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Demonstration and Necessity: A short note on Metaphysics 1015b6-9

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Abstract: I discuss a short string of five sentences in *Metaphysics* V.5, 1015b6-9 relating demonstration to necessity. My proposal is that Aristotle focuses his attention on the demonstration as a demonstration. Other interpretations reduce the necessity in question to the modality of the component sentences of the demonstrations (the conclusion and the premises). My view does not deny that modality of the component sentences is important, but takes seriously

the idea that a demonstration itself should be understood as necessary—as not capable of being otherwise. A demonstration cannot be different from what it is in the sense that [i] its components cannot be different from what they are, [ii] its components must be related to each other exactly in the way they are related. Demonstrations aim at the fully appropriate explanation of a given explanandum—and each demonstration is individuated by the explanandum it takes. Thus, the basic idea is that, for the target explanandum that individuates a given demonstration, the premises delivering the fully appropriate explanation cannot be replaces with different ones. I show how this proposal, which explains Aristotle's language in 1015b6-9 accurately, does not make demonstrations 'melt down into conditional necessity', first, because the modality of the component sentences is still importantly involved, second, because the explanatory relation expressed in a demonstration is a necessary fact in the real world, so that the demonstration itself is also necessary (in the way I have explained) inasmuch as it captures that fact.

I. Introduction

There is a short string of five sentences in *Metaphysics* V.5 relating demonstration to necessity. Although that small passage can hardly be taken as delivering an elaborate argument, it certainly advances certain claims about the two concepts. Usually, Aristotle's train of thought is taken to be the following: demonstrations are to be counted among the necessary items, i.e., any real demonstration should be called "necessary", because it must have a necessary conclusion (otherwise, it would not be a real demonstration), and the cause of that necessity (namely, the necessity of the conclusion and, by extension, of the demonstration itself) are the necessary premises. Thus, the whole story sounds like this: any demonstration is called necessary on the basis of the necessity of its conclusion; for, indeed,

if the conclusion has been demonstrated, it must be necessary, and necessary conclusions can only be derived (demonstrated) from necessary premises—as if Aristotle were tempted to reduce demonstration to sound deduction of a necessary conclusion from necessary premises.

Some of the isolated claims involved in this story are true—e.g., that demonstrative conclusions are necessary (at least as a default)[1]. But I will argue that this story does not capture what Aristotle is conveying in the passage.

II. Survey of the issues

The passage runs thus (I divide it into steps to make references easier to follow):

> T1: [i] Besides, demonstration is among the necessary things, [ii.a] because it cannot be otherwise, [ii.b] if there has been demonstration in the full sense; [iii.a] and the causes of this are the primary [causes], [iii.b] for that from which this [kind of] syllogism stems cannot be otherwise (1015b6-9, my translation).

> [6] [i] ἔτι

> [7] ἡ ἀπόδειξις τῶν ἀναγκαίων, [ii.a] ὅτι οὐκ ἐνδέχεται ἄλλως

> [8] ἔχειν, [ii.b] εἰ ἀποδέδεικται ἁπλῶς· [iii.a] τούτου δ᾽ αἴτια τὰ πρῶτα,

> [9] [iii.b] εἰ ἀδύνατον ἄλλως ἔχειν ἐξ ὧν ὁ συλλογισμός.

There might be several options to interpret the genitive "τῶν ἀναγκαίων" in 1015b7, but the most straightforward option is to take it as *partitive* to the effect that demonstrations are items (besides many others listed in the chapter) that count as necessary and can

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[1] But even here there might be difficulties, for Aristotle allows demonstrations of conclusions that hold for the most part (in APo. I.30).

correctly be called "necessary".[2] So far, so good. But most scholars believe that a demonstration should be called necessary because its conclusion must be necessary, or, more elaborately, because the necessity of its conclusion must be based on (and derived from) the necessity of their premises. Thus, saying that a demonstration is necessary can be understood in two ways (not necessarily incompatible with each other): either the necessity of the conclusion is the rationale allowing us to extend the predicate "necessary" to the whole demonstration[3] (pretty much in the same way as the truth-value, or the quality, or the quantity, of the conclusion sometimes is the rationale behind expressions such as "false syllogism", "privative syllogism", "particular syllogism")[4], or the demonstration is called necessary because all its component propositions are necessary. In any case, "necessary" is always understood as equivalent to "necessarily true" (whatever that means on a more fine-grained analysis).[5] Again, I stress that the story—which I will call the "traditional interpretation" just for easiness of reference—sounds *prima facie* plausible: most of its isolated sentences represent truths in Aristotle's philosophy. However, the message encoded in 1015b6-9 is more particular, and more informative. Let us look closer.

First of all, note that clause [ii] introduced by "ὅτι" in 1015b7 advances an explanation of the previous claim—that demonstrations are counted among the items correctly called necessary. On the traditional interpretation, the implied subject of the verb "ἐνδέχεται"

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[2] This is the option found in most translations: Kirwan, 1993, p. 35; Reeve, 2016, p. 74; Berti, 2014, p. 35; Ross, 1984, p. 44.

