Examples of conditionals are: ‘If it rains, then the match will be canceled,’ ‘If Oswald did not shoot Kennedy, then someone else did,’ and ‘If Carter had been re-elected, the pundits would have been surprised.’ It is no straightforward matter to give a precise delineation of the class of conditional sentences. Conditionals do not have to contain the word ‘if.’ ‘No ticket, no start’ is a conditional (provided it is thought of as directed to some particular person, not as a covert universal saying that anyone without a union ticket will not be allowed to start). Nevertheless, we all have a reasonable intuitive grasp of the intended class of sentences, and that will suffice for our purposes here.

Conditionals are typically formed by applying a dyadic sentential operator or connective. ‘If Mary went to the party, it was a success’ is the result of applying ‘if—, (then)—’ to the two sentences ‘Mary went to the party’ and ‘It was a success.’ The sentence that goes into the first place is the antecedent, and the one that goes into the second place is the consequent of the conditional. Other examples of dyadic sentential operators are ‘—or—’ which operates on two sentences to form their disjunction, the component sentences being known as disjuncts; and ‘—and—’ which operates on two sentences to form their conjunction, the component sentences being known as conjuncts. We will also have occasion to refer to the monadic sentential operator ‘It is not the case that—’ which operates on a sentence to form its negation. We will follow (reasonably) common practice and use ‘&’ for ‘and,’ ‘v’ for ‘or,’ ‘¬’ for ‘not,’ and ‘→’ for ‘if, then.’

We will be concerned with various theories of the conditional and the interconnections between these theories and valid inference patterns for conditionals.

The Equivalence Theory

It is widely agreed that ‘¬,’ ‘&,’ and ‘v’ are truth functions: the truth value of a compound sentence formed using them is fully determined by the truth value or values of the component sentences. (Sometimes this is made a matter of definition
for the symbols, and then the wide but not universal agreement is that the meanings of the natural language operators are captured, near enough, by the relevant symbols.) This is reflected in the following simple rules for these operators: \((A \& B)\) is true if and only if \(A\) is true and \(B\) is true; \((A \lor B)\) is true iff at least one of \(A\) and \(B\) is true; and \(\neg A\) is true iff \(A\) is false. The simplest and oldest theory of the conditional holds that \(\rightarrow\) likewise is a truth function. For some history, see Sanford (1989) and Mackie (1973).

If \(\rightarrow\) is a truth function, which truth function is it? Logical intuitions give us the answer.

First, the inference pattern

\[
\begin{align*}
A \\
A \rightarrow B \\
B
\end{align*}
\]

known as modus ponens, is intuitively valid. But then whenever \(A\) is true and \(B\) is false, \(A \rightarrow B\) is false. Otherwise it would be possible to have the premises of an instance of modus ponens true together when the conclusion is false.

Secondly, \((A \rightarrow A)\) is a logical truth. It follows that some conditionals whose antecedents and consequents have the same truth value (are both true or both false) must be true. But if \(\rightarrow\) is a truth function, what is true for some cases where the antecedent and consequent have the same truth value, is true for all such cases; hence, if \(\rightarrow\) is a truth function, then whenever \(A\) and \(B\) are alike in truth value, \((A \rightarrow B)\) is true.

Finally, \([(A \& B) \rightarrow A]\) is a logical truth. But there are substitution instances of it where \(A\) is true and \(B\) is false, and so \((A \& B)\) is false. But this tells us that some conditionals with a false antecedent and a true consequent are true, and so that if \(\rightarrow\) is a truth function, then whenever \(A\) is false and \(B\) is true, \((A \rightarrow B)\) is true.

This covers all combinations of truth values for \(A\) and \(B\) – both true, both false, \(A\) true and \(B\) false, and \(A\) false and \(B\) true – and, on the assumption that the truth value of a conditional is a truth function of the truth values of its antecedent and consequent, gives the truth value of \((A \rightarrow B)\) for each. The result can be summarized in the rule: \((A \rightarrow B)\) is true except when \(A\) is true and \(B\) is false. Given the rules for \(\neg\), \(\&\), and \(\lor\) stated above, this amounts to treating \((A \rightarrow B)\) as equivalent to each of: \((\neg A \lor B)\), \((\neg A \lor (A \& B))\), and \((A \lor \neg B)\). This makes sense if we translate back into English. For instance, the sentence ‘If it rains, then the match will be canceled’ does seem equivalent to the sentence ‘Either it will not rain, or it will and the match will be cancelled.’

