

# Reference, Specificity and Functionality

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# Outline

I'd like to try and lay down and connect some 'apparent' 'traditional' insights and logical tools, which may be brought to bear on the topic of the current workshop.

- 1 Reference
- 2 Functionality
- 3 Dimensionality
- 4 Specificity
- 5 Conclusions

## “On terms that may fail to denote, ...”

“Nun haben die Sprachen den Mangel, daß in ihnen Ausdrücke möglich sind, welche nach ihrer grammatischen Form bestimmt erscheinen, einen Gegenstand zu bezeichnen, diese ihre Bestimmung aber in besonderen Fällen nicht erreichen, weil das von der Wahrheit eines Satzes abhängt.” (Gottlob Frege, 1892, “Über Sinn und Bedeutung”, p. 40) “A phrase may be denoting, and yet not denote anything.” (Bertrand Russell, 1905, “On Denoting”, p. 479)

- (1) Kepler died in misery.
- (2) Odysseus wurde tief schlafend in Ithaka ans Land gesetzt.
- (3) The center of mass of the solar system at the beginning of the 20-th century was definitely not Stuttgart.

“...or denote ambiguously.”

“A phrase may denote ambiguously; e.g., ‘a man’ denotes not many men, but an ambiguous man.” (Bertrand Russell, *op. cit.*)

- (4) A picture is missing from the gallery.
- (5) The murderer of Smith is insane.
- (6) The man holding a martini over there is secretary of state.
- (7) Niko owns a donkey. He rides it.
- (8) A man just fell over the cliff.  
He didn't fall, he was pushed!
- (9) If a certain philosopher comes to the party, Max will be upset.  
But, hell, who?

## A Newspaper's Reader's Concern with Her Flight

The one example I will not be able to deal with today.

- (10) “Zondagavond (lokale tijd) was een terminal van de internationale luchthaven van Newark, bij New York, ontruimd. Een man zou zonder te zijn gecontroleerd langs een verkeerde route de hal zijn binnengegaan, waarop iedereen opnieuw moest worden gecontroleerd. De man is nog altijd spoorloos.” (De Telegraaf, Tuesday January 5, 2010)
- “A man is said to have entered the terminal without being controlled. He has not been found.” (My report of the news to my wife)

## Some Linguists' Concerns with Disambiguation

### On the 'Meaning' of 'Bank', 'The', 'And', 'A', and 'Or'.

- (11) Tanja and Ursula had lunch at the bank.
- ▶ The river bank? Barclays?
- (12) Gerald saw the ape with a telescope.
- ▶ Did he see him through the telescope, or was the monkey having one?
- (13) The man with the martini is hot.
- ▶ Who? 'The<sub>D</sub>', or 'the<sub>R</sub>' man with the martini?
- (14) Georgina woke up. . . . She had a sour throat.
- ▶ What '. . . .'? '∧', or '∩', or '∪', or '⊕', or "and then", or . . . ?
- (15) A picture is missing from the gallery.
- ▶ Which picture? 'A certain picture by Barnett Newman'? A picture the removal of which caused the alarm to go off?
- (16) Zag or Will will attend the party.
- ▶ What 'or'? 'Or', or/orr 'orr'?

## Some Philosophers' Concerns with Individuals

- Individuals are infinite, and ‘the infinite *qua* infinite cannot be known’ (Aristotle, *Physics*, 187b7–8) ‘singulars are infinite and unknowable’ (Aristotle, *Rhetorics*, 1256b31–2)
- “individuality involves infinity, and only someone who is capable of grasping the infinite could know the principle of individuation of a given thing.” (Gottfried Leibniz, *New Essays on Human Understanding*, pp. 289–90)
- “Ein Wahrheitswert kann nicht Teil eines Gedankens sein, sowenig wie etwa die Sonne, weil er kein Sinn ist, sondern ein Gegenstand.” (Gottlob Frege, 1892, “Über Sinn und Bedeutung”, p. 36)
- I could stop here.

