THE ADVANTAGES OF AN IMPLICATION APPROACH

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ABSTRACT
It is usually accepted that conditional sentences are sui generis and enigmatic. In this paper I try to make them more accessible by interpreting them as claims to relations of implication restricted to a parameter world. This interpretation revives an old idea that fell into disuse, but in its improved version leads to refreshing solutions to known problems in conditional theory. The many benefits of this approach are evidenced by its insightful explanation of some counter-examples to classical argumentative forms (the paradoxes of material implication, antecedent strengthening, contraposition, hypothetical syllogism, conditional negation), conditional standoffs, the problem of counterfactuals, the referential/inferential nature of conditionals, the Apartheid thesis, the triviality results and conditionals embedding.

1. INTRODUCTION
It is usually accepted that unconditional sentences are more accessible than conditional ones. Take for instance an unconditional sentence such as ‘John went to the supermarket’. This sentence is true if John went to the supermarket, otherwise is false. The fact that John went to the supermarket is the truthmaker responsible for the truth of the sentence. There are some potential complications here. We can question which worldly entities can be potential truthmakers (may we should include state of affairs as well?), ask about the implications of truthmaking of tensed sentences (non-presentist theories or the threat of determinism), decide whether the primary bearers of truth-value are propositions instead of mere sentences, or even doubt wether it is worth positing truthmakers at all (maybe the truthmaking of all sentences would require bizarre entities such as negative facts). These are all pertinent questions that we will encounter in entries about the subject, but it is fair to say that none of these difficulties are perceived by most philosophers as unsurmountable. In the worst-case scenario, one can make an educated bet on each issue and make peace with it.

These hurdles pale in comparison with the perplexities presented by conditional sentences. For starters, we don’t have any obvious and intuitive way of addressing how conditionals represent reality or which worldly entities can make them true. If I say ‘If John went to the supermarket, he bought M&Ms’ what would be the actual truthmakers that can make this conditional true? It is not obvious there is such a thing as a conditional fact, or even a conditional state of affairs. To make matters worse, conditionals seem to have a dual nature. On one hand, they are used to represent reality, so they have categorical-like features; but on the other hand, they are also inferential in nature, so they can be also interpreted as arguments. So are conditionals statements or arguments? Maybe both? We have a tried and tested metaphysical vocabulary that allow us to make sense of the truth-value
distinctions of categorical sentences and their connection to reality. But once we try to extend this vocabulary to conditional sentences it falls apart in spectacular fashion.

One may argue that these hurdles are due to the fact that conditionals are connectives and they are more complex by nature. But any rationale in this direction will be a non-starter, since, unlike conditionals, connectives such as disjunction and conjunction fit in our basic metaphysical toolbox in a seamlessly manner. When I say that ‘John went to the supermarket and bought M&Ms’, what I said is true iff it is true that ‘John went to the supermarket’ and it is true that ‘John bought M&Ms’. No muss, no fuss. Disjunctions also pass the normalcy test with flying colours. The sentence ‘John bought M&Ms or a Hershey’s Bar’ is true iff it is true that ‘John bought M&Ms’ or it is true that ‘John bought a Hershey’s Bar’. Notice that I made the effort to present the examples solely in natural language so that uninvited intuitions from formal practices gets in the mix. A competent language user doesn’t need to be indoctrinated in formal logic to accept these truth conditions. If conditionals seem off, it is because they are more complicated. We can’t make sense of how conditionals are used to represent how things are.

It gets worse. Our intuitive judgements of probability are also distorted when they are applied to conditionals. If I attribute a high probability to a sentence, I believe in it. But what would mean to say that a conditional has a high probability? One reasonable guess is that the probability of a conditional, say, ‘If John went to the supermarket, he bought M&Ms’, is measured by the conditional probability of the consequent given the antecedent. This is the thesis known as the Equation\(^1\). This looks promising for ten minutes, but Lewis would soon show that if ever existed such a conditional, its probability would end up being the same as the probability of its mere consequent. This defies belief. The probability that John will buy M&Ms given that he went to the supermarket is not intuitively the same as the probability that he bought M&Ms\(^2\).

