Clareira
Revista de Filosofia da Região Amazônica
ISBN: 2359-1951

The Stoic sign and the pragmatic or implicit premises in the formal theories

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Abstract

The current formal theories trying to account for reasoning and language often need to resort to the thesis of the pragmatic or implicit premises to explain the real role pragmatics plays in the human inferential activity. The main aim of this paper is to show that, although they did not propose theories in this way, the Stoics, by means of their concept of 'sign', already offered the essential arguments and foundations necessary to describe the real action of both pragmatics and the premises coming from general knowledge when we make inferences.

Keywords: Formal theories. Pragmatics. Premises. Reasoning. Stoicism

O signo estóico e as premissas pragmáticas ou implícitas nas teorias formais

Resumo

This article intends to make an analysis about the complex reality of the Amazon, taking as reference the theoretical contributions of the Critical Theory and, more precisely, using the concepts of emancipation and instrumental reason and of how it is necessary to imagine a possible emancipation that think the consequences of the use instrumental of reason, as Adorno and Horkheimer understand with the publication of the work Dialectics of Enlightenment. In this article I intend to demonstrate how instrumental reason, allied to the use of technique and science as a form of domination and exploitation, has also made felt its effects in the Amazon and, consequently, the need to rethink the way we relate to nature oriented towards an idea of emancipation that must be simultaneously social, political, economic and epistemological. An emancipation that helps us to think a rational way of using nature and what is produced in it but without exhausting its biological potential and its biodiversity, without undressing nature and breaking with its ecological equilibration.

Palavras-Chave: Teorias formais. Pragmática. Premissas. Raciocínio. Estoicismo

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Clareira
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Introduction

To explain the linguistic and inferential activity, the formal theories, that is, the theories trying to account for that activity based on fundamentally syntactic schemata, must often assume the thesis of the pragmatic or implicit premises. That thesis means that individuals do not reason only paying attention to the information explicitly received in a particular circumstance, but also to other premises provided by their general knowledge. These last premises are usually called 'pragmatic' or 'implicit' premises, and examples of how they work can be easily found in the literature on these theories. One of the formal theories is, for instance, the mental logic theory (e.g., BOMPASTOR BORGES DIAS & ROAZZI, 2003; BRAINE & O'BRIEN, 1998a; GOUVEIA, ROAZZI, MOUTINHO, & BOMPASTOR BORGES DIAS, 2002; GOUVEIA, ROAZZI, O'BRIEN, MOUTINHO, & BOMPASTOR BORGES DIAS, 2003; O'BRIEN, 2009, 2014; O'BRIEN & LI, 2013; O'BRIEN & MANFRINATI, 2010), and the way this framework considers the pragmatic or implicit premises is shown in several of the works authored by its proponents, including Braine and O'Brien (1998b).

However, what this paper intends is to argue that the basic idea of the thesis is earliest than thought, and that it dates back to Ancient Greece, and in particular to Stoic philosophy. Indeed, if we accept that the aforementioned basic idea is essentially that just the reference to a concept brings to mind a complete sentence in which, following general knowledge, that concept is related to other concepts, it can be said that it was already present in the Stoic theory of the sign. And this is so because, from both the formal theories and Stoic logic, it can be claimed that a concept such as that of 'snow' implies the one of 'white', and that simply the reference to 'snow' can lead one to a sentence such as 'if this thing is snow, then this thing is white'.

To show that, firstly, the exact role played by the pragmatic or implicit premises in the formal theories will be described, the example coming from the mental logic theory. Secondly, what the sign was really in Stoicism will be explained. Finally, the paper will give an account of how the Stoic concept of sign can perform a function in the intellectual activity similar to that attributed to the pragmatic or implicit premises by the formal theories. So, the next section is devoted to the mental logic theory and the way it understands pragmatics.

