

Featural Variables*

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Abstract. A long line of research takes some sign language loci to be the overt realization of variables. But as argued in Kuhn (to appear), this analysis fails in ASL in two cases. (i) First, loci sometimes appear to be inherited through agreement rather than directly interpreted, in particular in those environments in which *phi*-features are known to remain uninterpreted (= 'Kuhn's Generalization'). (ii) Second, there are cases in which one and the same locus can refer to different individuals, in contradiction with the predictions of the standard theory. Kuhn concludes that sign language loci are an open class of features rather than of variables; and he provides a variable-free treatment of them, although without accounting for their deictic uses. While granting the correctness of Kuhn's Generalization, we offer an alternative in which ASL loci are *both* features and variables: some loci (in particular deictic ones) obtain their value from an assignment function, and introduce presuppositions on the value of other (covert) variables; but loci are also subject to the same rules of agreement as *phi*-features, and they can thus remain uninterpreted in some other environments. We discuss their behavior both from the perspective of morpho-syntactic and of semantic theories of (apparent) feature agreement. Finally, we argue that in the tense domain spoken languages also have expressions that are featural while also containing a variable element.

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1 Loci as variables or loci as features?

1.1 Loci as variables

Lillo-Martin and Klima 1990 argued that logical variables or 'indices', which are usually covert in spoken languages, can be overtly realized in sign language by positions in signing space or 'loci'. In case a pronoun is used deictically or indexically, its locus usually corresponds to the actual position of its denotation, be it the speaker, the addressee, or some third person (e.g. Meier, to appear). If the pronoun is used anaphorically, the antecedent typically establishes a locus, which is then 'indexed' (= pointed at) by the pronoun. In (1)a (ASL), the sign names *Bush* and *Obama* establish loci by being signed in different positions; in (1)b, the antecedent DPs are accompanied with pointing signs that establish the relevant loci. In quantificational examples, indexing disambiguates among readings, as in (2) (LSF).

- (1) a. IX-1 KNOW BUSH_a IX-1 KNOW OBAMA_b. IX-b SMART BUT IX-a NOT SMART.
'I know Bush and I know Obama. He [= Obama] is smart but he [= Bush] is not smart.'
b. IX-1 KNOW PAST PRESIDENT IX-a IX-1 KNOW NOW PRESIDENT IX-b. IX-b SMART BUT IX-a NOT SMART.
'I know the former President and I know the current President. He [= the current President] is smart but he [=the former President] is not smart.'
(ASL; 4, 179; Schlenker 2011)
- (2) DEPUTY_b SENATOR_a CL_b-CL_a IX-b a-TELL-b IX-a / IX-b WIN ELECTION
'An MP_b told a senator_a that he_a / he_b (= the deputy) would win the election.' (LSF; 4, 233)

In addition, it was argued in recent research that *if* loci are indeed the realization of indices, they can shed new light on some foundational issues in semantics, for instance on the necessity of a dynamic logic to handle anaphora (Schlenker 2011), on the existence of a uniform anaphoric system in the nominal, temporal and modal domains (Schlenker 2012), or even on the very nature of variables (Schlenker et al. 2013).

1.2 Kuhn's objections

Against this tradition, Kuhn (to appear) argues that loci are features rather than variables. He gives two arguments: first, there are uninterpreted loci under *only*; second, multiple occurrences of the same locus may refer to different individuals.

□ *Variable capture: uninterpreted loci under 'only'*

Kuhn shows that under *only* the loci-as-variables view undergenerates, as in (3). (Both Kuhn's and our ASL examples are assessed on a 7-point scale, with 7 = best; numerical averages appear in lieu of the standard *, ?, ??, etc., right before the examples.¹)

¹ Original data were elicited using the 'playback method' (see e.g. Schlenker et al. 2013 and Schlenker 2014): repeated quantitative acceptability judgments and repeated inferential judgments were obtained from our consultant on separate days, on videos involving minimal paradigms. Glossing conventions are standard for sign language research, with *IX-a* encoding a pronoun ('index') pointing towards locus *a*, and with the subscript *a* on *BUSH_a* (as in (1)a) indicating that the expression *BUSH* was signed in locus *a*. Numbers following the examples (e.g. 4, 179 in (1)) are the references of the corresponding videos.

- (3) 7 IX-a JESSICA TOLD-ME IX-b BILLY ONLY-ONE FINISH-TELL POSS-b MOTHER POSS-b FAVORITE COLOR.

'Jessica told me that only Billy told his mother his favorite color.'

Can be read as: bound-bound, bound-free, free-bound, or free-free. (Kuhn, to appear)

Let us focus on the (available) 'bound-free' reading, on which the boxed possessive is read as bound by *ONLY-ONE* while the underlined possessive refers to Billy.² For the boxed possessive POSS-b to be bound, *ONLY-ONE* must somehow bind this variable, say by way of a Logical Form akin to (4), with the assumption that *IX-b BILLY* comes with a requirement that *b* denotes Billy, and that there is an empty copula preceding *ONLY-ONE* to yield a meaning such as: 'Billy is the only person who...'.³

- (4) IX-b BILLY ONLY-ONE λb t_b FINISH-TELL POSS-b MOTHER POSS-b FAVORITE COLOR
But if the boxed possessive POSS-b is bound by λb , the underlined pronoun POSS-b, which is lower in the structure, cannot get a deictic reading on which it denotes Billy.³

On the view that loci may be interpreted, these data suggest that there are some environments in which they can be disregarded as well. Precisely this view is standard for *phi*-features, which are believed to be interpreted on free pronouns but to remain uninterpreted on bound variables under *only*; this similarity between loci and *phi*-features is what we call 'Kuhn's Generalization'. There are two general directions to analyze the behavior of *phi*-feature under *only*.

- (i) According to *semantic analyses*, a feature *F* on a pronoun *pro* remains uninterpreted *due to its semantics* in the focus dimension (Heim 2005, Spathas 2007, Jacobson 2012).

² In fieldwork with a consultant that Kuhn also worked with, we elicited a different paradigm in which the context was strongly biased towards a bound-free interpretation, as shown in (i)a. We believe that these further data confirm Kuhn's insights.

(i) JOHN J_a BILL B_b MARY M_c THE-THREE-a,b,c COP TEAM. YESTERDAY THE-THREE-a,b,c FIND IX-c PREGNANT. EVENING DISTRIBUTE HOME CONVERSATION-rep.