So conditionals don’t get along with unconditional sentences or other connectives, we have no idea if they are either arguments or statements, we don’t understand how they can represent things in the world and the only tiny intuition that seemed clear is obviously incorrect.

In this paper I will try to offer a way out of this nightmare by arguing that conditionals are perfectly natural when they are explained as claims to implications restricted to a parameter world. This interpretation allows us to offer a clear picture of the basic nature of conditionals. The article will be divided by small sections as follows: (section 2) conditionals as implication; (section 3) the paradoxes of material implication, (section 4) antecedent strengthening, (section 5) contraposition, (section 6) hypothetical syllogism, (section 7) conditional negation, (section 8) conditional standoffs, (section 9) the problem of counterfactuals, (section 10) the referential/inferential nature of conditionals, (section 11) the Apartheid thesis, (section 12) the triviality results and (section 13) conditionals embedding, (section 14) conclusion.

2. IFS AS CLAIMS OF RESTRICTED IMPLICATION

Intuitively, conditional statements express some sort of deductive reasoning, but the precise nature of this relation is

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1 See Jeffrey (1964: 702–703).
controversial. It seems obvious that if $p$ entails $q$, $p \rightarrow q$ is necessarily true, and inversely, if $p \rightarrow q$ is necessarily true, $p$ entails $q$. This relation, however, doesn’t hold in most cases, since most true conditionals are not necessarily true. Is there some other connection between the two though? Mackie suggested that conditionals are condensed arguments. Thus, to accept ‘if $p$ then $q$’ is to be willing to infer that $q$ while discovering that $p$. In this sense, the conditional ‘If it rains, the street is wet’ would express an inference we would be willing to perform given the assumption that it rains, and not a belief on a proposition. Ryle defended a similar view by suggesting that conditional sentences are like inferential tickets. To accept ‘if $p$ then $q$’ is to find out that one is entitled to argue that ‘$p$, therefore $q$’, given the condition that the premise $p$ is obtained. The reasoner does not actually need to make the inference she is entitled to, in the same way that an owner of a railway ticket does not need to use it to travel, even though she would be entitled to.

Other philosophers also highlighted conditionals’ relationship with arguments, but were cagier about its precise nature. For instance, Strawson proposed that ‘if $p$, then $q$’ conventionally implies the existence of a ground-consequence relation between the two propositions and means the same as ‘$p$, so $q$’. The hypothesis is that if ‘$p$, so $q$’ is a conventional argument-form, ‘if $p$, then $q$’ would be the conventional quasi-argument-form, and that the only difference between the two is that the premises of a quasi-argument-form are ‘entertained rather than asserted’. Strawson thinks that this would explain why we may hesitate to call conditional statements true, and prefer to call them ‘reasonable or well-founded”.

One attempt to establish this relation between conditionals and arguments is to emphasise its relationship with modus ponens. Hare hinted at this idea when he said that ‘to understand the ‘If … , then’ form of sentence is to understand the place that it has in logic (to understand its logical properties). It is, in fact, to understand the operation of modus ponens and related inferences. Jackson endorsed a similar view according to which the acceptance of $p \rightarrow q$ is measured by our willingness to employ it on a modus ponens. He argued for the importance of modus ponens as condition for the assertibility of conditionals using the concept of robustness: $p \rightarrow q$ is acceptable when $q$ is robust with respect to $p$, i.e., when $\Pr(q)$ is high and would remain high after learning that $p$. In this sense, $p \rightarrow q$ would only be acceptable when it can be employed on a modus ponens inference.