Clareira
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The formal theories and the pragmatic or implicit premises: The case of the mental logic theory

While it is true that, in general, the formal theories are approaches that, in one way or another, recall Gentzen's (1934, 1935) calculus and, a fortiori, standard logic, it is also the case that actually they are often different from that calculus and that logic in several aspects, and that, of course, all of the formal theories are not identical. Nevertheless, although this is so, for the aims of this paper, the differences between the formal theories and classical logic and between the diverse formal theories can be ignored. The reason of this is that, even though what will be explained now by means of an example is basically the function the mental logic theory assigns to the pragmatic or implicit premises, the example refers neither to aspects of this last theory that differentiate it from standard calculus nor points of it clearly rejected by other formal theories. Thus, it can be stated that the following account could, in principle, be accepted not only by the mental logic theory, but also by any other formal theory, including, of course, a hypothetical one that assumed that human beings make inferences just following the rules and syntactic requirements of standard logic.

The example is a commentary on how the mental logic theory can explain the fact that people sometimes commit fallacies such as that of affirming the consequent, and is taken from López-Astorga (2016). As it is well known, that fallacy is related to the conditional and happens when a formula such as p is concluded from premises such as $p \rightarrow q$ (where '$\rightarrow$' means conditional relationship) and q. Obviously, this is not, in principle, a correct inference in logic (neither in most of the formal theories, including, of course, the mental logic theory, nor in standard propositional calculus), but the truth is that, as said, people often make it. Among other inferences and sentences coming in turn from Johnson-Laird and Byrne (2002), López-Astorga (2016) review a pair of premises for which the aforementioned fallacy is highly likely. The conditional sentence of that pair is as follows:

"If she owes money then she must repay it" (JOHNSON-LAIRD & BYRNE, 2002, p. 663; used by LÓPEZ-ASTORGA, 2016, p. 289).

ISBN: 2359-1951

Evidently, if the premise 'she must repay money' were considered along with the previous sentence and 'she owes it' were derived, this would be clearly a case of affirming the consequent fallacy. Nonetheless, López-Astorga (2016), as well as Johnson-Laird and Byrne (2002), seem to claim that that is exactly the situation that can be expected given the sentences indicated, and that it can be predicted that most people will do that in similar circumstances.

However, what is interesting for this paper is, as mentioned, the way the mental logic theory can account for this phenomenon, which is explained by López-Astorga (2016). The basic argument is that, by virtue of their general knowledge, people know that, if somebody must repay money, then he/she owes that money, and, therefore, that, if she must repay money, then she owes that money. Thus, if we assume that p refers to the fact that she owes money and q stands for the fact that she must repay that very money, we can state that individuals have a pragmatic or implicit premise with the logical form $q \rightarrow p$, which is also taken into account in the inference.

In this way, it can be thought that the exact mental process that occurs is the following: by receiving the information that she must repay money (q), the individual remembers a conditional sentence that is in his/her general knowledge and that, as indicated, provides that, if she must repay money, then she owes it ($q \rightarrow p$). So, he/she can derive p. This is not really made from $p \rightarrow q$ and q, but from $q \rightarrow p$ and q, which is not actually committing a fallacy, but applying an absolutely valid rule (again, both in most of the formal rules, including, obviously, the mental logic theory here as well, and in standard calculus) which is well known and called Modus Ponendo Ponens.

Because Modus Ponendo Ponens allows deducing the consequent of a conditional from that conditional and its antecedent, there is no doubt that this account alone can be an explanation of why the affirming the consequent fallacy is apparently committed in this case and in other similar inferences. However, it is also clear that the situation to which the example reviewed refers is more complex than indicated. The union of $p \rightarrow q$ and $q \rightarrow p$ transforms the first conditional in the biconditional $p \leftrightarrow q$ (where '$\leftrightarrow$' denotes biconditional relationship), and hence leads to the consideration of another pragmatic phenomenon: the conditional perfection. These points are men-