[3] See Kirwan, 1993, p. 132 ("demonstrations, i.e. deduced conclusions"); perhaps Mendelsohn, 2019, p. 136 ("this is the sense of necessity that also characterizes the conclusions of demonstrations"). I wonder why those who prefer this option do not take the genitive in 1015b7 as introducing the "object" of a demonstration and thereby referring to its conclusion (the plural, in this case, being distributive: for any demonstration, its conclusion is necessary).

[4] For discussions of this point, see Ferreira, 2020, p. 64-69.

[5] For further discussion, see Malink, 2013.

in [ii.a] must be taken to refer to the conclusion of a demonstration[6] — as well as the implied subject of the verb "ἀποδέδεικται" in [ii.b]. There might be several options here, in a more fine-grained perspective, but the general idea is that a given state-of-affairs that gets expressed as conclusion of a given demonstration is the implicit subject of both verbs. Then, the train of thought would be the following: the demonstration is necessary, for, if the conclusion has been demonstrated (i.e., if the state-of-affairs in question gets expressed as conclusion of a real demonstration), then that conclusion cannot be otherwise.

Here, I am not concerned with what I consider to be a minor, traditional objection. The conditional we get from step [ii] can turn out to be false, given that Aristotle seems to allow for demonstrations of states-of-affairs that hold not necessarily but only for the most part (see I.30, 87b21-25). Thus, if a state-of-affairs *X* that holds only for the most part turns out to be demonstrated (as Aristotle seems to allow), the antecedent stated in [ii.b] is true, but the consequent stated in [ii.a] turns out to be false. Indeed, this might be a trouble for the traditional view, but my central concern here consists in different problems.[7]

A first main problem for the traditional interpretation is the loose connectedness with the broader context of the chapter. A second main problem is the lack of connectedness with other relevant passages in which Aristotle presents the notion of demonstration closely associated with the notion of necessity (especially *Posterior Analytics* I.6, 74b13-18). Finally, a third problem is that the traditional interpretation does not deliver a convincing exegesis of Aristotle's particular phrasing of step [ii], namely, the omission of an explicit subject for the verbs, and the use of the perfect form of the

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[6] See Ross, 1984, p. 65 (Revised Oxford Translation): "because the conclusion cannot be otherwise, if there has been demonstration in the full sense".

7 For a recent discussion, see Ferejohn, 2013, p. 82. One might be inclined to take the adverb "ἁπλῶς" in 1015b8 as ruling out the for-the-most-part truths, but that issue does not concern me here.

verb, "ἀποδέδεικται" (1015b7). Let me start tackling the third problem.

III. Two kinds of properties of the component predications.

I propose to pay due attention to the exact phrasing of the sentence [ii.b]. Both the omission of an explicit subject for the verb and the employment of the perfect form of the verb ("ἀποδέδεικται") can be encoding something important in this case. Let me start with the omission of the grammatical subject. There is nothing wrong with readers supplying an implied subject from the context. That is a general practice, completely justified by what we know about natural languages and about Aristotle's style too. However, in this particular case, I submit that the omission of the subject is a controlled phrasing by which Aristotle focuses his attention *not* on any ingredient of the demonstration, but on the demonstration itself. By "ingredient" of the demonstration I mean the conclusion and the premises.

A most important step for my view is to note that the properties of those ingredients can be sorted into two groups. Each of those ingredients (i.e., each premise and the conclusion) have properties that belong intrinsically to them independently of their being an ingredient of a particular demonstration. A given conclusion is true, and even necessarily true, independently of being the conclusion of a given demonstration. If someone asks you whether the sentence "triangles have 2R" is true, or whether it is necessarily true, you will be able to give your answer without asking for a further reflection as this: "well, let me first see the other predications that happen to be ingredients of the same demonstration together with that sentence". Similarly, consider the sentence "isosceles triangles have two angles equal to each other". If someone asks you whether the sentence is true, or whether it is necessarily true, you will be able to give your answer without asking for a further reflection as this: "well, let me first see the other predications that happen to be ingredients of the same demonstration together with that sentence". Thus, being true

and being necessary are *intrinsic properties* of those predications—properties that a predication will have independently of happening to be an ingredient of this or that particular demonstration.

I said that Aristotle's focus in step [ii.b] is on the *demonstration itself,* not on its ingredients. This will be helpful to grasp the other kind of properties of the ingredient-sentences of a demonstration. Demonstrations are essentially meant to capture the appropriate explanation for the explanandum they target as conclusion.[8] The full success of a demonstration obviously depends on the intrinsic properties of the ingredient predications—for one cannot explain a real explanandum from false premises etc.[9] But—importantly—the full success of a demonstration qua demonstration hinges on something further, namely, the appropriate explanatory connection between the premises (taken all together) and the conclusion.