It is fair to say then that despite the prevalent Quinean view that rigidly extricates conditionals from arguments, the association between the two was perceived as natural by multiple authors. In fact, the supposed differences between conditionals and arguments are usually exaggerated. Sometimes it is said that a conditional ‘if $p$, then $q$’ does not involve an assertion of $p$ and $q$, while an argument ‘$p$, therefore $q$’, involves both an assertion of $p$ and $q$, and an additional assertion that $p$ implies $q$. But this interpretation has some problems. First, it ignores that a commitment to the truth-

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3 Here ‘$\rightarrow$’ stands for natural language conditionals, and ‘$\models$’ stands for entailment. I will use $p$, $q$, $r$, … for both sentence letters and propositional variables—the context will make it clear which one is being used.

4 Mackie (1973: 81).

5 Ryle (1950: 312).

6 Strawson (1952: 35).

7 Strawson (1952: 83).

8 Hare (1970: 16).

values of \( p \) and \( q \) can be expressed on the terms employed even if neither \( p \) nor \( q \) are asserted, e.g., ‘\( q \) because \( p \)’, ‘given \( p \), \( q \)’, etc. Second, it would mean that expressions such as ‘\( p \), therefore \( q \)’ contain three assertions, instead of one. In fact, it would imply that the word ‘therefore’ alone should be read as ‘\( p \) strictly implies \( q \)’, which is absurd. We could instead interpret ‘\( p \), therefore \( q \)’ as meaning only ‘\( p \) strictly implies \( q \)’, where \( p \) and \( q \) are not asserted, just mentioned. The commitment to \( p \) and \( q \) is expressed, but not stated.

Whatever way you look at it; it is part of the meaning of a conditional that the consequent follows from the antecedent in some sense to be specified. This intuition is reinforced by the fact that the terms that are usually associated with the protasis (‘if’, ‘given that’, ‘when’, ‘antecedent’, etc.) or the apodosis (‘then’, ‘consequent’) should be interpreted as indicative of premise(s) and conclusion, respectively. The strict implication view advanced by Clarence Lewis states that the consequent follows from the antecedent in the same sense that a conclusion deductively follows from the premise of an argument. It is an understandable mistake, since it tries to emulate the notion of entailment into the meaning of conditionals in order to do justice to the intuition that they involve some sort of implication, but it is a mistake nonetheless. Lewis view is unsatisfactory and somewhat ad hoc because it leaves no room for the specific role of conditionals in deductive arguments. In this proposal, conditionals will exhibit the same entailment relations of the deductive arguments to which they take part, but this is implausible since conditionals are not deductive arguments.

The notion of material implication advanced by Russell is more promising in that regard. It offers a notion of implication that is somewhat associated with our intuitions about entailment, but that it also manages to have its own distinct characteristics. The only aspects in which Russell’s characterisation was lacking are the modal distinctions that highlight both the similarities and differences between material implication and entailment. As it happens, these distinctions will also provide a compelling strategy to explain away the counter-intuitive aspects of conditionals.

One premise \( p \) materially implies a conclusion \( q \) if, and only if, it is not the case that both \( p \) is true and \( q \) is false in a given world that is assumed as a parameter. This is a relation of material implication. This reference to a parameter world is justified by the fact that when we evaluate arguments that contain a material implication in the premise, we consider all the possible worlds in which the premise is true. The set of these possible worlds might include the actual world, but don’t need to be restricted by it\(^{10} \). The relation of formal implication is slightly different. One premise \( p \) formally implies a conclusion \( q \) if, and only if, it is not the case that \( p \) is true and \( q \) is false in any possible world.

