Bound 'de re' Pronouns and Concept Generators

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1. The problem

This paper focuses on the syntax and semantics of attitude reports. More specifically, it is concerned with the effect of the presence of a quantifier in the scope of an attitude verb, as in (1) (where *every female student* is in the scope of *believe*) and (2) (where *only Mary* is in the scope of *believe*).

(1) John believes that every female student likes her mother.

(2) John believes that only Mary is French.

The following two points are made:

(a) The transparent syntax of attitude reports, offered in Percus & Sauerland (2003), is not only theoretically elegant, but also supported by judgments regarding (1);

(b) The interaction between attitude verbs and downward entailing operators (such as *only Mary* in (2)) poses problems for analyses of *de re* ascription based on existential quantification over acquaintance relations.

Our point of departure is (1), and we ask the reader to ignore any reading where *female student* is interpreted 'de dicto' (i.e., any reading that implies that John's thought is roughly: "Every female student likes…") and any reading where *her* is interpreted referentially. Ignoring those 'de dicto' and referential readings, (1) is felicitous in two types of scenarios, corresponding to two different readings. The first reading is illustrated by a scenario where John is looking at the set of actual female students, saying to himself something like this: "for each x such that x is one of these individuals, x likes x's mother" (without necessarily acknowledging that the individuals in question are students). This reading – which we call the 'simple bound' reading –

is read off the LF in (3), where *her* is co-indexed with the trace of *every female student* (which moves locally), and both are bound by the movement-index created when *every female student* moves.

(3) *John believes*-w_0 [1 [*every female student*-w_0 [2 [t_2 *likes*-w_1 *her*$_2$ *mother*-w_1]]]]

However, (1) is also felicitous in a scenario such as the following. Imagine the set of actual female students is {Mary, Sally, Betty}, and John is looking at pairs of pictures of them (i.e., two pictures of Mary, two pictures of Sally, and two pictures of Betty). Again, he may not be aware that Mary, Sally or Betty are students. For each pair, he mistakenly thinks its members are distinct from each other. That is to say, pointing first at the first member of the pair <Mary, Mary> and then at its second member, he says to himself something like this: "this woman likes that woman's mother" (this woman ≠ that woman); pointing at the first member of the pair <Sally, Sally> and then at its second, he says to himself the same thing: "this woman likes that woman's mother"; likewise for Betty. We call this reading (first observed in Sharvit 2010) 'bound de re'. Importantly, this reading is not read off (3) (or any version of (3)).

In section 2 we explain why the 'bound de re' reading cannot be read off (3). In fact, we show why it cannot be read off any of the standard LF where either *every female student* (or part of it) or *her* moves, because such LFs cannot simultaneously capture the 'de re'-ness of *her* and its being bound. In section 3 we present a version of the 'de re' theory of Percus & Sauerland (2003) that accounts for the 'bound de re' reading. Specifically, we show that the LF that accounts for the relevant reading is (4).

(4) *John believes*-w_0 [9 8 1 [*every female student*-w_0 [2 [$G_8(t_2)(w_1)$ *likes*-w_1 $G_9(her_2)(w_1)$ *mother*-w_1]]]]

Here, *her* is part of a bigger NP, so that despite the fact that t_2 and *her*$_2$ are co-indexed, the NPs that they are part of – $G_8(t_2)(w_1)$ and $G_9(her_2)(w_1)$ – are not co-valued; this leads to the interpretation ‘this woman ≠ that woman’, for each pair that John is looking at, so that “in his mind”, *her*$_2$ is not bound.

In section 4, we take a closer look at the special ‘bound de re’ reading, and show that this reading reveals that attitude verbs interact with downward-entailing quantifiers in a way similar to the way that indefinites interact with such quantifiers. The phenomenon itself remains, at this point, a mystery, but it leads us to entertain some thoughts regarding the semantics of attitude verbs.

