All Men are Animals

Hypothetical, Categorical, or Material?

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Abstract

The conditional interpretation of general categorical statements like 'All men are animals' as universally quantified material conditionals 'For all *x*, if *x* is F, then *x* is G' suggests that the logical structure of law statements is conditional rather than categorical. Disregarding the problem that the material conditional '$(\forall x)(Fx \supset Gx)$' is trivially true whenever there are no *x*s that are F, there are some reasons to be sceptical of Frege's equivalence between categorical and conditional expressions.

Now many philosophers will claim that the material conditional interpretation of laws statements, dispositions ascriptions, or any causal claim is generally accepted as wrong and outdated. Still, there seem to be some basic logical assumptions that are shared by most of the participants in the debate on causal matters which at least stems from the traditional truth functional interpretation of conditionals. This is indicated by the vocabulary in the philosophical debate on causation, where one often speaks of 'counterfactuals', 'possible worlds' and 'necessity' without being explicit on whether or to what extent one accepts the logical-technical definition of these notions. To guarantee a non-Humean and non-extensional approach to causal relations, it is therefore important to be aware of the logical and metaphysical implications of the technical vocabulary.

In this paper we want to show why extensional logic cannot deal with causal relations. Via a logical analysis of law-like statements 'All Fs are Gs' we hope to throw some new light on interrelated notions like causation, laws, induction, hypotheticality and modality. If successful, our analysis should be of relevance for a deeper understanding of any type of causal relations, whether we understand them to be laws, dispositions, singulars or categoricals.

(260 words)

I

Aristotelian logic treats general categorical statements such as 'All men are animals' as basic and primitive. This means that they cannot be further analysed or logically deduced. We can see this from the prominent role general categoricals play in the syllogisms. Here they often appear as the first premise of a valid inference, defining essential properties for a class of objects. With the introduction of Fregean logic, general categoricals like 'All men are animals' were analysed as universally quantified conditionals. Then we get that, among all things in the world, if something is a man, then this something is also an animal. This move seems philosophically innocent, yet logic has never been the same since.

With the conditional interpretation of categorical, and the material interpretation of conditionals, we get logical equivalence between the following expressions:

(A) All Fs are Gs.
(B) If *x* is F, then *x* is G.
(C) $(\forall x)(Fx \supset Gx)$

In this paper we argue that there are some logically relevant divergences between (A), (B) and (C) and that the move from (A) to (C) is not philosophically innocent.

II

Now the most obvious divergence between the three general statements (A) 'All men are animals', (B) 'If something is a man, then it is an animal' and (C) '$(\forall x)(Fx \supset Gx)$' is with respect to existence claims. That at least (A) and (C) involve existence in different ways should be apparent when we compare the so-called logical square of the Port Royal logic (fig. 1) with that of Fregean logic (fig. 2):