We can say then that in a material implication the relation of logical consequence is restricted to a parameter world, whereas in a formal implication the relation of logical consequence is unrestricted and extends over many worlds. One way to talk about this distinction is to

\(^{10}\) Another reason is that possible world theories always redirect us to the closest-\( p \) world to evaluate the truth value of a conditional, but in this \( p \)-world the relation of implication between \( p \) and \( q \) is also material. In order to make sense of the classical use of material implication and differentiate it from its use in possible world theories, we observe that in the second, but not in the first, the parameter world is always the closest one where \( p \) is true. In order to make sense of the classical use of material implication and differentiate it from its use in possible world theories, we observe that in the second, but not in the first, the parameter world is always the closest one where \( p \) is true.
maintain that formal and material implication are the same type of implication presented in two degrees. In the first degree, we have what is usually referred to as the relation of material implication, which is restricted by a parameter world. In the second degree, we have what is known as a relation of formal implication, which ensures that in every possible world in which their premises are true, their truth is preserved. The important thing is that the same pattern of implication presented in first degree is repeated in the second degree. Thus, instead of relying on a distinction between material and formal implication, we can adopt a distinction between implications in first and second degree.

Conditional sentences are claims to a deductive inference, which means that the assertion of a conditional contains the implicit claim that the antecedent (or premise) necessitates the consequent (or conclusion) relatively to the parameter world. The fact that the claim to a necessitation relation is restricted to a given world does not alter the dynamic. Conditional sentences are arguments, not connectives. If they happen to be used in arguments, it’s because we make arguments that involve arguments either as a premise or a conclusion, or both.

One could object that even if it is conceded that conditionals are claims to implication restricted to the actual world, necessitation is a requirement that is too strong for most conditionals that are about matters of fact. There is an easy way to address this worry by adding a probability qualification in the consequent in such cases. In these cases, $p$ entails that $q$ is more likely relatively to the parameter world. We are still thinking in terms of implication, a notion that is more accessible and direct than the quicksand of conditional probability and related intuitions.

3. THE PARADOXES OF MATERIAL IMPLICATION

Let’s consider the first paradox of material implication, i.e., the argumentative form $\neg p \models p \rightarrow q$. One apparent counterexample to this argumentative form is ‘Some John did not drink poison. Therefore, if John drinks poison, it will be good for his health’. Intuitively, the conclusion is false. But let’s analyse this argumentative form interpreting conditionals as implications restricted to a parameter world. The first paradox can be interpreted as claiming that that in every possible world in which $\neg p$ is true, $p$ implies $q$ in that parameter world. The conclusion of the argument seems false if we conceive a world where $p$ is true, but this modal intuition is motivated by poor reasoning. This way of thinking ignores that the world parameters in this case is a world where $p$ is false, not true.

The argumentative form, $q \models p \rightarrow q$, is classically valid, but has counter-intuitive instances in natural language such as ‘The match will not be cancelled. Therefore, if the players broke their legs, the match will not be cancelled.’ Let’s call this argumentative form the second paradox of material implication. The second paradox can be interpreted as claiming that that in every possible world in which $q$ is true, $p$ implies $q$ in that parameter world. The apparent counter-example seems plausible if we ignore that this claim to implication is restricted to parameter worlds in which $q$ is true. Since in those worlds the match is not cancelled, the assumption that the players broke their legs is also false. Once again the contrary intuition is motivated by a modal illusion and poor reasoning: what seems obvious results from an illicit shift in the parameter world.

4. ANTECEDENT STRENGTHENING
This reasoning also allows us to explain the counter-examples against classical argumentative forms in a principled manner. Consider antecedent strengthening: \( p \rightarrow q \models (p \& r) \rightarrow q \). This argumentative form faces the following counter-example: ‘If the match is struck it will light. Therefore, if the match is struck and it is held under water, it will light’. In order to understand what is wrong with this counter-example, let’s take a step back and consider one feature of deductive validity, namely, monotonicity. If \( p \rightarrow q \) and \( p \) deductively entails \( q \), this implication will persist notwithstanding additional information, including information that may render one of the premises false. Thus, the following instance of modus ponens will preserve the truth of the premise, ‘If the match is struck, it will light. The match is struck. Therefore, it will light’. Now, if we add an additional premise that makes the conclusion false, the argument will still be valid. Thus, the following instance of modus ponens is valid, ‘If the match is struck, it will light. The match is struck. The match is held under water. Therefore, it will light’. This argument is somewhat counter-intuitive because the truth of the additional premise is incompatible with a background condition required for the conclusion, i.e., that the match is dry. But then again, if this premise is true, the conclusion is false, but so is the first premise. So there is no conceivable circumstance where all premises are true and the conclusion is false. Therefore, the counter-example is merely apparent.

