The De Re / De Dicto Ambiguity, Part 3
The Ambiguity with Proper Names

1. The Challenge

We need to augment our syntactic and semantic theory so that sentences like (1a) can receive a *de re* reading, one where they are true in situations like (1b).

(1) **De Re Readings with Non-Quantificational DPs**

a. **Sentence:** Dave believes Bill is a jerk.

b. **Verifying Situation:**
Dave has heard of our friend Bill, and has heard that he is a nice guy. However, one day *unbeknownst to Dave* he bumped into Bill in an elevator. Bill made some wiseass remark, which lead Dave to think ‘that guy is a jerk’.

c. **Key Property of the Situation**

- Dave has not formed the literal belief ‘Bill is a jerk’
  (Indeed, he holds as a ‘literal’ belief the opposite view, ‘Bill is not a jerk’)
- Nevertheless, sentence (1a) can be read as true in situation (1b).

d. **Popular Paraphrase of the Intended Reading**
‘Dave believes of Bill that he is a jerk.’

(2) **The Problem, Part 1**

QR of the DP *Bill* out of the subordinate clause should have no semantic effect.

\[
[[ \text{Bill} [ 1 [ \text{Dave believes} t_1 \text{ is a jerk} ] ] ]]^w = T \text{ iff } \forall x : \forall w'' \in \text{Beliefs}(\text{Dave},w): x \text{ is a jerk in } w'' (\text{Bill}) = T \text{ iff } \\
\forall w'' \in \text{Beliefs}(\text{Dave},w): \text{Bill is a jerk in } w''
\]

*But, in our last unit, we saw that the ‘scope analysis’ of the de re reading is wrong even for quantificational DPs…*

… *could our solution to those problems (explicit world pronouns) provide the solution here?*

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1 These notes are based upon material in Maier (2009: 429-436) and Cresswell & von Stechow (1982: 503-510).
(3) **The Problem, Part 2**

Allowing type \(e\) names like *Bill* to take explicit world-pronouns as arguments (as in our solution to the ‘third reading’) will have no semantic effect.

a. **The Intension of Proper Names**

Recall that in our system, proper names are ‘rigid designators’, and denote the same entity across all possible worlds.

\[
[[\text{Bill}]]^{w,g} = [\lambda w : \text{Bill}]
\]

b. **The Failure of the Imagined LF**

Therefore, even if we were to assign (1a) an LF like that below, we still would continue to derive only the ‘*de dicto*’ T-conditions.

(i) **The Hypothetical LF**

\[
[\Lambda w_1 [\text{Dave} ([[\text{believes } W_1] [\Lambda w_2 [[[\text{Bill } W_1] [\text{is a jerk } W_2]])]])]
\]

(ii) **The Predicted T-conditions**

\[
\forall w'' \in \text{Beliefs(Dave}, w) : [\lambda w' : \text{Bill }] (w) \text{ is a jerk in } w'' = \forall w'' \in \text{Beliefs(Dave}, w) : \text{Bill is a jerk in } w''
\]

(4) **An Obvious Response**

- Maybe we’re just wrong that proper names should (always) be ‘rigid designators’ like in (3a)!
- Maybe there is a reading of ‘Bill’ where it’s interpreted akin to a* definite description* like ‘that guy Dave saw in the elevator’.
- Then we could get the supposed ‘*de re*’ reading in (1b) via the following ‘*de dicto*’ T-conditions:

\[
\forall w'' \in \text{Beliefs(Dave}, w) : \text{the guy Dave saw in that elevator in } w'' \text{ is a jerk in } w''
\]

*Dave believes the following ‘The guy I saw in that elevator is a jerk’*

(5) **Problem**

- There are a lot of reasons to believe that proper names *are always* rigid designators
- It’s unclear how we truly, compositionally allow names to be interpreted as definite descriptions
  - How does our *semantics* get that [[Bill]] = ‘the guy Dave saw in the elevator’

…But, there’s a classic solution to this puzzle that comes close to the idea in (4)!
Making the Puzzle Even More Puzzling

Let’s make the situation in (1b) a little more complicated:

a. The Situation Extended

Dave has heard of our co-worker Bill, but doesn’t know what he’s like. However, one day unbeknownst to Dave he bumped into Bill in an elevator. Bill made some wiseass remark, which lead Dave to think ‘that guy is a jerk’.

