SOME RELATIONSHIPS BETWEEN INDIAN AND STOIC LOGIC*

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Abstract. *In this paper, I try to show that Indian and Stoic logic are more similar to each other than to standard logic. To do that, I analyze a passage of the* Kathāvatthu *that has been interpreted as proposing the definition of the conditional assumed by modern propositional logic, and argue that that interpretation is not absolutely justified. In this way, I contend that what is said in that passage and the actual view of the conditional presented in the* Kathāvatthu *are also consistent with the criterion of the conditional held by Chrysippus of Soli.*

Keywords: *Chrysippus of Soli, conditional,* Kathāvatthu*, standard logic, Stoic logic*

Introduction

It seems that it has been usual to interpret ancient logics as systems precursor or predecessor of modern standard logic or calculi akin to that proposed by Gentzen (1935). This is, for example, the case of Stoic logic, which, because of the comparison between it and standard logic has been considered to be a framework with certain weaknesses (Bobzien 1996: 134). However, it has also been said that modern propositional logic is not the appropriate criterion to evaluate Stoic logic (e.g. Bobzien 1996: 134), and that the latter can be better understood if it is reviewed from approaches other than modern

propositional calculus. In this way, López-Astorga (2015), for instance, claims that a more adequate criterion to analyze Stoic logic is a contemporary cognitive theory, the mental logic theory (e.g., Braine and O'Brien 1998, O'Brien 2009, 2014, O'Brien and Li 2013, O'Brien and Manfrinati 2010).

But this is the circumstance of Buddhist texts such as the *Kathāvatthu* too. As indicated by Ganeri (2004: 314), authors such as Schayer (1933) or Matilal (1998) saw clear correspondences between this later text and modern logic. Nevertheless, this, as in the case of Stoic logic, is debatable as well. In fact, it can be thought that the *Kathāvatthu* and the Stoicism share certain commonalities that cannot be found in standard logic.

To show that is the main goal of this paper and I will focus on a particular passage of the *Kathāvatthu* in order to achieve that aim. Thus, firstly, I will provide a gen-

eral commentary on the *Kathāvatthu* and the passage. Secondly, I will expose how that passage has been interpreted based on propositional logic. Thirdly, following López-Astorga's (2015) exposition, I will describe the basic points of Stoic logic that need to be taken into account to clearly see its connections and relations to the *Kathāvatthu*. And, finally, paying attention to the previous description, I will try to explain which those connections are relations are. I hence begin by commenting on the mentioned Buddhist text.

The *Kathāvatthu* and the *anuloma*

As indicated by Ganeri (2004: 314ff), the *Kathāvatthu* was written probably around the third century BCE, and its title can be translated into English as *Points of Controversy*. Actually, it shows a method that can be considered to be useful for the Buddhists, since it is intended to help reason about doctrinal problems and doubts in a correct way. Thus, it provides that, when a dialogue follows the rules of the method, it can be said to be a *vādayutti*. The dialogues in turn consist of eight "openings" or *atthamukha*, which are short dialogues with five elements: "the way forward (*anuloma*), the way back (*patikamma*), the refutation (*niggaha*), the application (*upanayana*), and the conclusion (*niggamana*)" (Ganeri 2004: 316, italics in text).

In this paper, I will mainly pay attention to the first element, the way forward or *anuloma*, since the example of it offered by Ganeri (2004: 316–317) is sufficient to note the similarities between the method of the *Kathāvatthu* and Stoic logic. That example is a passage describing a counter-argumentation process. In it, there are two people

involved. On the one hand, a proponent, and, on the other hand, a *puggalavādin*, i.e. an individual who believes that personal souls are real. Given that it can be expected that the *puggalavādin* does not accept that knowing physical objects is the same as knowing oneself, the proponent can propose a counter-argumentation by removing this difference. In this way, the particular passage cited by Ganeri is as follows:

> Theravādin: Is the soul (*puggala*) known as a real and ultimate fact?
> [1] Puggalavādin: Yes.
> Theravādin: Is the soul known in the same way as a real and ultimate fact is known?
> [2] Puggalavādin: No, that cannot be truly said.
> Theravādin: Acknowledge your refutation (*niggaha*):
> [3] If the soul be known as a real and ultimate fact, then indeed, good sir, you should also say, the soul is known in the same way as any other real and ultimate is known.
> [4] That which you say here is false, namely, that we should say 'the soul is known as a real and ultimate fact', but we should not say, 'the soul is known in the same way as any other real and ultimate fact is known.'
> [5] If the later statement cannot be admitted, then indeed the former statement should not be admitted either.
> [6] In affirming the former, while denying the latter, you are wrong. (Ganeri 2004: 316–317).

