Copy theory of movement and indexical shift in Farsi*

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Abstract

Abstract: In this paper I argue that the operator-based approach to indexical shift has over-generation problems when it is combined with the copy theory of movement (Chomsky 1993 and subsequent literature). I proceed to develop two techniques to solve the over-generation problem. One technique maintains the core tenets of operator-based account but introduces auxiliary assumptions to solve the problem. The introduced assumptions pertain to the representation of shifted indexicals, on the one hand, and a fine-grained deletion operator at the LF interface which can target individual ϕ-features, on the other. The other technique proceeds from an entirely different theoretical premise. This time the binding-based approach to indexical shift (Schlenker 1999 and subsequent work) takes the center stage. I argue that the over-generation problems can be solved within this framework by a modification of an independently needed stipulation, i.e., the SHIFT TOGETHER constraint on indexical shift (cf. Anand & Nevins 2004). According to this constraint, two indexicals that occur in the same 'minimal domain' must be evaluated with respect to the same context. The proposed modification is applied to the notion of 'minimal domain'; the idea, in a nutshell, is that if an indexical occurs in a chain, its minimal domain is determined by the occurrence of the indexical at the *head* of the chain. In other words, one side-effect of movement, on this view, is to *extend* the minimal domain of indexicals that occur in the moved constituents.

Keywords: copy theory of movement, indexical shift, Farsi

1 Introduction

'Indexical shifting' is the phenomenon whereby an occurrence of an indexical expression in indirect discourse gets its value from the *reported*, not the *actual*, context of utterance (see Deal 2017, for a recent overview and references therein). For example, consider the Farsi sentence in (1).[1]

(1) Leilā be Minā goft kudum dāneshju-t-o dus-dāra-m?
L to M told pro which student-2sg-OM love-have-1sg
Reading 1: 'Which of your students did Leila tell Mina that I love?'
Reading 2: 'Which of Mina's students did Leila$_i$ tell Mina that she$_i$ loves?'

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[1] 'OM' stands for the object marker *-ra* which in colloquial speech generally surfaces as *-o*.

In (1) there are two indexical pronouns in the scope of the speech-report predicate *goftan* (to say / tell): there is the second person pronoun in the restrictor of *kudum* (which), which surfaces as a clitic on the noun *daneshju* (student) giving rise to a possessive reading (your student), the *kudum*-phrase itself occupying the object position of the embedded complex predicate *dust dashtan* (lit. to have love), and there is the null first person pronoun which occupies the subject position of the embedded complex predicate triggering first person agreement on its light verb. As indicated, this string allows for at least two readings, depending on whether the embedded indexicals refer to the actual speaker / addressee (Reading 1) or to the reported speaker / addressee (Reading 2).[2] Importantly, 'mixed' readings are not allowed: either both indexicals 'shift' or neither do.

Overtly fronting the *kudum*-phrase in (1), as in (2) below, introduces a reading which is not available for (1). In the new reading the first person pronoun in the embedded clause shifts as before but the second person pronoun in the restrictor of *kudum* 'unshifts', i.e., refers to the actual addressee. From now on, this reading will be referred to as the unshifted reading.[3]

(2) kudum dāneshju-t-o Leilā be Minā goft __ dus-dāra-m?
Which student-2sg-OM L to M told pro __ love-have-1sg
Unshifted reading: 'Which of your students did Leila$_i$ tell Mina that she$_i$ loves?'

A proper analysis of (2) requires making specific assumptions about the syntax and semantics of movement and of indexical shifting. Building on data from Farsi, one contribution of this paper is the observation that a naïve combination of the copy theory of movement (Chomsky 1995 and much subsequent literature) with the so-called operator-based approach to indexical shifting (Anand & Nevins 2004; Anand 2006) leads to over-generation problems. In response to this observation, the second contribution of this paper is develop two techniques for solving these problems. On the one hand, I will show that if, broadly in line with certain proposals in the literature (Fox 1999; Merchant 2000), copy theory is coupled with a severely restricted deletion operation at the LF interface which can target expressions of *any size* (down to individual features) and if suitable assumptions are made to allow for the LF representation of indexical pronouns as variables in a manner compatible with indexical shifting, then one of the two over-generation problems can be solved in a principled

[2] As *goftan* is a responsive predicate, (1) also has a reading in which *goftan* embeds the *kudum* question. Interestingly, this is only possible if the embedded indexicals do *not* shift (*Leila told Mina which of your students I hate*): if there is indexical shifting, the embedded question reading is impossible (**Leila$_i$ told Mina$_j$ which of her$_j$ students she$_i$ hates*). This issue is not relevant here as we will focus exclusively on matrix questions.

[3] Reading 1 of (1), i.e., the reading in which no indexical shifts, is, naturally, still possible with (2). Some but not all speakers can access the reading of (2) that would correspond to Reading 2 of (1), i.e., the reading in which both indexicals, including the one embedded in the restrictor of *kudum* shifts. As the latter reading presumably involves reconstruction, one can account for the inter-speaker variation on the assumption that there is some pressure in this language for the scope of operators to be 'surface true'. Importantly, for those speakers who can access the reconstructed reading the following generalization holds: if the second person indexical in the restrictor of *kudum* shifts then the first person indexical in the embedded clause *must* shift as well, while the reverse does not hold. In other words, the output of reconstruction must obey SHIFT TOGETHER! as well. I will not be concerned here with the significance of this observation *vis-à-vis* the theory of reconstruction, although note that this observation is *prima facie* not compatible with a semantic account of reconstruction.

manner but the other one remains open. On the other hand, I will argue that if the variable-based account of indexical shifting (Schlenker 1999, 2003; von Stechow 2004) is adopted instead of the operator-based account, a minor modification of an independently needed stipulation (namely, Anand's (2006) SHIFT TOGETHER! constraint) allows us to solve both problems without making any other changes to copy theory.

This paper is organized as follows. Section 2 contains the relevant background on Farsi and indexical shifting. In Section 3, the problems that arise when copy theory and the operator-based account of indexical shifting are combined are discussed in detail. In Sections 4 and 5, two potential solutions to these problems are discussed, one based on the operator-based account of indexical shifting and one based on the variable-based account, and Section 6 concludes. In the rest of the present section a summary of the content of the paper is provided, leaving blanks to be filled in the following sections.

According to copy theory (hf. CT), a moved expression leaves behind, not a trace, but a full-fledged copy of itself. According to the operator-based account of indexical shift (hf. OP), the shifted reading of indexicals is due to a covert, 'context-shifting' operator that inhabits the 'left periphery' of the clausal argument of certain attitude verbs. The combination of these two theories, call it CT+OP, therefore, predicts that the schematic LF in (3) is a possible LF for (2).[4]

(3) [which . . . you . . .] L told M [OP I [which . . . you . . .] love]

The first problem with CT+OP is that (3) does not correspond to a reading that (2) intuitively can have. The core of the problem is that the two copies of the second person indexical are predicted to be interpreted with respect to different contexts: the higher copy is predicted to refer to the actual addressee while the lower copy, being in the scope of the context-shifting operator, is predicted to refer to the reported addressee. Let us refer to (3) as the 'double-access' LF.[5] As the double-access LF does not denote a contradictory, or otherwise semantically defective, proposition (this will be discussed Section 3), the first problem for CT+OP is to somehow block it, whence the injunction in (4).

(4) Find a way to block the double-access LF (i.e., (3)) as a possible LF of (2)!

The second problem of CP+OP is that it incorrectly predicts an interaction between Condition C and indexical shift. To see this, consider the problem of finding a way to derive the unshifted reading of (2) from the double-access LF in (3). Evidently, the material in the restrictor of the based-generated copy of *kudum* needs to be neutralized: in order to derive the unshifted reading, (3) needs to be transformed into (5).

(5) [which . . . you . . .] L told M [OP I [which ////~~you~~////] love]

But if the only way to unshift the indexical in the restrictor of *kudum* is to delete the

[4] In order for LFs of this kind to be interpretable, some manipulation or other must be performed on the lower copy in order to generate a sensible operator-variable construction. The standard way to do this is via 'trace conversion' (Fox 2002).

[5] The label is borrowed from the literature on tense. Its use in this paper does not rest on any substantive assumptions or claims.

restrictor of its lower copy, then we predict that unshifting should have consequences for Condition C. For example, we predict that the matrix subject pronoun in (6) should be able to refer to Leila without violating Condition C, if the first person pronoun in the embedded clause is shifted and the second person pronoun in the restrictor of *kudum* is unshifted.

(6) *[kudum dāneshju-ie-to-o-Leilā]-ro be Minā goft __ dus-dāra-m?
Which student-EZ-2sg-and-L-OM pro to M told pro __ love-have-1sg
Intended reading: 'Which x is such that x is a student of you and Leila's and Leila$_i$ told Mina that she$_i$ loves x?'

To see this, note that in order to derive the reading of (6) that corresponds to the unshifted reading of (2), the LF in (7a) must be transformed into (7b) via deletion of the restrictor of the lower copy, same as the (3) to (5) transformation. If so, then, on the target reading, the matrix subject pronoun (and, therefore, also the embedded first person pronoun which is shifted) should be able to refer to Leila without violating Condition C as the lower copy of the r-expression *Leila* is deleted and, hence, is not c-commanded by the matrix subject pronoun.

(7) a. [which . . . you+Leila . . .]
pro$_x$ told M
[OP I [which . . . you+Leila . . .] love]
b. [which . . . you+Leila . . .]
pro$_x$ told M
[OP I [which ~~. . . you+Leila . . .~~] love]

This prediction is incorrect: the sentence is judged acceptable only if the null-pronoun subjects of the matrix and embedded predicates do not refer to Leila, a fact that can be explained on the assumption that the sentence generates a Condition C violation otherwise. The second problem of CP+OP can be summarized with the following injunction.

