Person and binding (A partial survey) [1]

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We provide a partial survey of three approaches to two problems in the semantics of person, which we call the 'Bindability Problem' and the 'Shiftability Problem'. On the standard (Kaplanian) view of indexical pronouns, the semantic value of *I* and *you* is determined by a context rather than by an assignment function [=Separation Thesis], and furthermore this context must be that of the actual speech act [=Fixity Thesis]. The 'Bindability Problem' originates in the observation that indexical pronouns sometimes behave as bound variables, as in Heim's *Only I did my homework (... therefore John didn't do his).* This problem suggests that the Separation Thesis is too strong. The 'Shiftability Problem' consists in the observation that some indexicals may be evaluated with respect to the context of a reported speech act, so that what is literally *John says that I be a hero* may mean (in Amharic) that John says that he, John, is a hero. This problem suggests that the Fixity Thesis is too strong.

We lay out and compare three approaches to these problems. According to THEORY I, pronouns are concealed definite descriptions whose restrictors may include predicates of the form *speaker(x, c)* or *hearer(x, c)*, which are endowed with (i) an individual variable (which solves the Bindability Problem), and (ii) a context variable (which solves the Shiftability Problem, with the auxiliary assumption that attitude verbs manipulate context variables). According to THEORY II, first person pronouns are variables that are always bound, be it by (i) another first person pronoun (which solves for the Bindability Problem), or (ii) an attitude verb (which solves for the Shiftability Problem), or (iii) a (bare) λ-operator. Rules of feature percolation account for the appearance of the right morphological features on the pronoun. According to THEORY III, a first person pronoun is a variable like any other variable, except that it must denote an individual with a specified role ('author' of a context). This requires an enriched notion of sequence of evaluation, one on which a sequence includes not just objects but also their roles with respect to the speech act. In order to solve the Shiftability Problem (as well as more complex instances of the Bindability Problem), Theory III posits that certain operators can introduce roles in the sequence that they manipulate. Somewhat surprisingly, a version of Theory III can naturally be stated in a way that derives important aspects of the syntactician's Binding Theory (especially Condition C and Condition B).

1. Two problems with indexical pronouns: Bindability and shiftability

1.1. The Standard View

Since the influential work of Kaplan (1977/1989), it has become traditional to separate 'context-dependency' from 'index-' or

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'sequence-dependency'. Let us say that an expression is 'context-dependent' if its value is determined by a triple or quadruple of the form <speaker, (addressee,) time of utterance, world of utterance> [2] (we will sometimes leave out the addressee coordinate). We will call an expression 'index-dependent' if its value is determined by a world or time parameter, and we will call an expression 'sequence-dependent' if its value is determined by a sequence of evaluation of arbitrary length (i.e. by an assignment function that determines the values of indices 1, 2, 3....). On anybody's account, *I, you, here* or *now* are context-dependent. Within an intensional semantics, *it rains* is index-dependent, because its value depends on a world and a time parameter. And he_i (subscripted with an index i) is sequence-dependent. Taking all three types of dependency into account, we may relativize the recursive definition of truth and denotation to a context c, a world parameter w, a time parameter t, and an assignment function s. We thus obtain the following interpretive rules:

(1) a. $[\![I]\!]^{c, w, t, s}$=the speaker of c
b. $[\![\text{it rains}]\!]^{c, w, t, s}$=1 iff it rains at t in w
c. $[\![\text{he}_i]\!]^{c, w, t, s}=s(x_i)$

In pre-kaplanian times, it was customary to lump these three types of parameters together in a big tuple, called an INDEX (we use the small capitals to avoid homography with the previously mentioned 'index'), which included aspects of the context, world and time of evaluation, and sometimes the values of variables. This INDEX was thus of the form <speaker, addressee, world of utterance, time of utterance, world of evaluation, time of evaluation, value of he_1, value of he_2, value of he_3, ...>. Kaplan's first claim was that it was a bad idea to lump all these parameters together:

(2) SEPARATION THESIS: Context-dependency should be kept separate from other types of semantic dependency

Why should one attempt to separate context-dependency from other types of semantic dependency? To obtain a notion of logical validity that reflects the facts of natural language, answered Kaplan. Call a formula valid if it is true at every INDEX. Then *I exist* is clearly invalid - just take PS as the speaker, and as the world of evaluation a world in which PS was never born. And yet *I exist* appears to be *a priori* true, since in every context in which the sentence is uttered, the sentence *evaluated at the world and time of that context* is true. In order

to capture the intuition that a formula is valid just in case it is *a priori* true, Kaplan suggested, we need to separate the context from the rest of the INDEX, and to redefine validity as truth in every context of utterance rather than at every INDEX [3]. The validity of *I exist* will now follow from (i) the obvious lexical rules in (3)a-b, together with (ii) the assumption that for each context c, the speaker of c exists at the time of c in the world of c. This is demonstrated in (3)c:

(3) a. $[\![\text{I}]\!]^{c, w, t, s}$=the speaker of c
b. $[\![\text{exist}]\!]^{c, w, t, s}$={x: x is an individual that exists at t in w}
c. $[\![\text{I exist}]\!]^{c, \text{world(c)}, \text{time(c)}, s}$=true iff the speaker of c exists at the time of c in the world of c, which is always the case.

The same rule would of course apply to *you,* replacing 'speaker' with 'addressee'. The interpretation of he_i *exists,* by contrast, proceeds along different lines, yielding the desirable result that He_i *exists* does not come out as valid (suppose for instance that he_i denotes a notorious Dead, such as Julius Caesar; it is then clear that he_i *exist* need not be true):

(4) a. $[\![\text{he}_i]\!]^{c, w, t, s}=s(x_i)$
b. $[\![\text{exist}]\!]^{c, w, t, s}$={x: x is an individual that exists at t in w}
c. $[\![\text{he}_i \text{ exist}]\!]^{c, \text{world(c)}, \text{time(c)}, s}$=true iff $s(x_i)$ exists at the time of c in the world of c, which need not be the case.

Thus on a kaplanian view, indexical pronouns and third person pronouns must be given entirely different treatments.

Kaplan's theory also embodies a second claim, namely that no logical operator may manipulate the value of the context parameter:

(5) FIXITY THESIS: The semantic value of an indexical is fixed solely by the context of the actual speech act, and cannot be affected by any logical operators

Why should one accept the Fixity Thesis? Because it appears to be a fact of natural language that those expressions that are context-dependent (i.e. whose value is fixed by some context of speech) always depend on the context of the 'actual' speech act, and may not be evaluated with respect to any other context that happens to be mentioned in the discourse. Kaplan buttressed his empirical claim by observing that the sentence *In some contexts, I am tired* may certainly not mean that "For some context c, the speaker of c is tired". I will suggest

shortly, *contra* Kaplan, that other operators (attitude verbs) can sometimes do what the operator *in some contexts*... cannot; this will lead me to challenge the Fixity Thesis. (Kaplan also had a less empirical reason for assuming the Fixity thesis - it was a consequence of his analysis of indexical expressions as 'directly referential', which was the main philosophical point of his paper. I will ignore this in what follows).

1.2. Problems

Since Kaplan's theory was concerned with the semantics of natural language, it is fair to ask how it should be assessed empirically. In some cases, it does rather well. For instance *now* seems to differ semantically both from index-dependent expressions (e.g. the present tense) and from sequence-dependent expressions (e.g. *he*). *Some day, your great-grandchildren will meet someone who appreciates them:* the great-grandchildren need not be born when the sentence is uttered, and the appreciation need not be ongoing, which goes to show that – in this case at least – the present tense of *appreciates* need not denote the time of utterance. Adding *now* kills the example: *Some day, your great-grandchildren will meet someone who appreciates them now* certainly requires the appreciation to be ongoing, and the great-grand-children to be already in existence at the time of speech. This is naturally explained by assuming that *now*, unlike the present tense, is context-dependent rather than index-dependent. The difference with third person pronouns is also obvious: *For every man, there is someone who likes him* is a simple case of binding of *him* by a quantifier. No corresponding example can be constructed with the context-dependent expression *now: At every moment, there is someone who is sick now* does not yield a reading on which *now* is bound by the time quantifier *at every moment*.

So far, so good. But when it comes to indexical pronouns, Kaplan's theory looks less impressive.

A. BINDABILITY: First, it was pointed out years ago by Irene Heim (1991) that first and second person pronouns can in fact function as bound variables. This may be seen in two kinds of environments: ellipsis and examples involving *only* (and more broadly focus-sensitive particles). Given standard assumptions, (6)a and b should have the Logical Forms in a' and b' respectively:

(6) a. I did my homework. Peter did too (ok to mean: Peter did his homework).
a'. I [λx x did my_x homework]
b. Only I did my homework (therefore Peter didn't do his)
b'. [only I] λx x did my_x homework

Thus the first person possessive pronoun *my* behaves as a bound variable, and is in this respect completely analogous to third person pronouns:

(7) a. Mary did her homework. Peter did too (ok to mean: Peter did his homework).
a'. Mary [λx x did her_x homework]
b. Only Mary did her homework (therefore Peter didn't do his)
b'. [only Mary] λx x did her_x homework

On the face of it, these facts are a problem for the Separation Thesis.

B. SHIFTABILITY: Second, it was pointed out in various places (e.g. Schlenker 2003a) that in some languages first or second person pronouns or agreement markers can be evaluated with respect to the context of a reported speech act, as is the case in the Amharic attitude report given in (8)a. Furthermore, the phenomenon holds even when it can be ascertained that the environments in question do *not* involve direct quotation, as shown by (8b):

(8) a. *Situation*: John says: 'I am a hero'
% on *% @ gna* *n@ -ññ* *yˆl -all*
John hero be.PF-1SO 3M.say-AUX.3M
'John says that he is a hero'
b. *mˆn amt' -a* *ˆnd-al-@ -ññ* *al-s@ mma-hu-mm*
(cf. Leslau 1995 p. 779)
what bring.IMPER-2M COMP-say.PF-3M-1SO NEG-hear.PF-1S-NEG
'I didn't hear what he told me to bring' (lit. I didn't hear that he said to me bring what) [4].

If the embedded clause in (8b) had been quoted, the original discourse should have been of the form: 'bring what!'. However this is not the correct reading, as the translation makes clear (in fact, such a direct discourse would presumably be meaningless). Rather, the report means that he told me 'Bring X!', and I didn't hear what X was. The fact that there is an indirect question shows that the embedded clause is not quoted. Still, the embedded second person

pronoun can be evaluated with respect to the context of the reported speech act. Given that there has been no systematic semantic fieldwork on these data, it could be maintained that they should in the end be analyzed as some exotic variety of quotation. But the phenomenon seems to be cross-linguistically robust: related facts have been unearthed by other authors for Navajo (Hale & Platero 2000, Speas 2000), Zazaki (Indo-Aryan; Nevins & Pranand 2004), Engenni (Kwa; Thomas 1978) and possibly Aghem (Bantu; Hyman 1979) (It should be noted that Nevins & Pranand 2004 confirm the basic finding that some indexicals may be shifted, but they refine considerably the empirical generalizations, with important theoretical consequences). Importantly, it is only in (some) attitude reports that *I* or *you* may denote someone other than the actual speaker or addressee, which suggests that we are really dealing with context-dependent expressions whose point of evaluation happens to be a non-actual context (we could be tempted to hypothesize that these elements are simply variables, which can be bound by any antecedent which is found in a given locality domain; but such a proposal would not explain the restriction to the semantic class of (some) attitude reports [5]).

These facts have two immediate consequences. First, they cast doubt on the Separation Thesis, since they suggest that some (though not all) context-dependent elements may be evaluated with respect to a non-actual context. Second, they raise a cross-linguistic puzzle, since English *I* and *you* obviously do not behave like their Amharic counterparts. In what follows we shall survey three theories that attempt to solve these problems. According to THEORY I, pronouns are concealed definite descriptions whose restrictors may include predicates of the form *speaker(x, c)* or *hearer(x, c)*, which are endowed with (i) an individual variable (which solves the Bindability Problem), and (ii) a context variable (which solves the Shiftability Problem, with the auxiliary assumption that attitude verbs manipulate context variables). According to THEORY II, first person pronouns are variables that are always bound, be it by (i) another first person pronoun (which accounts for the Bindability Problem), or (ii) in some cases, an attitude verb (which accounts for the Shiftability Problem), or (iii) a (bare) λ-operator. Rules of feature percolation are needed to ensure that first person pronouns get the 'right' morphological features. According to THEORY III, a first person pronoun is a variable like any other variable, except that it must denote an individual with a specified role ('author' of a context). This requires an enriched notion of sequence of evaluation, one on which a sequence of evaluation includes not just objects but also their roles with respect to the

speech act. In order to solve the Shiftability Problem (as well as more complex instances of the Bindability Problem), Theory III must posit that certain operators can introduce roles in the sequence that they manipulate. We will see that, somewhat surprisingly, a version Theory III can naturally be stated in a way that derives important aspects of the syntactician's Binding Theory (especially Condition C and Condition B).

The rest of this paper is structured as follows. In Section 2 we outline the main properties of Theory I and Theory II, emphasizing the similarities and the differences between the two approaches. The details of each theory are developed in Section 3. In Section 4 we introduce Theory III, which can be seen as an idiosyncratic compromise between the first two approaches, though one that offers considerable advantages for the analysis of Binding Theory.

2. The basic facts: two theories

The Bindability Problem and the Shiftability Problem can be solved in a semantic fashion, as in Theory I, or in a syntactic way, as in Theory II. In this section we outline and compare these approaches.

2.1. Theory I. The presuppositional analysis of person

A traditional analysis of gender features treats these as presuppositions on the value of individual variables (Cooper 1983, Heim & Kratzer 1998). The analysis is naturally stated by positing the lexical entries in (9), which entail for instance that one cannot use the pronoun he_i felicitously unless the index i denotes a male individual, and similarly that she_i cannot be used unless i denotes a female individual (c is the context of utterance, s is the sequence of evaluation, and # represents presupposition failure; we disregard world and time dependency):

(9) a. $[\![\text{he}_i]\!]^{c,s}$=# iff $s(x_i)$ is not male. If ≠#, $[\![\text{ he}_i]\!]^{c,s}=s(x_i)$
b. $[\![\text{ she}_i]\!]^{c,s}$=# iff $s(x_i)$ is not female. If ≠#, $[\![\text{ he}_i]\!]^{c,s}=s(x_i)$

To handle the problems described above, two extensions of the theory are necessary.

A. BINDABILITY: First, in order to analyze the bound variable readings of first and second person pronouns, we shall posit that these too

should be analyzed as variables with certain presuppositions (this proposal was developed in various ways by Schlenker 2003a,b and Sauerland 2003, among others). In simple cases the variables may be free, which leaves us with something very close to Kaplan's analysis. If no further adjustments were needed, we could posit the lexical entries in (10), which entail that I_i and you_i cannot be used felicitously unless the index i denotes a speaker in the first case and an addressee in the second:

(10) a. $[\![I_i]\!]^{c,s} \neq \#$ iff $s(x_i)$ is the agent of c. If $\neq \#$, $[\![I_i]\!]^{c,s} = s(x_i)$
b. $[\![you_i]\!]^{c,s} \neq \#$ iff $s(x_i)$ is an addressee of c. If $\neq \#$, $[\![you_i]\!]^{c,s} = s(x_i)$

Thus in the case of first person pronouns, the theory predicts a presupposition failure in case a speaker's demonstrative intention when using the pronoun *I* is incorrect, i.e. when he does not intend to refer to himself. It is hard to see how any speaker would want to do such a thing, since in general one has a clear idea who one is trying to refer to when uttering the pronoun *I*. For second person pronouns, however, the claim is easier to test. Suppose that I am pointing towards one person (say, to my right) while talking to another person (to my left). If I then utter *You are nice* with emphasis on *you* and a correlative pointing gesture, the result is decidedly odd - in the same way as if, pointing towards John, I were to say: *She is nice*. This is a welcome result: a presupposition failure is predicted because the person that is pointed to is not an addressee of the speech act (similarly, *she is nice* is odd when pointing to John because *she* carries a presupposition that it denotes a female individual). Another positive feature of the analysis is that it offers an account of sentences that contain non-coreferential occurrences of *you*:

(11) You_i [pointing to A] are clever, but you_k [pointing to B] are not.

On the presuppositional theory, (11) is unproblematic: each second person pronoun comes equipped with its own referential index. As long as these indices are different, the two pronouns are allowed to refer to different people, provided that they are both addressees of the speech act. This is at it should be. By contrast, a standard Kaplanian analysis would have to postulate that the context of the second clause was different from the context of the first clause, since for Kaplan *you* evaluated with a context c simply denotes the addressee of c.

When it comes to binding, the presuppositional theory analyzes

the bound reading of *I did my homework* by analogy with the bound reading of *She did her homework*. In both cases the key is that the rule of presupposition projection for structures of the form r λx F, where r is referential, is that the presuppositions of F should be satisfied when x takes as its value the denotation of r. As a result, the feminine feature of *her* in *she*$_i$ *λx[x did her*$_x$ *homework]* does not trigger any presupposition failure, because *her* does take as its value the individual denoted by *she*$_i$, which is already presupposed to be female. The same reasoning carries over to *I*$_i$ *[λx/x did my*$_x$ *homework]*: the first person feature of *my* in *I*$_i$ *[λx/x did my*$_x$ *homework]* triggers no presupposition failure because *my* takes as its value the individual denoted by *I*$_i$, who is presupposed to be the speaker of the speech act. This reasoning is shown in greater detail in (12). (For semplicity l assume that the description is Russellian and hence does not introduce presuppositions of its own).

