

## ON THE LFS OF ATTITUDE REPORTS

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### Abstract

We argue that attitude reports with embedded pronouns have LFs that specifically describe “de se” attitudes. We offer some proposals for what the LFs of attitude reports look like.

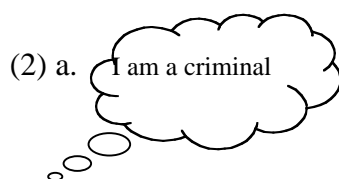
### 1 Background: a reminder about “de se” attitudes

We will begin with a reminder of what “de se” attitudes are and how we talk about them.

As emerged from the study in Chierchia 1991, while the English sentence in (1a) is the natural candidate to translate the Italian sentence in (1b), it is by no means an exact translation. There are many cases in which (1b) is false but (1a) is true. Take for instance the following scenario. We are interested in whether people use the same criteria to judge themselves that they use to judge other people, and we conduct an experiment. We interview John, but while we interview him, a hidden camera photographs him from the back. Meanwhile, this image is projected in front of him, and presented as though it is prefilmed footage of another person. We ask John his impression of that person in the film, and he says “It’s a criminal.”

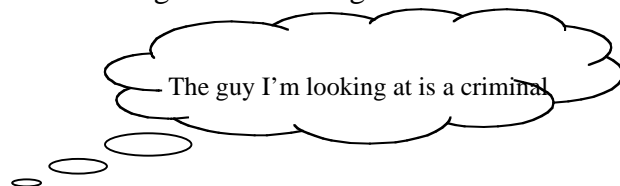
- (1) a. John thinks that he is a criminal.  
b. John crede di essere un criminale.

What is the difference between the two sentences? Evidently, one is this: while the English sentence can describe thoughts that we could represent in cartoon style as (2b), the Italian sentence is restricted to describing thoughts we would represent as (2a). These latter kinds of thoughts are called<sup>1</sup> “de se” thoughts about being a criminal.



OK (1a) (English)  
OK (1b) (Italian)

b.



OK (1a) (English)  
– (1b) (Italian)

(2a) depicts a “de se” thought about being a criminal. (2b) does not.

What makes an attitude – a thought, or, say, a hope or dream -- an attitude “de se” ? We can make sense of this given a possible worlds analysis of attitudes (cf. Hintikka 1969, Lewis 1979). To describe John’s thoughts -- or to describe John’s hopes, or John’s

<sup>1</sup> Adopting terminology introduced by Lewis 1979.

dreams -- is to describe a range of possible worlds. John situates himself as one of the people in each of these worlds.<sup>2</sup> What makes the case we considered “de se” is that, in each world, *the person John identifies as himself* is a criminal, We have written this in one conventional way in (3), quantifying over individual-world pairs.

- (3) Given any pair  $\langle y, w \rangle$   
     where  $w$  is a world compatible with John’s thoughts  
     and  $y$  is the individual in  $w$  who John identifies as himself,  
      $y$  gets promoted in  $w$

## 2. The goals of this paper

In this study, we assume that, when we interpret sentences, we start from an abstract representation of the sentence -- an LF -- which is systematically related to the way the sentence is pronounced. More specifically, following most current work, we assume that LFs are structures that represent moments in the derivational life of the structures that get pronounced.

We saw above that the English sentence (1a) is not restricted to describing a “de se” thought about being a criminal. But still it *can* describe that kind of thought. This opens various possibilities about the LFs for sentences like (1a). They could have one single LF compatible with all kinds of attitudes, both the (a) and the (b) kind that we depicted in our cartoons. Or they could have various LFs, one of which, for example, is dedicated uniquely to “de se” attitudes.

In this note we will argue for the second possibility: sentences like (1a) have, among other LFs, *LFs that are dedicated uniquely to “de se” attitudes*. LFs, in other words, that express what is expressed by superficially parallel Italian sentences like (1b). While our focus in this note will be on belief reports – sentences with *think* – we suggest that analogous remarks apply to all sentences that contain attitude verbs and embed pronouns. This position was taken by Chierchia 1991, but has not been unequivocally established. It is also the position that emerges from Percus and Sauerland (to appear), which focuses on dream reports in particular, and argues (in a different way) that dream reports with embedded pronouns have LFs dedicated uniquely to “de se” dreams.

In our argument, we will presuppose very little about what LFs for sentences like (1a) could in principle look like. This is good in that it makes the argument easy to accept, but unsatisfying if your hope is to learn something about the architecture of LFs. We will spend the rest of this note (**Section 4**) trying to fill in the picture. First, we will outline a proposal for what the LFs that do *not* describe “de se” attitudes look like. We will then fit this proposal together with a proposal for “de se” LFs that derives essentially from Chierchia 1991 – suggesting that the arguments in Percus and Sauerland (to appear) point in this direction.

## 3. An argument for a “de se” LF for attitude reports with embedded pronouns

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<sup>2</sup> Throughout this paper, we will make the simplifying assumption (contra Lewis 1979) that the attitude holder is never in doubt about which individual it is.