(8) Find a way to derive the unshifted reading without bleeding Condition C!

If the argument that a naïve combination of CT and OP generates empirical problems is on the right track then *a priori* there are two salient options, both of which I will explore in this paper:

1. Keep CT and OP, but introduce auxiliary assumptions, or,

2. Replace OP but keep CT intact, or,

There is a third option, which is to simply discard CT and adopt trace theory in conjunction with OP. Here I do not consider this option seriously, as a switch to trace theory would veer the locus of discussion back to the arguments that motivated copy theory to begin with and this is a different enterprise altogether.[6] I will instead assume that copy theory is on the right track and explore the two aforementioned options 1 and 2 in sections 5 and 4 respectively.

[6] See Takahashi 2010a,b for a review of the facts that motivate the claim that at least Ā-movement obligatorily involves leaving copies in the pre-movement site, and references therein.

In Section 5, neither CT nor OP are disposed of but auxiliary assumptions are introduced on both sides to solve the problems mentioned above. Working our way backwards, the core idea of the proposal is that the unshifted reading of (2) results from an LF that roughly looks like (9), where the pronoun in the *kudum*-restrictor of the lower copy is represented as a (feature-less) variable which is coreferential with the pronoun in the higher copy on which the second person feature is interpreted. Note that since the pronoun in the lower copy is simply a variable *without an* indexical *feature* its denotation is not controlled by the context-shifting operator which only affects the meaning of *indexical* expressions in its scope.

(9) [which . . . you$_x$ . . .] L told M [OP I [which . . . x . . .] love]

The challenge, of course, is deriving (9) from (3) in a principled manner. It will be proposed that two sets of assumptions suffice to accomplish this. First, on the OP side, certain assumptions need to be taken on board to allow indexical pronouns to be represented at LF as 'variables' with feature-bundles, as in (10a), as opposed to 'constants', as in (10b).[7] As discussed in Section 5 (following up on relevant discussion in Schlenker 2003, 2004), if the entry in (10a) is adopted without further ado, a presupposition failure is incorrectly generated in certain cases where an indexical pronoun is c-commanded by the context-shifting operator, forcing the standard accounts of indexical shifting to stipulate that shifty indexicals are constants. As discussed there, this problems needs to be solved somehow for the account under discussion to work, and I will sketched a proposal based on Schlenker 2004.

(10) a. $[\![\text{ [2nd pro}_i\text{] }]\!]^{c,g} = \#$ unless $g(i) = \textsc{addr}(c)$; if defined then $[\![\text{ [2nd pro}_i\text{] }]\!]^{c,g} = g(i)$.
b. $[\![\text{ 2nd-pro }]\!]^{c} = \textsc{addr}(c)$

The result of representing shifty indexicals as restricted variables is that the original LF of (2) now looks like this (cf. (3)). Notice that we are now one step closer to our target LF which was schematically represented in (9). If we incorporate a mechanism that can delete the indexical feature of the lower copy, the desired LF is generated.

(11) [which . . . [2nd pro$_x$] . . .]
L told M
[OP [1sg pro$_y$] [which . . . [2nd pro$_x$] . . .] love]

This brings us to the second set of assumptions, this time on the CT side. It will be

[7] In using terms 'variable' and 'constant' I have in mind the idea that the denotation a variable is assignment-dependent while the denotation of a constant is not. Since the denotation of an indexical (unlike, say, that of proper nouns) varies across contexts as a matter of definition, this terminology might be confusing. Furthermore, this terminology might be entirely inadequate as constants can be routinely re-analyzed as *prima facie* assignment-dependent expressions. Thus, instead of (ia) one could adopt (ib) on which the denotation of *John* is, strictly speaking, assignment-dependent.

(i) a. $[\![\text{ John }]\!]^{g,\cdots} = \textbf{John}$
b. $[\![\text{ John}_i \text{ }]\!]^{g,\cdots} = \#$ unless $g(i) = \textbf{John}$; if defined, $[\![\text{ John}_i \text{ }]\!]^{g,\cdots} = g(i)$

One could, however, adopt the following definition of assignment-dependency which side-steps this problem: the denotation of expression α is assignment-dependent iff there are assignments g_1, g_2 and context c and index i such that $[\![\alpha]\!]^{c,i,g_1}$ and $[\![\alpha]\!]^{c,i,g_2}$ are both defined but $[\![\alpha]\!]^{c,i,g_1} \neq [\![\alpha]\!]^{c,i,g_2}$. The reader can verify that on this definition *John* in (ib) is not assignment-dependent.

argued, following proposals in the literature, that CT must be coupled with a deletion operation at the LF interface which (a) can target expressions of any size (down to individual features), (b) is subject to an economy constraint that minimizes its application (in line with Fox (1999)); specifically, it can only target an expression if deleting that expression has semantic consequences of a particular kind, and (c) can only target the *smallest* possible expression that yields the designated interpretation (in line with Merchant (2000)). A deletion operation subject to these assumptions allows the grammar to delete the second person *feature* of the lower copy of the indexical pronoun, getting us from (11) to (12).[8]

(12) [which . . . [2nd pro$_x$] . . .]
L told M
[OP [1sg pro$_y$] [which . . . [~~2nd~~ pro$_x$] . . .] love]

This LF then allows us to derive the unshifted reading by deleting only the indexical feature on the pronoun in the lower copy, which in turns allows us to make sure that Condition C need not be bled as no expression larger than the person feature can now be deleted. Thus the second problem (i.e., (8)) is solved. Unfortunately on this approach the double-access LF is not blocked. The first problem (i.e., (4) above), then, remains open. One possibility is that the feature deletion exemplified in (12) is in this case *obligatory* after all for some reason or other. The underlying generalization might be that ϕ-features on pronouns that occur in chains are always interpreted just once, perhaps only on the head of the chain. I am not aware of an independent motivation for this claim. An alternative, perhaps more conservative, line would be that the double-access LF *is* in fact generated by the grammar but the reading that it gives rise to, while semantically coherent, cannot be intuitively accessed either due to contextual / pragmatic factors or processing cost.

In Section 4, in the spirit of option 2, it will be argued that the variable-based account of indexical shifting (Schlenker 1999 and subsequent work), coupled with a minor modification of an independently needed stipulation, can be combined with the original version of copy theory without generating either of the two problems mentioned above. In a nutshell, according to the variable-based account of indexical shifting, LFs have context abstractors explicitly represented and shifty indexicals have a context variable that can be bound by either the matrix abstractor (unshifted reading) or an embedded abstractor introduced by certain predicates (shifted reading). Now, it is well-known that canonical implementations of the variable-based system suffer from an over-generation problem and, consequently, need to be constrained by explicit stipulations. One such stipulation is SHIFT TOGETHER! (Anand & Nevins 2004; Anand 2006) which says that indexical expressions in the same 'minimal domain' must be bound by the same context abstractor, where the minimal domain of an indexical can roughly be taken to be the smallest CP / TP that dominates it. We modify this latter definition in only one respect: the minimal domain of an indexical that occurs in a chain is the determined by (i.e., is the same as) the minimal domain of *its highest copy*. One side-effect of movement, then, is to extend the minimal domain of those indexicals that occur in the moved constituent. This modification solves both

[8]There are various proposals in the literature that rely on 'deletion under agreement', the rough idea being that sometimes features on *bound* pronouns can remain semantically uninterpreted. The reader should bear in mind that in (12) the pronoun in the lower copy is *not* bound; therefore, the deletion operation involved in (12) cannot be subsumed under the same rubric.

of the problems mentioned above in one move. The first problem (i.e., (4)) is solved because different copies of the same indexical are now assigned the same minimal domain and as such are forced by SHIFT TOGETHER! to be bound by the same context abstractor ('vertical shift together'). The second problem (i.e., (8)) is solved because deriving the unshifted reading no longer *requires* deletion of any material in the lower copy and therefore, by economy, deletion is prohibited to apply in these cases, ensuring that Condition C is not bled. Indeed this account is compatible with a view of the grammar in which the grammar does not have access to a deletion operation at all.

2 Farsi and indexical shift

Farsi (or Persian, Indo-Iranian) has SOV word order although clause-embedding predicates always precede their clausal complements. Furthermore, beyond the verbal domain Farsi is head-initial.

(13) a. (Leilā) Ali ro zad.
Leila Ali OM hit
'Leila hit Ali.'
b. (Minā) goft (Leilā) Ali ro zad.
Mina said Leila Ali OM hit
'Mina said that Leila hit Ali.'

Farsi is a *wh*-in situ language (but see Kahnemuyipour 2001) in which *wh*-phrases can be optionally fronted, sometimes with truth-conditional consequences (cf. (1) and (2) in the previous section).[9]

(14) a. Ki goft Leilā Ali ro zad?
who said Leila Ali OM hit
'Who said that Leila hit Ali?'
b. Minā goft ki Ali ro zad?
Mina said who Ali OM hit
'Who did Mina say hit Ali?'
c. Minā goft Leilā ki ro zad?
Mina said Leila who OM hit
'Who did Mina say Leila hit?'
d. ?Ki Minā goft __ Ali ro zad?
Who Mina said __ Ali OM hit
'Who did Mina say hit Ali?'
e. Ki ro Minā goft Leilā __ zad?
Who OM Mina said Leila __ hit
'Who did Mina say Leila hit?'