Thus, as highlighted by Ganeri (2004: 317), three parts can be distinguished in a counter-argumentation, which are very clear in the previous quote:

> A.- *Thapanā* or first asseveration; in this case, 'the soul is known as a real and ultimate fact.'
> B.- *Pāpanā* or consequence drawn from the first asseveration; in this case, 'the soul is known in the same way as a real and ultimate fact is known.'

C.- *Ropanā* or proof of the contradiction; in this case, the proof is that it is not possible to accept the first asseveration and to reject the consequence drawn from it at the same time.

As also explained by Ganeri (2004: 317), the proponents of the idea that the *Kathāvatthu* is a precursor of standard logic usually base their arguments on the part corresponding to the *ropanā*. The next section develops this point.

Standard logic and the *ropanā*

Indeed, Ganeri (2004: 317–318) explains in details how authors such as, for example, Matilal (1998: 33–37) provide correspondences between the *ropanā* and propositional logic. I will expose in this section the general theses of the approaches in that regard. To do that, I will roughly follow Ganeri, but I will use neither the exact symbols nor the exact correspondences that appear in his text and in other texts such as that of Matilal.

Let us assume that "*p*" stands for "the soul is known as a real and ultimate fact", and that "*q*" represents "the soul is known in the same way as a real and ultimate fact is known." If this is so, [3] formally expresses that

$$p \rightarrow q$$

Where '→' refers to a conditional relationship interpreted materially, i.e. interpreted as standard logic does.

Likewise, [4] provides that

$$\neg(p \cdot \neg q)$$

Where "¬" is the standard truth-functional negation and "·" the standard truth-functional conjunction.

In the same way, [5] states that

$$\neg q \rightarrow \neg p$$

And [6] seems to insist in the same idea as [4].

True, the passage appears to mean that $[\neg(p \cdot \neg q)]$ can be derived from $(p \rightarrow q)$, and that $(\neg q \rightarrow \neg p)$ can in turn be deduced from both $(p \rightarrow q)$ and $[\neg(p \cdot \neg q)]$, and, as it is well known, such derivations are absolutely possible and correct in standard logic. So, it seems that to hold that the *Kathavātthu* anticipated basic requirements of propositional is, at least a priori, a right idea. Nonetheless, that idea may not be completely justified. And this is so because, while it is true that the text cited is coherent with standard logic, it is also so that that same text is consistent with other approaches too, in particular, with that of Stoic logic. But, to note that, it is necessary to take into account some essential theses of this later logic. I comment on those theses in the next section.

The conditional in Stoic logic

Today, it is clear that the conditional in Stoic logic is not the same as that of standard logic. The interpretation of the conditional adopted by the latter is called, as said, "the material interpretation", and the truth is that that interpretation was not the one assumed by the Stoics. Actually, the material interpretation of the conditional is that proposed by Philo of Megara (e.g. Sextus Empiricus, *Pyrrhoniae Hypotyposes* 2, 110; *Adversus Mathematicos* 8, 113; 8, 245; Mates 1953: 44; Bocheński: 1963: 89; O'Toole and Jennings 2004: 479). It can be claimed that, according to this interpretation, a conditional such as $(p \rightarrow q)$ can only be false if $(p \cdot \neg q)$ is the case. In all of the other cases, it is true. This means that, following Philo's interpretation, as provided

by its truth table, the conditional is true in the following scenarios:

$p \cdot q$
$\neg p \cdot q$
$\neg p \cdot \neg q$

And all of this shows in an obvious way why $(p \rightarrow q)$ can be transformed into $[\neg(p \cdot \neg q)]$, since if $(p \rightarrow q)$ is true then $(p \cdot \neg q)$ must be false, and into $(\neg q \rightarrow \neg p)$, since if both $(p \rightarrow q)$ and $\neg q$ are true then the only admissible option is that $\neg p$ is true too.

However, as said, that is not the interpretation taken by the Stoics, or, at the very least, by Chrysippus of Soli. Chrysippus claimed that an additional requirement was necessary: "συνημμένον οὖν ἀληθὲς ἐστιν οὗ τὸ ἀντικείμενον τοῦ λήγοντος μάχεται τῷ ἡγουμένῳ, οἶον 'εἰ ἡμέρα ἐστί, φῶς ἐστί'" (Diogenes Laërtius, *Vitae Philosophorum* 7, 73). This quote, which has been analyzed in very different works (e.g., López-Astorga 2015: 9; O'Toole and Jennings 2004: 492), can be translated into English in this way: "a conditional can only be true if the opposite of the second clause (λῆγον) is incoherent with (μάχεται) the first clause (ἡγούμενον), as in the case of 'if it is daytime, then there is light.'" Therefore, in my view, the requirement added by Chrysippus of Soli is obvious: given that it is not possible that there is not light and it is daytime, the conditional "if it is daytime, then there is light" is correct. Nonetheless, in the cases in which the relationship between the two clauses is arbitrary, the conditional cannot be admitted (on this point, see also, e.g. Sextus Empiricus, *Pyrrhoniae Hypotyposes* 2, 111; Cicero *De Fato* 12–16; Barnes, Bobzien and Mignucci 2008: 107; Gould 1970: 76; Mueller 1978: 20; O'Toole and Jennings 2004: 479).

