that the locative indexical has a shifted value but that this value is not subject to a *de se* requirement. Rather, the locative indexical is both shifted and *de re*.

Let us now briefly review the ways that this system captures the six generalizations about indexical shift reviewed in section 2.2. First, it captures both shift of first person pronouns (regardless of their morphosyntactic form) and shift of locative indexicals, by allowing both the author and location coordinates of the context to be shifted by shifty operators. Second, it does so in a way that respects the syntactic permeability of clauses that host indexical shift; one would not expect shifty operators (unlike true quotation operators) to interfere with A' movement. Third, the Shift Together effect is captured in virtue of the fact that the account involves overwriting of contextual parameters. If an  $OP_{auth}$  is present on a clause edge, all first person pronouns must shift; there is no optionality on a pronoun-by-pronoun basis. Fourth, it captures the *de se* requirement on shifty first person but not on shifty locative, as discussed in the preceding paragraphs. Fifth, it captures the optionality of shift by reference to syntactic optionality of shifty operators, and it captures the relationship between first person shift and locative shift by reference to the functional sequence the operators form. And sixth, it captures the fact that shift is possible for all simplex embedding verbs by reference to the idea that shifty operators are part of the functional sequence characteristic of a certain class of complement clauses – one shared across all the simplex embedding verbs, if not all attitude verbs in the language (a question we return to below).

Turning now to embedded tense, I follow a broad consensus in the literature in positing direct binding of an embedded temporal pronoun by the attitude verb (Heim 1994; von Stechow 1995; Ogihara 1996; Abusch 1997, among many others).<sup>27</sup> It should be pointed out that the overall semantics of *de se* shifty operator constructions amounts to binding of an indexical by the attitude verb, albeit in an indirect way: the attitude verb quantifies over indices, the shifty operator copies indices into contexts, and the indexical references contexts. Binding analyses dispense with the intermediate step and have tense meanings make reference to index values directly. For simplicity, I adopt a simple referential semantics for tenses, in which this index-sensitivity is foregrounded.<sup>28</sup>

$$(63) \quad a. \llbracket PRES_n \rrbracket^{c, i, g} = g(n), \text{ if } g(n) = t_i. \text{ Undefined otherwise.}$$

<sup>27</sup>That is to say, I set aside (for reasons of space) the possibility that relative tense behavior is itself a form of indexical shift (Schlenker 1999), involving a shifty temporal operator that effects a *de se* shifty semantics. Such a view would require that a temporal shifty operator be obligatory in the complements of simplex embedding verbs in Nez Perce and therefore that the shifty temporal operator be lowest in the functional sequence of operators,  $OP_{LOC} > OP_{auth} > OP_{time}$ . While I will not pursue this type of analysis here, it turns out that this proposal corresponds perfectly to Deal's (2017b, 2019c) conclusions regarding the syntax and semantics of temporal indexical shifters, reached on the basis of shift of temporal indexical adverbs in various languages.

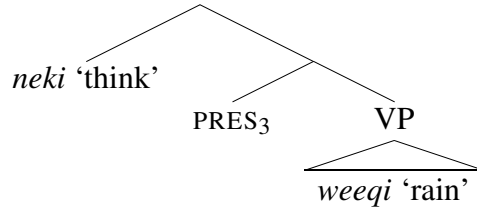
<sup>28</sup>A similar formalism can be found in Cable 2013, 2015, 2017. The main ideas here follow Abusch 1997: tense is referential and relates to 'local evaluation time'. For some recent discussion of

b.  $\llbracket \text{REC.PAST}_n \rrbracket^{c,i,g} = g(n)$ , if  $g(n)$  is shortly before  $t_i$ . Undefined otherwise.

This semantics is exemplified in (64)-(65), where embedded present tense is used to express a *de se* simultaneous reading. (I continue to abstract away from details of the embedded clause.)

(64) Meeli hi-nek-sa-qa [ *pro* hi-weeqi-se- $\emptyset$  ]  
 Mary 3SUBJ-think-IMPERF-REC.PAST [ 3SG 3SUBJ-rain-APPL-IMPERF-PRES ]  
 Mary believed it was raining.

(65) a.



b.  $\llbracket (65a) \rrbracket^{c,i,g} = \llbracket neki \rrbracket^{c,i,g} (\lambda i'. \llbracket \text{PRES}_3 weeqi \rrbracket^{c,i',g})$  (by CIFA)

c.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in \text{DOX}(x, \tau(e), w_i) : \llbracket \text{PRES}_3 weeqi \rrbracket^{c, \langle y, l, t', w' \rangle, g}$

(by lexical entry *neki*)

d.  $= \lambda e. \lambda x. \forall \langle y, l, t', w' \rangle \in \text{DOX}(x, \tau(e), w_i) : \text{it rains at } t' \text{ in } w'$

(by remaining lexical entries)

This demonstrates the desired result: the embedded present tense picks out the time at which the attitude holder self-locates.