Clareira
Revista de Filosofia da Região Amazônica
ISBN: 2359-1951

tioned by López-Astorga (2016), and Johnson-Laird and Byrne (2002) also appear to take them into account (in fact, for example, they state that the previous conditional sentence cited is an instance of a possible interpretation of the conditional called 'biconditional' by them). Nonetheless, what has been said can be illustrative enough with regard to the concept of pragmatic or implicit premise in the formal theories and how it works. So, only repeating that López-Astorga (2016) analyzes more examples of inferences built from conditional sentences used by Johnson-Laird and Byrne (2002) in order to show the action of pragmatic or implicit premises in them, and insisting that many more examples of the role of such premises in formal theories are to be found in the cognitive science literature, the consideration of these topics is stopped for the time being and the next section addresses the Stoic sign.

The sign in Stoicism

The correct interpretation of several concepts in Stoic philosophy is still debated. Some cases in this way can be, for instance, *πρᾶγμα*, *λεκτόν*, *ἀξίωμα* (see, e.g., for a discussion, O'TOOLE & JENNINGS, 2004). Undoubtedly, to deal with those controversies is beyond the goals of this paper and, for this reason, they will be ignored and only the word *ἀξίωμα* will be used here, which will receive a meaning that is often attributed to it, that is, 'proposition' (actually, as argued by O'TOOLE & JENNINGS, 2004, pp. 423 & 476, footnote 129, it is not clear whether or not this is the best meaning that can be assigned to the word; however, given that the debate is not essential for my aims in this paper, I will give it the sense indicated, which seems to be suitable for the arguments below and, as said, is not uncommon). As mentioned, what is truly interesting here is just the way the Stoics understood the sign and that will be hence the major issue to review in this section.

To do that, I will mainly base on three passages authored by Sextus Empiricus (*Adversus Mathematicos* 8.245, 8.250; *Pyrrhoneae hypotyposes* 2.104) and O'Toole and Jennings' (2004) work. The Greek word corresponding to 'sign' is *σημεῖον* and, following the texts mentioned, it can be said that it is a true *ἡγούμενον ἀξίωμα* (antecedent proposition) in a *συνημμένον ἀξίωμα* (conditional proposition) that is also true, which can reveal (*ἐκκαλυπτικός*) the *λῆγον ἀξίωμα* (consequent proposition). This definition (which is explained in detail in O'TOOLE and JENNINGS, 2004, pp. 468ff) applies to

ISBN: 2359-1951

two different types of sign (indicative and commemorative; see also O'TOOLE & JENNINGS, 2004) but that distinction is not absolutely relevant here either. Paying attention to what the definition implies can be much more important. According to it, a sign is a concept that, if provided, leads to a conditional sentence (*συνημμένον ἀξίωμα*; that is, in Greek, a sentence beginning with *εἰ*, i.e., 'if') in which it is the antecedent and the consequent is another concept clearly linked, by virtue of its meaning, to it. This can be better seen if some examples given by Sextus and commented on by O'toole and Jennings (2004) are considered.

Indeed, as indicated by O'Toole and Jennings (2004, p. 470), smoke, a scar, a punctured heart, lactation, and a bronchial discharge were clear examples of commemorative signs. The passages reviewed by them are *Adversus Mathematicos* 8.152-3, 8.252-3, and *Pyrrhoneae Hypotyposes* 2.102, 2.106, and, from their comments, it can be stated that, according to the Stoics, the presence of such signs led to the following conditionals (the translations of the words written by Sextus Empiricus used in the next conditional sentences are those of O'TOOLE & JENNINGS, 2004, p. 470):

Smoke: 'if there is smoke, then there is a fire'.

A scar: 'if there is a scar, then there is a previous wound'.

A punctured heart: 'if there is a punctured heart, then there is an immanent death'.

Lactation: 'if there is lactation, then there is conception'.

A bronchial discharge: 'if there is a bronchial discharge, then there is a lung wound'.