Later on that day, Dave bumped into Bill again outside in the snow. Bill was wearing a ski mask, and so Bill couldn’t see his face. Bill complemented Dave’s jacket, which lead Dave to think ‘that guy is nice’.

b. Key Property of the Situation

• Dave has not formed the literal beliefs ‘Bill is a jerk’ or ‘Bill is nice’

• Nevertheless, both these sentences can be read as true in situation (1a):

(i) Dave thinks Bill is a jerk.

(ii) Dave thinks Bill is nice.

c. The Puzzle

• The true readings of sentences (6bi) and (6bii) in situation (6a) would (in our current terminology) be classified as de re readings.

• Clearly, the propositions in question – Bill is a jerk and Bill is nice – are contradictory.

• However, we don’t feel that Dave is irrationally holding contradictory beliefs here.

The Ultimate Goal

• Our semantic theory needs to be augmented so that both (6bi) and (6bii) can be true in situation (6a).

• This semantics should also capture our sense that Dave is ‘faultless’ in this situation, and is not irrationally holding contradictory beliefs.
2. **Some Intuitions Towards a Solution**

(8) **Opening Observation 1**

- We don’t fault Dave for believing both that ‘Bill is a jerk’ and ‘Bill is nice’, because *Dave doesn’t know that both those people were Bill!*

- What Dave really, literally (*de dicto*) believes is ‘that guy on the elevator is a jerk’, and ‘that guy out in the snow is nice.’

- These beliefs are logically compatible, because *Dave thinks those are two different people.*

- To put it differently, restricted to Dave’s belief worlds, the following two intensions yield different entities:
  
  (i) \[ \lambda w : \text{the guy Dave saw on the elevator in } w \]
  
  (ii) \[ \lambda w : \text{the guy Dave saw out in the snow in } w \]

*Although this seems to put us on track to a solution… We already saw that we can’t just say the name ‘Bill’ has these descriptions as its intension…. So how do we correctly relate these observations to a sensible compositional semantics for (1a)?*

(9) **Opening Observation 2**

Recall the following paraphrases of the *de re* readings in question

a. **Paraphrases of the De Re Readings**

   (i) Dave believes *of Bill* that he is a jerk.
   
   (ii) Dave believes *of Bill* that he is nice.

b. **The Key Idea**

   - The syntactic form of these paraphrases suggests that ‘believes’ in English can also, explicitly be a three-place predicate
     
     \(<e, <e < st , t>>, Dave, Bill, ‘he is a jerk’/‘he is nice’

   - *Maybe it continues to be a three-place predicate in sentences like (1a)!*

   - *Maybe sentences like (1a) have an LF structure where ‘Bill’ is the object of the three-place ‘believe’ predicate in our paraphrases!*
What This Would Buy Us

a. The Proposal
Sentence (1a) is syntactically ambiguous, and can have either of the following structures at LF:

(i) De Dicto LF: [ Dave [ believes [ Bill is a jerk ] ]]
(ii) De Re LF: [ Dave [ believes Bill₁ [ he₁ is a jerk ] ]]

b. The Consequence:

• We might be able to rig things up so that LF (ii) above is not mapped to the same de dicto T-conditions as (i).

• Rather, as the paraphrases in (9) suggest, the LF in (ii) should perhaps be mapped to T-conditions that aptly characterize the observed de re reading.

Further Developing the LF
So, we’re going with the following as a paraphrase of our targeted de re reading.

a. The Paraphrases
(i) Dave believes of Bill that he is a jerk.
(ii) Dave believes of Bill that he is nice.

But, what does it mean to ‘believe of X that Y’? Here’s one shot that might help things:

b. The Paraphrases, Rephrased
(i) Dave ascribes to Bill the property of being a jerk.
(ii) Dave ascribes to Bill the property of being nice.

