

## Aristotle's definition of syllogism in *Prior Analytics* 24b18-20

(Draft)

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*Warning about the drafty state of the paper: I have not yet incorporated into my discussion some very recent contributions such as Steinkrüger, Morison, Ebert and others. Criticisms, suggestions and objections are most welcome.*

### *Introduction*

Aristotle's definition of syllogism in his *Prior Analytics* is usually charged of being too vague and, more specifically, of not being adequate for its supposed definiendum. Aristotle is supposed to define the stricter notion of "syllogism" (a sort of argument in which the premises are an appropriate pair of sentences formulated in predicative form, in which the conclusion is a different sentence in predicative form) but he seems to produce a definition for some broader notion of valid argument or deduction in general.<sup>1</sup>

I believe that this charge, however likely, is not correct. Aristotle's definition of syllogism is far from being clear, since it is phrased in his jargon and with his usual laconism. However, once we are in a better position to understand what he means with his peculiar phrasing, we can see that the definition he offers is appropriate for the very notion of syllogism. I mean that Aristotle is really defining that form of argument in which the conclusion is a predicative (or categorical) form attained by means of a premise-pair of the appropriate sort (with a middle term relating to each extreme in each premise<sup>2</sup>).

Moreover, I will argue that Aristotle's definition of syllogism is coherent with his definitions of *perfect* and *imperfect* syllogisms. My approach depends on how the final clause of Aristotle's definition ("*toi tauta einai*", 24b20) must be understood. The final clause not only restricts the definition to its intended definiendum but also introduces a basis for the distinction between perfect and imperfect syllogisms – a vexing distinction which, in my account, can be more reasonably understood.

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<sup>1</sup> See Ross 1949, p. 291: "The definition [...] is wide enough to cover all inference, [...] but the detailed doctrine which follows gives an account of something much narrower than inference in general"; Smith 1989, p. 110: "The definition is clearly intended to apply to a wide range of arguments"; Striker 2009, p. 79: "[...] what he sets out to define is the notion of valid deductive argument"; cf. also Patzig 1968, p. 45; Mignucci 1969, p. 190; Kneale & Kneale 1960, p. 69; Lear 1980, p. 10-11; Barnes 2012, p. 366; Crivelli 2012, p. 125; Malink 2013, p. 29; Andrade-Lotero & Novaes 2012, p. 390. See a recent approach in Corkum 2014, p. 5 ff.

<sup>2</sup> I do not need to directly discuss whether Aristotelian syllogisms are better understood as implications (as Lukasiewicz 1951, Patzig 1968 have proposed) or as inferences (as Corcoran 1974; Crivelli 2012, p. 125), or whether this dilemma is entirely misleading (Smiley 1973, p. 136-8; 1982/3, p. 13; Martin 1997, p. 9-10) or whether a third approach (such as Thom 1981, p. 17-8) is possible. All I need as my starting-point is the notion of syllogism as that sort of argument with a premise-pair in predicative form and a conclusion which, being in predicative form too, is different from its premises.

*I. Preliminary survey of the key-passage:*

First, let me examine Aristotle's definition of syllogism in *Prior Analytics* A 1. For convenience of further reference and discussion, I shall divide Aristotle's formula into four parts:

**TI** "a syllogism is *df.*

- (i) an argument in which
- (ii) certain things being posited, something other than what was laid down
- (iii) results by necessity
- (iv) because these things are so" (24b 18-20, Striker's translation).

Part (i) of this formula presents the genus under which the notion of syllogism is classified. I do not need to discuss this point and I agree with Striker's option for "argument". My reader might be surprised with part (ii) of the formula, but I purposely have put together the *components* of the argument in this part, just to focus on the subsequent parts, which presents the notion of logical necessity (or logical consequence) and a further notion, which seems to be related to the ground for the logical necessity. Thus, part (ii) of the formula is designed to pick out *premises* and *conclusion* together, with the requirement that the conclusion must be different from the premises.<sup>3</sup> One might wonder whether Aristotle's phrasing captures the requirement that a syllogism must have only two premises (and no more than two). This is an important question and I might have something to say about it at the end, but my focus will be on the remaining parts of Aristotle's definition. More precisely, my focus is the relationship between part (iii) and part (iv) of his definition.

The basic questions in this respect are the following:

- What (if anything) part (iv) is supposed to add to part (iii)?
- Does it really add something, or is it rather a redundant recasting of the same point made at part (iii)? Or is it a redundant rephrasing rather of the points included in part (iii) together with the point made in part (ii)?

