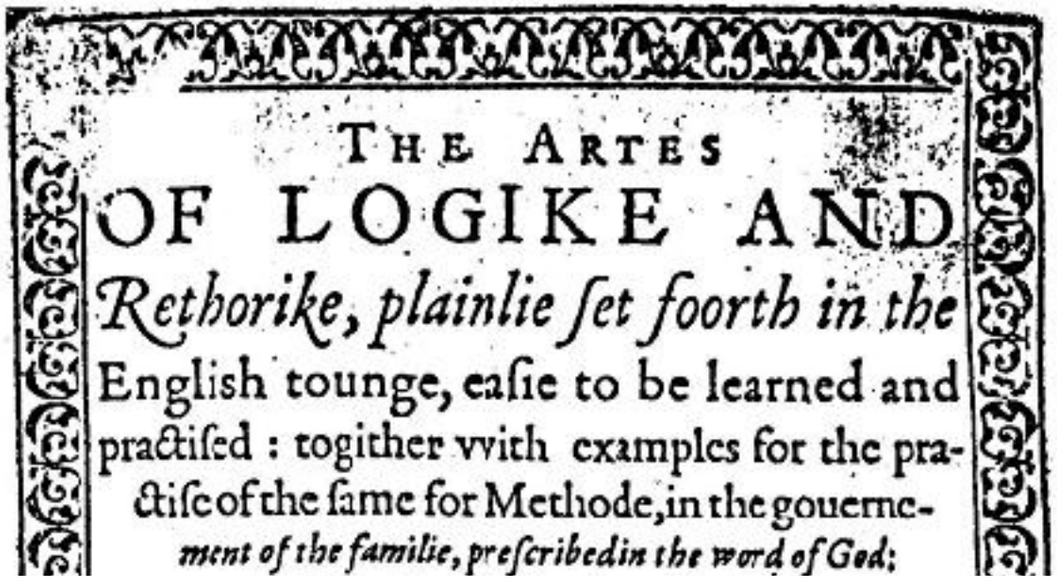
THE ARTES
OF LOGIKE AND
Rethorike, plainlie ſet foorth in the
English tounge, eaſie to be learned and
practiſed : togither with examples for the pra-
ctiſe of the ſame for Methode, in the gouerne-
ment of the familie, preſcribed in the word of God:

Philosophical Logic

LECTURE FIVE | **MICHAELMAS 2017**

Dr Maarten Steenhagen
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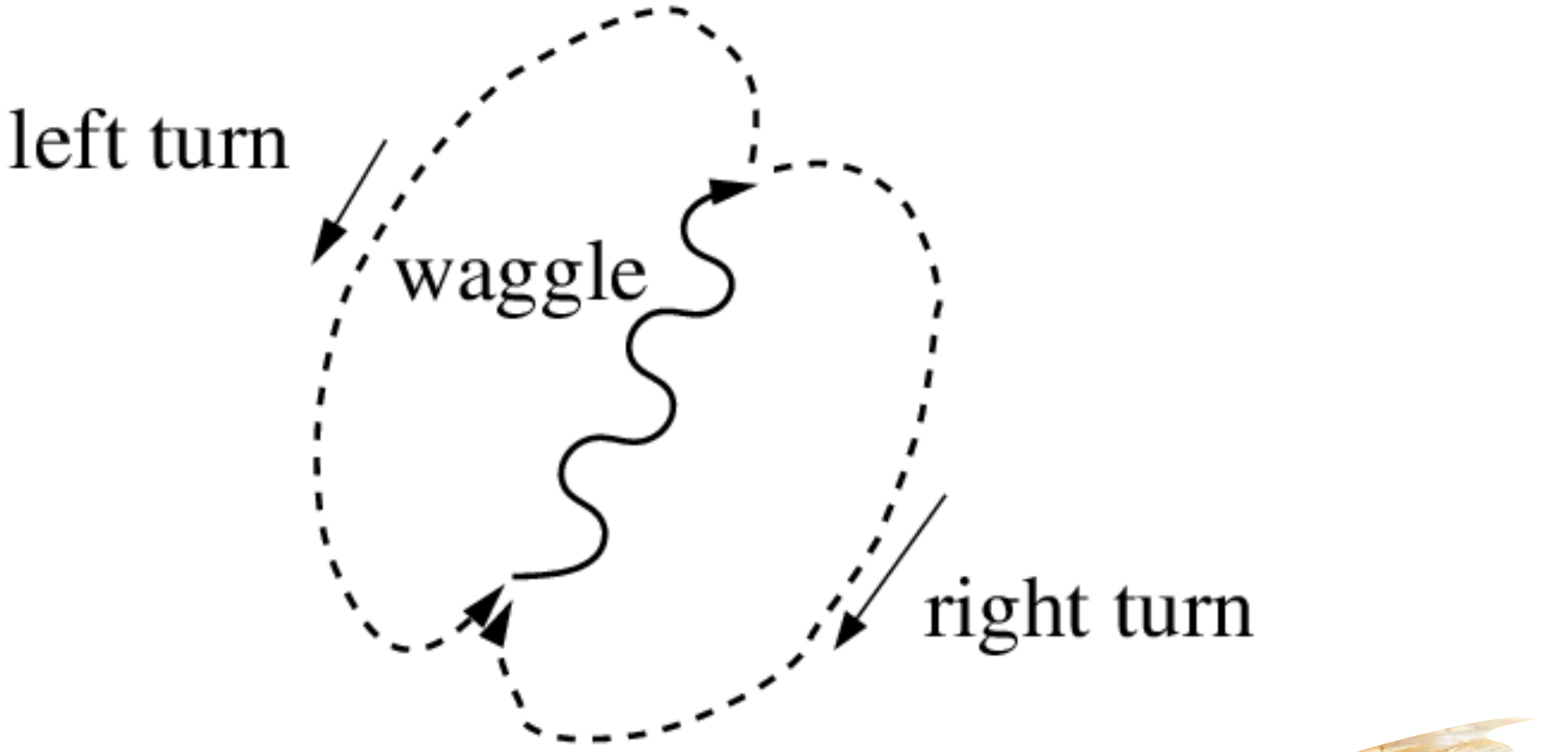
Last week

- ~~Lecture 1: **Necessity, Analyticity, and the A Priori**~~
- ~~Lecture 2: **Reference, Description, and Rigid Designation**~~
- ~~Lecture 3: **What Could ‘Meaning’ Mean?**~~
- ~~Lecture 4: **Natural Language**~~
- Lecture 5: **Formal Translations**
- Lecture 6: **Conditionals**
- Lecture 7: **Deeper into ‘the’**
- Lecture 8: **Quantification and Existence**

Today

1. Non-mentalism (‘teleofunctionalism’)
   Formal translations
2. Natural and formal languages
3. Does TFL do a good job?
4. Formalists, informalists, and Griceans
5. Testing the model: scope ambiguities

Non-mentalism & meaning naturalism



Ruth Garrett Millikan

- The bee dance is meaningful (proto-language)