The final piece that must be added is a requirement that embedded tenses in simplex complements not be interpreted *de re*. How such a requirement is to be implemented depends on the way in which *de re* readings are derived compositionally. Let us briefly consider potential implementations on two prominent theories. (What follows will, by necessity, be somewhat technical.) First: if *de re* readings involve *res*-movement, as commonly assumed in the tense literature (Heim 1994; Abusch 1997; Kratzer 1998; Ogihara 1999; Altshuler and Schwarzschild 2013; Cable 2015; Bochnak et al. to appear), then embedded tenses in simplex complements must be blocked from undergoing *res*-movement. *Res*-movement involves syntactic displacement of the element to be read *de re* (the *res*); this movement targets an argument position of the matrix verb, (66). A sample denotation for a *res*-movement verb is given in (67), based on Heim (1994, 155).<sup>29</sup>

(66) [VP [V<sub>de re</sub> t<sub>res</sub>] [CP I ... t<sub>1</sub> ... ]]

(67)  $\llbracket believe_{de re} \rrbracket^{c,i}(t_{res})(R_{\langle \kappa, \langle i, t \rangle \rangle})(x)(e) = 1$  iff  $\exists f[f(w_i, \tau(e)) = t_{res} \wedge \forall \langle y, l, t', w' \rangle \in \text{DOX}(x, \tau(e), w_i) : R(\langle y, l, t', w' \rangle)(f(w', t')) = 1$

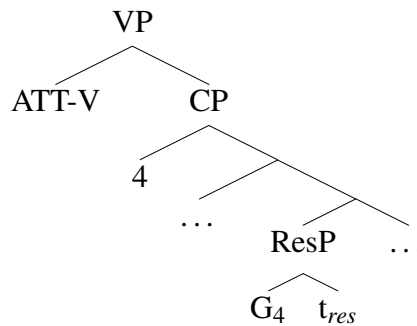
referential vs. quantificational tense theories, see Ogihara and Sharvit 2012, Sharvit 2014, and Mucha 2015. While space reasons rule out a full exposition here, suffice it to say that I believe that a quantificational semantics can also be made fully compatible with the Nez Perce data. I assume that composition of temporal variables with VPs is mediated by Asp heads (Kratzer, 1998).

<sup>29</sup>Note that Heim's formulation requires  $f$  to be provided by context, on pain of undefinedness. Here I simplify and invoke existential quantification over  $f$ .

Once *res*-moved,  $t_{res}$  is outside the scope of the attitude verb. Therefore, it cannot be bound by the temporal quantification expressed by that verb. Working in a *res*-movement theory, Ogihara and Sharvit (2012) propose to capture the absence of (or degraded status of) *de re* readings for certain embedded tenses by appeal to a pragmatic principle that prefers bound readings to *de re* readings when the two yield “practically indistinguishable interpretations.” Thus past-under-past lacks the simultaneous reading which would be obtained via *de re* interpretation of the embedded past tense because present-under-past allows for what is (practically speaking) the same interpretation to be conveyed via binding.

A second prominent compositional treatment of *de re* is the concept generator theory (Percus and Sauerland 2003; Anand 2006; Charlow and Sharvit 2014; Pearson 2015), recently applied to embedded tense by Sharvit (2018). On this view, the *res* remains in situ in the embedded clause, but it is syntactically “wrapped” in a structure that contributes a time-concept-generator variable  $G_n$ . (I follow Pearson 2015 in labeling the resulting constituent a ResP.) This variable is bound just under the attitude verb, which quantifies existentially over time concept generators (henceforth: CGs). Relative to an evaluation world  $w$  and time  $t$ , CG variables range over functions from times to times, (69); the input time will be the temporal *res* and the output will be, intuitively, the corresponding time in the attitude holder’s doxastic alternatives. (This makes this kind of function a close relative of the function  $f$  in (67). See Percus and Sauerland 2003 for discussion.)

(68)



(69)  $\llbracket G_4 \rrbracket^{c,i,g} = g(4)(\langle w_i, t_i \rangle)$ ;  $\llbracket G_4 \rrbracket^{c,i,g} \in D_{\langle i,i \rangle}$

(70)  $\llbracket believe_{de\ re} \rrbracket^{c,i,g}(P_{\langle \kappa, \langle \langle i,i \rangle, t \rangle \rangle})(x)(e) = 1$  iff  $\exists G[G$  is suitable for  $x$  at  $w_i, \tau(e)$  and  $\forall \langle y, l, t', w' \rangle \in DOX(x, \tau(e), w_i) : P(\langle y, l, t', w' \rangle)(G) = 1$

(71) A concept generator  $G$  is suitable for  $x$  at  $w, t$  iff for all  $t'$  in the domain of  $G$ :<sup>30</sup>

- a.  $G(\langle w, t \rangle)(t') = t'$
- b.  $\lambda \langle w'', t'' \rangle . G(\langle w'', t'' \rangle)(t')$  corresponds to an acquaintance-based description that an attitude holder can use to describe a time to himself.

A consequence of this setup is that a (temporal) variable may be *both* bound within the embedded clause (e.g.  $t_{res}$  might be bound by the attitude verb) and *de re* (if CG-wrapped as in (68)). Indeed, the existence of this type of configuration is the major argument for the concept-generators approach advanced by Charlow and Sharvit (2014) and Pearson (2015). Applied to Nez Perce embedded tense, this analysis allows for a bound *de re* reading of embedded present as shown in (73) for example (72). (This reading, as we will see, will need to be ruled out.)

<sup>30</sup>This definition is adapted from Pearson (2015) and Sharvit (2018). Both authors propose additional elaborations; the reader is referred to the original works for a fuller exploration of the issues.