Farsi is a *pro*-drop language with obligatory subject-verb agreement. Throughout I will assume dropped subjects are represented at LF with a covert pronominal element which enters into agreement with the predicate and has interpretable ϕ-features.

[9]Fronting is somewhat marked with *wh*-phrases that originate in the subject position, cf. (14d) and (14e).

(15) a. (man) xāb-am
1sg slept-1sg
'I slept.'
b. (mā) xāb-im
1pl slept-1pl
'We slept.'
c. (to) xāb-i
2sg slept-2sg
'you slept.'
d. (shomā) xāb-in (or, (shomā) xāb-id)
2pl slept-2pl
'You slept.'
e. (Un) xāb-e
3sg slept-3sg
'He / She slept.'
f. (unā) xāb-an
3sg slept-3sg
'They slept.'

The pronominal system has two sub-paradigms consisting of full pronouns (shown above) and enclitics. The enclitics can attach, e.g., to prepositions and to nouns, in the latter case generating possessive readings.[10] Either way, only person and number are grammatically marked.

(16) a. Ketāb-am
book-1sg
'My book'
b. ketāb-emun
book-1pl
'Our book'
c. ketāb-et
book-2sg
'Your book'
d. ketāb-etun
book-2pl
'Your book'
e. ketāb-esh
book-3sg
'His / Her book'
f. ketāb-eshun
book-3pl
'Their book'

There is no object-verb agreement *per se* but the enclitics can attach to inflected verbs, a process which is obligatory if the object is dropped but optional otherwise.[11]

[10] I assume the 'ezafe' clitic *-e* must be syntactically present between the enclitic, in which case, e.g., *ketaab-emun* must be parsed as *keetab-e-mun*. I abstract away from this as it is not pertinent.

[11] Enclitics that double the object are in general somewhat marked.

(17) a. Man Ali ro zad-am-(?esh)
1sg Ali OM hit-1sg-3sg
'I hit Ali.'
b. Man zad-am-*(esh)
1sg hit-1sg-3sg
'I hit him / her.'

Turning to indexical (i.e., first and second person) pronouns, as pointed out in the previous section these can appear as full pronouns (18a), as enclitics (18b), or as null pronouns (18c).

(18) a. Man Ali (r)o dus-daram.
'I like Ali'
b. Xāharam Ali (r)o dus-dare.
'My sister likes Ali'
c. ~~Pro~~ Ali (r)o dus-daram.
'I like Ali'

All three forms give rise to an ambiguity when embedded under the speech-report predicate *goftan*, depending on whether they take their value from the actual or the reported context of speech.[12]

(19) a. Mina goft man Ali ro dus-daram.
Reading 1: 'Mina said that I like Ali'
Reading 2: 'Mina$_i$ said that she$_i$ likes Ali'
b. Mina goft xāharam Ali ro dus-dare.
Reading 1: 'Mina said that my sister like Ali'
Reading 2: 'Mina$_i$ said that her$_i$ sister likes Ali'
c. Mina goft ~~pro~~ Ali ro dus-daram.
Reading 1: 'Mina said that I like Ali'
Reading 2: 'Mina$_i$ said that she$_i$ likes Ali'

When two indexicals occur in the complement of *goftan* either both shift (21b) or neither does (21a). In other words, Farsi respects Anand's (2006) SHIFT TOGETHER! constraint which is informally given in (23).

(20) Leilā be Minā goft dus**et** dara**m**.
L to M said love-2sg have-1sg

(21) *Possible readings for (20)*:
a. Leila told Mina that I love you
b. Leila$_i$ told Mina$_j$ that she$_i$ loves her$_j$

(22) *Impossible readings for (20)*:

[12]Some consultants report that the shifted reading with full pronouns, e.g., Reading 2 of (19a), is somewhat marked particularly in comparison with (19c). The important point, for my purposes, is that full pronouns do shift. Evidence for this comes from constructions in which the null form is barred and only the full form can be used such as cases in which the pronoun is stressed. The shifted reading can be accessed in such cases very easily.

(i) Minā goft faghat man$_F$ Ali ro dus-dāram.
Mina said only 1sg Ali OM love-have
Possible Reading: 'Mina$_i$ said that only she$_i$ likes Ali.'

a. Leila told Mina$_j$ that I love her$_j$
b. Leila$_i$ told Mina that she$_i$ loves you

(23) a. SHIFT TOGETHER! Indexical expressions in the same minimal domain must get their value from the same context.
b. The minimal domain of a particular occurrence of an indexical expression is the smallest CP / TP that contains it.

Note that extraction from the complement of *goftan* is possible even when there are shifted indexicals in the embedded clause. (Here too SHIFT TOGETHER! must be respected.) This suggests that the shifted reading of indexicals in Farsi is not due to quotation or any other process that generates an environment opaque to grammatical transformations.

(24) a. Leilā be Minā goft ~~pro~~ ketāb-e ki ro barā-t xaridam?
L to M told pro book-EZ who OM for-2sg bought.1sg
'Whose book did Leila$_i$ tell Mina$_j$ she$_i$ bought for her$_j$?'
b. Ketāb-e ki ro Leilā be Minā goft ~~pro~~ __ barā-t xaridam?
book-EX who OM L to M told pro __ for-2sg bought.1sg?
'Whose book did Leila$_i$ tell Mina$_j$ she$_i$ bought for her$_j$?'

Finally, shifted indexicals are obligatorily interpreted *de se*. Thus (25a) can be felicitously and truthfully used to report the situation given in (26), but the sentence in *shifted sentence*, on its shifted reading, cannot.

(25) a. Doktor be parastār goft hale-sh xeili bad-e.
Doctor to nurse told condition-3sg very bad-is
Possible: 'The doctor$_i$ told the nurse that he$_i$ is in a bad condition.'
b. Doktor be parastār goft hala-m xeili bad-e.
Doctor to nurse told condition-1sg very bad-is
Not possible: 'The doctor$_i$ told the nurse that he$_i$ is in a bad condition.'

(26) The doctor has been reviewing patients' files, which are anonymous. Unbeknownst to him, his own file is among the files that he is reviewing. After studying his file the doctor turns to the nurse and says, "this patient is in a very bad condition."

The standard analysis of indexical shifting, due to Anand & Nevins 2004; Anand 2006, rests on the following assumptions (various complications are ignored for the sake of exposition). The interpretation function is parametrized to a context c, an index (of evaluation) i, and an assignment function g, $[\![\cdot]\!]^{c,i,g}$. Contexts are taken to be tuples with various coordinates. For our purposes, we abstract from the temporal and locative information and assume that contexts consist of an individual author / speaker $\textsc{auth}(c)$, an individual addressee (possibly plural) $\textsc{addr}(c)$, a possible world $\textsc{world}(c)$. It is assumed that indices are 'homologous' to contexts, thus an index i also has a speaker $\textsc{auth}(i)$, an addressee $\textsc{addr}(i)$, a possible world $\textsc{world}(i)$. Within this framework a speech-report predicate like *goftan* (to tell / say) is interpreted as in (28) and indexical pronouns are assigned the lexical entries in (27).[13] Note that, unlike third person pronouns, indexical pronouns are assignment-independent. We will revisit this difference in Section 5.

[13]The entries in (27) will be modified in Section 5.

(27) a. $[\![\text{ I }]\!]^{c,i,g} = \textsc{auth}(c)$
b. $[\![\text{ you }]\!]^{c,i,g} = \textsc{addr}(c)$
c. $[\![\text{ she}_x]\!]^{c,i,g} = \#$ unless $g(x)$ is female in $\textsc{world}(c)$; if $\neq \#$ then $[\![\text{ she}_x]\!]^{c,i,g} = g(x)$.

(28) a. $[\![x \text{ tell } y \text{ that } \phi]\!]^{c,i,g} = 1$ iff $\forall i' \in \textsc{say}^i_{x,y} : [\![\phi]\!]^{c,i',g} = 1$
b. $i' \in \textsc{say}^i_{x,y}$ iff i' is compatible with what x told y in $\textsc{world}(i)$.

The final ingredient is the context-shifting operator, OP, which over-writes the context parameter with the index parameter (this is why the assumption is made that contexts and indices are homologous). A syncategorematic analysis of this operator is given in (29).

(29) $[\![\textsc{op}\ \phi]\!]^{c,i,g} = [\![\phi]\!]^{i,i,g}$

The assumptions enumerated above coupled with the assumption that speech-report predicates in certain languages (such as Farsi) license the context-shifting operator in their scope allow us to derive not only the shifted reading of indexicals but also the fact that shifted indexicals must be interpreted *de se* and the SHIFT TOGETHER! constraint.

(30) a. $[\![x \text{ tell } y \text{ [I hate you] }]\!]^{c,i,g} = 1$ iff
$\forall i' \in \textsc{say}^i_{x,y} : [\![\text{ I hate you }]\!]^{c,i',g} = 1$ iff
For all i' that is compatible with what x told y in $\textsc{world}(i)$, $\textsc{auth}(c)$ hates $\textsc{addr}(c)$ in $\textsc{world}(i')$.
b. $[\![x \text{ tell } y \text{ [OP I hate you] }]\!]^{c,i,g} = 1$ iff
$\forall i' \in \textsc{say}^i_{x,y} : [\![\textsc{op} \text{ I hate you }]\!]^{c,i',g} = 1$ iff
$\forall i' \in \textsc{say}^i_{x,y} : [\![\text{ I hate you }]\!]^{i',i',g} = 1$ iff
For all i' that is compatible with what x told y in $\textsc{world}(i)$, $\textsc{auth}(i')$ hates $\textsc{addr}(i')$ in $\textsc{world}(i')$.