We said above that we would argue that English sentences like those we considered above – or like (4a)<sup>3</sup> – have an LF that describes a “de se” attitude. Really, what this section will be is an argument about the structures available for  $V'$  constituents like the one embedded in (4b)<sup>4</sup> -- *thinks that he will win the election* – and not about the structures for full sentences. But the connection will be obvious.

Our discussion will be guided by the view that LFs are interpreted compositionally, along the lines given in Heim and Kratzer 1998. We will argue that this  $V'$  has, among its possible LFs, one that denotes the property of having a “de se” belief about winning the election (i.e. (5)<sup>5</sup>). The natural conclusion from this will be that sentences like (4a) have an LF that describes a “de se” belief of John’s about winning the election.<sup>6</sup>

(4) a. John thinks that he will win the election.

b. John [ $\lambda_1$  [ $_{VP}$   $w_0$   $t_1$  [ $_{V'}$  *thinks that he will win the election*] ] ]

(5)  $\lambda x. \lambda w.$  Given any pair  $\langle y, w' \rangle$

where  $w'$  is a world compatible with  $x$ 's thoughts in  $w'$   
and  $y$  is the individual in  $w'$  who  $x$  (in  $w$ ) identifies as himself,  
 $y$  wins the election in  $w'$

Our argument will take the following form. We will take for granted an idea about *one* LF that the  $V'$  admits (we regard this idea as fairly uncontroversial), and we will argue that, if it has *that* LF, it must also have a second one with the denotation in (5). So let us first spend a brief subsection on the idea we are taking for granted.

### 3.1 The argument: the background assumption

The idea that we are taking for granted is that the  $V'$ s of belief reports admit LFs that express existential quantification over acquaintance relations. This is one way of adapting Lewis 1979's analysis of “de re” belief. We can summarize the idea as follows.

Suppose the embedded clause in a belief report contains an individual-denoting DP, like *Mary*.

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<sup>3</sup> We cite the sentence in (4a) because it has already been discussed in the literature in connection with this issue, and different conclusions have been drawn. See the references to Schlenker 1999 in later footnotes. Similar sentences were considered in Chierchia 1991.

<sup>4</sup> The item  $w_0$  in (4b) is a silent variable over possible worlds. We assume that all VPs contain such an item. In what follows, we will imagine for convenience that world variables in the matrix VP always carry the index 0.

<sup>5</sup> By “property” we mean a function from individuals to propositions (by “propositions” we mean a function from worlds to truth values). Note that we will ignore tense throughout this paper.

<sup>6</sup> Why? To say that a sentence is true on the basis of an LF is to say that, for some relevant assignment  $g$ ,  $[[LF]]^g = 1$ . In the case of LFs with the format in (4b) and the  $V'$  denotation in (5), this will amount to saying that, for some relevant  $g$ ,  $[[John]]^g$  has a “de se” belief in world  $g(0)$  about winning the election. One thing that makes an assignment “relevant” is that it maps world variables to the actual world. So this will amount to saying that, in the actual world, John has a “de se” belief about winning the election.

(6) thinks [ that Mary is happy ]

Then, we assume, one LF that is available for V' will denote a property that we can describe by talking about acquaintance relations that the holder of the property bears to Mary. What kind of property? In the case of (6), this one, informally speaking: the property of thinking "The person who I bear R to is happy," for some acquaintance relation R that the property holder actually bears to Mary. This property would hold of Mary's husband if he thought "my wife is happy." It would hold of the person whose article Mary reviewed anonymously if he thought "the reviewer of my article is happy."

We can specify this property in another way in terms of possible worlds. Let  $DOX_{x,w}$ <sup>7</sup> be the set of individual-world pairs that characterize x's thoughts in w – that is, the set of all pairs  $\langle y, w' \rangle$  such that  $w'$  is a world compatible with x's thoughts in w, and y is the individual in  $w'$  who x (in w) identifies as himself. Then the property is the one that holds of x in w as long as for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ , the individual that y bears R to in  $w'$  is happy in  $w'$  – for some acquaintance relation R that x bears uniquely to Mary in w.<sup>8</sup>

(7) and (8) schematize the general pattern in cases where the embedded clause of a belief report contains an individual-denoting DP, and show how the pattern applies to the V' *thinks that Mary is happy*. Look in (8) at the condition that the  $\langle y, w' \rangle$  pairs have to meet, and you will see that it relates to what the clause *Mary is happy* on its own would express -- more precisely, it relates to the condition that the pair  $\langle \text{Mary, the actual world} \rangle$  would have to meet in order for *Mary is happy* on its own to be true in the actual world. A quick way of describing the pattern here might be as follows: in our gloss of the condition that the  $\langle y, w' \rangle$  pairs meet, we will write *the individual that y bears R to in w'* where intuitively we might expect *Mary*.

