CONDITIONALS | Michaelmas 2018 | Maarten Steenhagen (ms2416@cam.ac.uk)
http://msteenhagen.github.io/teaching/2018cda/

Lecture 3: **Paradoxes of natural language**

Mark Sainsbury (2001), 'The Project of Formalization,' (ch. 6) in *Logical Forms: An Introduction to Philosophical Logic*, Oxford: Blackwell, 339-391.

Natural language

There is no single definition of a language, but we can think of a language simply as a set of well-formed sentences. English then is a specific collection of well-formed sentences. What is a natural language?

(a) It is a language that is *not artificial* (e.g. natural vs artificial sweeteners). An artificial language is a language that was created or designed intentionally to do some of the typical things natural language does.
(b) It is a language that is *not formal* (e.g. naturalistic vs formalist paintings). A formal language is not as such about anything.

Are all artificial languages formal languages? Are all formal languages artificial languages?

Problems with TFL

Problem: natural languages and formal languages are not obviously inter-translatable. Example: "I ate my dinner and brushed my teeth." In Truth Functional Logic (TFL), this should be translated as "$P \wedge Q$", which is equivalent to "$Q \wedge P$", which should then be translated back into English as "I brushed my teeth and ate my dinner". But "I ate my dinner and brushed my teeth" and "I brushed my teeth and ate my dinner" are not equivalent in English!

Natural language seems to contain more than its formal counterpart TFL. What do we do with these 'linguistic leftovers'? 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.

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 or convention. All the while, at the level of *sentence meaning*, 'and' and 'or' share their meaning with the logical connectives.

Conditionals

The puzzles presented by conditionals are seemingly most serious and put the Gricean theory to test. Let us first look at conditionals in English and in TFL.

In English conditional statements use 'if… then' constructions. Contrast: 'Paula wonders if her argument is valid' (not a conditional) with 'If Paula's argument is valid, she gets full marks' (conditional). There are two main types of conditional statements: indicative and subjunctive conditionals. Compare: 1. 'If Oswald didn't shoot Kennedy, then someone else did' (indicative); 2. 'If Oswald hadn't shot Kennedy, someone else would have' (subjunctive). Here 1 seems trivially true, whereas 2 is very contentious.

Crucially, indicative conditionals in English allow us to construct arguments. They appear to behave truth-functionally (the truth value of a complex statement is determined by the truth values of its component claims). Moreover, the indicative conditional in English is structurally analogous to the material conditional in TFL: antecedent + connective + consequent.

Equivalence Thesis

The correspondence between indicative and material conditional has led some to advance an *Equivalence Thesis (ET):*

> The truth conditions for the indicative conditional (if…,then…) are the truth conditions for the material conditional ($\rightarrow$)

So the Equivalence Thesis takes the *logical form* of the indicative conditional to be that of $A \rightarrow B$. This implies that an indicative conditional behaves just as the inclusive disjunction (or $\vee$). (e.g. 'If it rains, then the streets are wet' says the same as 'it doesn't rain or the streets are wet'.)

Here's an argument for ET:

1. The indicative conditional is truth-functional
2. If the indicative conditional is truth-functional, then the logical form of the indicative conditional is that of $A \rightarrow B$
3. Therefore, the logical form of the indicative conditional is that of $A \rightarrow B$

The second premise of this argument is motivated by the observation that other truth-functional connections clearly do not give us the way we intuitively reason with indicative conditionals. (e.g. 'if Trump doesn't use Twitter, then Paris is in France', this is true but $\wedge$ would make it false; 'If Trump does use Twitter, then Paris is in Germany', this is false but $\vee$ would render it true; etc…)

Paradoxes of the conditional

The Equivalence Thesis runs into trouble, however.

A. Contraposition: "If Corbyn has majority support, then it isn't a large majority. Therefore, if Corbyn is supported by a large majority, then he doesn't have majority support." ($A \rightarrow B \vdash \neg B \rightarrow \neg A$)
B. Antecedent strengthening: "If I strike this match then it will light. Therefore, if I pour water on this match and strike it, it will light." ($A \rightarrow C \vdash (A \wedge B) \rightarrow C$)

Both inferences are valid in TFL, yet seem invalid in English. It is possible to deny that in these examples we're dealing with genuine indicative conditionals, or that the conditionals we have are complex (i.e. the first 'conditional' in A is just an atomic sentence, i.e. that he's supported by a no more than a small majority; the second conditional in B, similarly, has an atomic antecedent: 'water-and-striking' instead of 'water' and 'striking'). But there are serious problem cases:

C. Ice is not warmer than water. Therefore, if ice is warmer than water, ice is not warmer than water. ($\neg A \vdash A \rightarrow B$)
D. Ice floats on water. Therefore, if ice is denser than water, ice floats on water. ($B \vdash A \rightarrow B$)

Argument against ET

This suggests that merely sometimes indicative conditionals conform to the material conditional: sometimes they do not. Yet ET implies that they always conform to the material conditional. Hence, ET is false.

1. If the indicative conditional is truth-functional, then the logical form of the indicative conditional is that of $A \rightarrow B$
2. The logical form of the indicative conditional is not that of $A \rightarrow B$
3. Therefore, the indicative conditional is not truth-functional

Two available routes

The 'paradoxes of the conditional' present us with two available options. Either we reject ET and offer a non-truth-functional account of the indicative conditional:

> Non-truth-functional accounts agree that 'If A, B' is false when A is true and B is false; and they agree that the conditional is sometimes true for the other three combinations of truth-values for the components; but they deny that the conditional is always true in each of these three cases. (Edgington 2008)

In that case we have to find a non-truth-functional interpretation of the correctness of inferences like: "If Paula's argument is valid, then she gets full marks. But look, her argument is valid! So she gets full marks."

Alternatively, we can employ Grice's framework and say that *what is said* in 'if…, then…' statements is always truth-functional, but that this does leave room for further *implicatures*.

Suppose I believe that the match will be cancelled anyway, and I tell you that "if it rains, the match will be cancelled". What I say can indeed be asserted based on what I believe. However, by uttering just "If it rains, the match will be cancelled" I also imply (conventionally) that the condition of rain would somehow be responsible if the match were to be cancelled. So I have said something misleading.