2. Why does the LF in (3) not capture the ‘bound de re’ reading?

We will now see why on any of the standard theories of ‘de re’ report, the ‘bound de re’ reading of (1) cannot be accounted for. The reason is that on any of these theories, either *her* ends up being bound “in John’s mind” (incorrectly), or not bound at all (also incorrectly).

2.1. The naïve theory of belief ‘de re’

Let us start with the very simple example in (5), on its ‘de re’ reading.

(5) John believes that every female student is a fool.

If we assume a very naïve theory of ‘de re’ reports, there are essentially two ways to deal with (5): assume no world-denoting pronouns in the syntax (in which case the only way to get the ‘de re’ reading is by moving *every female student* above *believe*), or assume that predicates take world-pronouns as arguments, and that the world argument of *female student* can be co-indexed with that of *believe*. In the latter case, it does not matter whether we scope *every female student* above *believe* or not – in both cases we get the same interpretation. For simplicity, we will illustrate only the world-pronoun approach (but this choice has no effect on the more general point we are making). For simplicity (and temporarily), we assume that *believe* has the simple semantics in (6); (7a,b) give the two possible LFs and (7c) the interpretation that results from both of them (@ is the actual world).

(6) $[\![believe]\!]^g(w)(p^{<s,t>})(x) = 1$ iff $Dox_{x,w} \subseteq \{w' \in D_s: p(w') = 1\}$

(7) a. [*every female student*-w_0][1 [*John believes*-w_0 [2 [t_1 *is*-w_2 *a fool*]]]]

b. [*John believes*-w_0 [2 [*every female student*-w_0 [1 [t_1 *is*-w_2 *a fool*]]]]

c. $Dox_{John,@} \subseteq \{w \in D_s$: for all y such that y is a female student in @, $[\lambda x$. x is a fool in w](y) = 1}

With similar assumptions, and with the LF in (3) for *John believes that every female student likes her mother*, we get (8) as the interpretation of the argument of *every female student* in (3) and (9) as the truth conditions of (3).

(8) For any w, $[\![$ 2 [t_2 *likes*-w_1 *her*$_2$ *mother*-w_1] $]\!]^{[1\to w]}$ = [λx . x likes in w the mother of x in w]

(9) a. *John believes*-w_0 [1 [*every female student*-w_0 [2 [t_2 *likes*-w_1 *her*$_2$ *mother*-w_1]]]]

b. [*every female student*-w_0] [3 [*John believes*-w_0 [1 [t_3 [2 [t_2 *likes*-w_1 *her*$_2$ *mother*-w_1]]]]]]

c. $Dox_{John,@} \subseteq \{w \in D_s$: for all y such that y is a female student in @, [λx . x likes in w the mother of x in w](y) = 1}.

(9) certainly captures the 'simple bound' reading of (1), but crucially not the 'bound de re' reading, according to which *her* is not bound "in John's mind".

2.2. The relational theory of belief 'de re'

Although as we have just seen, the naïve theory of *believe* does not distinguish between the case where *every female student* scopes above *believe* and the case where it doesn't, it is still worth pointing out that there are cases where the two LFs do not give rise to identical truth conditions: this happens when the quantifier is downward-entailing. For example, the intuitive truth conditions of (10) (on its 'de re' reading) require that for every actual female student x, John points at x thinking: "This person didn't pass the exam".

(10) John is certain that no female student passed the exam.

These truth conditions are guaranteed if *no female student* does not scope above *certain*; scoping *no female student* above *certain* allows for the possibility that John is unsure about some actual female student or other. This means that 'de re' ascription is NOT a simple matter of scope.

In fact, using non-quantificational expressions (e.g., names), Quine (1956) already showed that 'de re' attitudes are not a simple matter of scope.

(11) Ralph believes that <u>Ortcutt</u> is a spy and, at the same time, he believes that <u>Ortcutt</u> is not a spy.

(11) has a reading that does not attribute to Ralph contradictory beliefs (imagine a situation where Ralph sees Ortcutt on two different occasions, but fails to acknowledge that the individual he saw on the first occasion is the one he saw on the second occasion). As long as we hang on to our naïve semantics in (6), it won't matter whether we scope *Ortcutt* above *believe*, or leave it 'in-situ': both options yield only the reading according to which Ralph has contradictory beliefs.