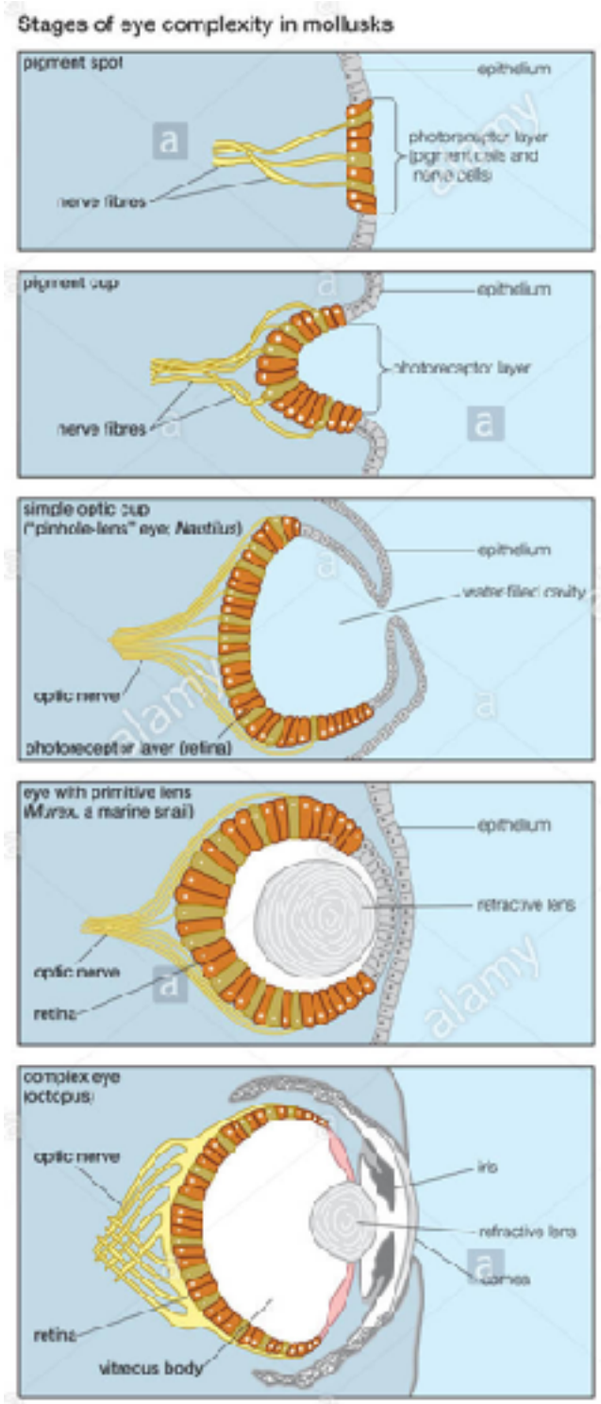
- These dances are about the location of nectar, and clearly ‘inform’ or ‘tell' other bees where the nectar is (the dance induces other bees to fly to that place)

- However, it is not a case of Grice’s natural meaning (e.g. no entailment between dance and location)

- We need not introduce a communicative intention to explain how gestures come to have meaning

‘Teleosemantics’

- Millikan develops a teleo-semantic theory of meaning (‘teleo-’ from Greek *telos* = ‘goal’ or ‘purpose’)
- The bee dance *evolved*; it came about through a process of natural selection, roughly in the way an organ such as the eye evolved
- The biological function of the eye is to see
- The biological function of the bee dance is to ‘tell’ other bees about the location of nectar
- The biological function of the bee dance is special in that it is a *cooperative* function
- A particular dance means what it does because doing so is its cooperative function



The function of language

“A stabilizing function of a language device must be one that accords both with the speaker's purposes and with the hearer's purposes often enough to keep the device in circulation along with a stable response to it. Stabilizing functions are found where speakers and hearers cooperate, where their immediate interests overlap, though overlapping immediate interests sometimes conflict, of course, in ulterior motives.”

(Millikan, *Language: A Biological Model*, p. 94)

Interim Summary

MENTALISM

- Grice offers a mentalist theory of meaning: he tries to explain the meaning of language in terms of specific mental states (communicative intentions)
- Communicative intentions and sentence meaning do not always line up perfectly. Grice explains the mismatch in terms of intentional or conventional violations of the norms of conversation: conversational and conventional implicature

NON-MENTALISM

- Millikan offers a non-mentalist theory of meaning: she tries to explain the meaning of language in terms of specific biological functions (cooperative or ‘stabilising’ functions)

Natural and Formal Languages

What is a language?

- There is no single definition of a language

- One suggestion: a language is a set of meaningful symbols + a set of formation rules

- e.g. {dog,cat,the,sits,and} + ‘No member of set can follow itself’

  - ‘the dog sits’ = well-formed

  - ‘the dog dog’ = ill-formed

What is a language?