## Some Logician's Concerns with Beliefs

### **Takes this one first.**

- (17) Ralph believes that the man seen on the beach is not a spy.  
The man seen on the beach is Ortcutt.  
Ralph believes that Ortcutt is not a spy.

### **Now take this one.**

- (18) Ralph believes that the man with the brown hat is a spy.  
The man with the brown hat is Ortcutt.  
Ralph believes that Ortcutt is a spy.

### **Collect the results.**

- (19) Ralph believes that Ortcutt is a spy and not a spy.



## Maria Aloni's Concern with Bas van Fraassen

“Susan's mother is a successful artist. Susan goes to college, where she discusses with the registrar the impact of the raise intuition on her personal finances. She reports to her mother.”

(20) *S*: He said that I should ask for a larger allowance from home.

*M*: He must think I<sup>1</sup> am rich.

*S*: I don't think he has any idea who<sup>3</sup> you<sup>2</sup> are.

*M*: I<sup>4</sup> am your mother<sup>5</sup>.

- We could stop here.

## What Linguists and Logicians Often Don't Realize

- A person known in one way, may be not known in another way.
- A person not known in one way, may be known in another way.
- The Police know this, sometimes, the CIA knows this, sometimes, but ordinary people like students, brothers, sisters, and colleagues, always forget.
- Maria Aloni, 2005, "Individual Concepts in Modal Predicate Logic", *Journal of Philosophical Logic* 34, pp. 1-64.
- Reference is something functional. Something like 'possibly intended referents'. Individual concepts underlie the intuitions of all what follows, but invisibly.

## Decomposition and Reconstruction in DRT

- Initial representation:  $\{x, y\}(Mx \wedge Wx \wedge Dy \wedge Sxy \wedge Rxy)$ .

(21) A man was walking in the park. // He saw a dog. // He ran away from it.

- Discourse representational theoretic decomposition:

$x_1$	$y_2$	
$Mx_1$	$Dy_2$	
$Wx_1$	$Sx_2y_2$	$Rx_3y_3$

- Discourse representational theoretic reconstruction:

$$x_1 = x_2 = x_3 \text{ and } y_2 = y_3.$$

- In principle, this should go for any kind of connections in a discourse or representation:
  - identity, anaphora, causal, temporal and discourse relations, ...

## Markerese and Mentalese

*Translation into Markerese is at best a substitute for real semantics*  
(David Lewis, 1971)

*Our own opinion, for whatever it is worth, is that the calculating mind is a metaphor rather than a model. It is a powerful metaphor, no doubt, on which many branches of ‘cognitive’ science are based, and sometimes it can be helpful, even insightful. But it remains a way of speaking, rather than a true description of the way we are.*  
(Groenendijk and Stokhof, *DPL*, 1987)

- We no doubt represent (picture, remember, idealize, ...) the world around us in some or other way.
- What counts is not the way it is represented, but the way it is represented to be. Truth- or satisfaction conditions!

# A Satisfaction Semantics with Functional Witnesses

- $M, g, \hat{e} \models \phi$ :
  - ▶  $\phi$ : a formula of first/second order logic  $L$ , with pronouns;
  - ▶  $M$ : a first/second order model  $\langle D, I \rangle$  consisting of a domain of individuals  $D$ , and an interpretation  $I$  for the non-logical vocabulary of  $L$ ;
  - ▶  $g$ : an assignment of values to the variables of  $L$ ;
  - ▶  $\hat{e}$ : a sequence of witnesses;
  - ▶  $\models$ : a Tarskian satisfaction relation.
  
