Indicative conditionals

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1 Three types of conditionals

A first key distinction is the distinction between indicative and subjunctive/counterfactual conditionals, which is often introduced via the contrast between conditionals like

> If Oswald didn't kill Kennedy, then someone else did.
>
> If Oswald hadn't killed Kennedy, someone else would have.

We've already talked (when we discussed modals) about the second sort; our topic today is the first.

Indicative conditionals should also be distinguished from 'biscuit conditionals', as in

> There are biscuits on the sideboard if you want them.

Our focus today will be on indicative conditionals. As we'll see, it is surprisingly difficult to give a semantics for indicative conditionals which, in all cases, agrees with our intuitions about their truth conditions.

2 Indicatives as material conditionals

In your introductory logic, class, the "if-then" you learned was the material conditional, which we can symbolize by '$\supset$'. '$\supset$' is, like 'and', a truth-functional connective; whether a sentence

$p \supset q$

is true depends only on the truth-values of p and q. In particular, it is true iff p is false, or q is true.

One very simple hypothesis is that indicative conditionals just are material conditionals; that, in English, 'if p, then q' is true iff the material conditionals '$p \supset q$' is true.

The main arguments for this view are attempts to show that indicative conditionals are equivalent to — have the same truth conditions as — the corresponding material conditional. One way to show that two sentences, p and q, are equivalent is to show that p entails q and that q entails p.

It is relatively uncontroversial that indicative conditionals entail the corresponding material conditional. For if it didn't, then we could have a situation in which 'if p then q' was true, and p true, and q false. But this seems impossible.

The opposite entailment is much more controversial. Here are two arguments for the conclusion that material conditionals entail the corresponding indicative.

Argument 1. ake any sentence of the form 'p or q', like

> Either philosophy is the best major or physics is.

This seems to immediately entail the corresponding indicative:

> If philosophy isn't the best major, then physics is.

And in general sentences of the form 'p or q' seem to entail 'if not p, then q.' But then it follows that sentences of the form '(not p) or q' entail 'if p, then q.' And this is equivalent to the claim that the material conditional entails the corresponding indicative conditional.

Argument 2. This argument rests on two assumptions. The first is that if p entails q, then the indicative 'if p, then q' is true. The second is that sentences of the following forms are equivalent:

> (i) If p, then, if q then r
>
> (ii) If p and q, then r

Using the equivalence of (i) and (ii), we argue for the claim that material conditionals entail the corresponding indicative conditional. Consider the material conditional $p \supset q$. There are two ways for this to be true: either $\neg p$ is true or q is true. We want to argue that, either way, the indicative conditional 'if p then q' is true:

> Suppose first that $\neg p$ is true. We know that an indicative conditional is true if its antecedent entails its consequent, and hence that 'if p & $\neg p$, then q' is

true. This is a sentence of form (ii); by the equivalence of (ii) and (i), we get that 'if ¬p, then if p then q' is true. We are supposing that ¬p is true; by modus ponens we can then derive that 'if p then q' is true, which is what we want.

Suppose now that q is true. The argument here is parallel to the above. By the fact that indicatives are true if their antecedents entail their consequents, we get that 'if p and q, then q' is true. By the equivalence of (i) and (ii), we get that 'if q, then if p then q' is true. But we are supposing that q is true, so by modus ponens we derive that 'if p then q' is true.

We conclude that if p⊃q is true, so is the indicative 'if p then q'.

Given that we accept the equivalence of (i) and (ii), the only way to block the argument seems to be to deny modus ponens. Here's a suggested counterexample to modus ponens:

> If a Republicans will win the election, then if Reagan will not win, Anderson will win. A Republican will win the election. So, if Reagan will not win, Anderson will win.

Is this convincing?

3 Paradoxes of material implication

So we have arguments that the indicative conditional is true iff the corresponding material conditional is. But this leads to some very surprising consequences (sometimes called the 'paradoxes of material implication'). These result from the fact that it is very easy to make a material conditional true: all one needs is either a false antecedent or a true consequent. And, if material conditionals entail the corresponding indicative, it is also very easy to make indicatives true. If indicatives were equivalent to material conditionals, the following arguments would be valid:

> Bob failed the class.
>
> If Bob got an A on every assignment, then he failed the class.

> The sun will come up tomorrow.
>
> If the sun ceases to exist in the next five minutes, the sun will come up tomorrow.

> The sun will come up tomorrow.
>
> If the sun doesn't come up tomorrow, no one will be surprised.

But most people think that arguments of this sort are not valid; that, in each case, the first sentence can be true and the second sentence false. But if this is right, then the theory that indicative conditionals are equivalent to material conditionals must be false.