(7) a. Clauses of the form ...DP...

admit LFs whose denotation (wrt g) is 1 as long as  $P([\text{DP}]^g)(g(0)) = 1$ <sup>9</sup>



b. V's of the form *thinks that* ...DP...

admit LFs whose denotation (wrt g) is

$\lambda x. \lambda w. \text{there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to } [\text{DP}]^g \text{ in } w,$   
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$   
 $P(\text{the individual that } y \text{ bears } R \text{ to in } w')(w') = 1$

<sup>7</sup> DOX because it is the set of x's "doxastic alternatives" in w.

<sup>8</sup> A more precise description would run as follows: ...as long as there is there is some acquaintance relation R such that x bears R uniquely to Mary in w, and such that, for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ , (i) there is an individual z such that y bears R uniquely to z in  $w'$ ; and (ii) this individual is happy in  $w'$ . In what follows, we will frequently omit mention of the uniqueness condition in (i).

<sup>9</sup> Recall the assumption that world variables in the matrix VP carry the index 0.

(8) a. The clause *Mary is happy*

admits an LF whose denotation (wrt  $g$ ) is 1 *as long as*  $[[\text{Mary}]]^g$  *is happy in*  $g(0)$



b. The  $V'$  *thinks that Mary is happy*

has an LF whose denotation (wrt  $g$ ) is

$\lambda x. \lambda w. \text{there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to } [[\text{Mary}]]^g \text{ in } w,$   
 such that,  
*for all*  $\langle y, w' \rangle$  *in*  $\text{DOX}_{x,w}$ ,  
*the individual that } y \text{ bears } R \text{ to in } w' \text{ is happy in } w'*

We have concentrated here on a certain kind of LF that the  $V'$ 's of belief reports admit. In what follows, we will use a shorthand: to say that a  $V'$ -LF yields a denotation of the kind we laid out here, we will say that the LF is one where the individual-denoting DP in the embedded clause is “construed de re.”

### 3.2 The argument: the strategy

Our goal is to show that the  $V'$  in (9) has an LF with the “de se denotation” in (10) in addition to any LF it might have in which the pronoun is construed de re. (We will call the LF we are arguing for  $\text{LF}_{(9)\text{-de-se}}$ .)

(9) *thinks that he will win the election*

(10)  $[[\text{LF}_{(9)\text{-de-se}}]]^g = \lambda x. \lambda w. \text{For all } \langle y, w' \rangle \text{ in } \text{DOX}_{x,w}, y \text{ wins the election in } w'$

With this in mind, we are going to think about constituents that contain  $V'$ . And we are going to think about what denotation we expect for the constituent if the contained  $V'$  has the denotation in (10), or if the contained  $V'$  has the kind of denotation that we find by construing the pronoun de re.

So to begin with, what *is* the kind of denotation that we find for  $V'$  when we construe the pronoun de re? Assume (standardly) that the pronoun is indexed, and that the index functions as a variable. Then, for every index  $i$  that can appear on the pronoun, the clause (11) will have an LF  $\text{LF}_{(11)}^i$  interpreted as in (12). Accordingly (recall the pattern we are taking for granted), for every index  $i$  on the pronoun, the  $V'$  (9) will have an LF  $\text{LF}_{(9)\text{-de-re}}^i$  interpreted as in (13).

(11) *He will win the election*

(12)  $[[\text{LF}_{(11)}^i]]^g = 1$  *as long as* **person  $g(i)$**  *wins the election in world*  $g(0)$

(13)  $[[\text{LF}_{(9)\text{-de-re}}^i]]^g$

$= \lambda x. \lambda w. \text{there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to } \underline{g(i)} \text{ in } w,$   
 such that, *for all*  $\langle y, w' \rangle$  *in*  $\text{DOX}_{x,w}$ ,  
*the individual that } y \text{ bears } R \text{ to in } w' \text{ wins the election in } w'*

Bearing this in mind, let us now move to constituents that contain V'. In particular, let us focus on the constituent that the subject combines with in sentences of the form *DP thinks that he will win the election*.

Since subjects move from VP, leaving a  $\lambda$  and a coindexed trace, the constituent that the subject combines with will look like this in cases where the pronoun in the V' is construed de re:

$$(14) \ [_{\alpha} \lambda_j \ [_{VP} w_0 t_j \mathbf{LF}_{(9)\text{-de-re}}^i ] ] \quad \text{for some } i, j$$

We will produce two different kinds of denotations for LFs of this kind, depending on whether or not  $i$  and  $j$  are the same index – that is, depending on whether or not the “de-re-construed” pronoun is bound by the  $\lambda$ . When the two indices are the same, we will get the predicate in (15a), a predicate which we would describe in terms of acquaintance relations that its argument bears to *himself*. When the two indices are different, we will get a predicate of the kind in (15b), a predicate we would describe in terms of acquaintance relations that its argument bears to *a certain individual whose identity depends on the assignment*.

