Locality in the syntax and semantics of attitude ascriptions*

Simon Charlow, *NYU*

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1 Intro

- Sometimes when we talk about what goes on in other people's heads (thoughts, desires, dreams, and so on), we characterize certain features of those attitudes "from the outside", in effect importing our beliefs into our descriptions of other people's states of mind.

- For example, sentences like (1) don't usually commit their speakers to Michelle being fundamentally irrational; rather, they generally suggest we just have some piece of information she happens to lack.[1]

  (1) Michelle thought Bo wasn't Bo.
  (2) Michelle thought Bo was Sunny and Sunny was Bo.

- We'll call these sort of attitudes and attitude ascriptions *de re* (that term is subject to some ambiguity in the literature, but I'll try to be consistent). We'll call the thing the *de re* attitude is about the *res*.

- Received view about *de re* ascription:

  - Standard assumptions about the semantics of attitudes give unacceptable results for (1), i.e. committing us to Michelle having inconsistent beliefs.

  - To fix this, we take the outside-inside metaphor literally, interpreting things construed from an outside point of view outside the ascribed clausal complement (Cresswell & von Stechow 1982, Heim 1994).

- In contrast, I'll argue that:

  - Evidence from quantification, binding, and association with focus indicates that **variables bound by an operator inside the ascribed clause can be interpreted *de re***. I'll call these **bound *de re*** pronouns.

  - Thus, things which seem to get interpreted outside an attitude are actually **interpreted on the inside**.

- For instance, speakers judge sentences like (3) true even in cases where Michelle's conclusion takes the form "Bo hated hearing Sunny's voice, and Sunny hated hearing Bo's?" (Don't worry, this shouldn't be obvious yet.) And speakers judge that (4), like (1), doesn't necessarily commit us to Michelle being irrational.

  (3) Michelle concluded each dog$_i$ hated hearing his$_i$ voice.
  (4) Michelle thought every dog$_i$ in the doggy lineup was some other$_i$ dog.

- How the talk will go:

  - After briefly reviewing previous theories of the syntax/semantics of attitudes, I'll introduce you to 'bound *de re*' pronouns and show how they entail that *de re* items are interpreted inside the embedded clause.

[1] Bo and Sunny Obama are both Portuguese water dogs. Modulo the white fluff on Bo's chest, I believe they look pretty similar. I think Sunny's a girl, but we'll pretend they're both boys to keep the pronouns simple.

- Following Percus & Sauerland (2003) and Charlow & Sharvit (2014), I'll propose that natural language has dedicated devices ('concept generators') that provide semantic plumbing linking the inside and outside of an ascribed attitude.

- I'll point out a few ways this (I think non-negotiable) commitment to locality causes trouble.

- I'll suggest that a useful way to think about this strategy and its issues is by analogy with problems that beset choice-functional accounts of the scope-taking of indefinites (Reinhart 1997, Winter 1997). Both are instances of a general problem with mechanisms that combine in situ interpretation with long distance semantic effects.

2 The basics, the problem for the basics

- Extensional setup: world pronouns in the syntax (see e.g. Cresswell 1990, Percus 2000, Keshet 2008).

- So application and abstraction are as normal (Heim & Kratzer 1998):

  (5) $[\![\alpha\,\beta]\!]^g = [\![\alpha]\!]^g\,[\![\beta]\!]^g$ or $[\![\beta]\!]^g\,[\![\alpha]\!]^g$, whichever is defined
  (6) $[\![1\,\alpha]\!]^g = \lambda x.\,[\![\alpha]\!]^{g[x/1]}$
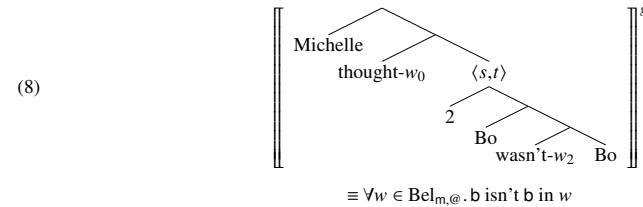
- Notational conventions:

  - 'w_0' will always evaluate to the "actual world"/world of evaluation, written '@'.
 - I'll sometimes write $[1,2\,\alpha]$ as an abbreviation for $[1\,[2\,\alpha]]$.

- This in place, we can give a venerable sort of semantics for verbs of belief (Hintikka 1962):

  (7) $[\![\text{think}]\!]^g\,w\,p\,x \Leftrightarrow \forall w' \in \text{Bel}_{x,w}.\,p\,w'$
  $\approx$ every w' compatible with what x thinks in w is such that $p\,w'$

- But this makes hash out of our (1):

  (8)

  $\equiv \forall w \in \text{Bel}_{\text{m},@}.\,\text{b isn't b in } w$

- A scoping LF does no better. Proper names are scopeless; interpretation undoes the movement:

  (9)

  $\equiv \forall w \in \text{Bel}_{\text{m},@}.\,\text{b isn't b in } w$
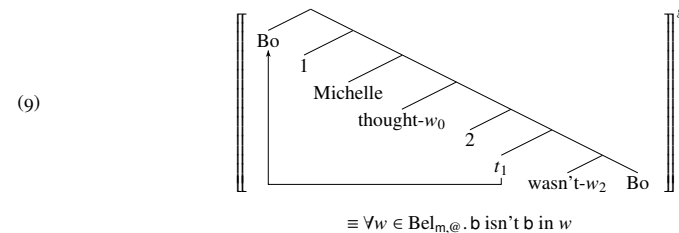
- So, incorrectly, this semantics only predicts readings that attribute irrationality to Michelle. Working with similar assumptions, Quine (1956) hastily concluded *de re* ascription couldn't be a matter of scope.

3 Descriptivism and *res*-movement

- Here's a plausible take on what's happening in (1). *Michelle believes Bo isn't Bo* is true in virtue of these facts:

  – There is a description D that actually characterizes Bo, for instance *the dog bounding towards Michelle*, and
  – Michelle thinks something like "D isn't Bo".

