• (Apparent) Fact: communication happens
• one agent sends some signal to another, and the other comprehends
• they both win (more or less) if they (more or less) coordinate
• how does this happen?
• two extremes
• signals carry no conventional meaning on their own – the hearer just has to do the best she can with what she’s given (the construction of ‘passing theories,’ cf. Quine, Davidson)
• each form is mapped to a determinate meaning (eg. formal languages such as calculus, Lisp, Peano Arithmetic, etc.)

1. \( \int x^2 \, dx, x^2 \int \, dx \)
2. \( \forall x \exists y(\phi(x, y)), \exists y \forall x(\phi(x, y)) \)
3. etc.

• formal languages usually have some sort of ‘unique readability theorem’ associated with them to ensure no ambiguity, etc.
• human languages seem to be different
1 Ambiguity

4. Mary saw the man with binoculars
5. Everyone loves someone

- eg. jokes exploit these ambiguities, cf. *Every ten minutes a man in NYC gets mugged. And he’s with us here today to tell us his personal story...*
- why do we call these *ambiguities*?
- eg. is the following ambiguous?

6. John bought a car

- technically, the semantic component of a grammar involves an interpretation function \( [\cdot] \) that takes as input a parse tree, not a string of words\(^1\)
- let us reserve (for now) the idea that a sentence is *structurally ambiguous* if the grammar generates \( n > 1 \) parse trees for the sentence
- assuming these are all in the domain of \( [\cdot] \), there will be up to \( n \) different *readings* of the sentence, i.e. up to \( n \) distinct outputs of \( [\cdot] \) generated by the parse trees of the sentence
- call a sentence *semantically ambiguous* if it generates \( n > 1 \) readings
- we will use ‘ambiguous’ to mean semantically ambiguous
- consider (4)
- we have evidence that English contains at least two phrase structure rules of the kind required to generate an ambiguity in (4)

7. (a) Mary saw John with the binoculars
   (b) Mary saw the man with the gold necklace

- have various ways of disambiguating

8. (a) Who did Mary see with the binoculars?
(b) What did Mary see the man with?

9. (a) He was embarrassed that he had no binoculars
(b) She wished she had binoculars, too

• note that at this point, we are not really all that different from formal languages

• the string of words allows for various parse trees (cf. $3 + 2 \times 4$), and it is parse trees that get interpreted, where each of the available parse trees has a determinate meaning associated with it\(^2\)

• there are different potential (grammatically determined) readings of the sentence, and the task is to disambiguate

• since most ambiguities go unnoticed, something must be helping select one of these parses

• here, grammar and cognition interact

• here is a different case, made famous by Grice [4]

2 Particularized Implicatures

10. Context: You see someone stranded in their car at the side of the road.
Stranded Stranger: Um, excuse me, I’m out of gas.

11. Context: At the dinner table.
Dinner Participant: Can you please pass the salt?

12. Context: Guest at someone’s home.
(Shivering slightly) Brrr. It’s kind of cold in here...

• the output of grammar does not seem to convey any of the information that you actually take away from the sentence

• Grice: the speaker said something, for some reason

\(^2\)Unless there are free variables occupying terminal nodes, eg. pronouns, which will need to get their meaning from the context.
• your task is to figure that out, using whatever data is available to you: the meaning of the sentence, your beliefs about the world, including your beliefs about the speaker’s probable beliefs and intentions, etc.

• it is thus expected that what you take away from the sentence could vary in arbitrary ways depending on the context

• eg. imagine someone uttering (10) mid-way through a marathon, a father who’s having difficulty taking care of his newborn child, a politician in the midst of an embarrassing campaign, etc.

3 Scalar Implicatures

Suppose John is on the witness stand. He knows that all of the board members were involved in gambling away people’s money. The following exchange takes place:

13. Attorney: Which employees of the bank were involved in the gambling ring?
   John: Well, all of the janitors, the CEO, and some of the board members.

• is John’s statement true? most adult humans would reject his statement, while most children would accept it (we’ll get back to this)

• compare with:

14. Attorney: Does John have a Toyota?
   John: Well, he has a car.

• three hypotheses: (i) John’s utterance means ‘some but not all of the board members were involved,’ (ii) John’s utterance means means ‘some, possibly all of the janitors were involved,’ and this literal meaning is strengthened to ‘some but not all’ through implicature, (iii) John’s utterance is ambiguous between the meanings in (i) and (ii)

• let us first convince ourselves that (i) will not work
15. (a) # John has a Toyota. In fact, he doesn’t have a car
(b) John ate some of the cookies. In fact, he ate all of them.
(c) John has a car. In fact, he has a Toyota.

16. (a) Does John have a Toyota. (Yes). # Does he have a car?
(b) Did John eat some of the cookies? (Yes) Did he eat all of them?
(c) Does John have a car? (Yes) Does he have a Toyota?

• tests like this leave (ii) and (iii) as viable hypotheses
• let us turn to (iii), for a second
• if it’s ambiguous, what kind of ambiguity would it be?
• two obvious options: (a) Lexical (like bank), or (b) Structural (like Mary saw the man with the binoculars)
• if the ambiguity is lexical, that would mean English has two words that have the phonology of some, but with different meanings, with one meaning the standard logical one, and the other meaning the strengthened one
• there are at least two difficulties with this view
• first, why does no language lexicalize these two meanings in different ways? i.e. why is there no language that assigns phonology X to the logical ‘some,’ and phonology Y to the strengthened ‘some,’ with $X \neq Y$?
• second, we are clearly missing a generalization here, since or (Basic Meaning = A or B or Both, Strengthened meaning = A or B but not both), may (SM = may but not must), possible (SM = possible but not necessary), three (SM = three but not four), etc. seem to behave the same way

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3There is a tendency to treat numerals differently from other scalar terms, in that it really feels like their basic meaning is ‘exact.’ Indeed, even though children tend to accept weaker readings of scalar items more than adults, this does not seem to hold true of numerals (eg. Huang and Snedeker [6]). There is a lot of literature on this, and we will get back to this in later sessions. However, it is noteworthy that there is evidence for duality even here, eg. Mary: Anyone who has three children gets the pension. Does John have three children? Bill: Yes. In fact, he has five.
• but if there is no lexical ambiguity, then, if $[[some]] = \lambda X.\lambda Y.X \cap Y \neq \emptyset$, how do we get a structure like $[[someX]Y]$ to end up meaning ‘some but not all X Y?’

• the answer from Chierchia [1], Fox [2], and others is that there is a structural ambiguity here: one structure that’s generated is $[[someX]Y]$, and the other is $[O[[someX]Y]]$, where $O$ is an unpronounced operator that is responsible for generating scalar implicatures (it is something like a silent only)

• next week, will look at two proposals for deriving the strengthened meaning along the lines of (ii) and (iii)

• we will present an algorithm from Gamut [3] that attempts to stick to an unambiguous meaning for some (and other scalar terms), and to derive their strengthened meanings through a formal interagent reasoning procedure

• we will present an ambiguity theory from Fox [2] that argues for the idea that implicatures are derived within the grammar, hence are the output of $[\cdot]$, not interagent reasoning (though principles of disambiguation will have to kick in to help determine which reading gets selected, as with Mary saw the man with the binoculars)

References


