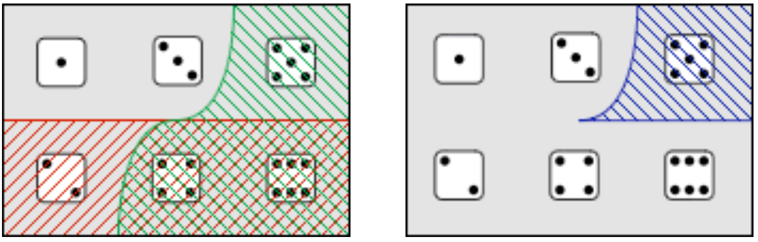
5.1.2. Does the conditional have a truth table?

We have looked at ψ *if* φ as a way of hedging the claim ψ by limiting our liability, leaving ourselves in danger of error only in cases where φ is true. If this perspective on the conditional is correct, we cannot go wrong in asserting ψ *if* φ except in cases where ψ is false while φ is true. Thus, the forecaster who predicts that it will rain tomorrow if the front goes through is wrong only if it does not rain even though the front goes through. That suggests that the truth conditions of the conditional are captured by the table below. The only cases where $\varphi \to \psi$ has a chance of being false are those where φ is true; and, in these cases, it has the same truth value as ψ.

φ	ψ	$\varphi \to \psi$
T	T	T
T	F	F
F	T	T
F	F	T

This can be seen in another way by diagramming the propositions expressed by conditionals, as in Figure 5.1.2-1. Adapting the example used with this sort of illustration before, 5.1.2-1B represents the proposition expressed by *The number shown by the die is less than 4 if it is odd*.



A B

Fig. 5.1.2-1. Propositions expressed by two sentences (A) and a conditional (B) whose consequent rules out the possibilities at the right of A.

The possibilities ruled out by the main clause or consequent of the conditional form the hatched region at the right of 5.1.2-1A and those ruled out by the antecedent or condition form the lower half. In 5.1.2-1B, the region at the right is whittled down to the portion containing possibilities left open by the antecedent, showing how the conditional weakens the claim made by the consequent alone (in the example, *The number shown by the die is less than 4*). Since the consequent is the second component of the conditional $\varphi \rightarrow \psi$, the rows of the truth table correspond to the top left and right and bottom left and right regions of 5.1.2-1A, respectively.

This account of the truth conditions of $\varphi \rightarrow \psi$ was proposed by the Greek logician Philo (who was active around 300 B.C). It was immediately subjected to criticisms by other logicians—Diodorus Cronus in particular—on the grounds that not having φ true along with ψ false is not sufficient for the truth $\varphi \rightarrow \psi$; some further connection between φ and ψ was felt to be necessary. The later report of this dispute by Sextus Empiricus contains the example

If it is day, I am conversing.

According to the table above, this is true whenever its speaker is engaged in conversation during the daytime as well as being true throughout the night under all conditions. On the other hand, according to the view of conditionals offered by Diodorus Cronus, this sentence is true at a given time only if its speaker is and always will be conversing from sunrise to sunset. If Diodorus' account is correct, the truth of the sentence depends on more than the current truth values of its components and, since that is the only input in a truth table, no truth table is possible for a conditional as he understood it.

The controversy apparently became rather widespread in antiquity, and it has reappeared whenever the logic of conditionals has been given serious attention. In recent years, quite a bit of thought has been devoted to the issue, and a consensus may be emerging. It is widely granted that certain conditional sentences are in fact false in cases beyond those indicated in the table for →. But other conditionals are held to obey the table though they carry implicatures that obscure this fact.

The clearest failures of the table occur with what are known variously as ***subjunctive*** or ***counterfactual*** conditionals. The difference in both form and content between these conditionals and ordinary ***indicative*** conditionals can be seen clearly in the following pair of examples (due to Ernest Adams):

If Oswald didn't shoot Kennedy, someone else did.
If Oswald hadn't shot Kennedy, someone else would have.

The first conditional, which grammarians would say is in the indicative mood, will be affirmed by anyone who knows Kennedy was shot by someone; but the second, which is in the subjunctive mood, would be asserted only by someone who believes there was a conspiracy to assassinate him (or who believes that his assassination was likely for other reasons). Notice also that the first suggests that the speaker is leaving open to question the identity of Kennedy's assassin while the second suggests the conviction that Oswald did shoot Kennedy. The antecedent of the second does not function simply as a hedge on what is claimed by the consequent; instead, it directs attention to possibilities inconsistent with what its speaker holds to be fact—in this case, possible worlds in which Oswald did not shoot Kennedy. That is the reason why conditionals like the second one are referred to as "contrary-to-fact" or counterfactual.

Now, if subjunctive conditionals are asserted primarily in cases where their antecedents are held to be false, it is clear that the table we have given is not appropriate for them. According to the table, a sentence of the form $\varphi \rightarrow \psi$ is bound to be true when its antecedent is false and cannot provide any information about such cases; but subjunctive conditionals seem designed to provide information in just this sort. We have to be a little careful here and remember that we can derive information from an assertion not only by considering what it implies (which is what a truth table is intended to capture) but also what it implicates. So we might consider the possibility that counterfactual conditionals really do not imply anything at all about the cases where their antecedents are false, and the information we get about such cases comes from their implicatures. But it is not hard to see that this is not so. Consider, for example, the following survey question (with *X* replaced by the name of a politician):

If the election were held today, would you vote for X?