- That's the sense in which we're importing our beliefs into our characterization of Michelle's: though Michelle's belief holds in virtue of some D which *we* take to be a good description of the *res*, we do not require *Michelle* to have any knowledge of the *res*'s identity. The *res* is for you and me.

- This line, which I'll call *descriptivism*, goes back to Kaplan (1968), Lewis (1979). It's standard in linguistics work on *de re* ascription (though see Ninan 2012 for a recent exception), and I'll assume it in what follows.

- Descriptivism requires that we have some way to replace the *res* argument with an appropriate description. Usual way to cash this out compositionally—though, to be clear, one I won't endorse in the end—is via a finer-grained semantics for *think* which takes a *res* argument directly and plugs a *res*-sized hole in its complement with a description (Cresswell & von Stechow 1982):

(10)
$$\llbracket \text{think}^{\text{re}} \rrbracket^g \, w \, y \, P \, x \Leftrightarrow \exists D. D\, w = y \, \wedge$$
$$\forall w' \in \text{Bel}_{x,w}. P(D\,w')\,w'$$
$$\approx \text{there is some description } D \text{ of } y \text{ in } w \text{ such that } x \text{ believes } D \text{ is } P$$

- Since the *res* is a separate argument of the verb, it must make its way there via covert *res*-movement (Heim 1994). That is, given the entry in (10) the *res* must be interpreted **outside the attitude verb's complement**.

(11)

$$\equiv \exists D. D\, @ = \mathsf{b} \, \wedge$$
$$\forall w \in \text{Bel}_{\mathsf{m},@}. \underline{D\,w \text{ isn't } \mathsf{b}} \text{ in } w$$
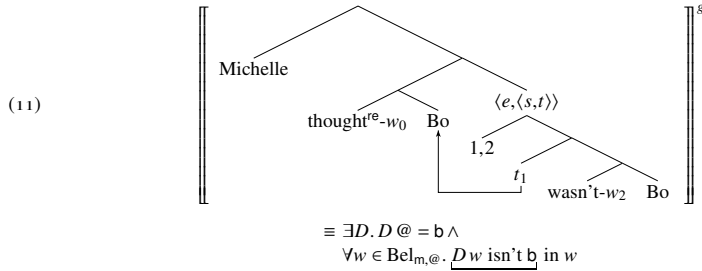
- Witnessed by $D = \lambda w$. the dog bounding at Michelle in w:

  ✓ D is actually Bo, and
  ✓ Michelle thinks D isn't Bo

- Unusual type of A-bar movement (i.e. to satisfy the attitude verb's lexical desires). Moreover, islands don't seem to make any difference, see (12), where you might expect *res*-movement to trigger a Coordinate Structure Constraint violation (Ross 1967). And sometimes, as in (13), a *res* needs to *res*-move *twice* (i.e. Michelle is wrong about Sunny and compounds her error by attributing a mistaken *de re* belief to Joe).

(12)   Michelle thought Bo was Sunny and wondered whether it was raining.

(13)   Michelle believed Joe was stupid to think Sunny was Sunny.

***Res* movement summary**: We need a way to replace *de re* terms with appropriate descriptions. *Res*-movement accomplishes this by QRing the *res* up to the attitude verb. The requisite movement is syntactically fishy, but the results are semantically coherent.

4 Three arguments that the *res* is interpreted inside the attitude complement

4.1 Argument 1/3: bound *de re* pronouns

- Consider the following scenario (here and throughout, the rectangle represents what goes on in Michelle's mind):

(14)   Michelle made recordings of Bo and Sunny's voices a long time ago. At some point, she became confused about which recording was of which dog. One day, she decided to play Bo Bo's tape and Sunny Sunny's tape (unbeknownst to her). It doesn't go well: growling, etc. Michelle concludes each hated it.
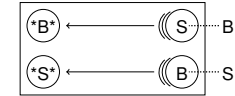

a.   Michelle concluded Bo_i hated hearing his_i voice.
b.   Michelle concluded Sunny_j hated hearing his_j voice.
c. ∴Michelle concluded each dog_k hated hearing his_k voice.
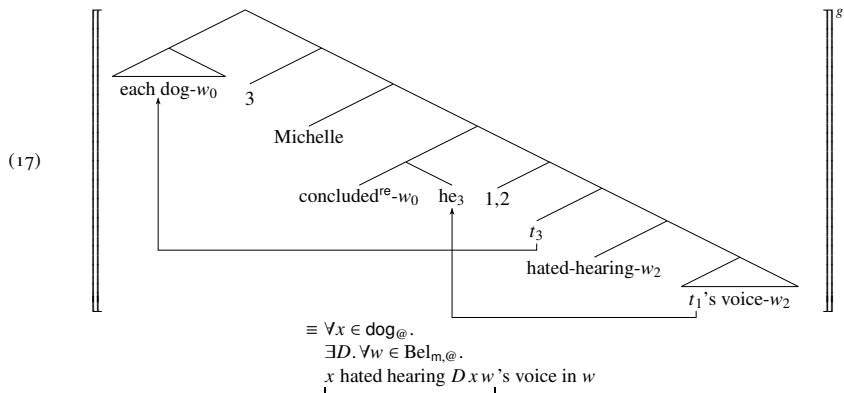
- Though we as speakers recognize the pronoun in (14c) as bound by *each dog*, "in Michelle's mind" the pronoun isn't bound (i.e. Michelle thinks something like "Bo hates Sunny's voice and Sunny hates Bo's"). This means the bound pronoun is construed *de re*.

- You can make the same point with a construction like (4), repeated in (15). Uttering this sentence doesn't commit us to Michelle's thoughts being of the form "each dog x is some dog other than x". Nevertheless, we as speakers recognize the pronoun as bound.

(15)   Michelle thought every dog_i in the doggy lineup was some other_i dog.

- ***Res*-movement cannot generate these readings**.

- Consider (14c). *Res*-moving the *de re* pronoun removes it from the scope of *each dog*. The result is certainly *de re*, but not bound *de re*.