It is common to use \(\mathcal{A} \supset \mathcal{B}\) – read as ‘\(A\) hook \(B\)’ or as ‘\(A\) materially implies \(B\),’ and known as the material conditional – as a definitional abbreviation of \((\neg A \lor B)\), so the simplest theory of the conditional can be expressed as the theory that \((A \rightarrow B)\) is equivalent to \((A \supset B)\). We will call this theory the equivalence theory.
The Paradoxes of Material Implication

If \((A \rightarrow B)\) is equivalent to the material conditional, the following two inference patterns, known as the paradoxes of material implication, are valid.

\[
\begin{align*}
\neg A \\
\hline
(A \rightarrow B) \\
B \\
\hline
(A \rightarrow B)
\end{align*}
\]

This follows from the fact that a material implication is true whenever its antecedent is false, and whenever its consequent is true. The paradoxes are not so much paradoxes of material implication but paradoxical consequences of the view that the ordinary, natural language conditional is equivalent to the material conditional, for it is counter-intuitive that the falsity of ‘Mary went to the party’ is logically sufficient for the truth of ‘If Mary went to the party, it was a success,’ particularly because it would then also be sufficient for the truth of ‘If Mary went to the party, it was not a success.’ It is also counter-intuitive that the truth of ‘The party was a success’ is sufficient for the truth of ‘If Mary went to the party, it was a success.’

The Possible Worlds Theory

It is widely agreed that the equivalence theory is right to this extent: a conditional with a true antecedent and a false consequent is false, and hence that a necessary condition for the truth of \((A \rightarrow B)\) is the truth of \((A \supset B)\). The moral typically drawn from the paradoxes of material implication is that more than the truth of \((A \supset B)\) is required for the truth of \((A \rightarrow B)\).

One addition sometimes suggested is that \(A\) be somehow relevant to \(B\). However, sometimes we use conditionals to express a lack of relevance between \(A\) and \(B\). One who says ‘If Fred works he will fail, and if Fred does not work he will fail’ is saying, sadly, that for Fred working is irrelevant to whether or not he passes. Similarly, it would not be plausible to require that \(A\) support \(B\). Ozzie Bob’s being in the UK may support his being in Wales in the sense of raising its chance of being true, but it may still be true that if he is in the UK, he is not in Wales.

A more promising approach, due to Stalnaker (1968) and Lewis (1973), draws on the resources of possible worlds semantics. It starts from the appealing idea that when we reflect on a conditional, we add ‘in the imagination’ the antecedent to the way things actually are, keeping everything else as much like the way they actually are as is possible consistent with the addition, and then ask whether in that case the consequent is true. Why, for instance, do we think that ‘If there is an earthquake in five minutes time, we will have something to worry about’ is true? Because we think...
that adding an earthquake in five minutes and keeping things otherwise as much as possible like the way they actually are – earthquakes are kept as nasty as they actually are, houses and bones as vulnerable as they actually are, what things we need to worry about the way they actually are, and so on – gives a situation, a possible, non-actual (we hope) situation, in which we have something to worry about.

We can make the idea more precise and amenable to evaluation by putting it in terms of truth conditions of the following general shape

\[(A \rightarrow B) \text{ is true (is true at the actual world) iff the closest A-world (the possible world most like the actual world at which A is true) is a B-world.}\]

This preserves the feature that a necessary condition for the truth of \((A \rightarrow B)\) is the truth of \((A \supset B)\). For suppose that A is true and B is false at the actual world. The actual world is maximally similar to itself, so the closest A-world would not in that case be a B-world. It also respects the putative lesson of the paradoxes of material implication that the truth of \((A \supset B)\) is not sufficient for the truth of \((A \rightarrow B)\). For suppose, to illustrate, that A is false. Then \((A \supset B)\) is true, but nothing is implied one way or the other about whether the world most like the actual world except that A is true is a B-world or is a not-B-world.