3 Two problems with copy theory and the operator-based approach

In this section, I will elaborate on the two problems mentioned in Section 1. First, I will describe the problem raised by the double-access LF. I will describe the truth conditions that the double-access LF generates, given standard semantic assumptions, showing that the resulting truth conditions are not contradictory or otherwise semantically deficient. Second, I will argue that indexical shifting and Condition C do not interact in Farsi: the unshifted reading mentioned in Section 1 does not derive from an LF in which movement bleeds Condition C.

Consider again the sentences in (31a) and (31b). In both sentences a *which*-phrase contains a second person pronoun in its restrictor and the embedded clause contains a first person pronoun. The only structural difference between the two sentences is that in (31b) the *which*-phrase is overtly fronted while in (31a) it remains *in situ*.

(31) a. Leila be Mina goft [kudum daneshju-t-o] dus-dara-m?
L to M told which student-2sg-OM love-have-1sg

'Which of Mina$_j$'s students did Leila$_i$ tell her$_j$ she$_i$ loves?'
*'Which of your students did Leila$_i$ tell Mina she$_i$ loves?'

b. [kudum daneshju-t-o] Leila be Mina goft e dus-dara-m?
which student-2sg-OM L to M told e love-have-1sg
'Which of Mina$_j$'s students did Leila$_i$ tell her$_j$ she$_i$ loves?'
'Which of your students did Leila$_i$ tell Mina she$_i$ loves?'

Interestingly, overt movement of the *which*-phrase in (31b) introduces a semantic ambiguity which otherwise does not exist. In (31a) if the first person pronoun is shifted then the second person pronoun in the restrictor of *which* must shift as well (as predicted by the SHIFT TOGETHER! generalization). Not so in (31b); here, the indexical in the restrictor of *which* may or may not shift (in fact the latter is the more salient option) if the first person pronoun in the embedded clause is shifted.[14]

The findings above are summarized in (32).

(32) a. In a sentence of the form

x told y that [. . . [which . . . indx$_1$ . . .] . . . indx$_2$ . . .]

indx$_2$ shifts if and only if indx$_1$ shifts as well.

b. In a sentence of the form

[which . . . indx$_1$ . . .] [x told y that [. . . e . . . indx$_2$ . . .]]

if indx$_2$ shifts, indx$_1$ may or may not shift but (i) if indx$_1$ shifts then indx$_2$ must shift as well and (ii) if indx$_2$ is not shifted then indx$_1$ cannot shift either.

From now on, I will focus exclusively on the cases like (31b) where the *which*-phrase moves overtly.

Assuming copy theory of movement, the LFs underlying (31b) would be (33a). To yield an interpretable, operator-variable structure, this LF must undergo trace conversion (Fox 1999) with the result in (33b). Note that the presence of OP is dictated by the assumption that the embedded first person (which is represented by *1st-pro*) is shifted.

(33) a. [which student-of-2sg]
L to M told OP
[1st-pro [which student-of-2sg] love]

b. [which student-of-2sg]
1 [L to M told OP
[1st-pro [the [student-of-2sg =1]] love]]

Even a superficial examination of (33b) immediately reveals two issues. First, the LF in (33b) generates a reading according to which the lower copy of the second person pronoun shifts while the higher copy does not. Second, neither of the two readings in (31b) correspond to the LF in (33b).

Regarding the first issue, the reading that (33b) generates can be called the double-access reading for indexicals: the copy at the tail (being in the scope of OP) will be

[14] If the first person pronoun in the embedded clause is *not* shifted, then the second person pronoun in the restrictor of *kudum* can*not* shift.

shifted to refer to the reported addressee, Mina, while the copy at the head (being outside of the scope of OP) remains unshifted and refers to the actual addressee. I will now argue that the double-access reading is not semantically incoherent. To see the truth conditions of the LF in (33b), it suffices that we focus on the constituent that *which* abstracts over.

(34) 1 [L to M told OP
[1st-pro [the [student-of-2sg =1]] love]]

(34) denotes a set of individuals. Each of these individuals x have the following two properties. First, Leila thinks of x (on some description or other) as a student of the individual that she identifies as Mina. Second, Leila has told Mina that she, Leila, loves x. The first of these properties is the restrult of the presupposition triggered by the definite description *[the [student-of-2sg =1]]* and the second is simply the assertive content of expression. Now, what happens when the set of individuals denoted by (34) is fed to *[which student-of-2sg]* in (33b)? The first task is to determine how the presupposition noted above will project. Let us assume that this projection is universal.[15] The result is the matrix presupposition that every individual in the restrictor of *which* satisfies the presupposition of (34); i.e., every individual x who is one of the actual speaker's students is such that Leila thinks of x (on some description) as a student of Mina's. Moving on to the assertive side, thinking of *which* as an existential quantifier for simplification, we predict the sentence to be true iff there is at least one individual who in fact is one of actual speaker's students, who Leila thinks of as one of Mina's students, and of whom Leila has spoken (very) positively to Mina. Notice that the result of the double-access reading is simply the inference that the relevant domain of quantification consists of individuals who are in fact the speaker's students and are also thought by Leila to be Mina's students. The double-access reading can be roughly paraphrased in English as in (35).

(35) Which student of yours is such that Leila$_i$ told Mina$_j$ that she$_i$ likes this student of hers$_j$?

As far as I can see, although the truth conditions are certainly rather involved there is no contradiction here. I conclude that the reading that the double-access LF gives rise to is not semantically incoherent. Given that this reading is not intuitively perceived (cf. (35)), either the double-access LF is not generated by the grammar at all or, perhaps, the relevant LF is ruled out for contextual / processing reasons. As the nature of the putative contextual / processing constraints remains unclear to me, I will tentatively assume that the grammar simply does not generate double-access LFs (see also Section 4 for further discussion).

Let us now move on to the second issue. Appropriate LFs for the two readings of (31b) can be derived from (33a) via deletion. In (36a) the higher copy is deleted. The result is total reconstruction of the *which*-phrase. Assuming a treatment of *which*-phrases which allows *in situ* interpretation,[16] this LF derives the reading in

[15] My goal in this discussion is to establish that the double-access reading is not semantically defective. Whether the target presupposition projects universally or in a weaker fashion is somewhat beside the point. Note however that if the meaning that results from universal projection is not contradictory, then the meaning that results from any form of weaker projection is not contradictory either.

[16] Alternatively, deletion can only target the restrictor of the higher copy. This, coupled with trace conversion, can generate a structure that is compatible with a semantics of *which*-phrases that requires

(31b) where both first and second person pronouns are shifted as both pronouns are now c-commanded by OP. In (36b) the restrictor of the lower copy is targeted by deletion. As the second person pronoun is now not c-commanded by OP it is not shifted while the first person of course is. This corresponds to the other reading of (31b) (i.e., the unshifted reading).

(36) a. ~~[which student-of-2sg]~~
L to M told OP
[1st-pro [which student-of-2sg] loves
b. [which student-of-2sg]
1 [L to M told OP
[1st-pro [the [~~student-of-2sg~~ =1]] loves]]

It would appear, then, that we can derive the desired LFs, specifically for the unshifted reading, if we allow the grammar to have access to a deletion operation that can target material in the lower copy. Evidence against this hypothesis comes from the fact that unshifting does not bleed Condition C, as illustrated in (37). The restrictor of the *which*-phrase in (37) contains the r-expression *Leila* conjoined with the first person pronoun. Crucially, the subject pronoun cannot be co-referential with *Leila*.

(37) [kudum ketab-e-man-o-Leila$_i$-ro] ~~pro~~$_i$ be Mina goft [. . . ___ . . .]?
which book-of-1sg-and-L-OM pro to M told . . .

This is puzzling for the approach sketched above as here deleting the lower copy would force the *un*shifted reading of the first person pronoun, much like (36b) above. But if deletion was possible, the sentence would have been acceptable with the subject *pro* referring to Leila, contrary to fact.

4 The operator-based approach, deletion and indexical pronouns as restricted variables

The idea that I will pursue in this section is that the LF of a sentence like (38) (= (2) from Section 1) has the abstract shape in (39) (= (9) from Section 1). The key characteristic of this LF is that the two 'copies' of the second person indexical embedded in the restrictor of the moved *which*-phrase have different forms; the one at the tail of the chain is 'structurally impoverished' in the sense that it is represented as a feature-less, unrestricted, variable while the one at the head of the chain is represented as a variable with a bundle of features, including in particular the second person feature (throughout, I ignore number and gender). Furthermore, the two copies are semantically related in that the lower variable is ('accidentally') co-referential with the higher one.

(38) kudum daneshju-t-o Leila be Mina goft __ dus-dara-m?
Which student-2sg-OM L to M told pro __ love-have-1sg
Unshifted reading: 'Which of your students did Leila$_i$ tell Mina that she$_i$ loves?'

them to be interpreted *ex situ*. The net-result for my purposes is the same.

(39) [which . . . you$_x$ . . .] L told M [OP I [which . . . x . . .] love]

The crucial question, of course, is how the grammar can generate (39) for (38). One option is to hardwire certain assumptions in the mechanics of the copying / movement operation. For example, one could stipulate that copying a *which*-phrase (or, more generally, any quantificational noun phrase) involves replacing every pronoun that occurs in the 'original' copy with a feature-less variable that is co-referential with the corresponding pronoun (with features and all) in the 'new', higher copy. Call this the brute force approach. The brute force approach immediately yields the following generalization which, in a sense, is the core intuition behind the analysis explored in this section.

(40) ϕ-features on pronouns that occur in chains are always interpreted (i) just once, (ii) at the head of the chain.