Consequently, if someone asks whether the sentence "isosceles triangles have two angles equal to each other" is *explanatorily right,* or *explanatorily appropriate,* your reasonable reaction will be a further question: "what is the targeted explanandum you are talking about here? You are presumably taking the sentence as a premise; but for *what* explanandum?" Indeed, the same sentence can be "the right one" in relation to a given explanandum, but a wrong one in relation to a different explanandum. That sentence can well furnish the appropriate explanation of some particular features of isosceles triangles as isosceles, but it will not deliver the appropriate explanation of why (e.g.) "triangles have 2R". Thus, the explanatory appropriateness of a given premise is a *non-intrinsic property*—in contrast with the intrinsic properties of predications. A given predication will be universal, affirmative, true, necessary, etc., *intrinsically* (with no need to consider the role it plays in a given argument), but the same predication will be explanatorily appropriate

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[8] I am talking about demonstration as the notion presented in Posterior Analytics 71b17-19. More on this below.

[9] See Prior Analytics 53b8-10, Posterior Analytics 71b20, 25-26.

non-intrinsically, because the explanatory appropriateness depends on which explanandum has been selected as target.

Thus, the explanatory connectedness between the premises and the conclusion is something that goes beyond the mere intrinsic properties of the component predications—even if it depends on those intrinsic properties. Consequently, the full success of demonstrations does, indeed, depend on the intrinsic properties of the component predications, but it most importantly hinges on something else, that cannot be reduced to those intrinsic properties. For, the full success of demonstrations depends on the explanatory connectedness between the premises (the explanans) and the conclusion (the explanandum).

Aristotle's phrasing in 1015b8 has two features: the employment of the perfect "ἀποδέδεικται", and the omission of the subject of "ἀποδέδεικται". Now, I submit that both features are controlled moves by which Aristotle focuses his attention not on the intrinsic properties of any ingredient of the demonstration (let alone of the conclusion), but on the demonstration itself—namely, on the full explanatory success of the demonstration *as demonstration*. The following paraphrase can help to clarify the point: "if the demonstrating performance went well, i.e., has been fully successful".[10]

IV. Demonstration as appropriate explanation:

Before exploring the consequences of this specific focus on the demonstration itself (not on the intrinsic properties of the component sentences, let alone of the conclusion), let me clarify what I have in mind with the notion of demonstration *as demonstration*. The adverb "ἁπλῶς" in 1015b8 recovers the notion of *ἐπίστασθαι ἁπλῶς* (defined in 71b9-12) and the ensuing use of "ἀπόδειξις" to refers to syllogisms

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[10] The translation found in Ross (1984, p. 65) is more felicitous on this point: "if there has been demonstration in the full sense". But there is no indication that Ross would extract the relevant consequences from this way of understanding step [ii.b].

that express that kind of knowledge (71b17-19).[11] Now, that kind of knowledge has been defined by two requirements.[12] First, there is the requirement of knowing, about the cause of a given explanandum, that it is *the* cause of *that* explanandum (and of nothing else, significantly different from that explanandum). In other words, the success of the demonstration hinges on knowing the *appropriate* explanation of the explanandum in question. Before exploring the second requirement (the necessity requirement), I stress that the connection between demonstration and appropriate explanation is already significant enough to highlight the following feature: a demonstration as presented in 71b17-19 is not a kind of argument meant to *establish, in the first place,* that a given predication holds. It might happen in some cases within a given discipline that a demonstration does, indeed, deliver that product. But establishing in the first place that a given predication holds is not the default result that essentially defines what a demonstration is. Rather, a demonstration is essentially a kind of argument in which the truth of a given predication (which turns out to be its conclusion) is already known:[13] what matters—what the argument is expected to address— is *why* that predication is true or, more precisely, what is exactly the appropriate explanatory factor that makes that predication what it is. Now, it is really important to stress this point to understand how the full success of a demonstration depends on the explanatory connectedness between the premises and the conclusion.

Since I am talking about five sentences in which demonstration and necessity are linked together, the necessity requirement in the definition of *ἐπίστασθαι ἁπλῶς* is also important for my purposes. As I have extensively discussed elsewhere, the necessity requirement ranges over the causality requirement—for, grammatically, the

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[11] Sometimes, Aristotle uses the expressions "ἀποδείκνυσθαι/ἀποδεῖξαι ἁπλῶς" (72b25, 76a14) and "ἀπόδειξις ἁπλῶς" (72b31, 75b23) to make sure that "demonstration" refers back to the definition expressed in 71b9-12.

[12] For the definition of epistasthai haplos, see Angioni, 2016. For different views, see Ferejohn, 2013; Bronstein, 2016.