- Set-theoretic notation (you'll get the details in Lent). We use '{' and '}' to define sets of elements

- The proposal is probably too simplistic for English.

- There are different *kinds* of symbols (nouns, verbs, articles, etc.) So better would be to think of a language as including a set of sets: {{dog,cat}, {the}, {and}, {sits}}

- English seems to lack well-defined formation rules

- Instead we could also think of a language simply as a set of well-formed sentences: {'the dog sits', 'I saw the dog', 'the dog sits and I see it',…, etc.}

Natural language

- 'Natural' is said in many different ways

- We can use it to contrast with ‘artificial’ (e.g. natural vs artificial sweeteners)

- So understood, a natural language is a language that is not artificial

- What is an artificial language?

- An artificial language is a language that was created or designed intentionally, to do some of the typical things a language does

Formal language

- People also contrast natural language with *formal* languages

- Think of ‘formalism’ or 'abstraction’ in the visual arts. Kandinsky abstracts away from the world, showing only relations between the ‘things’ (e.g. mere shapes) on his canvas

- Similarly, statements in a formal language are meant to be nothing more than a structure of simpler elements (e.g. statements, truth values)

The language of TFL

Vocabulary
{{A, B, C,…},{¬, ∧, ∨, →, ↔},{(,)}

Definitions of sentences
If **A** is a sentence, then ¬**A** is a sentence
if **A** and **B** are sentences, then (**A**∧**B**) is a sentence
etc.

- TFL is an artificial language: it was defined to do some of the typical things a language does (argument, inference)

- TFL is a formal language: it is limited to representing relations between elements (sentences and truth values)

Does TFL do a good job?

‘and’ vs ∧

- I ate my dinner and brushed my teeth
- P ∧ Q

  (P ≡ ‘I ate my dinner’, Q ≡ ‘I brushed my teeth’)
- I brushed my teeth and ate my dinner
- Q ∧ P
- But Q ∧ P implies P ∧ Q, whereas that I brushed my teeth and ate my dinner doesn’t imply that I ate my dinner and brushed my teeth!

Correspondences?

- On the one hand, propositional logic is designed to follow or mimic ordinary language
    - Example: definitions (truth tables) of the truth-functional connectives (¬, ∧, ∨, →, ↔); ‘∧’ is defined to represent ‘and’; ‘∨’ to represent ‘or’, etc.
- On the other hand, terms like ‘and’ and ‘or’ in natural language behave differently than their formal counterparts

‘or’ vs ∨

- Amber can afford an iPhone X or a four-star holiday to Spain

- P ∨ Q

  (P ≡ Amber can afford an iPhone X, Q ≡ Amber can afford a four-star holiday to Spain)

- Amber can afford the one, the other, but she surely cannot afford both!

- Yet ‘P ∨ Q’ implies either P, or Q, or P ∧ Q

Formalists, Informalists, Griceans

- Natural language seems to contain more than its formal counterpart TFL

- What do we do with the left-overs?

- A: “What is not captured by TFL here simply shows imperfections of natural language. Such quirks are not part of the study of *language* as such.”

- B: “What is not captured by TFL here does belong to natural language as such. TFL is incomplete, as a model of natural language.”

Formalists and Informalists

- Both *formalists* and *informalists* agree that '$\wedge$' does not capture the full meaning or significance of 'and'.