The same reasoning holds for the implication restricted to a parameter world. If \( p \rightarrow q \) is true, \( p \) implies \( q \) in a parameter world and the addition of another premise will not make this implication invalid. Thus, if the implication ‘If the match is struck it will light’ is valid, it will remain valid given the addition of the premise that the match is held under water. This is somewhat counter-intuitive, because we know that under typical background conditions, the strengthened conditional will not have a true antecedent and a true consequent. However, this not a counter-example, since the strengthened conditional will only be false with a true antecedent and a false consequent, and in this circumstance the premise is also false. Or to put in other words, in the only circumstance where the attempt of implication exhibited by the strengthened conditional is invalid is also a circumstance where the attempt of implication exhibited by the premise is also invalid. The validity of antecedent strengthening can be explained as a form of monotonicity related to the relations of the implication in the premise and in the conclusion. The reason why antecedent strengthening is perceived as invalid is that the implication restricted to a parameter world is monotonic, while the evidential support between the antecedent and the consequent is not. If the evidential support may well be undone by additional findings, the implication still holds. But we can’t approach deductive logic as nonmonotonic logic.

5. CONTRAPOSITION

Contraposition allows us to infer \( \neg q \rightarrow \neg p \) from \( p \rightarrow q \). This argumentative form has counter-intuitive instances such as ‘If it rains tomorrow there will not be a terrific cloudburst. Therefore, if there is a terrific cloudburst tomorrow it will not rain’. The conclusion seems false if we consider a parameter world where the antecedent is true, but the premise is only true in a parameter world where the antecedent is false. Thus, we can’t have an evaluation in which the premise is true and the conclusion is false. However, this not a counter-example, since the strengthened conditional will only be false with a true antecedent and a false consequent, and in this circumstance the premise is also false. Or to put in other words, in the only circumstance where the attempt of implication exhibited by the strengthened conditional is invalid is also a circumstance where the attempt of implication exhibited by the premise is also invalid. The validity of antecedent strengthening can be explained as a form of monotonicity related to the relations of the implication in the premise and in the conclusion. The reason why antecedent strengthening is perceived as invalid is that the implication restricted to a parameter world is monotonic, while the evidential support between the antecedent and the consequent is not. If the evidential support may well be undone by additional findings, the implication still holds. But we can’t approach deductive logic as nonmonotonic logic.

\[ \text{(Adams (1975: 15).) } \]
is false if they involve the same parameter worlds.

6. HYPOTHETICAL SYLLOGISM
Consider now Hypothetical Syllogism: \( p \rightarrow q, q \rightarrow r \vdash p \rightarrow r \). This argumentative form has counter-intuitive instances such as the following: ‘If Brown wins the election, Smith will retire to private life. If Smith dies before the election, Brown will win it. Therefore, if Smith dies before the election, then he will retire to private life.’ One could plausibly accept both premises, but reject the conclusion. It is absurd to suppose that Smith could decide to retire after he died.

The counterexample does not work, since the premises and the conclusion are not evaluated in the same parameter world. Suppose that the conclusion is false, i.e., that it has a true antecedent and a false consequent. In this case, Smith will not be able to retire, because he will die before the election takes place. The first premise has a false consequent and the second premise has a true antecedent. It remains to be seen whether Brown will win the election in this context. If he does, the first premise will have a true antecedent and a false consequent, and the second premise must be true, since the antecedent is true and the consequent is true. Therefore, at least one of the premises will be false. There is no counterexample.