[13] For, as Aristotle stresses in Posterior Analytics II.1-2, knowing the why presupposes knowing the that.

referent of the pronoun "*touto*" in 71b12 is the previous sentence that conveys the requirement of knowing that the cause provided in a demonstration is the appropriate cause of its explanandum.[14] As I will explore in what follows, this interpretation of the two requirements for ἐπίστασθαι ἁπλῶς delivers a better comprehension of what Aristotle means when he focuses on the demonstration itself in 1015b6-9 to say that it is itself necessary.

V. Demonstration itself as necessary:

As I said, step [ii] does not focus on the intrinsic properties of the component predications of a demonstration, but on the demonstration itself—and, more precisely, on the success of the demonstrating performance. Now I will argue that this focus explains the conditional in 1015b7-8 better than the traditional approach. On the traditional approach, the conditional only delivers the necessity as an intrinsic property of the conclusion; but, as the conditional itself purports to explain why demonstrations are among the necessary things (as stated in the previous sentence in step [i]), the traditional interpretation must appeal to the assumption that a demonstration itself is called necessary by a sort of extension from the necessity of its conclusion (or of all its component sentences). Now, there is nothing intrinsically wrong with that assumption. But my proposal explains better how T1 fits in with things said previously in the chapter. If a demonstrating performance has been fully successful, then the demonstration itself, as a whole, is such that *cannot be otherwise*, which is what entitles it to be counted among the necessary things and be called "necessary". The conditional in step [ii] explains the previous sentence smoothly and more connectedly.

Indeed, previously in the chapter (1015a33ff.), Aristotle has presented the description "that which cannot be otherwise" (1015a34) as the most basic notion of necessary, the one working as (if it were) a core meaning that comes to be applied to different things

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[14] See Angioni, 2016, p. 145-152; Angioni, 2020, p. 196-7.

in different contexts, giving raise to those more specific notions of necessary.[15] The passage runs thus:

> T2: We say that what cannot be otherwise must necessarily be the way it is (1015a34-35, my translation).
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> [34] Τὸ μὴ ἐνδεχόμενον ἄλλως ἔχειν ἀναγκαῖόν φαμεν οὕτως
>
> [35] ἔχειν

In many contexts, being an item that cannot be otherwise just amounts to being eternal, such that the item cannot not be (cannot cease to exist). But 1015a34-35 is not one of those contexts. Indeed, the adverb "οὕτως" in 1015a34 refers to the (intrinsic) way of being of something.[16] For linguistic comfort, we can express the general idea from T2 with a conditional: if X cannot be otherwise, it is necessary for X to be the way it is. [17] But note that, in Greek, the consequent of my conditional is presented in a more straightforward form—in predicative form: "*anankaion*" works as an adjective directly applied to X, and with a propositional complement that, in this case, refers to the intrinsic way of being of the thing called *anankaion*.

Thus, the basic idea is that X is necessary because X cannot be differently from what it is (or from how it is). Now, consider X as a composite thing of any kind, and ask what it is for X (as a composite thing) to be a necessary item or a necessary being. The notion of *being necessarily what X is* involves (besides other things) two conditions:

[a] having exactly the components X has;

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[15] See Angioni, 2019, p. 188-189, for this notion of specification of the same core meaning.

[16] See Reeve, 2016, p. 74: "we say that it is necessary for what does not admit of being otherwise to be the way it is" (my italics).

[17] See something similar in Kirwan, 1993, p. 35 (instead of a conditional starting with "if", he uses "when").

[b] having those components related to each other exactly in the way they are related.

Now, consider X as a demonstration. The notion of *apodeixis* as *anankaion*—the notion of a demonstration as something that is *itself* necessary—involves (besides other things) two conditions:

[a] having exactly the components it has (namely, *that* conclusion, and *those* premises);

[b] having those components related to each other exactly in the way they are related: the conclusion is the explanandum, the premises are the appropriate explanans.

The importance of the last point cannot be underestimated. Considering the conclusion as an explanandum means that it is not its truth-value that needs to be established; rather, what the demonstration must address is why, appropriately, the state-of-affairs expressed in the conclusion is as it is. Accordingly, considering the premises as *appropriate explanans* means that the product to be delivered by them is not merely sound deduction, or even some weaker, generic sort of explanation; rather, the product to be delivered by the premises is the identification of the primary, appropriate explanatory factor for the explanandum in question.

Note that Aristotle, as he develops the chapter, explains how even those items that are called "necessary" in weaker ways can be re-described in such a way that illustrates the basic notion of what cannot be otherwise. Even the violent items (1015a26-33), or the auxiliary causes of life etc. (1015a20-26), can be made sense of as something that cannot be otherwise. (In their case, the cause of their necessity—of their not being capable of being otherwise—stems from something external, cf. 1015b9-11, but that does not concern my point here). What I want to stress here is that even those items are actually called "necessary" in a straightforward way in Greek: the adjective "*anankaion*" is directly applied to them. Aristotle employs "*anankaion*" (or the plural "*anankaia*") in this way in 1015a36 (twice), then in 1015b6. He is referring to a liberal set of different things, as the things that happen by constraint (or coercion, or

violence, 1015a26-33) and the auxiliary causes of life or of any good thing (1015a20-26). Now, it is *exactly at this juncture* that we find the first sentence of T1, in which Aristotle uses the partitive genitive "τῶν ἀναγκαίων" after "ἀπόδειξις". It is clear that his point has nothing to do with *objects* of demonstrations (the states-of-affairs that are targeted as conclusions). His point is that also demonstrations must be included in that large, liberal set of things that come to be called necessary because they cannot be otherwise. This is how T1 fits into the general point being made since 1015a34.