'John, Bill and Mary are a team of cops. Yesterday, they found out that Mary is pregnant. In the evening, they each had a conversation in their respective homes.'

a. 7 THE-THREE-a,b,c ONLY-CL-c FEEL ANXIOUS BEFORE IX-c ANNOUNCE IX-c PREGNANT.

Of these three, only Mary felt anxious before she announced that she was pregnant.' (ASL; 22, 92b; 3 trials)

b. 6.3 BEFORE IX-c ANNOUNCE IX-c PREGNANT THE-THREE-a,b,c ONLY-CL-c FEEL ANXIOUS.

Before she announced that she was pregnant, of these three, only Mary felt anxious.' (ASL; 22, 94b; 3 trials)

When asked what one could infer about John, our informant noted on the first trial that (i)a, but not (i)b, lead to the inference that John told his family that Mary was pregnant. On the other two trials, he noted that (i)a but not (i)b weakly implied that John might have told his family about Mary's pregnancy. These preliminary facts can be explained if (i)a has a reading on which IX-c is bound and IX-c is free, and *BEFORE* triggers a (weak) factive presupposition, which is then projected according to the rule in (22) below. In (i)b, the *BEFORE*-clause is not in the scope of *ONLY-CL-c*, hence no bound reading is available. These data could be theoretically helpful because the *BEFORE*-clause is presumably an island for the covert movement of pronouns. If so, we can reiterate Kuhn's argument as follows: in (i)a, IX-c can get a bound reading, which shows that the temporal clause is in the scope of *ONLY-CL-c*. IX-c is trapped in the same island, and yet has a strict reading. But it couldn't be that the very same variable *c* has a bound and a strict reading in this configuration. (Note that Kuhn's example in (3) might include an island as well if *ONLY-ONE* has a relative clause as its sister.)

³ The same issues arise in examples with ellipsis. But these arguably involve independent problems: in ellipsis resolution, it has been argued that a Logical Form with a bound variable representation can give

An implementation for feminine features is sketched in (5). For ease of comparison with the rest of our discussion, we adopt a (presuppositional) framework compatible with a variable-full treatment, as in Rooth 1996.

- (5) Let E be an expression of type e and f a feminine feature, F a focus marker, and $[[\bullet]]^{O,c,s,w}$ and $[[\bullet]]^{F,c,s,w}$ the ordinary and focus values of \bullet under a context c , an assignment function s and a world w .
- a. $[[E^f]]^{O,c,s,w} = \#$ iff $[[E]]^{O,c,s,w} = \#$ or $[[E]]^{O,c,s,w}$ is not female in the world of c . If $[[E^f]]^{O,c,s,w} \neq \#$, $[[E^f]]^{O,c,s,w} = [[E]]^{O,c,s,w}$.
 - b. $[[E^f]]^{F,c,s,w} = \{[[E]]^{O,c,s,w}\}$ (i.e. the feature f plays no role in the focus dimension)
 - c. $[[E^f]]^{F,c,s,w} = [[E_F]]^{F,c,s,w} = E$, the set of individuals.

To illustrate, we assume that the ordinary value in (6)a is computed as usual, hence a feminine presupposition; while the focus value in (6)b ignores the features on *her*:

- (6) a. $[[\text{Mary}_F \lambda i t_i \text{ did her}_i \text{ homework}]]^{O,c,s,w} = [\lambda x. \# \text{ unless } x \text{ had a homework to do and } x \text{ is female; if } \neq \#, 1 \text{ iff } x \text{ did } x\text{'s homework}](\text{mary})$
 b. $[[\text{Mary}_F \lambda i t_i \text{ did her}_i \text{ homework}]]^{F,c,s,w} = \{\lambda x. \# \text{ unless } x \text{ had a homework to do; if } \neq \#, 1 \text{ iff } x \text{ did } x\text{'s homework}\}(D) = \{[\lambda x. \# \text{ unless } x \text{ had a homework to do; if } \neq \#, 1 \text{ iff } x \text{ did } x\text{'s homework}](d) : d \in D\}$

If *only* works on top of (6), f will play no role in the focus dimension, as is desired.

(ii) According to *morpho-syntactic analyses*, a feature F on a pronoun *pro* can remain uninterpreted if *pro* is bound by an element with feature F – henceforth 'deletion under agreement' (see Heim 1991, 2008, Kratzer 2009, Schlenker 1999, 2003, Stechow 2004). A simple-minded rule is displayed in (7)-(8), where the gender/person features ~~*her*~~_{*i*} and ~~*my*~~_{*i*} remain uninterpreted.

- (7) a. Optionally delete the feature F of a variable v^F if (i) v^F appears next to a λ -abstractor λv^F , and the appearance of λv^F is triggered by an expression with feature F , or (ii) v^F is bound by λv^F .⁴
 b. λ -abtractors inherit the features of the expressions that trigger their appearance.
- (8) In my study group,
 a. only Mary did her homework (... therefore John didn't do his).
 a'. only Mary $\lambda i^{\text{fem}} t_i$ did ~~*her*~~_{*i*} homework
 b. only I did my homework (... therefore others didn't do theirs).
 b'. only I $\lambda i^{\text{+st}} t_i^{\text{+st}}$ did ~~*my*~~_{*i*} homework

We add for future reference that Schlenker 1999 and Stechow 2004 posit that expressions like *now* can trigger the deletion of present tense features as well (this point will matter in the analysis of (10) below). For Schlenker 1999, this is because interpretable features are maximally used to constrain the denotation of expressions of referential type, hence the present tense feature can be added to *now*. The motivation lies in examples such as (9)a, analyzed as (9)b – where i_k is a time variable, which despite its present tense features can range over past moments as well. Tense features are deleted by agreeing with *unpronounced* features on *now*.⁵

rise to a strict reading in the elided clause (Fox 2000, Schlenker 2005). This is the reason the present discussion solely appeals to strict readings under *only*.

⁴ As far as we can tell, (i) is immaterial for the spoken languages that have been described, because features cannot be assigned values by λ -operators. Things will be different when we consider (20) below.

⁵ For Stechow 2004, by contrast, *now* doesn't itself carry the feature (as it is of type $\langle i, \langle it, t \rangle \rangle$ rather than i), but associates with a time variable that carries the relevant feature.