(12) a. *Ralph believes*-w_0 [1 [*Ortcutt is*-w_1 *a spy*]] *and Ralph believes*-w_0 [1 [*Ortcutt is*-w_1 *not a spy*]]

b. [*Ortcutt* [2 [*Ralph believes*-w_0 [1 [t_2 *is*-w_1 *a spy*]]]]] *and* [*Ortcutt* [2 [*Ralph believes*-w_0 [1 [t_2 *is*-w_1 *not a spy*]]]]]

c. $\text{Dox}_{\text{Ralph},@} \subseteq \{w \in D_s: [\lambda x\ .\ x \text{ is a spy in } w](\text{Ortcutt}) = 1\}$ and $\text{Dox}_{\text{Ralph},@} \subseteq \{w \in D_s: [\lambda x\ .\ x \text{ is a spy in } w](\text{Ortcutt}) = 0\}$

Capturing the relevant reading via "scoping" is possible, though, as long as the semantics of the attitude verb is made more fine-grained (Lewis 1979, Cresswell & von Stechow 1982 among others): *believe*$^{\text{de-re}}$ takes *Ortcutt* as one of its arguments, and requires an acquaintance relation to hold between Ralph and Ortcutt in the actual world, and between Ralph and some individual in

Ralph's doxastic alternatives, see (13).[1] The LF in (14) follows Heim's (1994) version of this idea, called 'res'-movement.

(13) $[\![believe^{de\text{-}re}]\!]^g(w)(x)(P^{<e,<s,t>>})(z) = 1$ iff there is a salient acquaintance relation R such that:

(i) $R(w)(x)(z) = 1$ and for all $y \neq x$, $R(w)(y)(z) = 0$; and

(ii) $Dox_{z,w} \subseteq \{w' \in D_s$: there is a y such that: (i) $R(w')(y)(z) = 1$, (ii) for all $y' \neq y$, $R(w')(y')(z) = 0$, and (iii) $P(y)(w') = 1\}$

(14) [[[*Ralph believe*$^{de\text{-}re}$-w_0-*Ortcutt* [3 1 [t_3 *is*-w_1 *a spy*]]] and [*Ralph believe*$^{de\text{-}re}$-w_0-*Ortcutt* [3 1 [t_3 *is*-w_1 *not a spy*]]]]]$^{[0\to@]}$ = 1 iff there is a pair of salient acquaintance relation R1 and R2 such that:

(i) Ortcutt is the unique y such that R1(@)(y)(Ralph) = 1;

(ii) Ortcutt is the unique y such that R2(@)(y)(Ralph) = 1; and

(iii) $Dox_{Ralph,@} \subseteq \{w \in D_s$: the unique y such that $R1(w)(y)(Ralph) = 1$ is a spy in w and the unique y such that $R2(w)(y)(Ralph) = 1$ is not a spy in w$\}$

There are two problems with this theory: one that has been noted before (von Stechow & Zimmermann 2005) and one that we are observing here. The first problem is the following: depending on one's theory of LF movement, 'res'-movement may lead to a violation of island constraints, especially when there are multiple embeddings, as in *John believes that the woman that Ralph had seen the day before was a spy*, where *Ralph* appears inside a complex NP. This, in and of itself, has led researchers to seek alternative solutions (which avoid 'res'-movement, but at the same time preserve Quine's insights). However, one could always say that 'res'-

[1] This is a simplified semantics, that doesn't take into account the subject's beliefs 'de se'. A semantics that is more faithful to what the authors cited above assume is this:

(i) $[\![believe^{de\text{-}re}]\!]^g(w)(x)(P^{<e,<s,t>>})(z) = 1$ iff there is a salient acquaintance relation R such that:

(i) $R(w)(x)(z) = 1$ and for all $y \neq x$, $R(w)(y)(z) = 0$; and

(ii) $Dox_{z,w} \subseteq \{<w',z'> \in D_s \times D_e$: there is a y such that: (i) $R(w')(y)(z') = 1$, (ii) for all $y' \neq y$, $R(w')(y')(z') = 0$, and (iii) $P(y)(w') = 1\}$

For simplicity, we ignore the 'de se' component here. Our argument remains intact.

movement, as opposed to other movements (e.g., Quantifier Raising), is not subject to islands constraints. If so, the fact that expressions are interpreted ‘de re’ inside islands cannot, in and of itself, provide an argument against ‘res’-movement.