- (72) Meeli hi-nek-sa-qa [ *pro* hi-weeqi-se- $\emptyset$  ]  
 Mary 3SUBJ-think-IMPERF-REC.PAST [ 3SG 3SUBJ-rain-APPL-IMPERF-PRES ]  
 Mary believed it was raining.
- (73) a. Matrix VP LF: Mary believe [CP 4 [ [ResP G4 PRES3 ] rain ]  
 b.  $\llbracket \textit{believe}_{de\ re} \rrbracket^{c,i,g}(\lambda t'. \llbracket [CP\ 4\ [ [ResP\ G4\ PRES3]\ rain ] \rrbracket^{c,i',g})(\textit{Mary})(e) = 1$   
 iff  $\exists G[G \text{ is suitable for Mary at } w_i, \tau(e) \text{ and } \forall \langle y, l, t', w' \rangle \in DOX(\textit{Mary}, \tau(e), w_i) :$   
 $\llbracket [CP\ 4\ [ [ResP\ G4\ PRES3]\ rain ] \rrbracket^{c, \langle y, l, t', w' \rangle, g}(G) = 1$   
 $= 1 \text{ iff } \exists G[G \text{ is suitable for Mary at } w_i, \tau(e) \text{ and } \forall \langle y, l, t', w' \rangle \in DOX(\textit{Mary}, \tau(e), w_i) :$   
 it rains at  $G(\langle w', t' \rangle)(t')$  in  $w'$

These truth conditions are met iff there is a suitable concept generator for Mary at event time in the evaluation world such that for every index  $\langle y, l, t', w' \rangle$  compatible with her beliefs, it rains at the time that the concept generator maps  $t'$  to. Now suppose that Mary holds this belief on a Tuesday, but mistakenly believes it is Saturday. Thus at each index  $\langle y, l, t', w' \rangle$  compatible with her beliefs,  $t' = \text{Saturday}$ . But (73b) does not require that (per Mary's beliefs) it rain at  $t'$  – only that it rain at the time that some suitable concept generator maps  $t'$  to. This type of difference is useful in familiar cases of *de re* reports about individuals such as Quine's example *Ralph thinks Ortcutt is a spy*. Ralph need not think to himself, "Ortcutt is a spy"; rather, he thinks to himself "The man I see over there is a spy" (for instance), and it happens that the man he sees is Ortcutt. The substitution, so to speak, is permitted because Ralph is acquainted with Ortcutt in the "man I see over there" type way.

Now note that Mary is acquainted with Tuesday, the time at which she *actually* holds this attitude, under the acquaintance-based relation corresponding to "today". Of course, she does not know that it is Tuesday that this relation acquaints her with – this is one of the things she is wrong about. Her ignorance is parallel to that of Ralph, who does not know that Ortcutt is the person he sees. Suppose, then, that Mary thinks it was raining on Tuesday. (In particular, she thinks to herself, "It's not raining today, but it was raining on Tuesday." In much the same way, Ralph might think to himself, "Ortcutt is not a spy, but the man I see over there is.") In this case, the "today" relation – more precisely, a relation that maps  $t'$  to the concept associated with the description "today" – provides us with a suitable concept generator to witness the existential quantifier in (73), despite the fact that Mary's attitude is not temporally *de se*. But this "relative *de re*" interpretation not a possible reading of embedded present tense in Nez Perce, as (37) and (38) show.

These considerations show that the concept generator view of *de re* must also be supplemented with a restriction on the application of *de re* mechanisms to embedded tense in simplex attitude reports. A preference for variable binding is not enough to rule out *de re* interpretations on the concept generator theory. Perhaps the most straightforward restriction adequate for simple cases would require that embedded tenses in simplex attitude reports not be wrapped in ResP structures. The same goes, it should be noted, for shifted first person indexicals.

In considering the choice between the *res* movement account and the concept generator account, I will note, first, that recent work has argued that both types of options may indeed be possible, even within the same language (Deal 2018a; for an earlier suggestion that *de re* readings involve multiple compositional pathways, see Kratzer 1998). Deal (2018a) suggests that *res*-movement is limited by syntactic principles: it occurs in cases where movement obeys standard syntactic constraints, but not in cases where syntactic constraints would be violated. In this

connection it should be noted that *res*-movement of an embedded tense is movement of a syntactic head across a number of intervening heads, in violation of the Head Movement Constraint (Travis, 1984). This might be taken to favor the concept generator theory of temporal *de re*. Moving forward, when the composition of *de re* reports is at issue, I will therefore assume a concept generator approach. However, given the complexity of the concept generator approach, the reader is advised that I will largely refrain from implementing a proper semantics for attitudes *de re* in the remainder of the discussion.

## 5 Relative embeddings as uncentered attitude reports

We now have the first of our three desiderata: an account of shifty indexicals and relative tense in simplex embeddings. We are thus in a position to ask: Why should relative embeddings be different? Why is it that the dedicated *de se* devices available in simplex embedding (viz. shifty first person pronouns and relative tenses) should be unavailable in relative embedding? Why should tenses and pronouns in relative embeddings resist interpretation *de se* (the Relative Embedding Generalization)?

The possibility of bound *de re* raised by the concept generator approach makes one aspect of the answer clear. The type of *de re* reading that indexicals and tenses receive in relative embeddings is not merely what we would get if we implemented some kind of principle that forced shifty indexicals and tenses in relative complements to be read *de re* while otherwise carrying over everything else from the semantics and syntax of simplex embedding. If, for instance, some principle forced indexicals and tenses to occur in ResP structures in relative embeddings, what we would derive would be bound *de re* readings. On an intuitive level, this would mean that first person indexicals would still appear shifty, and tenses would still appear relative – the only difference would be that there would be no restriction to *de se* interpretations. This is not the pattern that relative embeddings show. In relative embeddings, tenses and first person pronouns cannot be bound by the attitude verb at all, whether or not they are also read *de re*.

