

# Philosophy of Language and Logic

Term paper: The material analysis

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Conditional statements are a large part of human communication. Phrases like “if you help me out, I will help you in return” demonstrate one particular type of conditional statement, that being the indicative conditional. These statements contain an antecedent (“you help me out”), and a consequent (“I will help you in return”). The relationship between these is such that if the antecedent is true, the consequent must also be true, otherwise the statement as a whole would be false. This much is clear from everyday communication. While all indicative statements contain an antecedent and a consequent, they need not always be connected according to the if-then structure of the aforementioned example. Statements such as “you scratch my back, I scratch yours” convey the same logical relationship, as do statements where the consequent precedes the antecedent like in “I will help you out in return for you helping me”.

In indicative statements, the antecedent and consequent seem to be in a relationship expressible in propositional logic. As mentioned above, if the antecedent is true, the consequent must be true as well. Analysing the further truth functions proves however much more complicated. One proposal for doing this is the so-called material analysis, which proposes equivalence between the indicative conditional and the material conditional. While this analysis seems appealing at a first glance, there are numerous problems expressed in the literature resulting from this approach. In this paper I will outline the material analysis in general and the problems that it creates, followed by Grice’s approach at defending the material analysis. I will argue that Grice’s theory is ultimately not successful, and I will propose a variation of his approach which I believe to be more successful.

## 1 Structure

This paper will begin with a quick overview of the used terminology as well as the notation that will be used for the various logical operators. I will then briefly cover the reasons for even pursuing the material analysis, explaining why it is the foremost theory of analysing indicative conditionals as truth

functional. The section afterwards will cover the shortcomings of the material conditional when it comes to expressing indicative statements. These examples will demonstrate how the indicative conditional has greater nuances which are not expressed by the material conditional.

Having thus covered the generic information regarding the material analysis, the next section will delve into the specific focus of this paper, namely H.P. Grice's theory of conventional-, and conversational- implicatures. I will show how this theory attempts to resolve the paradoxes brought on by the material analysis, and then proceed to argue that it is ultimately not successful in doing so. My contribution to the debate will occupy the following section, consisting of an alternate version of Grice's theory which I will outline, defend, and compare with Grice's original.

## 2 Terminology and Notation

One important aspect of logical analysis is formal notation. I will use a notation that is fairly standard in the literature, but which is nevertheless important to make clear.

There is some notation of general propositional logic, not specific to indicatives. For instance, the letters  $T$  and  $F$  (capitalised) refer to truth and falsehood respectively. Individual lower case letters will refer to generic sentences. "And", "Or", and "Not" will respectively be expressed by  $\wedge$ ,  $\vee$ , and  $\neg$ .

For conditional statements,  $A$  will refer to the antecedent and  $C$  to the consequent (both capitalised). Indicative conditionals are expressed with the right arrow symbol:  $\rightarrow$ . Material conditionals are expressed with the proper superset symbol or horseshoe:  $\supset$ <sup>1</sup>.

## 3 Why the material analysis

Starting them with the reasons for pursuing the material analysis as a potential truth. Indeed, the material analysis is the only notable suggestion for analysing the indicative conditional as being truth functional. The reason being that the material conditional fits very well with out everyday use of the indicative conditional. This can be seen clearly in the formal proof given by Edgington (Edgington 1986, section 6) which uses two fairly commonsensical assumptions:

1.  $p \wedge q \rightarrow p$  is a tautology
2.  $p \rightarrow q$  is not a tautology

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<sup>1</sup>I prefer the term "material conditional" over "horseshoe", and likewise prefer "material analysis" to "horseshoe analysis". I include the horseshoe terminology in this section only because these are somewhat common in the literature, though henceforth only the material terminology will be used.

Put in the terms of natural language, these assumptions become rather obvious: ‘If the table is blue and the table is square, the table is blue’. We can substitute  $q$  “the table is square” for any statement here and the conditional would still hold true in natural language, the same goes for  $p$ , so this is indeed a tautology. This cannot be said for the second formula though, “if the table is blue, the table is square”, so this is not a tautology in natural language. All of this is of course also assuming that the indicative conditional is truth functional, which is exactly what Edgington argues against (Edgington 1986).