We claim that the “real” argument against ‘res’-movement is that it doesn’t account for ‘bound de re’ readings: making *her* an argument of *believe* as in (15) takes it outside the scope of *every female student* (with the result that *her* can only be interpreted referentially). Scoping both *female student* and *her* above *believe* gives us (16), where *her* is still outside the scope of *every*.

(15) *John believe*$^{\text{de-re}}$-w_0-*her* [3 1 [*every female student*-w_0 [2 [t_2 *likes*-w_1 t_3 *mother*-w_1]]]]

(16) *John believe*$^{\text{de-re}}$-w_0-*female-student*-w_0-*her* [3 1 [*every* [2 [t_2 *likes*-w_1 t_3 *mother*-w_1]]]]

One could perhaps toy with the idea of scoping *every* along with *her*, as follows.

(17) *John believe*$^{\text{de-re}}$-w_0-*every-female-student*-w_0-*her* [3 1 [*likes*-w_1 t_3 *mother*-w_1]]

It is far from clear how (17) is to be interpreted. In particular, it would require us to say that John is acquainted with the function ⟦*every female student*-w_0⟧, and it is not so clear what that would mean (i.e., what kind of “acquaintance” relation can hold between John and this function). But more seriously, we would not always get the right quantificational force below the attitude verb in examples such as (10) (*John is certain that no female student passed the exam*): if Ralph can be mistaken regarding the identity of Ortcutt, then John can be mistaken regarding the “identity” of the function ⟦*no female student*-w_0⟧, but intuitively, it seems that (10) forces John to have the thought: “None of these individuals passed the exam”, rather than, for example, “all of these individuals passed the exam”.

We therefore conclude that neither the naïve theory nor the relational theory can account for the ‘bound de re’ reading of (1).

3. The solution – concept-generators

3.1. Belief ‘de re’ without movement

Percus & Sauerland’s (2003) concept-generator theory obviates the need for ‘res’-movement: a ‘de re’ expression, according to that theory, is interpreted as embedded in a larger NP – an argument of a pronoun that denotes a concept generator (to be defined below). For example, our Ortcutt-example has the LF in (18).

(18) [*Ralph believe*-w_0 [8 1 [G_8(*Ortcutt*)(w_1) *is*-w_1 *a spy*]]]

Clearly, (18) contains no island violations. As we will now show, the theory also provides an elegant solution to the ‘bound de re’ reading problem.

The theory relies on the definition of ‘concept generator’ given in (19); the semantics of *believe* is (20).[2]

(19) A function G of type <e,<s,e>> is a suitable **concept-generator** for individual x in w iff:

(a) Dom(G) = {z: x is acquainted with z in w}; and

(b) for all z ∈ Dom(G), there is some acquaintance relation R such that: (i) R(w)(z)(x) = 1 and for all y ≠ z, R(w)(y)(x) = 0; and (ii) and for all w’ ∈ $Dox_{x,w}$: R(w’)(G(z)(w’))(x) = 1 and for all y ≠ G(z)(w’), R(w’)(y)(x) = 0.

(20) $[\![believe]\!]^g(w)(p^{<<e,<s,e>>,\ <s,t>>})(x) = 1$ iff there is a suitable concept-generator G for x in w such that: $Dox_{x,w} \subseteq \{w' \in D_s: p(G)(w') = 1\}$.

Accordingly, our Ortcutt-example is interpreted as follows.