I aim to show that this restriction is accounted for most straightforwardly via a theory that departs from Uniformity: binding is impossible in relative embeddings simply because relative embedding verbs do not express centered modal quantification. Relative embedding reports are uncentered attitude reports. We saw in (3) and (4) above how this type of proposal might be implemented for simple doxastic verbs like ‘believe’. Relative complement verbs like *lilooy* ‘be happy’, of course, have a slightly richer semantics. The proposal to be given in (74) for *lilooy* ‘be happy’ follows Heim’s (1992) analysis of English *be glad* (which is also an uncentered analysis). As Heim puts it, “*John is glad you are gone* means ‘John thinks that because you are gone he is in a more desirable world than he would be in if you were not gone’” (p 205). Two central ideas of this analysis are (i) ranking of worlds in terms of desirability and (ii) counterfactual conditionality. In (74), while I follow Heim’s treatment of (i), I have simplified matters related to (ii), due to their considerable complexity. As above, I have added an event argument. I also temporarily set aside questions about factivity.

$$(74) \llbracket \textit{lilooy} \textit{ ‘be happy’} \rrbracket^{c,i} = \lambda p_{(s,t)}. \lambda e. \lambda x. \forall w' \in \text{DOX}^h(x, \tau(e), w_i) : p(w') = 1 \wedge w' \text{ is more desirable to } x \text{ at } \tau(e) \text{ in } w_i \text{ than is any of the nearest } \neg p \text{ worlds}$$

Observe that this proposal is a variant of (3) above, where  $\text{DOX}^h$  is a Hintikka-style doxastic alternativeness relation that returns a set of worlds. This is a relatively arbitrary choice, as a proposal

along the lines of (4) (where the doxastic alternativeness relation returns a set of individual-world-time tuples, but individual and time coordinates are subsequently ignored) could also be adopted here. This, like (74), would be an analysis that violates Uniformity, since the complement clause provides only a set of worlds, not a set of centered tuples.

What do we expect for pronouns and tenses in the complement of a verb like (74)? Let us consider tenses first. A tense is sensitive to local evaluation time. Given (74), *lilooy* ‘be happy’ does not manipulate local evaluation time. Accordingly, a present tense in the complement of this verb is not expected to pick out the “internal now” of the attitude report, unlike in simplex embedding ((64), (65)). Suppose we are interested in a *lilooy* clause that is not further embedded. Our semantics for tense, (63), does not shift evaluation time; neither does *lilooy*. The present tense will thus have to pick out our starting evaluation time. This, I assume, is equivalent to the time of utterance,  $t_c$ , adopting a definition of truth at a context (and assignment) that follows Kaplan’s (1989, p 547):

(75) A sentence  $\alpha$  is true at a context  $c$  and assignment  $g$  iff  $\llbracket \alpha \rrbracket^{c,c,g} = 1$

This leads to two potential problems. One is what von Stechow (1995) calls *Abusch’s Constraint*: “in complements of attitudes, we can never have a “referential” tense, i.e., an absolute or anaphorical tense.” von Stechow makes two key remarks about this proposal. First, ideally, a way to derive this constraint would be by appeal to a broader principle that rules out direct reference in attitude reports for all kinds of expressions, not just tenses. Second, a way to avoid violation of the Constraint is to impose a *de re* reading. On a concept generators view of *de re*, the expectation is thus that any tense occurring in the direct complement of *lilooy* will have to occur in a ResP structure. This is the only way to avoid a violation of the overall prohibition of direct reference from within attitude reports.

The second potential problem concerns the Upper Limit Constraint (ULC; Abusch 1997). Suppose the *lilooy* clause is remote past tense whereas its complement is recent tense. The embedded tense, as we just saw, must be read *de re*. This raises a problem, given the need for a relation between the attitude holder and the *res* time which is acquaintance-based. One can be acquainted with times in the past, or the time of the present, in ways that one cannot be acquainted with the future.<sup>31</sup> Accordingly, there is no simple *de re* reading of recent past tense embedded under remote past tense under *lilooy*, as the *res* time must be in the future of the attitude time:

(76) # Waqiipa *pro* hi-llooy-ca-na [ yo $\hat{x}$  ke weet’u picpic  
 while.back 3SG 3SUBJ-be.happy-IMPERF-REC.PAST [ RP.NOM C NEG cat.NOM  
 hi-wii-ca-qa ]  
 3SUBJ-cry-IMPERF-REC.PAST ]  
 Literally: A while back she was happy that the cat wasn’t crying.

Here a relative recent past reading cannot be derived, given (74), and a *de re* reading violates the ULC.

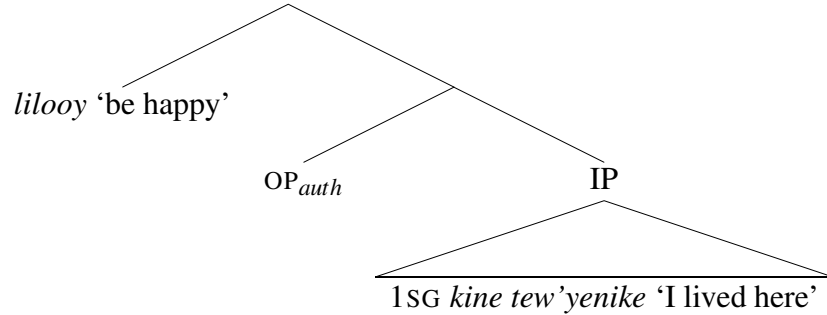
Turning to licit cases of past tense under past tense in a relative embedding complement, the embedded past tense must denote a time before  $t_c$  and must be read *de re*. If the ULC arises from

<sup>31</sup>This basic intuition about the source of the ULC is discussed by Abusch (1997) and taken up by Anand and Hacquard (2008b).

constraints on acquaintance relations, the limitation we expect here is that this tense cannot denote a time later than the attitude time.<sup>32</sup> The open options, then, are that this time denotes a time simultaneous with the attitude time, or a time before the attitude time. This correctly predicts the facts we saw in section 5.