(15) a.  $i=j$ :

$$[[\alpha]]^g = \lambda x. \text{ there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to } x \text{ in } g(0), \\ \text{such that,} \\ \text{for all } \langle y, w' \rangle \text{ in } \text{DOX}_{x, g(0)}, \text{ the individual that } y \text{ bears } R \text{ to in } w' \\ \text{wins the election in } w'$$

b.  $i \neq j$ :

$$[[\alpha]]^g = \lambda x. \text{ there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to } \mathbf{g(i)} \text{ in } g(0), \\ \text{such that,} \\ \text{for all } \langle y, w' \rangle \text{ in } \text{DOX}_{x, g(0)}, \text{ the individual that } y \text{ bears } R \text{ to in } w' \\ \text{wins the election in } w'$$

By contrast, if the V' were our “de se” V', the denotation for the constituent that combines with the subject – the constituent sketched in (14') -- would be as in (16). The predicate in (16) works differently from the predicates in (15): it describes individuals who have a “de se” thought about winning the election.

$$(14') \ [_{\alpha} \lambda_j \ [_{VP} w_0 t_j \mathbf{LF}_{(9)\text{-de-se}} ] ]$$

$$(16) \ [[\alpha]]^g = \lambda x. \text{ for all } \langle y, w' \rangle \text{ in } \text{DOX}_{x, g(0)}, y \text{ wins the election in } w'$$

Now we have determined how we interpret the sister of the subject when the V' it contains is the version of (9) where the pronoun is construed de re – we would obtain the predicate in (15a) or in (15b). And we have determined how we would interpret the sister of the subject if the V' it contained were the “de se” version of (9) – we would obtain the predicate in (16). To argue that (9) admits the “de se” LF, we will capitalize on the following observation. While it happens to be the case that you couldn't satisfy the predicate in (16) without also satisfying the predicate in (15a) (this is because the identity relation is a kind of acquaintance relation<sup>10</sup>), you could perfectly well be the

<sup>10</sup> That is, another way of writing (16) is as in (i). Since the identity relation is a relation that everyone bears (uniquely) to himself, anyone who satisfies this predicate also satisfies the predicate in (15a).

only person satisfying the (16) predicate without being the only person satisfying the (15a) predicate or the only person satisfying the (15b) predicate.

The argument will run as follows.<sup>11</sup> We will consider the sentence *Only John thinks that he will win the election*. A given LF for this sentence will express that John is the only person satisfying the predicate denoted by the subject's sister (cf. (17)). And we will consider a scenario where (given the assignments under which we would evaluate the LFs in question) John *is* the only person satisfying the predicate in (16) but *is not* the only person satisfying either of the other kinds of predicates. We will then observe that we judge the sentence to be true in that scenario. Given that we judge the sentence to be true, the sentence must admit an LF where the subject's sister denotes a predicate different from those of the kind in (15a) or (15b) – the kind of predicate we get when, in the contained *V* 'thinks that he will win the election', the pronoun is construed de re. We could explain why we judge the sentence to be true if the sentence admitted an LF where the subject's sister denoted a predicate of the kind in (16) – the kind of predicate we would get if *thinks that he will win the election* had the “de se” LF. Conclusion: The *V* 'thinks that he will win the election' has the “de se” LF.

(17) a. Only John thinks that he will win the election.

b. LF: [ Only John ] [<sub>α</sub> ... ]

c. [[ (17b) ]]<sup>g</sup> = 1 as long as John is the only individual x such that [[α]]<sup>g</sup>(x) = 1.

### 3.3 The argument live

That was the plot. Here are the details. Here first is the scenario.

(18) Scenario.<sup>12</sup> A group of drunken election candidates watching campaign speeches on television do not recognize themselves in the broadcast. John, the only confident one, thinks “I’ll win,” but does not recognize himself in the broadcast. Bill and Sam, both depressive, think “I’ll lose” but are impressed by the speeches that happen to be their own and are sure “that candidate” will win. Peter, also depressive, happens to be impressed not by his own speech but by John’s.

Before proceeding, note that by hypothesis we evaluate LFs with respect to assignments that map the index 0 to the actual world (see footnote 6) and that map the index of the pronoun *he* to a salient (male) individual. In what follows, we will say that a person “satisfies the (15a) predicate” to say that, when we compute the denotation of the LF in (15a) *with respect to an assignment of this kind*, we find that the resulting function characterizes that person. (Analogous remarks obviously hold for “satisfying the (15b) predicate” and so on.) With this in mind, here are the important things to remark about our scenario.

(i) [[α]]<sup>g</sup> = λx. for all <y, w'> in DOX<sub>x, g(0)</sub>,  
the individual that y bears *RI* to in w' will win the election in w',  
where *RI* is the identity relation

<sup>11</sup> A argument of a similar kind can be made on the basis of VP ellipsis examples, where we can test for what the denotation of an elided VP is.