[2] We are again simplifying (see Fn. 1). P&S’s definition (see their Fn. 16) is closer to that in (i):

(i) A function G of type <e,<s,e>> is a suitable **concept-generator** for individual x in w iff:

(a) Dom(G) = {z: x is acquainted with z in w}; and

(b) for all z ∈ Dom(G), there is some acquaintance relation R such that: (i) R(w)(z)(x) = 1 and for all y ≠ z, R(w)(y)(x) = 0, and (ii) and for all <w’, x’> ∈ $Dox_{x,w}$, R(w’)(G(z)(w’))(x’) = 1 and for all y ≠ G(z)(w’), R(w’)(y)(x’) = 0.

And the semantics they assume for *believe* is:

(ii) $[\![believe]\!]^g(w)(p^{<<e,<s,e>>,\ <s,t>>})(x) = 1$ iff there is a suitable concept-generator G for x in w such that: $Dox_{x,w} \subseteq \{<w',x'> \in D_s \times D_e: p(G)(w') = 1\}$.

(21) $[\![$ [*Ralph believe*-w_0 [8 1 [G_8(*Ortcutt*)(w_1) *is*-w_1 *a spy*]]] $]\!]^{[0\to@]}$ = 1 iff there is a suitable concept-generator G for Ralph in @ such that:

$\mathrm{Dox}_{\mathrm{Ralph},@} \subseteq \{w \in D_s\text{: G(Ortcutt)(w) is a spy in w}\}$

The output of $[\![G_8]\!]^{[8\to G]}$(Ortcutt)(w) for any relevant concept generator G and world w may be different from Ortcutt.

To account for the ‘bound de re’ reading of (1) (which contains two ‘de re’ expressions – a trace and a co-indexed pronoun) we have to assume a flexible semantics for *believe* as in (22), instead of (20) (the value of n – and the type of p – are determined by the number of concept-generator abstractors). We also have to assume that bound pronouns as well as traces can be arguments of concept-generator pronouns. Thus, we generate both (23) and (24) as LFs of (1).

(22) $[\![$*believe*$]\!]^g$(w)(p)(x) = 1 iff there is a salient (and possibly empty) sequence of concept-generators $\langle G_1, G_2, \ldots, G_n\rangle$ suitable for x in w such that: $\mathrm{Dox}_{x,w} \subseteq \{w' \in D_s\text{: } p(G_1)(G_2)\ldots(G_n)(w') = 1\}$.

We will say that a sequence of concept generators s is suitable for x in w iff each member of the sequence is suitable for x in w. Accordingly, the ‘simple bound’ reading of (1) is obtained from (23), where the two concept-generator-pronouns are co-indexed; and the ‘bound de re’ reading is obtained from (24), where the two concept-generator-pronouns are not co-indexed.

(23) <u>Simple bound reading: the two concept-generator pronouns are co-indexed</u>

John believes-w_0 [8 1 [*every female student*-w_0 [2 [G_8(t_2)(w_1) *likes*-w_1 G_8(*her*$_2$)(w_1) *mother*-w_1]]]]

a. For any G and any w, $[\![$[2 [G_8(t_2)(w_1) *likes*-w_1 G_8(*her*$_2$)(w_1) *mother*-w_1]] $]\!]^{[8\to G,\ 1\to w]}$ = [λx: x∈Dom(G) . G(x)(w) likes in w the mother of G(x)(w) in w]

b. There is a concept-generator G suitable for John in @ such that: $Dox_{John,@} \subseteq \{w \in D_s$: for any y such that y is a female student in @, $[\lambda x$. G(x)(w) likes in w the mother of G(x)(w) in w](y) = 1}.

