'If, then': The Material Conditional

Conditionals come in many forms.[1]

> *Conceptual*: 'If this is an apple, then this is a fruit.'
> *Subjunctive* (counterfactual): 'If people were smart, they would read Plato.'
> *Indicative*: 'If there is a lot of traffic, we will be late.'

Perhaps there are more. Since subjunctive conditionals are (probably) not truth-functional, the challenge is to make sense of natural language indicative conditionals with the material implication ('⊃') of PL, or vice versa. As our discussions in class have shown, this is not possible in an elegant and direct way. The best is: '$\phi \supset \psi$' is equivalent to '$\sim(\phi \,\&\, \sim\psi)$' (as well as '$\sim\phi \vee \psi$').

The main obstacle is the natural idea that the *then*-clause (the consequent) *follows from* the *if*-clause (the antecedent). (Remember: both clauses are 'the' conditional, when connected with the horseshoe.) In this sense, if $\phi \supset \psi$, then ϕ 'entails' ψ, so that ψ is 'a consequence of' ϕ. There seems a *connection* of some sort between ϕ and ψ, when connected by '⊃'.

But this connection is undermined by the *truth-functional* definition of '⊃'. Remember, '$\phi \supset \psi$' is *false* iff ϕ is true and ψ is false, and *true* otherwise (see Reader, p. 17). And this leads to two *paradoxes*, i.e. violations of our natural intuitions about conditionals. Here is an example to brings this out: 'If I am well, then I will come to class.' (Let's call this 'the promise'.)

	P I'm well	*Q* I come to class	*P* ⊃ *Q* If I'm well, I come to class	Interpretation
(a)	T	T	T	It is true that I am well and it is true that I come to class. I keep the promise, so what I say is true.
(b)	T	F	F	I'm well but I'm not coming to class (I read Plato instead). It is clear that I do not keep my promise: I say something false.
(c)	F	T	T	I'm not well but I come to class anyway. I keep my promise.
(d)	F	F	T	I'm not well and I do not come to class either. Do I keep my promise? Yes, for I *would* come if I *were* well.

1 For detailed discussion, Edgington, D. (2014). Indicative Conditionals. *Stanford Encyclopedia of Philosophy*. URL: https://plato.stanford.edu/entries/conditionals/.

Case (b) is the most relevant: a conditional could not be true if the antecedent is true while the consequent is false. The truth the to conditional thus depends on the truth of its constituent clauses. (This is a what truth-functionality means, see Reader, p. 14.)

Cases (c) and (d) are the paradoxical ones:

(1) Whenever the *antecedent* is *false*, the whole conditional is true. Thus, a conditional with a false antecedent is true, regardless of the truth or falsity of the consequent. So, since the truth of the antecedent is *irrelevant* for the truth of the *conditional*, it makes no sense to try to establish its truth when evaluating the truth of a whole conditional.

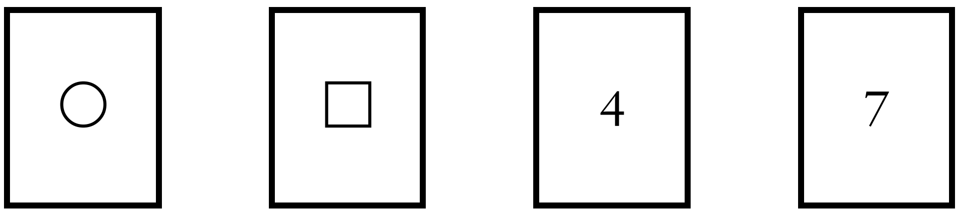
(2) Whenever the *consequent* is *true*, the whole conditional is true. So, a conditional with a true consequent is true regardless of the truth of the antecedent.

This means that the *content* of ϕ and ψ is irrelevant for the truth of $\phi \supset \psi$. And this in turn suggests that ϕ and ψ are *not really connected*. But this exactly this connection *is* a requirement for quotidian 'if…then' statements.

People are usually very bad at interpreting material conditionals. Take the Wason 'card test', for instance.[2] Each of the four cards below has a figure on one side and a number on the other side. Figures and numbers appear according to this rule:

If a card has a circle on one side, then it has an even number on the other.

Question. Which of the cards do you need to turn over to find out whether the rule is broken? Choose those card or cards you *definitely* have to turn over, *and only that card or those cards*, in order to determine whether the rule is violated.



Think about. The task is to *falsify* the rule. In general, when is a conditional false? A true antecedent is the card with a circle, and a false consequent is the card with the *uneven* number. Lexicon: P = ○, $\sim P$ = □, Q = 4, and $\sim Q$ = 7. Given this information, which card(s) do you select?

Solution. The combination of circle and 7 refutes the rule, and this is why you have to turn them over.

2 Wason, P. C. (1968). Reasoning about a rule. *The Quarterly Journal of Experimental Psychology*, *20*, 273–81.