Historically, the possible worlds theory of conditionals was preceded by a metalinguistic view according to which \((A \rightarrow B)\) is true iff there is an X that meets some specified condition and is such that \((A \& X)\) entails B, or, equivalently, B is deductible from \((A \& X)\). See, e.g., Goodman (1947). The major issue for this view is getting the specified condition right. With the benefit of hindsight, we can see the metalinguistic approach as a natural precursor of the possible worlds approach. \((A \& X)\) entails B iff every possible world where \((A \& X)\) is true is one where B is true. This in turn is true iff, for every world where A is true, any world where X is true is a world where B is true. So the problem of specifying the condition that X must meet parallels the problem in the possible worlds approach of deciding which worlds where A is true should be counted as closest, that is, as the worlds that need to be worlds where B is true in order for \((A \rightarrow B)\) to be true.

A major strength of the possible worlds account are the answers it delivers concerning the validity of inferences involving conditionals: it delivers the intuitively right answers – as we will now observe.

**Some Famous Inference Patterns**

**Modus ponens**

\[
\begin{align*}
A \\
A \rightarrow B \\
\hline
B
\end{align*}
\]
is validated by the possible worlds account. If A is true then the closest A-world is the actual world, and so the closest A-world is a B-world just if the actual world is a B-world, that is, just if the conclusion, B, is true.

**Modus tollens**

\[
\begin{align*}
& \sim B \\
& A \rightarrow B \\
& \sim A
\end{align*}
\]

Despite the appeal of modus ponens and modus tollens, they have occasionally been challenged. There are apparent counter-examples to modus ponens involving conditionals whose consequents are themselves conditionals. (A similar case can be mounted against modus tollens.)

Imagine, following McGee (1985), that we are talking before the presidential election in which the Republican challenger Reagan beat the Democrat incumbent Carter, as expected, and there was a maverick Republican candidate, Anderson, who had very little chance of winning. And consider the following (putative) instance of modus ponens.

A Republican will win.

If a Republican wins, then if Reagan does not win, Anderson will.

If Reagan does not win, Anderson will.

The plausible claim is that in the case as described, the two premises are true but the conclusion is false. The conclusion is false because the right thing to say before hand is that if Reagan does not win, Carter and not Anderson will.

The best reply, in my view, to this argument points out that we sometimes need to do a certain amount of massaging of surface linguistic structure in order to display logical form. For instance, if I ask, Who knows where the body is buried? and am told that either Jones or Robinson could tell me, then despite the presence of the ‘or,’ what I am being told is that both Jones and Robinson could tell me. Now it is plausible that the second premise of the putative counter-example should strictly be written as ‘If a Republican wins and Reagan does not win, then Anderson will.’ The sentence whose surface form is \([A \rightarrow (B \rightarrow C)]\) has logical form \([(A \& B) \rightarrow C]\). Hence, the alleged counter-example is not really an instance of modus ponens.
Strengthening the antecedent

If the equivalence thesis is true, Strengthening the antecedent is valid. For then $(A \rightarrow B)$ is true just if $(A \supset B)$ is true, that is, if it is not the case that $A$ is true and $B$ is false. But then it is not the case that $A$ is true and $B$ is false and, in addition, $C$ is true. But that is just the case in which $[(A \& C) \supset B]$ is true. There are, however, intuitive counter-examples to strengthening the antecedent.

Take any conditional you confidently judge to be true, and yet falls short of being logically true. Its truth depends on contingent features of the situation. An example might be ‘If I jump from the top of the Empire State Building, I will fall to my death.’ There will always be something that added to the antecedent seems to turn the conditional into a false one, namely, something which (1) is known false, and (2) whose falsity is crucial to the truth of the original conditional. For instance, part of the reason that ‘If I jump from the top of the Empire State Building, I will fall to my death’ is true is that it is false that I am wearing an extremely effective, quick opening parachute. But then, surely, ‘If I jump from the top of the Empire State Building wearing an extremely effective, quick opening parachute, I will fall to my death’ is false. We have, that is, the following counter-example to strengthening the antecedent

If I jump from the top of the Empire State Building, I will fall to my death.
If I jump from the top of the Empire State Building wearing an extremely effective, quick opening parachute, I will fall to my death.