(12) a. She did her homework
  a'. she$_i$ λx [x did her$_x$ homework]
  a". [[a']] $^{c, s}$≠# iff (i) s (i) is female, and (ii) [[x did her$_x$ homework]] $^{c, s[x\rightarrow s(i)]}$≠#. (ii) holds iff
  [[she$_i$]] $^{c,s[x\rightarrow s(i)]}$ is female, iff s (i) is female. Hence condition (ii) is satisfied iff condition (i) is. If ≠#,
  [[a']] $^{c, s}$=1 iff s(i) did s(i)'s homework.
  b. I did my homework
  b'. I$_i$ [λx x did my$_x$ homework]
  b". [[b']] $^{c, s}$≠# iff (i) s(i) is the speaker of c, and (ii) [[x did my$_x$ homework]] $^{c, s[x\rightarrow s(i)]}$≠#. (ii) holds iff [[I$_i$]] $^{c,s[x\rightarrow s(i)]}$ is the speaker of c, iff s(i) is the speaker of c. Hence condition (ii) is satisfied iff condition (i) is. If ≠#,[[b']] $^{c, s}$=1 iff s(i) did s(i)'s homework.

This is not the end of the story, however. There are (at least) two kinds of cases in which gender or person features are present morphologically but appear to be ignored semantically. The first case is ellipsis, where incorrect results would be obtained on a 'sloppy' (=bound variable) interpretation if the elided conjunct were syntactically copied from its antecedent (as is often assumed in the syntactic literature) and semantically interpreted:

(13) a. Mary did her homework. Peter did too (i.e. Peter did his homework)
  a'. Mary λx x did her$_x$ homework. Peter did too ~~λx x did her$_x$ homework~~
  b. I did my homework. Peter did too (i.e. Peter did his homework).
  b'. I$_i$ λx x did my$_x$ homework. Peter did too ~~λx x did my$_x$ homework~~

If this copying procedure were applied blindly, we would obtain a presupposition that Peter is female in a., and that he is the speaker in b. In this case things might not be so bad, since for independent reasons syntacticians have postulated that ellipsis resolution is sometimes allowed to ignore certain features ('vehicle change', Fiengo & May 1994). Thus our problem might have more to do with general properties of ellipsis resolution than with person features *per se*. More worrisome, however, are the following cases:

(14) a. Only Mary did her homework. (Therefore Peter didn't do his)
a'. [Only Mary] λx x did her_x homework.
b. Only I did my homework. (Therefore Peter didn't do his) (Heim 1991)
b'. [only I_i] λx x did my_x homework

Analyzed as a generalized quantifier, *only I* or *only Mary* has to range over non-female individuals (as in a.) or non-speaker individuals (as in b.), which should yield a presupposition failure in both cases, contrary to fact. One could try to reduce this problem to the previous one by analyzing *Only I did my homework* in two steps:

– The presupposition is of the form: *I did my homework*.

– The assertion is of the form: *Nobody else did* ___, where ___ is an elided VP, which falls under the rules of ellipsis resolution discussed earlier.

It is not entirely clear how the details should go (but see Schlenker 2003a for a sketchy attempt). If this attempt fails, we are forced to posit purely morphological rules of agreement to account for these cases, i.e. we must say that *only I* (a) inherits first person features, and (b) transmits them to the variable it binds (*my*) in the morphological component. This certainly takes away some of the conceptual appeal of this line of analysis, since we are forced to posit that features are sometimes interpreted and sometimes inherited morphologically. As we will see below, a third problem for the presuppositional theory arises with certain readings of attitude verbs, which also appear to require that some features be transmitted morphologically without being interpreted semantically. This problem is discussed in Section 3.

One further remark is in order. It has often been noted that pronouns sometimes appear to go proxy for definite descriptions - notably, in so-called 'donkey' and 'paycheck' sentences:

(15) a. If a farmer owns a donkey, he beats it (Geach)
b. The man who gives his paycheck to his wife is wiser than the man who spends it. [Karttunen, 1969])

If pronouns are sometimes descriptions, we could assume for conceptual economy that they *always* are, with variable descriptive content. In fact, we obtain all the results of the theory developed so far if we posit that singular pronouns go proxy for the following definite descriptions:

(16) a. I_x → [ιy: y=x & speaker(x)]
b. you_x → [ιy: y=x & addressee(x)]
c. he_x → [ιy: y=x & male(x)]
d. she_x → [ιy: y=x & female(x)]

In this version of the theory, the presuppositional behavior of pronouns derives solely from the fact that they are (Strawsonian) descriptions with certain formulas in their restrictors (see Neale 1990 for a Russellian version of this analysis). We must specify, of course, that in a context c *speaker* is true only of the speaker of c, that *addressee* is true only of each addressee of c, etc. But with these provisos the semantic rules given in (9) and (10) follow from the Logical Forms in (16).

B. SHIFTABILITY: Treating pronouns as definite descriptions is more than a mere convenience when it comes to the further extension we need to solve the Shiftability Problem. It was argued in Schlenker (2003a) that the Amharic data in (8) suggest that attitude verbs can manipulate the context of evaluation of (some) indexicals. Since an embedded indexical typically has a choice of being evaluated with respect to the context of the actual speech act or with respect to the context of a reported speech act, it was argued that contexts should be explicitly represented in the object language, which was thus taken to contain context variables [6]. The variable c* was designated to denote the context of the actual speech act. On a technical level, it was assumed that attitude verbs quantify over contexts rather than over possible worlds (the latter assumption is traditionally made in modal logic). Thus *r says that F* was given the Logical Form and the semantics represented in (17). For notational convenience, I write time and world variables as suffixes on the verb, and I append the context variable introduced by the attitude verb on the complementizer. The intended semantics is that every context compatible with the agent's attitude satisfies the embedded clause. In the schematic example in (17b), *r say-t_k-w_m that-c_i F* is thus true just in case every context c_i compatible with what the agent r says at time t_k in world w_m is one that makes F true. This is stated more formally in (17c):

(17) a. r says that F
b. r say-t_k-w_m that-c_i F
c. $[\![b]\!]^{c, s} \neq\#$ iff $[\![r]\!]^{c, s} \neq\#$ and for each context c' compatible with what $[\![r]\!]^{c, s}$ says at $s(t_k)$ in $s(w_k)$, $[\![F]\!]^{c, s[ci \rightarrow c']} \neq\#$. If $\neq\#$, $[\![b]\!]^{c, s}=1$ iff for each context c' compatible with what $[\![r]\!]^{c, s}$ says at $s(t_k)$ in $s(w_k)$, $[\![F]\!]^{c, s[ci \rightarrow c']}=1$

It should be observed that the semantics proposed here is that of a universally quantified statement: in essence, *r says that F* is true if and only if "each of the contexts compatible with what r says satisfies the embedded clause F". As with other structures of restricted universal quantification, the rule of presupposition projection is that every element (here: context) that satisfies the restrictor (here: every context compatible with what the agent says) should satisfy the presuppositions of the nuclear scope (here: of the embedded clause) [7].

For this analysis to have any bite with respect to embedded indexical pronouns, the value of the latter must in some cases be determined by an embedded context variable. This causes a serious problem for our initial version of the presuppositional analysis, according to which pronouns are simply variables with certain presuppositions. At best, we could revise the Logical Forms and the semantics given in (10) so as to allow Amharic first- or second-person markers to have as a further index a context variable. Following the spirit of the presuppositional theory, we could for instance give the lexical entries in (18) (the superscript *Amh* is there to remind us that these are Amharic lexical entries). To take an example, $I^{Amh}{}_i$-c_k is taken to yield a presupposition failure unless the index i refers to the author of the context c_k, as is spelled out in greater detail below:

(18) a. $[\![I^{Amh}{}_i\text{-}c_k]\!]^{c, s} \neq\#$ iff $s(x_i)$ is the agent of $s(c_k)$. If $\neq\#$, $[\![I^{Amh}{}_i\text{-}c_k]\!]^{c, s} = s(x_i)$
b. $[\![you^{Amh}{}_i\text{-}c_k]\!]^{c, s} \neq\#$ iff $s(x_i)$ is not an addressee of of $s(c_k)$. If $\neq\#$, $[\![you^{Amh}{}_i\text{-}c_k]\!]^{c, s} = s(x_i)$

But this analysis would still yield the wrong result for Amharic sentences with shifted indexicals. The problem is that the value of $I^{Amh}{}_i$-c_k under an assignment s is either (a) $s(x_i)$, i.e. a value which is *not* affected by the quantification over the context variable c_k, or (b) #, which symbolizes presupposition failure. But what we need is for $I^{Amh}{}_i$-c_k to be the agent of c_k, something that the rule in (18a) does not enforce. In Schlenker (2003a) the problem was solved by stipulating that an operation of 'ι-closure' is somehow made available to ensure

that $I^{Amh}{}_{i}$-c_k should, in effect, be interpreted as: *the* x_i *which is the agent of* c_k, or to use a modified version of the formalism we introduced earlier: *[ιx$_i$: speaker(x$_i$, c$_k$)]*.

Of course the mechanism of ι-closure is ugly, and we are better off postulating from the start that pronouns are definite descriptions, as we suggested when we developed the second version of the presuppositional analysis. With the convention that c* always denotes the context of the actual speech act, we can give the following treatment of indexical pronouns, where we have modified the rules given in (10) in specifying that:

(a) the predicates *author* and *hearer* now take a second argument, which is a context variable, and

(b) the pronouns may optionally lack an individual index. This is indicated by enclosing the optional part in angle brackets.

(19) a. $I_{<i>}$-c' → [ιx$_m$: <x$_m$= x$_i$ &> author(x$_m$, c')]
b. you$_{<i>}$-c' → [ιx$_m$: <x$_m$= x$_i$ &> addressee(x$_m$, c')]

The distinction between English and Amharic can then be obtained by stipulating that English indexical pronouns can only take as a context variable the distinguished variable c*, while Amharic pronouns are not so constrained. By taking the version of (19)a in which the index i is omitted, we can give a correct analysis of the Amharic sentence in (20a), whose Logical Form is provided in (20b). To put it informally, the Logical Form *John say-t$_k$-w$_m$ that-c$_i$ [ιx$_m$: author(x$_m$, c$_i$)] be-a-hero-c$_{iT}$-c$_{iW}$* is taken to be true just in case for every context c$_i$ compatible with what John says at time t$_k$ in world w$_m$, the author of c$_i$ is a hero at the time of c$_i$ in the world of c$_i$ (thus c$_{iT}$ and c$_{iW}$ represent the time and the world of c$_i$ respectively). This is stated more formally in (20)c:

(20) a.% *on* % *@gna* *n@ -ññ* *yˆl -all*
John *hero* *be.PF-1SO* *3M.say-AUX.3M*
b. John say-t$_k$-w$_m$ that-c$_i$ [ιx$_m$: author(x$_m$, c$_i$)] be-a-hero-c$_{iT}$-c$_{iW}$
c. [[b]]$^{c, s}$≠# since there are no presupposition-inducing terms in this Logical Form. Furthermore,
[[b]]$^{c, s}$=1 iff for each context c' compatible with what John says at s(t$_k$) in s(w$_k$), [[[ιx$_m$: author(x$_m$, c$_i$)] be-a-hero-c$_{iT}$-c$_{iW}$]]$^{c, s[ci→c']}$=1, iff for each context c' compatible with what John says at s(t$_k$) in s(w$_k$), the agent of c' is a hero at the time of c' in the world of c'.

Note that by using for the pronoun *my* the version of (19a) in which

the index i is included (and bound by a λ-operator), we can also obtain the bound reading of *I did my homework,* as is shown in (21). The crucial element is that the representation of the possessive pronoun, namely *[ιx$_m$: x$_m$= x$_i$ & author(x$_m$, c*)]*, includes a variable (*x$_i$*) which is bound by the λ-abstractor *λx$_i$*:

(21) a. I do my homework
b. [ιx$_m$: author(x$_m$, c*)] λx$_i$ (x$_i$ do-c*$_T$- c*$_W$ [ιx$_m$: x$_m$= x$_i$ & author(x$_m$, c*)]'s homework)

As earlier, the rule of presupposition projection for structures of the form of r λx$_i$ F will ensure that the presuppositions introduced by the possessive pronoun are satisfied.

Finally, the demonstrative uses of *you* are also analyzed straightforwardly by this theory. Each demonstrative occurrence contains a free variable, for instance *[ιx$_m$: x$_m$=x$_i$ & addressee(x$_m$, c*)],* which introduces a presupposition that the person denoted by the index i is an addressee. When several demonstrative occurrences of *you* co-occur in the same sentence, no problem arises as long as the free variables that they contain are distinct, as is illustrated in (22).

(22) a. You [pointing] are clever but you [pointing] are not clever.
b. [ιx$_m$: x$_m$=x$_i$ & addressee(x$_m$, c*)] be-clever-c*$_T$- c*$_W$ & not [ιx$_m$: x$_m$=x$_k$ & addressee(x$_m$, c*)] be-clever-c*$_T$- c*$_W$

2.2. Theory II. The binding analysis of Person

There are (at least) two properties of the presuppositional analysis that are potentially unpleasant:

(i) As was mentioned earlier, a mechanism of purely formal feature transmission might be needed for cases of ellipsis, constructions involving *only,* and cases of embedding under an attitude verb (the latter case is discussed below). But if so, wouldn't we obtain a leaner and nicer theory if we treated *all* occurrences of person features as arising from rules of feature transmission?

(ii) The treatment of shifted indexicals requires two controversial assumptions. First, and least importantly, the analysis of pronouns-as-variables needs to be supplemented with the ugly device of ι-closure to account for the simplest facts. This deficiency was addressed above by uniformly treating pronouns as definite descriptions. Second, and more importantly, the theory is committed to the claim that attitude verbs are 'context shifters', and thus that

Kaplan's Fixity Thesis cannot be maintained. An alternative, however, is to maintain that the Amharic data are the result of a mechanism of feature transmission *peculiar to pronouns*, and do not tell us anything about the availability of context shift in natural language. In other words (so the claim goes) Kaplan's Fixity Thesis can be saved once a sufficiently detailed morpho-syntactic analysis is developed [8]. This is explicitly the line of analysis followed by von Stechow (2003), in opposition to Schlenker (2003a).

On an empirical level, the question is whether it is possible to find, in full generality (i.e. beyond the domain of expressions that can somehow 'inherit' features, such as tenses and pronouns), indexical expressions that violate Kaplan's Fixity Thesis. In Schlenker (2003a) it was claimed that this is indeed the case, and that for some speakers English *two days ago* or French *dans deux jours* (lit. 'in two days') have precisely this behavior:

(23) John has told me repeatedly over the years: 'I was still sick two days ago/the day before yesterday'
   a. #John has told me repeatedly over the years that he was still sick the day before yesterday.
   b. John has told me repeatedly over the years that he was still sick two days ago

It must be granted, however, that the data are not as clear as one would wish. I will leave the empirical question open in what follows, though one should bear in mind that a lot hinges on it.

Let us see, then, how a theory based solely on feature percolation can be developed. The most radical proponent of this analysis was Heim (1991), followed in some respects by Schlenker (1999/2000), Heim (2002) and von Stechow (2003). Kratzer (1998) offered a related theory, though she did not discuss shifted indexicals but only logophoric pronouns.

In the version we will study below, the main tenets of the theory are the following:

I. Indexical pronouns are systematically represented as bound variables.

II. A bindee always inherits the features of its binder. In addition, special rules are postulated for (a) sentences involving *only* (and presumably other focus-sensitive constructions as well), and (b) attitude reports.

III. (Some) Amharic attitude verbs can transmit first person features in the absence of a first person antecedent. English attitude verbs cannot do this.

A. BINDABILITY: Consider first a simple use of *I*, as in the sentence: *I run*. If we wish to maintain Points I and II, we must stipulate that every sentence starts with a prefix λx_i^{1st} which (i) binds the first person pronoun, and (ii) transmits first person features to it. In fact, we may generalize this approach to account for time and world dependency, and stipulate that every sentence starts with a prefix $\lambda<x_i^{1st}, t_k, w_m>$, which abstracts simultaneously over an individual, a time and a world variable (the present account of person features can be extended to tense and mood features, as was done in Schlenker (1999/2000) and in Stechow (2003). We do not attempt to do so in the present survey). Heim (1991) motivated this analysis with the observation, made in Lewis (1979), that the semantic value of a sentence should be seen as a set of triples of the form <individual, time, world> rather than simply as a set of possible worlds, as is standardly assumed. Importantly, a triple of the form <individual, time, world> can be seen as a context, and thus another way of stating Heim's and Lewis's observation is that the value of a sentence should be seen as a set of contexts rather than as a set of possible worlds. The reason for adopting this more fine-grained notion of meaning is that, as Lewis noted, an amnesiac – say, one who had read all the books – might know everything there is to know about the world without thereby knowing the truth value of the sentence: 'I am John Smith'. By hypothesis, the knowledge he lacks cannot be modeled as an uncertainty about the world; by contrast it can easily be analyzed as an uncertainty about the value of the first coordinate of the context he happens to be in. In effect, then, Heim's proposal gives a syntactic rendering of Lewis's semantic conclusion: since the value of sentences is a set of triples, their Logical Forms can just as well start with an abstraction over a triple of variables.

Let us develop this analysis in greater detail. Every sentence starts with a prefix of the form $\lambda<x_i^{1st}, t_k, w_m>$, and accordingly the semantic value of every sentence is a set of triples of the form <agent, time, world>. Once the value p of a sentence S is computed, we can establish whether S is true by determining whether the context c in which it is uttered satisfies: $<c_A, c_T, c_W> \in p$, where c_A, c_T and c_W are respectively the individual, time and world coordinates of c. A simple example is given in (24):

(24) a. I run
b. $\lambda<x_i^{1st}, t, w>$ $[x_i^{1st}$ run-t-w$]$
c. (b) is true in the context c and with the assignment function s iff $<c_A, c_T, c_W> \in [\![\lambda<x_i^{1st}, t, w>\ [x_i^{1st}$ run-t-w$]]\!]^{c, s}=1$, iff $<c_A, c_T, c_W> \in \{<x, t, w>$: x runs at t in w$\}$, iff c_A runs at c_T in c_W

Informally, (24c) says that the Logical Form $\lambda<x_i^{1st}, t, w>[x_i^{1st}$ *run-t-w]* is true in a context c just in case c is in the value of this formula. But the value of the formula is the set of triples <x, t, w> for which individual x runs at time t in world w. As desired, the sentence ends up being true just in case the agent c_A of c runs at the time c_T of c in the world c_W of c.