(16)
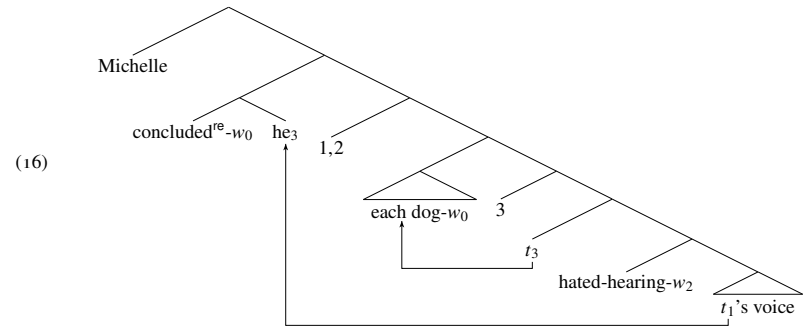
- For the pronoun to be bound, the quantifier will have to scope out of the ascription. On the one hand, this does yield an acceptable bound *de re* interpretation. The pronoun is in a *de re* position, and the quantifier has moved into a position from which it can bind the pronoun.

(17)

$$\equiv \forall x \in \mathsf{dog}_@\,.$$
$$\exists D.\forall w \in \mathsf{Bel}_{m,@}\,.$$
$$x \text{ hated hearing } D\,x\,w\text{'s voice in } w$$

- On the other hand, double-movement doesn't offer a general solution to the problem of bound *de re* pronouns. Specifically, it over- and under- generates readings when the binder of the *de re* pronoun is **downward monotone**:[2]

(18)   Same scenario as (14): Michelle played Bo Bo and Sunny Sunny. Unfortunately, they both got upset.
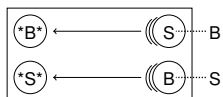
 a. Michelle concluded Bo_i didn't like hearing his$_i$ voice.
 b. Michelle concluded Sunny_j didn't like hearing his$_j$ voice.
 c.∴Michelle concluded neither dog$_k$ liked hearing his$_k$ voice.

- Speakers accept (18a), (18b), and (18c) in this scenario. (18c) requires a *de re* interpretation of the bound pronoun. But attempting what we did in (17) both yields an unattested reading (i.e. *neither > concluded*) and fails to generate the bound *de re* reading we're after (i.e. *concluded > neither*).

4.2   Argument 2/3: covarying readings under *only*

- Background: covarying readings of pronouns with focused antecedents under *only*:

(19)   Only SUE_i thinks she$_i$'s smart
  Sue is the only x who thinks Sue is smart.
 ☞ Sue is the only x who think x is smart.

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[2] More generally, whenever the binder of the *de re* pronoun and the attitude verb aren't scopally commutative.

- Traced to a difference in LFs. The covarying interpretation requires *binding*:

(20)
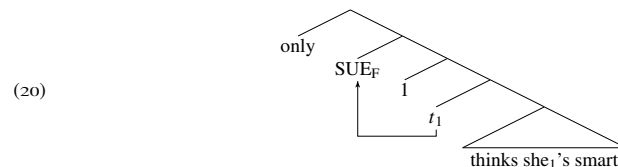
- Relevantly for us, *de re* pronouns receive covarying readings when a focused antecedent associates with *only*:

(21)   Scenario: Same as (18), except this time Bo gets annoyed at the recording and Sunny doesn't. Michelle concludes Bo hated hearing the voice, but Sunny didn't.
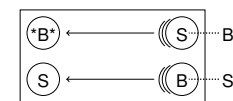
 a. Michelle concluded that Bo_i hated hearing his$_i$ voice.
 b. Michelle concluded that Sunny_j didn't hate hearing his$_j$ voice.
 c.∴Michelle concluded that only BO_{Fi} hated hearing his$_i$ voice.

- Michelle thinks *de re* that Bo hated hearing Bo's voice and she thinks *de re* that Sunny didn't hate hearing Sunny's voice. This is a covarying reading of the *de re* pronoun. BO_F must bind the *de re* pronoun.

- *Res*-movement won't generate this bound *de re* reading either. Moving BO_F and/or *only* over the attitude verb is impossible. The former takes BO_F out of *only*'s scope (*only* needs to c-command something in focus to avoid a crash). The latter yields an unattested reading, i.e. with *only > concluded*.

4.3   Argument 3/3: *de re* quantifiers

- In addition to names and (bound) pronouns, *quantifiers* can be construed *de re*. Neither of the following necessarily entails that Michelle's irrational:[3]

(22)   Michelle thought each dog was a wolf.
(23)   Michelle thought no dog was a dog.

- *De re* readings of quantifiers are unexpected given *res*-movement. We don't want to say that Michelle has a *de re* belief about the type-$\langle\langle e,t\rangle,t\rangle$ function *no dog*, for instance, since it's difficult to see what having a mistaken description about such a function could consist in.

- A natural thing to suppose in this case is that the quantifier's *trace* is somehow being interpreted *de re*. However, that's a nonstarter for *res*-movement; as before, QRing the trace up to the verb will unbind it.

> **Generalization:** A variable can simultaneously be (a) interpreted *de re* with respect to an attitude verb V and (b) bound by a quantifier that scopes under V. This creates an ordering paradox for *res*-movement: the pronoun has to be outside the scope of its binder to be construed *de re* and within the scope of its binder to get bound.

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[3] This is true even if Michelle totally knows who the dogs are—i.e. $\forall w \in \mathsf{Bel}_{m,@}\,.\mathsf{dog}\,@ = \mathsf{dog}\,w$. She just needs to not be aware of all the dogs' properties (e.g. their penchant for moon-howling). That means we can't appeal to the world index on *dog* to explain these readings.

5 Concept generators: what's the scenario?

5.1 What's in a concept generator

- To account for bound *de re* pronouns and *de re* traces, we need to suppose that **de re things are interpreted in situ**. Fortunately, there's a proposal in the literature for doing precisely that, namely Percus & Sauerland's (2003) **concept generators** (see Ninan 2012 for another proposal that would do the job).

