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Argumentation and counterfactual reasoning in Parmenides and Melissus

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Abstract: Parmenides and Melissus employ different deductive styles for their different kinds of argumentation. The former's poem flows in an interesting sequence of passages: contents foreword, methodological premises, *krisis*, conclusions and corollaries. The latter, however, organizes an extensive process of deduction to show the characteristics of *what is*. In both cases, the strength of their argument rests on their deductive form, on the syntactical level of

their texts: the formal structure of their reasonings help to identify the features and logical intersections of their thoughts. On the one hand, Parmenides uses modal reasoning, enforcing the employment of the principle of the excluded middle. On the other hand, Melissus radicalizes the use of modal reasoning and employs counterfactual statements in order to develop his doctrine of what is. Despite their differences, both deserve a place in the Stone Age of logic and theory of argumentation due to their common ambition to demonstrate *what is*.

Keywords: Parmenides, Melissus, argumentation, demonstration, counterfactual reasoning.

Introduction

Demonstration and deduction have always been the most commonly practiced activities for logicians. Logic deals with arguments, namely

Any group of propositions of which one is claimed to follow from the others, which are regarded as providing support or grounds for the truth of that one. [...] A deductive argument makes the claim that its conclusion is supported by its premises conclusively (Copi, Cohen & McMahon, 2014, p. 6, p. 24).

An argument is defined as *deductive* when, if its premises are true, then its conclusion is also true: if each statement is either a premise or follows from previous statements through rules of inference, then the argument is formally valid. Validity is a formal characteristic of arguments, as distinguished from the truth, which applies to propositions.

The tendency to make deduction the *Via Regia* to demonstration was acquired and developed at the very beginning of early Greek philosophy, especially on account of its relationship with ancient mathematics. However, the intention of making deductions and obtaining demonstrations must have also drawn some ideas from a

non-mathematical context. Above all, argumentative skills were strengthened by the Eleatic School, creating the speculative conditions necessary for demonstrative reasoning.

This essay aims to explore the birth and development of argumentation and deductive reasoning within the Eleatic School, particularly by Parmenides and Melissus. Eleatic ontological inquiries are developed inside deductive arguments which should support, guard and protect the validity of the thesis presented. In other words, the possibility to develop a deduction is the method to obtain the most important theses of their doctrines. Parmenides and Melissus were not aware of the need to verify the validity of the deduction and truth of premises, necessary conditions to admit that the conclusion is true. At the dawn of logic, the rules of inference and fundamental principles of identity (PI), non-contradiction (PNC) and excluded middle (PEM) were not clear. The discovery of the connection between the demonstration of the truth of a conclusion and the structure of the reasoning in which it is deduced, however, was decidedly significant and merits adequate investigation. To demonstrate what being is, Parmenides and Melissus carried out two different deductive approaches, oriented by their teachings. Although they both made logical mistakes, both wanted to guarantee the truth of their theses from the global architecture of their reasoning. In addition, both resort to counterfactual forms of reasoning, although Parmenides in a weaker way, and Melissus much more strongly. Generally,¹ in counterfactual reasoning the antecedent is assumed to be false and can be expressed in the conditional form with the antecedent declined to the past. In our inquiry, we examine how the

¹ Counterfactual reasoning is used in situations where it is necessary to imagine and evaluate alternative situations. This reasoning is expressed in conditional counterfactual statements, around which there is abundant literature with many different applications, which we cannot discuss in this paper. To this end, a more specific study is being prepared in order to apply some recent developments in the debate on counterfactuals to the issues argued here. About conditional and counterfactual statements, see Bennett (2003) and Byrne (2005). As a general introduction with reference to classical work about the topic, see Morato (2019), Starr (2019).

assumption of the falsehood of the antecedent is used by the Eleatic and the Samian to deduce impossible properties of being and prove the truth of the antecedent: for the two thinkers, this practice becomes a demonstrative mode, which Greek thought did not officially assume because it opted for the material implication.

This paper sets out to examine the syntactic dimension of the Parmenidean and Melissean proposals, excluding both their semantic contents and the discussion about the specific attributes of the Eleatic *what is*. It is divided into five parts: Part 1 analyses the structure of Parmenides' poem, distinguishing premises, inferences and conclusions. Part 2 highlights the illicit shift from the assertive logic of being (being is) to the modal logic of being (being must be), meaning the domain of the alethic modal logic, in which there are statements such as 'It is necessary that *p*', 'It is possible that *p*', concerning the modalities of logical necessity, possibility or impossibility. It also focuses on the assumptions necessary to understand the whole logical structure of the poem, regardless of the errors made, and on Parmenides' first use of counterfactual reasoning. Part 3 analyses some passages contained in Melissean fragments in order to examine his illicit shift in modality and exemplify his use of counterfactual logic that guarantees his radical monism. Part 4 shows how the assumptions necessary to understand the poem of Parmenides serve to understand the treatise of Melissus, although the latter uses counterfactual reasoning in a more radical way. The conclusion follows in Part 5.