Of course this analysis needs to be refined to account for second person pronouns. We may simply add one coordinate to the initial prefix, and modify the definition of truth accordingly. Thus in (25), the value of *you run* is a set of quadruples <x, y, t, w> for which y (that is, the addressee) runs at time t in world w. Accordingly, the sentence is true at a context c just in case the quadruple of its coordinates lies within that set (in what follows c_H designates the hearer of the context c):

(25) a. You run
b. $\lambda<x_i^{1st}, x_k^{2nd}, t, w>[x_k^{2nd}$ run-t-w]
c. (b) is true in the context c and with the assignment function s iff $<c_A, c_H, c_T, c_W> \in [[\lambda<x_i^{1st}, x_k^{2nd}, t, w>[x_k^{2nd}$ run-t-w]]] $^{c, s}=1$, iff $<c_A, c_H, c_T, c_W> \in \{<x, y, t, w>$: y runs at t in w}, iff c_H runs at c_T in c_W

Note that on this analysis indexical pronouns do not introduce presuppositions. Rather, they simply spell out variables that happen to inherit particular features from particular binders.

However there is a price to pay for this theory: it becomes difficult to analyze sentences that involve different addressees. It would seem that one of two choices can be made:

(a) We may assume that the sentence prefix can contain as many addressee coordinates as there are addressees to the speech act.

(b) Alternatively, we may postulate that the initial prefix has only one addressee coordinate, but that the context can shift between two clauses, or even within one and the same sentence.

Solution (a) is not particularly elegant. And Solution (b) might encounter problems when two demonstrative occurrences of *you* are found in the same clause. It is not entirely clear how the examples below should be evaluated according to Solution (b). Presumably a 'very quick' context shift should be able to occur between the first and the second occurrence of *you*, but I do not know how such a theory can be developed.

(26) a. You [pointing] and you [pointing], please stop talking to each other
b. You [pointing] should stop talking to you [pointing]

Unless otherwise noted, we will disregard the addressee coordinate in what follows, with the understanding that the 'official' version of the theory should include it.

Be that as it may, the Binding theory of person has a field day when it comes to analyzing bound readings of first person pronouns. Since we have assumed that a bindee inherits (in the morphological component) the features of its binder, the bound reading of *I did my homework* is analyzed in a very simple way: the pronoun *I* is raised, leaving behind a λ-abstract which inherits its first person features. This λ-abstract is in turn responsible for binding the possessive pronoun, which again inherits in this way *its* first person features. This analysis is represented in (27):

(27) a. I do my homework
b. $\lambda<x_i^{1st}, t, w> [x_i^{1st} [\lambda x^{1st}_k [x^{1st}_k$ do- t- w x_k^{1st}'s homework]]]

Exactly the same analysis can be extended to *only I* examples, as long as one is willing to stipulate that, for reasons unknown, the entire expression *only I* inherits its features from *I*. We can then give the following Logical Form:

(28) a. Only I do my homework
b. $\lambda<x_i^{1st}, t, w> [[\text{only } x_i^{1st}]_{1st} [\lambda x^{1st}_k [x^{1st}_k$ do- t- w x_i^{1st}'s homework]]]

B. SHIFTABILITY: How does this analysis deal with indexical pronouns that are evaluated with respect to a non-actual context? As it turns out, a large part of the required machinery was already in place even before the issue of shiftable indexicals arose in the semantics literature. The motivating factor was the analysis of PRO, the unpronounced subject of the infinitive, which has different interpretive properties from garden-variety pronouns. Let us consider the contrast between (29a) and (29b):

(29) a. George hopes PRO to be elected
b. George hopes that he is elected

Morgan (1970) and Chierchia (1989) observed that there is an interpretive difference between these sentences. Suppose that George is drunk, and has forgotten that he is a candidate in the election. He watches TV and sees a candidate that he finds appealingly reactionary, hoping that this person – none other than himself, as it turns out – should be elected. (29b) might provide a passable way of

describing truly this admittedly unusual situation; (29a) would not. Somehow (29a) requires that the candidate be in a position to utter the first person statement: *I should get elected* - a reading called 'De Se' in the literature (the reading that does not require a first person thought is called 'De Re'. Both De Re and De Se are distinct from De Dicto readings). From the standpoint of the preceding paragraphs, PRO has exactly the behavior that one would expect of a shifted indexical, i.e. PRO yields a reading that one can symbolize as in (30). Given the rules we have set up in earlier paragraphs, it says that every context c_i compatible with what George hopes for at time t in world w is one whose author is elected at the time and in the world of c_i. In other words, George hopes to be in a context c_i in which he can say truly: 'I am elected' [9]:

(30) George hope-t-w to-c_i [ιx_m: author(x_m, c_i)] be-elected-c_{iT}-c_{iW}

However when these facts were first discussed in the formal semantics literature (Chierchia 1989), representations such as (30) were not available - among others because they violated Kaplan's Fixity Thesis. So a somewhat different solution was devised. What Chierchia suggested (following in part Lewis 1979) was that an infinitive clause with a PRO subject does not denote a proposition, of the form λw'ϕ (=a function from possible to truth values), but rather but rather a property or function from possible worlds to sets of individuals, of the form λw' λx ϕ. This was not the end of the story, however. Researchers working on tense – in particular Ogihara (1996) and Abusch (1997) – suggested that tense too should also receive a 'De Se' analysis, and thus that an additional abstraction over times should be superimposed to the abstractions over worlds and over individuals that Chierchia had argued for [10]. Taking all of these abstractions into account, one is naturally lead to posit a Logical Form such as (31), where the prefix $\lambda w'\ \lambda t'\ \lambda x_k$ in the embedded clause yields three abstractions, over worlds, over times, and finally over individuals:

(31) λ<x_i^{1st}, t, w> George hope-t-w to λw' λt' λx_k x_k be-elected-t'-w'

The order of the abstractions does not matter in the least, and we may thus restate this analysis as providing for a single abstraction over triples of an individual, a time and world, as is shown in (32):

(32) λ<x_i^{1st}, t, w> George hope-t-w to λ<x_k, t', w'> x_k be-elected-t'-w'

This representation displays with complete clarity the parallelism between main clauses and clauses embedded under an attitude verb, since both are prefixed with a λ-operator abstracting over a triple of variables of the form <x, t, w>. In addition, we may observe that such a triple can be thought of as a context whose author coordinate is x, whose time coordinate is t and whose world coordinate is w. As it turns out, then, the analysis in (31)-(32) is similar to that in (30): in both cases attitude verbs are treated as quantifiers over contexts (contexts are taken as primitive in (30), and they are constructed out of triples of elements in (32)). The analogy can be further emphasized by treating the complementizer itself as a λ-operator, which yields the Logical Form in (33) (it should be compared to the Logical Form in (30), where a context variable c_i was appended to the complementizer *to*):

(33) $\lambda<x_i^{1st}$, t, w> George hope-t-w to-$<x_k$, t', w'> x_k be-elected-t'-w'

This Logical Form can be interpreted using the semantic rule in (34), which in this case says that *George hopes to be elected* is true just in case every triple <x, t, w> compatible with what George hopes (at the time and in the world of utterance) satisfies: x is elected at t in w (in other words, George hopes to be in a context <x, t, w> in which he can say truly: 'I am elected').

(34) $[\![$d hope-t_k-w_m to-$<x_i, t_q, w_p>$ F$]\!]^{c, s}=1$ iff for each triple <x, t, w> (where x is an individual, t is a moment and w is a possible world) compatible with what $[\![$[d]$]\!]^{c, s}$ hopes at s(t_k) in s(w_m), $[\![$p$]\!]^{c, s[xi\rightarrow x, tq\rightarrow t, wp\rightarrow w]}=1$[11]

Thus we see that Chierchia's analysis of PRO, extended to tense and combined with an analysis of indexical pronouns as bound variables, leads us to (i) represent contexts syntactically as triples of variables that appear at the beginning of every sentence, and (ii) treat attitude verbs as quantifiers over these triples. The question whether this analysis really forces us to 'quantify over contexts', and thus to discard Kaplan's Fixity Thesis, becomes hard to resolve. On the one hand, attitude verbs do not literally quantify over contexts - rather, they quantify simultaneously over an individual, a time and a world variable, which might lead us to conclude that on this analysis attitude verbs do not quantify over contexts. On the other hand, however, attitude verbs quantify over precisely those things (those triples) that allow one to analyze the context-dependency of indexical pronouns

and of present tense (and possibly indicative mood). This might lead us to think that in this analysis attitude verbs really do quantify over contexts. I take it that the point is largely terminological (Schlenker (1999/2000) interpreted this analysis as being one that involves quantification over contexts; von Stechow (2003) drew the opposite conclusion from a closely related theory).

Unsurprisingly, then, very little is needed to extend this analysis to shiftable indexicals. Still, *something* must be said to ensure that an indexical pronoun embedded under an attitude verb V can be bound by V (i.e. by the triple of variables introduced by V). The required device should allow (some) attitude verbs to generate first person features on the individual variables that they introduce. Following Heim 2002, this is what we assume about the verb 'say' in Amharic. The Amharic equivalent of *John says that I (=John) be a hero* would then be represented as in (35), where the author coordinate of the embedded context is generated with the features *1st*:

(35) $\lambda<x_i^{1st}, t, w>$ George hope-t-w to-$<x_n^{1st}, t', w'> x_n^{1st}$ be-elected-t'-w'

The details are discussed in Section 3, but we can already see that the analysis stands a good chance of matching the predictions of the presuppositional theory of person.

In order to make the debate between Theory I and Theory II precise, we now discuss further details needed to implement each analysis. After we have done so, we will introduce another alternative, Theory III, which re-states some of the syntactic insights of Theory II in a semantic fashion, but adds to it an account of some binding-theoretic effects.

3. Developing Theory I and Theory II

3.1. Plural pronouns in Theory I

3.1.1. Basic cases

Consider again the presuppositional theory discussed earlier:

(36) a. I_x → [ιy: y=x & speaker(y, c)]
b. you_x → [ιy: y=x & addressee(y, c)]
c. he_x → [ιy: y=x & male(y)]
d. she_x → [ιy: y=x & female(y)]

This account has the advantage of easily accounting for (a) bound uses of indexical pronouns, and (b) shifted uses of some indexical pronouns in some languages. Still, the analysis isn't optimal, because it doesn't easily extend to plural pronouns. There is some morphological evidence that first person plural pronouns should sometimes be analyzed as the plural of first person pronouns. This is shown for instance by the pronominal paradigm in Mandarin, where plural pronouns are transparently derived from singular pronouns with an added suffix, '-men' which *is* 'occasionally used to express plurality with nouns referring to people' (Li & Thompson 1981: 12; in other cases Mandarin does not mark plurality):

(37)	I	*wo*^{3}	we	*wo*^{3}*-men*
	you	*ni*^{3}	you-pl.	*ni*^{3}*-men*
	he/she	*ta*^{1}	they	*ta*^{1}*-men*

Given the foregoing *semantics*, however, the most natural extension of the account to plural pronouns would involve (i) considering an enlarged domain of objects, which includes pluralities, and (ii) refining the definitions in (36) as in (38):

(38)	a. I_x	→	[ιy: y=x & singular(y) & author(y, c)]
	b. you_x	→	[ιy: y=x & addressee(y, c)]
	c. he_x	→	[ιy: y=x & singular(x) & male(x)]
	d. she_x	→	[ιy: y=x & singular(x) & female(x)]
	e. we_x	→	[ιy: y=x & plural(x) & author(x)]
	g. $they_x$	→	[ιy: y=x & plural(x)]

In these definitions I have attempted to achieve a modicum of elegance by defining a single lexical entry for the singular and plural versions of *you*. Depending on how the predicates *author* and *addressee* are interpreted, the result may or may not be semantically adequate:

(i) If we provide a semantics according to which the predicate 'author' applied to a plural object d yields the value *true* just in case every member of d is a speaker, we get a completely wrong result. This is because such an analysis predicts that *we* can only denote a plurality of 'speakers', which is clearly incorrect (Cf. *You and I should talk about the problems we are having;* or: *John and I didn't do our homework*). The correct generalization is that a first person plural pronoun must denote a group of individuals that includes the speaker, but there is certainly no requirement that each member of the group be itself a speaker.

(ii) The problem can be solved straightforwardly by modifying the rule of interpretation for first person features. We shall only require that the speaker be a part of the individual which is denoted (where the notion part of can be explicated using any theory of mereology). In the singular, nothing really changes, since the only way for a singular individual to contain the speaker as a part is to *be* the speaker. But in the plural this system yields the far weaker -and undoubtedly more correct- presupposition that the plural individual that is denoted should simply include the speaker. The new rules of interpretation for our features will thus look as follows:

(39) a. $[\![\text{author } (x_i, c')]\!]^{c, s}=1$ iff $s(x_i)$ contains the author of $s(c')$. Otherwise $[\![\text{author } (x_i, c')]\!]^{c, s}=0$
b. $[\![\text{hearer } (x_i, c')]\!]^{c, s}=1$ iff $s(x_i)$ contains the addressee of $s(c')$. Otherwise $[\![\text{hearer } (x_i, c')]\!]^{c, s}=0$

We may keep the feature analysis particularly simple by assuming that feature selection is subject to the following principle (argued for in Heim 1991, Sauerland 2003, Schlenker 2003a. The present account is very close to that developed in Sauerland 2003):

(40) Maximize presupposition!
The features that appear on a pronoun should be chosen so as to maximize the presupposition they express, as long as no presupposition failure is triggered.

If we adopt this principle, we can simply assume that there are no third person features, and that there are even no negative versions of first and second person features. If the only available features are 'author' and 'hearer', third person will simply be marked as the absence of both features. Interestingly, there are purely semantic arguments in favor of this treatment of third person features. Observe that in the following example *he* ranges over a variety of individuals, including the speaker:

(41) Everybody (including me) respects his parents

Clearly it would not do to posit that *his* carries a presupposition that it denotes (under any assignment function) a non-speaker, as this would incorrectly predict a presupposition failure for (41). The theory we just sketched, by contrast, has no difficulty with this example. It is clear that including first or second person features on the bound

variable would trigger a presupposition failure. As a result, no features whatsoever can be inserted, and the pronoun is correctly predicted to appear in the third person.

We can further economize on features by assuming that there is a plural feature but no singular feature (we could also make the opposite choice, which seems a bit less natural, in view in particular of the Chinese data given above - there it would seem that *-men* really does appear to spell out a plural feature. See however Sauerland 2003 for arguments in favor of the hypothesis that plural marking is semantically vacuous). We end up with the following analysis of singular and plural pronouns:

(42) a. I_x → [ιy: y=x & author(y, c)]
b. you_x → [ιy: y=x & addressee(y, c)]
c. he_x → [ιy: y=x & male(y)]
d. she_x → [ιy: y=x & & female(y)]
e. we_x → [ιy: y=x & plural(y) & author(y, c)]
g. $they_x$ → [ιy: y=x & plural(y, c)]

To take an example, suppose that the variable x denotes a plurality that includes the speaker but does not include any addressee. The principle MAXIMIZE PRESUPPOSITION! requires that the feature 'plural' and the feature 'author' be found in the restrictor of the pronoun (i.e. of the concealed description it corresponds to). We end up in this way with the representation *[ιy: y=x & plural(y) & author(y, c*)]*, where c* is the distinguished variable that designates the context of the actual speech act.

Interestingly, this inventory of features is rather constrained, and predicts only two additional combinatorial possibilities in the plural:

(a) [ιy: y=x & plural(x) & hearer(x, c)], which is the banal second person plural pronoun found in many languages (e.g. French *vous*; in English this form is identical to the second person singular form).

(b) [ιy: y=x & plural(x) & author(x) & hearer(x, c)], which corresponds to the *first person inclusive* found in more exotic languages. No other possibilities are predicted to be possible in the syntax. As morphologists have often pointed out (e.g. Noyer 1997), this is a desirable result: no other combinations appear to be morphologically realized. In particular, no language appears to distinguish between two kinds of 'you', one that denotes only hearers while the other denotes both hearers and non-participants to the speech act (this distinction would be easy to define if there were a feature '3rd person';

the former case would come out as [+hearer, +3rd, +plural] while the latter would be [+hearer, -3rd, +plural]).

Just as we re-defined 'author' as requiring only that the object it applies to 'contain' the speaker, a similar re-definition of the semantics turns out to be necessary for some gender features as well. In French the masculine plural pronoun *ils* need not denote a group that only includes males; rather, the requirement is simply that at least one member of the group be male. This suggests for 'masculine' a semantics that is formally similar to that of 'author':

(43) $[\![\text{masculine}(x_i)]\!]^{c,s}=1$ iff $s(x_i)$ contains a male individual. Otherwise $[\![\text{masculine}(x_i)]\!]^{c,s}=0$

In this case as well nothing really changes in the singular since the only way for a singular individual to contain a male part is to be male.

3.1.2. Partial binding: partee's examples [12]

Having separated features from variables, we may further extend our mechanism to give an account of some puzzling data discussed in Partee (1989):

(44) John often comes over for Sunday brunch. Whenever someone else comes over too, we (all) end up playing trios. (Otherwise we play duets). (Partee 1989)

If one were to treat *we* as denoting a fixed group of individuals that includes the speaker, the wrong truth conditions would be predicted. For in this case *we* means something like: *I, John and whoever else comes over too*. To put it differently, *we* appears to be partially bound by *someone*, even though it is still constrained to denote a group that includes the speaker. Since Partee's example involves both partial binding and donkey anaphora ('whenever someone...'), it will prove easier to deal with the following example, which only involves standard binding:

(45) Each of my colleagues is so difficult that at some point or other we've had an argument.

Here too the pronoun *we* appears to be partly bound by the quantifier *each of my colleagues*; as before, however, its denotation must still include the speaker.

This phenomenon is not unique to plural indexical pronouns. Similar cases can readily be constructed with third person plural pronouns. The same pattern is thus found with split antecedents:

(46) [Talking about John] Each of his colleagues is so difficult that at some point or other they've had an argument.