The possible worlds theory has a simple explanation of why strengthening the antecedent fails. $(A \rightarrow B)$ is true on the theory iff the closest $A$-world is a $B$-world – that is, iff the closest $A$-world is an $(A \& B)$-world. This is consistent both with this world being an $(A \& B \& \neg C)$-world and with its being an $(A \& B \& C)$-world. But only in the latter case is the closest $(A \& B)$-world an $(A \& B \& C)$-world – that is, only in the latter case is $[(A \& B) \rightarrow C]$ true on the theory.

Hypothetical syllogism (sometimes known as transitivity) is the following inference pattern

\[
\begin{align*}
A \rightarrow B \\
B \rightarrow C \\
A \rightarrow C.
\end{align*}
\]
If hypothetical syllogism is valid, then necessarily whenever both premises are true, so is the conclusion. But the first premise is necessarily true, so necessarily whenever the second premise is true, both premises are. Hence, if hypothetical syllogism is valid, necessarily whenever the second premise is true, so is the conclusion. But the passage from the second premise to the conclusion precisely is strengthening the antecedent.

Here, to add to the just given case against hypothetical syllogism, is a direct counter-example. Suppose that it may rain but will not rain much, that is to say, if it rains, it is not the case that it will rain a lot. It is plausible that the following inference has true premises and a false conclusion.

\[
\begin{align*}
\text{If it rains a lot, it will rain} \\
\text{If it rains, it is not the case that it will rain a lot} \\
\text{If it rains a lot, it is not the case that it will rain a lot.}
\end{align*}
\]

Our final example is *contraposition*, the inference pattern

\[
\begin{align*}
A & \rightarrow B \\
\sim B & \rightarrow \sim A
\end{align*}
\]

It is like strengthening the antecedent and hypothetical syllogism in being valid on the equivalence theory, invalid on the possible worlds theory, and intuitively invalid, i.e., there are intuitively appealing counter-examples to it. Here is a counter-example to contraposition, drawing on the kind of situation described when we gave the counter-example to hypothetical syllogism, and assuming the equivalence of \( \sim \sim A \) with \( A \).

\[
\begin{align*}
\text{If it rains, it is not the case that will rain a lot} \\
\text{If it rains a lot, it is not the case that it will rain}
\end{align*}
\]

It is easy to explain why hypothetical syllogism and contraposition fail on the possible worlds theory. This is left as an exercise, or see Lewis (1973).

---

**The No-truth Theory**

The possible worlds theory is one response to the difficulties of the equivalence theory of conditionals. A different response is the no-truth theory. According to the no-truth theory, conditionals have justified assertion or acceptability condi-
ions but not truth conditions. ‘If I jump from the Empire State Building, I will fall to my death’ is not strictly speaking true but is instead highly acceptable. One motivation for the theory is the view (1) that only assertions have truth values because only assertions make a claim about how things are and so get to be true just if how things are corresponds to how they are claimed to be, combined with the view (2) that to utter a conditional is not to make an assertion but rather to make a conditional assertion. We do not, strictly speaking, assert conditionals but rather assert their consequents under the condition given by their antecedents. Another motivation is the idea that conditionals are really condensed arguments (Mackie 1973). To assert \((A \rightarrow B)\) is to offer an argument from A to B via contextually given additional premises, rather than making a statement concerning how things are. A similar view sees the conditional as providing an ‘inference ticket’ to go from its antecedent to its consequent (Ryle 1950).

On the no-truth theory, there is no question of inference patterns like modus ponens and modus tollens being necessarily truth preserving. We need a different way of looking at questions of validity of inference involving conditionals. This was provided by Adams (1975).

What makes ‘If I jump from the Empire State Building, then I will fall to my death’ highly acceptable or assertable? Adams’s plausible answer is the very high probability of falling to my death given that I jump, in the sense that the probability that I jump and die is a high fraction of the probability that I jump. According to Adams, the justified assertability of conditionals is governed by

\[
(\text{Adams}) \quad \text{Ass}(A \rightarrow B) = \text{Pr}(B/A) = \frac{\text{Pr}(A \& B)}{\text{Pr}(A)}
\]

where \(\text{Pr}(B/A)\) is read ‘the conditional probability of B given A.’ (This idea can be found in Ramsey 1931, but that paper also has suggestions akin to the metalinguistic and possible worlds theories.)