- Think of concept generator as a scenario or a playbill, something that links individuals up with the characters they're playing in a given scene.

- In other words, think of a concept generator as akin to the dotted lines in our diagrams:

(24)

(25) $\quad$ Possible G relative to (24) : $\begin{cases} \text{B} \mapsto \lambda w.\text{the dog Bo hears in } w \\ \text{S} \mapsto \lambda w.\text{the dog Sunny hears in } w \end{cases}$

- How the syntax works: a representative LF for *Michelle thought Bo wasn't Bo*:

(26)
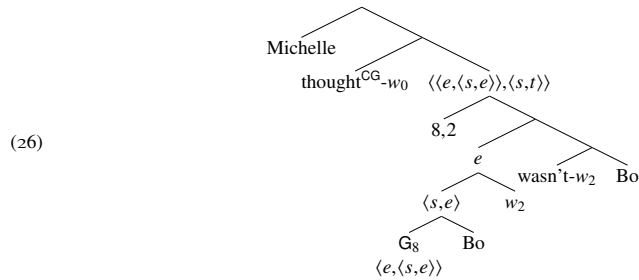
- A couple things to notice about this LF:

  - A concept generator is a simple a function from individuals to descriptions or guises, i.e. of type $\langle e,\langle s,e\rangle\rangle$. It attaches directly to the thing being construed *de re* and returns a description/guise.

  - A concept generator introduces a variable that is abstracted over in the immediate scope of the attitude verb. The clausal complement here is a function from concept generators to propositions, i.e. with type $\langle\langle e,\langle s,e\rangle\rangle,\langle s,t\rangle\rangle$.

- So the clausal complement is asking for a scenario we can interpret it with respect to. The attitude verb obliges, requiring that the attitude holder believe the clausal complement *relative to some suitable scenario/pairing of individuals with guises*:

(27) $\qquad$ $[\![\text{think}^{\text{CG}}]\!]\, w\, P\, x \Leftrightarrow \exists \text{G}.$
$\qquad\qquad$ G is **suitable** for x in $w \wedge$
$\qquad\qquad$ $\forall w' \in \text{Bel}_{x,w}.\, P\,\text{G}\,w'$

- Suitability bottles up the tenets of descriptivism, viz. there is a good description D for the *res* (i.e. one *we* accept; that's the $D\,w = y$ condition), and that the concept generator returns what D does at the attitude holder's belief-worlds (that's the $D\,w' = \text{G}\,y\,w'$ condition):

(28) $\qquad$ $\text{G}_{\langle e,\langle s,e\rangle\rangle}$ is **suitable** for x in w only if:
$\qquad\qquad$ $\text{Dom}\,\text{G} \subseteq \{y \mid \exists D_{\langle s,e\rangle}.\, D\,w = y \wedge$
$\qquad\qquad\qquad$ $\forall w' \in \text{Bel}_{x,w}.\, D\,w' = \text{G}\,y\,w'\}$

- Putting this together, (26) has the following denotation:

(29) $\qquad$ $\equiv \quad \exists \text{G}.\, \text{G}$ is **suitable** for m in @ $\wedge$
$\qquad\qquad$ $\forall w \in \text{Bel}_{\text{m},@}.\, \underline{\text{G}\,\text{b}\,w}$ isn't b in w
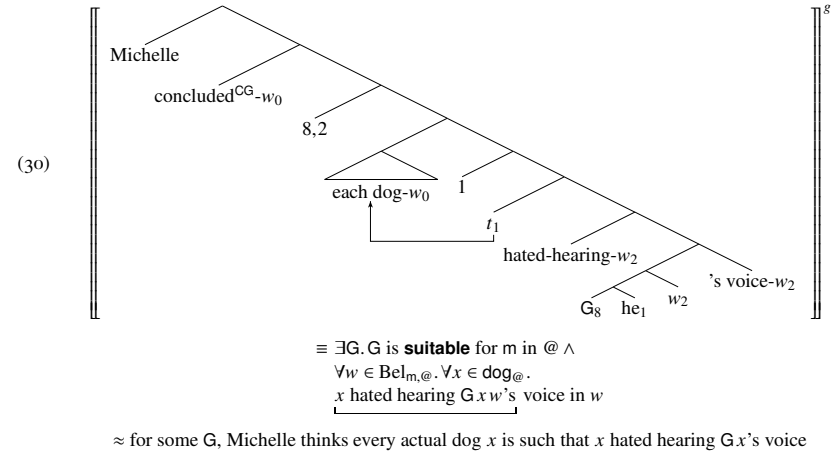
$\qquad$ 'for some concept generator G suitable for Michelle in @, Michelle thinks G of Bo isn't Bo'

- A witnessing, suitable G might be such that G b is $\lambda w.$ the dog bounding towards Michelle in w.

Interim summary: Concept generators allow attitudes to be interpreted relative to scenarios, i.e. pairings of individuals with descriptions for those individuals. This generates descriptivist *de re* truth conditions without movement.

5.2 How this solves our problems

- Bound *de re* pronouns (e.g. our *Michelle concluded each dog$_i$ hated hearing his$_i$ voice*) no longer cause trouble. Concept generators allow the bound pronoun to be interpreted both in situ and *de re*.