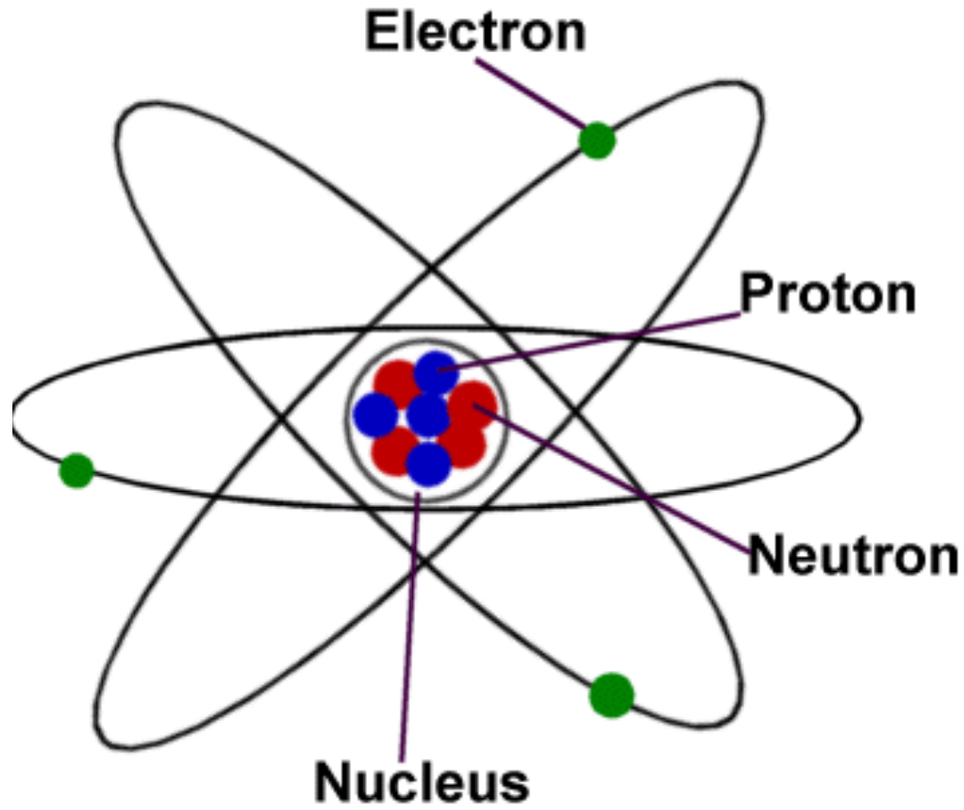
- They disagree about what this tells us about the status of formal logic.

- The formalist maintains that the leftovers were imperfections of natural language, whereas the informalist maintains that the leftovers are evidence of an imperfection of our formal languages