Validity of inference on the no-truth theory is now (what follows is a rough sketch) analyzed in terms of assertability preservation. We set the assertability of a non-conditional premise or conclusion identical to its (unconditional) probability, and the assertability of a conditional premise or conclusion equal to the conditional probability of its consequent given its antecedent. An inference is ass-valid iff making the assertability of each premise sufficiently close to one makes the assertability of its conclusion as close to one as we please.

If we use this test for validity, we get the following results applied to the inference patterns discussed earlier: modus ponens and modus tollens come out valid, and strengthening the antecedent, hypothetical syllogism, contraposition and the paradoxes of material implication come out invalid. We get, that is, the intuitively plausible answers when judged against examples. The no-truth theory and the possible worlds theory thus share this notable advantage over the equivalence theory.

The equation of the assertability of a conditional with the probability of its consequent given its antecedent leads to an influential argument for a no-truth
theory. If conditionals have truth values, then how assertable or acceptable they are should plausibly be given by how likely they are to be true, and so if (Adams) is right, it should be the case that $\Pr(A \rightarrow B) = \Pr(B/A)$. However, conditional probabilities are not the probability of anything. They are *quotients* of probabilities: $\Pr(B/A) = \Pr(A \& B)/\Pr(A)$. We can put the essential point in terms of the possible worlds way of thinking of probability. The probability of $A$ is the sum of the probabilities of all the $A$-worlds; likewise, for $B$, $(A \& B)$, etc. The probability of $B$ given $A$ is the fraction of the probability of the $A$-worlds that goes to worlds where $B$ is true, and that in turn is the sum of the probabilities of all the $(A \& B)$-worlds divided by the sum of the probabilities of all the $A$-worlds.

It might be suggested that a quotient of probabilities is nevertheless the probability of something: perhaps the meaning of a conditional is such that for a suitably wide range of probability functions: $\Pr(A \rightarrow B) = \Pr(A \& B)/\Pr(A)$. There are, however, a number of demonstrations that this assumption leads to unacceptable results. Here is a simple version of the best known (and first) proof due to Lewis (1976, expanded in 1986).

Suppose that the equality holds for all probability functions $\Pr$ and all $A$ and $B$. Now $\Pr(A \rightarrow B) = \Pr(A \rightarrow B/B).\Pr(B) + \Pr(A \rightarrow B/B^c).\Pr(B^c)$, by expansion by cases. But if $\Pr(A \rightarrow B) = \Pr(B/A)\Pr(A)$ holds for all $\Pr$, it holds for $\Pr(\neg B/A)$ and $\Pr(\neg \neg B/A)$, as the class of probability functions is closed under conditionalization. Hence, we have $\Pr(A \rightarrow B) = \Pr(B/A \& B).\Pr(B) + \Pr(B/A \& \neg B).\Pr(\neg B) = 1.\Pr(B) + 0.\Pr(\neg B) = \Pr(B)$. But then, by the claim under discussion, $\Pr(B) = \Pr(B/A)$. This is a *reductio*, for in general the probability of $B$ is not independent of that of $A$.

**Indicative versus Subjunctive Conditionals**

If the possible worlds theory and the no-truth theory come out roughly equal in terms of validating and invalidating the inferences they ought to validate and invalidate, how do we choose between them? One answer is that we do not have to choose. The two theories should be seen as directed towards different kinds of conditionals (see e.g. Gibbard 1981). Conditionals like ‘If it rained, the match was canceled’ are sometimes called indicative conditionals. The contrast is with subjunctive conditionals like ‘If it had rained then the match would have been canceled.’ (Adams) is only plausible for indicative conditionals. A famous example to illustrate this is the subjunctive

If Oswald had not shot Kennedy, someone else would have.

If we assume general agreement with the Warren Commission, this subjunctive conditional is highly unassertable. But the conditional probability of someone other than Oswald shooting Kennedy given that Oswald did not is very high indeed, and the corresponding indicative conditional

---

Frank Jackson
If Oswald did not shoot Kennedy, someone else did

Thus, one major reason for holding a no-truth theory – namely, the appeal of (Adams) – only applies to indicative conditionals.