Note that Bulgarian definite descriptions might be similar to *now* in being able to 'acquire' a feature which is not overtly spelled out, but triggers agreement phenomena (this is also the behavior we attribute to the ASL expression for *the tall man* in (10) below). Thus in (i)a, the plural description, which is unmarked

- (9) a. Only now is the Concord in Paris. (Therefore it wasn't there before.) (Schlenker 1999)
 b. only now^{pres} λi^{pres} i_k^{pres} be the Concord in Paris

Kuhn's Generalization can be further strengthened by considering the behavior of feature-like elements within sign language itself. Schlenker 2014 argues that height specifications of loci behave like *phi*-features in that (i) they normally have a presuppositional semantics (e.g. high loci normally denote tall, important or powerful individuals), while (ii) under *only* (and ellipsis), they can remain uninterpreted. The data about *only*, illustrated in (10), suggest that Kuhn is exactly right: not just loci but other feature-like elements can be disregarded under *only*. As was the case for *now* in (9), we must posit in (10) that the subject HEIGHT_a (signed neutrally, and meaning something like 'the tall one') is given a 'high' feature (compatible with its semantics), which in turn triggers feature deletion on the boxed object pronoun, as in (10)b.

- (10) *Context*: Tomorrow there is a swimming competition. A French team with a giant in it competes against a German team with a dwarf in it.
 a. 7 COMPARE [FRENCH VERY HEIGHT MAN]_a [GERMAN SHORT-PERSON]_b ONLY HEIGHT_a^[high] LIKE PEOPLE SUPPORT [IX-a^{high}].
Preferred reading: bound variable
 'Comparing the very tall French man and the short German person, only the tall man likes people who support him.' (ASL, 17, 71; Schlenker 2014)
 b. only height^{high} λk^{high} k^{high} like people who support [pro_k^{high}]

□ *Locus re-use*

Kuhn (to appear) offers a second argument against the loci-as-variables approach. In (11) a single locus is assigned to John and Mary, and another locus is assigned to Bill and Suzy. As a result, the boxed occurrences [IX-a] and [IX-b] refer to John and Bill respectively, while the underlined pronouns IX-a and IX-b refer to Mary and Suzy.

- (11) 6 EVERY-DAY, JOHN_a TELL MARY_a [IX-a] LOVE IX-a. BILL_b NEVER TELL SUZY_b [IX-b] LOVE IX-b.
 'Every day, John_i tells Mary_j that he_i loves her_j. Bill_k never tells Suzy_l that he_k loves her_l.' (ASL, Kuhn, to appear)

As Kuhn observes, this example is problematic for the variable-based view. The initial association of the proper name *JOHN* with variable *a* should force *a* to refer to John;

for person, still triggers first person agreement on the verb. Furthermore, it is unlikely that this is due to a null pronoun co-occurring with a left-dislocated description, as left-dislocation is degraded with an overt pronoun, as shown by (i)b.

- (i) a. Visokite zheni imame hubavi drehi.
 the-tall women have-1st-plural nice clothes
 'We the women have nice clothes.'
 b. ??Visokite zheni, nie imame hubavi drehi.
 the-tall women we have-1st-plural nice clothes (R. Pancheva, p.c.)

Crucially, despite the fact that definite descriptions are morphologically unmarked for person, they can trigger deletion of first person plural features under *only*, as in (ii)a (where verbal first person features must be deleted) and in (ii)b (where both verbal and pronominal features must be deleted). One possibility is that the subject has the representation [*the-women*]^{1st plural}, and that the subscripted feature triggers deletion of the same feature lower in the structure – just as the feature *pres* in (9)b.

- (ii) a. Samo zhenite imame hubavi drehi.
 only the-women have-1pl nice clothes
 'Only we the women have nice clothes.'
 b. Samo zhenite se grizhim za nashite figuri.
 only the-women refl take-care-1pl for our figures
 'Only we the women take care of our appearance.' (=> bound reading) (R. Pancheva, p.c.)

but then how can *a* also refer in the same clause, and without any intervening binder, to Mary? By contrast, these data are unproblematic for the feature-based analysis of loci: just like two DPs may bear the same feminine gender features while denoting different individuals, so it is with loci-as-features. (There might be pragmatic constraints – such as clarity – that explain why this pattern isn't more prevalent in sign languages.)

□ *Kuhn's theory*

Kuhn (to appear) solves these problems by treating loci as features which are not interpreted (so that neither the problem of variable capture nor of variable re-use can arise in the first place), but are inherited by a mechanisms of morpho-syntactic agreement; this allows him to provide a variable-free treatment of loci. He accepts the consequence that features need not be part of a closed inventory, since there is no natural upper bound on the number of loci that can appear in a sentence (though there are clear performance limitations). On the other hand, he does not provide an account of deictic loci; we come back to their treatment below.

2 Loci as variables *and* as features

We now suggest that loci are *both* variables and features: deictic loci are interpreted as free variables; while bound loci may remain uninterpreted in some environments.

□ *Deictic readings*

As mentioned, when individuals are present in the discourse situation, the signer normally points towards them to realize deixis. Kuhn's system could be extended to capture these uses, by analogy with the treatment of gender and person features given in Jacobson 1999, 2012. Jacobson's proposal is that *she* and *you* behave as other pronouns in denoting an identity function, but that they come with a domain restriction to female individuals for *she* and to addressees for *you*. On this view, then, the pronoun *you* evaluated in a context *c* denotes the partial identity function λx_c : *x* is an addressee of *c* . *x* (i.e. the function which is defined on an individual *x* just in case *x* is an addressee of *c*, and which outputs *x* itself if this condition is met). Given the rest of Jacobson's system, the sentence *You left* ends up denoting a partial function of type $\langle e, t \rangle$, restricted to a domain of addressees⁶; and a truth value is finally obtained when that function is applied to a salient individual. The same analysis could be extended to a deictic locus *a* corresponding to the position of an individual *s(a)*: the meaning of *a*

⁶ The result is obtained by applying Jacobson's z-rule to the meaning of *left*. Its base meaning is of type $\langle e, t \rangle$, and is turned into a meaning of type $\langle \langle e, e \rangle, t \rangle$ after application of the z rule. The latter meaning is appropriate to compose with the meaning of *you*, which is a (partial) identity function over individuals, and hence of type $\langle e, e \rangle$.

could be seen as an identity function restricted to individual $s(a)$. Importantly, however, this takes Kuhn's and Jacobson's 'features' one step closer to variables: not only is there a potentially infinite number of them (as there is no natural upper bound on the number of loci), but in addition all the deictic ones must be associated with potentially distinct individuals – a relation that comes close to the reference relation established by assignment functions.

