Dialectic, the Dictum de Omni and Ecthesis

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Thus Aristides is a representative of honesty; for, as Athenians said, if there is any honest man it is Aristides. Assuming that we know the representative we can decide the question whether there is an honest man or whether all are dishonest by merely looking at him: if he is dishonest everybody is.

Hermann Weyl

1. INTRODUCTION

Given that demonstrations can be analysed into inferences, Aristotle is naturally understood as having constructed the theory of inference (or deduction) of *Prior Analytics* as a tool for his theory of demonstrative science in *Posterior Analytics*,[1] and there is a long tradition of commentators, harking back at least to Pacius, according to which Aristotle's belief that there is no demonstrative knowledge of singulars terms[2] entails that inferences in *Prior Analytics* could not involve such terms.[3] Thus, the typical syllogism 'Humans are mortal, Socrates is human, therefore Socrates is mortal' could not be truly Aristotelian.[4] Still, there are a number of proofs within Aristotle's own presentation of his theory of inference that appear at first sight to involve singular terms, among them, what has been called 'proofs by ecthesis', such as the proof of the convertibility of universal negatives or '*e*-conversion':

> Now, if *A* belongs to none of the *B*s, then neither will *B* belong to any of the *A*s. For if it does belong to some (for instance to *C*), it will not be true that *A* belongs to none of the *B*s, since *C* is one of the *B*s.[5]

Although he does not use that word in this very passage, Aristotle calls the selection of a *C* 'ecthesis' (ἔκθεσις) – translated by Robin Smith and others before him as 'setting out'.[6]

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[1] After all, Aristotle himself tells us in the very first sentence of *Prior Analytics* that his treatise is about 'demonstration' and that its object is 'demonstrative science' (*An. Pr.* A1, 24a10-11).

[2] This claim is based on Aristotle's argument according to which individuals cannot be predicated of other things, and the concomitant claim at *An. Pr.* A27, 43a42-43 that "arguments and inquiries are almost always chiefly concerned with" things that are, as explained a few lines above, "both predicated of others and have others predicated of them" (*An. Pr.* A27, 43a29-31).

[3] See *Łukasiewicz 1957*, p. 4-7.

[4] For a modern statement, see Ross *ad An. Pr.* A1, 24a17 in *Ross 1949a*, p. 289.

[5] *An. Pr.* A2, 25a15-17. Unless indicated, we use Robin Smith's translation of *Prior Analytics* in *Smith 1989*.

[6] See *Smith 1982*, p. 113, *1983*, p. 225, *1989*, p. xxiii. For earlier instances, see *Heath 1921*, I, p. 370, II, p. 533 and *Ross 1949b*, p. 36 n. 2. Jules Tricot *ad An. Pr.* A2, 25a15-17 in *Tricot 1971* p. 8 & p. 332, used 'ecthèse', which hardly counts as translation.

In this paper, we would like to address two problems engendered by the presence of proofs by ecthesis. (1) Do they involve singular or general terms? In the last century, Łukasiewicz notoriously argued that they involve only the latter.[7] However, this issue remains unsettled, as we shall see in the next section. (2) Is ecthesis a separate procedure somewhat external to the theory of inference or is it constitutive of it? While ecthesis is usually treated in the secondary literature as an alternative mode of inference, i.e., as part of Aristotle's inferential arsenal, so to speak, it is usually considered as not truly pertaining to his theory of inferences. In Robin Smith's words, "it is virtually redundant".[8] If this were the case, one wonders why Aristotle did not simply do away with its occurrences, instead of marring his presentation with them. Hence this second problem.

In order to answer both of these problems, we shall propose a new perspective on ecthesis, presenting it as a *procedure* such that (answering the second question) it will be seen as fully pertaining to Aristotle's theory of inference, and (answering the first one) as involving *both* singular and general terms. These answers will be motivated in sections 2-3, with a critical review of alternatives in the secondary literature. But we should state at the outset that, according to our perspective, although it is part of the theory of inference, ecthesis is not at the same level, so to speak, as that of the rules of syllogisms and of conversion. With the *dictum de omni* one can recover the meaning explanation of the main building blocks of Aristotle's theory of inference, the universal affirmative (AaB), universal negative (AeB), particular affirmative (AiB), and particular negative (AoB) propositions, and we see ecthesis as a procedure implementing the *dictum*,[9] that allows one to prove the *admissibility* of the basic rules of his theory, i.e., rules of the first figure (*Barbara, Celarent, Darii* and *Ferio*), and the three conversion rules (for propositions *a-e-i*).

While our perspective involves a bit of 'formalism', it is meant to be more historically sensitive than is usually the case in the secondary literature on logical aspects of Aristotle, as it relies on the claim that dialectic, far from being simply discarded by Aristotle when he wrote *Prior Analytics*, actually forms its historical context.[10] In this we follow E. W. Beth, Kurt Ebbinghaus, Mathieu Marion & Helge Rückert, and claim that the *dictum de omni* at *An. Pr.* A 2, 24b28-29 originates in a *dialectical* rule in *Top.* Θ 2, 157a34-37,[11] that involves one of the players, in their terminology (taken from Aristotle), *Questioner* getting the other player *Answerer*, to concede a few instances before she can introduce a universal affirmative proposition such '*A* belongs to all *B*' ('*AaB*'), and ask *Answerer* for a counterexample: if unable to provide one, *Answerer* must then concede it. To argue their point, Marion & Rückert followed a suggestion by Jan von Plato[12] in using Martin-Löf's Constructive Type Theory[13] to read *AaB* as meaning that no *c* of type *B* – or no '*c* : *B*' – can be found for which it is not the case that *A*(c). We shall here travel further along that path, using a dialogical take

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[7] *Łukasiewicz 1957*, § 19.