1. The deductive structure of Parmenides' poem

After its first diffusion, Parmenides' poem was perceived as focussing on the doctrine of being and the presence of verses about the cosmos and its phenomena was underestimated.² The problem

² Aristotle mentions in passing the contents of natural philosophy and Theophrastus is the first to reproduce the *doxai*. See L. Rossetti and F. Marcacci, *Introduzione*

intensified when, centuries later, the historiography of science emerged and the debate about the role of the section about nature in Parmenides' poem arose again. On the other hand, the doctrine of *what is* led to the belief that it was an "unprecedented exercise of the logical faculty" (Raven, 1948, p. 23) and that it contained the first formulation of logical principles, like PNC.³ The general structure of the poem, with its section on the doctrine of being and the following one on nature, received more attention when Diels⁴ collated the verses into a framework which is still currently used as a reference. Apart from a few authors (above all Mansfeld, 1964)⁵ however, not much attention was paid to the general deductive structure of the verses. Above all, we know that an argument is valid not because of the semantic content of its propositions, but because of the formal relations (syntactic) among those propositions: Parmenides' poem's

(*apud* Cordero, 2008, p. 7-21); Pulpito, 2007. About historiography on ancient science, see Zhmud, 2006.

³In this vein and seeing Eleatic logic as an influential factor in the formation of ancient mathematics, see Szabò (1977, p. 237-238) and De Santillana (1966, p. 102-107). Against this opinion, see Stannard (1960), according to whom the discovery of the PNC responds only to the attempt not to contradict the laws of the Greek syntax, therefore far from any logical ambition; Netz (2001), according to whom Eleatic logic did not influence mathematics, because no Greek mathematician joined it; besides, Barnes (1982, p. 230): "[Melissus], like Parmenides, leaves open a narrow and fairly tedious path to the scientist". However, this discussion does not adequately consider the distinction between the history of science and the history of logic. Since logic (or at least an 'embryonic' form of logic) influenced mathematics at the beginning of early Greek thought, it is fundamental to understand the role of the Eleatics. Eleatism provided some logical elements of demonstration during a period in which mathematicians mostly focused on an empirical approach to demonstration. The juxtaposition and interaction between the two souls of ancient Greek science becomes mature over time, as the comparison between Aristotelian logic and the *Elements* of Euclid shows (see Marcacci, 2012; Rossetti, 2017, vol. 2, p. 113-147).

⁴Diels, 1922. For an example of the discussion on the right sequence of the verses, see Cordero, 2011.

⁵Mansfeld (1964, p. 42-121) analyses the structure of the poem, starting from fragment 2 and identifies the need for the radical logical duality between the two ways. His comparison between Zeno and Parmenides is also very interesting to this end.

deductive structure shows a syntactic logic that should be investigated, not only declared.⁶

Parmenides' poem flows in an interesting sequence of passages that can be classified as methodological premises, contents premises, *krisis*, conclusions and corollaries.⁷ Observing the poem from this point of view, we can admit that its strength lies in the development of its deductive form. It is important to remember that there is no need for contiguity between the listed sections. As logicians know, premises and conclusions in an argument can be set out in an order which is not strictly logical but is equally workable.⁸ Thus, the important debate about the arrangement of the verses becomes secondary:⁹ isolating and recording the individual premises and distinguishing them according to their functions, is now more noteworthy for our purposes.¹⁰

Methodological premises. The methodological premises clarify the rules within which every other teaching is handed over. Without these rules, it is not possible to understand or absorb any content. The Goddess shall be listened to with attention since every truth descends from her (DK28 B2.1: "I will tell you...", "ἔγὼν ἐρέω"); the youth to whom the goddess is speaking shall assume the teaching (B2.1: "and

⁶ Stannard (1960, p. 527-528): "Unfortunately, few of the writers on Parmenides are explicit about what they mean by such terms as 'logic', 'deduce', 'premise', and the like. It is small wonder then that there have been, despite fundamental agreement on the significance of Parmenides, widely divergent interpretation. In no small part, this divergence of interpretation is due, I think, to different estimates regarding the nature and function of logic".

⁷ See Marcacci, 2012, p. 85.

⁸ In an argument, the premises and conclusion can be confusingly intertwined: for this reason, logicians usually rewrite the argument using *paraphrases* or *diagrams*, which clarify the correct logical order, so that it is possible to assess the premises and the conclusion (Copi, Cohen & McMahon, 2014, p. 36-65).

⁹ For example, in Laks-Most (2016, LM from now on), the fragment B4 of Diels-Kranz (1951, DK from now on) becomes D10, entitled *Methodological Exhortation*. Nevertheless, the methodological contents perform the same function, in order to understand the general contents of the Goddess's discourse.

¹⁰ Fragment numbering system is from DK. Translations essentially take into account Kirk-Raven-Schofield (1983), LM, Barnes (2005).

you must carry my account away with you when you have heard it”, “κόμισαι δὲ σὺ μῦθον ἀκούσας”). Useless efforts are avoided when the youth realizes that being and understanding are the same thing and one implies the other (B3: “For it is the same, to think and also to be”, “τὸ γὰρ αὐτὸ νοεῖν ἐστὶν τε καὶ εἶναι”). Likewise, it is also important to avoid any distraction interposed by non-being, whose path does not lead anywhere, just as nobody is due to follow the road to uncertainty that many mortals travel (B6.3-4). The youth should not be surprised if faraway things look close (B4.1-2): being is what gathers everything within itself, so much so that every starting point coincides with the arrival point (B5). After receiving the goddess’ instructions, the youth can be sure that it will never be demonstrated that non-being is (B7.1-3). Most of all, though, the youth learns to understand the correct path of reasoning (B7.5-6).