Without refuting the variable-free analysis, we can offer an alternative within a variable-full system. Specifically, the loci-as-variables view can simply posit that deictic loci are free variables whose value is given by an assignment function (provided by the context), and come with a presupposition that their realization in signing space must spatially correspond to the actual position of their denotations. Importantly, deictic loci are no different from other loci in their ability to give rise to bound readings, as shown in (12); it is thus desirable to develop an analysis that handles all loci on a par.⁷

- (12) a. 7 JOHN_a MARY_b IX-1 THE-THREE-a,b,1 ONLY-CL-1 FINISH WRITE POSS-1 HOMEWORK.
'Of John, Mary and I, only I finished writing my homework.' (the others didn't finish writing their homeworks [or: the others didn't finish writing your homework]) (ASL; 22, 09; 3 judgments)
b. 7 JOHN_a MARY_b IX-2 THE-THREE-a,b,2 ONLY-CL-2 FINISH WRITE POSS-2 HOMEWORK.
'Of John, Mary and you, only you finished writing your homework.' (the others didn't finish writing their homeworks [or: the others didn't finish writing your homework]) (ASL; 22, 11; 3 judgments)
c. *Context*: a student is present in the context. The signer is talking about that student [pointing towards him].
7 JOHN_a MARY_b IX-c THE-THREE-a,b,2 ONLY-CL-c FINISH WRITE POSS-c HOMEWORK.
'Of John, Mary and s/he, only s/he finished writing his/her homework.' (the others didn't finish writing their homeworks) (ASL, 28, 35; 1 judgment)

□ *Phi-features*

Let us start with a standard treatment of gender, extended to person (e.g. Cooper 1983, Schlenker 2003a,b, Heim 2008, Sauerland 2008)⁸. Assuming that the semantics is relativized to a context, a world and an assignment function, we posit the interpretive rules in (13), where # encodes presupposition failure. An example is given in (14).

- (13) Let c be a context of speech with speaker c_a and addressee c_h , w a world, and s be an assignment function. If E is an expression of type e , f is a feminine feature, 1 a first person feature, 2 a second person feature, and i is in index,
a. $\llbracket E^f \rrbracket^{c,s,w} = \#$ iff $\llbracket E \rrbracket^{c,s,w} = \#$ or $\llbracket E^f \rrbracket^{c,s,w}$ is not female in the world of c . If $\llbracket E^f \rrbracket^{c,s,w} \neq \#$, $\llbracket E^f \rrbracket^{c,s,w} = \llbracket E \rrbracket^{c,s,w}$
b. $\llbracket E^1 \rrbracket^{c,s,w} = \#$ iff $\llbracket E \rrbracket^{c,s,w} = \#$ or $\llbracket E \rrbracket^{c,s,w}$ is not the speaker of c . If $\llbracket E^1 \rrbracket^{c,s,w} \neq \#$, $\llbracket E^1 \rrbracket^{c,s,w} = \llbracket E \rrbracket^{c,s,w}$
c. $\llbracket E^2 \rrbracket^{c,s,w} = \#$ iff $\llbracket E \rrbracket^{c,s,w} = \#$ or $\llbracket E \rrbracket^{c,s,w}$ is not an addressee of c . If $\llbracket E^2 \rrbracket^{c,s,w} \neq \#$, $\llbracket E^2 \rrbracket^{c,s,w} = \llbracket E \rrbracket^{c,s,w}$
d. For every $i \in \mathbb{N}$, $\llbracket \text{pro}_i \rrbracket^{c,s,w} = \llbracket i \rrbracket^{c,s,w} = s(i)$
(14) $\llbracket \text{pro}_i^f \rrbracket^{c,s,w} = \#$ iff $s(i) (= \llbracket \text{pro}_i \rrbracket^{c,s,w})$ is not female in the world of c . If $\llbracket \text{pro}_i^f \rrbracket^{c,s,w} \neq \#$, $\llbracket \text{pro}_i^f \rrbracket^{c,s,w} = \llbracket \text{pro}_i \rrbracket^{c,s,w} = s(i)$.

⁷ See Schlenker et al. 2013 for a discussion of the interaction between this rule and patterns of 'locative shift'. Note that the distinction between first and non-first person is usually thought to be grammaticalized in ASL, but that the distinction between second and third person isn't (Meier 1990). If so, second and third person all fall under the rule for deictic loci.

⁸ See Wechsler 2010 for a critique. Note also that the treatment of second person features in (13)c would, if applied to French, predict that the sentence *Chacun de vous pense que tu es le plus intelligent* (lit. Each of you-pl thinks that you-sg be-2sg the smartest) has a bound reading meaning, akin to *[Each of you]_i thinks that you_i are the smartest of the two*. This is incorrect – *tu* definitely cannot be bound in this case.

It is immediate that *phi*-features on deictic pronouns are presuppositionally interpreted. For bound pronouns, the rules in (5) and (7) entail (for different reasons) that in (15)a the feminine feature of *herself* might be interpreted: for the morpho-syntactic analysis, this is so to the extent that the feature cannot be deleted under agreement;⁹ for the semantic analysis, this is because the focus value plays no role in (15)a. On either analysis, the desired inference follows from the Logical Form in (15)b, together with the standard assumptions that (i) each object that satisfies the NP-restrictor must satisfy the presuppositions of the VP-nuclear scope, and that (ii) presuppositions project out of questions.

(15) a. Is each of your four collaborators proud of herself?

=> each of your collaborators is female

b. [each your-collaborator] λx t_x proud-of pro_x^f

By contrast, for (16), the morpho-syntactic analysis must appeal to the rule in (7) to ensure that the feminine feature of *her* remains uninterpreted; while the semantic analysis appears to (5)b to guarantee that features are ignored in the focus dimension.

(16) In my study group,

a. only Mary did her homework (... therefore John didn't do his).

b. only Mary λi t_i did ~~her~~_i homework

□ *Loci*

We will now suggest that a similar semantics can be extended to loci. But whereas the features in (13) have a semantics which is only sensitive to the *context* parameter *c*, the contribution of loci is sensitive to the *assignment function* *s* – unless they are first and second person loci, in which case they too are sensitive to *c* only, as in (13)b-c. A simple rule is stated in (17) and illustrated in (18).