[8] *Smith 1982*, p. 113.

[9] It is also linked nowadays with the notion of downwards and upwards monotony developed during the Middle-Ages. See, e.g., *Parsons 2014*, p. 45-48.

[10] This claim is not new, see, e.g., *Kapp 1942*.

[11] Beth linked ecthesis to the no counterexample reasoning embodied in his rules for semantic tableaux in *Beth 1969*, p. 35 & 37 (originally published in 1955), so he stands at the origin of the viewpoint developed here, although he did not notice the link with dialectic. This link was first noted in *Ebbinghaus 1964*, p. 57 n. 1 and it was fully argued for in *Marion & Rückert 2016*. Jaakko Hintikka had also linked ecthesis to the rule of existential instantiation in, e.g., *Hintikka 1973*, p. 111, or *Hintikka 1991*, p. 175, and recognized his debt to Beth in *Hintikka 2006*, p. 10. But, despite some perceptive remarks in, e.g., *Hintikka 1993*, p. 14-19, to our knowledge he never developed a dialectical account of ecthesis of the sort we set forth here.

[12] *von Plato 2009*, *2013*, sec. 14.1.

[13] See, e.g., *Martin-Löf 1984* or *Granström 2011*.

on CTT that yields an interactive logical framework called 'immanent reasoning',[14] which we will adapt to Aristotle's syllogistic. We motivate this approach to ecthesis in sections 2-3, provide rules for syllogistic reasoning within it in section 4 and proofs within this logical framework of Aristotle's uses of ecthesis, and of rules of syllogism and conversion in section 5 and the Appendix. But, we begin with a brief overview of ἔκθεσις in the *Prior Analytics*, in order further to clarify the meaning of that expression and make our two problems more precise.

[……..]

6. CONCLUSION

Our aim in this paper was to promote a unitary and systematic reading of Aristotle's logic, based on the historical significance of dialectics. Thus, we extended the dialectical reading of the *dictum de omni* initiated by *Ebbinghaus 1964* and *Marion & Rückert 2016* to an account of ecthesis in *Prior Analytics*, with a view to understand correctly the relation of the rules of syllogism and conversion to their dialectical roots. In order to do this, we interpreted dialectic in a new dialogical framework, syllogistic dialogues for immanent reasoning, which allowed us to import and adapt features of CTT (Constructive Type Theory). The above examples show that this logical framework provides for a natural rendering of Aristotle's logic, while remaining closer to the text than previous approaches.

We identified two problems in the literature: Does ecthesis involve individual terms or general terms? And: Is ecthesis separate from the theory of syllogism or not? Our analysis of uses of 'ἔκθεσις' and cognate words in Aristotle allowed us to understand ecthesis as a multifarious *procedure* that results from implementing the *dictum de omni* – whose dialectical interpretation can thereby be seen as offering a unifying framework for Aristotle's syllogistic – and we could thus investigate ecthetic rules and steps involved, in order to answer these questions. We thus argued that ecthetic *steps* involve the choice of an *arbitrarily suitable object*, but that these objects depend on the plurality they represent, so that in those steps they always are in an internal part-whole relation – recall that the units of ecthetic steps are *assertions* of the form $c : A$, rather than 'individual terms' (c) or 'general terms' (A). In this sense, we can say that those objects are rather arbitrary, not individual, and rather dependent-parts of a whole, not general. Keeping in mind the distinction between the level of dialectical bouts themselves and the level of strategy, we argued further that ecthetic *rules* are the *strategic outcome* of the dialectic meaning explanations of the quantifiers in the *dictum de omni*. In other words, these rules, while being elucidations of the commitments and entitlements found in the *dictum* itself, govern the correct application of ecthetic steps. This explains why ecthesis is not on a par with rules of syllogism and conversion, without being separate from the theory of syllogism.[15]

[14] See *Rahman et al. to appear*.

[15] The authors would like to thank Simon Brunin, Ansten Klev, and Göran Sundholm for previous discussions on the topic of this paper, and Kuno Lorenz for comments on a first draft. The framework of syllogistic dialogues for immanent reasoning is developed by Zoe McConaughey in her doctoral thesis 'La science et l'activité du dialecticien' (Université de Lille & Université du Québec à Montréal).

APPENDIX

Since we have contended that admissibility is fundamental for understanding the project of the *Prior Analytics*, i.e., that the syllogistic figures are an extension of the first figure with conversions, and that these rest on the meaning of the quantifiers provided by the *dictum de omni*, and that ecthesis occurs directly on its very level, we complete here our demonstrations of *e*-conversion, *Darapti* and *Bocardo* by providing a proof for the two other conversions – showing also that our rules do not allow to prove *o*-conversion, in conformity with Aristotle – and for the first figure (*Barbara*, *Celarent*, *Darii* and *Ferio*), with the rules of syllogistic dialogues for immanent reasoning. As above, we begin from the text, but with minimal discussion.

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