<sup>12</sup> The use of scenarios like (18) together with sentences of the form *DP thinks that he will win the election* originates with Ede Zimmermann, according to the attribution in Schlenker 1999. (Our argument is new, though, as far as we know.)

First, *it is not the case that John is the only person who satisfies the (15a) predicate*. It is true not only for candidate John, but for candidates Bill and Sam as well, that we can find an acquaintance relation R such that the candidate bears R to himself, and such that the candidate thinks the person he bears R to will win the election. We have listed the relevant R's in (19a).

(19) a. John: R is the identity relation

Bill: R is the relation x bears to the *first* candidate x hears  
(assuming that the first candidate Bill hears is himself)

Sam: R is the relation x bears to the *second* candidate x hears  
(assuming that the second candidate Sam hears is himself)

Second, *it is not the case either that John is the only person who satisfies the (15b) predicate*. In particular, John is not the only person who satisfies the (15b) predicate if we limit the assignments under consideration to those that assign the index of the pronoun to *John*. This is because it is true not only for candidate John, but also for candidate Peter, that we can find an acquaintance relation R such that the candidate bears R to *John*, and such that the candidate thinks the person he bears R to will win the election. We have listed the relevant R's in (19b).

b. John: R is the identity relation

Peter: R is the relation x bears to the *third* candidate x hears  
(assuming that the third candidate Peter hears is John)

And if we instead limit our range to assignments that assign the pronoun's index to one of the other salient male individuals – Bill, Sam, or Peter -- the scenario (sparely presented as it is) still does not make it evident that John is the one and only person with the (15b) property.

But, third, *John is the only person who satisfies the (16) predicate*: he is the only person with a “de se” thought about winning the election.

The fact is that we take the sentence to be true in this scenario.

But now, to take the sentence to be true is to say this: if we take some LF for the sister of *only John*, evaluate it with respect to some relevant assignment, and look at the predicate that results, we find that the only person that function characterizes is John.<sup>13</sup> So if the only LFs available for V' are LFs where *he* is construed de re, then our fact is a surprise. In saying that the sentence is true, we would be saying either that John is the only person who satisfies the (15a) predicate or that John is the only person who satisfies the (15b) predicate, neither of which is the case. But if V' has the “de se” LF, our fact is predicted. In saying that the sentence is true, we could be saying instead that John is the only person who satisfies the (16) predicate, and this *is* the case. The conclusion: V' has the “de se” LF.

### 3.4 The argument: a final remark

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<sup>13</sup> This follows from the more basic hypothesis that to say that a sentence is true is to say that some LF for the sentence, evaluated with respect to some relevant assignment, yields 1.

This argument started from the assumption that the V's of belief reports admit LFs that express existential quantification over acquaintance relations. And the argument is only as good as this starting point.

The basic idea that we were drawing on was this Lewis-inspired one: a sentence like *John thinks that Mary is happy* is true if there is some acquaintance relation R that John in fact bears uniquely to Mary, such that, for all  $\langle y, w' \rangle$  in  $\text{DOX}_{\text{John, the actual world}}$ , the individual that y bears R to in  $w'$  is happy in  $w'$ . But does the implementation of this idea require putting the existential quantification *in the V'*? Not obviously. We would arrive at the same effect if there were an unpronounced existential quantifier at the sentence level, for example. And in that case our argument would be affected. The idea that the existential quantification comes from the V' was important to our argument, because it was important to our argument that, in any LF for *Only John thinks that he will win the election* that is not a "de se" LF, this existential quantification "has narrow scope" with respect to the subject quantifier *only John*.

To break into this argument, then, one thing that you could do is this: show that there is a viable alternative implementation of the Lewis-inspired idea that predicts the *Only John...* sentence to have an LF compatible with our scenario. We will not consider this further here. But we will note that the literature contains examples that show that, at least sometimes, the existential quantification over acquaintance relations "has narrow scope" with respect to a quantifier in subject position – as we have imagined here.<sup>14</sup> This is something to take into account in thinking about alternatives.

#### 4 The LFs of attitude V's, in more detail

At this point we have arrived at a picture on which attitude V's like *thinks that he will win the election* admit a variety of LFs, with a variety of denotations. And we have said something about what the denotations are for V's of this kind, or for V's like *thinks that Mary is happy*. But we haven't said anything concrete about what the LFs for these V's look like, and how the denotations arise. This section is to remedy the situation.

We will start by outlining how the denotation of a V' like *thinks that Mary is happy* could be derived compositionally from the material in its LF – given standard assumptions about the way the words are grouped together hierarchically. This preliminary idea will form the basis of the slightly more complicated proposal that we will then sketch in the ensuing two sections.