There is an obvious sense in which the brute force approach, true to name, is completely stipulative as it involves an entirely *ad hoc* manipulation of already constructed structures. Therefore, my aim in the rest of this section is to design an alternative that is less outrageous. Nevertheless it should be stated at the outset that the brute force approach has two desirable consequences. First, the brute force approach solves *both of the two problems* that were discussed in Section 3. It predicts that unshifting does not bleed Condition C and it predicts that what I have referred to as double-access LFs are not generated by the grammar at all. Unshifting is predicted not to bleed Condition C because no deletion operation is called upon to remove material in the lower copy. Double-access LFs are not generated because, as pointed out above, indexical features are interpreted *only once*, at the head of the chain, *outside of the scope of the context-shifting operator*. Second, as the brute force approach does not rely on a 'free standing' operation of deletion, it is highly restricted in this respect: there is no danger of over-generation by misapplication of deletion and, obviously, no stipulations need to be made regarding the workings of deletion. Neither of these two desirable consequences are easy to capture in less stipulative alternatives to the brute force approach, as far as I can see. In particular, the analysis that I will sketch below runs into an over-generation problem because it cannot block double-access LFs and it relies on a particular deletion operation which must be subjected to very specific constraints at the pain of over-generation. Nevertheless, as discussed at the end of this section, these issues are probably not as problematic as they might appear.

The proposal that I would like to consider as an alternative to the brute force approach relies on two independent sets of assumptions. The core ideas are (i) that shifty indexicals can be represented as variable with feature-bundles and (ii) that there is a deletion operation that can, in certain cases, remove the person features of pronouns in the lower copies. The LF of (38), then, looks more like (41) (= (12) from Section 1) than (39) above but it should be clear that the two will end up being semantically equivalent.

(41) [which . . . [2nd pro$_x$] . . .]
L told M
[OP [1sg pro$_y$] [which . . . [~~2nd~~ pro$_x$] . . .] love]

Let us discuss the assumptions needed to cash out (i) and (ii), beginning with the former which might appear as rather innocuous. As noted in Section 2, the standard

assumption in the literature on shifty indexicals is that, at LF, these expressions are represented as individual-denoting constants (see fn. 7) as in (42).

(42) $[\![\text{I}]\!]^{c,i,g} = \textsc{auth}(c)$

Why should shifty indexicals have the representation in (42), instead of the more familiar representation in (43c)?

(43) a. $[\![\text{1st}]\!]^{c,i,g} = \lambda x : \textsc{auth}(c) = x . x$
b. $[\![\text{pro}_x]\!]^{c,i,g} = g(x)$
c. $[\![\text{1st pro}_x]\!]^{c,i,g} = \#$ unless $g(x) = \textsc{auth}(c)$;
if defined then $[\![\text{1st pro}_x]\!]^{c,i,g} = g(x)$.

Notice the fact that indexicals can have bound readings (Heim 1991), as shown in (44), is strong evidence that the representation in (43c) is at least available. The claim that *shifty* indexicals should be represented as in (42), then, amounts to the claim that some choice is involved in the LF representation of indexicals.

(44) Only I did my homework.
⇝ *Nobody else did his or her homework*

The question is rarely discussed explicitly in the literature, with the notable exception of Schlenker (2003, 2004) (who attributes the observation to Arnim von Stechow (p.c.)). The problem in a nutshell is that the assignment-dependent representation in (43c) incorrectly predicts presupposition failure in certain cases when the indexical is embedded in a context-shifted environment. To see why, consider the schematic example in (45) in which I pretend that the predicate *believe* allows indexical shifting.[17] In what follows, the reader is well-advised to keep in mind that we are working in a framework in which an individual may exist in several possible worlds ('trans-world individuals').[18]

(45) Leila believes $[_{\phi}$ OP $[\text{1st pro}_x]$ ~~am~~ hungry]

Suppose we want to interpret (45) relative to context c, index i and assignment function g. It is a general fact that assignment functions (once made salient by the contexts) map variables to individuals *independently from the context parameter* (and independently from the index parameter, for that matter). This means that quantification over the context parameter does not influence the denotation of x in (45), because even if the context parameter is quantified over, the assignment function remains constant. Now, in order to compute the denotation of (45) we need to evaluate the embedded clause ϕ with respect to indices that are compatible with what Leila believes in i, i.e., with respect to every i' in $\textsc{dox}^{i}_{\text{Leila}}$. Let i' and i'' be two members of $\textsc{dox}^{i}_{\text{Leila}}$. Crucially, there is no guarantee that $\textsc{auth}(i')$ and $\textsc{auth}(i'')$ are the same individual: just as Leila may be uncertain regarding the world in which

[17] The choice to use *believe* instead of *tell* is made only for expository purposes as it allows sidestepping certain complications that arise with the latter. Nothing hinges on this and the point made in the text applies to *tell* just as it does to *believe*.

[18] One might suspect that if we drop this assumption, i.e., if we adopt a framework of 'world-bound' individuals this problem disappears. This, unfortunately, is not the case; once relevant assumptions are made which determine which world-bound individuals are to be considered 'identical', the same problem re-surfaces albeit in a more complicated fashion.

she lives, she may be uncertain regarding who she is.[19] If so, then AUTH(i') and AUTH(i'') could be different individuals (just as uncertainty about the world would means that WORLD(i') and WORLD(i'') could be different worlds). If this happens to be the case, then the assignment function g fails to assign a value to *[1st pro$_x$]*. Note that due to the context-shifting operator, the context parameter is over-written with the index parameter: *believe*'s quantification over the index parameter is turned into quantification over both the index *and the context parameter*. The interpretation of (45), then, involves, in part, computing the denotation of *[1st pro$_x$]* with respect to i' and i''. If the author coordinates of i' and i'' end up being distinct, then there is no individual that g can assign x to *while satisfying the presupposition triggered by the first person feature* according to which $g(x)$ must be identical to both AUTH(i') and AUTH(i''). The inevitable result in that case would be presupposition failure due to transitivity of identity and (45) is predicted to be undefined.

The LF in (45), then, triggers a presupposition failure as soon as Leila has some uncertainty regarding who she is. This, however, is incorrect: we want this LF to denote a proposition that comes out as true as soon as Leila has a first-personal thought of the form, "I am hungry", and this could happen even if Leila harbors some uncertainty regarding her identity. One might react to this problem by dismissing it; perhaps uncertainty about who one is is rare enough that it can be safely ignored. This may be true regarding uncertainty about who one is, but it certainly is not true regarding uncertainty about who one is talking to. Consider the context in (46), nothing about which is particularly fantastic.

(46) *Context: Doctor Rezai calls his patient's house with some bad news. The person who picks up the phone is a young woman. The doctor knows that his patient has two daughters (call them Zahra and Zohreh), so he infers that the person on the other side is one of the daughters; however, he does not know which one. He says, "your father needs antibiotics which are hard to find".*

If I know that, as a matter of fact, the doctor was talking to Zahra (because Zohreh is out of town), I can report the doctor's utterance as follows.

(47) Doktor be Zahra goft babat be ye dāruye nāyāb ehtiyāj dāre.
Doctor to Zahra told father-2SG to one medicine rare need has-3SG
'The doctor told Zahra that her father needs a rare medicine.'

Suppose we represent the shifted second person pronoun in (47) as a restricted variable, as in (48). What individual should the variable x refer to? Note in particular that x cannot be mapped to Zahra; as far as the doctor is concerned his addressee may well have been Zohreh, the other sister. Thus, while every index / context i' compatible with the doctor's utterance is such that ADDR(i') is either Zahra or Zohreh, as the doctor in uncertain about who his addressee is, there are both indices compatible with his utterance in which ADDR(i') is Zohreh and indices compatible with his utterance in which ADDR(i') is Zahra. As Zohreh and Zahra are different individuals, the assignment-function cannot assign a value to x without incurring presupposition failure.

[19] Examples of this in the philosophical literature include Lewis's (1979) two gods who are omniscient as far as propositional knowledge is concerned (i.e., can located themselves in the logical space exactly) but suffer from the unfortunate condition of not knowing who they are, and Perry's (1979) amnesiac in the Stanford library.

(48) The doctor told Zahra [OP [2ND pro$_x$]'s father needs a rare medicine]

The lesson that Schlenker (2003, 2004) draws from this problem reflects what I take to be the common wisdom, namely that the LF representation of indexical pronouns (perhaps pronouns in general) is systematically ambiguous between a structure that contains a *free* individual-denoting variable (paralleling (43c)) and one that does not (paralleling (42)), and, importantly for us, that shifty indexicals are typically (perhaps necessarily) represented in the latter form. Here I will adopt a variant of Schlenker's (2004) particular implementation which is easier to embed in the general framework assumed here. In this variant, every pronoun has the abstract form of a definite description with the descriptive content provided by ϕ-features and an optional variable which is type-shifted with the identity operator, as in (49).[20] (Material in angle brackets are optional.)

(49) [THE [[ϕ-features] $\langle = x \rangle$]]

a. $[\![\text{THE}]\!]^{c,i,g} = \lambda P_{et} : \exists! x P(x).\, \iota x P(x)$

b. $[\![x]\!]^{c,i,g} = g(x)$

c. $[\![=]\!]^{c,i,g} = \lambda x_e . \lambda y_e . x = y$

Crucially, (49) also necessitates systematic re-analysis of the meaning of ϕ-features; these are now assumed to be of type et. The relevant entry for first and second person are given below.[21]

(50) a. $[\![\text{1ST}]\!]^{c,i,g} = \lambda x_e .\, x = \text{AUTH}(c)$

b. $[\![\text{2ND}]\!]^{c,i,g} = \lambda x_e .\, x = \text{ADDR}(c)$

The representation for the second person pronoun, for example, would be (51a) with the denotation given in (51b).