(30)

$\qquad$ $\equiv \exists \text{G}.\, \text{G}$ is **suitable** for m in @ $\wedge$
$\qquad\qquad$ $\forall w \in \text{Bel}_{\text{m},@}.\, \forall x \in \text{dog}_@.$
$\qquad\qquad$ x hated hearing $\text{G}\,x\,w$'s voice in w

$\qquad$ $\approx$ for some G, Michelle thinks every actual dog x is such that x hated hearing $\text{G}\,x$'s voice

- This works out great. A witnessing G is just the one we gave in (25), repeated here:
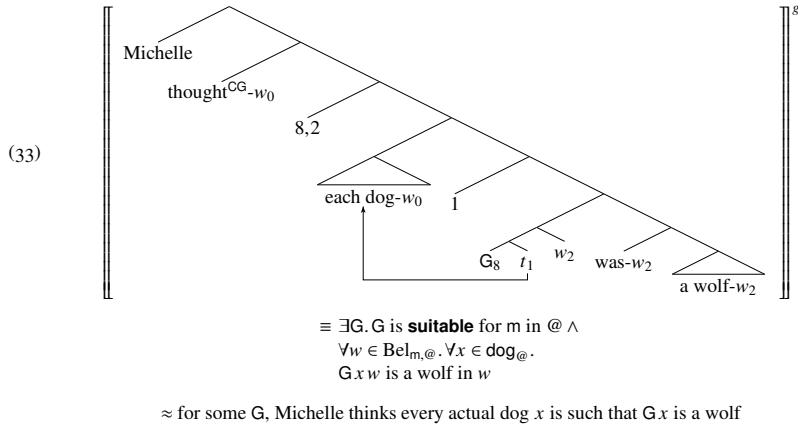
(31) $\qquad$ $\text{G}: \begin{cases} \text{B} \mapsto \lambda w.\text{the dog Bo hears in } w \\ \text{S} \mapsto \lambda w.\text{the dog Sunny hears in } w \end{cases}$

- Since, for any w among Michelle's belief worlds and any x among the dogs, $\text{G}\,x\,w \neq x$, we correctly have it that the pronoun isn't bound "in Michelle's mind".

- Nevertheless, since G is suitable only if the guises it supplies are good ones (i.e. ones which evaluate to the *res* in the actual world), we correctly have it that from our point of view as speakers, the pronoun is bound.

- Since the pronoun is interpreted in situ, there's no need for the quantifier to raise out of the complement in order to keep the *de re* pronoun in its scope.

- Here's how the *only* case goes. Recall that we want a covarying *de re* reading: i.e. with a *de re* pronoun bound by a focused item within the scope of the attitude verb.

(32)

$$\equiv \exists G.\, G \text{ is \textbf{suitable} for m in @} \wedge$$
$$\forall w \in \mathrm{Bel}_{m,@}.\{x \mid x \text{ hated hearing } G\,x\,w\text{'s voice in } w\} = \{b\}$$

$\approx$ for some G, Michelle thinks Bo is the only x such that x hated hearing G of x's voice
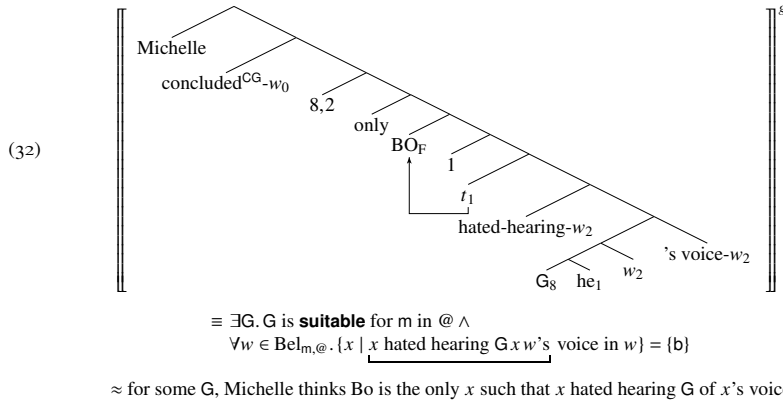
- Again, the LF requires no *res*-movement. Binding is no problem, and the satisfying G is again just (31).

- As before, this G doesn't require binding "in Michelle's mind", though it achieves binding from the perspective of the speakers.

- Finally, *de re* quantifiers are a piece of cake. The concept generator just adjoins to the QR'd quantifiers's trace:

(33)

$$\equiv \exists G.\, G \text{ is \textbf{suitable} for m in @} \wedge$$
$$\forall w \in \mathrm{Bel}_{m,@}.\, \forall x \in \mathrm{dog}_{@}.$$
$$G\,x\,w \text{ is a wolf in } w$$

$\approx$ for some G, Michelle thinks every actual dog x is such that Gx is a wolf

- Interestingly, this LF has the effect of shifting the domain of quantification from Michelle's point of view to a new, *de re* domain of quantification (though, again, not from the speaker's point of view). The quantifier furnishes dogs, and the concept generator turns the dogs into wolves.

> **Conclusion:** moving to an in situ theory of belief ascription solves the problems associated with binding, association with focus, and *de re* quantification.

6 Three pitfalls of locality

6.1 Pitfall 1/3: problem of the evaluation index (if we have time)

- Suitability for x at w guarantees G is well-behaved at any w' compatible with what x believes in w:

(34)
$$G \text{ is \textbf{suitable} for } x \text{ in } w \text{ only if:}$$
$$\mathrm{Dom}\,G \subseteq \{y \mid \exists D_{\langle s,e\rangle}.\, D\,w = y \wedge$$
$$\forall w' \in \mathrm{Bel}_{x,w}.\, D\,w' = G\,y\,w'\}$$

- But what about worlds *outside* of what x believes? We actually place no restrictions on these. One man's suitable G could return scary things in the privacy of another's belief state:

(35)   Michelle believed [8,2 Joe was stupid to think [3 [[G$_8$ Sunny] $w_{2/3}$] was Sunny]]

- Avoided in *res*-movement, which introduces a description D and feeds $D\,w'$ directly to the complement clause.

- We need to add a line to our definition of suitable. Given a *res* y, the only worlds w where Gyw is defined are worlds compatible with what the attitude holder believes. This ensures that we get a presupposition failure if we attempt to evaluate any lower than warranted.