(17) [first version] For every locus $a \neq 1, 2$,

a. if *E* is an expression of type *e*,

$\llbracket E^a \rrbracket^{c,s,w} = \#$ iff $\llbracket E \rrbracket^{c,s,w} = \#$ or $\llbracket E \rrbracket^{c,s,w} \neq s(a)$. If $\llbracket E^a \rrbracket^{c,s,w} \neq \#$, $\llbracket E^a \rrbracket^{c,s,w} = \llbracket E \rrbracket^{c,s,w}$;

b. if *E* is an expression of quantificational type, *a* is not interpreted and thus

$\llbracket E^a \rrbracket^{c,s,w} = \llbracket E \rrbracket^{c,s,w}$

(18) Assume that *a* is a non-first, non-second person locus and that $s(i) \neq \#$. Then $\llbracket \text{pro}_i^a \rrbracket^{c,s,w} \neq \#$ iff

$\llbracket \text{pro}_i \rrbracket^{c,s,w} = s(a)$. If $\llbracket \text{pro}_i^a \rrbracket^{c,s,w} \neq \#$, $\llbracket \text{pro}_i^a \rrbracket^{c,s,w} = \llbracket \text{pro}_i \rrbracket^{c,s,w} = s(i)$.

So far we haven't said anything about loci that appear on expressions of quantificational type. We assume that in this case a DP associated with locus *a* introduces a λ -operator that binds variables with feature *a* (expressions of type *e* can but need not display this behavior). Rules are stated in (19)-(20) and schematically illustrated in (21). (We will ask in Section 3 whether in the end we need all the

⁹ The situation is complex. In (i), we need to allow *my collaborator* to carry a feminine feature in order to license a bound variable reading on which *herself* ranges over males.

(i) Only my collaborator is proud of herself.

The rule that handles (9) and (10) can also achieve the desired result in this case. But then in (15) *your four collaborators* might also carry feminine features, which could conceivably be transmitted to the quantifier *each of your four collaborators*; if so, the features of *herself* would not have to be interpreted. Interestingly, the situation will be different in our sentence with bound iconic loci in (33), where one and the same quantifier binds two variables with contradictory iconic features, and hence couldn't *transmit* them to both.

provisions made in (20), where the λ -operator simultaneously binds a variable i and the locus feature a that it carries.)

- (19) If a DP d^a carries a third person locus a , (a) or (b) or both hold:
 a. d^a is of type e and is interpreted in accordance with rule (17)a, or
 b. d^a is immediately followed by a λ -operator binding variables carrying the feature a , and interpreted in accordance with (20) (for the λ -operator) and (17)a (for the variable).
 (20) For any expression E , any variable i of type e and any locus $a \neq 1, 2$,
 $[[\lambda i^a F]]^{c, s, w} = \lambda x. [[F]]^{c, s[i \rightarrow x, a \rightarrow x], w}$ (with the standard convention that $s[i \rightarrow x, a \rightarrow x]$ is the assignment function which is identical to s except that it assigns x to i and x to a)
 (21) a. $JOHN^a VP$ is interpreted with (19)a and (17)a, and hence introduces a requirement that the locus a should denote John, i.e. $s(a) = [JOHN]$ (this could have consequences if a later pronoun IX - a indexes locus a : that pronoun could refer to John as well).
 b. $ONE^a \lambda i^a i^a VP$ is interpreted with rules (19)b, (20) and (17)a-b. ONE is of quantificational type and thus by (17)b its interpretation is unaffected by a . Taking $F = i^a VP$ in (20), the predicate will have the value:
 $[[\lambda i^a i^a VP]]^{c, s, w} = \lambda x. [[i^a VP]]^{c, s[i \rightarrow x, a \rightarrow x], w}$ (by (20))
 $= \lambda x. [[VP]]^{c, s[i \rightarrow x, a \rightarrow x], w}([i^a]^{c, s[i \rightarrow x, a \rightarrow x], w})$ (Function Application)
 $= \lambda x. [[VP]]^{c, s[i \rightarrow x, a \rightarrow x], w}(x)$ (by (17)a).

The last step follow because the presuppositional constraints on i imposed by a in the expression i^a (interpreted with (17)a) will be automatically satisfied under an assignment function that assigns the same object x to i and to a .

Finally, we assume that in the special case in which *only* associates with an expression E of referential type (individual or temporal, i.e. e or i), it is interpreted in accordance with the rule in (22); it predicts in particular a presupposition failure if an alternative to the denotation of E yields a failure when fed to the value of the sister of E , e.g. *Only John continues to smoke* presupposes that alternatives to John used to smoke.¹⁰

- (22) For any expression E of type $\tau = e$ or i ,
 $[[only E]]^{c, s, w} = \lambda f_{\langle e, \tau \rangle} . \#$ iff (i) for some alternative e' to $[E]^{c, s, w}$ given by c , $f(e') = \#$, or (ii) $f([E]^{c, s, w}) = \#$; if $\neq \#, 1$ iff for some alternative e' to $[E]^{c, s, w}$ given by c , $f(e') = 0$.

To illustrate, consider the first person example in (23)a; to abstract away from irrelevant details, we treat *finish-write-the-homework-of* as an atomic predicate.

- (23) a. ONLY-CL-1 FINISH WRITE POSS-1 HOMEWORK
 b. only $pro_i^1 \lambda i^1 t_i^1 \text{ finish-write-the-homework-of } pro_i^1$
 c. only $pro_i^1 \lambda i^1 t_i^1 \text{ finish-write the-homework-of } pro_i^1$

As in (17)a(ii), we can apply the optional rule of feature deletion to the boxed expression, as in (23)b, which is interpreted as in (24)a (for clarity, we include a barred version of the deleted feature, written as \bar{t} ; and we write c_a for *the speaker of c*).

- (24) a. $[[\lambda i^1 t_i^1 \text{ finish-write-the-homework-of } pro_i^1]]^{c, s, w} = \lambda x. [[t_i^1 \text{ finish-write-the-homework-of } pro_i^1]]^{c, s[i \rightarrow x], w} = \lambda x. [[\text{finish-write-the-homework-of}]]^{c, s[i \rightarrow x], w}([pro_i^1]^{c, s[i \rightarrow x], w})([t_i^1]^{c, s[i \rightarrow x], w}) = \lambda x. \text{ finish-write-the-homework-of}(x)(x)$
 b. $[[\lambda i^1 t_i^1 \text{ finish-write-the-homework-of } pro_i^1]]^{c, s, w} = \lambda x. [[\text{finish-write-the-homework-of}]]^{c, s[i \rightarrow x], w}([pro_i^1]^{c, s[i \rightarrow x], w})([t_i^1]^{c, s[i \rightarrow x], w}) = \lambda x. \text{ finish-write-the-homework-of}_w(\#)(\#)$ if $x \neq c_a$; $\text{finish-write-the-homework-of}(x)(x)$ otherwise = $\lambda x. \#$ if $x \neq c_a^{11}$; $\text{finish-write-the-homework-of}(x)(x)$ otherwise

Without feature deletion, we would obtain for (23)c the value in (24)b, which yields a

¹⁰ See Schlenker 2009 Appendix E for theoretical and empirical discussion; in a more general treatment, this rule would be stated within a focus-based semantics. Note also that the natural reading of (9) involves a slightly different lexical entry, akin to German *erst* rather than English *only* (Stechow 2004).

failure on all arguments except the speaker. Given the lexical entry of *only* in (22), this would incorrectly block the bound reading.