(51) a. you$_{\langle x \rangle}$ $\longrightarrow$ [THE [[. . . 2ND] $\langle = x \rangle$]]

b. $[\![$ THE [[2ND] [$= x$]] $]\!]^{c,i,g}$ = # unless $g(x) = \text{ADDR}(c)$; if defined, $= g(x)$.

c. $[\![$ THE [[2ND]] $]\!]^{c,i,g} = \text{ADDR}(c)$

Note that the variable-full representation in (51a) is synonymous with (43c) and the variable-free representation in (51c) is synonymous with (42). The advantage of the former representation is that by deleting the ϕ-features, a pronoun can now be reduced to an unrestricted variable.

[20] An alternative route would be to analyze shifty indexicals as *de re* pronouns with a *de se* layer 'on top' contributed by the person feature. Adopting Percus & Sauerland's (2003) account of *de re* ascription for simplicity, the idea is that the LF of (45) looks something like (i) where the 'concept-generator' variable G intervenes between the variable x and the first person feature. The reader can verify that the assumptions proposed in Percus & Sauerland (2003) allow the assignment function to map x to Leila if it maps the variable G to Leila's 'self'-concept (approximately, the function that maps every index compatible with Leila's beliefs to the author coordinate of that index, i.e., the individual in that world with whom Leila self-identifies, and, say, is undefined for other indices except possibly for the index of evaluation in which the function simply returns Leila).

(i) Leila believes λG [OP [1st [G pro$_x$]] ~~am~~ hungry]

[21] Appropriate entries for number and gender can be similarly constructed. For familiar reasons having to do with the interpretation of *plural* indexical pronouns, the entries in (50) must be re-stated in terms of *overlap* as opposed to *identity*. For example, $[\![\text{2ND}]\!]^{c,i,g} = \lambda x_e .\, x \circ \text{ADDR}(c)$ (where '$\circ$' is the overlap operator: $x \circ y \Leftrightarrow \exists z(z \leq x \wedge z \leq y)$).

(52) ⟦THE [[2ND] [= x]]⟧^{c,i,g} = ⟦x⟧^{c,i,g} = $g(i)$

This brings us to the second set of assumptions needed to make this analysis work. At this point, the following LF can be generated for our running example (38). What we need in order to generate the unshifted reading is to remove the second person feature in the (underlined) lower copy (as the indexical feature on the lower pronoun will be removed, the problem raised above does not arise; uncertainty regarding the addressee will be possible one the feature on the lower copy is removed and the one on the higher copy is interpreted).

(53) [which . . . [THE [[2ND] [= x]]] . . .]
L told M
[OP I [which . . . [THE [[2ND] [= x]]] . . .] love]

There are more than one ways to design a system in which the feature on the lower copy of the pronoun is not semantically interpreted. As far as I can see all of these collapse for the particular case of examples discussed here.[22] The most salient way to do this, I believe, is to assume that the grammar has access to a deletion operation at the LF interface. This is not enough however, we also need to assume that deletion can target expressions of any size *down to individual features*. (This is broadly in line with Merchant's (2000) 'partial deletion' operation, augmented with the claim that individual features also qualify as candidates for 'partial deletion'.) If so, then in principle deletion can apply to the person feature of the lower copy of the indexical in (53) generating (54) as the result, as desired.

(54) [which . . . [2nd pro$_x$] . . .]
L told M
[OP [1sg pro$_y$] [which . . . [2nd pro$_x$] . . .] love]

If deletion is an operation that the grammar has access to then there *must* be constraints on its application. To begin with, a freely available deletion operation threatens to make copy theory completely vacuous as lower copies can always be freely turned into impoverished structures. Furthermore, free deletion makes a host of undesirable empirical predictions. For example, note that if deletion of features was a freely available option then a sentence like *everybody did my homework* would allow for the reading, everybody x is such that x did x's homework (cf. *everybody did his homework*). This reading can be easily generated if *my* is bound by *everybody* and its features are removed by deletion. The most salient solution, building on some remarks in Fox 1999, is to posit that deletion is subject to an economy constraint that severely limits its application. The intuition is that deletion can only apply if the resulting LF has an interpretation that is 'different' from the original, pre-deletion LF. Furthermore, assuming that the 'cost' of deletion is positively correlated with the size of the deleted constituent, we also posit that deletion can only target the smallest

[22]One possibility, with interesting empirical consequences is this. One could postulate that ϕ-features on lower copies in chains are not interpreted because ϕ-features on *un*pronounced pronouns are in general not interpreted. For example, the first person feature on the bound pronoun in *only I did my homework* and *I did my homework, and you did too* must remain uninterpreted to derive the target readings. One could imagine that this is because in both cases covert instances of the bound pronoun are the culprit (the occurrence of the bound pronoun in the ellipsis site and in the computation of focus-alternatives). An approach along these lines unifies all these cases under one rubric.

constituent possible to yield an LF with a particular interpretation that is different from the original LF's. These two requirements are codified below.

(55) Deletion can target the constituent α of ϕ only if (i) $\phi[\not\alpha]$, i.e., the result of deleting α in ϕ, is not strawson equivalent with ϕ and (ii) there is no α' such that α' is a proper part of α and $\phi[\not\alpha']$ is strawson equivalent with $\phi[\not\alpha]$.

To cash out what it means for two LFs to have different interpretations within a trivalent framework (in which a third truth-value is introduced to capture presupposition failure), (55) relies on the notion of strawson equivalence instead of the more straightforward notion of strict equivalence. According to the latter, two propositions are distinct if and only if it is possible for them to have distinct truth-values. According to the former, weaker notion, two propositions are distinct if and only if it is possible for one of them to be true and the other one be false.

(56) a. ϕ and ψ are strictly equivalent relative to assignment function g iff for any context c and indices i and i', $[\![\phi]\!]^{c,i,g} = [\![\psi]\!]^{c,i',g}$.
b. ϕ and ψ are strawson equivalent relative to assignment function g iff for any context c and indices i and i', if $[\![\phi]\!]^{c,i,g} \neq [\![\psi]\!]^{c,i',g}$ then either $[\![\phi]\!]^{c,i,g} = \#$ or $[\![\psi]\!]^{c,i,g} = \#$.

To see the justification for using strawson equivalence consider again the LF [$_\phi$ *everybody* λx [x *did* [1st pro$_x$]*'s homework*]. We want to prevent deletion from targeting the first person feature of the bound pronoun, thereby generating [$_\phi$ *everybody* λx [x *did* [~~1st~~ pro$_x$]*'s homework*]. Importantly, ϕ and ψ are *not* strictly equivalent. On the standard assumption that presuppositions triggered in the scope of the universal quantifier project universally to root, as soon as the domain of quantification contains an individual distinct from the speaker, ϕ is undefined (has the third truth-value) while ψ is either true or false depending on the facts; therefore it is indeed possible for the two to have distinct truth-values. What *is* impossible, however, is to find a world in which *both LFs are defined* but have distinct truth-values. If ϕ is defined then the domain of quantification contains only the speaker; if so, then either both sentences are true or both are false depending on whether the speaker has done her homework or not. If we want to prevent deletion from generating ψ from ϕ, then, we need to assume that what counts as 'having different meanings' is 'not being strawson equivalent'. Let us note that the LFs in (53) and (54) are indeed non-strawson equivalent and, therefore, deletion can be legitimately applied to the former to derive the latter. The reason in a nutshell is that whether or not the indexical feature in the lower copy of (53) is interpreted has consequences for the *denotation* of the pronoun in the lower copy: if the indexical feature is present the pronoun refers to the attitude-holder (simplifying somewhat) and if it is not present the pronoun refers to the actual speaker. The choice between the two has truth-conditional repercussions beyond the presuppositions making the two sentences non-strawson equivalent.

Finally, to see the justification for the second clause of (55) (beyond *a priori* considerations pertaining to economy) note that we need to make sure that deletion is not allowed to completely remove the material in the lower copy (thereby generating a structure which is very similar to the one generated by trace theory). Doing that would indeed generate a new meaning, much as before (because it involve deleting the indexical feature *inter alia*), but it would also mean that any r-expression in the restrictor of *which* gets removed with the consequence that movement is now

predicted to bleed Condition C; i.e., the second problem mentioned in the previous section would remain unsolved. The current formulation of (55), however, makes sure that only the *smallest* possible constituent can get removed, i.e., the indexical feature, leaving the rest of the material in the lower copy (including potential r-expressions) intact.

Let us recap. The goal of this section was to design a method whereby the two problems mentioned in the previous section can be addressed without discarding either copy theory of movement or the operator-based account of indexical shifting. We noted that there is a way of doing this which is entirely stipulative, i.e., the brute force approach. To achieve a more principled solution we introduced certain assumptions regarding the LF representation of shifty indexicals and deletion at the LF interface. As explained above, the economy condition on deletion makes sure that this approach solves one of our problems: unshifting is not predicted to bleed Condition C. Unfortunately, however, this approach does not solve the other problem: although we have a way to derive the desired LF in (54) which yields the target truth conditions, we have no way of preventing the double-access LF derived by using the non-assignment-dependent entry of the shifty indexical (which, recall, we need in order to solve the problem of shifty indexicals under attitudes that involve uncertainty regarding the identity of one of the coordinates). Consequently in this framework we predict that the double-access LF is indeed generated by the grammar. As briefly pointed out in Section 3, however, this problem might not be so bad after all. Perhaps there is an independent reason to block double-access LFs. The nature of such a constraint, then, remains to be explicated in future work.