(36)
$$G \text{ is \textbf{suitable} for } x \text{ in } w \text{ only if:}$$
$$\mathrm{Dom}\,G \subseteq \{y \mid \exists D_{\langle s,e\rangle}.\, D\,w = y \wedge$$
$$\forall w' \in \mathrm{Bel}_{x,w}.\, D\,w' = G\,y\,w' \wedge$$
$$\underline{\mathrm{Dom}\,G\,y \subseteq \mathrm{Bel}_{x,w}}\}$$

- Don't eval too high (so concept generators), don't eval too low (so fix). Semantically calibrated with **suitable**.
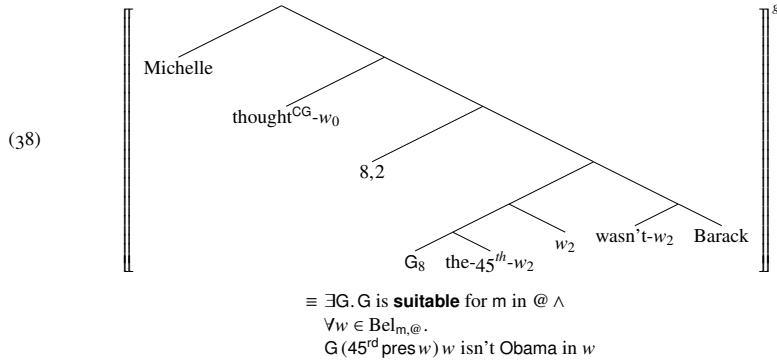
6.2 Pitfall 2/3: concept generators getting *de dicto* arguments

- Another problem with interpreting *de re* things in situ: nothing seems to prevent a concept generator from attaching to a *de dicto* expression or trace (that is, an expression evaluated at the ascribee's belief-worlds)!

(37)   Michelle has made a mistake. She's certain her husband is the 45th President (he's actually 44th). One night she has her contacts out and sees a shadowy figure down the hall. She thinks it must be a Secret Service agent, though in fact it's her sleepwalking husband:
a. #Michelle thought the 45th President wasn't Barack.
b. Michelle thought Barack wasn't Barack.

- Unfortunately, we generate a true reading for the robustly false (37a) (that is, its only defined reading is a *de dicto* one). In the scenario, *the 45th president* is, for Michelle, the same as Barack. This means the *de re* readings of

(37a) and (37b) are predicted to be synonymous, given the following LF for (37a):
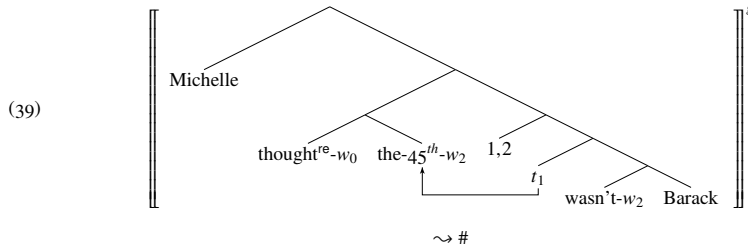
(38)

$$\llbracket \quad \text{Michelle} \quad \text{thought}^{CG}\text{-}w_0 \quad 8,2 \quad G_8 \quad \text{the-}45^{th}\text{-}w_2 \quad w_2 \quad \text{wasn't-}w_2 \quad \text{Barack} \quad \rrbracket^g$$

$\equiv \exists G.\, G$ is **suitable** for m in @ $\wedge$
$\forall w \in \mathrm{Bel}_{m,@}.$
$G\,(45^{rd}\,\mathrm{pres}\,w)\,w$ isn't Obama in w

'for some concept generator G suitable for Michelle in @, Michelle thinks G of 45(=Barack) isn't Barack'

- Suitability is too weak to cover this. It only requires that the *res* exists in @. Though this correctly rules out *de re* beliefs about unicorns, it doesn't help if the *de dicto* term denotes something that exists in the actual world.[4]

- One possible, if drastic, way to avoid this prediction is to suppose that the Barack that lives in Michelle's belief-worlds just isn't the same as his counterpart that lives in the worlds that make up our belief-state (Lewis 1968).
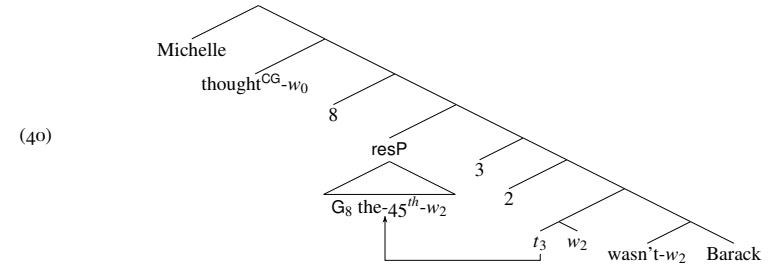
6.2.1 A scoping solution (if we have time)

- Seems better handled by res movement, interestingly. The *res* always moves to the verb with respect to which it's construed *de re*, which always takes it out of the clause that verb embeds.
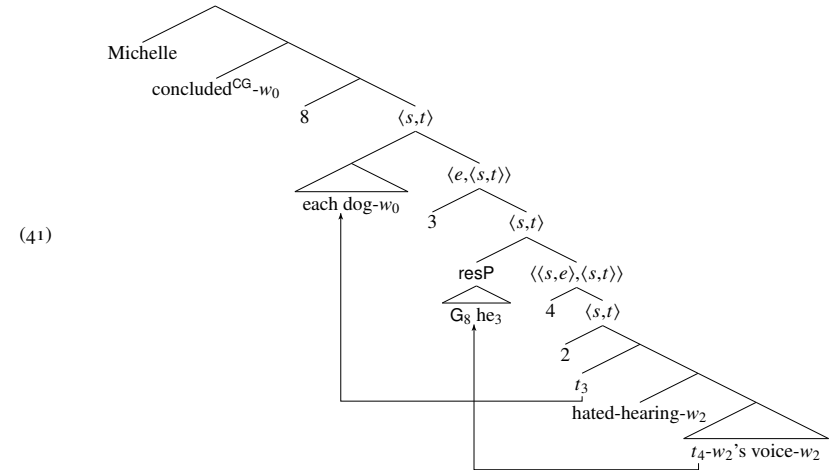
(39)

$$\llbracket \quad \text{Michelle} \quad \text{thought}^{re}\text{-}w_0 \quad \text{the-}45^{th}\text{-}w_2 \quad 1,2 \quad t_1 \quad \text{wasn't-}w_2 \quad \text{Barack} \quad \rrbracket^g$$