1. *Content premises.* Along with rules for a good apprenticeship, the Goddess also gives premises of content, able to give something similar to the axioms on the grounds of reasoning. First of all, the irreducible duplicity of the ways of being and non-being (B2.2-5). PI can be acknowledged among the Goddess’ precepts (B6.1: “for it is possible that it is”, “ἔστι γὰρ εἶναι”) and everything is condensed in it: non-being does not exist (B6.2: “while nothing is not”, “μηδὲν δ’ οὐκ ἔστιν”). It is not possible, therefore, for what is not to be (and non-being cannot even be conceived) (B8.8-9). Logic is fulfilled in the PNC (if x, x cannot both be and not be: ‘(x) not(x is \wedge x is not)’ and things are all in it (B7.1, 8.8-9) and it establishes the only two paths of inquiry (B2.3, 5: “The one, that ‘is’, ...The other, that ‘is not’”, “ἢ μὲν ὅπως ἔστιν τε ... ἢ δ’ ὡς οὐκ ἔστιν τε”) in a necessary disjunction (PEM: ‘(x)(x is \vee x is not)’).
2. *Krisis* (inferential rule). The critical moment, the peak of reasoning, the keystone around which the whole argument develops is when a transition from *is* to *ought to* is produced, and modal reasoning subverts assertive

reasoning. Parmenides leads the principle to its extreme consequences, a step which is iterated a few times, as if it were the inferential rule par excellence. When on the brink of the abyss of such consequences, the Eleatic must abandon the certainty of assertive logic and stumble into modal logic.¹¹ The Goddess declares her loyalty to the PEM ‘___ is or ___ is not’ since when she decries the dichotomy between the two paths (B2.3, 5) until the end of her speech and until the question: ‘Is or is not?’ (B8.16: “ἔστιν ἢ οὐκ ἔστιν”). Such assumption determines fragment 7.1. Yet from the start, the Goddess deflects her arguments stepping from the PEM to its own modal version: ‘it is necessary that ___ is and necessarily is or that ___ is not and necessarily is not’ (B2.3, 5: “καὶ ὡς οὐκ ἔστι μὴ εἶναι ... καὶ ὡς χρεών ἐστι μὴ εἶναι”). Such a manoeuvre is *per se* unjustified, exercised by authority. The dramatism with which it is introduced further emphasizes its centrality. The Goddess’ tone turns into questions (B8.19: “How then could what is exist afterward?”, “πῶς δ’ ἂν ἔπειτα πέλοι τὸ ἐόν ...”; “And how could it be born?”, “... πῶς δ’ ἂν κεγένοντο;”). Finally, she agrees to try to contradict herself, showing that the consequences are worse (B8.33: “for it is not lacking; if it were, it would lack everything”, “ἔστι γὰρ οὐκ ἐπιδευές· [μὴ] ἐόν δ’ ἂν παντὸς ἐδεῖτο”). In the middle of the speech made by the Goddess, who had to get consensus through the coherence of her teachings, the poetical afflatus is underlined and dims the weakness of logical consequentiality.

3. *Conclusions.* Being has got the aforementioned features: it is indivisible and (B8.22, 25); motionless (B8.26, 27); eternal, without beginning or ceasing (B8.27); complete

¹¹ It seems to evoke Aristotelian page style, where in which the Unmoved mover is discussed by means of counterfactual analysis, because assertive logic is no longer useful (Arist. *Metaph.* Λ.6 1071b12-31).

and spherical (B8.43). These conclusions are provided after the introduction of the necessity and possibility inherent to being (B8.8, 11, 16, 30, 47): the Goddess had no alternative, her tones get dramatic and she throws down the gauntlet. What would have moved being to its birth, if it had been born from nothing (B8.9-10)? How could it be fulfilled in the future (B8.24), and how could it be born (B8.24)? If so, then it would not be being.

4. *Corollaries*. The characteristics of being mean that there is nothing beyond it, that nothing can be taken from nothing (B8.12-13) and that it is contained within its own limits (B8.26).

2. Modality and interpretation criteria for the Parmenides' poem

The Goddess' argument follows an intense pace and, verse by verse, it tends to eliminate every counterargument. The principle of being becomes cause and rule of every deduction, the reason for the systematic organization of the poem's central passages. The general deductive structure of the poem has to be read along with the singular deductive steps, even if it is based on errors.

In an effective reconstruction of the so-called 'Russell-line' (Palmer, 2009, p. 74-82), initiated by Russell's interpretation of Eleatism, Palmer recognizes a fundamental vice perpetrated in the analytical tradition of the studies on Parmenides: the embarrassment produced by the passage in the poem from 'what is' to 'what must be' was avoided in an attempt to focus on the philosophical thesis according to which "Parmenides believed that whatever one inquiries into, or speaks and thinks about, (necessarily) exists" (Palmer, 2009, p. 76). On the contrary, according to Palmer, it is important to recognize a modal interpretation of Parmenides' paths of inquiry (Palmer, 2009, p. 105). "Palmer makes the highly original proposal that Parmenides' entire argument through the whole poem, both Truth and Doxa, is logically based on an assumed threefold

distinction of modes of Being” (Mourelatos, 2016, p. 262): the first two ways (be and not-be) connected with the Truth and the third with the Doxa. Palmer (2009, p. 86) stresses the importance

to be careful in employing the language of modality when dealing with Parmenides, for he was not yet in a position to conceive necessity and impossibility as logical properties, that is, as properties that indicate the relation of predicate to subject in a statement or thought.

The scholar goes on to ask many interesting philological and semantic questions, and also insists on the fact that “the Parmenidean modalities of necessary being and necessary not-being or impossibility are likewise not to be understood as logical properties” (Palmer, 2009, p. 93).