Furthermore, as I made explicit above, the approach outlined in this section relies crucially on a deletion operation at the LF interface. As far as I know, there is no independent evidence for such an operation.[23] As we will see in the section, if one is willing to adopt the variable-based account of indexical shifting, a single modification of the SHIFT TOGETHER! constraint (which itself is needed to avoid over-generation in that system) solves both of the problems, including the problem of double-access LFs, without relying on an operation of deletion at all.

5 Copy theory and the variable-based account of indexical shifting

The core claim of the operator-based approach to indexical shifting, as sketched in Section 1, is that the shifted readings of indexicals in indirect discourse result from the presence of a covert context-shifting operator which occupies the left periphery of the embedded clause and which is licensed by only certain attitude predicates as a matter of, *inter alia*, their lexically determined selectional requirements. In contrast, the core claim of the variable-based analysis, which is the focus of this subsection, is that the shifted reading of an indexical results from it being bound by a local context abstractor.

[23] There are other questions that one might ask about the proposal in this section. For example, one might worry about an over-generation problem caused by deletion. What happens if, in (53), deletion targets the indexical feature of the *higher* copy and not the lower one? What if it targets both? These questions are potentially problematic for this approach. I leave a proper discussion of these questions to future work.

Various implementations of the variable-based account are conceivable with subtle empirical and conceptual differences (Schlenker 1999, 2003; see also von Stechow 2004 for an attempt in the same spirit). For our purposes here the following "toy" implementation will do just fine: (i) LFs allow for explicit representation of context variables and abstractors; in particular, every LF must be closed off by a context abstractor λc_0 (the 'matrix' abstractor, which as a matter of principle is always fed the actual context of utterance), (ii) (at least some) attitudinal predicates quantify over, not possible worlds (or world-time pairs), but contexts and therefore may introduce context abstractors in their scopes, and (iii) indexical expressions involve context variables lexically equipped with features that determine their binding possibilities: in languages that do not allow indexical shifting, every indexical is lexically restricted to be bound by λc_0 while in other languages an indexical may be free to be bound either by λc_0 or a local binder.[24] Here, it suffices to view indexical pronouns as context variables with person features which determine which coordinate of the context they refer to, as in (57).[25]

(57) a. $[\![\text{1st-c}_i]\!]^g = \textsc{auth}(g(i))$, $[\![\text{2nd-c}_i]\!]^g = \textsc{addr}(g(i))$[26]

b. $\lambda c_0 \ldots$ A told B $[\lambda c_2 \ldots \text{1st-c}_i \ldots] \ldots$[27]
If $i = 0$: not shifted, reference to the actual speaker.
If $i = 2$: shifted, reference to the reported speaker, A.

It is often claimed (Anand & Nevins 2004; Anand 2006; Deal 2017) that the operator-based approach to indexical shift is superior to the veteran, variable-based approach because the former yields a principled explanation of Shift Together! (and, more generally, ***No Intervening Binder***) while the latter needs to stipulate this. In other words, in general nothing prevents the variable-based system to generate the LFs in (58) which violate Shift Together!.[28]

[24]Note that something also needs to be said, in the variable-based framework, to explain the fact that even in languages that do allow indexical shifting, only certain predicates license indexical shifting. In Farsi, for example, speech-report predicates like *goftan* allow indexical shifting while predicates of belief do not. One way or the other, then, assumption (ii) in the text needs to be modified. One possibility is that only predicates that allow indexical shifting introduce context abstractors in their scope. Another possibility is that every predicate (that quantifies over contexts) may in principle introduce context abstractors but the semantics of only some predicates is such that binding to the introduced context abstractor amounts to indexical shifting. Other possibilities are conceivable, none particularly elegant. The issue is orthogonal to our purses here and is therefore ignored in the body of the text.

[25]In other words, we need not be explicit about those features that determine whether the indexical must be matrix-bound or not, we assume that indexicals under discussion here, i.e., the first and second person pronouns in Farsi, do not involve any restriction of this sort (because they may or may not shift). We furthermore abstract away from gender (which is not encoded in Farsi to being with) and number features assuming singular marking throughout.

[26]To avoid clutter I am suppressing type / sortal restrictions, specifically the requirement that the index i, in both entires, needs to be mapped by g to a context.

[27]Schematic LFs of this kind are adopted to avoid getting into the question of whether, in a variable-based system, indices (traditionally, world / situation variables) *need* to be represented at LF on top of contexts or not.

[28]There are variants of the variable-based system which do derive Shift Together!. For example, if one assumes that there is only one context variable, c_0 and that certain predicates can optionally introduce context-abstractors, then, with some technical details straighten out, one arrives at a system which is essentially notational variant of the simplest operator-based system (in which there is only one operator that shifts all coordinates of the context) and, from the present perspective, suffers from the same short comings; see also fn. 24 of Deal 2017).

(58) a. $\lambda c_0 \ldots$ A told B $[\lambda c_2 \ldots$ 1st-$c_2 \ldots$ 2nd-$c_0 \ldots] \ldots$
b. $\lambda c_0 \ldots$ A told B $[\lambda c_2 \ldots$ 1st-$c_0 \ldots$ 2nd-$c_2 \ldots] \ldots$

Whether SHIFT TOGETHER! can be used as an argument in favor of the operator-based approach depends ultimately on whether the formulation of SHIFT TOGETHER! which the operator-based approach derives as a descriptive generalization is in fact empirically adequate. If the analysis provided in this section is correct then SHIFT TOGETHER! is more flexible than the operator-based account allows, and this particular argument in favor of the operator-based account is in effect turned into an argument against it.

In (59) an explicit formulation of SHIFT TOGETHER! as a stipulation in the variable-based system is provided. I take (59) to be merely a precisification of SHIFT TOGETHER! as described in Anand 2006. In other words, (59) is more or less what SHIFT TOGETHER! should amount to, according to the operator-based account.[29] Within the variable-based system, a constraint like (59) can be thought of as an aspect of a binding theory of context variables (cf. Percus 2000).[30]

(59) a. *SHIFT TOGETHER!* Indexical expressions that occur in the same minimal domain must be bound by the same context abstractor.
b. Let α be an occurrence of an indexical in LF ϕ. The minimal domain of α in ϕ, $\text{MD}(\alpha, \phi)$, is the smallest CP / TP of ϕ that dominates α.
c. Two occurrences of indexicals α_1 and α_2 in LF ϕ are in the same minimal domain iff $\text{MD}(\alpha_1) = \text{MD}(\alpha_2)$. (*to be revised*)

Now, what if an indexical occurs in a chain? In that case, (59) predicts that two different copies of the same indexical may *have to* be bound in some cases by different abstractors. To see this, consider the schematic LF in (60), where the binding possibilities of the two copies of the second person indexical are to be determined.

(60) $[_\alpha \lambda c_1 \ldots$ [which $\ldots$ 2nd-$c_i \ldots] \ldots$
A told B
$[_\beta \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which $\ldots$ 2nd-$c_j \ldots] \ldots] \ldots]$

[29] This is not exactly correct. Consider a sentence like *Leila told Mina* $[_\phi$ *I think* $[_\psi$ *you are smart*$]]$. Here the MD of *I* is ϕ while the MD of *you* is the smaller ψ. SHIFT TOGETHER! as formulated in the text predicts that it should be possible for *you* to shift even if *I* does not, contrary to fact (based on Farsi judgments). Evidently in determining minimal domains, not every CP / TP is taken into account. The (ugly) solution is to introduce the set of predicates that allow indexical shifting, call it S, and modify (59b) along these lines: the minimal domain of α in ϕ is the smallest CP / TP of ϕ which (i) dominates α, and (ii) is either the matrix CP / TP or is immediately embedded by a predicate that belongs to S. According to this modification the MD of *you* in the above example is ϕ; ψ is ruled out because it is neither the matrix CP / TP nor immediately embedded by a context-shifting predicate.

[30] The more general ***No Intervening Binder*** can be formulated as follows. The reader can verify that ***No Intervening Binder*** yields SHIFT TOGETHER! as a special case when $\text{MD}(\beta) = \text{MD}(\alpha)$ (i.e., $\text{MD}(\beta) \sqsubseteq \text{MD}(\alpha)$ and $\text{MD}(\alpha) \sqsubseteq \text{MD}(\beta)$).

(i) a. ***No Intervening Binder.*** Let α and β be two occurrences of indexicals in LF ϕ. If $\text{MD}(\beta) \sqsubseteq \text{MD}(\alpha)$ then $\text{MD}(c_\beta) \not\sqsubset \text{MD}(c_\alpha)$.
b. Let α be a particular occurrence of an indexical pronoun or context abstractor in the LF ϕ. The minimal domain of α, notated $\text{MD}(\alpha)$, is the smallest CP / TP of ϕ that contains α.
c. For any indexical expression α in ϕ, c_α is the context abstractor in ϕ that binds α.
d. Let C_1 and C_2 be two subconstituents of the LF ϕ. Then $C_1 \sqsubset C_2$ iff C_1 is a (proper) subconstituent of C_2 and $C_1 \sqsubseteq C_2$ iff either $C_1 = C_2$ or $C_1 \sqsubset C_2$.