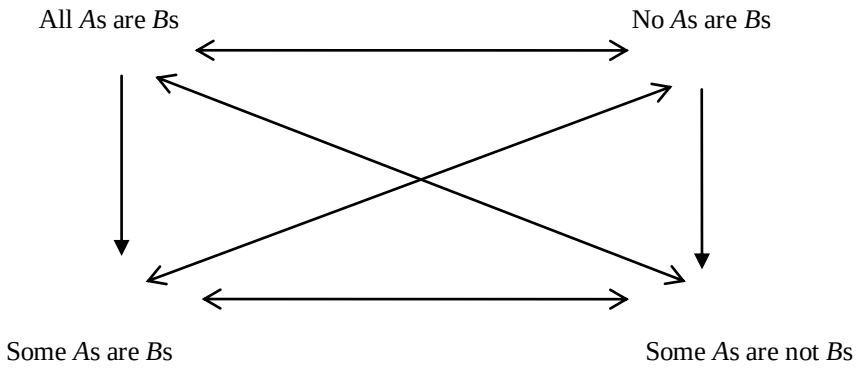

Figure 1: Port Royal logical square

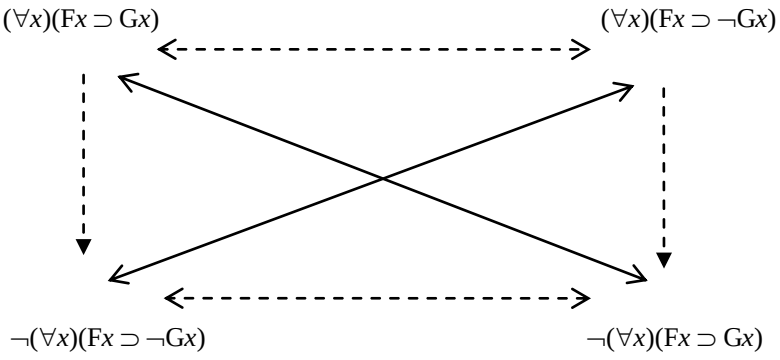

Figure 2: Frege's logical square, §12

Although we have existence claims both in categorical statements and in general material conditionals, they do not claim existence in the same manner: While 'All men are animals' asserts existence about men and animals, thereby implying that

‘Some men are animals’, the universally quantified material conditional does not entail that there exists an x that is F and G. A non-material conditional, ‘If something is a man, then it is an animal’, does not involve existence claims about men or animals, but is a hypothetical claim about the relation between men and animals. We can sum up the relation between (A), (B) and (C) as follows:

(A) ‘All men are animals’ is false if there are no men, while ‘No men are animals’ is true if there are no men. We can say that general categorical statements have *qualitative existential import*, entailing that some men are animals.

(B) ‘If something is a man, then it is an animal’ asserts a conditional, hence hypothetical, relation between being a man and being an animal regardless of whether there are any men or animals. Involving no existence claims whatsoever, general non-material conditionals have no existential import. Hence the existence or non-existence of men or animals will not affect the truth-value of the conditional statement.

(C) ‘$(\forall x)(Fx \supset Gx)$’ has quantitative existential import. Interpreted as general material conditionals, ‘All men are animals’ and ‘No men are animals’ are both true if there are no men, while both ‘Some men are animals’ and ‘Some men are not animals’ are false under this condition.

This should be a first indication that it is not logically irrelevant whether we interpret ‘All men are animals’ as a categorical, conditional or material claim.

III

We have seen that the categorical/conditional distinction points to a divergence in existence claims. This difference is less explicit on the level of singular instantiations where they both have corresponding conditional expressions: ‘If *Fa*, then *Ga*’: ‘If Socrates is a man, then he is an animal.’ It is therefore important to be explicit about whether we assert a singular expression as a conditional or a categorical statement.

Where a causal relation is expressed, both the generic conditional (If F*x*, then G*x*) and the singular instantiation (If F*a*, then G*a*) express a purely hypothetical relation between antecedent and consequent. Thus they both express hypotheticality with respect to the existence of Fs or Gs. In addition, the singular conditional expresses hypotheticality with respect to whether the instantiated object is an F or a G. An example of a generic statement that we usually take to express a matter of causal relation is ‘If a body is not subject to any net external force, it either remains at rest or continues in uniform motion’.

Where a classification is expressed, it will be as a general categorical (All Fs are Gs) or as a singular conditional (If *a* is F, then *a* is G). Since there is no hypotheticality involved in the categorical expression, no causal relation is expressed. In the singular instantiation, however, the conditional form points to the hypotheticality concerning whether the instantiated object is F or G. An example of a generic statement that we

usually take to express a matter of classification is the categorical 'All men are mortal' and the singular instantiation 'if Socrates is a man, then he is mortal'.

If we understand the logical structure of causal relations to be the categorical rather than conditional, then laws, dispositions and causation would all be a matter of classification. Understanding the class of Fs as contained in the class of Gs seems to rule out the possibility of accepting something that is not G as an F. If all men are mortal *by* essence, an immortal being could not be a man. This indicates why Aristotle didn't have a problem of induction.

Consider also the example of all even numbers being divisible on 2. Were we ever to find a number that is not divisible on 2, we would say that it isn't an even number. - Hence no problem of induction. Induction is therefore only part of causal relations, not of classifications. This indicates that the logical structure of laws and causal relations must be the conditional, hence hypothetical 'If Fx, then, as a result, Gx'.

Kepler's first law is often given a categorical form 'All planetary orbits are elliptic'. However, it was never formulated nor meant as categorical statements by Kepler himself. To him this would be the same as saying that they are in no need of explanation. So in order to make apparent that this law was meant as causal relation, he insisted on a conditional reading. Causal relations are in need of explanations because they are empirical matters rather than logical ones.