- $[c]_{M,g,\hat{e}} = I(c); \quad [x]_{M,g,\hat{e}} = g(x); \quad [P_i]_{M,g,\hat{e}} = \hat{e}_i;$
  
- $M, g, \hat{e} \models R t_1 \dots t_n \quad \text{iff } \langle [t_1]_{M,g,\hat{e}}, \dots, [t_n]_{M,g,\hat{e}} \rangle \in I(R);$   
 $M, g, b\hat{c}\hat{e} \models \exists x \phi \quad \text{iff } M, g[x/b], \hat{c}\hat{e} \models \phi.$

# Dynamic Conjunction

- $M, g, \widehat{ace} \models (\phi \wedge \psi)$  iff  
 $M, g, \widehat{ce} \models \phi$  and  $M, g, \widehat{ace} \models \psi$ .
- The dynamics resides:
  - ▶ *not* in the notion of meaning
  - ▶ but in the *use* of witnesses, and
  - ▶ a *dynamic* notion of conjunction.
- And this gives us all basic *DRT* results.

## One Basic Example

(22) A farmer owns a donkey. He beats it with a stick.

(22')  $\exists x(Fx \wedge \exists y(Dy \wedge Oxy)) \wedge \exists z(Sz \wedge B_{p_1 p_2} z)$

$M, g, s f d \hat{e} \models (22')$  iff

$\gg M, g, f d \hat{e} \models \exists x(Fx \wedge \exists y(Dy \wedge Oxy))$  and

$M, g, s f d \hat{e} \models \exists z(Sz \wedge B_{p_1 p_2} z)$  iff

▶  $M, g[x/f][y/d], \hat{e} \models (Fx \wedge Dy \wedge Oxy)$  and

$M, g[z/s], f d \hat{e} \models (Sz \wedge B_{p_1 p_2} z)$  iff

★  $\langle f, d \rangle \in ((I(F) \times I(D)) \cap I(O))$  and

$f \in I(S)$  and  $\langle f, d, s \rangle \in I(B)$

i.e., iff  $s$  is a stick which a farmer  $f$  used to beat a donkey  $d$  of his.

- Interpretation functionally dependent upon sequences (triples) of witnesses.

## More Functional Dependencies

- (23) Every little boy thinks he is smart.
- (24) Every little boy thinks he is his mother's favourite.
- (25) Every little boy loves her most.



# Categorial Wisdom

- *loves*  $\rightsquigarrow \lambda y \lambda x Lxy$ ; a function from an object argument to a function from a subject argument to a truth value.
- *John*  $\rightsquigarrow \lambda P Pj$ ; a function from properties assigning ‘true’ to the properties that John has.
- *he*  $\rightsquigarrow \lambda x x$ ; a function from contextually given elements to those elements themselves.
- *his mother*  $\rightsquigarrow \lambda x Mx$ ; a function from contextually given elements to the mother of those elements.
  
- Peter Geach’ division and Pauline Jacobson’ binding only generalize these contextual points in a formal manner;
- the same insights are formalized in a functional satisfaction semantics.

## So This is What we Get (Without Explanation Today)

- (26) Every little boy has devoted his heart to some woman, but none of the boys indeed intends to marry her.
- (27) Most boys had a gun, but hardly any boy ever used it.
- (28) Sue used it to chase foxes though.
- No need to postulate an ambiguity in pronouns; just dynamic conjunction (or composition) of meanings.

# Semantics and Pragmatics

- The question what well-formed expressions mean. (Semantics)
  - ▶ Tarski, Montague, Davidson, . . . .
- The question what people do with them. (Pragmatics)
  - ▶ Strawson, Grice, Kripke, Stalnaker, . . . .
- Can these questions be distinguished? (Methodology)
  - ▶ I just did.
- Should these questions be dealt with separately?
  - ▶ Better not. (Dynamic Semantics)

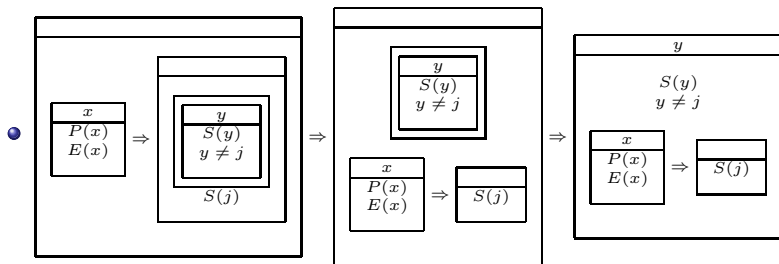
## Robert Stalnaker on Presuppositions in Assertions

