

## Symbolic Logic 2

### Translating from English into the-truth-functional logic

English is a natural language, and like the rest of enormous complexity. I haven't kept up with linguistics but I don't think there is an adequate descriptive theory or theoretical description of it. Natural languages exist in a complex social context; they are used by people to do many things. All of that impinges on what we take them to mean. It is not likely that an artificial system that merely puts together true or false atoms into larger truth-functional compounds is going to be able to capture a lot of what we get from ordinary language.

But of course we didn't invent it to put it alongside the language of Shakespeare; it is merely to help us understand deductive inference. And for that purpose we can hope that abstracting away from a lot of the complexity of ordinary, or Shakespearean, language will reveal something valuable, just as ignoring air resistance allowed Galileo to advance towards an understanding of dynamics.

But the deductive inferences we are mostly concerned with occur in ordinary language, so there are at least two practical matters we need to become acquainted with. One is those complexities of ordinary language that we are ignoring, abstracting away from, in offering our mini-language translations. The second is a range of expedients for trying to capture what ordinary language is saying in our very exiguous system. I do not pretend that there is a clear boundary between these two sets of practical matters.

To take the second set first, there are initially the standard translations of our connectives:

| English connective | Rough translation | Name of connective |
|--------------------|-------------------|--------------------|
| not                | $\neg$            | negation           |
| and                | $\wedge$          | conjunction        |
| or                 | $\vee$            | disjunction        |
| if ... then ...    | $\rightarrow$     | conditional        |

Then there are various other English expressions that are taken to be translatable into our mini-language by means of various conventional translation schema.

**But** = and, so =  $\wedge$ . It is plain that 'she was poor but honest' does not convey the same content as 'she was poor and honest' but as far as the truth-value of the component sentences goes, they are the same.

**Unless** = if not, so ' $P$  unless  $Q$ ' =  $\neg Q \rightarrow P$ . You will not reach 100 years of age unless you first reach 99 = If you do not first reach 99, you will not reach 100 years of age. [Howson's example, p. 13.]

**Only if**. This is a matter of switching around the antecedent and the consequent of the simple 'if' conditional. If  $P$  then  $Q$  ( $P \rightarrow Q$ ); Only if  $P$  then  $Q$  ( $Q \rightarrow P$ ). When 'If  $P$  then  $Q$ ' holds,  $P$  is often called a **sufficient condition** for  $Q$ , and  $Q$  a **necessary condition** for  $P$ .

By way of a transition to the other set of issues, let me observe that English can be very misleading, in that it may use what appears to be one connective to mean what in our mini-language is a

different one. Thus, as Howson observes (p. 9), ‘you may have tea or coffee’ [which looks like it involves a disjunction] actually says that you may have tea *and* you may have coffee – in addition it usually carries an implicature (see below) that you can’t have both.

Hodges spends a good deal of space on the first set of issues I have mentioned: the messiness of ordinary language that we ignore in translating things into our mini-language.

He mentions various nuisances: there are unlimited possibilities of what he calls ‘perturbations’; much language is ambiguous. There are more serious problems about fixing what we are talking about, and there is considerable scope for misleading people.

*Perturbation* is Hodges’ term for an unlimited number of cases where something has gone wrong with the language being used; something ungrammatical but where we can work out what is intended, or a breach of ‘selection rules’ (what typically goes with what) which are themselves of varying degrees of stringency. Because the language is in some respect non-standard we cannot be certain we know what is being said, and thus what claim is up for assessment as true or false. [Since these issues typically arise *within* sentences they are really not pertinent till we get beyond truth-functional logic, but let us get them out of the way, once and for all.]

*Ambiguity* is of two main types: lexical and structural. One of Hodges’ examples (p. 24) of a lexical ambiguity is a shoe-maker’s advertisement: ‘Our shoes are guaranteed to give you a fit’. The word ‘fit’ has at least two different meanings, either of which might fit truly into the given sentence. For structural ambiguity Hodges offers (p. 24) ‘I heard about him at school’ where this might mean when I was at school I heard about him, or I heard about what he did when he was at school. In this case all of the words have the same meaning in both interpretations, but the different interpretations depend upon different construals of the structure of the sentence. Dealing with ambiguity requires that one specify which construal is in question, and that one sticks to that.

