5.2.4. Three forms compared

Before going on to work through some sample analyses, let us bring together the key points about the three connectives:

English forms	Symbolic analyses	Truth conditions	Core implicatures	Secondary implicatures
ψ *if* φ	ψ ← φ	same value as ψ when φ is **T**;	φ is sufficient	φ is necessary
if φ, ψ	φ → ψ	otherwise **T**	for ψ's truth	for ψ's truth
ψ *only if* φ	¬ ψ ← ¬ φ	opposite value to ψ when φ is **F**;	φ is necessary	φ is sufficient
	¬ φ → ¬ ψ	otherwise **T**	for ψ's truth	for ψ's truth
ψ *unless* φ	ψ ← ¬ φ	same value as ψ when φ is **F**;	φ is necessary	φ is sufficient
unless φ, ψ	¬ φ → ψ	otherwise **T**	for ψ's failure	for ψ's failure

The core implicatures are the ones that can make an indicative conditional seem non-truth-functional. The secondary implicatures are the ones that can make it difficult to distinguish between different kinds of conditional. The latter implicatures are easily canceled.

It may help, when trying to recall the symbolic analysis of *only if*, that in response to the question *Did they finish?* the answers *Only if the supplies arrived* and *Not unless the supplies arrived* come to pretty much the same thing (give or take a few implicatures). Combining this idea with the paraphrase of *unless* as *only if*, we get the formula *not if not* for *only if*—that is, ψ *only if* φ amounts to *Not* ψ *if not* φ or ¬ ψ ← ¬ φ.

Here are some examples involving *only if* and *unless*.

If Dave didn't show up, they moved the piano only if it was a small one
Dave didn't show up → *they moved the piano only if it was a small one*
¬ *Dave showed up* → (¬ *they moved the piano* ← ¬ *the piano was a small one*)

¬ D → (¬ M ← ¬ S)
¬ D → (¬ S → ¬ M)
`if not` D `then if not` S `then not` M

[D: *Dave showed up*; S: *the piano was a small one*; M: *they moved the piano*]

Mike didn't hear from either Sue or Tom unless a call came through late
Mike didn't hear from either Sue or Tom ← ¬ *a call came through late*
¬ *Mike heard from either Sue or Tom* ← ¬ *a call came through late*
¬ (*Mike heard from Sue* ∨ *Mike heard from Tom*) ← ¬ *a call came through late*

¬ (S ∨ T) ← ¬ L
¬ L → ¬ (S ∨ T)
`if not` L `then not either` S `or` T

[L: *a call came through late*; S: *Mike heard from Sue*; T: *Mike heard from Tom*]

Notice that the form assigned to the second example would do as well for *Mike heard from either Sue or Tom only if a call came through late*, a sentence that is a fair paraphrase of the one we analyzed. The first example shares its form with *Unless Dave showed up, they moved the piano only if it was a small one*, also a reasonable paraphrase.

In general, the forms marked by *unless* conditionals can also be expressed by simple conditionals, and the form marked by an *only-if* conditional can be expressed by any of the three English forms. That means that there can be a number of different ways of synthesizing an English sentence with a given form. For example, the truth conditions of the analyzed sentence

¬ *they ate outside* ← ¬ *it was warm*

can be expressed by any of the following:

They didn't eat outside if it wasn't warm.
They didn't eat outside unless it was warm.
They ate outside only if it was warm.

And the differences among implicatures in this case are limited enough that these sentences would be equally appropriate in many situations.

Glen Helman 25 Aug 2005