Relying only on the attestation to the presence of modal categories in the poem, it is useful to make a comparison with a recent study by Wedin. His study highlights the logical form of the poem as consistent in a deductive movement and is divided in two: the *Master Argument* in fragments 2, 3, 6 and the *Deductive Consequences* in fragment 8. The *Master Argument* is based on the fact that the PEM presides over *Governing Deduction* (DK28 B2, 3: introduction of two paths of investigation, *what is* and *what is not*, and impossibility of the second one) since it represents the logical elements recurring throughout the section of the poem regarding the *Way of Truth*. Some corollaries and the third path follow (B6). Deductive consequences are the features of what is: (A) uncreated¹² and imperishable (B8.5-21), (B) indivisible and continuous (B8.22-5), (C) motionless (B8.26-31), (D) complete (B8.32-49). Wedin suggests that the right order to understand the *deductive consequences* is (A), (B), (C), (D), even knowing that other scholars opt for different deductive genealogies.¹³

¹² The term ‘uncreated’, used by Wedin, seems not so adherent to the Parmenides’ conceptual world, even if it clearly refers to what has been called “the generative dilemma” (Barnes, 1982, p. 185).

¹³ E.g. Rea (2001, p. 129-151) makes an interesting attempt at studying the features of what is in Parmenides for temporal logic.

Now, there are data which make it possible to better focus on the logical structure of the poem, which is important *per se* and to contextualize even semantic questions, but is particularly useful for a comparison with Melissus, as we be outlined shortly. Hence, taking into account these considerations and those set out in paragraph 1, the following assumption can be made:

The force of Parmenides' argument is its deductive form.
[assumption A]

The fundamental disjunction that dominates the whole argument is expressed by the PNC, which establishes the two ways of being and not being. Wedin confirms this interpretation in the perspective of radically refusing the *Ionian interpretation*, i.e. the interpretation linking Parmenides' fragments on nature to the tradition of the Ionian *peri physeos*: 'The view argued in this monograph, outré or not, favors an austere reading of Fr. 8's 'signs' or deductive consequences of what is. It favors a reading on which the natural world of the Ionians is flatly rejected as a legitimate target for the investigation' (Wedin, 2014, p. 2). Wedin radically eliminates any possibility of admitting a doxastic path, intermediate between being and non-being, in DK28 B6: for this reason, he prefers to quote the PEM more than the PNC. According to Wedin, neither in B6 nor anywhere else would Parmenides have embraced the Ionian interpretation in his *Way of Truth* (WT).¹⁴ Furthermore, he observes the poem from the point of view of the development of the PEM's consequences, observing that it directs all of the speech's verses on truth.

Thus, we can infer the second assumption.

¹⁴ See Wedin (2014, Part I, 53 ff. & Part III). The scholar admits being only interested in the logic of the WT and not in the one of the *Way of Opinion* (WO) and declares that he does not deal with literature and accounts that would distract him from his aim (Wedin, 2014, p. 5).

The PEM determines two paths of inquiry, by means of a necessary disjunction: $(x)(x \text{ is } \vee x \text{ is not})$.
[assumption *B*]

The poem's deductive structure gives the principle of being the power of self-defence. However, the central moment of the argument is the so-called *krisis*, the moment of the decision (see section 1.3 above). At this moment, the Goddess accords a specific deductive rule, exactly the passage from the assertive proposition (*the being is*) to the modal proposition (*the being necessarily is*). To interpret the poem entirely (e.g. B8.45, 47, 53-54), we need the *modal equivalence* of 'x is' and 'x is not' to 'x ought to be' and 'x ought to not be'. Parmenides juxtaposes the PEM with a version of the same principle, which is extended to modality. Hence if '___ is OR ___ is not' is valid, also '___ is and necessarily is OR ___ is not and necessarily is not' is such.

Lewis (2009) severely underlined Parmenides' logical error in the transition from assertive to modal categoricity for two reasons. Firstly, the passage from the PEM to its modal version is erroneous, because it confuses the necessity of the consequence ($\Box(P \rightarrow P)$) with the necessity of the consequent ($P \rightarrow \Box P$) (*illicit modal shift*); by forfeiting the PEM, the Goddess's arguments on which it is based lapse. However, these arguments always proceed by elimination (they reject the way of not being in favour of the way of being) and are carried out within a reasonable deduction, even if based on a false assumption. Secondly, the third path, the 'mixed' path, is intrinsically contradictory and meaningless because it contains negative existential statements without reference (semantic defeat), such as depriving any discourse that encompasses them of meaning. Lewis goes on to show that the third way is rejected not because it is identical to the way of not being, but because it produces contradiction: if something is given as true, the opposite is not true. *Ergo*, the path that mixes being and not being, is not viable. Lewis concludes that with this mechanism, the Goddess of Parmenides urges to decide (*krisis*) between the two ways while prohibiting any mixed path.

Like Lewis,¹⁵ Wedin recognizes that that modal equivalence is a wrong assumption, from a logical point of view.¹⁶ Stating this assumption as an alternative version of [assumption *B*]:

The PEM has got a modal counterpart: ‘ $(x)([x \text{ is } \wedge x \text{ necessarily is}] \vee [x \text{ is not } \wedge x \text{ necessarily is not}]$ ’,¹⁷ perfectly compatible with the principle’s canonical version.
[assumption *B*’]

Further problems arise, among the most interesting of which is the semantic one. According to the governing deduction, it is not possible to think *what is not*. However, as soon as this impossibility is declared, *what is not* is considered and discussed. The fact that Parmenides is treading a dangerous path becomes evident in fragment 8 when, to deduce the features of being, he must introduce negative sentences.

Although Parmenides’ text is logically clearer if [assumption *B*’] is supposed, some remarks lead us to question the value of a particular passage:

DK 28 B8.9-10: what need would have caused it to grow, sooner or later, starting from nothing? Thus it must be completely or not at all.