- “Presuppositions are what is taken by the speaker to be the COMMON GROUND of the participants in the conversation, what is treated as their COMMON KNOWLEDGE or MUTUAL KNOWLEDGE.” (Robert Stalnaker, 1978, “Assertion”, p. 321)
- “But the information presumed to be common will also include facts about the discourse that is currently taking place, since when one is engaged in a conversation, one can normally take for granted that speakers and hearers are aware that the conversation is taking place, that speakers are saying what they are saying in the way they are saying it. And one can take for granted that everyone is taking these things for granted. The interaction of the information of these two different kinds is a theme of much of the current work in discourse semantics and pragmatics (...)” (Robert Stalnaker, 1998, “On the Representation of Context”, p. 5)

## Accommodation / Binding (Geurts / van der Sandt)

- “(…) presuppositional expressions (…) have internal structure and semantic content. (…) The resulting account can neither be classified as wholly semantic nor wholly pragmatic.” (Rob van der Sandt, 1992, “Presupposition Projection as Anaphora Resolution”, p. 333)

(29) If the package is empty, then John has smoked, too.



- This is the favoured one of three resolutions, or, better, dynamic conjunctions.

# Questions and Answers

## Good Questions

- What is the meaning of a *DRS*?
- What is the interpretation of a presupposition?

## Good Answers

- The meaning of a DRS resides in its satisfaction conditions.
- Presuppositions are informational objects in their own right.

## Old Implementation

- Two-dimensional interpretation (Karttunen and Peters, 1979).

## Two-Dimensional Interpretation (Karttunen and Peters)

- A division of meanings over two or more dimensions, so that the sum again equals the original.
- Every utterance has a presupposition and an assertion in its proper denotation type.

### (30) “Manage to raise my interest”

- denotation type: property of individuals.
  - ▶ It ‘presupposes’ the set of individuals who try to raise my interest;
  - ▶ and it ‘asserts’ the set of individuals who succeed in doing so.
- That’s as simple as it is. Presupposition and assertion are possibly independent creatures.

# Solving a Management Problem

(31) Someone managed to raise my interest. ( $\exists xMANxp_i$ )

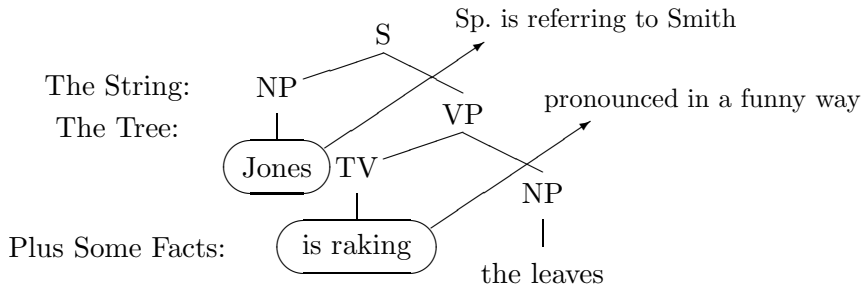
- $M, g, d\hat{e} \models^p$  (31) iff  $d$  tried  $\hat{e}_i$   
 $M, g, d\hat{e} \models^a$  (31) iff  $d$  succeeded with  $\hat{e}_i$

(32) Noone managed to raise my interest. ( $\neg\exists xMANxp_i$ )

- $M, g, \hat{e} \models^p$  (32) iff some  $d$  tried  $\hat{e}_i$   
 $M, g, \hat{e} \models^a$  (32) iff no  $d$  succeeded with  $\hat{e}_i$



## (33) Jones is Raking the Leaves



- The presupposition (that “Jones” refer to Jones) may fail, while the assertion succeeds!
- This, too, is dynamic conjunction!
- Of semantic and pragmatic information.