Moreover, there is an independent reason for giving truth conditions to subjunctive conditionals. Subjunctive conditionals are intimately connected with matters to do with dispositional properties and causation. A glass may be fragile even though its fragility is never manifested. Indeed those who own valuable fragile glasses hope that their fragility will never be manifested. What makes it true that a glass that is never dropped is fragile? The fact that, roughly, its nature is such that if it had been dropped it would have broken. But this means that if subjunctive conditionals cannot be true, we cannot say that it is true that a glass that is never dropped is fragile. Again, we frequently distinguish fluky successions from causal ones in terms of the obtaining or failing to obtain of subjunctive conditionals, that is, in terms of whether or not they are true. Thus, we address a question like, Did Fred’s getting caught in a storm cause him to get a cold? by asking, Would Fred have got the cold if he had not been caught in the storm?

In consequence, a position some find attractive is that the possible worlds theory applies to subjunctive conditionals, whereas the no-truth theory applies to indicative conditionals.

However, others worry about offering very different accounts of indicative and subjunctive conditionals. They distrust assigning to a somewhat recondite grammatical difference a very substantial semantical difference. They typically prefer a possible worlds account for both kinds of conditionals, pointing out that it makes sense that the similarity metric by which closeness of possible worlds is settled should vary with context and mood, and explain the manifest difference between ‘If Oswald had not shot Kennedy, someone else would have’ and ‘If Oswald did not shoot Kennedy, someone else did’ in terms of a difference in the metric operative in the two cases.

However, there is a reason not to apply the possible worlds theory to indicative conditionals (Jackson 1981). The possible worlds theory in effect construes a conditional as being potentially about possible worlds other than the actual world. But whereas we can say in the subjunctive that had Oswald not shot Kennedy, then things would be very different from the way they actually are in American politics, it is nonsense to say in the indicative that if Oswald did not shoot Kennedy, things are very different from the way they actually are in American politics.

The Supplemented Equivalence Theory

We have seen the attractions of the no-truth theory for indicative conditionals but it faces problems. One is that it flies in the face of the strong intuition that indicative conditionals with true antecedents and false consequents are false. This
objection can perhaps be blunted by insisting that the pre-analytic data is really
that an indicative conditional with a known true antecedent and a known false
consequent is about as unassertable as they come. A second problem is that it
cannot offer the obvious account of the notion of (justified) assertability or
acceptability that figures so centrally in it, namely, that it is tied to the likelihood
of being true. It is, therefore, worth noting a variety of equivalence theory that
explains (Adams) in terms of the view that indicative conditionals have the truth
conditions of material conditionals.

The supplemented equivalence theory (Jackson 1979) argues that there is a con-
vention governing the assertion of (A → B) to the effect that it should only be asserted
when it would be right to infer B on learning A. This convention is like that governing
the use of ‘but.’ ‘A but B’ has the same truth conditions as ‘A and B,’ but the use of
former conventionally implicates, in the terminology of Grice (1989), a contrast.
Likewise, runs the suggestion, (A → B) has the same truth conditions as (A ⊃ B) but
its use carries the implicature that the reasons for (A ⊃ B) are such that it would be
right, on learning A, to infer B (that is, to use modus ponens). Now that will be the
case just if (A ⊃ B)’s probability would not be unduly diminished on learning that A is
true – otherwise it would not then be available as a probably true premise to combine
with A on the way to inferring B. It follows that it will be right to assert (A → B) to the
extent that a) (A ⊃ B) is probable, and b) (A ⊃ B) is probable given A. But Pr(A ⊃ B/
A) = Pr(B/A), and Pr(A ⊃ B) ≥ Pr(B/A).