Of particular interest are cases in which the two binders (or the binder and the contextually supplied referent) do not agree in gender. The following French example suggests that in such cases gender agreement is triggered by the same rule as in the unbound case, i.e. the plural pronoun must be masculine as soon as one member of the plural individual it denotes under an assignment is male; while feminine features appear just in case every member of the group is female:

(47) a. Chacune des anciennes copines de Jean était si embêtante que, à un moment ou à un autre,
Each of-the former girlfriends of Jean was so annoying that, at a point or at another,
'Each of Jean's former girlfriends was so annoying that, at some point or other,
*elles / ils se sont disputé(e)s.
*they-fem./they-masc. each-other are quarreled
they had a fight'

b. Chacune des anciennes copines de Marie était si embêtante que, à un moment ou à un autre,
Each of-the former girlfriends of Marie was so annoying that, at a point or at another,
'Each of Marie's former girlfriends was so annoying that, at some point or other,
elles / *ils se sont disputé(e)s.
they-fem./*they-masc. each-other are quarreled
they had a fight'

Partee's facts are but a special case of this general pattern. Nothing special needs to be said about the feature 'author', which has its usual interpretation. The data can be explained if it is assumed that variables may be summed in the syntax. On the present approach there is no reason to exclude this possibility, since our working assumption is that pronouns express sets of features (predicates) rather than variables. If sums of variables are allowed in the syntax, *we* may spell-out any of the following configurations (I have represented a combination that corresponds to exclusive *we*):

(48) a. [ιy: y=x_i & plural(y) & author(y, c)]
b. [ιy: y=x_i+x_k & plural(y) & author(y, c)]
c. [ιy: y=x_i+x_k+x_l & plural(y) & author(y, c)]

Within this framework, our version of Partee's example, as well as the French example with a plural *ils*, can then be represented roughly as follows (I omit gender in the first example):

(49) a. [∀x_i: colleague(x_i)] argument([ιy: y=x_i+x_k & plural(y) & author(y, c)])
b. [∀x_i: girlfriend(x_i)] argument([ιy: y=x_i+x_k & plural(y) & masculine(y)])

Note that in (49) the presupposition constrain, in effect, the value of the sum x_i+x_k (since for instance in b. *[ιy: y=x_i+x_k & plural(y) & masculine(y)]* triggers a presupposition failure just in case there isn't exactly one object y identical to x_i+x_k which is plural and masculine; this boils down to the condition that x_i+x_k be plural and masculine). To this one could oppose an alternative theory, according to which each feature must constrain the denotation of one of the variables x_i or x_k. This would for instance be predicted by the representation in (50):

(50) [ιy: y=x_i & author(x_i, c)]+[ιy: y=x_k & plural(x_k)]

While it is conceivable that this second mechanism is also available (the predictions are intricate and complex), it certainly cannot be the *only* one. Certainly plural features must be allowed to apply globally to a sum of variables of cases of split antecedents:

(51) a. Each boy was so convincing to some girl that they ended up having an affair.
b. [all x_i: boy(x_i)][some x_k: girl(x_k)]... affair([ιy: y=x_i+x_k & plural(y)]

Both x_i and x_k range over singular individuals, and it is only their sum which licenses plural marking of the pronoun. For uniformity of treatment I shall assume that the same principle applies to all features, though further arguments would be needed to buttress this claim.

This theory has an important shortcoming, which appears with data discussed by Rullmann (2004) in the context of a slightly different analysis (I give a French version of Rullmann's data; Rullmann

mentioned these as a problem for his analysis). Suppose that the following sentences are addressed to a plurality of people:

(52) a. #Chacun de vous est fidèle à ton épouse.
Each of you-pl is faithful to your wife
b. Chacun de vous est fidèle à son épouse.
Each of you-pl is faithful to his wife

Given the presuppositional analysis given above, we would expect (52a) to have the analysis in (53), which incorrectly predicts that it could have the reading that is in fact instantiated by (52b):

(53) $[\forall x_i$: ...] ... [ιy: y=x_i & hearer(y, c)]...

The reason we are forced to make this prediction is that, due to the partitive construction *each of you*, the variable x_i only ranges only over (singular) addressees, and therefore the presupposition triggered by the predicate *hearer(y, c)* in the embedded definite description should be automatically satisfied. In fact, things are worse; since the theory predicts that the presuppositions triggered by *hearer(y, c)* should be satisfied, MAXIMIZE PRESUPPOSITION! predicts that second person marking on the possessive pronoun should be not just possible but obligatory. Plainly, both predictions are false. (We shall revisit this issue in Section 4 [13]).

3.2. Shifted indexicals, logophoric pronouns and De Se *readings in Theory I*

3.2.1. Shifted Readings

Let us now see how shifted indexicals can be integrated to Theory I. The basic cases are nearly trivial, thanks to two theoretical choices that were motivated by hindsight, namely that (a) context variables should be represented in the object language (so that they may be bound by attitude operators), and (b) pronouns should systematically be analyzed as descriptions (so that binding of a context variable can affect the value of an embedded pronoun). With this background in mind, what is literally *John says that I* (=John) *be a hero* in Amharic is analyzed as in (21), repeated here for the reader's convenience:

(54) a. % on % @gna n@ -ññ y^l -all
John hero be.PF-1SO 3M.say-AUX.3M
b. John say-t_k-w_m that-c_i [ιx_m: author(x_m, c_i)] be-a-hero-c_{iT}-c_{iW}

Needless to say, there has to be some difference between English and Amharic with respect to these data. Where should this difference be located?

(i) One possibility is that English attitude verbs, unlike some of their Amharic counterparts, are not quantifiers over contexts (maybe they are simply quantifiers over possible worlds). But there are two objections to this claim:

– First, the existence of De Se readings suggests that English attitude verbs must, in some cases at least, quantify over things that are as fine-grained as contexts - be they literally contexts, or triples of the form <individual, time, world> which can be put in 1-1 correspondence with them. Positing that English attitude verbs also quantify over contexts makes for a nice unification of De Se pronouns and shifted indexicals.

– Second, if it is indeed correct (as claimed in Schlenker 2003a) that some English indexicals such as *two days ago* can be shifted in attitude reports, this would seem to argue that the difference between English and Amharic should not be located in the semantics of the attitude reports.

(ii) Another possibility is that the difference between English and Amharic is lexical in nature: Amharic *I* can take as an argument any context variable, whereas English *I* can take as argument only a designated context variable, c*, which by definition denotes the context of the actual speech act. This line of analysis has the advantage of allowing for considerable flexibility across languages - a flexibility that appears to be needed, since in several languages that have been described (though never in depth), some pronouns (say, *I*) can be evaluated with respect to any context, while other indexicals (say, *you*) can only be evaluated with respect to the context of the actual speech act. (See Schlenker 1999/2000 for discussion)

3.2.2. Logophoric pronouns

Let us henceforth assume a theory based on lexical stipulations that ensure that some indexicals can only be evaluated with respect to the matrix context while others can be evaluated with respect to any context whatsoever (as in (ii) above). How should *that* theory be implemented? We suggest that all indexicals are defined by the feature c, which indicates that they take as argument a context variable. For Amharic *I,* this is sufficient – all we want is to insure that Amharic *I* is dependent on some context variable, though we need not specify whether this should be the distinguished context variable c* which, by definition, denotes the actual context, or any other context

variable. But for English *I* a further specification is needed, namely that it carries an additional feature * which forces its context argument to be the distinguished context variable c*. To summarize, we shall posit the following lexical entries:

I^{Amh} <-> [c]
I <-> [c, *]

Now it is natural to ask what would happen if a language had both a word (call it LOG) for the feature bundle [c] and a word (call it FIRST) for the feature bundle [c, *]. Clearly, FIRST would be more highly specified than LOG, since it contains all the features of LOG (namely c), and then some (namely *). The question, of course, is how the choice between these two items should be effected. A standard answer in morphology is that the choice of lexical items is performed in two stages:

STAGE 1: A syntactic representation is produced which is 'fully specified' for all grammatical features (in the sense that it contains all the features that might be syntactically or semantically necessary).

STAGE 2: Lexical items are inserted in the terminal nodes of the syntactic representation. Unlike these terminal nodes, however, the lexical items need not be fully specified; they may contain only a subset of the features found in the terminal nodes. When two or more such items can be inserted and thus compete for insertion in the same node, that item is inserted which is most highly specified, i.e. which contains a proper superset of the features of its competitors [this need not decide all cases, but for present purposes this mechanism will suffice].

In the case at hand, then, this mechanism of 'competition for insertion' has the effect that FIRST, which corresponds to the feature bundle [c, *], should be inserted whenever it can be. To make things concrete, consider a worked out example. Suppose that in the language under study (with both FIRST and LOG) we analyze the sentence pro_i *run*, where the index i denotes the speaker. By MAXIMIZE PRESUPPOSITION!, the syntactic representation should contain the predicate author(_, _) (and furthermore the context variable has no choice but to be c*, since other context variables can only be introduced by attitude operators). We obtain in this fashion the syntactic representation in (55b):

(55) a. pro_i run
b. Syntactic Representation: [ιx$_m$: x$_m$=x$_i$ & author(x$_m$, c*)] run-c*$_T$-c*$_W$
c. Lexical items: FIRST <-> [author, c, *]
d. Lexical insertion: insert FIRST

The lexical items in competition are simply FIRST and LOG. Clearly, all the features that are pronounced by either lexical entry are present in the syntactic representation. Furthermore, FIRST is more highly specified than LOG, so it wins out in the competition process and ends up being inserted.

So when would LOG ever be inserted? Whenever an element contained the predicate *author* with a 'normal' context variable rather than the distinguished context variable c*. In other words, given its specifications, LOG should take as argument a context variable, but this context variable *may not be* the distinguished context variable c*. Since only attitude operators are allowed to introduce context variables in syntactic representations, we conclude that *LOG* should be used exclusively to refer to the agent of a reported speech- or thought-act. As it turns out, such pronouns are instantiated in natural language: they are the logophoric pronouns or agreement markers found in Ewe and Gokana. As discussed in Clements 1975, when a first person speech act is reported, as in (56)a, a logophoric pronoun must be used to denote the agent. If a normal, non-logophoric pronoun is used, a disjoint reference is obtained, as in (56)b:

(56) a. kofi be yè-dzo (Ewe, Clements 1975)
Kofi say LOG-leave
'Kofi says that he (=Kofi) left'
b. kofi be e-dzo (Ewe, Clements 1975)
Kofi say he/she-left
'Kofi says that he (≠Kofi) left'

From the present perspective, the facts in (56a) can be analyzed straightforwardly if Ewe has at the same time LOG, FIRST, and a third person pronoun (THIRD) which contains no feature specification at all. When a first person speech act is reported, the feature 'author' (of the reported speech act) should appear in the embedded clause, as is illustrated in (57):

(57) a. John says that LOG be-a-hero (Ewe/Gokana)
b. Syntactic Representation: John say-t_k-w_m that-c_i [ιx$_m$: author(x$_m$, c_i)] be-a-hero-c_{iT}-c_{iW}

c. Lexical items: FIRST <-> [author, c, *]
LOG <-> [author, c]
THIRD <-> []
d. Lexical insertion: insert LOG

Since FIRST contains a feature, namely *, which is not contained in the syntactic representation, it cannot be inserted. LOG, by contrast, can be inserted, and since it is more highly specified than THIRD it must be inserted. (It should be observed that this analysis -which in this respect is identical to all other analyses of 'De Se' pronouns currently on the market- departs somewhat from the initial generalization on non-logophoric pronouns which was given above. We predict that a non-logophoric pronoun could be used to refer to Kofi in the embedded clause, but only if Kofi did not realize that he was talking about himself, e.g. if he thought about someone he had just seen in the mirror (and who happened to be Kofi himself): 'He left'. This prediction has insufficiently be tested, but see Kusumoto (1998) for relevant data.

Interestingly, we make a rather fine-grained prediction about what happens when a first person pronoun is embedded under a first person attitude verb, as is illustrated in (58):

(58) a. I say/said that I fell (Ewe/Gokana)
b. Syntactic Representation:
[ιx$_m$: x$_m$=x$_i$ & author(x$_m$, c*)] say-t$_k$-w$_m$ that-c$_i$ [ιx$_m$: author(x$_m$, c$_i$) & **author(x$_m$, c*)**] fall-c$_{iT}$-c$_{iW}$
c. Lexical items: FIRST <-> [author, c, *]
LOG <-> [author, c]
d. Lexical insertion: insert FIRST in the embedded clause

I have indicated a part in **bold**, which must be included by MAXIMIZE PRESUPPOSITION! whenever it is in fact presupposed that for each context c compatible with the speaker's claim, the agent of c is the speaker himself - which is just to say that the speaker knows (or knew, if the verb is in the past tense) who he is (presumably this is the only case that has been investigated in the descriptive literature). So we predict that logophoric pronouns cannot normally appear in the first person. By the mechanism of 'Competition for Insertion', whenever the features present are those in (58b) (including the part in bold), the lexical item that must be inserted is FIRST, not LOG.

We derive in this way a typological generalization that appears to be relatively strong: there do not appear to exist any logophoric

pronouns that denote the author of the actual speech act. Roncador (1988), who provides a survey of the literature, notes only two apparent exceptions to this general absence: Ngbaka, for which he claims that the descriptions are contradictory; and Gokana, where the logophoric agreement marker can *in principle* be applied to all persons. For Gokana Roncador relies on the description of Hyman & Comrie (1981). The latter point out, however, that although logophoric marking is morphologically possible in the first person, it is 'dispreferred', so that (59)b is degraded by comparison with (59)a:

(59) Gokana (Hyman & Comrie's (11))

a. Ok:	mm̀	kɔ	mm̀	dɔ2		
	I	said	I	fell		
b. 'Dispreferred to [a]':			mm̀	kɔ	mm̀	dɔ2-ɛ̀
			I	said	I	fell-LOG

The fact that (59b) appears to be relatively degraded is all the more striking since in the other persons logophoric marking is *preferred* whenever it is possible; the opposite pattern is thus found in the first person [14]. Although far more fieldwork is needed to confirm these data, I take this to be preliminary evidence in favor of the proposed theory.

One additional proviso is that the present theory predicts that in Gokana the combination of a first person pronoun with logophoric marking should in fact be grammatical *if* the speaker is or was wrong about who he is, so that there are contexts compatible with his claims whose agent is not the speaker himself. Whether this is indeed so remains to be tested (a variant of the theory that we shall develop shortly does not make this prediction; the Gokana data should adjudicate between the two theories).

3.2.3. De Se *readings of PRO*

As was observed earlier, in attitude reports PRO is unambiguously interpreted De Se, and thus *John hopes PRO to be elected* can only serve to attribute to John a first-person thought of the form: *I should be elected*. This can be analyzed semantically by postulating that PRO has the behavior of a logophoric pronoun, which leads to the following analysis:

(60) a. John hopes to be elected

b. John hope-t_k-w_m to-c_i [ɪx_m: author(x_m, c_i)] be-elected-c_{iT}-c_{iW}

This analysis leaves several questions open, however.

(i) First, PRO also occurs outside of attitude reports. In other environments it must obey well-studied syntactic constraints. How is the obligatory De Se interpretation of PRO related to the syntactic properties it has in other environments? Here a theory that does not posit context variables, but rather introduces triples of the form <individual, time, world>, might be slightly better off. This is because such a theory could attempt to claim that PRO is always bound by the most local binder, and that the individual coordinate of the triple is precisely such a binder. If this theory could be fleshed out, it would derive the obligatory De Se interpretation of PRO from independent syntactic properties - certainly a nice result. With context variables, on the other hand, a similar analysis seems harder to defend.

(ii) Second, PRO appears to inherit the features of the matrix subject, even when the presuppositional analysis would predict that it does not. To make this point, I cited the following example in Schlenker (2003a):

(61) John (a transsexual) hopes to become a woman, and he hopes PRO to buy himself/*herself a car

In this example, the first conjunct asserts that all contexts compatible with John's hope are contexts with a female author. But what is asserted in the first conjunct should be a presupposition of the second conjunct. As a result, the presuppositional analysis of gender features predicts that *himself* should yield a presupposition failure, and that by contrast *herself* should be used unproblematically. But we observe precisely the opposite pattern.

There are two possible lines of inquiry to solve this problem.

(a) The first line is to posit a rule of agreement whereby PRO inherits in the morphological component the features of the matrix subject (it is important that this happen in the morphological component, so that the features in question are not semantically interpreted). The rule that is required is rather puzzling from the present standpoint, since PRO is semantically dependent on the context variable introduced by the attitude operator, but must inherit its features from the matrix subject. Introducing such a rule in the presuppositional theory under study diminishes considerably its initial appeal, which was precisely to do without rules of feature percolation.

(b) The alternative (sketched, among others, in Schlenker 2003a) is that these features are interpreted, but De Re rather than De Se.

The idea is that the interpretation of PRO is really the product of two components:

– a pronoun read De Re

– an element that specifies the nature of the implicit description under which the attitude holder thinks about the denotation of the De Re term. This second element is what is responsible for the fact that, in the end, a De Se reading is obtained.

The reason such a theory can be pursued is that it is almost universally accepted that a De Se reading entails the corresponding De Re reading; in other words, a De Se reading is a De Re reading with some additional requirements. To put it in more intuitive terms: *John hopes PRO to be elected* means that John hopes, about John, that he is elected (De Re reading), with the additional requirement that John has this thought about John under the implicit description 'the author of the present thought act (or: *I*)'. As a result, it is not problematic to assume that every De Se pronoun is read De Re, *as long as* one specifies that the pronoun also contains 'something else' that makes it De Se. The De Re part of the analysis is implemented in (62) by positing the existence of a variable x_p bound by John in the embedded clause. And the De Se part is contributed by the predicate 'author', which takes as a context argument the variable introduced by the attitude verb:

(62) a. John hopes to be elected
b. John λx_p x_p hope-t_k-w_m to-c_i [ιx_m: x_m=x_p & author(x_m, c_i)] be-elected-c_{iT}-c_{iW}

Of course we have not yet said how the Logical Form in (62b) should be interpreted. Here we face a much more general problem: it is not at all obvious how De Re terms should be interpreted in attitude reports. The initial difficulty, noted in Quine (1956), was that both of the following sentences may be simultaneously true of Ralph, who saw the same man, Ortcutt, at a cocktail party and at the beach, without realizing that it was one and the same person he was observing.