Turning now to first persons, one consequence of the uncentered semantics in (74) is that no special syntactic ban on the shifty operator  $OP_{auth}$  needs to be put in place:  $OP_{auth}$  could be present, or absent, with no effect on the interpretation of embedded pronouns. To see this, consider a variant on (61) with relative embedding verb *lilooy* ‘be happy’ instead of simplex embedding verb *neki* ‘think’. As line (c) shows, the effect of  $OP_{auth}$  is to overwrite the context’s author coordinate with the corresponding coordinate of the index. Since this structure features no modification of this index coordinate whatsoever, and the starting value for the index is the same as the context, by (75), this has the effect of overwriting a value with itself. This captures the desired results for relative embedding: the embedded indexical does not shift, *even if*  $OP_{auth}$  is present.

(77) a.



- b.  $\llbracket (77a) \rrbracket^{c,i} = \lambda e. \lambda x. \forall w' \in DOX^h(x, \tau(e), w_i) : \llbracket OP_{auth} \text{ 1SG kine tew'yenike} \rrbracket^{c,i^{w'/w}} \wedge w' \text{ is more desirable to } x \text{ at } \tau(e) \text{ in } w_i \text{ than is any of the nearest } \neg \llbracket OP_{auth} \text{ 1SG kine tew'yenike} \rrbracket^{c,i^{w'/w}} \text{ worlds}$  (by lexical entry *lilooy* and IFA)
- c.  $\llbracket OP_{auth} \text{ 1SG kine tew'yenike} \rrbracket^{c,i^{w'/w}} = \llbracket \text{1SG kine tew'yenike} \rrbracket^{c,auth_i/auth,i^{w'/w}} = auth_c \text{ lived at } loc_c \text{ in } w'$  (by lexical entry  $OP_{auth}$  and (75))
- d.  $\llbracket (77a) \rrbracket^{c,i} = \lambda e. \lambda x. \forall w' \in DOX^h(x, \tau(e), w_i) : auth_c \text{ lived at } loc_c \text{ in } w' \wedge w' \text{ is more desirable to } x \text{ at } \tau(e) \text{ in } w_i \text{ than is any of the nearest worlds in which } auth_c \text{ did not live at } loc_c.$  (by lines b and c)

The semantics in (77d) predicts that simple affirmative sentences containing the VP in (77a) will be true just in case the attitude holder believes that the speaker ( $auth_c$ ) lived at the utterance location ( $loc_c$ ) and considers that state of affairs preferable to one in which the speaker did not live at the utterance location. The reader can verify that exactly the same semantics will obtain in a case where  $OP_{auth}$  is absent. Now, one might wonder whether this state of affairs could, after all, give

<sup>32</sup>It should be noted that standard formulations of the ULC state this restriction with respect to the ‘internal now’ of the attitude, not the actual attitude time itself. Where these two times are distinct, it seems to me most plausible that an attitude holder is only barred from being acquainted with times after their actual attitude time; they may well be acquainted with times after the time at which they self-locate (e.g. someone living in 2019 but believing it is 1850 is acquainted with times in 2019, whether or not they would acknowledge as much). For discussion of the nature of the ULC, its origin, and potential exceptions, see Abusch (1997); Klecha (2016); Sharvit (2018).

rise to a situation in which  $OP_{auth}$  is banned from relative complements – not as a *sui generis* syntactic restriction, but in virtue of some principle like (78):

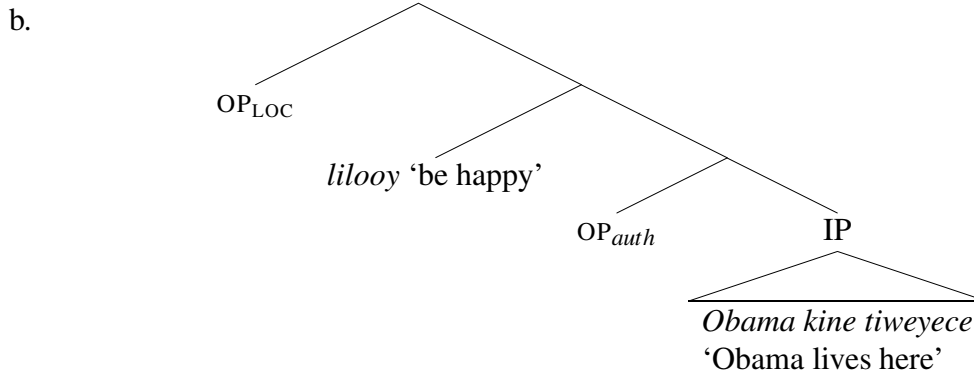
(78) No Vacuous Operators!

Where  $[OP \alpha]$  is semantically equivalent to  $[\alpha]$ ,  $*[OP \alpha]$ .

We return to this idea just below.

Our final desideratum is an account for the intermediate status of locative shifting in relative embedding. As we have seen, locative indexical shift presents an immediate difference from first person shift and embedded tense: shifty locative indexicals need not be read *de se*. In section 4, this fact was captured with the help of a locative shifty operator that overwrites the contextual location value with the attitude location, *de re*. Could such an operator attach in a relative complement? The semantics certainly presents no obstacle: states of being happy, for instance, have locations just as events of thinking do. In terms of the syntax, we have assumed throughout that the presence of  $OP_{LOC}$  requires the presence of  $OP_{auth}$ . Accordingly, so long as  $OP_{auth}$  is possible – that is, no principle like (78) is in place – then  $OP_{LOC}$  should be syntactically possible as well. For the grammar which allows a shifty locative reading in (54), repeated below in (79a), we therefore posit a VP LF as in (79b), yielding the semantics in (79c):