First, we need to determine the MD's of the three occurrences of the indexicals in (60): (a) the smallest CP / TP that contains the first person pronoun is β, (b) the smallest CP / TP that contains the higher copy of the second person pronoun is α, and, finally, (c) the smallest CP / TP that contains the lower copy of the second person pronoun is β. From (a) and (c) it follows by (59) that the lower copy of the second person indexical must be bound by the same abstractor that binds the first person pronoun, i.e., $j = 2$. The MD of the higher copy of the second person pronoun, however, is different (that is, it is larger) therefore there is no need for the higher copy to be co-indexed with λc_2. It must be, then, that the higher copy is bound by the matrix abstractor, i.e., $i = 1$. The only licit resolution of i and j, then, leads to (61) which is precisely the double-access LF that we need to block.

(61) $[_\alpha\ \lambda c_1 \ldots$ [which ... 2nd-c_1 ...] ...
A told B
$[_\beta\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_2 ...] ...] ...]

The core problem here is that the MD of the lower copy is determined to be the embedded clause by definition (59b).

I would like to suggest an *ad hoc* modification of (59) that changes this. Specifically, I'd like to propose that the *head* of the chain dictates the minimal domain of the lower copies: if an indexical occurs in a chain then its MD is the same as that of the highest copy. This modification can be captured by a slightly different formulation of definition of minimal domains given in (59b).

(62) Let α be a particular occurrence of an indexical in LF ϕ. The minimal domain of α in ϕ, $\textsc{md}(\alpha, \phi)$, is the smallest CP / TP of ϕ that dominates *the highest copy of* α in ϕ.[31]

Let us see how the variable-based analysis, supplemented with (59) as modified in (62) solves both of the problems mentioned above when combined with the standard formulation of copy theory. Consider the LFs in (63). These four LFs exhaust the logically possible options *vis-à-vis* the binding of the indexical pronouns. (The embedded first person pronoun is shifted by assumption.) Note that the minimal domains of the indexicals are the same in all four cases, as their structural location is constant. They only differ in binding relations.

(63) a. $[_\alpha\ \lambda c_1 \ldots$ [which ... 2nd-c_1 ...] ...
A told B
$[_\beta\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_1 ...] ...] ...]

b. $[_\alpha\ \lambda c_1 \ldots$ [which ... 2nd-c_1 ...] ...
A told B
$[_\beta\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_2 ...] ...] ...]

c. $[_\alpha\ \lambda c_1 \ldots$ [which ... 2nd-c_2 ...] ...
A told B
$[_\beta\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_2 ...] ...] ...]

d. $[_\alpha\ \lambda c_1 \ldots$ [which ... 2nd-c_2 ...] ...
A told B
$[_\beta\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_1 ...] ...] ...]

[31] If α does not occur in a chain, then I assume it is its own 'highest copy' in a trivial sense.

LFs (63c) and (63d) are immediately ruled out as the indexical in the higher copy in both cases is co-indexed with the embedded context abstractor which does not c-command them. What the exact reason is to rule out (63c) and (63d) is theory-dependent. Within the toy model that I have sketched, it suffices to assume that context variables must be bound: contexts cannot be referred to via deixis.

This leaves us with (63a) and (63b). As to the latter, which amounts to the problematic double-access LF, notice that by (62) the minimal domain of the second person pronoun in both copies is effectively the matrix CP. Consequently, (63b) now violates SHIFT TOGETHER!, a prediction which can be thought of "vertical shift together". The only LF in (63), therefore, which survives is (63a) which represents exactly the reading of (31b) in which the second person pronoun in the restrictor of *kudum* is unshifted. Finally, note that no application of deletion is required to generate the reading denoted by (63a) (assuming that the grammar has access to such a operation to begin with). It follows from economy, then, that deletion is barred from applying here and Condition C is not predicted to be bled as the material in the lower copy, including possible r-expressions, remain intact.

One theory-internal point is worth discussion at this point. Consider again the LF in (63b), repeated below. As pointed out above, (62) makes sure that this LF is ruled out by SHIFT TOGETHER!. But notice that in this LF the two copies of the context variable carry two distinct indices, i.e., are two different variables. But if these two are *copies* then perhaps this should not be allowed on independent grounds. Specifically, one might think that we can drop (62) and simply keep in mind that in copy theory movement is a *copying* operation, and copies are identical by definition.

(64) $[_{\alpha}\ \lambda c_1 \ldots$ [which ... 2nd-c_1 ...] ...
A told B
$[_{\beta}\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which ... 2nd-c_2 ...] ...] ...]

Two remarks are in order. First, although copies are by definition identical there might be processes that apply *after* copies are generated that manipulate one copy but not the other one, causing divergence. Indeed we have already discussed two such 'post-syntactic' processes: trace conversion and deletion. The relevant characterization, then, is this:

(65) Elements of a chain are identical *modulo* post-syntactic operations such as trace conversion, deletion and so on.

The crucial question, then, is whether indexation of pronouns, including 'context pronouns' is a post-syntactic operation or not. If it is not, then indeed (63b) is ruled out by (65). If it is, then whether (63b) is ruled out or not depends on constraints on the indexation process.

Second, and more to the point, even if indexation is not a post-syntactic process (62) is still necessary. To see this, suppose indexication is not a post-syntactic process. On this assumption, we can only generate two LFs for our running example one of which is (63a), repeated below (the other LF, which I put aside, is one in which no indexical shifts). The problem is that if we adopt the standard version of SHIFT TOGETHER! given in (59) this LF is ruled out. Note that the MD of the lower copy of second person pronoun in this LF, according to the definition in (59b), is *the embedded clause*. As a result SHIFT TOGETHER! blocks this LF and we are left with only one possible LF, one in which no indexical shifts.

(66) $[_{\alpha}\ \lambda c_1 \ldots$ [which $\ldots$ 2nd-$c_1 \ldots$]$\ldots$
A told B
$[_{\beta}\ \lambda c_2 \ldots$ 1st-$c_2 \ldots$ [which $\ldots$ 2nd-$c_1 \ldots$] $\ldots$] $\ldots$]

To summarize, then, (62) is necessary independently from whether indexation of pronouns is a post-syntactic process or not; i.e., independently from whether different copies of a pronoun are allowed carry difference indices.

What we have seen in this subsection is that if we are willing to adopt the variable-based account of indexical shifting, then the problems described in the previous section receive a uniform solution by a simple modification of the SHIFT TOGETHER! constraint which needs to be stipulated in this framework on independent grounds.

Before closing this section, I would like to point out that there might be independent motivation for the way in which SHIFT TOGETHER! was modified on this analysis. Specifically, we think of SHIFT TOGETHER! as a principle of binding theory for context variables. From this perspective, SHIFT TOGETHER! is rather similar to Conditions A and B of (standard) binding theory, as all three conditions are domain-dependent. I would now like to sketch an argument to the effect that the same modification that was made to SHIFT TOGETHER! (i.e., that the minimal domain of indexicals that occur in chains is determined by the head of the chain) might be needed for Condition A as well.

Consider the (English) example in (67). This sentence is acceptable, and in particular, it does not violate Condition A.[32]

(67) John asked [which picture of himself] Mary saw.

Now, the LF of this sentence under copy theory would be (68).

(68) John asked [which picture of himself] Mary saw [which picture of himself].

On a standard formulation of Condition A, given in (69), the lower copy of the anaphor violates Condition A, generating the prediction that (67) should be unacceptable, contrary to fact.

(69) **Condition A.** Anaphors must be bound by (or be co-referential with) some element in their local domain, where the local domain of an anaphor is the smallest XP that has a subject and contains it.

One might attempt to solve this problem by deleting the lower copy, as in (70).

(70) John asked [which picture of himself] Mary saw [which ~~picture of himself~~].

Here, too, Condition C can be used to test whether the material in the lower copy is deleted or not. Consider the paradigm in (71).

(71) a. *John asked [which picture of himself and Mary$_i$] she$_i$ saw.
b. John asked [which picture of himself and Mary] Bill saw.
c. John asked [which picture of himself and Mary$_i$] her$_i$ father saw.

The judgments are subtle, but if the contrast between (71a), on the one hand, and (71b) and (71c), on the other, proves robust, then the paradigm in (71) furnishes a

[32] A standard formulation of Condition A suffices here: This would be the embedded TP in (67).

strong piece of evidence in against of the analysis in (70). But notice that if we perform the same move for Condition A that was proposed above for SHIFT TOGETHER!, cf. (72), this problem disappears. On the formulation of Condition A in (72), the lower copy of the anaphor in (68) does not violate Condition A because its local domain is extended by the movement, and is the same as the local domain of the higher copy (i.e., the local domain in both cases is the matrix TP).

(72) **Condition A. (revised)** Anaphors must be bound by (or be co-referential with) some element in their local domain, where the local domain of an anaphor is the smallest XP that has a subject and contains the occurrence of the anaphor at the head of the chain.

6 Conclusion

I pointed out two problems that arise when copy theory of movement is naively combined with the operator-based account of indexical shift. I discussed two possible ways to tackle these problems. In the first approach auxiliary assumptions are introduced to fix these problems keeping copy theory and the operator-based account constant. As pointed out, this approach faces a number of challenges. In the second approach the operator-based account is dismissed in favor for of the variable-based analysis of indexical shift. I argued that once this move is made, a fairly natural modification of an independently needed stipulation, i.e., SHIFT TOGETHER!, provides a unified solution to both problems.

It thus appears that the variable-based approach has an advantage over the operator-based approach as far as the data in this paper are concerned. It should be emphasized, however, that the variable-based solution comes at the high price of discarding the operator-based approach altogether, raising worries about the possibility of having thrown the baby out with the bath-water (for a recent review of the main arguments in favor of the operator-based approach see Deal 2017). It might be, then, that the first approach sketched above is in fact on the right track after all and the double-access problem has an independent solution. We leave the resolution of this dilemma to future work.

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