Knowing that the first formula is a tautology, we can extract three truths about the functioning of the truth-functional indicative, those being:  $F \rightarrow T$ ,  $T \rightarrow T$ , and  $F \rightarrow F$ . This leaves us with one unresolved constellation, that being  $T \rightarrow F$ . We can resolve this with the second assumption, since this assumption is not a tautology, and since the other three possible constellations are already proven to hold true, this final one must be false, otherwise  $P \rightarrow Q$  would also be a tautology.

Thus, the indicative conditional is true in all cases except those where the antecedent is true and the consequent false. We know however that this is exactly the functioning of the material conditional, thus making the two logically equivalent. Keep in mind that this equivalence is still postulated on the assumption that the indicative conditional is truth functional. This assumption is central to the debate surrounding the material analysis. Importantly for this paper, Grice accepts the assumption. As mentioned previously, accepting the material analysis has numerous problems, these problems are the focus of the next section.

## 4 The problem with the material analysis

When we use the material conditional in place of the indicative conditional, we observe that there are certain things seemingly not expressed in the material case which appear to be present in the indicative. This gap is clearly observable in certain sentences which hold true in logic, but whose truth is dubious in natural language. These paradoxical sentences usually emerge from the fact that the material conditional is true whenever its consequent is true, or its antecedent is false, irrespective of other concerns.

One such concern is the relation between the antecedent and consequent, as strange sentences emerge when the two are wholly unrelated. “If the moon is made out of cheese, then I am currently writing a paper”. This sentence has can be expressed logically as:  $F \rightarrow T$ . According to the material analysis then, this formula holds true, but in natural language the sentence is incoherent.

Another paradox comes in the form of embedded conditionals. These are conditionals where the consequent or antecedent is itself another indicative conditional. This is aptly put in “if it is not raining then it is not the case that if I go outside, I will get wet”. I will formalize this statement as  $\neg A_1 \supset_1 \neg(A_2 \supset_2 C_1)$  (the numbers in subscript are for clarity only). When we accompany this

– correct, albeit unconventionally phrased – statement with the additional statement that “I do not go outside”, then one can conclude that “it is raining”.

The reasoning for this is as follows: Through the statement “I do not go outside”,  $A_2$  is made false, necessitating that  $\supset_2$  is true. The negation of  $\supset_2$  is the consequent of  $\supset_1$ . As this consequent is false,  $\neg A_1$  must also be false, otherwise  $\supset_1$  would be false. As such,  $A_1$  must be true, therefore: It is raining. The exact formulation here does not matter, one might as well say “if it is raining then it is not the case that if I go outside, I will not get wet”, then the statement “I do not go outside” implies that it is not raining. In either case, the use of the material conditional in place of the indicative conditional leads to very strange consequences, as one’s decision to go outside should not have an effect on the weather.

There are further problems one might raise in the domain of reformulating logical formulae. We know for instance that  $A \supset \neg C$  is logically equivalent to  $\neg C \supset A$  and  $\neg A \vee C$ . These contrapositions are however difficult to square with natural language.

For example, “If I drink, I do not drink excessively” would be logically equivalent to saying “if I drink excessively, I do not drink” and “I do not drink or I do not drink excessively”. The first contraposition is largely nonsensical, whereas the second seems to assert something quite different from the original statement.

## 5 Grice’s answer

Grice argues that indicative conditionals express a statement logically equivalent to the material conditional while also implying other factors which are not possible to express in the formal language of propositional logic. These factors are determined through the context of the given conversation and conventional use of natural language.

### 5.1 Conversational implicatures

The first of these – the conversational implicatures – stem from a principle Grice calls “the principle of conversational helpfulness”<sup>2</sup> (Grice 1991, p. 61). To explain this privilege, is worth quoting Grice at length:

Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.

(Grice 1991, p. 26)

This principle – Grice argues – lies at the core of many typical human conversations. Rather than applying the principle directly however, Grice extracts

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<sup>2</sup>Sometimes “The Cooperative Principle”

from its various maxims which make it easier to indicate exactly how a given statement violates the principle. These maxims are as follows; be appropriate in: Quantity, Quality, Relation, and Manner. In informative conversation, this means that we must (respectively) say no more or less than needed, make our contributions as truthful as required, say only things which are relevant to the degree established, and be as clear as necessary.