(24) <u>'Bound de re' reading: the two concept-generator pronouns are not co-indexed</u>

John believes-w_0 [9 8 1 [*every female student*-w_0 [2 [$G_8(t_2)(w_1)$ *likes*-w_1 $G_9(her_2)(w_1)$ *mother*-w_1]]]]

a. For any G,H and any w, $[\![[2\ [G_8(t_2)(w_1)\ likes\text{-}w_1\ G_9(her_2)(w_1)\ mother\text{-}w_1]]\ ]\!]^{[8\rightarrow G,\ 9\rightarrow H,\ 1\rightarrow w]}$ = $[\lambda x$: $x \in Dom(G)$ and $x \in Dom(H)$. G(x)(w) likes in w the mother of H(x)(w) in w]

b. There is a pair of concept-generators <G, H> suitable for John in @ such that: $Dox_{John,@} \subseteq \{w \in D_s$: for any y such that y is a female student in @, $[\lambda x$. G(x)(w) likes in w the mother of H(x)(w) in w](y) = 1}

For the 'de re' ascription in (24) to be true John needn't think anything of the form, "x likes x's mother" (since t_2 and her_2, though co-indexed, occur with distinct concept generators).

3.2. Setting the record straight: what is borrowed and what is new

Previous work (Percus & Sauerland 2003, Anand 2006) has already provided the essential ingredients of our proposal (including the assumption regarding the flexibility of *believe*, and the assumption that concept-generators may take pronouns/traces as arguments). However, to our knowledge, no one till now has shown that there are readings that <u>only</u> the concept-generator theory can account for. Let us elaborate on this point.

First, notice an interesting difference between the 'res'-movement theory and the concept-generator theory. In practice, the number of 'res'-denoting expressions can be bigger than one (as in *John believed that Mary introduced Bill to Sue*). On the 'res'-movement theory, we have to move all three 'res-es' (and ensure the type-flexibility of *believe*$^{de\text{-}re}$ accordingly). On the concept-generator theory, we can work with one type-fixed *believe*, as long as the 'res'-denoting expressions are not coreferential. This is because the domain of the concept generator already – by definition – includes all the individuals that the "subject" is acquainted with.

(25) [*John believe*$^{\text{de-re}}$-w_0-*Mary-Bill-Sue* [4 2 3 1 [t_3 *introduced*-w_1 t_2 *to* t_4]]]

(26) [*John believe*-w_0 [8 1 [G_8(*Mary*)(w_1) *introduced*-w_1 G_8(*Bill*)(w_1) *to* G_8(*Sue*)(w_1)]]]

However, if the ‘res’-denoting expressions are co-referential, even the concept-generator analysis requires a flexible *believe* (such as our (22)). This is already noted in Anand (2006) (see also Percus 2006).

(27) Ralph believes that the woman who likes Ortcutt$_2$ will marry Ortcutt$_2$/him$_2$
(Ralph’s thought is: “The woman who likes this man will marry that man”)

(28) [*John believe*-w_0 [9 8 1 [*the woman who likes* G_8(*Ortcutt*$_2$)(w_1) *will-marry*-w_1 G_9(*Ortcutt*$_2$/*him*$_2$)(w_1)]]]

But positing a flexible *believe* is not enough if we want to account for ‘bound de re’ readings: this requires allowing bound variables – traces and bound pronouns alike – to be arguments of concept-generator pronouns. Since Anand relies on an example such as (29), he doesn’t make this point about either traces or bound pronouns.

(29) Ralph believes that Ortcutt$_3$ hurt himself$_3$.

Indeed, Anand is right that if we want to account for the reading where in Ralph’s “mind” the hurter and hurtee are not the same person using concept-generators, we need a flexible *believe*. But crucially, (29) does not show that the concept-generator analysis has an advantage over the ‘res’-movement analysis, as the relevant reading is easily accounted for within either analysis.

(30) a. Concept-generator analysis
[*Ralph believe*-w_0 [9 8 1 2 [G_8(*Ortcut*$_3$)(w_1) *hurt*-w_1 G_9(*himself*$_3$)(w_1)]]]

b. ‘Res’-movement analysis
[*Ralph believe*$^{\text{de-re}}$-w_0-*Ortcut*$_3$-*himself*$_3$ [3 2 1 [t_3 *hurt*-w_1 t_2]]]

Percus & Sauerland (2003), on the other hand, do acknowledge that bound pronouns can be arguments of concept-generator variables. They discuss examples such as (31).