Thus, in the context of 1015b6-9, both the adjective "necessary" and the description "that which cannot be otherwise" are directly saying something about *the demonstration itself*, not about one particular ingredient of the demonstration (for instance, the conclusion). The partitive genitive "ἀναγκαίων" tells us that demonstrations are also to be counted among the things correctly called necessary because they display the feature of *not being capable of being otherwise*.

VI. Primary causes and necessity of the demonstration:

Let us see how all this coheres with what Aristotle says in step [iii]. It will be helpful to quote the passage in Greek again:

> [6] [i] ἔτι
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> [7] ἡ ἀπόδειξις τῶν ἀναγκαίων, [ii.a] ὅτι οὐκ ἐνδέχεται ἄλλως
>
> [8] ἔχειν, [ii.b] εἰ ἀποδέδεικται ἁπλῶς· [iii.a] τούτου δ᾽ αἴτια τὰ πρῶτα,
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> [9] [iii.b] εἰ ἀδύνατον ἄλλως ἔχειν ἐξ ὧν ὁ συλλογισμός.

As for [iii.a], a central issue is what the referent of the pronoun "τούτου" (genitive) is. As for [iii.b], everything depends on two issues: what is the referent of the expression "that from which the

syllogism comes up" ("ἐξ ὧν ὁ συλλογισμός"), and how the notion of impossibility of being otherwise should be understood.

From a merely grammatical standpoint, the referent of the pronoun "τούτου" could be anything from the previous sentences (from step [i] or [ii]). But I argue that the referent of the pronoun is the proposition stated in [ii.b]. Aristotle says that the primary items are causes of "something", or that "the primary *causes*" are the causes of "something". But the question is what "something" stands for here. Now, it is true that, in the context of demonstrations, primary causes are causes of the explanandum expressed in the conclusion. I am not denying that—on the contrary, I am an enthusiastic defender of that idea. But I do deny that Aristotle is expressing that idea here with the pronoun "τούτου". He is rather expressing the idea that the cause *of the full success of a demonstration* (cf. "ἀποδέδεικται ἁπλῶς") is the primary cause—and, from other contexts, we know that a primary cause is that which appropriately explains its targeted demonstrandum.[18] It is by explaining its targeted demonstrandum in the most appropriate way that a primary cause also turns out to be the cause of the full success of the demonstration. And, by being so, the primary cause also makes the demonstration such that *it cannot be otherwise*. Remember that for a demonstration, being necessary as something that cannot be otherwise involves (besides other things) having exactly the components it has (namely, *those* premises, for *that* conclusion), and having those components related to each other exactly in the way they are related (the conclusion is the explanandum, the premises are the explanans). Thus, a demonstration cannot be otherwise in the sense that, for the targeted explanandum expressed as its conclusion, the premises that turn out to be appropriately explanatory cannot be replaced with any other premises. And the premises that are appropriately explanatory are those that capture the *primary* cause as middle term (cf. 78b4).[19]

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18 See (e.g.) 78b4, 72a5-7. See Angioni, 2018.

19 Ross, 1924, p. 299, believes that the mention of "τὰ πρῶτα" is related to the next point in 1015b9-11: "it is only τὰ πρῶτα, the ultimate premises of demonstrations, that are necessary in their own right". But there is no evidence for taking τὰ πρῶτα

As for step [iii.b], the expression "that from which the syllogism stems" ("ἐξ ὧν ὁ συλλογισμός") is not referring to *all the ingredients* that compose the demonstrative syllogism. The referent of that expression in 1015b9 is the premises (which happen to be just a subset of the ingredients of the syllogism). However, I do not need to rely (and actually I am not relying) on any arbitrary assumption about subsets of ingredients being selected or neglected. What happens is that Aristotle is employing the expression "ἐξ ὧν" in a way that is commonly found in his Corpus. Indeed, "ἐξ/ ἐκ + genitive" is employed in many ways.[20] One of these ways—which is found precisely in 1015b9—identifies the item expressed in the genitive as *the most important factor* from which something stems.[21] Thus, the expression in 1015b9 must be paraphrased as follows: "those factors from which the full success of the demonstrative syllogism stems", or "those factors on which the demonstrative syllogism, as such, most importantly depends". From an extensional standpoint, the referent of the expression "ἐξ ὧν ὁ συλλογισμός" in 1015b9 turns out to be the *premises* (and only the premises—for the conclusion is not at stake, being rather what is assumed as targeted explanandum).