##### 4.1 The LFs of belief reports: a first attempt<sup>15</sup>

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<sup>14</sup> In particular, Ede Zimmermann (p.c. to Philippe Schlenker) observes that a sentence like *Every candidate thinks that he will win the election* can be true even when there is no single acquaintance relation R such that every candidate bears that relation to himself and thinks "The person who I bear R to will win the election" – as long as, for every candidate c, there is *some* R such that c bears R to himself and thinks "The person who I bear R to will win the election." (Imagine a scenario like ours except that Peter is missing.) See Schlenker 1999, chapter 2. This suggests that the sentence must admit an LF with an existential quantifier that "resides below" *every candidate*, and that is the kind of position we are taking.

<sup>15</sup> This section was inspired by lecture notes of Irene Heim (Heim 1993) that Arnim von Stechow kindly made available to us. Connections can probably also be drawn to aspects of Aloni 2000.

Let us start by reconsidering what we said about the denotation of (6)'s LF. We said that the denotation in question was a property, and we defined what the property was by existentially quantifying over acquaintance relations ((20)).

(6) thinks that Mary is happy

(20)  $[[LF_{(6)}]]^g =$   
 $\lambda x. \lambda w. \text{there is some acquaintance relation } R \text{ that } x \text{ bears uniquely to Mary in } w,$   
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  
 the individual that  $y$  bears  $R$  to in  $w'$  is happy in  $w'$

While we talked in terms of existential quantification over acquaintance relations, naturally there are other ways of talking which would serve to identify the same property. For instance, we could have put the property as in (20'), quantifying over individual concepts (functions from worlds to individuals). (20') talks about "acquaintance-based Mary-concepts for  $x$  in  $w$ ." What this means is of course the following:  $C$  is an acquaintance-based Mary-concept for  $x$  in  $w$  if we can find some acquaintance relation  $R$  such that  $x$  bears  $R$  uniquely to Mary in  $w$ , and such that, for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $y$  bears  $R$  uniquely to  $C(w')$  in  $w'$ .

(20')  $\lambda x. \lambda w. \text{there is some "acquaintance-based Mary-concept for } x \text{ in } w," C,$   
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $C(w')$  is happy in  $w'$

And, in that case, we could also have expressed the same property as in (20''). (20'') quantifies not directly over acquaintance relations borne to Mary, or over acquaintance-based Mary-concepts (which "encode" acquaintance relations borne to Mary), but rather, more generally, over ways of assigning individuals like Mary to concepts like acquaintance-based Mary-concepts.

(20'')  $\lambda x. \lambda w. \text{there is some way } G \text{ of assigning individuals to acquaintance-based}$   
*concepts of those individuals for } x \text{ in } w,  
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $G(\text{Mary})(w')$  is happy in  $w'$*

In general, we will use the term *concept-generator* to mean a way of assigning individuals of one's acquaintance to concepts. A way of assigning such individuals to acquaintance-based concepts is an *acquaintance-based concept-generator*.<sup>16</sup> So a quicker way of writing (20'') is as in (20'''):

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<sup>16</sup> Definition:

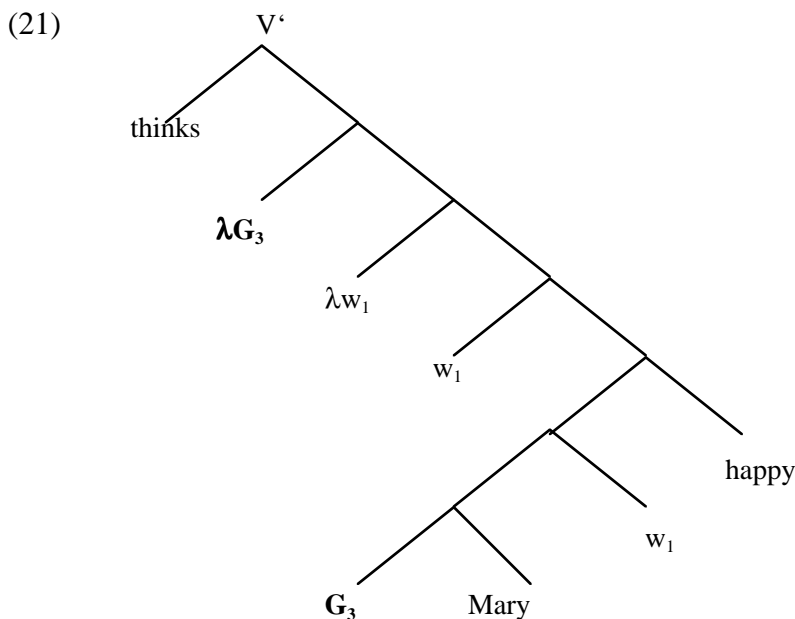
- $G$  is a **concept-generator** for individual  $x$  in  $w$  iff
- i.  $G$  is a function from individuals to individual concepts
  - ii.  $\text{Dom}(G) = \{z: x \text{ is acquainted with } z \text{ in } w\}$

Definition:

- $G$  is an **acquaintance-based concept-generator** for individual  $x$  in  $w$  iff
- i.  $G$  is a concept-generator for  $x$  in  $w$
  - ii. the concepts  $G$  yields are "acquaintance-based" in the sense that  
 For all  $z$  in  $\text{Dom}(G)$ ,  
 there is some acquaintance relation  $R$  such that  
 $x$  bears  $R$  uniquely to  $z$  in  $w$ , and  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $y$  bears relation  $R$  uniquely to  $G(z)(w')$  in  $w'$ .