As you can see, these maxims are all relative to the conversational requirements. As such, the maxim of Manner, as an example, would require the speaker to speak clearly in an informative conversation, but might require obscurity when the conversation is part of a game or test of intelligence.

When the maxims are violated relative to the given conversation, such as excessive obscurity in informative conversation, we take the speaker to be implying something without outright asserting it. In this case, we might assume the speaker wishes to discourage their interlocutor from engaging in the topic, or they might wish to display their own eloquence in the subject. The degree to which we take something to be implied is relative to the degree in which the maxims are violated. Obvious and blatant violations can even lead to the implied meaning being directly contrary to the stated meaning.

For example, take a conversation where you are asking me whether I would recommend you to buy the same washing machine as I have. In response, I only state: “The detergent dispenser is easy to use”. I am quite clearly violating the maxim of Quantity, and my contribution is not a direct answer to your question, therefore violating – though to a lesser extent – the maxims of Relation and Manner. You might ask for me to elaborate, at which point I will repeat the same statement, Now the violation of maxims is quite blatant. The takeaway is that this model of washing machine is likely quite difficult to operate, if *only* the detergent dispenser is easy to use. I am also implying that you should not buy the same machine – if you desire ease of use that is – answering the question only with the implied meaning, not with the stated one.

With the maxims in hand, we can address general paradoxes which are brought against the material analysis. For instance, there is the above case where a false antecedent always leads to a true conditional. The example given above: “If the moon is made out of cheese, then I am currently writing a paper” violates the maxim of quantity, as we can transfer the same information in fewer words: “I am currently writing a paper”.

My violation of maxims may imply that I am in fact not writing a paper at the moment. Why else would I include such a notorious falsehood as the moon being made out of cheese? We see this more obviously when statements such as this are phrased in response to a question: “Did you start writing your paper yet?”, if I reply to this: “Is the moon made out of cheese?”, I am really saying: “obviously not”. The common opposite response would be: “Is the Pope Catholic?”, implying “obviously yes”.

Grice’s maxims can similarly address the cases of embedded conditionals:

“if it is not raining then it is not the case that if I go outside, I will get wet” can be said in a much clearer and shorter manner as: “if I go outside and it is raining, I will get wet”. Here the violation of maxims may just be a needless display of eloquence rather than implying anything in particular

While Grice can neatly address these problem of the material analysis using his theory of conversational implicatures, he cannot – with this theory – address the contraposition cases. According to all the maxims of conversation, there should be no difference between asserting “If I drink, I do not drink excessively” and “if I drink excessively, I do not drink”. For this, Grice uses the concept of conventional implicatures.

## 5.2 Conventional implicatures

Conventional implicatures imply something through the way we conventionally use certain words. This can be seen for instance in the difference between “and” and “but”. The statement: “It is nice weather *but* cloudy” is true if it is both nice weather *and* cloudy, however, the but-statement carries with it the connotation of there being a contrast between nice weather and cloudiness. Similarly, we say that indicative conditionals have truth functions equivalent to material conditions and that the indicative conditional furthermore implies something else. This something else for Grice is a reasonable connection between the antecedent and the consequent. Grice calls this reasonable connection: “robustness”.

“If the moon is made out of cheese, then I am currently writing a paper” is an example of a non-robust statement. The statement follows the general structure of an indicative conditional, so we conventionally expect robustness, though it is notably absent to anyone analysing the statement, as there is no plausible connection between the composition of the moon, and the state of my occupation. The lack of the implied robustness explains why statements like this one sound strange.

Grice calls a statement robust if it passes the Ramsey test. The Ramsey test suggests that the meaning of a statement lies in its observable consequences. In other words, the meaning of a proposition is determined by the conditions under which we would consider it true or false. The Ramsey test for conditional statements thus operates as follows: First one takes scope of one’s current beliefs. These will be dictated at least in part by context. Then, one takes an indicative statement, and adds the antecedent to one’s previous set of beliefs. If this assumption of the antecedent leads to a belief in the consequent, then the statement passes the Ramsey test.