It still remains to be settled how the notion of impossibility of being otherwise should be understood in step [iii.b]. As I just said, Aristotle is talking about the *premises alone*. But premises have, as I explained before, both *intrinsic* properties that do not depend on their being ingredients of this or that particular demonstration, and *non-*

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as the ultimate premises of demonstrations (if Ross means the "first principles"). For discussion of why those premises will be needed to explain the necessity of the demonstration, see Mendelsohn, 2019, p. 136 ff. For discussion of 1015b9-11, see Delcomminette, 2018, p. 320.

20 See Aristotle himself making controlled distinctions: Metaphysics 994a22-b3; 1023a26-b11 (=V.24); 1033a5-23; 1092a21-35; Physics 190a21-31; 190b4-5; Generation of Animals 724a20-30.

21 For this use, see Metaphysics 1043b7-10. This use of "ek + genitive" with causal-explanatory force is much more common than usually recognised. Consider sentences introduced with expressions such as "ek touton de delon/ phaneron"— which are absolutely common in the Corpus: the pronoun in the genitive refers to the previous remarks as the source or causal factor from which a given point results evident or plain.

intrinsic properties that do depend on their being ingredients of this or that particular demonstration—for these properties depend on the specific role they are playing in the demonstration qua demonstration. *Intrinsic* properties are features such as the truth-value, the modality, the quality and the quantity etc. *Non-intrinsic* properties are features such as elucidativeness and explanatory appropriateness.

The notion of impossible to be otherwise in step [iii.b] is not describing any intrinsic property of the premises (let alone of the conclusions of demonstrations). Thus, "ἀδύνατον ἄλλως ἔχειν" in 1015b9 is not expressing the *modality* of the premises (let alone of the conclusion). Rather, "ἀδύνατον ἄλλως ἔχειν" in 1015b9 is expressing the idea that the premises on which the full success of a given demonstration depends cannot be replaced by any other premises.[22] As I said, a demonstration is necessary (as something that cannot be otherwise) because it has exactly the components it has (namely, *those* premises, for *that* conclusion), and because it has those components related to each other exactly in the way they are related (the conclusion is the explanandum, the premises are the appropriate explanans). Thus, for the targeted explanandum expressed as conclusion of the demonstration, the premises that turn out to be explanatorily appropriate cannot be replaced with any other premises. And I stress that Aristotle usually employs the term "πρῶτον" (either as an absolute noun or as an adjective of a given

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[22] Besides, consider the premise-set as bearer of "ἀδύνατον ἄλλως ἔχειν" in 1015b9. What has been said in 1015a34-35 will apply: it is necessary for that premise-set to be the premise-set it is (sc. in the context of a given demonstration, individuated by a given conclusion selected as explanandum), which is equivalent to say that no premise can be removed from that set, no premise can be replaced with a different one etc. One might argue that, on this interpretation, the source of the necessity of the premise-set is the conclusion selected as explanandum. The statement itself is true: the language employed by Aristotle in [iii.b] implies that the conclusion selected as explanandum is so to speak the condition on which the premise-set turns out to be the necessary for the appropriate explanation. But this does not imply that Aristotle has thereby abandoned his idea that the component predications must be necessary themselves, or his idea that the causal relation is a real necessity in the structure of the world. More on this below.

noun) to refer exactly to those premises (or to those middle terms) that deliver the fully appropriate explanation of a given explanandum.[23]

VII. The parallel with Posterior Analytics 74b13-18.

Aristotle is not developing in T1 the awkward argument that tradition is tempted to ascribe to him. He is not [a] taking the assumption that the "objects" of demonstration are metaphysical necessities, and then [b.1] arguing that you can only derive the conclusion (expressing an "object" X) from premises that are *necessarily true*, or [b.2] arguing that a demonstration must also have premises that are *necessarily true*.[24]

Even if the content presented in [a] and [b.2] is true on Aristotle's eyes (putting aside the propositions that hold for the most part), that idea has nothing to do with his train of thought in 1015b6-9. For Aristotle is not talking about necessity as an *intrinsic* property of the component predications [25] —he is not even focusing on the component predications *as ingredients*.

A closely related passage seems prima facie to be developing the awkward argument, or some elaborate version of it. It reads thus:

> T3: We must […] posit as a starting-point that demonstration is necessary, i.e. that if something has been demonstrated it cannot be otherwise—the syllogism, therefore, must proceed from necessary [items], for from true [items] you can deduce without demonstrating, but from necessary [items] you cannot deduce without demonstrating—this is precisely the

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[23] See Angioni, 2018, p. 164. See 72a5-6; 78b4; 194b20; 983a25-26.

[24] See Ross, 1949, p. 526-7; Barnes, 1993, p. 126-7. That argument is awkward because (as I will explore below) it needs to ascribe Aristotle with a weird (and false) view: any sound deduction with necessary sentences will count as a demonstration.