This view is akin to an earlier view entertained in Grice (1989) (see also Lewis
1976) which gave indicative conditionals the same truth conditions as hook but
sought to explain away the paradoxes of material implication in terms of violations
of conversational propriety or implicature instead of the conventional implicature
of the supplemented theory: the claim is that ‘~A, therefore (A → B)’ is valid
precisely because arrow is hook but seems ‘crook’ because when you know ~A, you
should come out and assert it rather than the pointless weaker (A → B). Among
the difficulties for this suggestion is the fact that supporters of the Warren Com-
mission do assert ‘If Oswald did not shoot Kennedy, someone else did’ despite
being sure that it has false antecedent. The supplemented equivalence theory
explains this in terms of the fact that the probability that someone else shot
Kennedy given that Oswald did not is very high independently of the very low
probability, according to Warrenites, of ‘Oswald did not shoot Kennedy.’

**Conditionals with Compound Constituents**

It is hard enough to give a plausible account of conditionals with relatively simple
antecedents and consequents. Indeed, it is a matter of note that a construction
we all use with relative ease has proved so recalcitrant to theory. Matters do not get easier when we look at conditionals with compound components, including cases where one or more are themselves conditionals.

Some examples seem to be sentences whose grammatical form should be distinguished from their logical form. 'If Tom had voted for Dick or for Harry, then Fred would not have won' would appear to say that if Tom had voted for Dick, then Fred would not have won, and that if Tom had voted for Harry, then Fred would not have won. What is syntactically a narrow scope 'or' seems logically to be a wide scope 'and.'

Subjunctive conditionals within the scope of conditionals, both subjunctive and indicative, are reasonably common. Examples are: 'If it had rained, then I would have got wet had I gone to the game,' 'If Fred would have died had he not agreed to the operation, then he did the right thing in agreeing to the operation,' and 'If Fred would have died had he not agreed to the operation, then he would have caused his family great grief had he not agreed to the operation.'

The issue of indicative conditionals within the scope of conditionals is more difficult. An example like ‘If the match was canceled if it rained, then the game was cricket’ seems to make sense inasmuch as it is construed as ‘If the match would have been cancelled had it rained, then the game was cricket’; i.e. with the indicative conditional within the scope of the conditional replaced by a subjunctive one. And we noted above that an example like ‘If a Republican wins, then if Reagan does not win, Anderson will’ is plausibly construed as ‘If a Republican wins and Reagan does not win, Anderson will.’ Incidentally, the situation is different for the corresponding subjunctive conditional. Suppose that Reagan did not win and we are having a postmortem. We would no doubt agree that if a Republican other than Reagan had won, it would have been Anderson. But we might well doubt that if a Republican had won, then if Reagan had not, it would have been Anderson, arguing that as the only way a Republican could have won would have been by Reagan winning, the right thing to say is that if a Republican had won, then if Reagan had not, a Republican would not have won.

**Further Reading**

Adams, Ernest (1975). *The logic of conditionals*. Dordrecht: Reidel. This is an extended defense of a no-truth theory of conditionals, focussed especially but not exclusively on indicative conditionals. It is noteworthy for its account of validity tailored for sentences that may or may not have truth values and exploiting the idea that the assertability of conditionals goes by the probability of their consequents given their antecedents.

Edgington, Dorothy (1995). On conditionals. *Mind* 104, 235–329. This is a good, detailed account of the state of play in the debate as at 1995 as well as being a contribution to the philosophy of conditionals in its own right.


Jackson, Frank (ed.). (1991). *Conditionals*. Oxford: Oxford University Press. This is a useful collection of papers on conditionals covering the main theories with a (I trust) helpful introduction.

Lewis, David (1973). *Counterfactuals*. Oxford: Basil Blackwell. This is an exposition and defense of the possible worlds theory for subjunctive conditionals including a discussion of the virtues of various versions of the possible worlds theory. Lewis holds that indicative conditionals have the truth conditions of material conditionals.


Lewis, David (1986). Probabilities of conditionals and conditional probabilities II. *Philosophical Review*, 95, 581–9. This paper and the preceding one by Lewis give in detail the proof that $Pr(A \rightarrow B) = Pr(B/A)$ cannot hold with sufficient generality to explain (Adams).


Stalnaker, Robert (1968). A theory of conditionals. In Studies in Logical Theory, *American Philosophical Quarterly Monograph*, 2. Oxford: Basil Blackwell. This paper defends a possible worlds theory differing from Lewis’s in a number of interesting ways; also the theory, unlike Lewis’s version, is intended to apply to both indicative and subjunctive conditionals.