IV

Now it seems far from clear in what way or to what extent causal matters like causation, laws or dispositions are necessary. Noticing that causal relations involve induction while classifications don't, we should expect different types of necessity to be involved. The interpretation of both conditionals and categoricals as the material conditional blurs the distinction between them. It also forces a problem of induction on all generic expressions, – not only the ones about causal matters. But unlike the empirical induction involved in law statements about causal matters, and mathematical induction used to prove generic mathematical statements, the logical induction is vicious and unproductive.

This becomes particularly clear when we consider how a universally quantified material conditional is nothing but a conjunction of the infinite set of corresponding singular material conditionals ($Fa \supset Ga$) & ($Fb \supset Gb$) & …and so on. Thus we get entangled with the problem of incompleteness and induction: We will never be able to check on all its singular instantiations and conclude that for instance all iron bars expand when heated.

In order to preserve the causal relation, therefore, we shouldn't read the generality as 'For *all x*s'. Rather we should read it as 'For *any x*'. Saying that 'For any iron bars, if they are heated, they will expand', we are challenged to take any iron bar (as many or as few as we like) and check whether it expands if heated. In this way the expression of 'any' – unlike 'all' or 'every' – points to the hypotheticality, hence potentiality, of general causal relations. At the same time it seems to preserve the modality expressed in infinite potentialities.

What the distinction between ‘any’ and ‘all’ points to, then, is that the distinction between hypothetical and categorical statements is essential for understanding causal matters. This is because it reveals a distinction between the potentiality and infinity expressed in causal relations between two events, and the categorical classification of some property F as being defined or classified according to some essential property G.

In a classification, like ‘All men are animals’, we seem to be dealing with a logical rather than an empirical and causal matter. This is because a man could never be prevented from being mortal. Classification involves no causality whatsoever. For instance, a ceteris paribus clause would never even be considered as relevant if we understood causal matters as classifications. We could just say that without *x* being G, we wouldn’t even consider it as being F. Hence there is no problem of induction involved in classifications. Thus the use of ‘all’ is justified by the classification itself, and not by the truth of the sum of all its singular instantiations. In causal relations, it is essential that we are trying to predict what will follow from *x* being F, while no such prediction is part of a classification.

V

So we need an adequate understanding of conditionals to understand causal relations. Taken as a material conditional, however, any statement ‘All Fs are Gs’ will be true if there are no *x*s that are F. This is the so-called problem of counterfactuals. But the truth is that there is no problem of counterfactuals without the material conditional interpretation. The non-material conditional ‘For all *x*, if F*x*, then G*x*’ would never be true just because there are no Fs. In fact, the truth, falsity, probability or modality of the antecedent as such does not have impact on the truth, falsity, probability or modality of the non-material conditional as a whole. A conditional’s truth-value is not affected by changing the mode from indicative to subjunctive as long as the background conditions remain unchanged.

For instance, the same causal relation is expressed in ‘If I drop this pen, it will fall’, ‘If I were to drop this pen…’ and ‘If I had dropped this pen…’ etc. So why treat them differently? A conditional is true, highly probable, likely, possible or necessary, irrespectively of whether or not the antecedent is true. To even have a theory of counterfactuals would therefore place us within a mistaken understanding of conditionals, hence of causal matters.

Thus a property that is usually associated with counterfactuality, namely hypotheticality, is actually an essential aspect of all conditionals that express a sufficient/necessary relation between antecedent and consequent. A conditional is never factual or counterfactual in the traditional sense, according to the truth or falsity of the antecedent. On the contrary, it is always a matter of hypotheticality.

To give a separate account for so-called counterfactuals therefore misses the point that the conditional relation is not found in the antecedent (or consequent) as such. A conditional relation can only be found, explained, predicted or justified according to a certain set of background conditions. Hence any contextual change might interfere with the relation. No conditional is necessary in the sense that the truth of some F*x* is

sufficient for the truth of some G*x* irrespectively of everything else. But this only points to the fact that causation, laws and dispositions are empirical matters, not something to be left to logic alone.

VI

The point with this paper has been to show that Frege's interpretation of both conditionals and categoricals as universally quantified material conditionals blurs an important logical distinction. This distinction points to the division between causal relations and classifications. We have tried to show that causal relations and classifications relate differently to matters like existence claims, induction, hypotheticality and prediction. If we can be free of the material conditional's influence on these matters, the way should be open for causal realism, where matters like potentiality, hypotheticality and causation are taken as fundamental, irreducible and as real as it gets.