## Three-Dimensional Interpretation

- Indefinites contribute, not assert, discourse referents;
- but they are not ‘presuppositional’.

(34) Yesterday some student wanted to hear my opinion about free logic.

(35) No, nobody wanted to know anything from you.

(35') No, she really wanted to see your new haircut.

(35'') ??No, she is not a student any longer.

(35''') Wait a minute. I didn't know you had an opinion on free logic?

(35''''') ??Wait a minute, I didn't know she was a student?

- Distinguish assertoric, presuppositional and yet other aspects of interpretation.

## A Very Simple Example

(36) Pedro hired a donkey.

- ▶ Presupposes a guy  $p$  named ‘Pedro’,
- ▶ introduces a donkey  $d$ ,
- ▶ asserts that  $p$  hired  $d$ .

- $M, g, pd\hat{e} \models^p (36)$  iff  $p$  is Pedro;
- $M, g, pd\hat{e} \models^c (36)$  iff  $d$  is a donkey;
- $M, g, pd\hat{e} \models^a (36)$  iff  $p$  hired  $d$ .
  
- Again, we witness functional, cross-dimensional, dependence on (this time) two witnesses.

# Interpretation of Terms and Quantifiers

- $\bullet$   $\llbracket \text{MARY} \rrbracket_{M,g,d\hat{e}}^p = \{Q \mid d = [m]_{M,g,\hat{e}} \ \& \ d \in Q\}$   
 $\llbracket \text{MARY} \rrbracket_{M,g,d\hat{e}}^c = \{Q \mid d \in Q\}$   
 $\llbracket \text{MARY} \rrbracket_{M,g,d\hat{e}}^a = \{Q \mid d \in Q\}$
- $\bullet$   $\llbracket \text{HE}_i \rrbracket_{M,g,d\hat{e}}^p = \{Q \mid d = \hat{e}_i \ \& \ d \in Q\}$   
 $\llbracket \text{HE}_i \rrbracket_{M,g,d\hat{e}}^c = \{Q \mid d \in Q\}$   
 $\llbracket \text{HE}_i \rrbracket_{M,g,d\hat{e}}^a = \{Q \mid d \in Q\}$
- $\bullet$   $\llbracket \text{SOME}(\pi) \rrbracket_{M,g,d\hat{c}\hat{e}}^p = \{Q \mid d \in \llbracket \pi \rrbracket_{M,g,\hat{c}\hat{e}}^p \ \& \ d \in Q\}$   
 $\llbracket \text{SOME}(\pi) \rrbracket_{M,g,d\hat{c}\hat{e}}^c = \{Q \mid d \in \llbracket \pi \rrbracket_{M,g,\hat{c}\hat{e}}^{c\&a} \ \& \ d \in Q\}$   
 $\llbracket \text{SOME}(\pi) \rrbracket_{M,g,d\hat{c}\hat{e}}^a = \{Q \mid d \in Q\}$
- $\bullet$   $\llbracket \text{DET}(\pi) \rrbracket_{M,g,Df\hat{h}}^p = \{Q \mid \emptyset \neq D = \llbracket !\pi \rrbracket_{M,g,f\hat{h}} \subseteq Q \ \& \ FC(f)\}$   
 $\llbracket \text{DET}(\pi) \rrbracket_{M,g,Df\hat{h}}^c = \{Q \mid D \subseteq Q\}$   
 $\llbracket \text{DET}(\pi) \rrbracket_{M,g,Df\hat{h}}^a = \{Q \mid \langle D, Q \rangle \in \llbracket \text{DET} \rrbracket\}$ 
  - $\blacktriangleright$   $FC(f)$  requires  $f$  to be a function.
- $\bullet$   $M, g, d\hat{a}\hat{c}\hat{e} \models^x T(\rho)$  iff  $\llbracket \rho \rrbracket_{M,g,\hat{a}\hat{c}\hat{e}}^x \in \llbracket T \rrbracket_{M,g,d\hat{c}\hat{e}}^x$ , by default.