7. CONDITIONAL NEGATION
In classical logic, \( \neg(p \rightarrow q) \) entails \( p \& \neg q \). This argumentative form faces counter-intuitive instances when someone accepts the premise due to intensional evidence, but the conclusion is a conjunction he ignores. For example, if I deny the conditional ‘If God exists then the prayers of evil men will be answered’ I must admit that, ‘God exists and the prayers of evil men will not be answered’. Thus, from the negation of a simple conditional, I can prove that God exists. This is implausible, because someone could refuse the conditional based on assumptions about the moral dispositions of God even if she does not believe in the existence of God.

Let’s that a person believes that God’s moral dispositions are essentially inconsistent with answering the prayers of evil men. The conditional then is interpreted as deductive argument such as ‘There is no possible world in which God exists but the prayers of evil men are not answered’, which can be accepted without any commitment to the truth-values of either its premise or conclusion in the actual world. In other words, the counter-example is motivated by a simple mistake. It confuses a conditional, which is a claim to an implication restricted to a parameter world, with a claim to an unrestricted implication.

8. CONDITIONALS STAND-OFF
In very loose terms, conditional stand offs occur when one individual has grounds to accept \( p \rightarrow q \), while another has equally compelling grounds to accept what seems to be the opposite conditional, \( p \rightarrow \neg q \). If conditionals have truth conditions, \( p \rightarrow q \) and \( p \rightarrow \neg q \) cannot both be true, because they seem contradictory. The reasoning then is that in order for one of the conditionals to be false, someone would have to make a mistake about the facts of the case. However, both individuals have perfect good reasons to accept each conditional. If none of them is making a mistake, none of them is saying something false. Therefore, conditionals have no truth conditions. This

\[12\text{ Adams (1965: 166).}\]
\[13\text{ Stevenson (1970: 28).}\]
puzzle is evidenced in the following example:\textsuperscript{14}

Sly Pete and Mr. Stone are playing poker on a Mississippi riverboat. It is now up to Pete to call or fold. My henchman Zack sees Stone's hand, which is quite good, and signals its content to Pete. My henchman Jack sees both hands, and sees that Pete's hand is rather low, so that Stone's is the winning hand. At this point, the room is cleared. (…) Zack knows that Pete knew Stone's hand. He can thus appropriately assert ‘If Pete called, he won.’ Jack knows that Pete held the losing hand, and thus can appropriately assert ‘If Pete called, he lost.’ From this, we can see that neither is asserting anything false.

There is a caveat with this example though. It is arguable that the example is not really symmetric because Jack has better reasons to justify his belief than Zack. This lead to attempts to offer new stand off examples which ensured perfect symmetry:\textsuperscript{15}

In a game, (1) all red square cards are worth 10 points, and (2) all large square cards are worth nothing. X caught a glimpse as Z picked a card and saw that it was red. Knowing (1), he believes ‘If Z picked a square card, it’s worth 10 points’. Y, seeing it bulging under Z’s jacket, where Z is keeping it out of view, knows it’s large. Knowing (2), he believes ‘If Z picked a square card, it’s worth nothing’.

The obvious response is that one can have epistemic bad luck even if she hadn’t done nothing. You can ‘do your job’ as an epistemic agent and still be wrong if the context is somewhat averse to your belief justification process. Moreover, if both statements are interpreted as claims to implication they can both be correct if their common premises turn out to be false, i.e., if Z didn’t pick a square card. Otherwise, notwithstanding X and Y good epistemic practices, one of the conditionals will have a true premise and a false conclusion, and one of them will be mistaken.