With this, Grice can address cases of contraposition, because the conventional implicatures of the indicative conditional are not translatable using the material conditional. Thus, if we take an indicative statement, and translate it to a disjunction, we lose the conventional implicatures, which makes the statement sound rather strange.

## 6 Shortcomings of Grice's answer

While Grice's theory is powerful in addressing the paradoxes raised by the material analysis, it is not without its share of problems.

First, there is the idea that conventional implications lie outside of the truth conditions of a particular statement. One could say for instance that “ $p$  but  $q$ ” is true just in case  $p$  is true,  $q$  is true, and  $q$  is unexpected given  $p$ . Whether something is unexpected or not depends, of course, on context. Similarly, one might say  $A \rightarrow C$  is true just in case  $A \supset C$  is true, and  $A$  being the case reasonably leads to  $C$  being the case (robustness). But this is not how Grice sees these statements. Rather, he claims that the truth conditions for “but” are *just* those of “and” and that the truth conditions for  $\rightarrow$  are *just* those of  $\supset$ . The conventional use of words only makes statements sound strange if they respectively: are missing the implied contrast, or are missing the robustness.

This fully commits Grice to the consequences of the material analysis, being able to claim only that these indicatives using the material conditional have the wrong tone. It seems however that attributing the strangeness of the material analysis to tone does not always work for indicative statements. We frequently encounter indicative statements which imply complete falsehoods when given the treatment of the material analysis. The example above demonstrates this well. Extracting “I do not drink, or I do not drink excessively” from “if I drink, i do not drink excessively” is commonsensically wrong in content, not just in tone.

One can furthermore call into question Grice's maxims. It does indeed seem that some (if not many) human conversations follow the principle of conversational helpfulness. However, there are also many exceptions, such as the tests of intelligence and games mentioned earlier. The principle is thus rather demanding, while also not explaining all cases of conversation. Compare this to theories such as those proposed by Clark (Clark 2015) and Stalnaker (Stalnaker 1976). Clark uses a single concept to explain all human interactions, ranging from cooperative conversation, to non-verbal non-cooperative interaction. Stalnaker's theory can be used to explain both indicative conditionals and subjunctives. These theories thus have greater explanatory power while requiring fewer ontological commitments.

Both of these points come together as a general criticism of the weight of Grice's ontology. Grice requires us to commit to strong principles whilst not accounting for all the cases which rival theories address. This lack of simplicity does not necessarily make Grice's account wrong, though it does make it more unsatisfying. Especially problematic is the fact that simple theories with greater explanatory power do exist, leaving little room for an ontologically heavy theory such as Grice's.

The remainder of this paper will cover my personal approach to indicative conditionals which I believe to roughly match Grice's in explanatory power

with a much smaller ontological footprint. This theory is not intended as a rival to Grice's theory as such, but rather as a simplification of the concepts which he outlines, being intended more as a defence of Grice's account than anything else.

## 7 My approach

My approach will ultimately be defending the following claim: while some statements sound like indicative statements, or have the sentence structure which would suggest them, a conditional is only indicative if it passes the Ramsey test. Statements which failed the Ramsey test are not indicative conditionals so the material analysis does not apply to them. In this way, one can avoid the paradoxes that emerge from these statements when analysed with the material conditional.

Whether a statement qualifies as an indicative one does not rely exclusively on syntax. For instance, there certain keywords occasionally point to indicative statements, while at other time expressing different relationship's. "Do that again *and* you will regret it" is different from "Get me a coffee *and* I would like a bagel". Even though these statements are syntactically similar, the former is clearly an indicative statement, whereas the latter is not. The difference between these statements can be found in the context wherein the utterance is made. We expect that regret may result for one's actions, but we do not expect a desire for a bagel to arise from drinking coffee. There are of course contexts where these expectations would be different, though I think the above characterization is fairly commonsensical when no further context is given.

As such, when addressing what is and is not an indicative statement, we seem to require some sort of pointer which indicates that the antecedent could affect the consequent. This plausible connection of course sounds very similar to Grice's robustness, though I prefer to put in the terminology of the Ramsey test: the addition of the antecedent to one's set of beliefs must conceivably be able to influence the acceptance of the consequent.