We normally think that to investigate the truth of a claim we need to know what it is talking about and what is being about whatever that may be. The ‘what it is talking about’ is usually termed the sentence’s *reference*. One of pervasive features of ordinary language is the way in which reference is very often determined, not by the words in the sentences so much as the context in which those words are used. Hodges (section 5) indicates several varieties of this:

Token-reflexives (where reference is traced via the occasion of use: ‘I’, ‘now’, tenses, etc.)

Deictics (where identifying the reference requires some sort of pointing: ‘this chair’)

Almost all proper names (there are millions of ‘John Smiths’ but usually we can use such a name without any problems)

Cross-referencing (where a phrase picks up a reference from some earlier phrase: ‘the aforementioned reindeer’, a lot of use of pronouns)

For the purposes of our mini-language, once reference is fixed it has to remain that way, but you can see that if we are dealing with thought expressed in ordinary language there may be room for a further kind of ambiguity to slip in.

We have seen that in our mini-language a sentence is either true or false, and not both. But in ordinary language things seem a lot more complicated.

One type of problem is presented by reference failure. Consider a claim such as 'Jim's daughter is wearing a pink dress'. If someone responds 'No, she isn't' they would normally be taken to be saying, of Jim's daughter, that she isn't wearing a pink dress, maybe because her dress is yellow, or because she is wearing jeans, or... But they might be basing their response on the belief that there is no such person as Jim's daughter. Now some would say that in this second sort of case it would be better to regard the claim we started with as neither true nor false - the question doesn't arise, as Strawson put it. If you follow that line, there are not just two truth-values, but a third category.

Another different problem arises from the vagueness of so much language. Some people are fat, some people are thin; some people are in between. But we cannot determine precisely where the borders are, so there are cases where it is not clear whether a particular person is or is not fat (and thus it is unclear whether it is true that that person is or is not fat). Instead of just one of two and only one of those two truth-values, it seems we actually deal in a different third value (borderline).

Hodges (section 6) also mentions another kind of case where it is not possible to determine whether a claim is true or false: where our existing language just hasn't adapted to a bizarre but now actual situation (his example is of 'split-brain' patients and whether the person with such a brain knows what he or she sees with only the non-language using half of their brain. This kind of issue is pertinent to a lot of philosophical 'thought experiments'.)

Hodges' section 7, on misleading statements, raises issues that I want to consider under the heading of '*implicatures*'. This is a term we owe to H.P. Grice. The general idea is that, given the conventions we adopt in using language in talking to each other, there are various things we can be taken to convey that are not literally part of what we say. Take Hodges' second example: after a party a man admits to his wife 'I did kiss some of the girls' when in fact he kissed all of them at the party. One reaction is to say that he lied: by saying 'some' he said 'not all', which was false. Grice's view is that what he said was true, but given the rule of polite conversation that you should say as much and no more than is necessary to convey the relevant facts you know, if the man said 'some' his wife could reasonably take him to suggest that there were some girls he didn't kiss. So the sentence in its context conversationally implies 'not all' though that is not what it literally says.

As Hodges' examples show, this issue arises for all our binary connectives. ' $P \wedge Q$ ' is true simply if  $P$  is true and  $Q$  is true; but if  $P$  = Jim hit Bill [in 2012] and  $Q$  = Bill had a broken leg [in 2010] we might not accept the English conjunction ' $P$  and  $Q$ '. When we narrate series of events, our 'and's typically implicate 'and then'. [This is of course only one of the possible ways of theorising these cases: Grice tried to find a way in which English words could be given meanings equivalent to their corresponding items in our mini-language, so he had to introduce some machinery to explain away appearances to the contrary. You could try to theorise English on the assumption that the literal meaning of 'some' includes 'not all' and similarly for the other cases.] Similarly, one can try to use these ideas to explain away the apparent exclusivity of some disjunctions which literally are merely inclusive: if a speaker knows that both disjuncts are true he or she should say so; asserting only the disjunction then implicates that all one knows is that one or the other is true, but not both.