

Philosophical Logic

Lecture 5: Natural language vs Formal Language

1. What is a language? This question is different from the question ‘What is language?’. Language as such seems a unified phenomenon (compare: the weather, digestion). In contrast, there are a huge variety of languages, each with different properties and characteristics: English, French, Sanskrit, Python, Propositional calculus... .

We can think of *a* language as a set of (meaningful) strings ($\{\text{dog, cat, the, sits, and}\}$) and some rules for their combination (‘the dog sits’ is well-formed; ‘cat cat the’ is not well-formed).

2. What is a natural language? ‘Natural’ is used in many different ways. It can be taken to contrast with ‘artificial’. In that case: a natural language is a non-artificial language. What is an artificial language? A language that was created or constructed as such. How do you create or construct a language?

3. Formal languages People also contrast ‘natural language’ with ‘formal language’. What is a formal language? We can think of a formal language as a language that has no or a very generic *semantics*. Are all artificial languages formal languages? Are all formal languages artificial languages?

4. Formal logic What is the relation between the language of propositional logic and natural language? On the one hand, propositional logic is designed to follow or mimic ordinary language. Think of the definitions (truth tables) for the logical connectives: ‘ \wedge ’ is an interpretation of ‘and’, ‘ \vee ’ of ‘or’, ‘ \neg ’ of ‘not’, etc. On the other hand, these expressions in natural language do behave differently from their formal counterparts. Take an example:

1. I ate my dinner and brushed my teeth.
2. I ate my dinner \wedge I brushed my teeth.

Natural language seems to contain more than its formal counterpart. What do we do with the left-overs?

5. Formalists and Informalists Both formalists and informalists agree that ‘ \wedge ’ does not capture the full meaning of ‘and’. They disagree about its significance for formal logic. The formalist maintains that the left-overs were imperfections of natural language, whereas the informalist maintains that the ‘left-overs’ are a proper aspect of the language. (See: H.P. Grice, ‘Logic and Conversation’, 1975, pp. 41-3)

6. A resolution? It is a mistake to think that a formal logic is an adequate model of natural language as such, but it is just as misguided to think that natural language as such cannot be adequately modeled by a formal logic. A paradox?

No. We should see that we always model an aspect of a phenomenon. Formal logic offers an adequate model of some aspect(s) of natural language. Question: which aspects of natural language are formal logics able to model?

7. Case study: scope ambiguities To showcase how formal languages can shed light on natural language, consider a specific kind of ambiguity. We can pin down ambiguities in ordinary language by translating them into the language of formal logic. This allows us to distinguish ‘narrow-scope’ from wide-scope’ readings. Examples:

1. ‘All that glitters is not gold’ (\neg)
2. ‘A dog stood in front of every building’ (\forall)
3. ‘I think, therefore I must exist’ (\square).