But, what does it mean to ‘ascribe to X the property Y’? We’ll come back to that, but consider what this buys us now:

c. Revision to our De Re LF:
Under the ‘de re’ reading, ‘believes’ is a three place predicate, one that relates:
• An entity (the believer)
• Another entity (the object of the belief; the ‘res’)
• A property:
  o A function from entities to worlds to T-values (<e, <s, t> >) ²

Thus, the LF for the de re reading looks more like the following:

[ Dave [ [ believes Bill ] [ 1 [ Aw₂ [ t₁ is a jerk W₂ ] ] ] ] ] ]

² Functions of type <e, <s, t>> - from entities to propositions – are also often given the label ‘properties’. Note indeed that for every <s, <e, t>> function there corresponds an ‘equivalent’ <e, <s, t>> function, and vice versa.
But even if this is all correct...

We must explain what it means to “ascribe” a property to some entity...
And, it must be such that a person can rationally “ascribe” mutually incompatible properties to the same entity!

(12) **Ascribing Mutually Incompatible Properties**

a. **Question**
   
   So what’s ‘going on’ when Dave ascribes to Bill the property of being nice/a jerk?

b. **One Possible Answer**
   
   • Dave ‘encounters’ this entity, Bill.

   • Via this encounter, Dave bears a kind of relation to Bill.
     
     o *The relation ‘x saw y in the elevator’*
     
     o *The relation ‘x saw y outside in the snow’*

   • This relation provides Dave a means for mentally representing the object he encountered (e.g. Bill)
     
     o *The x such that I/Dave saw x in the elevator*
     
     o *The x such that I/Dave saw x outside in the snow*

   • When Dave ‘ascribes’ a property to Bill, the following takes place, logically speaking:
     
     o Dave identifies the relation that holds between him and the object in question (Bill).

     o Dave’s belief worlds are updated so that in every world \( w \):
       
       The object that bears that relation to Dave in \( w \)...

       also has that property in \( w \).

(13) **Illustration 1**

Here’s what happens when Dave ascribes to Bill the property of ‘being a jerk’.

a. Dave encounters Bill in the elevator.

b. Consequently, Dave bears the following relation to Bill:
   
   ‘*x saw y in the elevator’*

   
   c. This relation provides Dave with a means for mentally representing Bill:

   *The x that I/Dave saw x in the elevator.*

   
   d. Dave’s beliefs are updated so that the following holds in every belief world \( w \):

   *The x that I/Dave saw x in the elevator in \( w \) is a jerk in \( w \).*
Illustration 2
Here’s what happens when Dave ascribes to Bill the property of ‘being nice’.

a. Dave encounters Bill out in the snow.

b. Consequently, Dave bears the following relation to Bill:
   ‘x saw y out in the snow’

d. This relation provides Dave with a means for mentally representing Bill:
   The x that I/Dave saw x out in the snow.

d. Dave’s beliefs are updated so that the following holds in every belief world w:
   The x that I/Dave saw x out in the snow in w is nice in w.

Key Observation
Under this way of modeling ‘property ascription’, an entity (Dave) can rationally ascribe two mutually incompatible properties to the same object (Bill).

- In doing so, Dave places the following two constraints on his belief worlds w:
  (i) The x that I/Dave saw x in the elevator in w is a jerk in w
  (ii) The x that I/Dave saw x out in the snow in w is nice in w.

- Clearly, these two conditions can hold of a single belief world, and so Dave does not irrationally hold mutually inconsistent beliefs.

- But, the rationality of these beliefs crucially rests on the following fact:
  Dave does not know that in the actual world w₀ the following are the same entity:

  (iii) The x that I/Dave saw x in the elevator in w₀
  (iv) The x that I/Dave saw x out in the snow in w₀

Goals Achieved
- We’ve spelled out what it means for an entity to ‘ascribe’ a property to another entity
- We’ve done it in a way that allows entities to rationally ‘ascribe’ mutually incompatible properties to the same entity.

Now, let’s tie this in with our T-conditions for the targeted ‘de re’ readings!...
3. The Truth Conditions

(17) Our Targeted Paraphrases of the De Re Readings

a. Dave ascribes to Bill the property of being a jerk.

b. Dave ascribes to Bill the property of being nice.

Given the theory of 'property ascription' we just laid out, these paraphrases are themselves more aptly paraphrased as the following.

