Confirmation of conditionals and Carnap's reduction sentences[1]

Confirmação de condicionais e sentenças de redução de Carnap

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ABSTRACT

Given that the material conditional can be true in three different situations, an empirical datum can confirm different conditionals. In fact, the same datum can confirm even conditionals that appear to be in contradiction with each other. By means of an example presented by Khemlani, Byrne, and Johnson-Laird, this issue is addressed below. To do that, the present paper resorts to the concept of reduction sentence offered by Carnap. The conclusions refer to the idea that, if this last concept is assumed, the problems of the confirmation of the conditional seem to disappear. This is, at least, as far as the example dealt with here is concerned.

Keywords: Carnap. Conditional. Confirmation. Predicate. Reduction sentence.

RESUMO

Uma vez que o condicional material pode ser verdadeiro em três situações diferentes, um dado empírico pode confirmar diferentes condicionais. De fato, o mesmo dado pode confirmar até condicionais que parecem estar em contradição entre eles. Por meio de um exemplo apresentado por Khemlani, Byrne e Johnson-Laird, esta questão é considerada mais abaixo. Para isso, o presente artigo recorre ao conceito de sentença de redução oferecido por Carnap. As conclusões remetem à ideia de que, se este último conceito for assumido, os problemas da confir-

mação do condicional parecem desaparecer. Isso é, pelo menos, no que diz respeito ao exemplo tratado aqui.

Palavras-chave: Carnap. Condicional. Confirmação. Predicado. Sentença de redução.

Introduction

Khemlani, Byrne, and Johnson-Laird (2018) remind a problem related to the material interpretation of the conditional. That problem refers to confirmation: the same piece of evidence can support several different conditionals. The reason for this is well known. Given a conditional such as (1),

(1)   IF P THEN Q

From the material perspective, it is confirmed by all the scenarios that include neither P nor not-Q at the same time. So, (1) is true in all these hypothetical situations:

(2)   P & Q
(3)   Not-P & Q
(4)   Not-P & not-Q

Besides, this implies, for example, that a fact matching (4) can confirm, in addition to (1), conditionals so different as:

(5)   IF not-P THEN not-Q
(6)   IF P THEN not-Q

In Khemlani et al. (2018) and below, all of this is better explained by means of examples. Undoubtedly, more accounts resorting to other concepts or perspectives could also be given. However, the issue with those other accounts is that, if what has been already said is considered, most of them can seem trivial. For that reason, the mention of only one of them can be enlightening enough. That is the account that can be offered from Carnap's (1947) approach.

From Carnap's (1947) framework and hence modal logic, it can be said that (1) is true in all the 'state-descriptions', that is, possible worlds, in which (2), (3), and (4) are true too. In the same way, another point that can be claimed is that in a state-description in which (4) is true, (1), (5), and (6) are that as well.

But perhaps it is more important for this paper that, as said, this is a problem from the confirmation of conditional hypotheses point of view. Khemlani et al. (2018) present several examples linked to a clinical setting that appear to show relevant difficulties. Nevertheless, it will be argued here that 'reduction sentences' such as those proposed by Carnap (1936) can remove such difficulties. It suffices to rebuild the hypotheses in a way coherent with the formal structure of reduction sentences and the condition that, following Carnap, those sentences need to fulfill.

Thus, this paper first analyzes the particular examples used by Khemlani et al. (2018) and their difficulties in detail. Next, what, according to Carnap (1936), a reduction sentence is will be

indicated. Lastly, the manner reduction sentences can eliminate the difficulties raised by the examples will be described.

The advanced treatment and the conditional

The examples proposed by Khemlani et al. (2018) have an aim: to explain important theses of the theory of mental models (e.g., BUCCIARELLI & JOHNSON-LAIRD, 2019; BYRNE & JOHNSON-LAIRD, 2020; JOHNSON-LAIRD & RAGNI, 2019). This theory is a psychology approach. Therefore, Khemlani et al.'s (2018) goals are very different from those in the present paper. Their purpose is to show how the human mind works in the case of the verification of conditionals; in general, their paper is intended to address the actual way human beings reason (for the exact manner the theory of mental models understands the human mental verification processes, see, e.g., GOODWIN & JOHNSON-LAIRD, 2018).

Nevertheless, their examples also reveal the essential problem that will be considered here. The context is the one of a sick person that visits a doctor. The doctor says:

(7)   "If you don't have the advanced treatment then you won't get better" (KHEMLANI et al., 2018, p. 1900).

The person does not keep calm and decides to consult a second doctor. This new doctor appears to claim the opposite to what was indicated by the first one. The answer given in this case is:

(8)   "If you don't have the advanced treatment then you will get better anyway" (KHEMLANI et al., 2018, p. 1900).

This is perceived as an inconsistency, and the person looks for one more opinion. The third opinion is:

(9)   "If you have the advanced treatment then you will get better" (KHEMLANI et al., 2018, p. 1900).