[25] Note that I am using "intrinsic property" in the way defined in section III.

mark of demonstration (74b13-18, Barnes' translation with modifications).[26]

[13] […] λεκτέον, ἢ ἀρχὴν θεμένοις ὅτι ἡ ἀπόδειξις

[14] ἀναγκαῖόν ἐστι, καὶ εἰ ἀποδέδεικται, οὐκ οἷόν τ᾽ ἄλλως

[15] ἔχειν· ἐξ ἀναγκαίων ἄρα δεῖ εἶναι τὸν συλλογισμόν. ἐξ ἀλη–

[16] θῶν μὲν γὰρ ἔστι καὶ μὴ ἀποδεικνύντα συλλογίσασθαι, ἐξ

[17] ἀναγκαίων δ᾽ οὐκ ἔστιν ἀλλ᾽ ἢ ἀποδεικνύντα· τοῦτο γὰρ ἤδη

[18] ἀποδείξεως ἐστιν.

Barnes' analysis of the passage is clearly expressed. He believes (1993, p. 126) that the target of the argument is to establish thesis (1) (in which "P" stands for the conclusion, whereas "Π" stands for the premises):

"(1) If P is demonstrated from Π, then Π is necessary".

On this interpretation, thesis (1) can be taken to correspond in general to step [iii] in T1. The basic idea that both passages would share is that, inasmuch as demonstrations have a necessary conclusion, their premises must be necessary too, and the necessity of the premises must be the cause of the necessity of the conclusion. Again, there is nothing wrong with the content of the three propositions involved in this story (besides the "traditional objection"

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[26] One of the most infelicitous moments in Ross' commented edition of the Posterior Analytics is his change from ἀναγκαῖόν to ἀναγκαίων in 74b14 with no authority in the manuscript tradition. He follows Philoponus' paraphrase and takes the genitive as indicating the object of demonstrations, that is, necessary truths (Ross, 1949, p. 528). But ἀναγκαῖόν in 74b14 has exactly the same force as the partitive ἀναγκαίων (which is far from pointing to the objects of demonstration): it is applied to the demonstration itself.

about propositions that hold for the most part). The problem is to believe that this is the story being told in T3.

Barnes believes that thesis (1) "is to be inferred from the posit that 'demonstration is necessary', i.e. from:

(5) If P is demonstrated, P is necessary" (Barnes, 1993, p. 126).

Now, the transformation of the claim that "demonstration is necessary" into thesis (5) corresponds exactly to what I have labelled the traditional interpretation of steps [i]-[ii] in T1. The claim that "demonstration is necessary" is taken as tantamount to saying that *the conclusion* of a demonstration is necessary. Then, Aristotle's argument according to Barnes would be the following:

(5) If P is demonstrated, P is necessary;

(6) if P is inferred from Π, and Π is necessary, then P is demonstrated"

Therefore, (1) if P is demonstrated from Π, then Π is necessary".

Barnes takes this argument to be a failure, involving (besides other things) a false proposition: "But (5) and (6) do not yield (1); and (6) is false" (Barnes 1993, p. 126).[27]

Barnes' assessment of the argument *he provided* is correct. But the argument he provided is not what Aristotle's text has. He assumed that Aristotle is talking about necessity as an *intrinsic* property of the component predications. But that is a wrong assumption. In 74b14, Aristotle is employing the term "*anankaion*" to refer to the necessity of the demonstration itself (as he did in 1015b7): the demonstration cannot be otherwise because, for the conclusion targeted as explanandum, the premises that capture its appropriate explanatory factor cannot be replaced with different premises. As for 74b15, 17, Aristotle is employing the term "*anankaion*" to refer to the most decisive *non-intrinsic* property of the premises of a given demonstration—and he has employed the description "ἀδύνατον ἄλλως ἔχειν" to the same effect in 1015b9. The premises from which

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[27] See also Mignucci, 2007, p. 171, for a similar assessment.

a successful demonstration stems are necessary because they cannot be replaced with any other premise without loosing the appropriateness of the demonstration.

Note that there is no equivocation in Aristotle's shifting the use of "*anankaion*" from 74b14 to 74b15, 17: the core meaning is always the same ("what cannot be otherwise, what cannot be differently from what it is"); what changes is the range of application, so that the core notion should be cashed out differently according to the intensional object it is applied to. With "intensional object", here, I want to remark that premises taken in themselves with their intrinsic properties are intensional objects different from the same premises as intended explanatory factors for a given conclusion.