(31) Every candidate believes that he will win.
(Every candidate x, pointing at a picture of x, without necessarily realizing that it is a picture of himself: “This guy will win”)

Again, (31) only shows that if the concept-generator theory is to be adopted, it needs to allow concept-generators to apply to bound pronouns. What (31) crucially doesn’t show is that the concept-generator theory has any advantage.

(32) a. Concept-generator analysis
[*every candidate* [4 [t_4 *believe*-w_0 [9 1 [$G_9(he_4)(w_1)$ *will-win*-w_1]]]]]
b. ‘Res’-movement analysis
[*every candidate* [4 [t_4 *believe*$^{\text{de-re}}$-w_0-he_4 [4 1 [t_4 *will-win*-w_1]]]]]

Although Percus & Sauerland do not discuss traces, a similar point can be made about traces. Consider (33a), which can be analyzed equally well within the concept-generator theory or the ‘res’-movement theory: the former requires that we allow traces to be arguments of concept-generator pronouns;[3] the latter requires that we allow set-denoting expressions to undergo ‘res’-movement (and T_5 is a variable over sets).

(33) a. John believes that every female student jogs.
b. Concept-generator analysis
John believes-w_0 [8 1 [*every female student*-w_0 [2 [$G_8(t_2)(w_1)$ *jogs*-w_1]]]]
c. ‘Res’-movement analysis
John believes-w_0-*female-student*-w_0 [5 1 [*every* T_5 *jogs*-w_1]]

[3] In fact, the concept-generator idea can also be executed if we make the quantifier’s restrictor – and not the trace – an argument of a concept-generator (alternatives to (23) and (24) would also look like that).

Crucially, only those examples where the pronoun is bound by an operator situated "below" *believe* (e.g., (1)) show the superiority of the concept-generator analysis (from an empirical point of view).

It is worth pointing out that there IS a way to account for 'bound de re' readings within 'res'-movement (see Sharvit 2010), but it requires some questionable assumptions and stipulations. Sharvit's (2010) analysis posits lexical items (*OP*, *every**) that are not independently motivated. Translated to 'res'-movement, Sharvit's analysis works only if: (a) *OP* in (i) applies to *female-student-*w_0 to yield a set of ordered pairs (whose first and second members are the same); (b) the trace T_5 in (34) is a variable over sets of ordered pairs; and (c) *every** in (i) (as opposed to the standard *every*) applies to a set of pairs to yield something of type <<e,<e,t>>,t>.

(34) *John believes-*w_0-[*female-student-*w_0 *OP*] [5 1 [*every** T_5 [2 3 [t_3 *likes-*w_1 *her*$_2$ *mother-*w_1]]]]

These assumptions are obviously ad-hoc, with the result that this theory is not explanatory.

4. *Believe* as a universal quantifier over concept-generators

The semantics for *believe* that our proposal in Section 3 relies on is repeated below.

(35) $[\![believe]\!]^g(w)(p)(x) = 1$ iff there is a salient (and possibly empty) sequence of concept-generators $<G_1, G_2, \ldots, G_n>$ suitable for x in w such that: $Dox_{x,w} \subseteq \{w' \in D_s: p(G_1)(G_2)\ldots(G_n)(w') = 1\}$.

This "existential" semantics is, in fact, sometimes too weak. To see this, consider (36a) and (36b): the former is acceptable in the scenario in (36c)/(36c') as well as the scenario in (36d); the latter is unacceptable in the scenario in (36c)/(36c'), but acceptable in the scenario in (36d).

(36) a. John believes that Mary is French.

b. John believes that only Mary is French.

c. John looks at two pairs of pictures -- two pictures of Mary and two pictures of Sally -- and he doesn't realize that the same person is depicted in each pair. Suppose now that John says: "The woman in red [who happens to be Mary] is French. The other three – including the woman in blue [who also happens to be Mary] – are Italian."

c'. John looks at two pairs of pictures -- two pictures of Mary and two pictures of Sally -- and he doesn't realize that the same person is depicted in each pair. Suppose now that John says: "The woman in gray [who happens to be Sally] is Italian. The other three – including the woman in yellow [who also happens to be Sally] – are French."

d. John looks at two pairs of pictures -- two pictures of Mary and two pictures of Sally -- and he doesn't realize that the same person is depicted in each pair. Suppose now that John says: "The woman in red [who happens to be Mary] is French and the woman in blue [who also happens to be Mary] is French. The other two are Italian."