As pointed out by Khemlani et al. (2018), (7) and (9) can be interpreted as compatible. Nonetheless, maybe what is most relevant about this story is that what finally happens is that:

(10)   "The patient has the advanced treatment and gets better" (KHEMLANI et al., 2018, p. 1900).

As indicated, Khemlani et al. (2018) are interested in how human beings react and process information in situations such as this one. Thereby, what they explore is what, from the cognitive point of view, people tend to think that (10) confirms. However, what is important now is that, as they mention, (10) supports (7), (8), and (9) at once.

Indeed, (1) and (4) show that a conditional can be true when its two clauses are negated. So, it can be said that (7) can be true in a situation in which (10) is that. In the same way, (1) and (3) reveal that a conditional can be true when just its antecedent is negated. Accordingly, (8) can also be true if (10) is the case. Finally, if (1) and (2) are taken into account, it is clear that any

conditional holds when both its antecedent and its consequent hold. Therefore, (10) is a scenario in which (9) can be true as well.

Nevertheless, all of this seems to be solved by virtue of the reduction sentences proposed by Carnap (1936). The next section describes that kind of sentences.

Carnap and reduction sentences

One of Carnap's (1936) goals is to offer schemata that can be useful to reduce a predicate to another one. Thus, properties that can appear associated to other properties can be confirmed. One of those schemata is the one of reduction sentences. A reduction sentence for predicate R has this logical form:

(11)   IF P THEN (IF Q THEN R)

With other symbols, (11) is formula (R) in Carnap (1936, p. 442).

Schema (11) is under universal quantification and its predicates (P, Q, and R) have the same variable assigned. Hence, (11) means that, for any x, if x is P, then, if x is also Q, then x is R.

But, following Carnap (1936), (11) can be a reduction sentence for predicate R only if there are cases of P and Q, that is, only if there is at least one x having both property P and property Q. This is important because, if it is kept in mind that (11) only makes sense when there are cases of P and Q, the problem presented by Khemlani et al. (2018) seems not to be that serious.

The advanced treatment and reduction sentences

To note that, first it is necessary to build formulae with the structure of (11) from clinical options (7), (8), and (9). For (7), the formula could be (12).

(12)   IF S THEN (IF not-T THEN not-B)

Where (12) is universally quantified as (11), 'S' means to be sick, 'T' refers to the fact of having the advanced treatment, and 'B' denotes the situation in which somebody gets better.

In the case of (8), (13) appears to be suitable.

(13)   IF S THEN (IF not-T THEN B)

As far as (9) is concerned, following the previous equivalences and ways to propose logical forms, its formula is also clear:

(14)   IF S THEN (IF T THEN B)

Thus, (10) would imply a case of T and B. This last case, as pointed out, in principle, would confirm (12), (13), and (14). Nevertheless, the restriction given to (11) by Carnap indicated above can show that perhaps that should not be taken into account.

Regarding (12), that restriction means that (12) is only relevant in scenarios in which S and not-T happen. However, (10) shows that the situation is not that. What occurs is T, and not not-T. Therefore, it seems that (12) should not be considered.

The circumstances are not different with (13). The appropriate situations continue to be those in which S and not-T shape the actual scenario. But, as with (12), what is real is T. Accordingly, (13) could be ignored too.

Hence, it could be claimed that (10) should be taken as a piece of evidence only for (14). The reason is evident. Carnap's (1936) condition means for (14) that S and T, that is, the predicates involved in (10), are the key predicates.

Conclusions

Under Carnap's (1936) framework, therefore, the problem is not that hard. Evidence (10) is relevant only for (14). This is because of the requirement given by Carnap (1936) for (11): there must be cases of its two first predicates, that is, P and Q.

So, the conclusions here have to follow a double direction. The material interpretation of the conditional might not be a problem when scientific hypotheses are raised. Apparently, that interpretation can cause difficulties such as those indicated by Khemlani et al. (2018). However, with the due delimitation of criteria or requirements, those difficulties can lose their strength. The restriction for (11) is a clear instance in this way.

On the other hand, it seems that some of the proposals offered by Carnap keep being interesting nowadays. That has been already underscored. For example, in López-Astorga (2019), his semantic method (Carnap, 1947) is used to review the four manners to understand the conditional described by Sextus Empiricus. As it is well known, one of those manners is the one of Philo of Megara, which is usually linked to the material interpretation of the conditional (see, e.g., O'TOOLE & JENNINGS, 2004). Accordingly, as in papers such as that of López-Astorga (2019), it can be stated that it is still worth continuing to analyze the possibilities some aspects of Carnap's philosophy can give; such aspects can help work from different research perspectives.

The possible natural extension of the present work is hence double as well. First, the checking whether reduction sentences (or similar schemata) can solve all the problems the conditional can raise in scientific field can move on. Second, the review of theses and ideas presented by Carnap in different works (especially, in works such as CARNAP, 1936, 1937, 1947) can also pursue; this last task would allow verifying whether other resources indicated by him are handy too at present. What has been shown above seems to predict the results that could be obtained by working in these two investigation lines. Nevertheless, perhaps it is suitable to try to prove that those results can be truly observed in practice.

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