¹⁵ Wedin (2014, p. 41) criticizes Lewis essentially because his analysis does not imply the rejection of the Ionian interpretation, as at the beginning Lewis wanted to demonstrate. This is principally because “Lewis’s account allows investigation of *P*, so long as one doesn’t also presume to investigate $\neg P$, what is now deemed impossible”.

¹⁶ By extensive analysis, which is not the subject of this paper, Wedin shows that the modal version of the principle is perfectly compatible with its canonical form and would make the Eleate able to fully reject the second *logos*. To avoid weakening the strategy of radical rejection of the second *logos* and on the basis of fr. 6.1-3, Wedin deflects modal equivalence in an extended version of the PEM (Wedin, 2014, p. 34-43).

¹⁷ To say: $(x)(x \rightarrow \Box x) \vee (\sim x \rightarrow \Box \sim x)$.

τί δ' ἄν μιν καὶ χρέος ὤρσεν / ὕστερον ἢ πρόσθεν, τοῦ
μηδενὸς ἀρξάμενον, φῶν; οὕτως ἢ πάμπαν πελέναι
χρεῶν ἔστιν ἢ οὐχί.

Parmenides is inquiring into the value of the necessity of being, its sharpness. It is very interesting to examine the way he chooses to do this: he does turn down a counterfactual path, a strategy which recognizes what Mansfeld defined as “(proto-) counterfactuals”.¹⁸ The aforementioned verse B8.9-10 is necessary to introduce the property according to which what is is uncreated and imperishable. It is also observable how completeness receives the same treatment and is strengthened through the counterfactual path.

DK 28 B8.33: for it is not wanting; if it were, it would want everything.

ἔστι γὰρ οὐκ ἐπιδευές· μὴ ἔόν δ' ἄν παντὸς ἐδέϊτο.¹⁹

Regarding the properties of indivisibility, continuity and immobility of being, it is stated that something which could deny the entirety and fullness of what is does not exist (v. 22-25). Its immobility, continuity and homogeneity result in its absence of birth and death (v. 26): thus, everything always stays the same and nothing exists outside of being (v. 26-49).

Here is another new explanatory principle for the poem's structure:

To strengthen the PEM, counterfactual reasoning is needed.

[assumption C]

The aforementioned semantic problem does not have sufficient tools to be solved within the poem: there is no logical device to justify the passage from ‘___ is or ___ is not’ to ‘___ ought to be or ___

¹⁸ See Mansfeld (2016, p. 186-187). Mansfeld makes these remarks in response to the essay ‘Sulla logica dimostrativa di Melissus’ by F. Marcacci, published in the same volume (p. 145-149).

¹⁹ See Coxon (2009) and Cerri (1999): both preserve μὴ.

ought to not be'. The reference to the naturalistic fragments becomes even more problematic: the counterfactual way denies any alternative to being²⁰. A solution is nonetheless attempted by straining the language of the poem and testing out the following strategy: counterfactual demonstration is the formal structure within which the unjustified passage is mediated, a stance that Melissus made even more radical.²¹

3. Melissus, modal equivalence and counterfactual logic

The (proto-)counterfactual legacy of Parmenides is applied deeply in Melissus, until it becomes the only demonstrative technique chosen. In his *Peri physeos he peri tou ontos*²² Melissus organizes a complete scheme of arguments that, even compared to Parmenides, is new in the scene of Pre-Socratic thought. For the first time in the history of philosophy, there is a written text about ontology, the very first book in a form of treatise to be openly dedicated to the question of *being*. Reducing all nature to what is is his goal, his *demonstrandum*: nothing could be more absolute in this kind of *monism*. However, whereas Parmenides' poem renders a perspective that allows the possibility to reflect on natural phenomena, Melissus'

²⁰ The issue is raised, intentionally leaving aside the very broad and accurate discussion in many scholars, primarily Wedin. On the consequences of the distance between the goddess' speech and the naturalistic fragments, see also Rossetti (2017, vol. I, p. 89-113).

²¹ Among other problems, one deserves attention: why the information transmitted in the naturalistic fragments is crystalline, synthetic and unambiguous (fr. 10-20) and only when the Goddess refers to natural phenomena does opinion seem to get closer to what is: "I tell thee the whole arrangement as it seems to men, in order that no mortal may surpass thee in knowledge" (DK28 B8.60-61). Furthermore, a lack of understanding of the serious gap of communication and content is evident within the poem after the discourse on what is, to the point that it is not absurd to suppose that Parmenides has not deeply questioned the status of the *doxai*. See Bollack (2006); De Long (2017); Graham (2006); Rossetti (2010), Rossetti (2017, vol. 1, p. 29-65), Ruggiu (2011).

²² About the authenticity of the title, see Harriman (2015).

treatise omits any reference to nature from his teachings in order to leave room just for the inquiry of being.²³

What kind of ontology does Melissus argue for in his treatise?²⁴ Being has no temporal limit in the past and in the future (DK30 B1: “Whatever is always was and always will be”, ἀεὶ ἦν ὃ τι ἦν καὶ ἀεὶ ἔσται)²⁵ and it has not got a beginning or an end (B2: “(it) has neither a beginning nor an end”, ἀρχὴν οὐκ ἔχει οὐδὲ τελευτήν). It does not move (B7.7: “nor does it move”, οὐδὲ κινεῖται) and it is one (B6: “... it would have to be one”, ... ἔν εἶν ἄν). Finally, Melissus is resolved: what is is eternal and infinite and one and entirely similar (B7). And again: it does not lose anything, it does not get bigger, it does not change, it does not feel pain nor suffering, it is full, it does not move, it is not dense and rare, and it is undivided. So how does Melissus argue for ‘his’ being? The sort of proofs he gives in B7-B8 are not taken from empirical data, e.g. like the Milesians used to do in a considerable part of their reasonings. Instead, Melissus searches for *logical* proofs. Thus, he not only developed a long deductive chain, as Barnes was able to codify (Barnes, 1982, p. 181), but he defended his deductive chain by relying extensively on counterfactual reasoning.