A Gricean solution

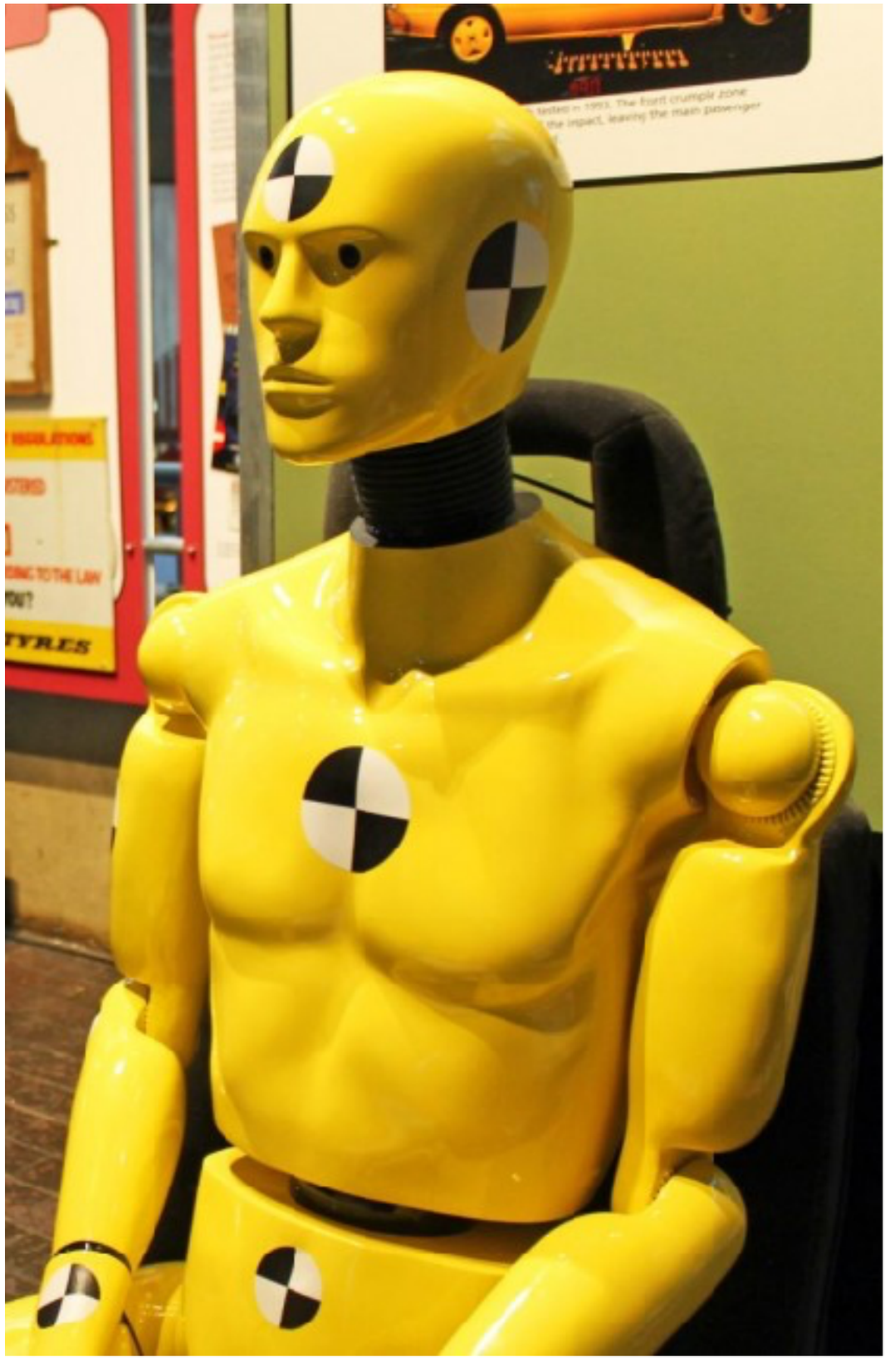
- Grice allows a more nuanced point of view: the alleged leftovers are *implicatures* that attach to ‘and’, ‘or’ and the like. These implicatures kick in depending on context. All the while, at the level of conventional *sentence meaning*, ‘and’ and ‘or’ behave just like the logical connectives

- If this is right, then the leftovers are a proper aspect of natural language (contra the formalist) but it is not necessarily the aim of our formal languages to **model** this aspect (contra the informalist)



Testing the model: scope ambiguities

A case study



Quantifier scope ambiguities

Sanna wants to steal some military secrets. A spy warns her: “There is a guard standing in front of every building”.

This of course didn’t worry Sanna at all. She very well knew that no guard can stand in front of more than one building. Sanna concluded: “What that spy tells me must be false!”

Quantifier scope ambiguities

"There is a guard standing in front of every building"

1. ∀x Bx → (∃y Gy ∧ Syx)
   Existential quantifier takes narrow scope

2. ∃y ∀x Gy ∧ (Bx → Syx)
   Existential quantifier takes wide scope

(G for '…is a guard', B for '…is a building', S for '…stands in front of…')

Modal scope ambiguities

1. If I think, then I must exist

2. If I must exist, then I exist in all possible worlds

3. But I think!

4. Therefore, I exist in all possible worlds

*we use '□' to represent the concept of necessity

Modal scope ambiguities

If I think, then I must exist

1. □ (A → B)
   Necessity operator takes wide scope

2. A → (□ B)
   Necessity operator takes narrow scope

(A ≡ I think, B ≡ I exist)

*we use '□' to represent the concept of necessity

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