(20“”)  $\lambda x.\lambda w$ . there is some acquaintance-based concept-generator  $G$  for  $x$  in  $w$   
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $G(\text{Mary})(w')$  is happy in  $w'$

With this in mind, here is the basic proposal. It has been argued (see e.g. Percus 2000) that LFs contain silent items that function as variables over possible worlds and abstractors over these variables. Suppose they also contain silent items that function as variables over *concept-generators*<sup>17</sup> and abstractors over *these* variables. Then we could generate an LF roughly like the following.<sup>18</sup> The complement of *thinks* in (21) denotes a function from concept-generators to propositions. It should be transparent that if the denotation of *thinks* selects for such an object, and is as in (22), we will get just the denotation we wanted.



(22) The denotation of *thinks* (to be revised):

$\lambda \Phi_{\langle \langle e, se \rangle, st \rangle} \lambda x.\lambda w$ . there is some acquaintance-based concept-generator  $G$  for  $x$  in  $w$   
 such that,  
 for all  $\langle y, w' \rangle$  in  $DOX_{x,w}$ ,  $\Phi(G)(w') = 1$ .

The lesson of this section has been that, while one can talk about the denotations of belief reports in terms of quantification over acquaintance relations, it is in some respects more illuminating to talk about them in terms of quantification over concept-generators. Talking in this way allows us to see how we can derive these denotations compositionally on the basis of LF material – once we admit the existence of variables over concept-generators. A final remark: While our concern here has been with belief reports, it is natural to expect that other attitude reports too should be analyzed along the lines we sketched here. Interestingly, proceeding in this way would lead to the

<sup>17</sup> Or, more precisely, over functions from individuals to individual concepts.

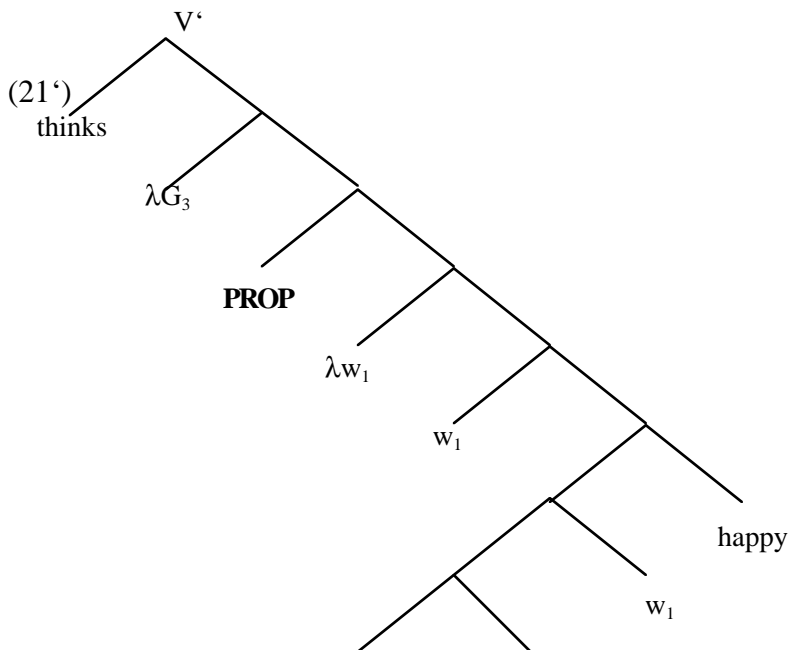
<sup>18</sup> Here, we have assumed for convenience that the subject lowers into VP and “pruned” nodes that contribute nothing to interpretation, thereby removing from the complement of *think* all material above VP.

conclusion that different attitude verbs quantify over different kinds of concept-generators.<sup>19</sup>

## 4.2 Some adjustments

The proposal we just sketched accounts for those LFs where individual-denoting DPs are construed de re. For instance, to arrive at an LF for *thinks that he will win the election* that behaves as in (13), just replace *Mary* in the diagram above with *he<sub>i</sub>*, and *happy* with *will win the election*. But how about the “de se” LF for *thinks that he will win the election*? There are various possibilities that are compatible with this general approach. The one we favor, though, requires introducing a complication, according to which the LF for *thinks that Mary is happy* is in fact a little different from what we assumed above.

Above, we assumed that the denotation of the embedded clause -- before the  $\lambda G$  attaches -- is a proposition, and that the denotation of *think*, accordingly, selects for functions from concept-generators to propositions. Now we will alter this: the denotation of the embedded clause will now be a *property*, and the denotation of *think*, accordingly, will select for functions from concept-generators to *properties*. In order to create a property out of the embedded clause material, we will assume that there is another silent ingredient that LFs can contain: a “type-shifter” PROP can adjoin to proposition-denoting constituents, making them into property-denoting constituents. The revised LF for *thinks that Mary is happy* is thus as in (21’). Given the denotations for *think* and PROP below, this LF will obviously have the same denotation as the earlier one.