(63) a. Ralph believes, of Ortcutt, that he is a spy (*qua* the man Ralph saw at the cocktail party)
b. Ralph believes, of Ortcutt, that he is not a spy (*qua* the man Ralph saw at the beach)

On the assumption that beliefs are closed under conjunction, the sim-

plest analysis would risk attributing irrationality to Ralph. For instance if we analyze (63a) as asserting that every context (or world, for that matter) compatible with Ralph's belief is one in which Ortcutt is a spy, by parity of reasoning we will also have to analyze (63b) as asserting that every world (resp. every context) compatible with Ralph's belief is one in which Ortcutt is not a spy. Since there are no contexts in which Ortcutt both is and isn't a spy, there should be no contexts at all compatible with Ralph's beliefs, which should make him irrational (as this would have the same effect as if Ralph believed a contradiction, e.g. *It is raining and it is not raining*). This fails to distinguish irrationality from cases of mistaken identity - not a good result. The solution offered in Kaplan 1969 was to reintroduce in the truth conditions the mode of presentation under which Ralph held the relevant beliefs. According to Kaplan, what is asserted by (63a) is that for some 'vivid' description α which in fact picks out Ortcutt, Ralph believes (De Dicto): *α is a spy* (for instance α may be the description *the man I saw at the cocktail party*). This doesn't exclude that for some other description α' that also denotes Ortcutt (e.g. *the man I saw at the beach*) Ralph may believe: *α' is not a spy*. As long as α and α' are different, no irrationality need be attributed to Ralph, just as is desired.

Of course some amount of magic is needed to obtain an existential quantification over implicit descriptions from the Logical Form in (62b). Cutting some corners, we shall obtain the analysis in (64c) after the magic has been performed, i.e. after the De Re term has been replaced with an existential quantification over modes of presentation of John to himself:

(64) a. John hopes to be elected
b. John λx_p x_p hope-t_k-w_m to-c_i x_p [ιx_m: x_m=x_p & author(x_m, c_i)] be-elected-c_{iT}-c_{iW}
c. John λx_p [$\exists d_{<c,e>}$:N(d, x_p, x_p, t_k, w_m)] x_p hope-t_k-w_m to-c_i [ιx_m: x_m=d(c_i) & author(x_m, c_i)] be-elected-c_{iT}-c_{iW}
where N(d, x_p, x_p, t_k, w_m) stands for: d is a 'vivid' description of x_p for x_p at t_k in w_m
'For some vivid description d of John, John hopes to be in a context c_i such that the person described by d in c_i and who is the author of c_i is elected at the time and in the world of c_i'.

(64b) is the Logical Form before the De Re magic has been applied; (64c) is the product of the magic: the De Re term x_p has been replaced with a variable d, of type <c, e> (which means that it has the seman-

tic type of a definite description: given a context c, it yields an individual e), bound by an existential quantifier. It is further stipulated through the (admittedly opaque) condition N(d, x_p, x_p, t_k, w_m) that d should be a 'vivid' description of x_p (i.e., in effect, John) for x_p at the time and in the world of John's thought act, i.e. at t_k in w_m. The precise definition of 'vivid' is the object of Kaplan (1969), and is in many ways an open question. But for our purposes it is enough to see that the De Re procedure, for which there is quite a bit of independent evidence, suffices to yield the desired result. Specifically, in (64c) only two types of situations can obtain:

– if John has a thought that is roughly equivalent to *I should be elected*, and if (as is standardly assumed) *I* counts as a 'vivid' name of John for John, the sentence is predicted to be true.

– otherwise, the sentence is predicted to be false or a presupposition failure (for observe that in the embedded clause the term $[\iota x_m: x_m=d(c_i)\ \&\ author(x_m, c_i)]$ must denote the same thing as $[\iota x_m: author(x_m, c_i)]$, or else it must yield a presupposition failure).

Let me now mention two arguments, one in favor of theory (a), and one in favor of theory (b).

– Uli Sauerland (p.c.) gives examples that cannot readily be analyzed by (b):

(65) We all sometimes believe that we're the only person in the world

The problem is that even when the plural pronoun is interpreted De Re, it must attribute to each of the agents a thought about a plurality of individuals; but in fact each one of them has a thought about a singular individual, namely himself. The question, however, is whether this phenomenon requires a rule of agreement which is specific to attitude verbs. I am not sure that it does. Rather, it suggests that some plural features can remain uninterpreted under binding. Under theory (a), this would appear to follow; under theory (b), it is unclear how it would [15].

– But there is also a very serious problem for Theory (a). Suppose that John hopes to become somebody else, say Mary, and that we say in this situation:

(66) [John would like to be someone else, namely Mary, and] he would like to buy him a car

It is very difficult to understand the sentence as meaning that in each context c compatible with John's desires, the agent of the con-

text is Mary and Mary buys a car for John. On the face of it, this would seem to result from a Condition B effect: intuitively *he* and *him* both refer (in complicated ways, because of the complexity of the situation) to John. But Theory (a) has no way to derive this fact, because for that theory there is no sense in which *he* denotes John. By contrast, Theory (b) does posit that *he* denotes John, and thus a Principle B violation can be expected to obtain.

This analysis also has the advantage of extending directly to Gokana logophoric pronouns, which are suffixes on the verb that come in addition to pronouns (specifically, in Gokana a suffix *-e* appears on the embedded verb when the subject of the embedded verb is logophoric). Furthermore, we don't quite lose in the new theory the account we had of the person asymmetry we observed earlier, though the fine-grained predictions are somewhat different. Consider again the sentence *I said I fell* in Gokana:

(67) a. I said that I fell (Gokana)

b. SYNTACTIC REPRESENTATION I (first theory discussed above, De Se≠De Re, **bold** part licensed when the speaker knows/knew who he is):
[ιx$_m$: x$_m$=x$_i$ & author(x$_m$, c*)] say-t$_k$-w$_m$ that-c$_i$ [ιx$_m$: author(x$_m$, c$_i$) & **author(x$_m$, c*)**] fall-c$_{iT}$-c$_{iW}$

b'. SYNTACTIC REPRESENTATION II (second theory discussed above, De Se=De Re + further constraints)
(i) Before De Re magic is performed
[ιx$_k$: author(x$_k$, c*)] say-t$_k$-w$_m$ to-c$_i$ [ιx$_m$: x$_m$=[ιx$_k$: author(x$_k$, c*)] & author(x$_m$, c$_i$)] fall-c$_{iT}$-c$_{iW}$
(ii) After De Re magic is performed
[ιx$_m$: x$_m$=x$_i$ & author(x$_m$, c*)] λx$_p$ [∃d$_{<c,e>}$:N(d, x$_p$, x$_p$, t$_k$, w$_m$)] x$_p$ say-t$_k$-w$_m$ to-c$_i$ [ιx$_m$: x$_m$=d(c$_i$) & author(x$_m$, c$_i$)] fall-c$_{iT}$-c$_{iW}$
where N(d, x$_p$, x$_p$, t$_k$, w$_m$) stands for: d is a 'vivid' description of x$_p$ for x$_p$ at t$_k$ in w$_m$

c. Lexical items: FIRST <-> [author, c, *]
LOG <-> [author, c]
THIRD <-> []

Let us focus on the representation (i) in b'. The embedded subject pronoun *[ιx$_m$: x$_m$=[ιx$_k$: author(x$_k$, c*)] & author(x$_m$, c$_i$)]* contains two parts:

– a De Re term *[ιx$_k$: author(x$_k$, c*)]*, which denotes the author of the actual speech act.

– a predicate *author(x$_m$, c$_i$)*, which specifies that x$_m$ is the author of the embedded context.

Comparing this representation to the one we obtained earlier, repeated here as b., we see that no matter what the speaker knows about his own identity, the term *[ιx$_k$: author(x$_k$, c*)]* should be allowed to appear in the embedded clause (because it is interpreted De Re). By contrast, in the previous theory we predicted that this feature should appear in the embedded clause only in case the speaker knows/knew his own identity. Further empirical work will hopefully determine which of these two theories (if any) is correct. In any event, in the present theory FIRST rather than LOG should be inserted whenever the attitude holder is the speaker himself, as seems to be desired given Hyman & Comrie's data.

Two additional remarks are in order at this point.

(i) In Mupun, a Chadic language, there appear to be addressee-denoting logophoric pronouns – pronouns that specifically denote the addressee of a reported speech act (Frajzyngier 1985, 1993). The present analysis could be extended to them, and it would predict certain asymmetries that remain to be tested – notably, that no language should have second person addressee-denoting logophoric pronouns.

(ii) In the plural, it is enough for a logophoric pronoun to be licensed that part of the plurality which is denoted contain the speaker of a reported speech act. This fact follows from the semantics of the feature 'author', which holds true of any plurality which contains an author of the relevant speech act. These facts, which are discussed in greater detail in Schlenker (2003a), are consistent with the analysis of logophoric pronouns as a kind of a obligatorily 'shifted' first person pronouns [16].

3.3. Restating the analysis for Theory II

Let us now see how the proponents of Theory II (esp. Schlenker 1999/2000, Heim 2002, von Stechow 2003) could match the results of the presuppositional theory.

I. With respect to singular pronouns, Theory II need only posit that each apparently free indexical pronoun is in fact bound by a λ-operator which is responsible for endowing it with its features. In case different occurrences of a second person pronoun denote different individuals, the proponent of Theory II must claim that there was some context shift between the first and the second occurrence.

– A general rule of feature transmission is posited, according to which a binder transmits its features to its bindee in the mophological component, i.e. without interpretive reflex.

– In addition, two special rules must be postulated:

RULE 1: the entire expression *[only DP]* inherits the features of *DP*. In particular, the entire expression *[only I]* has first person features, which explains why it can transmit these features to a pronoun it binds, as in *[Only I] λx x did my$_x$ homework*.

Re-writing the features 1st as the combination a, * [for reasons that will become clear later], we can analyze this example as follows:

(68) a. Only I do my homework
b. $\lambda<x_i^{a^*}, t, w>$ [[only $x_i^{a^*}$] $^{a^*}$ [$\lambda x^{a^*}{}_k$ [$x^{a^*}{}_k$ do- t- w $x^{a^*}{}_k$'s homework]]]

RULE 2: an embedded verb transmits to the individual variable it binds the features of the matrix subject. In particular, in *John hopes PRO to buy himself a car, PRO,* which is bound by the attitude verb, still receives in the morpho-syntax the masculine features of *John.* This is illustrated here on a simpler example:

(69) a. George hopes PRO to be elected
b. $\lambda<x_i^{a^*}, t, w>$ George^{masc} hope-t-w to-$<x_k, t', w'>$ $x^{masc}{}_k$ be-elected-t'-w'

One problem that this theory does not solve, however, is the Condition B effect that is obtained in *George hopes to buy him a car,* which should be acceptable with coreference between *him* and *George* (at least if George hopes to become someone else).

II. How can this theory be extended to plural pronouns? The simplest solution is to adopt a modification of the presuppositional analysis in which features are transmitted in a purely formal fashion. This is in essence the system proposed in Rullmann 2004. The lexical entries for the pronouns are as follows:

(70) a. I_x → x^{a^*}
b. you_x → $(x+...)^{h^*}$
c. he_x → x
e. $we_{x+...}$ → $(x+...)^{a^*}$
g. $they_{x+...}$ → $(x+...)$

The notation $(x+...)^{h^*}$ stands for a sum of one or more variables, at least one of which carries the feature h*. This system can provide an account of simple plural pronouns. Suppose that, talking about John, I say: *We get along.* This can be analyzed as in (71):

(71) a. We get along
b. $\lambda<x_i^{a^*}, t, w>$ $x_i^{a^*}+x_k$ get-along-t-w

Here the pronoun *we* serves to spell out the sum of variables $x_i^{a*}+x_k$. Since one of these variables carries the feature a*, the insertion of the first person plural pronoun is indeed authorized.

The proposal in (70) is inadequate, however, because it does not offer any serious account of plural features. Certainly it won't do to claim that plural pronouns are simply sums of singular variables (this would lead to obvious problems in the case of plural quantification, such as *Some students did their homeworks).* Going in the opposite direction, we could claim that plural features simply spell-out plural variables. But this won't do either - when a plural pronoun is simultaneously bound by several singular quantifiers, there is no choice but to posit that the plural pronoun serves to spell out a sum of singular variables:

(72) a. Each boy took each girl to a movie they both enjoyed
b. [each x: x boy][each y: y girl][a z: x+y enjoyed z] x took y to z

Thus it appears that plural features cannot be treated in the same way as first or second person features: no simple percolation mechanism can account for cases such as (72a).

III. Be that as it may, let us consider how the theory can be extended to logophoric pronouns. Following the spirit of the proposal in Heim (2002), we may assume that in Ewe, Gokana and Amharic the attitude verb transmits the feature a to the variable it binds (in fact we should postulate that only certain verbs or complementizers in Ewe, Gokana and Amharic have this ability; this is important because not all attitude verbs behave in the same way in the languages under study). Treating, as before, the complementizer as a λ-abstractor, this leads to the following Logical Form for a simple Amharic sentence:

(73) a. John says that I (i.e. that he) be a hero (Amharic)
b. $\lambda<x_i^{a*}$, t, w> John say-t-w that-$<x_n^{a}$, t_o, $w_p>$ x_n^{a} be-a-hero-t_o-w_p
c. Lexical entries:

I^{Amh}	<-> [a]
you^{Amh}	<-> [h]
he^{Amh}	<-> []

Note that in this case it also wouldn't hurt to apply in addition the rule of feature transmission that we posited for PRO in English (according to this rule, the variable bound by the attitude verb inherits in the morphological component the features of the matrix subject). This rule might in fact be necessary for other examples, in

which several agents each say 'I am a hero'. Apparently in such cases it is possible to report the situation by saying that 'They said that we be a-hero', where the embedded pronoun is in the plural [these data, which are discussed in Schlenker (1999/2000), remain to be confirmed]. If so, one should posit that the plural features of the embedded pronoun are, like the features of PRO, inherited morphologically from the matrix subject.

Consider now Gokana. The analysis is identical to that of Amharic, except that the lexical entries are somewhat different (this particular version of the analysis is directly inspired by Heim 2002):

(74) a. John says that LOG falls (pseudo-Gokana)
b. $\lambda<x_i^{a^*}, t, w>$ John say-t-w that $\lambda<x_n^{a}, t_o, w_p> x_n^{a}$ fall-t_o-w_p
c. Lexical entries:
I^{Gok} <-> [a, *]
you^{Gok} <-> [h, *]
LOG <-> [a]
he^{Gok} <-> []

In the third person, the most highly specified item that can be inserted is LOG, which expresses the feature *a* transmitted by the attitude verb to the variable that it binds. Consider now what happens in the first person case:

(75) a. I say that LOG fall (Gokana)
b. $\lambda<x_i^{a^*}, t, w> x_i^{a^*}$ say-t-w that $\lambda<x_n^{a}, t_o, w_p> x_n^{a, a, *}$ fall-t_o-w_p
c. Lexical entries:
I^{Gok} <-> [a, *]
you^{Gok} <-> [h, *]
LOG <-> [a]
he^{Gok} <-> []

We see that the embedded pronoun inherits one feature *a* from $\lambda<x_n^{a}, t_o, w_p>$ (i.e. from the attitude verb), and in addition – following the rule of agreement that we posited for English PRO – a set of features *a, ** from the matrix subject. We may explain why logophoric marking does not show up in this case, but only if we make one additional assumption, namely that the two occurrences of the feature *a* get 'merged', so that in the end only one feature *a* and one feature * appear in the syntax right before lexical insertion takes place. The pronoun I^{Gok} spells out both features, and hence it is inserted. Interestingly, for singular pronouns the predictions of this theory are identical to those of the presuppositional theory based on a De Re analysis of De Se readings: whether the embedded pronoun is read De Se or (simply) De Re, it inherits the features of the matrix subject. This result is obtained here by virtue of a purely formal rule of agree-

ment; by contrast, in the presuppositional theory based on a De Re analysis of De Se readings, this result was obtained in a purely semantic fashion.

4. A mixed theory: Theory III

4.1. Outline

The Bindability Problem arose from the observation that *I* and *you* can sometimes be indexical, and sometimes be bound variables. Theory I solved the problem by postulating that they spell out definite descriptions which contain (a) an indexical predicate (i.e. *author(_, _)* or *hearer(_, _)*), and (b) a variable, which may be bound or left free. Theory II solved the problem by postulating that indexicals are always bound variables, and by 'syntacticizing' the standard analysis of indexicals, i.e. by claiming that standard kaplanian indexicals (i.e. free uses of *I* and *you*) are in fact bound by an operator, whose semantics yields the same result as if these elements denoted coordinates of the context. One somewhat surprising result of Theory II (especially in the version of Heim 2002) was that person features are never interpreted, but only give an indication on the nature of the binder of a variable. In this paragraph we explore a kind of compromise solution between Theory I and Theory II:

(i) as in Theory I, and unlike what happens in Theory II, first and second person features are always semantically interpreted

(ii) as in Theory II, and unlike what happens in Theory I, first and second person pronouns behave as simple variables, which may be bound or left free.

(i) and (ii) are made compatible by enriching the ontology, and introducing in the sequences of evaluation *roles* such as 'author' and 'hearer' which are attached to certain objects. In this way we can provide, in effect, a semantic rendition of the main ideas of Theory II, except that the 'features' (now called 'roles') are located in the sequence of evaluation rather than in the Logical Form. As it happens, this theory was originally developed for an entirely different purpose, which was to give a semantic derivation of some parts of Binding Theory (Schlenker 2004). There is a connection between the two enterprises, however. The starting point of this reinterpretation of binding theory arose from the observation that a speaker may not refer to himself using a proper name or a definite description. On the assumption that the speaker is always represented in the initial

sequence of evaluation with respect to which a sentence is evaluated, and given certain hypotheses about the way in which sequences of evaluation are constructed, this was taken to show that sequences of evaluation may not contain the same element twice. Applied in full generality, this constraint, called 'Non-Redundancy', derives Condition C and – indirectly – Condition B.