(18) Expanded Paraphrases of the De Re Readings

a. There is a relation R that Bill bears uniquely to Dave (x saw y in the elevator), and in all of Dave’s belief worlds w, the following holds:
   the unique x such that Dave bears R to x in w
   is a jerk in w

b. There is a relation R that Bill bears uniquely to Dave (x saw y out in the snow), and in all of Dave’s belief worlds w, the following holds:
   the unique x such that Dave bears R to x in w
   is nice in w

The following is a way of more compactly representing these paraphrases in logical notation.

(19) Formalized Truth-Conditions of the De Re Readings

a. $\exists R \& Bill = x \text{ such that } R(Dave, x, w_0) \&$
   $\forall w' \in \text{Beliefs}(Dave, w_0):$
   the x such that $R(Dave, x, w')$ is a jerk in $w'$

b. $\exists R \& Bill = x \text{ such that } R(Dave, x, w_0) \&$
   $\forall w' \in \text{Beliefs}(Dave, w_0):$
   the x such that $R(Dave, x, w')$ is nice in $w'$

Let’s also go ahead and recognize these ‘paraphrases’ as the truth-conditions we’re looking to derive for the ‘de re’ reading…

After all, they do exactly what we want a theory of the truth-conditions of those readings to do:

• We’ve seen that these truth-conditions both hold in situation (6a)

• We’ve seen that these truth-conditions capture the fact that Dave is ‘faultless’ in (6a) –
  o Both these truth-conditions can hold and the ‘believer’ still be rational.
4. The Compositional Semantics

(20) Our New Goal

We need a way of compositionally mapping the following surface structures to the following T-conditions.

a. (i) **Surface Structure:** \[ \text{[ Dave [ believes [ that [ Bill is a jerk ] ] ] ]} \]
   
   \[ \text{(ii) **De Re T-Conditions**} \]
   \[ \exists R \& \text{Bill} = \text{x such that } R(\text{Dave, x, w}_0) & \]
   \[ \forall w' \in \text{Beliefs(Dave, w}_0): \]
   \[ \text{the x such that } R(\text{Dave, x, w'}) \text{ is a jerk in } w' \]

b. (i) **Surface Structure:** \[ \text{[ Dave [ believes [ that [ Bill is nice ] ] ] ]} \]
   
   \[ \text{(ii) **De Re T-Conditions**} \]
   \[ \exists R \& \text{Bill} = \text{x such that } R(\text{Dave, x, w}_0) & \]
   \[ \forall w' \in \text{Beliefs(Dave, w}_0): \]
   \[ \text{the x such that } R(\text{Dave, x, w'}) \text{ is nice in } w' \]

(21) Step 1: A New Semantics for ‘Believes’

Following our core idea in (9), the possibility of the de re reading rests on a lexical ambiguity in the English verb ‘believes’.

a. **Core Idea:**
   
   There is a homophonous verb ‘believes’ in English that is a relation between an entity, another entity, and a property.

Given the targeted truth-conditions in (20), the following looks like a good hypothesis as to the meaning of this ‘ternary believes’

b. \[ [[ \text{believes}_{DR} ]] = \]

\[ [ \lambda w : \text{the evaluation world} ] \]
\[ [ \lambda x_e : \text{the ‘object of belief’ (res)} ] \]
\[ [ \lambda P_{<e,\text{res}>} : \text{the property} ] \]
\[ [ \lambda y_e : \text{the ‘believer’} ] \]

\[ \exists R \& x = \text{the z such that } R(y, z, w) & \]
\[ \forall w' \in \text{Beliefs(y, w)}: \]
\[ P(\text{the z such that } R(y, z, w')(w') = T ) ]]]]
(22) **Obvious Problem**

If this is the right semantics for *de re* ‘believes’, we encounter a straightforward ‘type mismatch’ with the surface structures in (20).

(23) **The Solution: ‘Res-Movement’**

- Our solution is going to be to introduce a ‘crazy’, totally *ad hoc* kind of syntactic operation, called ‘res-movement’
- As you’ll see this ‘res-movement’ is completely unlike normal phrasal movement in natural language.
- There are ways of replacing this ‘res-movement’ with more reasonable mechanisms (Percus & Sauerland 2003), but…
  - These involve their own technical complications
  - And so, they also remain controversial…

a. **Step One: Normal DP Movement**

A DP from within the clause undergoes normal movement to a position just above the ‘world-lambda’ for the clause.