Consider now the third person example in (25), which favors a bound reading but also has a strict one:

- (25) 7 JOHN_a MARY_b SAM_c THE-THREE-_{a,b,c} ONLY-CL-_c FINISH WRITE POSS-_c HOMEWORK
'Of John, Mary and Sam, only Sam finished writing his homework.' (ASL; 22, 13c; 3 judgments)

On the assumption that the λ -operator inherits the features of the DP that introduces it, we can derive two readings, as shown in (26). By the rule in (19), the subject DP may but need not carry the *c* feature, which we indicate by putting it in parentheses.

- (26) a. ONLY CL_k^(c) $\lambda i^e t_i^e$ FINISH WRITE POSS_i^e HOMEWORK
b. ONLY CL_k^(c) $\lambda i^e t_i^e$ FINISH WRITE POSS_k^e HOMEWORK

Assuming that locus features can be deleted under agreement, we derive the bound reading, as in (26)a. For the strict reading in (26)b, the locus feature of the boxed pronoun does not hurt the interpretation.

□ *Variable capture*

Now consider Kuhn's example involving 'variable capture'. As mentioned, (27)a can have four readings, including one on which POSS-_b is bound but POSS-_b is free, and one on which POSS-_b is free but POSS-_b is bound. Presumably Kuhn must assume that, by one mechanism or another, *ONLY-ONE* can inherit the locus feature of *BILLY*. The key is then to assume that variables can be bound by (λ -operators introduced by) *BILLY_b* or by *ONLY-ONE_b*, but that in any event the feature *b* which they inherit need not be interpreted. The two mixed readings can thus be analyzed as in (27)b-c.

- (27) a. IX-_b BILLY ONLY-ONE FINISH-TELL POSS-_b MOTHER POSS-_b FAVORITE COLOR
b. billy_b λi^b only one_b $\lambda k^b t_k^b$ tell pro_k^e mother pro_i^b favorite-color
c. billy_b λi^b only one_b $\lambda k^b t_k^b$ tell pro_i^e mother pro_k^b favorite-color

□ *Locus re-use*

Consider now Kuhn's argument based on variable re-use. In (11), locus *a* was used to refer both to John and to Mary, while locus *b* was used to refer both to Billy and to Suzy. We could posit that locus features are inherited through agreement, as in (28):

- (28) John_a λi^a Mary $\lambda k^a t_i^a$ tell t_k^a [pro_i^a love pro_k^a]

But this won't account for the case in (29). Here *THE-TWO-_a* indexes the position *a*, and it is not c-commanded by either antecedent DP.

- (29) 7 EVERY-DAY, JOHN_a TELL MARY_b IX-_a LOVE IX-_b. BILL_a NEVER TELL SUZY_b IX-_a
LOVE IX-_b. THE-TWO-_a SMART.

'Every day John tells Mary he loves her. Bill never tells Suzy he loves her. Both John and Bill are smart.' (ASL; 22, 72b - 3 judgments)

At this point we can make two choices.

- (i) First, we may posit that variables can be deleted under agreement not just in case of

¹¹ As is standard, we assume that finish-write-the-homework-of(#)=#.

standard binding, but also in case of *dynamic* binding. If so, we could argue that *THE-TWO* has split dynamic antecedents and inherits the features of both antecedents – and hence gets the feature *a* twice by way of agreement.

(ii) Alternatively, we may revise (17) to only require that an expression with locus feature *a* denote *a part* of what *a* denotes – thus applying to locus features the format of (13)c (= requirement that the expression be *an* addressee, not *the* addressee).

(30) [second version] For every locus $a \neq 1, 2$, if E is an expression of type e , $[[E^a]]^{c,s,w} = \#$ iff $[[E]]^{c,s,w} = \#$ or $[[E]]^{c,s,w}$ **isn't a part of** $s(a)$. If $[[E^a]]^{c,s,w} \neq \#$, $[[E^a]]^{c,s,w} = [[E]]^{c,s,w}$.

In order to account for (29), all we need to posit is that *a* (and *m*) denotes the plurality John+Mary; and under this assumption, we don't need feature deletion, as seen in (31).

(31) John_a λi^a Mary λk^a t_i^a tell t_k^a [**pro**_i^a love **pro**_k^a]. pro_m^{dual,a} smart.

□ Refining the analysis of deictic loci

As mentioned, the present analysis provides a simple account of deictic loci. Still, a refinement is needed, since deictic loci must usually correspond in signing space to the actual position of the objects they denote. Schlenker et al. 2013 posit a presuppositional rule that can be adapted to the present system, as seen in (32).

(32) [third version] For every locus $a \neq 1, 2$, if E is an expression of type e , $[[E^a]]^{c,s,w} = \#$ iff $[[E]]^{c,s,w} = \#$ or $[[E]]^{c,s,w}$ isn't a mereological part of $s(a)$ or $[[E]]^{c,s,w}$ is present in the situation of utterance in c and 1, $[[E]]^{c,s,w}$ and a are not roughly aligned. If $[[E^a]]^{c,s,w} \neq \#$, $[[E^a]]^{c,s,w} = [[E]]^{c,s,w}$.

We leave it open whether conditions on first and second person pronouns should be made to follow as a special case of (32).

3 Bound Iconic Loci

At this point, no example argues for the rule in (20), and thus we could have a system in which (i) deictic loci receive their value from an assignment function (which is itself provided by the context), and (ii) bound loci are features and are never interpreted, just as in Kuhn's system. But as we will now see, some loci are *both* bound and interpreted.

Schlenker et al. 2013 discuss high loci, which can be used to refer to important, powerful, or tall individuals. In the latter case, they simultaneously display a variable-like *and* an iconic semantics: loci are structured areas rather than points in space, and they play the role of simplified pictures of their denotations (Liddell 2003). The position (up or down) indexed by a pronoun or by an agreement verbs turns out to have interpretive consequences *even under binding*. Thus in (33), *LOOK-a_{high}* and *FILM IX-a_{low}* index the same locus *a*, but the first expression indicates that one looks at the relevant individual while she is up, and the second that one films her while she is down. (33)b makes the further point that this feature does not undergo deletion under *only*, since the inference about the *other* gymnasts involves their particular positions as well.