For example: Given everything I know, the composition of the moon could not possibly affect my willingness to write. Therefore: "if the moon is made out of cheese, then I am currently writing a paper", fails to satisfy the robustness element and is thus not an indicative statement.

The Ramsey test can similarly address cases of embedded conditionals. For instance, the previously mentioned statement: "if it is not raining then it is not the case that if I go outside, I will get wet", formalized as:  $\neg A_1 \rightarrow_1 \neg(A_2 \rightarrow_2 C_1)$ . In this statement,  $\rightarrow_1$  passes the Ramsey test, as the rain could influence my getting wet if I go outside. The same cannot be said for  $\rightarrow_2$  however, as my going outside conventionally does not affect my getting wet. It affects me in this manner only if we presume  $A_1$ , but in any other context it does not. Therefore, we cannot subject this whole statement to the treatment of the material conditional.



Those statements which appear to be indicative conditionals but fail to pass the Ramsey test as described above are thus of a different type. For instance “If you got an A on that test, then I am The Pope” would not be an indicative statement but rather a statement expressing disbelief using an obvious falsehood (not expressing a logical relationship whatsoever). A full taxonomy could be made cataloguing such statements, though that project lies outside the scope of this paper. What is important for now is that, while indicative conditionals are logically equivalent to material conditionals, the non-robust statements – such as the aforementioned expression of disbelief – are not indicative, and therefore do not necessarily adhere to the truth function of the material conditional. If we do apply the material conditional in these cases, we highly warp the originally intended meaning.

In what ways then is this approach preferable to Grice’s? Firstly, I think that the examples above make clear that the difference between statements to which we can apply the material conditional and statements where we cannot, is one of meaning, not of tone. Grice can only explain that a given statement sounds strange because we go against the conventional-, and conversational-context. With my approach however, one can claim that extracting “I do not want a bagel, therefore, you did not get me a coffee’ from “Get me a coffee and I want a bagel” is wrong in *content*, not just the way it sounds. I believe this difference is essential in avoiding the unsatisfactory nature of Grice’s theory.

Secondly, the ontology of my approach is much is much lighter, being in essence a stripped-down version of Grice’s ontology which relies exclusively on the Ramsey test. My approach merely limits the scope of what qualifies as an indicative conditional. This limiting of scope using contextual information is not something new to the way we approach indicative statements in everyday natural language. My theory “merely” casts a light on a often overlooked contextual parameter, that being robustness.

For some however, it may still be too much of an ontological commitment reject indicative status to statements such as “if the moon is made out of cheese, then I am currently writing a paper”. This makes sense, as this sentence does intuitively seem a lot like an indicative statement. One could claim instead that this statement is indicative, but that the material analysis applies only to robust statements. A reason would however need to be given as to why the material analysis cannot be used in non-robust cases of indicative statements. Such a project is outside the scope of this paper, and I mention it merely for the sake of diligence.

## 8 Conclusion

In conclusion, the material analysis seeks to analyse indicative statements using the material conditional of propositional logic. This is a commonsensical idea, and there are reasons to believe that, if the indicative conditional is truth functional at all, it must follow the material conditional.

Despite these merits, the material analysis leads to some rather paradoxical statements which need resolved by anyone defending the approach. Grice attempts to make such a defence, stating that the indicative conditional implies something beyond its truth function. This implication is supplied by context and convention, and is lost when the material conditional is substituted for the indicative one.

Grice's theory can however only account for the fact that the application of the material conditional makes statements sound strange. He cannot claim that the application is wrong. This is particularly a problem for explaining contraption caresses. Furthermore, Grice requires rather heavy ontological concepts to defend his view.

My theory draws on Grice's and suggests instead to limit the scope of indicative conditionals to those statements which express robustness according to the Ramsey test. This way, one can account for the difference in content, rather than merely in tone. The theory furthermore has a smaller ontological footprint. I believe my theory can be defended especially because we already limit what counts as an indicative statement based on contextual pointers not present in the syntax of a statement.

## References

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