Melissus’s reasoning is developed by continually reaffirming the derivation of the ‘it must be’ from the ‘it is’. “For if it came to be, it is necessary that it was nothing before it came to be” (DK30 B1, LM21 D2); “... as it always is, in the same way it is necessary that it also always be unlimited ...” (DK30 B3, LM21 D4); “for if it existed, it would have to be one” (DK30 B6, LM21 D6); and above all, “if it were something that is, it must be one” (DK30 B9, LM21 D8). The illicit modal shift that Lewis recognized in Parmenides²⁶ is more easily identifiable in Melissus: if ‘___ is, then ___ necessarily is’,

²³ Regarding Melissus’s connection to Miletus’ legacy see Mansfeld (2016, p. 95-107).

²⁴ The fragment numbering system is from DK. Translations essentially take into account Kirk-Raven-Schofield (1983); Laks-Most (2016); Barnes (2005).

²⁵ Here Barnes (1982, p. 184) follows Loenen (1951).

²⁶ Especially Lewis (2009, p. 5-6, n. 5).

‘ $(x)(x \rightarrow \Box x)$ ’. In reality, the question is more articulated in Melissus and worth some consideration. In passages such as:

But just as it always is, in the same way it is necessary (DK30 B3, LM21 D4);

For if it existed, it would have to be one (DK30 B6, LM21 D6),

the necessity of the consequent refers to some properties of what is, and the passage is allowed by intermediate requirements.

[Being is eternal] and [eternity implies infinity in magnitude] then *necessarily* [being is infinite in magnitude].

[Being is infinite] and [infinity implies unity] then *necessarily* [being is one].

From these arguments, the Samian can derive all the properties of being, leaving the transition to necessity unjustified. Thus, assumption *B*’ is affirmed:

The PEM has got a modal counterpart: ‘ $(x)([x \text{ is } \wedge x \text{ necessarily is}] \vee [x \text{ is not } \wedge x \text{ necessarily is not}])$ ’, perfectly compatible with the principle’s canonical version.
[assumption *B*’]

Melissus articulates a few argumentative passages which establish that what is is an unarguable presupposition. Melissus’ thought includes an argumentative structure based on connected conceptual passages which have an embryonic logical structure that we will try to realize. For example, the beginning of fragment DK30 B7 (LM21 D10).²⁷

In this way, therefore [what is] is eternal (ἀίδιον) and unlimited (ἄπειρον) and one (ἓν) and entirely similar (ὅμοιον), and it could not either be destroyed, nor

²⁷Following Sedley (1999) for “could” and “could not” instead of “will” and “will not”.

increase in size, nor change its arrangement, nor suffer either pain or distress. For if it underwent any of these affections, it would no longer be one. For if it becomes different, it is necessary that what is not be similar, but that what was before be destroyed, and what is not come to be. If then the whole had become different by a single hair in the course of thousands of years, it would have been destroyed in the whole of this time.

Fragment 7 could be paraphrased²⁸ in a synthetic way that could also apply to all of the fragments, isolating a few sentences useful to understand the logical structure of the reasoning:²⁹

- [a₁] what is is eternal (... ἀίδιον ἔστι ...)
- [a₂] what is is unlimited (καὶ ἄπειρον ...)
- [a₃] what is is one (καὶ ἓν ...)
- [a₄] what is is entirely similar (... καὶ ὁμοιον πᾶν)
- [b₁] what is could not (either) be destroyed (fr. 7.2: καὶ οὔτ' ἂν ἀπόλλύοι τι)
- [b₂] what is could not increase in size (οὔτε μείζον γίνοιτο)
- [b₃] what is could not change its arrangement (οὔτε μετακοσμέοιτο)
- [b₄] what is could not suffer either pain or distress (οὔτε ἀλγεῖ οὔτε ἀνιᾶται)

The statement “if what is is entirely similar then what is does not suffer either pain or distress” could be interpreted as an *implication*: (a₄ then b₄). The features b₁, b₂, b₃, and b₄³⁰ are strictly related to each

²⁸ See here *footnote* 8.

²⁹ A broader analysis is given in Marcacci (2012, p. 78-83, p. 88-90).

³⁰ Melissus does not directly recall the properties a₂ and b₂ but lingers on the variant for which what is does not mutate its form (DK30 B7.3, LM21 D10). He is supposed to deem them to be equivalent.

other in paragraphs 2-10 of the fragment B7. Therefore, the beginning of fragment 7 may be organized as follows³¹:

(a₁ et a₂ et a₃ et a₄) then (b₁ et b₂ et b₃ et b₄) (1)

Fragment 7 continues with sentences that contain an implication in a conjunctive verbal form: the reasoning becomes strongly *suppositional* (Pollock, 1992). Since it is impossible to verify empirically the effects of the denial of the properties of being, Melissus proceeds exploring the logical consequences that would result from denying such properties. Thus, he organizes a series of sentences whose antecedent is false, properly counterfactual:

¬b₃ then ¬ a₄

For if it become different, it is necessary that what is not be similar ...