- (79) a. % 'Inlawtiwaa hi-lloy-ca- $\emptyset$  DC-pa [ yo $\hat{x}$  ke Obama kine  
 my.friend 3SUBJ-be.happy-IMPERF-PRES DC-in [ RP.NOM C Obama here  
 hi-tew'ye-ce- $\emptyset$  ]  
 3SUBJ-live-IMPERF-PRES ]  
 My friend in  $DC_i$  is happy that Obama lives here<sub>i</sub>. [elicited in Idaho]



- c.  $\llbracket(79b)\rrbracket^{c,i} = \lambda e. \lambda x. \forall w' \in DOX^h(x, \tau(e), w_i) : \text{Obama lives at } LOC(e) \text{ in } w' \wedge w' \text{ is more desirable to } x \text{ at } \tau(e) \text{ in } w_i \text{ than is any of the nearest worlds in which Obama does not live at } LOC(e).$

We derive the desired result for (79a): my friend, located in DC, believes Obama lives at his location, and prefers that state of affairs to one in which Obama lives elsewhere.

It remains to explain the grammar that rules out (79a), allowing only unshifty readings for locative indexicals. Note that this grammar is one that entirely forbids indexical shift in relative embeddings. For person indexicals, as we saw, shift may be ruled out without any ban on the shifty operator  $OP_{auth}$ . Things are different for locative indexicals, as (79) shows: if the shifty operator is present, then locative indexicals do indeed shift. Ruling out locative indexical shift requires ruling out the shifty operator. I would like to suggest that the reason for such a restriction traces back



to a potential ban on vacuous operators, (78). Suppose that the two grammars of Nez Perce are distinguished by whether or not they adopt (78). The grammar that does not adopt it will allow the vacuous  $OP_{auth}$  operator in (79) and therefore allow  $OP_{LOC}$  to be projected. But the grammar that does adopt (78) will not allow  $OP_{auth}$  to be projected at all in relative complements. Given that the syntactic presence of  $OP_{LOC}$  depends on the presence of  $OP_{auth}$ , this means that  $OP_{LOC}$  will not be possible. The result is that all indexical shift, both person and locative, will be ruled out in this second type of grammar.

A closing comment on the uncentered analysis of relative complements concerns their morphology. On this analysis, there is a certain abstract similarity between relative complements and true relative clauses: both express simplex properties, albeit of different sorts of objects (worlds vs. individuals). This contrasts with simplex complement clauses, which express more complex properties – or alternatively, properties of more complex model-theoretic objects. A potential generalization, to be subject to crosslinguistic investigation, is that full abstraction over centered propositions is always grammatically unmarked, handled by a semantic rule (*viz* CIFA), whereas “incomplete” abstract – just over individuals, or just over worlds, or just over times – must be grammatically marked in some way, derived by syntactically-represented means. In a related vein, one might further speculate that the similarity of marking between relative clauses and relative complements in Nez Perce arises because both feature an operator moving to the clause edge, creating a simplex abstraction. In the case of relative clauses, this operator leaves a type  $e$  trace, and abstracts over individuals; in the case of relative complements, it leaves a type  $s$  trace, and abstracts over worlds. Confirmation of this style of analysis would furnish a new type of argument for a representation of world arguments in the syntax.

## 6 Alternatives

We have seen how departing from Uniformity, and treating relative embedding reports as uncentered attitude reports, allows for the behavior of embedded indexicals and tenses to be captured. Let us now consider two types of Uniformity-preserving alternative analyses.

A first alternative is a syntactic approach: relative embedding verbs express centered modal quantification, like their simplex embedding counterparts do, but there is some reason why first person pronouns and tenses cannot be bound by this quantification in relative embeddings. For first persons, such a restriction could be accomplished by a ban on  $OP_{auth}$  operators in relative embedding clauses. (This is not a ban that could follow from (78), note;  $OP_{auth}$ , if present in this scenario, would not be vacuous.) This type of ban faces an immediate challenge in accounting for why locative indexical shift is not entirely ruled out in relative embeddings. As we saw in section 2.2, simplex embedding clauses in which person indexicals do not shift do not allow locative indexicals to shift (see (24)). This was accounted for in section 4 by a syntactic proposal, maintained throughout the discussion above:  $OP_{LOC}$  may only be present if  $OP_{auth}$  also is. This leads us to expect that relative embeddings, in which first persons do not shift, should also entirely disallow locative shift. But this is not the case. Thus, adopting a ban on  $OP_{auth}$  operators in relative embeddings requires us to find an alternative explanation for the complex interplay between embedding type, person shift, and locative shift:

## (80) Shifting possibilities by embedding type

|                           | Simplex embedding | Relative embedding |
|---------------------------|-------------------|--------------------|
| No shift                  | ✓                 | ✓                  |
| Person shift only         | ✓                 | ✗                  |
| Person and locative shift | ✓                 | ✗                  |
| Locative shift only       | ✗                 | %                  |

It is not clear what type of explanation for this pattern is available on a purely syntactic approach.

Matters are still trickier for tenses. Given that tenses are sensitive to local evaluation time (modeled as temporal information from the index), a tense that remains inside the scope of a centered attitude quantifier must always be bound by the quantifier. Ruling out the bound reading requires moving the embedded tense outside the scope of the quantifier. But this movement is not in keeping with what we expect for the syntactic behavior of tense heads (e.g., it violates the Head Movement Constraint), and furthermore, it is not clear what type of principle could be invoked to make such movement obligatory.