9. THE PROBLEM OF COUNTERFACTUALS

How can we verify a conditional when the antecedent is contrary-to-fact?\textsuperscript{16} Consider the following example: suppose that my friend almost touched a live wire. I say, with a sign of relief: ‘If you had touched that wire, you would get an electric shock’. How are we supposed to confirm the conditional if you did not touch the wire? There is the intuition that what really interest us is knowing whether she would get an electric shock in a hypothetical circumstance where she touched the wire. This intuition can be interpreted as a demand for knowing whether the premise of the conditional would imply the conclusion in a world where the premise is true. But this is simple a matter of knowing which world is taken as a parameter. If the arguer wants to know whether the implication is valid in a parameter world where the antecedent is true, and the antecedent is false in the actual world, then the actual world is irrelevant; otherwise, it is not irrelevant and the implication is vacuously valid. The notion that the only implication conveyed is one where the premise is true is misguided and confuses logic with epistemological considerations. The important thing is that while evaluating an argument, the premise and the conclusion are analysed in the same parameter world.

One could insist that only possible world theories are adequate to capture this intuition, but this is a mistake. For some strange reason people assume that only possible world theories are allowed to make

\textsuperscript{14} Gibbard (1981: 226–32).
\textsuperscript{15} Edgington (1995: 294).
use of modal intuitions, and these are the only correct modal intuitions. The limits of this point of view become clear when we consider the evaluation of a simples modus tollens argument. In these cases there are no possible worlds where both \( p \rightarrow q \) and \( \neg q \) are true, but \( \neg p \) is false, but all the possible worlds where \( p \rightarrow q \) and \( \neg q \) are true, are worlds where \( \neg p \) is true. Otherwise, the first premise would contain a true antecedent and a false consequent. Thus, the only meaningful way to make sense of a simple *modus tollens* argument is to abandon possible world theories.

10. THE REFERENTIAL/INFERENTIAL NATURE OF CONDITIONALS

Conditionals seem to have a dual nature. On one hand, they are used to represent reality, so they have categorical-like features; but on the other hand, they are also inferential in nature, so they can be also interpreted as arguments. So are conditionals statements or arguments? Maybe both? We have a tried and tested metaphysical vocabulary that allow us to make sense of the truth value distinctions of categorical sentences and their connection to reality. But when we try to extend this vocabulary to conditional sentences, it falls apart.

The present interpretation provides an easy answer for this problem: conditional statements are claims to a relation of implication between two propositions, the premise (antecedent) and the conclusion (consequent). In other words, they are statements about how one proposition ensures the truth of another in a parameter world. There is no need to resort to a dual nature, for they are categorical statements about facts associated with implication. A conditional corresponds to reality if the premise implies the consequent, otherwise they do not.

11. THE APARTHEID THESIS

The Apartheid thesis states that indicative and subjunctive conditionals have different truth conditions. One of the main arguments that have been presented to support this thesis are the Adam pairs. Consider the following pair of conditionals:

1. If Oswald did not kill Kennedy, someone else did.
2. If Oswald had not killed Kennedy, someone else would have.

Intuitively, these conditionals have different truth conditions. After all, in order to accept (1) is enough to know that Kennedy was killed by someone, but to accept (2) is necessary to assume a conspiracy theory regarding its murder\(^{17}\).

The intuition that supports the Apartheid thesis can be explained away in the following manner: since an indicative ‘if \( p \) is the case, then \( q \) is the case’ should be interpreted as saying ‘\( p \) implies \( q \) in a parameter world’, it is also natural to think that a subjunctive ‘if \( p \) were the case, then \( q \) would be the case’ should be interpreted as saying ‘if \( p \) were true, \( p \) would imply \( q \) in a parameter world’. But one can accept that \( p \) implies \( q \) in a parameter world, at the same time if she denies that if \( p \) were true, \( p \) would imply \( q \) in a parameter world. The error is in assuming that the fact that the antecedent is knowingly false makes any difference to the type of claim involving in an implication.