This calls for positing a "universal" semantics for *believe* as in (37).

(37) $[\![believe^{U}]\!]^{C,g}$(w)(p)(x) is defined only if: (i) $C_{x,w}$ is a set of contextually relevant n-long sequences of suitable concept generators for x in w ($|C_{x,w}| \geq 1$, and n is the number of <e,<s,e>>-arguments that p takes); and (ii) for all S (= $\langle G^{S}_{1}, \ldots, G^{S}_{n}\rangle$) such that $S \in C_{x,w}$: $Dox_{x,w} \subseteq \{w' \in D_s: p(G^{S}_{1})\ldots(G^{S}_{n})(w') \text{ is defined}\}$.

When defined, $[\![believe]\!]^{C,g}$(w)(p)(x) = 1 iff for all S (= $\langle G^{S}_{1}, \ldots, G^{S}_{n}\rangle$) such that $S \in C_{x,w}$: $Dox_{x,w} \subseteq \{w' \in D_s: p(G^{S}_{1})\ldots(G^{S}_{n})(w') = 1\}$.

Suppose that in the scenarios in (36), H1 yields "the woman in red" for Mary, and "the woman in gray" for Sally; and H2 yields "the woman in blue" for Mary, and "the woman in yellow" for Sally (so $C_{John,@} = \{\langle H1\rangle, \langle H2\rangle\}$). *Believe*^{U} correctly predicts the judgments reported for (36b).

(38) $[\![$ *John believes*^{U}-w_0 [8 1 [*only Mary* [2 [$G_8(t_2)(w_1)$ *is*-w_1 *French*]]]] $]\!]^{C,[0\to@]}$ is defined only if: $Dox_{John,@} \subseteq \{w \in D_s: \text{H1(Mary)(w) is French in w and H2(Mary)(w) is French in w}\}$.

When defined, $[\![$ *John believes*$^{\mathrm{U}}$-w_0 [8 1 [*only Mary* [2 [$G_8(t_2)(w_1)$ *is*-w_1 *French*]]]] $]\!]^{C,[0\rightarrow @]}$ = 1 iff: $Dox_{John,@} \subseteq \{w \in D_s$: neither H1(Sally)(w) nor H2(Sally)(w) is French in w$\}$.

On the other hand, the judgments reported for (36a) are predicted by (35); (37) imposes truth conditions that are too strong. Let us therefore assume that both are available. For some reason (that we do not fully understand yet) (37) is chosen whenever the "low" quantifier is downward-entailing. This is also evidenced by the following contrast (as before, John is standing in front of pictures of <Mary, Mary>, <Sally, Sally>, <Betty, Betty>).

(39) a. John believes that no female student likes her friend.

b. John believes that every female student likes her friend.

As we already saw, intuitions regarding (39b) are explained by "existential" *believe*. But notice that intuitions regarding (39a) are not: the truth of (39a) requires that, in John's "mind", not only is it the case that the first member of each pair doesn't like the mother of the second member, but also that the second member of each pair doesn't like the mother of the first. This is predicted by "universal" *believe*$^{\mathrm{U}}$ (assuming $C_{John,@} = \{\langle H1, H2\rangle, \langle H2, H1\rangle\}$).

Summary. 'Bound de re' readings of pronouns cannot be accounted for by any "scoping" mechanism, including 'res'-movement, thus providing an argument in favor of the concept-generator theory. The kind of scenarios required to evaluate 'bound de re' readings – scenarios involving beliefs about the same individual under different acquaintance relations – also lead to the conclusion that *believe* must have a "universal" incarnation.

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