A final remark about a syntactic account is that it makes it a sort of accident that relative embeddings resists exactly those two behaviors that are linked to *de se*. For instance, on a theory in which syntactic principles dictate which shifty operators a clause can contain (Sundaresan 2011; Deal 2017b, 2019c), we expect that a language might contain clauses that cannot contain shifty operators alongside clauses that can. Insofar as their syntax is parallel, *de se* and non-*de se* shifty operators should behave alike in terms of these patterns. But there is no expectation that tense should follow any parallel pattern, since tenses involve binding rather than indexical shift. What we find in the Nez Perce complement type alternation analyzed here is a quite different pattern. Shifty operators show two different behaviors, depending on whether or not they invoke a *de se* semantics. And tense patterns with *de se* indexical shift.

A second alternative is a semantic account that ties the special behavior of relative embedding verbs not to uncenteredness but to factivity. Notably, other cases of “disappearing *de se* phenomena” have been noted in factive complements: for instance, in certain factive complements in Russian (Grønn and von Stechow, 2010) and Japanese (Ogihara and Sharvit, 2012), instead of a typical relative tense we find tense *de re*. Such findings might suggest a principle of one sort or another that rules out dedicated *de se* devices in factive complements purely in view of the factive inference associated with these complements. I will not attempt to formulate a principle like this, however, because in spite of this suggestive crosslinguistic pattern, I do not think its empirical prospects are very strong. For one thing, in Russian and in Japanese, relative tense is not entirely ruled out in factive complements. Russian allows (but doesn’t require) present-under-past for simultaneous readings in factives (Grønn and von Stechow, 2010); Japanese tense shows speaker variation (Ogihara and Sharvit, 2012). In Nez Perce, by contrast, relative tense is entirely unavailable in relative complements. Appealing to the crosslinguistic behavior of factives thus does not seem likely to yield a strong enough restriction for the behavior of embedded tense.

There are also challenges internal to Nez Perce. One comes from the behavior of *cuukwe* ‘know’, a simplex embedding verb. This verb shows factive behavior, as we see in (81) below. For this example, consultants were presented with a Nez Perce sentence with no English translation. (I parenthesize a translation below.) The sentence contained an attitude report in a downward entailing context. Speakers were then asked a question which probed for an inference to the complement proposition. (This methodology follows Tonhauser et al. 2013.) As (81) shows, consultants en-

dorsed the complement proposition. This pattern held constant across five *cuukwe* elicitations following this design, featuring knowledge reports embedded in yes-no questions, antecedents of conditionals, and under sentential negation. By contrast, in controls using the same methodology but the verb *neki* ‘think’, speakers did not once endorse the complement proposition.

(81) Linguist: “Suppose you overheard this:

C’alawi sepehiteemenew’heet hi-cuukwe-ce- $\emptyset$  [ ’iin  
 if teacher.NOM 3SUBJ-know-IMPERF-PRES [ 1SG.NOM  
 k’oomay-ca- $\emptyset$  ], weet’u *pro* hi-cewcew-nuu-yu’-kum *pro*  
 be.sick-IMPERF-PRES ] NEG 3SG 3SUBJ-call-APPL-FUT-CIS 1SG  
 (If the teacher knows that I am sick, she won’t call me. )  
 Would you think that person was ill?”

Consultant: “Well, I would think that person WAS ill. So he or she will not call her, if she knows.”

The same type of data points to factivity for relative embedding complements, (82). (In (82), speakers were asked both a control question (whether the husband was happy) and the target question (whether the dog went back.) This pattern is also highly replicable: it held constant across nine elicitations, featuring a range of relative embedding verbs (*lilooy* ‘be happy’, *cicwaay* ‘be surprised’, *timiipni* ‘remember’, *tim’neeneki* ‘worry, be anxious’) and a range of DE contexts.

(82) Linguist: “Suppose you overheard this:

Weet’u ’in-haama hi-llooy-ca- $\emptyset$  [ yo $\hat{x}$  ke Fido  
 NEG 1SG-husband.NOM 3SUBJ-be.happy-IMPERF-PRES [ RP.NOM C Fido.NOM  
 hi-ckiliitoq- $\emptyset$ -a ]  
 3SUBJ-go.back-P-REM.PAST ]  
 (My husband isn’t happy that Fido went back.)  
 Would you think the husband was happy?”

Consultant: “No.”

Linguist: “Would you think the dog went back?”

Consultant: “Went back, uh-huh (yes). Wherever he came from.”

Given that we find an inference to the complement out of a DE environment both for *cuukwe* ‘know’ and for relative embedding verbs such as *lilooy* ‘be happy’, a principle that ruled out *de se* devices in factive complements would be expected to treat these two kinds of verbs the same way. But this is incorrect, as we saw in section 2: *cuukwe* ‘know’ allows first person indexical shift, (25), and embeds present tense with a simultaneous reading, (30)-(31). I conclude that factivity itself is insufficient to rule out *de se* phenomena. An additional factor, correlated with complement type, is required. Uncenteredness provides this piece.<sup>33</sup>

<sup>33</sup>There are of course many proposals that seek to subdivide the class of factives, considering the inference to the complement either from English knowledge verbs (e.g. Karttunen 1971) or from English emotive factives (e.g. Gazdar 1979) less than fully reliable. As it turns out, the data that motivate both sides of this discussion can be replicated in Nez Perce – e.g. Nez Perce speakers allow the equivalent of “Don’t leave! If I find out [*cuukwe*] you left, I’ll be mad” as well as “Mary