$\leadsto$ #

- We can achieve something analogous to this by requiring *res*-movement that targets an intermediate position,

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[4] We're in an even stranger pickle if the *de dicto* expression/trace varies across Michelle's belief-worlds.

above the attitude but below the attitude verb (cf. Keshet 2008):

(40)

$$\text{Michelle} \quad \text{thought}^{CG}\text{-}w_0 \quad 8 \quad \text{resP} \quad 3 \quad [\,G_8\ \text{the-}45^{th}\text{-}w_2\,] \quad 2 \quad t_3 \quad w_2 \quad \text{wasn't-}w_2 \quad \text{Barack}$$

- Unlike the Cresswell & von Stechow (1982), Heim (1994) variety of *res*-movement, this movement is still compatible with bound *de re* pronouns since the quantifier can target a position above the moved resP but below the attitude verb:[5]

(41)

$$\text{Michelle} \quad \text{concluded}^{CG}\text{-}w_0 \quad 8 \quad \langle s,t\rangle \quad \text{each dog-}w_0 \quad \langle e,\langle s,t\rangle\rangle \quad 3 \quad \langle s,t\rangle \quad \text{resP} \quad \langle\langle s,e\rangle,\langle s,t\rangle\rangle \quad [\,G_8\ \text{he}_3\,] \quad 4 \quad \langle s,t\rangle \quad 2 \quad t_3 \quad \text{hated-hearing-}w_2 \quad t_4\text{-}w_2\text{'s voice-}w_2$$

- But what forces this movement? One possibility is that abstraction over concept generators is introduced by the associate of the *res* rather than a higher abstractor, which forces the resP to move to a position immediately under the attitude verb. In that case, the sister of the *res* would have the following semantics:[6]

(42) $\llbracket G \rrbracket^g = \lambda x P G.\, P\,(G\,x).$

6.3 Pitfall 3/3: issues with downward entailing quantifiers

- When a downward entailing quantifier binds into or associates with the thing construed *de re*, we sometimes generate truth conditions that are way too weak.

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[5] As Keshet (2008) notes: *each dog* needs an argument of type $\langle e,t\rangle$, but instead it gets $\langle e,\langle s,t\rangle\rangle$. Need Büring's (2004) argument saturation. Just passes up the world argument:

  i. Argument saturation: $\llbracket \alpha\,\beta \rrbracket = \lambda w.\,\llbracket \alpha \rrbracket^g\,(\lambda x.\,\llbracket \beta \rrbracket^g\,x\,w)$ when defined

[6] Cases like (41), in which the quantifier scopes over resP, would also be interpreted via (generalized) argument saturation (see fn. 5).

- Here's a case with *only*:

(43) Michelle thinks she's watching videos of 4 dogs try to fetch, but they're actually just videos of Bo and Sunny. She thinks 1 and 2 know how to fetch, and 3 and 4 don't. But 1 and 3 are Bo and 2 and 4 are Sunny. So Michelle has mixed fetching assessments of both Bo and Sunny.

	fetch	no	
B	1	3	B
S	2	4	S

  a. #Michelle thinks only BO knows how to fetch.
  b. #Michelle thinks only SUNNY knows how to fetch.

- Both of these are definitely false. But we predict true readings for both. Here's the offending LF for (43a):

(44)
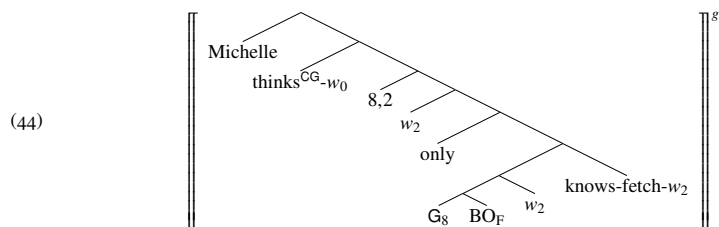
$$\equiv \exists G. \, G \text{ is } \textbf{suitable} \text{ for m in @} \wedge$$
$$\forall w \in \text{Bel}_{m,@}. \{x \mid G\,x\,w \text{ knows fetch in } w\} = \{b\}$$

$\approx$ for some G, Michelle thinks Bo is the only x such that G of x knows how to fetch

- To satisfy this, we only need to find a G mapping Bo to a fetcher guise (1) and Sunny to a non-fetcher guise (4):[7]

(45)
$$G : \begin{cases} b \mapsto 1 \\ s \mapsto 4 \end{cases}$$

- Since the range of this G only includes one fetcher (at Michelle's belief-worlds), (44) is incorrectly predicted true.

---

7 I'm bracketing the presuppositions of *only* for simplicity's sake. See Charlow & Sharvit (2014).

- There's a similar problem with *Michelle thinks neither dog knows how to fetch* (also judged false in scenario (43)):

(46)
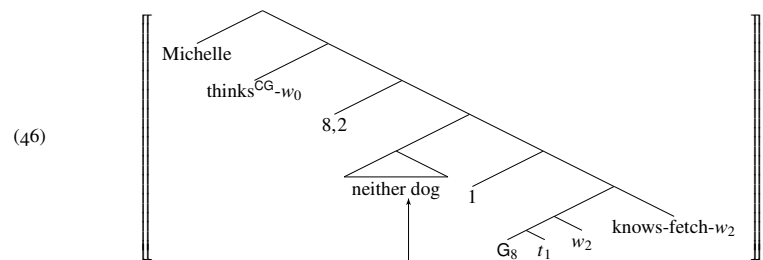
$$\equiv \exists G. \, G \text{ is } \textbf{suitable} \text{ for m in @} \wedge$$
$$\forall w \in \text{Bel}_{m,@}. \text{ neither } G\,b\,w \text{ nor } G\,s\,w \text{ knows fetch in } w$$

$\approx$ for some G, Michelle thinks neither $G\,b\,w$ nor $G\,s\,w$ knows fetch

- Again too easy to satisfy. Just need to find a G mapping both Bo and Sunny to their non-fetching guises:

(47)
$$G : \begin{cases} b \mapsto 3 \\ s \mapsto 4 \end{cases}$$

- This is a vexing problem. Charlow & Sharvit (2014) suggest attitudes might be ambiguous between universal and existential quantifiers over concept generators. This would at least give us the possibility of strong truth conditions in these downward-entailing scenarios. But leaves a lot of open questions: why, for instance, do we only seem to quantify universally over concept generators when a downward-entailing operator binds into/associates with a concept generator's *res* argument?