One might argue that my interpretation amounts to collapsing the necessity of the premises into *conditional* necessity, as if Aristotle were saying that their necessity is dependent on our explanatory concerns: "*if* we are to attain the most appropriate explanation of X, then these premises are necessary". But the alleged collapse does not hold. The premises that come to be described as "necessary for explaining a given explanandum X" express state-of-affairs that are themselves necessary. Their non-intrinsic property of being necessary for explaining a given explanandum X does not annihilate their necessity as an intrinsic property. Most importantly, those state-of-affairs being what they are necessarily make the explanandum be what it is. Therefore, the non-intrinsic property of the premises being "explanatory necessary" within a given demonstration corresponds to a necessary fact in the real world: it is *those* states-of-affairs expressed in these premises—but nothing else different from them—that make the explanandum be exactly what it is.[28]

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[28] I agree with Moravcsik, 1991, p. 31: "just as certain configurations of elements of reality make corresponding statements true, so certain configurations of elements of reality make some explanations adequate, true, and insightful. Aristotle's theory of aitia is a correspondence theory of explanations".

Consider the following sentences:[29]

(1) triangles have 2R;

(2) triangles have angles that are equal to angles around a point (see 1051a24-25);

Both sentences have the intrinsic property of being necessarily true. Besides, we can smoothly say that, if one is concerned with the appropriate explanation of (1), then (2) is necessary, i.e., required for that explanation. Furthermore, we can also say that the necessity (i.e., the impossibility of being otherwise) ranges over the explanatory relation itself: it is the state-of-affairs expressed in (2) that appropriately makes the state-of-affairs expressed in (1) be what it is.

VII. Conclusion:

For Aristotle, the component predications of a demonstration (i.e., the premises and the conclusion) must be necessary, if we put aside the "traditional objection" concerning those propositions that hold only for the most part. However, 1015b6-9 is not talking about necessity as an intrinsic property of the component predications of a demonstration. The passage is focusing on the demonstration itself, as demonstration. For a demonstration, to be necessary amounts to having exactly the components it has (*those* premises, for *that* conclusion), and having them related exactly in the way they are related (the premises as appropriate explanans, the conclusion as explanandum). Premises delivering the appropriate explanation for the targeted explanandum cannot be replaced with different ones—for they turn out to be the required ones for the full success of the demonstration. But it is because the explanatory relation expressed in a demonstration is a necessary fact in the real world that the demonstration itself is also necessary. The demonstration cannot be different from what it is because it must express that fact: the states-

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[29] Explanations will require three predications etc., but a simplified picture with only two predications is enough for my purposes here.

of-affairs expressed as premises appropriately make the state-of-affair expressed as conclusion be what it is.[30]

Bibliography

ANGIONI, L. (2016) Aristotle's Definition of Scientific Knowledge (APo 71b 9–12). *Logical Analysis and History of Philosophy* 19, p. 140-166.

ANGIONI, L. (2018). Causality and Coextensiveness in Aristotle's Prior Analytics I.13. *Oxford Studies in Ancient Philosophy* 54, p. 159-185.

ANGIONI, L. (2019). Aristotle's Contrast between episteme and doxa in its context (Posterior Analytics I.33). *Manuscrito* 42, n. 4, p. 157-210.

ANGIONI, L. (2020). Aristóteles e a necessidade do conhecimento científico. *Discurso* 50, n. 2, p. 193-238.

BARNES, J. (1993). *Aristotle: Posterior Analytics*, Oxford, Clarendon Press.

BERTI, E. (2014). *Aristote: Métaphysique Delta*. Paris, Librairie Philosophique J. Vrin.

BRONSTEIN, D. (2016). *Aristotle on Knowledge and Learning*. Oxford, Oxford University Press.

DELCOMMINETTE, S. (2018). *Aristote et la nécessité.* Paris, Librairie Philosophique J. Vrin

FEREJOHN, M. (2013). *Formal Causes*. Oxford, Oxford University Press.

FERREIRA, M. (2020). Συλλογισμός tem dois significados nos Analíticos?. *Dissertatio* 52, p. 59-89.

KIRWAN, C. (1993). *Aristotle: Metaphysics Books III, V and VI*, 2nd ed., Oxford, Clarendon Press.

MALINK, M. (2013). *Aristotle's Modal Syllogistic*. Harvard, Harvard University Press.

MENDELSOHN, J. (2019). *Aristotle on the Necessity of What We Know*. PhD Dissertation, University of Chicago.

MIGNUCCI, M. (2007). *Aristotele: Analitici Secondi*. Roma-Bari, Laterza.

MORAVCSIK, J. (1991). What Makes Reality Intelligible? Reflections on Aristotle's Theory of *Aitia*. In: JUDSON, L. (ed.). *Aristotle's Physics*. Oxford, Clarendon Press, p. 31-47.

REEVE, C. D. C. (2016). *Aristotle: Metaphysics*. Indianapolis, Hackett Publishing.

ROSS, D. W. (1924). *Aristotle's Metaphysics*. Oxford, Clarendon Press.

ROSS, D. W. (1949). *Aristotle's Prior and Posterior Analytics*, Oxford, Clarendon Press.

ROSS, D. W. (1984). *Aristotle: Metaphysics*. In: BARNES, J. (ed.) *Complete Works* (Aristotle). Princeton, Princeton University Press (The Revised Oxford Translation).

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