As in other standard semantic theories, the definition of truth and reference is relativized to a sequence of evaluation. But to present Theory III it is easiest to think of the sequence as a memory register, which is constructed step by step, as the sentence is semantically analyzed. It is further useful to think of the semantic analysis as proceeding top-down (the formal rules are order-neutral, but the theory makes more intuitive sense when presented in this way). An utterance is evaluated with respect to an initial register which only contains those elements that are given by the speech act in the strictest sense: the speaker and the addressee. These are represented with roles, say *a** for 'author' and *h** for 'addressee' (='hearer') (importantly, these roles are included in the sequence of evaluation rather than in the Logical Form; this is the sense in which this theory offers a semantic rendition of the syntactic analysis of Theory II). Thus if John, speaking to Mary, utters *I smoke,* the sentence is evaluated under an initial sequence of the form $j^{a*}{}^\frown m^{h*}$. As the sentence is analyzed, top-down, by analyzing step by step the sister-to-sister configurations found in the syntactic representation, additional elements are added to the sequence, which will thus represent at any given point the linguistic context with respect to which a constituent should be evaluated, where the notion of 'linguistic context' includes (i) the value of indexical elements, and (ii) the value of other terms which were computed as the sentence was semantically analyzed. Thus in the sentence *Bill thinks that he is clever* (as uttered by John to Mary), *he* is evaluated with respect to the sequence $j^{a*}{}^\frown m^{h*}{}^\frown b$: in addition to John and Mary, the sequence includes the denotation of *Bill,* which was added when the matrix subject was processed. The key idea is that the denotation of each referential element is mediated by the sequence of evaluation (by contrast, in standard approaches only the denotation of variables appear in the sequence).

4.2. Principles and examples

To be more specific, Theory III relies on the following rules. They

are most naturally stated for a syntax that is strictly binary branching, as we will assume throughout:

(i) The denotation of a proper name or definite descriptions is always added at the end of the sequence of evaluation. Demonstrative pronouns, which bear positive indices, are analyzed as 'temporary proper names', and are thus treated in the same way as proper names and definite descriptions (by contrast, anaphoric pronouns bear negative indices, and follow a different rule). The precise rule is stated in (76):

(76) Treatment of R-expressions
If α is a proper name, a definite description or a demonstrative pronoun (i.e. a pronoun with a positive index), $[\![[a\ b]]\!]^{t,w}s = [\![[\beta\ \alpha]]\!]^{t,w}s = [\![\beta]\!]^{t,w}s^\frown[\![\alpha]\!]^{t,w}s$

(This rule considers sister-to-sister configurations of the form [α β], where the order is irrelevant (hence the fact that $[\![[\alpha\ \beta]]\!]^{t,w}s = [\![[\beta\ \alpha]]\!]^{t,w}s$), and where α is an R-expression. The semantic value of this entire constituent under a sequence s is simply the value of β under an extended sequence s^d, where d is the value of α. This is just a formal way of saying that α 'adds' its value at the end of the sequence s, and that its sister β gets evaluated under this 'new' sequence.)

(ii) Anaphoric pronouns can only retrieve elements of the sequence of evaluation, and move them to the end of the sequence (for simplicity we also assume that when an element of the sequence is moved in this way, it leaves in its original position an empty cell, which we represent as #; this assumption is dispensable, as discussed in Schlenker 2004). In order to indicate how far back from the end of the sequence the intended element is to be found, an anaphoric pronoun bears a negative index: -1 indicates that the last element must be retrieved, -2 indicates that the penultimate element must be retrieved, etc. When an anaphoric element is semantically analyzed, its sister is evaluated under the new sequence which is obtained in this way. The rule can be stated formally as in (77):

(77) Treatment of Anaphoric and Indexical Pronouns
If α is a pronoun pro_{-i}, $[\![[\alpha\ \beta]]\!]^{t,w}s=[\![[\beta\ \alpha]]\!]^{t,w}s=\#$ iff s has strictly less than i elements. Otherwise, for a possibly empty sequence s' and for some elements $d_1, ..., d_i$, $s=s'^\frown d_i^\frown ...^\frown d_1$ and
$[\![[\alpha\ \beta]]\!]^{t,w}s=[\![[\beta\ \alpha]]\!]^{t,w}s= [\![\beta]\!]^{t,w}s'^\frown\#^\frown d_{i-1}{}^\frown ...^\frown d_1{}^\frown d_i$

(Once again the rule considers sister-to-sister configurations of the form [α β], where this time a is a pronoun with a negative index -i.

The semantic value of the entire constituent under a sequence s is simply the value of β under a new sequence obtained from s by 'moving' the element in position -i to the end of the sequence, and leaving an empty cell in the original position.)

(iii) An intransitive predicate is deemed true under a sequence just in case it is satisfied by the last element of the sequence. A transitive predicate is deemed true just it is satisfied by the pair of the last two elements of the sequence. In the general case, an n-place predicate is true under a sequence just in case it is satisfied by the n-tuple of the last n elements of the sequence. A semantic failure is obtained if one of the last n elements of the sequence is an empty cell. The rule can be formally stated as follows:

(78) Interpretation of Predicates
Let P be an n-place predicate and let s be a sequence with more than n elements.
$[\![P]\!]^{t,w}$ s =# if one of the last n elements of s is an empty cell. If ≠#, $[\![P]\!]^{t,w}$ s =1 iff the sequence of the last n elements of s satisfies *P* at time t in world w

To illustrate (i) and (iii), let us see how two simple sentences, both uttered by John to Mary, are analyzed in this system: *Ann runs* and *Ann hates Bill*. Truth is relativized to a sequence of evaluation as well as a time and a world parameter. The first sentence involves an intransitive construction. The value of the subject is added to the initial sequence of evaluation $j^{a^*}{}^\frown m^{h^*}$, yielding the new sequence $j^{a^*}{}^\frown m^{h^*}{}^\frown a$. The predicate, which requires a single argument, is deemed true under this sequence just in case the last element of the sequence, namely a (=Ann), satisfies it:

(79) $[\![$ Ann runs$]\!]^{t.w} j^{a^*}{}^\frown m^{h^*}$ =1 iff $[\![$ runs$]\!]^{t,w} j^{a^*}{}^\frown m^{h^*}{}^\frown a$ =1, iff a runs at t in w

A transitive construction is interpreted in the same way, except that the verb ends up being true just in case the pair of the last two elements of the final sequence lies in its extension:

(80) [[Ann hates Bill]] $^{t,w} j^{a^*}{}^\frown m^{h^*}$=1 iff [[hate Bill]] $^{t,w} j^{a^*}{}^\frown m^{h^*}{}^\frown a$ =1, iff [[hate]] $^{t,w} j^{a^*}{}^\frown m^{a^*}{}^\frown a^\frown b$=1,
iff a hates b at t in w

To illustrate (ii), suppose that the clause *he runs* is evaluated under a

sequence $j^{a*}\hat{}m^{h*}\hat{}s\hat{}b$, for instance because it is embedded under *Sam thinks that Bill claims that* __. Assuming that *he* carries the index -2, which indicates that its denotation is to be found in the penultimate position of the sequence, the derivation of the truth conditions proceeds as follows:

(81) $[\![\text{he}_{-2}\ \text{runs}]\!]^{t,w}\, j^{a*}\hat{}m^{h*}\hat{}s\hat{}b = [\![\text{runs}]\!]^{t,w}\, j^{a*}\hat{}m^{h*}\hat{}\#\hat{}b\hat{}s = 1$ iff s runs at t in w

4.3. Indexicals: solving the Bindability and the Shiftability problem

The presence of roles in this system is designed to make the analysis of first and second person as simple as possible. *I* simply has a lexical requirement that it should only access objects that carry the role *a**. And similarly *you* can only access objects that carry the role *h**. With this background in mind, we now discuss how Theory III can deal with the Bindability Problem and with the Shiftability Problem.

A. BINDABILITY: In order to solve the Bindability Problem, Theory II claimed that first person pronouns are always bound variables. The idea was implemented by positing λ-operators wherever a first (or second) person pronoun appeared to be free. Theory III achieves a similar goal of unification, but by setting up the semantics differently. We assume that *I* always behaves like an anaphoric pronoun, and that under a sequence of evaluation s, I_{-i} is acceptable just in case the element in position -i in the sequence of evaluation bears the role *a**. Unlike what we saw in Theory II, this does not require that I_{-i} be 'bound'; the only condition imposed is that an object with the desired role be found in position -i of the sequence. Whatever rules of feature transmission are stated in the morpho-syntax in Theory II can be stated in the semantics in Theory III: they are now rules of role transmission triggered by certain lexical items. To start with a very simple example, consider the analysis of *I run*, as uttered by John to Mary:

(82) $[\![\text{I}_{-2}\ \text{run}]\!]^{t,w}\, j^{a*}\hat{}m^{h*} = [\![\text{run}]\!]^{t,w}\, \#\hat{}m^{h*}\hat{}\ j^{a*} = 1$ iff j runs at t in w

Since the sentence is uttered by John to Mary, the initial sequence of evaluation is $j^{a*}\hat{}m^{h*}$. Thus no semantic failure arises when I_{-2} is processed, because at that point the element found in position -2 of the sequence of evaluation does carry the role *a**, as is required.

Now suppose that *I run* is embedded under I_{-2} *claim that* __, where we wish to analyze the bound reading on which the second *I* is semantically dependent on the first one. After the matrix subject I_{-2} is evaluated, the sequence $j^{a*}\hat{}m^{h*}$ gets turned into $\#\hat{}m^{h*}\hat{}j^{a*}$. As a result, if in *I run* the pronoun *I* is to pick out John, as is intended, it must bear the index -1 (since the only element of the sequence with the role a^* is found in the last position). When this is the case, the sequence $\#\hat{}m^{h*}\hat{}j^{a*}$ gets turned into $\#\hat{}m^{h*}\hat{}\#\hat{}j^{a*}$, and *run* ends up being evaluated under this modified sequence - so that running is attributed to the speaker John, as is desired. The semantic derivation is shown in (83):

(83) $[\![I_{-1} \text{ run}]\!]^{t,w} \#\hat{}m^{h*}\hat{}j^{a*} = [\![\text{run}]\!]^{t,w} \#\hat{}m^{h*}\hat{}\#\hat{}j^{a*} = 1$ iff j runs at t in w

The same mechanism extends to second person pronouns. In fact, we may even handle contexts in which there is a multiplicity of addressees by simply endowing several individuals with the role *h**.

For the account to be complete, we must say how ellipsis and *only* constructions are handled.

– Briefly, sloppy readings in ellipsis are obtained by copying the indices of the antecedent clause onto the elided clause. Thus to obtain the sloppy reading of I_{-2} *say that* I_{-1} *smoke. Peter does too* ~~*say that pro smoke,*~~ we copy onto the elided pronoun *pro* the index *-1* of the corresponding pronoun of the antecedent clause, i.e. I_{-1}. We also need to apply 'vehicle change' to insure that the first person features found in the antecedent clause are not copied in the elided clause, since otherwise we would predict a semantic failure when *Peter does too* ~~*say that* I_{-2} *smoke*~~. is interpreted (because in this case I_{-2} would retrieve from the sequence of evaluation Peter, which does not bear the role 'author'). With this assumption, we obtain the result that smoking is attributed to Peter, as is desired. (The derivation of strict readings, which is slightly more complex, is discussed in Schlenker 2004 [17]).

– For *only* constructions, we may either (a) reduce these to ellipsis constructions, as was suggested above when we discussed Theory I, or alternatively (b) state by brute force that the quantifier *only I* triggers the appearance of the role a^* on the element x that is at the end of the sequence of evaluation (for various values of x). Solution (b) is a semantic rendition of the morphological stipulations of Theory II, with rules of role transmission replacing rules of feature transmission. Needless to say, this semantic stipulation is by no means more elegant than its morphological counterpart.

B. SHIFTABILITY: In order to deal with the Shiftability Problem, we dress once again Theory II in semantic clothing by replacing feature transmission with role transmission (this part of the analysis is not discussed in Schlenker 2004). The idea is that when an attitude verb such as *say* is interpreted, it leads to the evaluation of the embedded clause under a modified sequence which, for every <x, t, w> compatible with the agent's assertion, contains the objects x^a, t, w, where x comes with the role 'author' (thus sequences of evaluation contain two kinds of 'author' roles, a^* and a: the former corresponds intuitively to the author of the actual speech act, while the latter represents the author of a reported speech act; it is no accident that these roles are identical to the features used in syntactic representations in Theory II). This will allow us to explain why an Amharic-style indexical can denote what is, intuitively, the agent of the reported speech act.

Let us be a bit more specific. As before, the actual speaker and addressee appear with the roles a^* and h^* respectively (each of these is analyzed as a combination of two roles: a [resp. h] and *). All that needs to be added is a rule that determines the treatment of clauses embedded under attitude verbs. Somehow the lexical semantics of the attitude verb must insure that the embedded clause is evaluated under a sequence that contains a 'non-actual speaker'. As in the De Se analysis of Theory II, the value of the embedded clause is obtained by simultaneously abstracting over a time, a world and an individual argument. But we must also state that the abstraction introduces the role a on the individual element that is abstracted over. This is achieved by the following rule [18]:

(84) $[\![$ say that p$]\!]^{t,w}s = 1$
iff $[\![$ say$]\!]^{t,w}$ s^π =1 with $\pi = \lambda x \lambda t' \lambda w'$ $[\![p]\!]^{t',w'}$ s^x^a

To put it in plain English, the lexical semantics of *say* triggers the evaluation of the embedded clause under a modified sequence that contains an element x with role a, for various values of x [19].

With this framework in place, we can provide an analysis of shifted first person pronouns in Amharic. In effect, by 'semanticizing' Theory II, i.e. by putting the features a and * in the sequence of evaluation, we obtain considerably simpler logical forms and can even dispense with λ-abstractors in the object language, as is shown in the analysis of the pseudo-Amharic sentence *Bill says that I (i.e. Bill) be a hero*, given in (85). The key interpretive step is that in which the

value of the embedded clause is computed as λxλt'λw' ⟦I be a hero⟧$^{t',w'}$ j^{a*}^m^{h*}^b^x^{a}, where the role *a* is introduced on the last element of the sequence of evaluation.

(85) a. Bill says that I (i.e. he, Bill) be a hero (Amharic)
a'. Bill say that I be-a-hero
b. ⟦a'⟧ ^{t,w} j^{a*}^m^{h*} =1 iff ⟦say that I be-a-hero⟧ ^{t,w} j^{a*}^m^{h*}^b =1 iff ⟦say⟧ ^{t,w} j^{a*}^m^{h*}^b^p, ø=1 with p=λxλt'λw' ⟦I be a hero⟧ $^{t',w'}$ j^{a*}^m^{h*}^b^x^{a}
=λxλt'λw' ⟦be-a-hero⟧$^{t',w'}$ j^{a*}^m^{h*}^b^x^{a}
=λxλt'λw'. x is a hero at t' in w'

We are now in a position to adapt to Theory III the lexical stipulations that were made by Theory II to account for logophoric pronouns, as well as for the non-existence of first person logophoric markers. The required hypotheses are as follows:

– English $I_{\text{-}i}$ interpreted with respect to a sequence of evaluation s leads to a failure unless the element found in position -i in s bears the roles *a, **

– An Amharic first person marker $I^{Amh}{}_{\text{-}i}$ interpreted with respect to a sequence of evaluation s leads to a failure unless the element of s in position -i bears the role *a*.

We need, as before, a principle such as MAXIMIZE PRESUPPOSITION!, which requires that a pronoun be chosen only if it marks the strongest presupposition (here: the greatest number of roles) compatible with the element it retrieves from the sequence of evaluation. Within such a framework, all we need to say about Ewe and Gokana is that they have a lexical entry equivalent to English *I* and that they also have a lexical entry equivalent to Amharic I^{Amh}. When both are compatible with the element that is to be denoted, the first entry is preferred because it marks the roles *a* and * rather than simply *a*. We also derive in this way the absence of first person logophoric pronouns, since such a pronoun would have to mark both *a* and * in order to count as first person, but it should also fail to mark * in order to count as logophoric. These requirements are clearly incompatible.

4.4. Deriving (parts of) Binding Theory

At this point Theory III might appear as a somewhat exotic mix of ideas from Theory I and Theory II. But it has a major advantage over its competitors: it can derive – almost 'for free' – a large part of the constraints on coreference known as 'Binding Theory' in syntax.