This asks the respondent to evaluate the truth of the conditional *If the election were held today, I would vote for X*, and it makes sense to ask such a question only if a conditional like this can be false in cases where it has a false antecedent.

If the truth table above does not tell us the truth conditions of subjunctive conditionals, what are their truth conditions? A full discussion of this question would lead us outside the scope of this course, but I can outline what seems to be the most common current view. Like most good ideas, this account is hard to attribute; but two recent philosophers, Robert Stalnaker and David Lewis, did much to develop and popularize it (in slightly different versions). When evaluating the truth of a subjunctive conditional of the form *If it were the case that* φ*, it would be the case that* ψ in a given possible world, we do not limit our consideration to the truth values of φ and ψ in that world. We consider other possible worlds, too, and see whether we find φ true and ψ false in any of them. However, we do not consider all possible worlds (as we do when deciding whether φ entails ψ). Some possibilities are closer to the world in which we are evaluating the conditional than others are; and, as we broaden our horizons past a given possible world, we can move to more and more distant alternatives. When evaluating a subjunctive conditional, we extend our view just far enough to find possible worlds in which its antecedent is true and check to see whether its consequent is false in any of these. In short, a subjunctive conditional is true if its consequent is true in the nearest possible worlds in which its antecedent is true.

As an example, consider the following:

If we were in the Antarctic, we would have very cold summers.
If we were in the Antarctic, the Antarctic would have warm summers.

I take the first of these sentences to be true and the second false, because I take the nearest possibilities in which we are in the Antarctic to be ones in which it has retained its location and climate but we have traveled to it. There are, no doubt, possible worlds in which the Antarctic is a continent in the northern temperate zone (and perhaps even some in which we have stayed here and it has traveled to meet us) but they are much more distant possibilities.

This account of truth conditions of counterfactual conditionals cannot be stated in a truth table because, when judging the truth value of a subjunctive conditional in a given possible world, it forces us to consider the truth values of its components in other possible worlds. And theri failure to have a truth table puts the logical properties of those conditionals outside the scope of this course.

But what about indicative conditionals? The argument just given that subjunctive conditionals do not have a truth table do not apply. However, we are not prepared to assert indicative conditionals in all cases when Philo's table would count them as true. This can be seen by considering examples such as *If Kennedy wasn't shot in Indiana, he was shot in Texas*. This sentence is true according to the table but suggests a belief on the part of the speaker that somehow ties Indiana and Texas together in the matter of Kennedy's assassination, and it would be inappropriate for a speaker who did not have such a belief to utter the conditional. (Notic that the tie need not be a conspiracy. The sentence *If Kennedy wasn't shot in Florida, he was shot in Texas* would be appropriately asserted by someone who believed that Kennedy was shot while travelling in the two states but did not know the precise location.)

Still, inappropriateness as a result of false suggestions need not mean falsity through false implications, and there is reason for holding that a connection between Indiana and Texas is not implied by this example, only implicated. I hope you will grant that the following two sentences are equivalent:

If Kennedy wasn't shot in Indiana, he was shot in Texas.
Either Kennedy was shot in Indiana or he was shot in Texas.

And this suggests that the content of an indicative conditional can be captured by a compound that does have a truth table.

Indeed, the restrictions that we feel on the use of indicative conditionals are ones that can arise even if the truth table for → gives an accurate account of its truth conditions. They are found in the second of the sentences above, and the table for ∨ gives it the truth conditions that are given to the first by the table for →. Moreover, it is possible to see the restrictions on the appropriateness of indicative conditional as arising naturally from these truth conditions. A speaker who knows whether the components φ and ψ are true or false, generally ought to say so rather than assert the conditional (or a disjunction). For information about the truth values of at least one clause will usually be relevant to the conversation if the conditional is. As a result, someone who asserts only a conditional is assumed not to know the truth values of its components. But a speaker must have some basis for an assertion if it is to be appropriate. So we assume that anyone asserting a conditional is basing this assertion on some knowledge of φ and ψ that is sufficient to rule out the case where φ is true and ψ is false without settling the truth value of either φ or ψ. And this sort of knowledge concerning φ and ψ could only be knowledge of some connection between them. So assertion of a conditional will often be appropriate only when the speaker knows some connection between its two components, and the conditional will thus often carry the existence of such a connection as an implicature. An argument similar to this was one of Grice's chief applications of his idea of implicature.

We will pursue this a little further in 5.2.2 but, for now, we can say that one possible account of the indicative conditional is to say that its truth conditions and what it says or implies is captured by the turth table for → but that an indicative suggests or implicates something more, and the content of this implicature cannot be captured by a truth table. Indeed, the corresponding subjunctive conditional often seems to roughly capture this implicature of an indicative conditional. However, it is hard to tell whether the correspondence is more than rough. Subjunctive conditionals have their own implicatures--e.g., that the antecedent is false--and these can make the comparison difficult. And the content of a subjunctive conditional depends on what possibilities are counted as nearer than others, something that can vary with the context in which a subjunctive conditional is asserted. So, while *If Kennedy hadn't been shot in Florida, he would have been shot in Texas* may not seem to be an implicature of *If Kennedy wasn't shot in Florida, he was shot in Texas*, that may be because the relations among possibilities corresponding to the normal context of the first assertion are not the ones required to capture the implicature of the second by a subjunctive conditional.