This leaves us with a kind of paradox: we have good arguments in favor of the material conditional theory, but also powerful counterexamples to it. Let's explore some alternatives to the theory.

4 Indicatives and possible worlds

A different sort of view treats indicative conditionals in a way more like the treatment we briefly discussed in connection with counterfactuals. One way into this view is to begin, not with truth conditions, but with the question of when we ought to believe some conditional 'if p then q.' Many have thought that something like the following is right: we 'hypothetically' add p to our stock of beliefs and ask whether, on that basis, we should believe q.

One might think that we should use this model of belief to guide our view of truth conditions. Stalnaker expressed one way of developing this sort of view as follows:

> Now that we have found an answer to the question, "How do we decide whether or not we believe a conditional statement?", the problem is to make the transition from belief conditions to truth conditions . . . . The concept of a possible world is just what we need to make the transition, since a possible world is the ontological analogue of a stock of hypothetical beliefs. The following . . . is a first approximation to the account I shall propose: Consider a possible world in which A is true and otherwise differs minimally from the actual world. "If A, then B" is true (false) just in case B is true (false) in that possible world.

This raises the question: if this is the correct view, what distinguishes indicative and subjunctive conditionals? One answer: the pragmatic requirement that, in the case of an indicative 'if p then q', p be compatible with the context set. Does this explain the contrast between the two 'Oswald' sentences above?

An immediate question for this view is how it can respond to the two arguments given above for the equivalence of indicative and and material conditionals. Stalnaker's response to the first argument: the inference from the disjunction to the indicative is not valid, but is still 'reasonable', given the pragmatic rule that disjunctions are in general only assertable when the context set is consistent with both disjuncts and neither entails the other. Given plausible assumptions about how uttering a disjunction modifies the context set, and how this in turn modifies the interpretation of the relevant conditional, it turns out that whenever the relevant disjunction is accepted, the conditional should subsequently be accepted as well.

What can be said about the second argument? Why, on this sort of view, are (i) and (ii) not equivalent?

5 Conditionals and adverbs of quantification

David Lewis drew attention to sentences like these:

> Usually, if it rains in South Bend, it pours.
>
> If it rains in South Bend, it seldom pours.
>
> If it rains in South Bend, it always pours.

'Usually', 'seldom', and 'always' seem to be sentence operators. Suppose that we adopt the material conditional theory. Then we might either take these to be operating on the consequent of the conditional, or on the conditional as a whole. Does either option give us the right truth conditions?

Suppose instead that we adopt the possible worlds theory just described. Does that fare better?

Lewis suggested that instead we take these terms, which he called 'adverbs of quantification,' to be quantifiers over 'cases' which are restricted by the antecedent. On this view, the above sentences are not really conditionals at all. The role of the antecedent is not to state 'conditional information', whatever that might mean, but rather to restrict the quantifier. The role of the antecedent is thus much like 'tallest student' in 'The tallest student cut class.' This is a radical departure from the material conditional theory; on this view, 'if - then' isn't a sentence connective at all.

One might then extend this view to indicative conditionals which contain no explicit adverb of quantification; we might take these cases to involve implicit universal quantification.

So one argument for this approach is that it can handle adverbs of quantification neatly. Another, related argument is that it can handle the following case, due to Grice:

> Yog and Zog play chess according to normal rules, but with the special conditions that Yog has white 9 times out of 10 and that there are no draws. Up to now, there have been a hundred games. When Yog had white, he won 80 out of 90. And when he had black, he lost 10 out of 10. Suppose Yog and Zog played one of the hundred games last night and we don't yet know what its outcome was. In such a situation we might utter (24) or (25):
>
> (24) If Yog had white, there is a probability of $\frac{8}{9}$ that he won.
> (25) If Yog lost, there is a probability of $\frac{1}{2}$ that he had black.
>
> Both utterances would be true in the situation described ...

Grice's judgement about the truth-values of these sentences seems to be correct. But this is not easy to accommodate if we are thinking of 'if - then' as a sentence connective. For then it looks like the sentence operators which ascribe probabilities must either attach to the consequent or the indicative as a whole. The former possibility gives us incorrect results for reasons that we have already discussed. The latter would render the truth conditions of (24) and (25) as, respectively

(24*) Pr(If Yog had white, then Yog won)=$\frac{8}{9}$.

(25*) Pr(If Yog lost, Yog had black)=$\frac{1}{2}$.

But the parenthetical sentences are (given the rules of chess) logically equivalent. And this leads to a problem, since presumably logically equivalent sentences can't have different probabilities.

The restrictor theory, by contrast, offers a neat solution to this problem.

How could the proponent of the restrictor view respond to the arguments for the material conditional view given above? Are (i) and (ii) equivalent on this sort of theory?