- (33) GYMNAST COMPETITION MUST STAND BAR FINISH STAND HANG.
 'In a gymnastics competition one must stand on a bar and then go from standing to hanging position.'
 a. 6.3 ALL GYMNAST IX-a_neutral WANT IX-1 LOOK-a_high FINISH FILM IX-a_low.
 'All the gymnasts want me to look at them while they are up before filming them while they are down.' (ASL; 23, 20c; 3 judgments)¹²
 b. 7 ONLY-ONE IX-a_neutral GYMNAST WANT IX-1 LOOK-a_high FINISH FILM IX-a_low.
 'Only one of the gymnasts wants me to watch her while standing before filming her while hanging.' (ASL; 23, 21c; 3 judgments)¹³

Crucially, the subject quantifier introduces a neutral version of locus *a*, and hence the high and low versions of the same locus cannot be disregarded under agreement.

With the binding rule in (20) and the iconic semantics in (34) (slightly simplified from Schlenker 2014), the Logical Form in (35)a correctly derives truth conditions on which all instances of *a* are bound, but come with different positional restrictions.

- (34) Let *c* be a context of speech, *s* an assignment function which assigns values to structured loci, and *w* a world (with *c_a* = the author of *c*; *c_w* = the world of *c*). We assume that *c* determines a projection π_c from the salient situations in *c_w* to the signing space of *c_a*. If *i* is a point locus which is part of a structured locus *I*, and if *s(I)* denotes a human being, $[[IX-i]]^{c,s,w} = \#$ unless *I* is the projection of *s(I)* in the signing space of *c_a* according to π_c , and *i* is within *I* the projection of the upper part of the body of *s(I)*. If $[[IX-i]]^{c,s,w} \neq \#$, $[[IX-i]]^{c,s,w} = s(I)$.
- (35) a. [all gymnast] $\lambda i^a t_i^a$ want [I look i^{a_high}] at-*t* and [film i^{a_low}] at-*t*+1
 b. $[[\lambda i^a t_i^a$ want I look i^{a_high} then film i^{a_low}]]^{c,s,w}
 $= \lambda x. [[t_i^a$ want [I look i^{a_high}] at-*t* and [film i^{a_low}] at-*t*+1]]^{c,s[i_x,a_x],w}

Without the binding rule in (20), we would have to posit that *a_high* and *a_low* are made of two parts: a pure locus *a* which remains uninterpreted, and an iconic locus *high* or *low* which provides positional information, as sketched in (36). But appropriate interpretive rules for these truncated positional loci have yet to be investigated.

- (36) [all gymnast] $\lambda i^a t_i^a$ want [I look $i^{<a, high>}$] at-*t* and [film $i^{<a, low>}$] at-*t*+1

It should be noted that the semantic analysis of features under *only* fails to capture (33)b, as it predicts that *high* and *low* features are obligatorily disregarded in the focus dimension. But a small modification might work: we could posit in (5)b that features are *optionally* disregarded in the focus dimension.¹⁴

It should also be noted that Kuhn's system *as it stands* cannot account for examples such as (33), where the bound pronouns cannot inherit their features from their antecedent. Still, Kuhn might develop a version of the analysis in (36), where loci

¹² Our translation is motivated by answers to inferential questions. Thus in our second session, where our informant perceived an ambiguity, he entered in the computer: "Either: 1) They want me to watch them while they're up on the bar and then film them while they're off the bar, or 2) They want me to watch them while they're standing on the bar and then film them when they rotate and are hanging from the bar."

¹³ In our second session, our informant entered in the computer: "One gymnast wants me to only watch her while standing on the bar and then film her when hanging from the bar. The other gymnasts want me to start filming while they're standing on the bar."

¹⁴ This liberalized version of the semantic analysis and the morpho-syntactic analysis of features under *only* still make different predictions. The morpho-syntactic analysis predicts that it is solely under binding that features may be disregarded in the focus dimension. The liberalized semantic analysis predicts that binding is irrelevant. (Some of our more recent examples, pertaining to 'locative shift', might argue for the latter position.)

themselves are not interpreted, but the iconic restrictions they realize are.

4 Featural Variables in Spoken Language?

Having argued that ASL loci are featural variables, we will now suggest that comparable examples can be found within the tense system of English.¹⁵

Following Partee 1973 and Heim 1994, Schlenker 1999 and Stechow 2004 take the semantics of the past tense to involve overt time variables, which we write as t_i below. But instead of adopting the standard rules in (37) (Heim 1994), for the past tense they adopt the more complex conditions in (38):

- (37) a. $[[t_i^{\text{pres}}]]^{c, s, w} = \#$ iff $s(t_i) = \#$ or $s(t_i)$ is not within T_c , a salient interval around the time of c (= moments that count as present). If $[[t_i^{\text{pres}}]]^{c, s, w} \neq \#$, $[[t_i^{\text{pres}}]]^{c, s, w} = s(t_i)$.
 b. $[[t_i^{\text{past}}]]^{c, s, w} = \#$ iff $s(i) = \#$ or $s(i)$ doesn't precede the time of c . If $[[t_i^{\text{past}}]]^{c, s, w} \neq \#$, $[[t_i^{\text{past}}]]^{c, s, w} = s(t_i)$
- (38) a. *past* spells out expressions of the form $t_i^{<t_k^{\text{pres}}}$ for some indices $i, k \in \mathbb{N}$
 b. For any time-denoting expression E , $[[t_i^{<E}]]^{c, s, w} = \#$ iff $s(i) = \#$ or $[[E]]^{c, s, w} = \#$ or $s(i)$ doesn't precede $[[E]]^{c, s, w}$. If $[[t_i^{<E}]]^{c, s, w} \neq \#$, $[[t_i^{<E}]]^{c, s, w} = s(t_i)$
 c. Derived rule (from (38)b and (37))
 $[[t_i^{<t_k^{\text{pres}}}]]^{c, s, w} = \#$ iff $s(t_k) = \#$ or $s(t_k)$ is not within T_c or $s(t_i) = \#$ or $s(t_i)$ doesn't precede $s(t_k)$

The motivation for (38) over (37)b lies in part in 0a, with the highly simplified LFs in (39)b or (39)c (t_0 -1 abbreviates *one month before* t_0 ; see Stechow 2004 for a more thorough treatment, especially of the present tense). The key is that the denotation of a past tense variable need not be before the context of evaluation; in some cases, it is enough that its denotation be before a time denoted with a present tense variable.