\[
[ \Lambda w_1 [ Dave [ [believes W_1] [ Bill [ 1 [ \Lambda w_2 [ t_1 \text{ is a jerk} ] \ldots ] ] ] ] ] ]
\]

\[
\text{Normal Movement}
\]

b. **Step Two: Crazy ‘Res-Movement’**

- The moved DP then undergoes ‘res movement’ *to a position sister to the V*
- *Unlike normal movement, this ‘res movement’ does not leave a trace, and does not create a lambda abstractor.*

\[
[ \Lambda w_1 [ Dave [ [ [believes W_1] Bill ] ] ] [ 1 [ \Lambda w_2 [ t_1 \text{ is a jerk} ] \ldots ] ] ]
\]

\[
\text{Res-Movement}
\]

---


4 Syntactically informed readers might also note that this is movement to a theta-position, and is also an instance of ‘improper movement’ (*i.e.*, *A*-to-*A*-‘to-*A*). Also note that this ‘res-movement’ is not clause-bound, unlike QR.
The Derived LF for the De Re Readings

Abbreviated Semantic Derivation

(24)

(25)
(26) The Desired T-Conditional Statement

\[
[[ \text{CP} ]]^w(w_0) = T \quad \text{iff} \quad (\text{by } (25))
\]

\[
[ \lambda w : \exists R & \text{Bill} = \text{the } z \text{ such that } \text{R} (\text{Dave} , z , w) \& \\
\forall w'' \in \text{Beliefs} (\text{Dave}, w) : \text{the } z \text{ such that } \text{R} (\text{Dave}, z, w'') \text{ is a jerk in } w'' ] (w_0) = T \quad \text{iff} \quad (\text{by LC})
\]

\[
\exists R & \text{Bill} = \text{the } z \text{ such that } \text{R} (\text{Dave} , z , w_0) \& \\
\forall w'' \in \text{Beliefs} (\text{Dave}, w_0) : \text{the } z \text{ such that } \text{R} (\text{Dave}, z, w'') \text{ is a jerk in } w''
\]

(27) Our Goal, Achieved!

Our syntactic and semantic theory can now do the following for sentences like (1a):

- Assign them ‘de dicto’ T-conditions (see last two handouts)
- Assign them a separate set of ‘de re’ T-conditions, under which:
  - They are true in situations like (1b) and (6a)
  - We can understand how both sentences in (6b) can be true in situation (6a) without Dave himself irrationally holding inconsistent beliefs.

5. Some Follow-Up Discussion

5.1 The Other Non-De Dicto Readings

(28) Observation

Now that we have this second ‘de re’ reading of believes we can capture the classic de re reading of sentences like (a), by assuming that they have LFs like that in (b).

a. Sentence: Dave thinks Mary kissed a fisherman.

b. LF:

\[
[ \text{a fisherman} \ [ 1 \ [ \text{Dave} \ [ \text{thinks}^\text{DR} \ t_1 ] ] ] \ [ 1 \text{Mary kissed } t_1 ] \ldots ]
\]

\[\text{Covert Movement} \quad \text{Res-Movement} \quad \text{Covert Movement}\]

c. Predicted T-Conditions

There is some \(x\) such that \(x\) is a fisherman in \(w_0\) and

\[
\exists R & x = \text{the } z \text{ such that } \text{R} (\text{Dave} , z , w_0) \& \forall w' \in \text{Beliefs} (\text{Dave}, w_0):
\]

Mary kissed the \(z\) such that \(\text{R} (\text{Dave}, z, w')\) in \(w'\)

\[
\text{Dave bears a relation } R \text{ to some fisherman, and in all of Dave’s belief worlds, the thing he bears relation } R \text{ to is being kissed by Mary}
\]
A Natural Subsequent Question
Can our posited ambiguity in believes, along with our operation of ‘res-movement’ be enough to get us the so-called ‘third reading’ too?

a. The ‘Third Reading’ of Sentence (28a)
\( \forall w' \in \text{Beliefs}(\text{Dave}, w_0): \exists x . x \text{ is a fisherman in } w_0 \& \text{Mary kissed x in } w' \)

In all of Dave’s belief worlds \( w' \), there is some \( x \) such that \( x \) is a fisherman \textit{in the actual world} and Mary is kissing \( x \) in \( w' \).