## Two Easy Examples

(37) Mary teased some dude.

$$MARY(\lambda x \text{ SOME}(DUDE)(\lambda y \text{ TEASE}xy))$$

▶  $M, g, md\hat{e} \models^p (37)$  iff  $m = I(m)$

$M, g, md\hat{e} \models^c (37)$  iff  $d \in I(DUDE)$

$M, g, md\hat{e} \models^a (37)$  iff  $\langle m, d \rangle \in I(TEASE)$

(38) She<sub>1</sub> was annoyed by a song he<sub>2</sub> sang.

$$SHE_1(\lambda x \text{ SOME}(SONG-SUNG-BY-HE_2)(\lambda y \text{ ANNOY}yx))$$

▶  $M, g, nbsmd\hat{e} \models^p (38)$  iff  $n = m$  and  $b = d$

$M, g, nbsmd\hat{e} \models^c (38)$  iff  $\langle b, s \rangle \in I(SUNG-SONG)$

$M, g, nbsmd\hat{e} \models^a (38)$  iff  $\langle s, n \rangle \in I(ANNOY)$

## Some More Involved Example

- (39) Most men who sent a present to Curt sent a quite different<sub>2</sub> present to Amelia.

$$\begin{aligned}
 &MOST(\lambda x Mx \wedge CURT(\lambda y SOM(P)(\lambda z Sxyz))) \\
 &\quad (\lambda x AMEL(\lambda y SOMDIFF_2(P)(\lambda z Sxyz)))
 \end{aligned}$$

- » Presupposes  $c$  is Curt,  $a$  is Amelia,  
 $D$  is the set of men  $d$  who sent a present, viz.  $p(d)$ , to Curt;
- » contributes  $q$ :  $q(d)$  is a present different from  $p(d)$ ;
- » asserts  $MOST d \in D$  sent  $q(d)$  to  $a$ .

## Dorit Abusch' Target Example

(40) Everyone moved to Stuttgart because a woman lived there.

- ... because Stuttgart is not 100% male?
  - ▶ quite unlikely, why not Amsterdam? Nijmegen?
- ... because Dorit Abusch lived there?
  - ▶ bad reason: Dorit left.
- ≫ ... because everyone's beloved one lived there.
  - ▶  $f$ :  $f(d)$  was the reason for  $d$  to move (for  $d \in D$ ).
- Witnesses, functionality, and dimensionality gets this all straight.

## A Moment of Reflection on Scope Islands

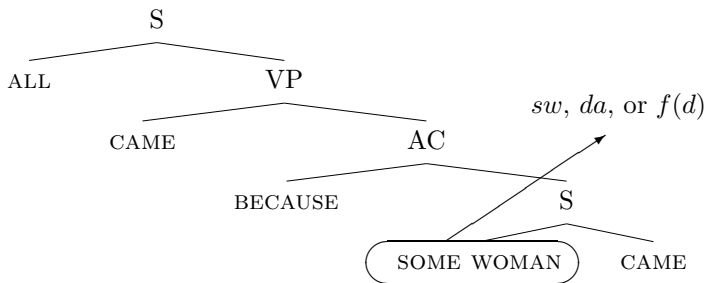
- Quantified expressions cannot escape scope islands (...):
  - (41) If many vegetarians come to the party, Max will have a problem.
  - (42) Max had a big problem, because many veg.s came to the party.
- (...) whereas indefinite expressions can, or so they say.
  - (43) If we invite a certain philosopher Max will be offended, but do you remember who? (Reinhart)
  - (44) Max did not consider the possibility that some politician is corrupt. Who, by the way? (Kratzer)
- Why do indefinites seem to do what syntax forbids them to do?
- Presuppositions can ‘swim’! (Geurts)



## Bart Geurts' Buoyancy Principle

- “(...) backgrounded material tends to float up towards the main DRS.” “(...) all things being equal, an indefinite will tend to be construed as part of the foreground because it carries new information. (...) It is only under special circumstances that new information is backgrounded, and if this happens, the expression in question is specific.” (Bart Geurts, 2000/10, “Specific Indefinites, Presupposition, and Scope”)

## Dorit Abusch Again



## Dorit in Detail

(45) Everybody came because a woman came.