> **The state of things:** The existence of bound *de re* pronouns means we need to be able to interpret *de re* things in situ. But a commitment to in situ interpretation causes problems of its own: there's no obviously correct or independently motivated way to guarantee that the *res* argument is evaluated in the right place, or to avoid too-weak truth conditions when the *res* argument is bound by (or associates with) a decreasing quantifier.

7 Analogous issues for indefinites

- As unlikely as it might seem, the issues for in situ *de re* interpretation are down-the-line analogous to issues that crop up in another, seemingly unrelated domain: namely, analyses of the interpretation and exceptional scope-taking properties of indefinites.

- Quick background: indefinites and *wh* in situ scope can take scope out of [scope islands].

(48) a. If [a relative of mine dies], I'll inherit a house.   ($\exists >$ if)
      b. If [every relative of mine dies], I'll inherit a house.   ($*\forall >$ if)

(49) Which linguist will be offended if [we invite which philosopher]?
      $\rightsquigarrow$ which $\langle x, y \rangle$: linguist $x \wedge$ philosopher $y \wedge$ (if we invite $y \Rightarrow x$ will be offended)

- Solution proposed by Reinhart (1997), Winter (1997): indefinites are interpreted via **choice functions**.

- A choice function is any f such that for any set P, $f\,P \in P$.

- The idea is that indefinites and wh-words are interpreted via choice functions, and choice functions can be existentially bound arbitrarily far away. This derives exceptional scope without resorting to island-violating QR:

(50) $\exists f.\ f$ (relative of mine) dies $\Rightarrow$ I'll inherit a house.
   $\approx$ there's a way to choose a relative of mine such that if s/he dies, I'll inherit a house

- This is exactly the same sort of idea as the one behind concept generators: there is motivation to interpret something in situ (for us: bound *de re* pronouns; for indefinites: restrictions on QR). Nevertheless, we want the effect of interpreting that thing higher.

- Two difficulties with using choice functions closely resemble difficulties with using concept generators.

- The first difficulty (noticed by Reinhart 1997: 393): the question in (51) is about actual linguists and *actual* philosophers and crucially not about individuals any linguist wants or believes to be a philosopher. Thus, the associate of the *philosopher*-choice function must one way or another be interpreted outside of *wants*.

(51) Which linguist wants to marry which philosopher?

- Our analog: a concept generator that is suitable for x can't get an argument that's interpreted *de dicto* with respect to x's beliefs (i.e. #*Michelle thought the 45th President wasn't Barack*).

- The other (due to Schwarz 2001): when a downward-entailing operator binds (or associates with) the argument of a choice function, the resulting truth conditions are too weak (e.g. f might pick every candidate's worst paper):

(52) No candidate$_i$ submitted a paper he$_i$ wrote.
   $\rightsquigarrow \exists f.$ no candidate x submitted f (paper x wrote)
   $\approx$ there's a way to choose papers by candidates such no candidate submitted *that* paper of his

- Again, essentially the same problem that afflicted us (cf. #*Michelle thinks neither dog knows how to fetch*).

- There's even an analogous choice-functional issue with *only* (cf. #*Michelle thinks only BO knows how to fetch*)!

(53) I only read a book about BO$_F$.
   $\rightsquigarrow \exists f.\{x \mid$ I read f(book about x)$\} = \{$b$\}$
   $\approx$ there's a way of choosing books on which Bo's the only x such that I read *that* book about x

- The meaning here is again too weak, namely that for non-Bo's, I didn't read *every* book about them (e.g. f might pick Bo's most readable book and every other dog's least readable).

- These parallels are quite suggestive. Each can be traced back to the dual lives that concept generators and choice functions live: they are expressly designed to stay close to home while simultaneously underlying semantic action at a distance.

- Schematically, the problematic configurations are as in (54). Unattested readings happen when Op$_i$ is an intensional or downward-entailing[8] operator.

(54) $\exists$G ... Op$_i$ ... [G [... x_i ...] ...] ...
      $\exists f$ ... Op$_i$ ... [f [... x_i ...] ...] ...

- Kratzer (1998, 2003), Schlenker (2006) have proposed that the sorts of choice functions available in a context are constrained, for instance by factors such as "plausibility" (Kratzer 2003) and "naturalness" (Schlenker 2006). It's worth considering the extent to which these sorts of factors might be at play with *de re* ascription, which is clearly quite sensitive to contextual manipulations.

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8 More accurately, non-increasing.

8 Final words

- Bound *de re* pronouns (and traces) reveal an in situ component to *de re* interpretation. A theory on which the attitude verb has a single internal argument that's interpreted relative to a concept generator or scenario does a good job accounting for that data.

- At the same time: interpreting *de re* things in situ raises the specter of both over- and under- generation. The problems are, I believe, largely independent of the specific implementation of in situ *de re* ascription I pursued (see e.g. Ninan 2012 for a different in situ theory with similar difficulties).

- Perhaps unexpectedly, the issues for concept generators turn out to be parallel to issues that come up when we use choice-functions to interpret indefinites. This suggests that there may be a general problem with these sorts of strategies for semantic action at a distance, and raises the possibility that progress on indefiniteness could help us make progress on *de re* (and vice versa).

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