4.4.1. Non-Redundancy

The key to obtain this result is to posit a constraint on possible sequences of evaluation. The constraint is best introduced from the standpoint of the semantics of person. Let us observe that John, talking to Mary, may neither say: *John is happy,* nor: *Mary is happy.* In the present framework this can be analyzed in terms of a constraint of 'Non-Redundancy', which prohibits the same element from occurring twice in any sequence of evaluation. Since the initial sequence has to include the speaker and the addressee, we derive a violation of Non-Redundancy if *John smokes* is uttered by John, as in (86): after the proper name *John* is semantically analyzed, its value is added to the sequence of evaluation $j^{a*}\hat{}m^{h*}$, yielding $j^{a*}\hat{}m^{h*}\hat{}j$. But the latter sequence violates Non-Redundancy because John (=j) is found twice. The derivation is shown in (86), where # is used to indicate semantic failure (the same symbol is also used to indicate that a cell is empty; the conflation is voluntary, since a predicate that must be evaluated with respect to an empty cell triggers a semantic failure):

(86) a. #John smokes (said by John to Mary)
a'. John smoke
b. $[\![\text{ a'}]\!]^{t, w}\ j^{a*}\hat{}m^{h*} = [\![\text{ smoke}]\!]^{t, w}\ j^{a*}\hat{}m^{h*}\hat{}j$=# because the sequence $j^{a*}\hat{}m^{h*}\hat{}j$ violates Non-Redundancy[20]

4.4.2. Condition C

Once Non-Redundancy is in place, it must of course apply to any sequence of evaluation. This turns out to provide a derivation of Condition C. To see this, consider a sentence such as *Bill likes Bill*, uttered by John to Mary. Once the subject is analyzed semantically, its value Bill (=b) is added to the original sequence $j^{a*}\hat{}m^{h*}$, so that the rest of the sentence is evaluated with respect to the new sequence $j^{a*}\hat{}m^{h*}\hat{}b$. When the second occurrence of *Bill* is analyzed, its value is also added at the end of the sequence, yielding $j^{a*}\hat{}m^{h*}\hat{}b\hat{}b$. But this sequence violates Non-Redundancy, and hence a semantic failure is predicted - as is desired:

(87) a. #Bill like Bill (said by John to Mary)
b. $[\![\text{Bill like Bill}]\!]^{t,w}\ j^{a*}\hat{}m^{h*} = [\![\text{like Bill}]\!]^{t,w}\ j^{a*}\hat{}m^{h*}\hat{}b = [\![\text{like}]\!]^{t,w}\ j^{a*}\hat{}m^{h*}\hat{}b\hat{}b$=# because $j^{a*}\hat{}m^{h*}\hat{}b\hat{}b$ violates Non-Redundancy [21]

By contrast, no violation of Non-Redundancy occurs in an utterance of *Bill's teacher likes Bill,* analyzed for simplicity as *The Bill teacher likes Bill* (where we take *teacher* to be a two-place predicate). The key

is that the VP *hates Bill* is evaluated under a sequence that contains Bill's teacher but not Bill himself, with the result that Non-Redundancy is in fact satisfied (see Schlenker 2004 for a detailed derivation):

(88) a. Bill's teacher likes Bill, *analyzed as*
a'. The Bill teacher likes Bill (said by John to Mary)
b. [[a']] $^{w}j^{a*}\hat{}m^{h*}$=[[like Bill]] $^{w}j^{a*}\hat{}m^{h*}\hat{}t$=[[like]] $^{w}j^{a*}\hat{}m^{h*}\hat{}t\hat{}b$, with t=[[the Bill teacher]] $^{w}j^{a*}\hat{}m^{h*}$

By contrast, *Bill likes Bills' teacher* (analyzed as *Bill likes the Bill teacher*) yields a violation of Non-Redundancy. This is because as soon as the subject is processed, its value Bill is entered in the sequence of evaluation, which now becomes $j^{a*}\hat{}m^{h*}\hat{}b$. All the elements that are in the scope of *Bill* are evaluated under some extensions of this initial sequence. As a result, when the second occurrence of *Bill* is processed, it adds b to a sequence of the form $j^{a*}\hat{}m^{h*}\hat{}b\hat{}\ldots$, yielding a sequence $j^{a*}\hat{}m^{h*}\hat{}b\hat{}\ldots\hat{}b$, which violates Non-Redundancy.

We just saw that in some cases the present system makes the same predictions as standard theories based on c-command. Does this result hold in full generality? It does. Theory III predicts that an R-expression may never be coreferential with an expression that c-commands it. To see this, consider a configuration [e [...r...]], where r is an R-expression that denotes Bill, and e is an expression which c-commands r and which also denotes Bill. r is thus contained within the sister of e, since this is just what r is 'c-commanded by e' means. It will be useful to be slightly more specific, and to assume that the sister of r is u, so that the entire configuration is [e [...[r u]...]] (by Binary Branching, the condition that r should have a sister is always satisfied). Now suppose that we evaluate this expression under a sequence s. Two cases may arise:

– If e is itself an R-expression, it adds its value (namely Bill) at the end of the sequence s, and as a result its sister [...[r u]...] gets evaluated under a new sequence sˆb.

– If e is an anaphoric pronoun, it recovers some element of the sequence s and brings it to the end the sequence, leaving behind an empty cell. As a result, the sister of e, namely [...[r s]...], gets evaluated under a sequence of the form s'ˆb.

Either way, then, [...[r u]...] is evaluated under a sequence that contains b. Once b is in the sequence, it stays there, since none of our rules of interpretation can delete an element from a sequence (the

rule for anaphoric pronouns reorders sequences but does not delete any elements). At some point, then, the expression [r u] is evaluated under a sequence ...ˆbˆ..., which contains b. But the rule of interpretation we stated for R-expressions requires that the sister of r, namely u, be evaluated under a modified sequence to which b was added. The result is a sequence ...ˆbˆ...ˆb. But it is now obvious that this sequence violates Non-Redundancy. This is our derivation of Condition C effects.

4.4.3. Condition B

We also derive a simple version of Condition B. The initial observation is that *Bill likes him* cannot normally mean that Bill likes Bill. But this fact already follows given our treatment of anaphoric pronouns, stated formally in (77). In essence, the problem is that for the sentence to have the intended meaning (where *him* refers to Bill), the verb *like* must be evaluated with respect to a sequence whose last two elements are ...ˆbˆb. But this violates Non-Redundancy, and so such a result cannot be obtained. To be more specific, we can reason as follows. If *[Bill [likes him]]* is evaluated under a sequence s, the treatment of R-expressions requires that *[likes him]* be evaluated under the extended sequence sˆb. Two cases may arise:

– Suppose first that *him* is a demonstrative pronoun, say one that carries the index i, which denotes Bill. Then the predicate *likes* is evaluated under an extended sequence sˆbˆb, since demonstrative pronouns, like proper names, add their value to the sequence of evaluation. The sequence sˆbˆb violates Non-Redundancy, and a failure is correctly obtained.

– Suppose now that *him* is anaphoric on *Bill* (or rather 'tries' to be), and carries the negative index -1. The treatment of anaphoric pronouns dictates that *likes* should be evaluated under the sequence sˆ#ˆb, obtained from sˆb by moving b to the last position and leaving behind an empty cell #. But then *likes*, which is a transitive predicate, seeks to retrieve the last two positions of the sequence; since one of them is empty, a semantic failure is naturally obtained, as was specified in the rule of interpretation of predicates, stated in (78). This reasoning is formalized in (89):

(89) a. #Bill likes him_{-1} (evaluated under a sequence s)
b. $[\![\text{Bill likes him}_{-1}]\!]^{t,w}$s
$=[\![\text{likes him}_{-1}]\!]^{t,w}$sˆb$=[\![\text{like}]\!]^{t,w}$ sˆ#ˆb
=# since *like* is transitive and one of the last two elements of the sequence is #

The version of Condition B which is derived prevents co-arguments of a predicate from being coreferential. There are well-known cases in which this version of the condition appears to be insufficient, for instance 'Exceptional Case Marking' constructions such as *John believes him to be clever*, where *him* and *John* cannot corefer even though *him* appears to be an argument of the embedded verb. In the present framework we are forced to posit that in this example the verb *believe* takes two individual arguments (*John* and *Bill*) and a propositional or property argument (*to be clever*), rather than just one individual and one propositional argument (the details are discussed in Schlenker 2004, where a treatment of reflexive pronouns is also offered).

4.4.4. Economy of variable binding

Fox (1999), followed by Büring 2002, argued that in a configuration such as *Bill promised that he will admit that he smokes*, understood with coreference (both occurrences of *he* denote Bill), the second occurrence of *he* must be bound by the closest antecedent that denotes Bill, i.e. it must be bound by the first occurrence of *he*, and it cannot be bound 'long distance' by *Bill*. Fox's argument is based on patterns of disambiguation in ellipsis resolution (specifically, he offers an account of what is known as 'Dahl's puzzle'), and is too complex to go into here. What is of interest is that a version of this condition of economy is derived from the present system. To see this, observe that, by Non-Redundancy, any object d occurs at most once in any sequence of evaluation, say in position -i. As a result, if an anaphoric pronoun is to denote d, it has not choice but to bear the index -i (note that if the pronoun were demonstrative, i.e. carried a positive index, it would be treated as a 'temporary proper name' and would thus add its denotation to the sequence of evaluation, which would immediately yield a violation of Non-Redundancy; thus this is not an option). As it turns out, this indexing is systematically the economical one. Consider the 'sequence history' of the sentence *Bill promised that he will admit that he smokes*, starting from a sequence $j^{a*}\hat{}m^{h*}$.

– After *Bill* is processed, the sequence becomes $j^{a*}\hat{}m^{h*}\hat{}b$, and remains unchanged until the first occurrence of *he* is processed. As a result, this occurrence must carry the index -1 if it is to denote Bill (=b).

– After he_{-1} is processed, the sequence becomes $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}b$, and remains unchanged until the second occurrence of *he* is processed. As a result, the second occurrence of *he* must bear the index -1 if it is to denote b.

In this scenario, everything works as desired: after the second occurrence of he_{-1} is processed, the sequence becomes $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}\#\hat{}b$, and when *smokes* is evaluated under this sequence, smoking is attributed to the last element of the sequence, namely Bill, as is intended. But now observe what would happen if a 'non economical' indexing were used. We could try to have the second occurrence of *he* carry the index -2. But this would lead to a catastrophic result: after he_{-2} is evaluated under the sequence $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}b$, the sequence of evaluation becomes $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}b\hat{}\#$. And when *smokes* is evaluated with respect to this sequence, a failure ensues because the last position is empty. We thus derive Fox's general result that variable binding must always be 'as economical as possible' (there are subtle differences between Fox's analysis and the present one, which are discussed in Schlenker 2004).

4.4.5. Quantification

The system outlined above encounters serious problems in the analysis of quantification. To see this, let us add on top of our theory the simplest possible analysis of quantification. We shall say that the quantifier *every Democrat* evaluated under a sequence s triggers the evaluation of the expression that follows it under an extended sequence $s\hat{}d$, for each individual d that is a Democrat. Assuming that the quantifier moves covertly to its scope position and leaves behind a trace, we obtain the following derivation of *Every Democrat prefers Kerry:*

(90) a. Every Democrat prefers Kerry (said by John to Mary)

b. $[\![$[every Democrat] t_{-1} prefer Kerry $]\!]^{w}j^{a*}\hat{}m^{h*}=1$
iff for each d that is a Democrat in w, $[\![t_{-1}$ prefer Kerry $]\!]^{w}$ $j^{a*}\hat{}m^{h*}\hat{}d=1$,
iff for each d that is a Democrat in w, $[\![$[prefer Kerry $]\!]^{w}$ $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}d=1$,
iff for each d that is a Democrat in w, $[\![$[prefer$]\!]^{w}j^{a*}\hat{}m^{h*}\hat{}\#\hat{}d\hat{}k=1$

In the end, then, the predicate *prefer* is evaluated under the sequence $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}d\hat{}k$, for each value of d which is a Democrat. But since d ranges over all Democrats, it ranges in particular over Kerry himself, and thus we see that for d=k the sequence $j^{A}\hat{}m^{H}\hat{}\#\hat{}d\hat{}k$ violates Non-Redundancy. The prediction is thus that the sentence should be deviant, contrary to fact. In Schlenker (2004) the following steps are taken to circumvent this problem:

(i) It is stipulated that quantifiers trigger the appearance of

objects in a different sequence, called the 'quantificational sequence', which is not subject to Non-Redundancy.

(ii) Traces have the role of introducing in the sequence of evaluation formal objects (indices) that cross-reference elements of the quantificational sequence.

The details are somewhat complex, but here is an example of how the evaluation of *Every Democrat prefers Kerry* would go in this modified system (the 'quantificational sequence' is the second sequence that is represented below; in this example the original quantificational sequence is empty, and is represented as ø):

(91) a. Every Democrat prefers Kerry (said by John to Mary)
b. $[\![$[every Democrat] t_{-1} prefer Kerry $]\!]^{t,w}\, j^{a*}\hat{}m^{h*}$, ø=1
iff for each d that is a Democrat at t in w, $[\![t_{-1}$ prefer Kerry $]\!]^{t,w}\, j^{a*}\hat{}m^{h*}$, d=1,
iff for each d that is a Democrat at t in w, $[\![$prefer Kerry $]\!]^{t,w}\, j^{a*}\hat{}m^{h*}\hat{}1$, d=1,
iff for each d that is a Democrat at t in w, $[\![$prefer$]\!]^{t,w}\, j^{a*}\hat{}m^{h*}\hat{}1\hat{}k$, d=1

Let us describe in words how the interpretive procedure works (assuming that the semantic rules for quantifiers and traces have been stated correctly):

– when the quantifier *every Democrat* is analyzed, it has the effect of introducing d in the quantificational sequence, for each value of d which is a Democrat. As before, the sequence of evaluation is $j^{a*}\hat{}m^{h*}$, but the quantificational sequence is now d instead of ø

– when the trace t_{-1} is analyzed, it introduces in the sequence of evaluation a formal index that cross-references the one and only position of the quantificational sequence. Thus the sequence of evaluation is now $j^{a*}\hat{}m^{h*}\hat{}1$, and the quantificational sequence is d

– after *Kerry* is analyzed, its value is added to the sequence of evaluation, which becomes $j^{a*}\hat{}m^{h*}\hat{}1\hat{}k$, while the quantificational sequence remains unchanged (d)

– finally, when the predicate *prefer* is evaluated, it looks at the last two element of the sequence of evaluation, namely $1\hat{}k$. Since the former cross-references d, the predicate is deemed true just in case d prefers k at time t in world w.

At this point the device of the 'quantificational sequence' is of course an outright stipulation. There are two ways to justify it independently:

(a) In Schlenker (2004), it is suggested that the quantificational sequence predicts Weak and Strong Crossover effects. In a nutshell, the idea is that a pronoun can never be semantically dependent on a quantifier without the mediation of a trace, for the simple reason that:

– quantifiers introduce elements in the quantificational sequence

– pronouns retrieve elements from the sequence of evaluation

– and only traces provide a 'link' between the sequence of evaluation and the quantificational sequence, by introducing in the sequence of evaluation an index that cross-references an element of the quantificational sequence. As a result, a pronoun can be semantically dependent on a quantifier *only* if a trace has been processed 'between' them, i.e. in a position which is c-commanded by the quantifier and which c-commands the pronoun. This derives a version of Weak Crossover. In addition, the distinction between Weak and Strong Crossover is also explained, though the reasoning is a bit more complex (the details are discussed in Schlenker 2004).

(b) This analysis also yields another welcome result. As soon as a quantifier is introduced, it manipulates elements of the quantificational sequence and can certainly not introduce any roles in the sequence of evaluation. In this way we make a prediction that is different from those of competing theories with respect to the following example, which caused serious difficulties for Theory I (see also Rullmann 2004):

(92) a. #Chacun de vous est fidèle à ton épouse.
Each of you-pl is faithful to your wife
b. Chacun de vous est fidèle à son épouse.
Each of you-pl is faithful to his wife

As we noted earlier, Theory I incorrectly predicts that the bound pronoun should be in the second person singular, since the individuals that are quantified over are all addressees. But no such prediction is made on the present theory. Consider for simplicity the sentence *[Each of you] [$t_{\cdot 1}$ likes his$_{\cdot 1}$ mother].* Suppose that the sentence is uttered by John to Mary, and that the original quantificational sequence is empty. The sentence thus starts by being evaluated with respect to the pair of sequences $j^{a*}\hat{}m^{h*}$, ø. In a nutshell, the interpretation of the sentence proceeds as follows:

– the quantifier *each of you* triggers the appearance of d in the

quantificational sequence, for each object d which is an addressee of the speech act. This yields a new pair of sequences $j^{a*}\hat{}m^{h*}$, d, for various values of d

– the trace of the quantifier introduces in the sequence of evaluation an index that cross-references d, yielding the new pair of sequences $j^{a*}\hat{}m^{h*}\hat{}1$, d

– the pronoun retrieves this new (formal) object from the sequence of evaluation, yielding at the point where *mother* is evaluated the pair of sequences $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}1$, d

But now we see that the bound pronoun retrieves the formal index 1, rather than the object d. As a result, even if we wanted to claim that for each d which is an addressee, d is introduced in the quantificational sequence with the role 'hearer', so that the final pair of sequences is $j^{a*}\hat{}m^{h*}\hat{}\#\hat{}1$, d^{h*}, we still would not predict that the bound pronoun must appear in the second person, because the index 1 does not itself come with the role 'hearer'. This is as it should be[22].

4.5. Plural pronouns

The extension of Theory III to plural pronouns is relatively unproblematic, and proceeds roughly along the lines of Theory I:

(i) In order to allow for split antecedents, 'split' cells, i.e. cells that have several compartments, are introduced in the sequence of evaluation. An anaphoric pronoun may carry several negative indices, one for each compartment of the cell it corresponds to.

(ii) In order to account for plural first and second person pronouns, we simply state the following (semantic) conditions:

(a) a plural pronoun must denote a plurality.

(b) a first person pronoun (be it singular or plural) must correspond to a cell which contains an element with the role 'author'; similarly a second person pronoun must correspond to a cell which contains an element with the role 'hearer'.

(c) MAXIMIZE PRESUPPOSITION! ensures that the maximum number of morphological features are expressed. As a result, if the morphology of the language contains both *exclusive we*, specified for $a*$ only, and *inclusive we*, specified both for $a*$ and $h*$, we will obtain the result that *inclusive we* must be used whenever both the speaker and addressee are denoted.

Here is for instance the treatment of *we agree*, where *we* is partly anaphoric on the last element a of the sequence of evaluation $j^{a*}\hat{}m^{h*}\hat{}a$ (in the meta-language, the notation $j^{a*}\check{}a$ indicates a split cell: j^{a*} and a are distinct elements of the same cell):

(93) a. $We_{-3,-1}$ agree (evaluated under a sequence $j^{a*}\hat{}m^{h*}\hat{}a$)
b. $[\![a]\!]^{t,w}\, j^{a*}\hat{}m^{h*}\hat{}a = [\![we_{,-1}\ agree]\!]^{t,w}\, \#\hat{}m^{h*}\hat{}a\hat{}j^{a*} = [\![agree]\!]^{t,w}\, \#\hat{}m^{h*}\hat{}\#\hat{}j^{a*\smile}a$ =1 iff the plural individual $j \oplus a$ satisfies the predicate *agree* at t in w

While many details remain to be worked out, Theory III has the advantage of embedding the theory of person within a much broader theory of binding. The Bindability Problem and the Shiftability Problem can both be solved in this framework, but in addition new connections can be drawn between person theory and binding theory, since the key constraint of Non-Redundancy accounts both for Condition C (and indirectly Condition B and the economy of variable binding) and for the obligatory use of first and second person pronouns to denote the speaker or addressee.