$ALL(\lambda x BEC(SOM(WO)(CA), CAx))$

- A dynamic notion of conjunction allows to leave the contribution of  $SOM(WO)(CA)$  where it is delivered (in situ), or make it transparent (possibly functional).
- The functional reading in a representational format:

$D, f$	$p, q$	
<ul style="list-style-type: none"> <li>• <math>\forall d \in D:</math>  <math>CA(d)</math>  <math>WOCA(f(d))</math></li> </ul>	$\forall d \in D:$ $p(d) = CA(d)$ $q(d) = WOCA(f(d))$	$\forall d \in D:$ $BEC(q(d), p(d))$

## Island Constraints Without Violations

- No violations; it is the pragmatic contribution of an indefinite, not its assertoric force, which is insensitive to the constraint // “presuppositions can swim”.
- The assertoric contribution is a witness  $f(d)$  figuring right there at the logical level where the indefinite occurs.
- That there are pragmatic (specificity) effects associated with the use of indefinites is orthogonal to their semantics.
- Thus, indefinites behave like other noun phrases:
  - ▶ like proper names, pronouns, definites, . . . , and
  - ▶ like generalized quantifiers as well.

(46) If a boy goes to a party because he thinks most girls in his class come too, he is disappointed, of course, when they don't show up.

## Inverse Dependencies (Kai von Fintel)

(47) A farmer  $[\text{MAY BEAT}]_F$  a donkey if he owns it.  
 $(\exists x(Fx \wedge \exists y(Dy \wedge MBxy)) \leftarrow Op_1p_2).$

(48) Only if a farmer  $[\text{OWNS}]_F$  a donkey may he beat it.  
 $(\exists x(Fx \wedge \exists y(Dy \wedge Oxy)) \leftarrow MBp_1p_2).$

- By ‘backgrounding’, we may take the contribution of the initial clauses as a domain of quantification.
- $M, g, \hat{e} \models \phi \leftarrow \psi$  iff (simplifying a little bit)
  - ▶  $\forall c: M, g, \hat{c}e \models^c \phi, M, g, \hat{c}e \models^a \phi$  if  $M, g, \hat{c}e \models^a \psi$ .
- We find that, effectively,  $M, g, \hat{e} \models (47)$  iff
  - ▶  $M, g \models \forall x \forall y ((Fx \wedge Dy) \rightarrow (MBxy \leftarrow Oxy)).$
- Example (47) is true iff for all pairs of farmers  $f$  and donkeys  $d$ :  $f$  may beat  $d$  if  $f$  owns  $d$ . Example (48) can be dealt with likewise.

## An Example After Philippe Schlenker

- (49) If each student finishes a paper on Chomsky in time and improves in two subjects, then noone will fail the exam.
- This may concern an arbitrary paper on Chomsky, a very specific one, and one specific to each student; and it may concern two arbitrary subjects, two specific ones, or two ones specific to each student (this is already nine interpretations).
  - But I can see none where for some students there is required to be an arbitrary paper but two specific subjects, and for others a specific paper and two just arbitrary subjects.
  - Pragmatic mode of composition must be visible at a level of logical form?

## Summing Up My Non-New Insights

- A Tarskian satisfaction semantics is the right thing.
  - ▶ But it needs more.
- Rigid reference can only be stipulated.
  - ▶ Like Kripke and Putnam explicitly implicate.
- Categorical insights are only methodologically driven.
  - ▶ Not ideologically.
- One cannot get around a dynamic concept of conjunction.
  - ▶ This is not a dynamic concept of meaning.
- The *DRT* theory of presupposition is the right one.
  - ▶ Cast in the wrong framework of *DRT*.
- Or the subject of SPECIFICITY proves all the above to be wrong.

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