εἰ γὰρ ἕτεροιοῦται, ἀνάγκη τὸ ἐὸν μὴ ὁμοῖον εἶναι (B7.2)

¬ b₃ then ¬ a₁

... and what is not come to being.

... τὸ δὲ οὐκ ἐὸν γίνεσθαι (B7.2)

¬ b₄ then ¬ a₃

For it could not feel pain as a whole ...

οὐ γὰρ ἂν πᾶν εἶν ἀλγέον (B7.4)

¬ b₄ then ¬ a₄

... nor would it be similar, if it felt pain.

οὐτ' ἂν ὁμοῖον εἶη, εἰ ἀλγέοι (B7.4)

Focussing on just a part of (1),³² as it is an example that could apply to other implications of DK30 B7:

If what is is entirely similar, then what is could not suffer pain or distress (**a₄ then b₄**)

³¹ Paragraphs 2-6 of Melissus' fragment 8 continue with approximately the same style and the same rules apply for their demonstrative structure.

³² I assume the distributive property as valid: (A1 et A2) → (B1 et B2) = (A1 → B1) et (A2 → B2).

Melissus considers both a_4 and b_4 true, and the implication ‘ a_4 then b_4 ’ is supposed true. In the fragments, he considers the converse proposition in order to reject the counterhypotheses that what is suffers pain or anguish:

$\neg b_4$ then $\neg a_4$ (2)

If what is could suffer pain or distress,
then what is would be not entirely similar.

(30B7.4: ...for it would not be all [alike] if it were in pain...)

In order to understand the value of implication (2), it is important to understand what happens by combining the different values of the antecedent and the consequent. As stated in the introduction, we will not examine the Melissean counterfactuality by a comparison with one or the other interpretation. We will start from the following very general considerations about a counterfactual implication, and then check what really happens in Melissus’ fragments. Based on this, what implications might be held or rejected will be evaluated.

Thus, firstly it is necessary to make some considerations about:

- (a) what the general law with which to solve the problem of being is: in our case, ‘*what is is, and it is not possible that it is not*’;
- (b) certifying what ‘happens’ and what is taken for real (factual context): in our case, ‘*what is is eternal, unlimited, one and entirely similar*’;
- (c) initiating an analysis of the counterfactual context by studying cases in which the antecedent of the counterfactual statement is true: according to Melissus, the property ‘*what is could not suffer pain or anguish*’ is true (and its negation is false);
- (d) the following possibilities about the consequent: (d.1) If the consequent is true, then the statement is valid. (d.2) If the consequent is false, then the corresponding semi-

factual statement must be assumed ('Even if A had happened, B would have happened anyway')³³. (d.3) If, on the other hand, the consequent is true or false depending on the interpretation, then we must assume the corresponding counterfactual statement of the possibility: 'If A had happened, B would have been able to happen'.³⁴ Now, various logical possibilities have to be considered in relation to the general sense of the fragments in order to evaluate the counterfactual reasoning used by Melissus.

It is necessary to start from the value of the antecedent of the counterfactual. At first, if we assume the antecedent as true:

$\neg b_4/\text{true}$: 'what is could suffer pain or distress,

in the case where

$\neg a_4/\text{true}$: 'what is would not be entirely similar'

the validity of the conditional (2) is admissible (see *below* Table 1, line (1*)).

The other case, where

$\neg a_4/\text{false}$: 'what is would be entirely similar',

determines the following conditional (see Table 1, line (3*)):

If what is could suffer pain or distress, *then* what is would be entirely similar (3*),

³³ "Even if ..." conditionals combine a counterfactual antecedent and a factual consequent (Chisolm 1946, Goodman 1983; besides Byrne, 2005, p. 129-150). Unlike other reasonings about what might have been, semifactual alternatives suggest that the outcome is inevitable.

³⁴ Lewis calls them *might counterfactual* (2001, p. 21-24).

which is rejected by Melissus.³⁵

Considering the remaining cases in which the antecedent of the counterfactual is false,³⁶ so that

$\neg b_4/\text{false} = b_4/\text{true}$: ‘what is could not suffer pain or distress.

If $\neg a_4$ -true, (2) becomes (see Table 1, line (2*)):

If what is could not suffer pain or distress *then* what is would not be entirely similar (2*)

If $\neg a_4$ -false, (2) becomes (see Table 1, line (4*)):

If what is could not suffer pain or distress *then* what is would be entirely similar (4*)

We are inclined to recognize that (4*) conforms to the thought of Melissus and (2*) does not. Although Melissus does not have a ‘theory’ of counter-factuality, it is possible to summarize his conception as shown in Table 1. The line (2*) does not conform to the material theory of implication, according to which, the implication is false only and only if the antecedent is true and the consequent is false.³⁷

Table 1. Melissus’ counterfactual implication

| $\neg b_4$ | $\neg a_4$ | $\neg b_4$ <i>then</i> $\neg a_4$ | |
|------------|------------|-----------------------------------|------|
| T | T | approved | (1*) |
| F | T | rejected | (2*) |
| T | F | rejected | (3*) |
| F | F | approved | (4*) |

³⁵ In fact, for Melissus the corresponding semi-factual statement could be taken for valid (as in the point d.2 above): ‘(Even) if the being had suffered or anguished, the being would have been homogeneous’.

³⁶ See Lewis (2001, p. 24-26), about counterfactuals with an impossible antecedent.

³⁷ Melissus’ use of *then* has formally behaviour of the XNOR gate, exclusive Nor, of typical use in computer science.