The difference between Stoic and standard logic hence is evident as well. The former is a framework more semantic (in the linguistic sense of the word "semantic") than the latter. Indeed, in standard logic the relevant points are the syntactic relationships between propositions by virtue of the connectives linking them and the truth-values of such propositions. However, in Stoic logic the meanings are essential too. Given a proposition starting with the word "if" (εἰ), it is necessary to know the meaning of the clauses, since, before accepting the sentence as a real conditional, we must verify whether or not the contrary of the second clause prevents the first clause from being true.

Furthermore, Stoic logic has no formal machinery to derive $[\neg(p \cdot \neg q)]$ or $(\neg q \rightarrow \neg p)$ from $(p \rightarrow q)$. In this later logic those formulae are linked too, but the deduction process is more semantic (again, in the linguistic sense of the word) than syntactic. As argued by López-Astorga (2015: 9–12), Chrysippus' criterion means that the content of the two clauses have to lead to both $(p \rightarrow q)$ and $(\neg q \rightarrow \neg p)$. So, as in standard logic, $(p \rightarrow q)$ is not possible without $(\neg q \rightarrow \neg p)$, but this is not so for the same reasons. In standard logic, both formulae can be drawn from each other by means of formal deduction processes. Nevertheless, what happens in Stoic logic is that $(p \rightarrow q)$ cannot be assumed if, by virtue of its semantic content, $(\neg q \rightarrow \neg p)$ cannot be assumed as true either. Evidently, beyond López-Astorga's arguments, based on this, it can also be said that, if the meanings of the clauses enable us to accept $(p \rightarrow q)$, we must accept $[\neg(p \cdot \neg q)]$ as well, since $\neg q$, the opposite of the second clause, should be inconsistent with the first clause.

But López-Astorga (2015: 9–12) also reveals an important strength of Stoic logic, as

it can solve a relevant problem for cognitive science today: the problem related to *Modus Tollendo Tollens*. This is an "indemonstrable" (ἀναπόδεικτος) which, according to Diogenes Laërtius (*Vitae Philosophorum* 7, 80), was proposed precisely by Chrysippus of Soli and whose structure is:

$$p \rightarrow q$$
$$\neg q$$
$$\overline{}$$
$$\text{Ergo } \neg p$$

This schema is a cognitive problem today because, although it is valid in propositional logic, people do not always resort to it (see, for example, Byrne and Johnson-Laird 2009, López-Astorga 2013). According to López-Astorga (2015: 11), *Modus Tollendo Tollens* can only be applied in Stoic logic when the conditional is an actual conditional, i.e. as mentioned, when the negation of the consequent (λῆγον) cannot be admitted at the same time as the antecedent (ἡγούμενον). And this in turn means that, according to the Stoics, *Modus Tollendo Tollens* can only be used when it is known for sure that the relation between *p* and *q* is not only ($p \rightarrow q$), but also ($\neg q \rightarrow \neg p$), i.e. when it is known for sure that, given $\neg q$, *p* is not possible and it is only possible $\neg p$. In this way, if ($p \rightarrow q$) does not lead, by virtue of the meanings and the contents of both *p* and *q*, to ($\neg q \rightarrow \neg p$), as also indicated, the conditional cannot be accepted, and *Modus Tollendo Tollens* hence cannot be applied. So, it can be said that Stoic logic provides an account of when and in which cases this later schema can be used.

This view is more similar to that of the *Kathavātthu* in general and the *ropanā* part of the counter-argumentation process in particular. I try to show that in the next section.

The *Kathavātthu* and Stoic logic

It is clear that, if we ignore standard propositional logic and read the passage cited above only paying attention to the theses of Stoic logic indicated in the previous section, we can realize that both approaches seem to be compatible and very close. In fact, it can be thought that what [3] actually provides is that there is a relationship between the first asseveration, or *thapanā*, and the consequence drawn from that first asseveration, or *pāpanā*, which allows building a real conditional (συνημμένον) by taking the *thapanā* as the first clause, or ἡγούμενον, and the *pāpanā* as the second clause, or λῆγον. And this is so because it is obvious that what is meant is that the contrary of the *pāpanā* is in conflict with the *thapanā*, since, if the *thapanā* is accepted, the *pāpanā* must also be accepted.