All of this is not to say that the factivity of relative embedding verbs is a mere accident. I suggest, however, that the explanation runs in the opposite direction of the one just pursued. On the uncentered analysis, the complement of a relative embedding verb expresses a classic proposition, type  $\langle s, t \rangle$ , picking out a set of possible worlds. Note that this kind of semantic object is particularly suitable for veridical inferences, as the proposition  $p$  may be simply applied to the evaluation world,  $w_c \in p$ . Thus the denotation for *lilooy* proposed above in (74) could readily be modified to encode an inference to the complement:<sup>34</sup>

$$(83) \quad \llbracket \textit{lilooy} \rrbracket^{c,i} = \lambda p_{\langle s,t \rangle} . \lambda e . \lambda x . \boxed{p(w_c) = 1} \wedge \forall w' \in \textit{DOX}^h(x, \tau(e), w_i) : p(w') \wedge w' \text{ is more desirable to } x \text{ at } \tau(e) \text{ in } w_i \text{ than is any of the nearest } \neg p \text{ worlds}$$

By contrast, for a centered factive verb like *cuukwe* ‘know’, the complement expresses a centered proposition, type  $\langle \kappa, t \rangle$ . It would not do here to impose a requirement that the complement proposition  $p$  hold of contextual coordinates,  $\langle \textit{auth}_c, \textit{loc}_c, \textit{time}_c, w_c \rangle \in p$ . For one thing, for a past tense knowledge report such as (84), this would generate the unwanted inference that it is raining now:

$$(84) \quad \begin{array}{ll} \textit{pro} \textit{ hi-weeqi-se-ne} & \textit{met'u Meeli weet'u} \\ 3\textit{SG 3SUBJ-rain-IMPERF-REM.PAST} & \textit{but Mary NEG} \\ \textit{hi-cuukwe-ce-ne} & [ \textit{pro hi-weeqi-se-}\emptyset ] \\ 3\textit{SUBJ-know-IMPERF-REM.PAST} & [ 3\textit{SG 3SUBJ-rain-IMPERF-PRES} ] \end{array}$$

It was raining but Mary didn't know that it was raining.

Rather, computing a factive inference here requires first plugging the individual, locative, and temporal coordinates of the complement proposition with *de re* values:  $\langle A, L, T, w_c \rangle \in p$ , where  $A$ ,  $L$ , and  $T$  refer *de re* to the attitude holder, attitude location, and attitude time respectively. Perhaps the additional complexity of this route to factive attitudes helps to explain why it would be that so many factive verbs in Nez Perce are instead expressed in an uncentered way.

## 7 Conclusion

We began with a thought experiment contrasting English *believe* with a hypothetical counterpart *believe\**, the latter an uncentered attitude predicate. In this paper I have worked to make a case, if not for *believe\** itself, for its close semantic cousins. Nez Perce relative embedding verbs are verbs for which a Hintikkan semantics is not an abbreviation: only quantification over worlds, not quantification over centered worlds, is what these verbs and their complements require. Accordingly, complements to these verbs cannot host shifty first person indexicals, and do not allow for

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thought it was Sunday and was happy [*lilooy*] she could sleep in. But it was Thursday – no way could she sleep in!”. Given that both types of verbs allow us to avoid the veridical inference in at least some cases, I refrain from assigning any explanatory power to a further subdivision of verbs based on factivity-avoidance behavior.

<sup>34</sup>It of course remains to tangle with the (familiar-from-English) issues raised in the previous footnote. Furthermore, the veridical entailment must either be specially lexically marked as projective, or a general pragmatic algorithm must specify that this entailment projects (Simons, 2001; Abrusán, 2011; Anand and Hacquard, 2014).

relative readings of embedded tenses. This makes for a contrast with another set of Nez Perce verbs, which express centered quantification (like our starting semantics for *believe*). If we had devoted our attention only to this second class of verbs, we might have been lulled into accepting the view that Uniformity is indeed a semantic universal of natural language. Taking both types of attitude verbs into consideration, I have argued that departing from Uniformity offers substantial explanatory benefits. In particular, it allows us an explanation for why it should be specifically the dedicated *de se* devices which behave differently between the two classes of verbs (rather than, say, indexical shift behaving one way and embedded tense behaving another).

This conclusion opens up a new space of questions for research at the intersection of formal semantics and linguistic typology: what sorts of attitude verb meanings belong to the centered class and to the uncentered class, crosslinguistically? (Is there always some sort of correlation with factivity?) What sorts of grammatical indicators, if any, correlate with the split between centered and uncentered attitude complements across languages? (Is it always the case that uncentered complement clauses have more morphological marking than centered complement clauses do?) And what other languages might provide us with case studies in centered and uncentered attitude reports?

While I can hardly begin to scratch the surface of these questions at the present moment, I will suggest that a potential partial answer to the last question may be *Amharic* (Semitic; Ethiopia). Like Nez Perce, this language has multiple types of dedicated *de se* phenomena, as Anand 2006 has argued – in its case, shifted person indexicals and a class of logophor-like elements that Deal (2018b) calls *indexiphors*. Out of all the attitude predicates in the language, these two devices are both restricted to complements of the verb meaning ‘say’. Deal (2018b) gives this fact a syntactic implementation: both shifted indexicals and indexiphors require some type of CP-level operator (though the operator is different in the two cases) and it so happens that only ‘say’ complements can host the operators involved. Perhaps a deeper explanation is within reach here if only the verb meaning ‘say’ is a centered attitude predicate in Amharic. Indexical shifting and indexiphoric operators are both possible in the complement of this verb, as both live on the centered quantification over individuals it imposes. But other verbs do not quantify over individual centers, and therefore do not provide the semantic ingredients for shifty readings of indexicals or indexiphors. Further work is required to assess this hypothesis empirically, and in particular, to assess its interaction with Amharic embedded tense. Certainly, if this proposal is sustained, it suggests that the correlation between uncenteredness and factivity is not a crosslinguistically reliable one (as Amharic has many nonfactive attitude predicates beyond ‘say’).

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