The implication heuristic nullifies approaches that give too much importance to the grammatical aspects of different conditionals since they are all removed from

\(^{17}\) Lewis (1973: 3). This example is a modification of the original example presented by Adams (1970: 90). Hence the name ‘Adam pairs’.
the expanded propositional content. The propositional content of complete conditionals does not admit the subjunctive mode of the propositions involved in the implication. For instance, we cannot say ‘The proposition ‘Kennedy were not killed by Oswald’ entails ‘Someone else would have killed Kennedy’, since this is ungrammatical. But if the full propositional content removes the subjunctive mode, then all theoretical intuitions motivated by the subjunctive mode are eliminated as a consequence.

12. THE TRIVIALITY RESULT

The thesis known as the Equation states that the probability of \( p \rightarrow q \) is the probability of \( q \) given \( p \)\(^{18}\). Lewis has shown that the acceptance of the equation implies that the probability of \( p \rightarrow q \) is the probability of \( q \), which is implausible: the probability of a conditional cannot plausibly be the same as the probability of its consequent, e.g., the probability that the match will light given that is struck is not intuitively the same as the probability that it will light\(^{19}\).

However, we can show that a similar result it is not only expected, but intuitively satisfactory if we interpret conditionals as implications restricted to a parameter world. In order to realize this task we need to make some assumptions. First, let’s assume that conditional probability is primitive, i.e., that \( \Pr(q/p) \) can’t be defined as \( \Pr(p&q)/\Pr(p) \). Intuitively, I can attribute a high probability to \( q \) given the assumption of \( p \) even if I don’t know the probability of \( p \). For instance, I can attribute a high probability to the ceremony being cancelled tomorrow given the assumption that there will be a heavy rainfall, even if I don’t know the probability that there will be a heavy rainfall tomorrow. Thus, saying that we are considering the probability of \( q \) given \( p \) amounts to saying that we are evaluating the probability of \( q \) in a context where \( p \) is taken as true. Now, if we accept that \( p \rightarrow q \) is equivalent to \( \neg p \lor q \), and the equation, it follows that the probability of \( \neg p \lor q \) equals the probability of \( q \) given \( p \). But the probability of \( \neg p \lor q \) is the same as the probability of \( B \) in a context where \( p \) is taken as true. Or, to put in other words, if \( p \) is assumed as true, the probability of \( \neg p \lor q \) is the same as the probability of \( q \). Now, we already agreed that \( p \rightarrow q \) is equivalent to \( \neg p \lor q \). Consequently, if \( p \) is assumed as true, the probability of \( p \rightarrow q \) is the same as the probability of \( q \). QED

13. CONDITIONALS EMBEDDING

Now let’s consider the phenomenon of embedded conditionals. Some will argue that the if conditionals were regular truth- valuables sentences, conditional embedding would not be so rare and obscure\(^{20}\). But if conditionals are interpreted as claims to implication this rarity becomes understandable. If arguments that contain an argument in either its premises or conclusion are pretty unusual in theorisation, imagine in natural language. But they can be made intelligible with the implication heuristic, even if they turn out to be convoluted. For instance, the conditional \( p \rightarrow (q \rightarrow r) \) can be interpreted as ‘\( p \) implies that \( q \) implies \( r \) in a parameter world’. This provide us with a clear rationale to interpret successive reiterations of embedding in conditionals, with increasing orders of complexity. We can explain conditionals in embedding contexts as composed assertions of implication restricted to parameter worlds. Just as we

\(^{18}\) See Jeffrey (1964: 702–703).

\(^{19}\) See Lewis (1976: 299–300).

may have one or more premises in an argument, we may have one more proposition in an antecedent or consequent. This is another puzzle that was laid to rest.

14. SUMMING UP
Interpreting conditionals as claims to implication restricted to a parameter world highlights the flexible nature of conditionals, for we can ascertain their truth values in different worlds. It also brings formal implication closer to conditionals, since they are simply the same type of implication without being restricted to a single world. And, on top of it all, it allows us to explain away counter-examples and puzzles that have plagued conditional experts for centuries.

REFERENCES