All of this makes it evident that, regardless the real function that the sign had in Stoic philosophy, the theory of the sign offered in this last framework has the machinery and the resources necessary so that the sign plays the same role in inference as the pragmatic or implicit premises of the formal theories. As argued for the example given by Johnson-Laird and Byrne (2002) analyzed in the previous section, the information that the antecedent is true is enough to evoke the entire conditional, even when the consequent is not even named. Thus, in the same way as a repayment implies a debt in that example, the Stoic signs indicated above also refer to consequents that can

Clareira
Revista de Filosofia da Região Amazônica
ISBN: 2359-1951

be linked to them by means of a *συνημμένον ἀξίωμα*. In this regard, the next section shows that, certainly, the sign in Stoicism can actually work as a pragmatic or implicit premise in a formal theory.

The pragmatic potential of the Stoic sign

Stoic logic proposed two schemata of inference related to the conditional *ἀξίωμα*. Really, in passages such as that of Diogenes Laërtius (*Vitae Philosophorum* 7, 79-81) are mentioned five *ἀναπόδεικτοι* or *indemonstrables* (see also, e.g., the comments on them presented by O'TOOLE & JENNINGS, 2004; or BOERI & SALLES, 2014, pp. 213-237), but, as it can be checked, only two of them refer to conditionals. They are Modus Ponendo Ponens, which has already been described, and Modus Tollendo Tollens, which, in standard logic symbols, allows one to derive ¬p (where '¬' means negation) from premises such as p → q and ¬q. There is no another schema that enables to deduce anything from a conditional premise in that logic, and this circumstance can be interesting if we think about an example in which one of the signs mentioned in the previous section is involved.

Let us suppose that we are said that these two sentences are true:

[I]: If he does not die, then he will come here

[II]: He has a punctured heart

Obviously, if only this information is considered, nothing can be inferred, since, because we do not have the necessary correspondences, neither Modus Ponendo Ponens nor Modus Tollendo Tollens can be applied to [I] and [II]. However, as said above, in Stoicism a punctured heart is a sign that leads to the fact of an immanent death and hence to the *συνημμένον ἀξίωμα* 'if there is a punctured heart, then there is an immanent death'. And, clearly, this last sentence, together with [II], makes it possible to deduce, via Modus Ponendo Ponens, that he will die at once. In the same way, it is not hard to assume that death could also be a *σημεῖον* for the Stoics, and, in particular, a sign that led to conditionals such as 'if he is dead, the he will not come here' (evidently, because a dead person cannot move). But, if this is so, from this last conditional and the previous conclusion that he will die at once, it can be in turn concluded that he will not

ISBN: 2359-1951

come here. Therefore, although, in principle, it seemed that nothing could be derived from [I] and [II], actually it can be inferred that he will not come, the key being that the signs evoke conditionals that are not explicitly provided but they are obviously true for people.

Maybe it is almost trivial to show that the explanation that the formal theories can give about the way an individual can conclude that he will not come from [I] and [II] is very akin to the previous one based on Stoicism. Nevertheless, it can be necessary for the aims of this paper, which, as said, intends to make it explicit that the fundamental elements of the thesis of the pragmatic or implicit premises were already in Stoic logic. In any case, a first step to understand the account that can be attributed to the formal theories is to formalize the sentences [I] and [II]. In this way, it can be claimed that their logical forms are as follows:

[I]: $\neg p \rightarrow q$

[II]: r

(Where 'p' stands for the fact that he dies, 'q' denotes the fact that he will come here, and 'r' refers to the fact that he has a punctured heart).

As in Stoic logic, nothing can be deduced from these premises both in standard propositional calculus and the formal theories, the reason of that being the same as in the Stoic framework: there is no suitable correspondences that allow applying schemata valid in that calculus or those theories. Nonetheless, most of the formal theories could accept 'if he has a punctured heart, then he will die' as a pragmatic or implicit premise as well. So, the formal structure that could be assigned to this last sentence could be $r \rightarrow s$ (where 's' represents the fact that he will die). And, applying Modus Ponendo Ponens (which, as it is well known, is valid in classical logic and, as far as I know, in all of the formal theories, including, once again, the mental logic theory) to this last formula and [II], the conclusion s could be obtained. However, in the same way, it is clear that another pragmatic or implicit premise coming from general knowledge that the formal theories could admit is $s \rightarrow \neg q$, which, given the conclusion

ISBN: 2359-1951

s and also via Modus Ponendo Ponens, could lead to ¬q (that is, to the fact that he will not come here) too.