<sup>19</sup> In claiming this, we have in mind facts such as the following. Suppose Mary anonymously reviewed John’s paper (unknown to John). We would then take the sentence *John thought that Mary was a bald man in his 90’s* to be true in a situation in which John thought that his article had been reviewed by a bald man in his 90’s. However, we would *not* take the sentence *John dreamed that Mary was a bald man in his 90’s* to be true in a situation in which John *dreamed* that his article had been reviewed by a bald man in his 90’s. One might conclude from this that, while both belief reports and dream reports quantify over concept-generators, they quantify over different kinds of concept-generators. The “belief-relevant” concept-generators can yield concepts that pick out anonymous reviewers but the “dream-relevant” concept-generators cannot.

G<sub>3</sub>          Mary

(22′) The denotation of *thinks* (revised)

$$\lambda \Pi_{\langle \langle e, se \rangle, \langle e, st \rangle \rangle}. \lambda x. \lambda w. \text{ there is some acquaintance-based concept-generator } G \text{ for } x \text{ in } w$$

such that,  
for all  $\langle y, w' \rangle$  in  $\text{DOX}_{x,w}$ ,  $\Pi(G)(y)(w') = 1$ .

(23) The denotation of PROP:

$$\lambda p_{\langle s, t \rangle}. \lambda x. p$$

### 4.3 LFs that report “de se” attitudes

The adjustments that we just made permit an account of “de se” LFs that naturally suggests itself in light of the work in Percus and Sauerland (to appear).

Our concern in Percus and Sauerland (to appear) is to account for the variety of readings of dream reports with embedded pronouns. We argue there that the key to this problem lies in recognizing that pronouns like *he* are ambiguous between a variable (call it *he<sub>i</sub>*) and an element more like a relative pronoun (call it *he\**) – an element that has no interpretation on its own, but can move, leaving behind a lambda and a trace (an individual variable bound by the lambda). Our proposal in that paper implies that dream reports like *John dreamed that an avalanche hit him* have an LF that specifically describes a “de se” dream. This LF contains an instance of *him\** which moves to the edge of the embedded clause, creating a property-denoting constituent<sup>20</sup> (it denotes the property of being hit by an avalanche). The semantic contribution of the rest of the LF is to say that in all the worlds compatible with John’s dream, the person John identifies as himself has this property.

If we can form LFs that describe de se *dreams* in this way – using *he\** to turn the embedded clause into a constituent that denotes a property – then it is natural to think that we can form LFs that describe de se *beliefs* in the same way. Our adjustments allow us to maintain this. For instance, given what we have said so far, we can generate LFs of the kind below. The first LF ((24)) is just the kind of LF we are after: it is an LF for *thinks that he will win the election* that describes a “de se” belief about winning the election. In this LF, a *he\** has moved, creating a property-denoting constituent, and a (“vacuous”)  $\lambda G$  has been inserted, creating a constituent of the kind that *thinks* can combine with. The second LF ((25)) is an LF that we could generate for *thinks that Mary voted for him*. This LF too describes a “de se” belief, but it is one where we might say (on analogy with our terminology thus far) that *Mary* is construed de re. In this LF, as in the first one, *him\** has moved and a  $\lambda G$  has been inserted, but, in contrast to our first LF, variables over concept-generators and over possible worlds have been inserted as well.

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<sup>20</sup> The idea that the embedded clause in attitude reports sometimes denotes a property originates in Chierchia 1991.



## 5 Closing summary

Our primary goal in this paper was to argue that attitude reports with embedded pronouns have specifically “de se” LFs.

Once we did this, we then made some proposals for what the LFs of attitude reports look like. In the case of LFs where an individual-denoting expression is construed *de re*, the arguments for our proposal were basically these: it works as far as producing the desired denotations; it sticks to the hierarchical structure that syntactic theory independently motivates. In the case of the “de se” LFs, we just said that a representation of roughly the kind we proposed has been independently argued to be needed for dream reports specifically. An important aspect of our proposals was the postulation of unpronounced elements in syntactic structures.

## Acknowledgments

This paper can be seen as a companion paper to Percus and Sauerland (to appear); the two papers are both based on Percus and Sauerland 2002. Thanks to Kai von Fintel and Graham Katz for comments that influenced Section 3.4, and to Arnim von Stechow for comments on the general enterprise. This paper constitutes part of the Tübingen Variables Project, funded by SFB Grant 441 to the University of Tübingen; the material therein was presented at the ESSLLI 2002 intensionality workshop and at Sinn und Bedeutung (2002). At the time of writing, Uli Sauerland was funded by DFG grant SA 925/1-1.

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