- (39) a. Whenever John changes jobs, he gets into a fight with people who were his best friends one month before. (modified from von Stechow 2004¹⁶)
 b. $[\forall^{D} t_0: t_0^{\text{pres}} \text{ Pierre changes jobs}] [\exists x: [t_0-1] \lambda t_1 \text{ **[[t}_1^{\text{past}}]]** \text{ Pierre befriend } x] [t_0^{\text{pres}} \text{ Pierre fight } x]$
 c. $[\forall^{D} t_0: t_0^{\text{pres}} \text{ Pierre changes jobs}] [\exists x: [t_0-1] \lambda t_1 \text{ **[[t}_1^{<t_0^{\text{pres}}]}]** \text{ Pierre befriend } x] [t_0^{\text{pres}} \text{ Pierre fight } x]$

(37) gives rise to the Logical Form in (39)b; on the assumption that the domain restriction D on the universal time quantifier denotes an interval $\mathbf{D} \subseteq T_c$, the boldfaced part contributes the additional presupposition that *for every time t in \mathbf{D} , $t-1$ precedes the time of c* – an incorrect result if \mathbf{D} extends, say, several months after the time of utterance (so that the sentence states a broad regularity). By contrast, no problem arises

¹⁵ Schlenker 1999 speculates that the English present / past / pluperfect distinction is an abstract temporal counterpart of the proximate / obviative / further obviative distinction found in Algonquian; and he sketches a unified account of both. We do not know whether the remarks of this section apply to Algonquian.

¹⁶ Stechow's own example is in (i), and his Logical Form is in (ii).

(i) Chaque fois que Pierre change d'emploi, il se querelle avec des gens qui étaient ses meilleurs amis un mois avant. (Schlenker p.c.)

'Each time that Pierre changes jobs, he quarrels with some people who were his best friends one month before.' (Stechow 2004)

(ii) $\exists t_1 [t_0^{\text{pres}} \subseteq t_1 \ \& \ \forall t_2 [(t_2 \subseteq t_1 \ \& \ \text{Pierre changes jobs at } t_2) \rightarrow \text{Pierre quarrels at } t_2 \text{ with people that } \exists t_3 \text{ were his friends at } t_3^{<[t_3 < t_2]}]]$

with the Logical Form in (39)c; briefly, we only get a presupposition that *for every time t in D, t-1 before t* – which is trivial.

For our purposes, what matters is that the element that spells out the past tense feature has a variable within it. We will now show that this featural and variable element is subject to the same rules of feature deletion as *phi*-features (and ASL loci). Consider the modified sentence in (40), with the addition in bold.

- (40) a. Whenever John changes jobs, he gets into a fight with people who were his best friends one month before, but **who were only useful at the time**.
 b. [$\forall^{D_{t_0}} t_0^{pres}$ Pierre changes jobs] [$\exists x: [t_0-1] \lambda t_1 t_1^{<t_0^{pres}}$ Pierre befriend x and [**only** $t_1 \lambda t_2. \boxed{t_2^{<t_0^{pres}} \text{useful } x}$] [t_0^{pres} Pierre fight x]]
 c. [$\forall^{D_{t_0}} t_0^{pres}$ Pierre changes jobs] [$\exists x: [t_0-1] \lambda t_1 t_1^{<t_0^{pres}}$ Pierre befriend x and [**only** $t_1^{<t_0^{pres}} \lambda t_2. \boxed{t_2^{<t_0^{pres}} \text{useful } x}$] [t_0^{pres} Pierre fight x]]

Simplifying, we take *at the time* to be a time variable that ends up being (possibly dynamically) bound by *a month before*, hence the simplified LF in (40)b. But the past tense features of the boxed time variable will have an undesirable consequence, namely to require that for every time t in **D**, every moment which is an alternative to t should be before t . As a result, we only get an inference that for every time t in **D**, the relevant people were not useful at times *preceding* t . By contrast, the desired inference is that for every time t in **D**, the people who had been useful at $t-1$ *failed to be useful at t and later* – which is the reason John could afford to get into a fight with them at t .

Getting the desired reading requires that the past tense features of the boxed variable be deleted. Schlenker 1999 and Stechow 2004 discuss simpler versions of the same problem, already seen in (9). The same mechanism can be extended to (40)c: the adverbial *at that time* can receive the (underlined) past tense feature $<t_0^{pres}$ (with *at that time* just represented as t_i). While this feature does not hurt the interpretation of *at that time*, it can trigger deletion of the feature of the boxed variable – as is desired. But crucially the feature in question, namely $<t_0^{pres}$, includes a variable within it, which thus undergoes deletion as well. Hence there might be variables with a feature-like behavior in spoken languages too.

5 Conclusion

While the present system should certainly be constrained further,¹⁷ it preserves the main

¹⁷ In general, standard constraints on variables should be added to account for Binding Theory (e.g. Buring 2005). In particular, an anonymous reviewer asks whether loci could be mismatched in examples such as (i)a, with the Logical form in (i)b – with loci *a* and *b* both referring to John. We believe our system should be constrained to block these. But in this case independent considerations might do so:

(i) a. IX-a JOHN_a TELL-ME IX-b WIN.
 b. John^a $\lambda i^a t_i^a$ tell me pro_i^b win

In the Logical Form in (i)b, *i* is a bound variable, and *b* is a free variable that presuppositionally constrains the value of *i*. As long as *b* denotes John, no presupposition failure arises. But (i)b is arguably ruled out by a general principle called *Have Local Binding!*, which mandates that *salva veritate*

insights of the loci-as-variables approach while granting the correctness of Kuhn's key intuition, namely that loci can *also* behave like features; synthesizing the two views, it proposes that loci are often *featural variables*. Our approach deals the problems of 'variable capture' and 'variable re-use', and it also accounts for some cases in which iconic loci are bound and yield interpretive effects. While it makes use of multiple covert variables, it was never part of the 'loci as variables' view that all variables are realized as loci, only that loci spell out variables. We certainly have not refuted the variable-free view of loci laid out in Kuhn, to appear; but we have shown that a variable-full analysis can account for the same data as well as well ones Kuhn doesn't discuss, and we have suggested that the variable-free account would need to be extended not just to account for deictic loci, but also for the iconic bound loci discussed in Section 3. Finally, we have suggested that featural variables might exist in spoken languages as well, namely in the temporal domain.

variables should be bound by the most local antecedents possible. Since *b* could be replaced with a locally bound variable *a* or *i* without changing the truth conditions, this representation is presumably ruled out.

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