Thus, it can be claimed that the previous explanations are so similar that they indeed show that Stoic logic had the machinery and the basic elements to account for the action of the pragmatic or implicit premises in the formal theories. The characteristics of the sign in that Greek logic allow it to play a role akin to the one of such premises in those theories. Accordingly, it could even be said that the Stoics anticipated to a certain extent a very important thesis for some current approaches trying to describe the real way human beings make inferences.

Conclusions

Nonetheless, of course, this study has its limitations. As indicated in other papers comparing Stoic logic to present theories (e.g., LÓPEZ-ASTORGA, 2017), the Stoics' aims and context were not the same as those of contemporary cognitive science. In this regard, it is very important to highlight that the sign in Stoic philosophy does not refer, as the pragmatic or implicit premises in the current formal reasoning theories, to a special kind of sentence, a sentence known by people and that does not need to be mentioned. According to the ancient sources and the secondary literature on Stoicism, it seems that the proponents of it claimed that the relationship that can be observed between the antecedent and the consequent of the conditional in the case of the sign was the relationship that should always exist between those two clauses in all of the valid or correct conditionals. Therefore, the idea was not that there were certain antecedents called 'signs' that, by virtue of their contents or meanings, referred to consequents not necessarily explicitly indicated, but that, to be valid, all of the conditionals always had to provide a similar relationship between their clauses. In other words, following Stoicism, a conditional could be valid or acceptable only if its antecedent was a sign. Undoubtedly from this perspective, the Stoic sign was not exactly the same as the pragmatic or implicit premises.

However, although the intentions were different, as shown above, there is no doubt that the two approaches overlap and, at least in a sense, we can speak about anticipation. This idea is not absolutely new, since anticipations of certain

ISBN: 2359-1951

particular aspects of current theories have already been seen in Stoic logic and some of the former have been used to try to better understand the latter (see also, e.g., LÓPEZ-ASTORGA, 2017). In this way, it is also possible to think that the Stoics, although maybe only to an extent, noted that it was necessary to know certain concepts that led to conditionals and allowed drawing conclusions impossible to infer without such conditionals and with the concepts included in their antecedents alone. Thus, indirectly, they offered powerful, or even indispensable, instruments to explain certain cognitive phenomena that are still used today.

Obviously, we do not know that for sure, and perhaps the actual function of the sign in Stoicism continues to require further research that explores in more detail both primary sources and secondary literature. In any case, what is certain is that, although the one described in this paper is not exactly the true sense that the Stoics attributed to the sign, the accounts above can be useful in different academic disciplines, and not only to help realize the action of the pragmatic or implicit premises in the formal theories. For example, in fields such as semiotics and general studies on the concept of sign or symbol, it can be very interesting to think about signs that are simply the antecedents of implicit conditionals. In this regard, for instance, red light could be understood as the antecedent of a conditional such as 'if there is a red light, then the vehicles must stop'. Likewise, to take another example, a crucifix in a building could be the antecedent of a conditional such as 'if there is a crucifix in a building, then that building is a Christian church'. In both cases, the sign refers to another concept that can be linked to it by means of a conditional relationship, and, clearly, this can be relevant at the very least to analyze the logical status of the sign.

So, we can see that the contributions from Stoicism can be related not only to pure logic. Several of its theses seem to still remain valid in different fields at present, and hence they continue to deserve further study in such fields. And all of this is not counting that future research can find more disciplinary perspectives in which those theses can be relevant as well.

ISBN: 2359-1951

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