On the other hand, [4] appears to indicate that, indeed, the conditional proposed in [3] is correct, as the denial of the *pāpanā* fights against (μάχεται) the *thapanā*. Thus, it is stated that it cannot be assumed the *thapanā* and the negation of the *pāpanā* at the same time.

As far as [5] is concerned, it shows that the conditional fulfills the requirement indicated by López-Astorga (2015: 11) to the conditional is real and *Modus Tollendo Tollens* can be used. Clearly, it claims that, if the *thapanā* is considered to be p and the *pāpanā* is stood for by q, in the case that $\neg q$ is true, $\neg p$ has to be true too, i.e., it claims that ($\neg q \rightarrow \neg p$).

Finally, [6] seems to insist that the denial of the *pāpanā* is inconsistent with (μάχεται) the *thapanā*, because it is not right to affirm the *thapanā* and to deny the *pāpanā* at the same time. To do that is wrong.

Therefore, it is evident that the quote can be interpreted from Stoic logic as well, and

this means that, as said, the relation between the *Kathavātthu* and standard propositional logic is not absolutely justified. Other interpretations are possible and, for this reason, it can be thought that, if we want to truly understand Indian logic, we need to take into account the idea that standard logic is not the only possible criterion.

Conclusions

Maybe the best action to take in connection to the ancient logics is to analyze them in their own context. The temptation to review them from the modern logical systems always exists, but it is evident that such logics had aims, goals, and intentions other than those of standard logic. It appears that they were intended to teach to argue and, based on the observation of how human reasoning works, to prescribe certain rules or requirements to make inferences and derive conclusions from premises. Thus, it can be thought even that those logics provided a better view of natural reasoning than the modern systems and calculi, a view that was not influenced by the restrictions and interpretations of the logical notions and concepts of standard logic.

In fact, standard logic has several problems and difficulties to explain human reasoning. One of them is, as mentioned, related to *Modus Tollendo Tollens*. However, as also indicated, Stoic logic can solve that problem, and, if the arguments provided in this paper are right and Indian logic is more linked to Stoic logic than thought, the *Kathavātthu* has the potential to do that as well. True, if the *Kathavātthu* shares with Chrysippus' logic the idea that an actual conditional is only so if the opposite of its second clause is inconsistent with its first clause, it can be said

that, following the *Kathavātthu*, a conditional such as $(p \rightarrow q)$ is correct only if the meanings of p and q lead to assume $(\neg q \rightarrow \neg p)$ too. And this in turn could be considered to mean that the *Kathavātthu* claims, in the same way as Stoic logic, that *Modus Tollendo Tollens* can only be used when the conditional fulfills this requirement.

Of course, it can be stated that to interpret Indian logic from Stoic logic is to make the same mistake as to interpret Indian logic from standard propositional logic. Ultimately, in both cases Indian logic is not considered all on its own, but from another framework. Nevertheless, I think that the main point of this paper is that it makes evident that accounts of Indian logic different from that based on modern logic are possible, and that hence this later logic is not necessarily the right criterion to value all of the other logics.

On the other hand, it is obvious that the one of *Modus Tollendo Tollens* is not the only problem that needs to be solved today in the cognitive science field. There are many more problems, and a review of ancient logics can help find solutions for them. By this I do not mean that ancient logics can provide approaches with a wide scope and that are able to explain all of the cognitive difficulties that are to be found in the scientific literature on reasoning. I only mean that certain particular theses of such logics can be useful to account for certain particular problems or difficulties of cognitive science at present. From this point of view, to pay attention to such logics can be very interesting for current science, and not only if the aims being pursued are purely historical. Furthermore, this does not only apply to Stoic and Indian logic, but also to the logics coming from any cultural tradition.

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APIE SĄSAJAS TARP INDIJOS IR STOIKŲ LOGIKOS

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Santrauka. Šiuo straipsniu mėginama parodyti, jog Indijos ir stoikų logika yra panašesnės viena į kitą nei į standartinę logiką. Šiuo tikslu analizuojama ištrauka iš *Kathāvatthu*, kurioje pateikiamas sąlyginio teiginio apibrėžimas dažnai interpretuojamas kaip atitinkantis modernioje teiginių logikoje vartojamą materialiosios implikacijos sampratą. Teigiama, jog tokia interpretacija nėra visiškai pagrįsta. Todėl daroma išvada, jog tai, kas iš tiesų sakoma aptariamoje ištraukoje, nuosekliai susiję su Chrisipo Soliečio pasiūlytu sąlyginio teiginio teisingumo kriterijumi.

Pagrindiniai žodžiai: Chrisipas Solietis, sąlyginis teiginys, *Kathāvatthu*, teiginių logika, stoikų logika