Logic crashes on ontology. Everything, logic included, obeys what is. It is certain that Melissus is Parmenides' most extreme and orthodox pupil.³⁸ The implication *then* in Melissus sets up the ontological relationship between what is and its properties: thus, Melissus' logic is totally based on his ontology.

4. Assumptions for understanding the Melissean doctrine

In pre-Aristotelian literature, it is difficult to find arguments so cogent in their logical coherence and so controlled in their flourishing of reasoning. The discussion is very rich and many scholars expressed various opinions (e.g. Mansfeld, 1964; Reale, 1970; Vitali, 1973; Barnes, 1982).³⁹ Loenen (1951) already investigated the demonstrative core of Melissus' fragments, seizing it in the concept of being (τὸ εἶν). According to the scholar, the formal dimension of reasoning did not fulfil Melissus' proposition, which claimed that the demonstrations have ontological relevance. Palmer (2004) trod a similar path, expounding the ontological contents from Melissus' deductive structure: Melissus makes the existence of being absolute and arrives at a strict monism when describing the properties of being. These are akin to Parmenides' ones, but the developments are very different. Fragment 30 B7.2-10 outlines further features of Melissus' being that cannot be found with the same precision in Parmenides.⁴⁰

[Assumption A] referring to Melissus is here totally confirmed.

³⁸ Regarding divergences in the contents, see Pulpito (2018, p. 22), who also refers to the different argumentative mode.

³⁹ For a very clear and useful synthesis, see M. Pulpito, 'Lo Straniero di Samo', *apud* Mansfeld (2016, p. 9-67).

⁴⁰ See Palmer (2004, p. 32). Harriman (2015, p. 20) also goes in the same direction: "The work is deductive in structure; the conclusion of one argument acts as the premise for the next argument".

The force of Melissus' argument is its deductive form.

[assumption A]

If nature disappears and being remains as the only thinkable object, empirical proofs disappear, and only logic is able to give any ontological help to Melissus. Nevertheless, logic happens to be strongly limited by ontology. In Parmenides, we found a (proto-) counterfactual demonstration of the features of being (in relation to properties A, B, C and D). Thus, Melissus' fragment 7 will hereby be analysed in order to locate his logical claim. Above all, it is possible to find a kind of demonstration, neither faint nor shrouded. [Assumption C] is confirmed also here.

To strengthen the PEM, counterfactual reasoning is needed.

[assumption C]

What inner rule presided over Melissus' thought? What was his *grand deduction*? For Melissus, what is becomes the only axiom to set up the reasoning. The [assumption B] is implicitly assumed and assertive categoricity collapses on necessity [assumption B']: what is *ought to be*, there is no room left for more.

The PEM determines two paths of inquiry, by means of a necessary disjunction: $(x)(x \text{ is } \vee x \text{ is not})$.

[assumption B]

The PEM has got a modal counterpart: ' $(x)([x \text{ is } \wedge x \text{ necessarily is}] \vee [x \text{ is not } \wedge x \text{ necessarily is not}]$ ',⁴¹ perfectly compatible with the principle's canonical version.

[assumption B']

Counterfactuality is required in a pervasive way because being does not pose alternatives: if what is is, what is must be. Unlike in Parmenides, counterfactual demonstration is much more extensive in Melissus, through which all the features of being are discussed.

⁴¹ To say: $(x)(x \rightarrow \Box x) \vee (\sim x \rightarrow \Box \sim x)$.

Hence, [assumption *A*] is also more effective in Melissus than in reference to Parmenides, and [assumption *B'*] and [assumption *C*] are fundamental to strengthen [assumption *B*].

After all, the semantic problem seems to be solved: only what is exists and logic is completely based on ontology.

Conclusion

This essay offers a mainly logical perspective on the general structure of the argumentation in Parmenides and Melissus. Rather than highlighting their contribution to specific laws of thought or specific errors, it intends to emphasize that the entire argumentative process is the framework for their individual theses, as well as their respective doctrines of being.

The deductive dimension of their reasoning is fundamental: it serves to build the context of their reflections, but it is not a neutral container. The part is understood within the system, and the system understood by observing the deductive link between the parts. This occurs by calling into question some general principles: assumptions *A*, *B*, *B'* and *C* play a role in both cases although, in Parmenides, *C* is barely mentioned, while in Melissus, *C* is fundamental and *B* only indirectly present.

However, another aspect distinguishes them: in Parmenides, assumption *B'* plays an essential role but does not provide many direct clues about the doctrine of non-being as a whole, since naturalistic fragments remain outside its applicability. In Melissus, on the other hand, [assumption *B'*] and above all [assumption *C*] are the tools used to build a logic that highlights a precise doctrine of being, in order to exclude any alternatives and ambiguity.

Consequently, both Parmenides and Melissus deserve a position in the 'Stone Age' of logic, especially the prehistory of scientific demonstration. Their role seems unequivocal: they played a specific part in the development of demonstrative reasoning, discovering the role of inference in order to demonstrate a theory. Moreover,

although they did not establish a formal set of logical rules, they certainly contributed to their development. In other words, [assumption A] corresponds to the need for the validity of reasoning, independently from contents; [assumption B] and [assumption B'] correspond to admitted logical rules; [assumption C] corresponds to specific, even if immature and uncertain, deductive style.

For what concerns Parmenides, the cast-iron logic of being becomes the court which nature's knowledge, admittedly or not, must face. On the other hand, nature's knowledge is just what Melissus rejected, through a well-defined conceptual tool: counterfactual reasoning, which is useful in order to reduce natural philosophy to pure ontology and demonstrate just how the logic of being is unquestionable.

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