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NOTE

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[2] It is an unfortunate terminological fact that a context-dependent expression is almost universally called 'indexical' (rather than 'contextual', which would have made more sense). But then again, the Holy Roman Empire was neither holy nor Roman nor an Empire, which has caused little confusion among less language-savvy people than linguists and philosophers. So I will stick to the traditional – if confusing – terminology in what follows.

[3] Kaplan's definition is in fact slightly more complicated. A formula F is valid just in case for every context of utterance c, F is true in the context c at the index corresponding to c (i.e. at the time and in the world of c). Thus in (3c) the world and time parameters are set to world(c) and time(c) respectively.

[4] Thanks to Degif Petros, Mengistu Amberber, Delombera Negga and Makonnen Argaw for help with the data and the transcriptions. It should be mentioned that these data appear to hold only under an all-purpose attitude verb that literally means 'say', but has a much broader use. Why this is so should be investigated.

[5] An alternative, suggested in conversation by R. Schwarzschild and B. Spector, is that the Amharic first person pronoun behaves semantically like the English definite description *the speaker*. The predictions of this analysis are different from the one which is developed below. In particular, the English description *the speaker* is not rigid when it appears in the scope of world or time operators (e.g.

Whenever I attend a talk, I find the speaker too quick). By contrast, our analysis predicts that the Amharic first person pronoun should fail to be rigid, but only in attitude reports. The two theories should obviously be compared much more precisely.

[6] I should emphasize that this theoretical move was explicitly made to account for the fact that in the same embedded clause some indexicals may be evaluated with respect to the actual context while others are evaluated with respect to the reported context. If all indexical elements in a given embedded clause were systematically evaluated with respect to the same context, context variables would not be necessary – it would be enough to stipulate that attitude operators manipulate a context parameter. See Nevins & Anand 2004 for data that suggest that this alternative route should indeed be explored. See also Speas 1999 for data that argue that context variables should be put in the object language.

[7] This rule of presupposition projection is of course motivated by independent examples. For instance, in *[Every director]$_i$[t_i admires herself$_i$],* the requirement is that all the individuals that satisfy the restrictor *director* should satisfy the presupposition of the nuclear scope, and thus be female. This is as it should be: intuitively the sentence is felicitous just in case every director in the domain of discourse is female.

[8] This line of argumentation could naturally be extended to tense, since the Russian present tense is one of the clearest examples of an indexical that appears to be evaluated with respect to the context of a reported speech act.

[9] I assume for simplicity that the intended reading is one on which George hopes to be (already) elected at the time of his thought act; the most salient reading is probably one on which he hopes that he gets elected at some time in the future, but for simplicity this fact can be disregarded

[10] This conclusion is almost universally accepted in the literature on tense semantics. Interestingly, however, the arguments that support it are much weaker than in the case of De Se readings of PRO, as no examples of unambiguously 'De Se' readings of tense were ever produced (at least to my knowledge). Thus the argument for a De Se analysis of tense is more indirect. It can be motivated by the existence of shiftable tense indexicals, such as the Russian present tense, which may be evaluated with respect to the context of a reported speech act (Schlenker 1999/2000, 2003a).

[11] lternatively, we could have defined a rule to interpret structures such as (32) (here p' is taken to include an abstraction over triples):
(i) $[\![$d hope-t_k-w_m to p'$]\!]^{c, s}$=1 iff for each triple <x, t, w> (where x is an individual, t is a moment and w is a possible world) compatible with what $[\![$d$]\!]^{c, s}$' hopes at s(t_k) in s(w_m), $[\![$p'$]\!]^{c, s}$ (<x, t, w>)=1.

[12] The following discussion is similar to Schlenker (2003b).

[13] In the context of a discussion at ZAS (Berlin) that included comments by several people (esp. E. Zimmermann), U. Sauerland suggested that the semantics of second person features should be modified so as to include an exhaustivity condition. If I understood his suggestion correctly, *hearer(y, c)* should be true only in case y includes *all* the hearers of c. This yields an immediate account of the contrast in (52), since a singular variable cannot denote an entity that includes all the addressees of the speech act when the latter is addressed to several people. It should be pointed out that this suggestion requires a different analysis of *You and you should stop talking to each other*. In earlier paragraphs we stated that each occurrence of *you* is presupposed to denote *some* addressee, though not necessarily all of them. With the exhaustivity condition we have no choice but to maintain that a context shift occurred between the first and the second occurrence of the word *you*. The implications of this theory remain to be worked out.

[14] Hyman & Comrie (1981) and Roncador (1988) give a functional explanation of this asymmetry.

[15] Maybe a mechanism of feature deletion under binding can be postulated in theory (b) without buying into all the mechanisms of theory (a). The main advantage of this enriched theory (b) would still be that it need not postulate *ad hoc* mechanisms for feature transmission in the scope of attitude verbs.

[16] Semantically, plural logophoric pronouns behave very much like PRO when the latter is embedded under an attitude verb. As shown in Landau (2000), a semantically plural PRO may be 'partially' bound, as in *John wanted PRO to meet at 6pm,* where John's desire is of the form: 'We should meet at 6pm'. In this case the same truth conditions would be obtained (at least according to the present theory) if PRO were replaced with a plural logophoric pronoun.

[17] The key is to deny that the strict/sloppy distinction reflects a syntactic ambiguity in the antecedent clause. Although the ambiguity theory is often entertained in the literature, it is falsified by the example in (i):

(i) Max thinks he is strong, Oscar does, too <think that Oscar is strong>, but his father doesn't <think that Oscar is strong>. (Fiengo & May 1994: 131)

As discussed in Schlenker 2004, if the antecedent has a 'sloppy' syntactic representation, then both elided VPs should be sloppy as well; on the other hand if it has a 'strict' representation, both elided VPs should be strict. But in fact we observe a mixed situation, which is not predicted: the second clause is read as sloppy with respect to the first, and the third is read as strict with respect to the second. In Schlenker (2004), a purely semantic procedure is given to derive the strict/sloppy ambiguity without having to posit that the antecedent clause can have distinct syntactic representations.

[18] This is only a first approximation. When the constraint of Non-Redundancy is introduced, as is done below, we will have to modify this rule.

[19] In a more elaborate version of the system, we could treat time and world arguments as pronominal elements rather than as implicit parameters, as is suggested in the theory of tense of Partee (1973), and in the theory of mood of Stone (1997). We could also include an abstraction over a hearer coordinate, in order to provide an analysis of shifted second person pronouns. We will disregard these in the present discussion.

[20] One detail must be cleared, however. We must ensure that when Non-Redundancy is checked diacritics are disregarded, or else j^{a*} and j would count as different objects, and no violation of Non-Redundancy would occur. A rigorous definition is given in Schlenker (2004), but for present purposes we can stick to the intuitive idea that 'diacritics are disregarded when Non-Redundancy is checked.

[21] The same effect holds if the subject is replaced with a demonstrative pronoun he_1 which denotes Bill. As soon as the subject is processed, the rest of the derivation becomes indistinguishable from that of (87), and Non-Redundancy ends up being violated once again (in what follows D is a 'demonstrative function' that yields the denotation of positive indices):

(i) a. #He_1 likes Bill (said by John to Mary, where he_1 is a demonstrative pronoun denoting Bill)

b. $[\![He_1 \text{ like Bill}]\!]^{w\, j^{a*}\hat{}m^{h*}} = [\![\text{like Bill}]\!]^{w\, j^{a*}\hat{}m^{h*}\hat{}D(1)} = [\![\text{like Bill}]\!]^{w\, j^{a*}\hat{}m^{h*}\hat{}b} = [\![\text{like}]\!]^{w\, j^{a*}\hat{}m^{h*}\hat{}b\hat{}b} =$ # because $j^{a*}\hat{}m^{h*}\hat{}b\hat{}b$ violates Non-Redundancy.

[22] Since attitude verbs are in essence analyzed as simultaneously quantifying over worlds, times and individuals, the problem we encountered with quantifiers will reappear in the analysis of attitude verbs. Specifically, the rule we stated in (84), repeated below as (i), will incorrectly predict a violation of Non-Redundancy:

(i) [[say that]]^{t,w} s, q=1
iff [[say]] s^π q=1 with π = λxλt'λw' [[p]]$^{t',w'}$ s^x^{a}

The problem is that the function λxλt'λw' [[p]]$^{t',w'}$ s^x^{a} requires the evaluation of p under the sequence s^x^{a} for various values of x. When x has as its value an element that is already found in the sequence s, a violation of Non-Redundancy will occur, although this conclusion is empirically incorrect. We may avoid the problem by stating a different version of the rule, one in which the element x is found in the quantificational sequence, and is cross-referenced by a formal index in the sequence of evaluation. This index is itself endowed with the role *a*, which yields the results we wanted in the previous version of the theory without running afoul of Non-Redundancy.

(ii) [[say that p]]^{t,w}s, q=1
iff [[say]]^{t,w} s^π, q=1 with π=λxλt'λw' [[p]]$^{t',w'}$ s^(|q|+1)^{a}, q^x

The crucial interpretive step is the computation of π, i.e. λxλt'λw' [[p]]$^{t',w'}$ s^(|q|+1)^{a}, q^x. x is appended at the end of the quantificational sequence, rather than at the end of the sequence of evaluation, as was earlier the case. Simultaneously, an index together with the role *a* is appended at the end of the sequence of evaluation. With the convention that indices in the sequence of evaluation cross-reference elements of the quantificational sequence by counting from the beginning of that sequence, the index that must be added to s is |q|+1, where |q| is the length of q (it can be checked that this index will indeed cross-reference x).

References

ABUSCH, D. (1997), "Sequence of Tense and Temporal *De Re*", *Linguistics & Philosophy* 20: 1-50.

ANDERSON, S.R. & KEENAN, E.L. (1985), "Deixis", in: SHOPEN, M. (ed.) *Language Typology and Syntactic Description,* vol. 3: "Grammatical Categories in the Lexicon", 259-308, Cambridge University Press.

BÜRING, D. (2002), "Bound to Bind", ms., UCLA.

CAPPELEN, H. & LEPORE, E. (1997), "Varieties of Quotation", *Mind* 106: 429-50.

CHIERCHIA, G. (1989), "Anaphora and Attitudes De Se", in: R. BARTSCH et al. (eds.) *Language in Context*, Dordrecht: Foris, pp. 1-31.

CLEMENTS, G.N. (1975), "The logophoric pronoun in Ewe: Its role in discourse", *Journal of West African Languages* 10: 141-77.

COOPER, R. (1983), *Quantification and Syntactic Theory,* Reidel.

Evans, G. 1980. 'Pronouns', *Linguistic Inquiry,* 11: 337-362

Fiengo, R. & May, R.: 1994, *Indices and Identity,* MIT Press

Fox, D. 1999. *Economy and Semantic Interpretation.* MIT Press.

Frajzyngier, Z. 1985. 'Logophoric Systems in Chadic', *Journal of African Languages and Linguistics* 7: 23-37

Frajzyngier, Z. 1993. *A Grammar of Mupun,* Dietrich Reimer Verlag.

Hagège, C. 1974. 'Les Pronoms Logophoriques', *Bulletin de la Société de Linguistique de Paris* 69, 287-310

HALE, K. & PLATERO, P. (2000), "Negative Polarity Expressions in Navajo", in: FERNALD, Th. B. & Paul R. Platero (eds.) (2000) *The Athabaskan Languages: Perspectives on a Native American Language Family*, pp. 73-91. Oxford: Oxford University Press.

HALLE, M. (1997), "Distributed Morphology: Impoverishment and Fission", *MIT Working Papers in Linguistics,* 30, 425-449.
HALLE, M. & MARANTZ, A. (1994), "Some Key Features of Distributed Morphology", *MIT Working Papers in Linguistics* 21, 275-288.
HEIM, I. (1983), "On the Projection Problem for Presuppositions", *Proceedings of WCCFL 2*, pp. 114-126.
HEIM, I. (1990), "E-Type Pronouns and Donkey Anaphora", *Linguistics & Philosophy* 13, pp. 137-177.
HEIM, I. (1991), Class hand-outs on 'Control' (Seminar taught by Heim & Higginbotham, Spring 1991): 'Interpretation of PRO' (Feb. 22), "The first person" (March 8), and a hand-out on 'connectedness' (April 12).
HEIM, I. & KRATZER, A. (1998), *Semantics in Generative Grammar*. Oxford: Blackwell.
HEIM, I. (2002), "Features of pronouns in semantics and morphology", hand-out of a talk given at USC on January 31st, 2002.
HYMAN, L.M. (ed) (1979), *Aghem Grammatical Structure*. Southern California Occasional Papers in Linguistics No. 7.
HYMAN, L.M. & COMRIE, B. (1981), "Logophoric Reference in Gokana", *Journal of African Languages and Linguistics* 3: 19-37.
KAPLAN, D. (1969), "Quantifying In", in: *Words and Objections,* ed. D. Davidson & J. Hintikka, pp. 178-214, Dordrecht: Reidel.
KAPLAN, D. (1977/1989), "Demonstratives', in: *Themes from Kaplan,* ed. Almog/Perry/Wettstein, pp. 481-563, Oxford University Press, 1989.
KARTTUNEN, L. (1969), Pronouns and variables. In *Papers from the Fifth Regional Meeting of the Chicago Linguistics Society* , 108-115. University of Chicago Press, Chicago.
KOOPMAN, H. & SPORTICHE, D. (1989), "Pronouns, Logical Variables, and Logophoricity in Abe", *Linguistic Inquiry,* 20: 4, 555-589.
KRATZER, Angelika (1998), *More Structural Analogies Between Pronouns and Tenses*, in: DEVON STROLOVITCH & AARON LAWSON (eds.), *Proceedings of Semantics and Linguistic Theory VIII*. Ithaca, New York: CLC Publications, 92-110.
KUSUMOTO, Kiyomi (1998), "Tenses as logophoric pronouns". Hand-out of a talk given at the MIT/UConn/UMass Semantics Workshop, October 31, 1998 (UConn).
LANDAU, I. (2000), *Elements of Control: Structure and Meaning in Infinitival Constructions*. Studies in Natural Language and Linguistic Theory, Kluwer Academic Publishers, Dordrecht. 2000.
LESLAU, W. (1995), *Reference Grammar of Amharic*. Harrassowitz - Wiesbaden.
LEWIS, D. (1979), "Attitudes De Dicto and De Se". *The Philosophical Review* 88: 513-43.
LI, C.N. & THOMPSON, S.A. (1981), *Mandarin Chinese (A Functional Reference Grammar),* University of California Press.
MORGAN, J. (1970), "On the Criterion of Identity for Noun Phrase Deletion", *CLS* 6.
NEALE, Stephen (1990), *Descriptions*, Cambridge: MIT Press.
NEVINS, A. & ANAND, Pranav (2004), "Shifty Operators in Changing

Contexts", to appear in *Proceedings of Semantics and Linguistic Theory* 14.

NOYER, R. (1997), *Features, Positions and Affixes in Autonomous Morphological Structure*. Garland Publishing, New York. Revised version of 1992 MIT Doctoral Dissertation.

OGIHARA, T. (1996), *Tense, Attitudes, and Scope*. Kluwer.

PARTEE, B. (1973), "Some Structural Analogies Between Tenses and Pronouns in English", *The Journal of Philosophy* 70: 601-609.

PARTEE, B. (1989), "Binding Implicit Variables in Quantified Contexts", *Proceedings of the Annual Meeting of the Chicago Linguistics Society 25* (Part One: The General Session), 342-365; reprinted in Partee (2004) (ed.) *Compositionality in Formal Semantics. Selected Papers by Barbara H. Partee*, Blackwell.

QUINE, W.V. (1956), "Quantifiers and Propositional Attitudes", *Journal of Philosophy,* 53: 177-187.

RECANATI, F. (2000), *Oratio Obliqua, Oratio Recta (An Essay on Metarepresentation),* MIT Press.

RONCADOR, M. von (1988), *Zwischen direkter und indirekter Rede,* Niemeyer.

RULLMANN, H. (2004), "First and Second Person Pronouns as Bound Variables", *Linguistic Inquir*y 35: 159-168.

SAUERLAND, U. (2003), "A New Semantics for Number". To appear in *Proceedings of Semantics and Linguistic Theory* 2003.

SCHLENKER, Philippe (1999/2000), *Propositional Attitudes and Indexicality (A Cross-Categorial Approach*. Ph.D. dissertation, MIT.

SCHLENKER, Philippe (2003a), "A Plea for Monsters", *Linguistics & Philosophy* 26: 29-120.

SCHLENKER, Philippe (2003b), "Indexicality, Logophoricity, and Plural Pronouns", in: *Research in Afroasiatic Grammar II (Select Papers from the Fifth Conference on Afroasiatic Languages, Paris, 2000)*, ed. J. Lecarme, Benjamins, pp. 409-428.

SCHLENKER, Philippe (2004), "Non-Redundancy: Towards a Semantic Reinterpretation of Binding Theory". Accepted for publication, *Natural Language Semantics*.

SCOTT, Dana (1970), "Advice on Modal Logic", in: K. Lambert (ed.) *Philosophical Problems in Logic. Recent Developments*. Reidel, Dordrecht, 143-173.

SPEAS, Peggy (2000), "Person and Point of View in Navajo Direct Discourse Complements', in: Andrew Carnie, Eloise Jelinek, & MaryAnn Willie (eds.) *Papers in Honor of Ken Hale*. Working Papers on Endangered and Less Familiar Languages 1. Cambridge, Massachusetts: MIT Working Papers in Linguistics.

STECHOW, Arnim von (2003), "Feature Deletion under Semantic Binding: Tense, Person, and Mood under Verbal Quantifiers", *Proceedings of NELS* 33.

STONE, Matthew (1997), "The Anaphoric Parallel between Modality and Tense", IRCS Report 97-06, University of Pennsylvania.

THOMAS, Elaine (1978), *A Grammatical Description of the Engenni Language*. Summer Institute of Linguistics Publication Number 60.