Answer: NO!
Recall that one of the key properties of the ‘third reading’ is the following:
• Under the ‘third reading’, the indefinite in question is \textit{non-specific}.
• That is, under this reading the existential force of the indefinite takes scope below the lambda operator for the subordinate clause.

However, as is clear from (24), (25) and (28), our operation or ‘res-movement’ will place the indefinite in the main clause, and so its existential force will take the subordinate clause in its scope…

Conclusion
In order to capture the observed range of readings that belief-sentences can have, we need the following mechanisms:

a. For the Classic ‘De Re’ Reading
• A lexical ambiguity in ‘believes’
• The operation of ‘res-movement’ (or something equivalent)

b. For the ‘Third Reading’
• Explicit world-pronouns and world-lambdas in our object-language representations (or something equivalent)

Some Outstanding Problems

a. Rampant Lexical Ambiguity
For a fully general account, we need to posit similar ambiguities for all propositional attitude verbs.

But:
• This may be due to a productive ‘lexical rule’ (or type-shifter)
• There are attempts to do without the ambiguity (Maier 2009)

b. Res Movement
There are some attempts to use other operators to do what this ‘movement’ does.
(33)  **One Last Observation**

Remember the following problem for our view that the object of beliefs are the ‘intensions’ of their sentential complements?

a.  **The Problem of Mathematical Beliefs**

- If a mathematical statement is T/F, then it is T/F in every possible world.
- Therefore, any true mathematical statement has the same intension (the function that maps any possible world to T)
- However, it seems we can believe one true mathematical statement without believing *all* true mathematical statements.
  - Tommy believes that $2 + 2 = 4$.  *True*
  - Tommy believes that $22 + 22 = 44$  *False*

Our new theory of *de re* readings might provide a solution to this. Note that we could now assign to sentence (34b) the *de re* LF in (34c).

b.  Tommy believes that $2 + 2 = 4$

c.  **De Re LF**  

$$\text{[ Tommy [ believes 4 ] [ 1 [ 2 + 2 = t_1 ] ] ]}$$

This LF would receive the T-conditions in (d), which are fully consistent with situation in (e) also holding.

d.  **De Re T-Conditions**

$$\exists R \& 4 = \text{the z such that } R(\text{Tommy}, z, w_0) \& \forall w' \in \text{Beliefs}(\text{Tommy}, w_0): 2 + 2 = \text{the z such that } R(\text{Tommy}, z, w') \text{ in } w'$$

There is some relation $R$ that Tommy bears uniquely to 4

(*e.g. knows to write as the Arabic numeral ‘4’*)

and in all of his belief worlds $w'$,

the thing that bears $R$ to Tommy in $w'$ equals $2+2$ in $w'$

e.  **Tommy’s Ignorance of ‘22+22’**

$$\exists R \& 44 = \text{the z such that } R(\text{Tommy}, z, w_0) \&$$  

$$\neg \forall w' \in \text{Beliefs}(\text{Tommy}, w_0): 22 + 22 = \text{the z such that } R(\text{Tommy}, z, w') \text{ in } w'$$

There is some relation $R$ that Tommy bears uniquely to 44

(*e.g. knows that it’s denoted by the English phrase ‘forty four’*)

and it’s *not true* that in all of her belief worlds $w'$

the thing that bears $R$ to Tommy in $w'$ equals $22+22$ in $w'$
The Main Point

Our theory of *de re* belief might correctly predict that the following two sentences aren’t (needn’t be) logically equivalent.

a. Tommy believes that $2 + 2 = 4$

b. Tommy believes that $22 + 22 = 44$

**Problem:**

It’s not clear how this account would extend to the analogous problem of ‘logical tautologies’.

- Every tautologous statement has the same intension (maps every world to T)
- Yet the sentence in (c) is not equivalent to the sentence in (d)

c. Tommy believes that either a dog is a mammal or a dog is not a mammal.
   \( \text{(Tommy believes } p \text{ or not } p) \)

d. Tommy believes that if a dog is a mammal and is not a mammal, then either a dog is a mammal or is not a mammal.
   \( \text{(} [\text{Tommy believes } \text{ if } p \text{ and not } p, \text{ then } p \text{ or not } p ] \text{)} \)