If part (iv) were just a rephrasing of the points already made at parts (ii) and (iii), Aristotle would be saying that a syllogism is whatever valid deduction in which the conclusion is different from the premises and the number of premises is greater than one. But this is still not strict enough to capture the notion of syllogism. As an alternative to this view, I will argue that part (iv) does indeed introduce a further requirement, not included in any previous part of the definition.

I claim that part (iii) establishes that a syllogism is a valid argument in the sense that Aristotle recognizes at *Prior Analytics* 47a32-5: an argument in which, given its premises, the conclusion follows according to a logical necessity. The expression "*ex anankes*" in this context (24b19) is

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<sup>3</sup> About this requirement, see Alexander 18.12-20; Philoponus 33.23-34.7; Ammonius 26.15-20; Barnes 2007, 487-81; Smith 1989, p. 110; Striker 2009, p. 79-80; Crivelli 2012, p. 125; Corkum 2014, p. 5-6; Malink 2013a, 233.

designed to capture this notion of logical necessity or logical consequence. Of course, the notion of “logical consequence” involved in this part is difficult and requires further discussion. A lot of questions can be addressed about it. A lot of questions can also be addressed about part (ii), which seems to introduce the requirements that the premises must be different from the conclusion and that their number must be greater than one.<sup>4</sup> But for a moment let me focus on my main point, which is the following.

I claim that part (iv), “because these things are so”, adds a specification so that it characterizes the syllogism as a stricter class of valid arguments: syllogism are arguments in which the consequence is grounded on some further conditions (or in which the consequence is attained by means of a more specific method). But what these conditions are? What they amount to?

One important exegetical point is that Aristotle himself seems to admit that his phrasing at step (iv) is not very enlightening, so that he himself goes on to clarify his meaning – in two stages. Thus, part (iv) of the definition is elucidated in two additional steps, as follows (for further reference, I label these steps as (a) and (b) respectively;<sup>5</sup> I will also refer to ***TI-T2*** together as the *enlarged* definition of syllogism):

***T2***: “(a) by ‘because these things are so’ I mean that it results through these, and (b) by ‘resulting through these’ I mean that no term is required from outside for the necessary to come about” (24b 20-22, Striker’s translation, with one modification).<sup>6</sup>

The most important issue here is what is meant by “the necessary” in the context of (b). Here I should be very careful about my point and I need to examine the Greek more closely. In part (iii) of the definition, the notion of “logical necessity” is phrased with the Greek expression “*ex anankes sumbainei*” (24b19-20). As Aristotle goes on to elucidate part (iv) in the clause (b), he also appeals to some notion of necessity, and the Greek text has “*to anankaion*” (24b22). Many people would infer (and actually have inferred) that Aristotle is talking about the same notion of necessity in both passages, that is, in parts (iii) and (iv.b) of his (enlarged) definition of syllogism. More precisely – since it might be dangerously vague to talk about “notions of necessity” – I would rephrase the point in a simpler way: many readers would assume (or infer) that what Aristotle means with

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<sup>4</sup> About the number of premises being greater than one, see Alexander 17.10-13; Philoponus 33.10-23; Smith 1989, p. 110; Striker 2009, p. 79-80; Corkum 2014, p. 5; Malink 2013a, p. 233.

<sup>5</sup> Patzig 1968, p. 45 (followed by Mignucci 1969, p. 190), claims that (b) does not elucidate either (a) or part (iv) of ***TI***, but rather part (iii) of ***TI***, but he has no evidence for that.

<sup>6</sup> My only departure from Striker’s translation is to replace “the necessity” with “the necessary”. Patzig 1968, p. 45, has rejected “the necessary” as a good translation, but he takes “the necessary” very differently from what I propose. The ensuing discussion will make clear that “the necessary” is an adjective of the premise-pair taken in an argument. It is important to stress from the start that my account has nothing to do with such a proposal as Duerlinger 1968, p. 481, who claims that “*sullogismos*” denotes a premise-pair.

“necessity” (*ex anankes*) in part (iii) is the same as what he means with “necessity” (*anankaion*) in the clause (iv.b).

My claim is that this assumption (or inference) is wrong. I claim that “*to anankaion*” in (iv.b), 24b22, is far from referring either to the logical necessity of the consequence or to the conclusion (understood as a necessary outcome of the argument). I claim that “*to anankaion*” in 24b22 is rather referring to some further requirements that the premises of a syllogism have to meet in order to accomplish the specific form of valid argument the syllogism is.

First of all, the bearer of the predicate “*anankaion*” in 24b22 are the premises or, more precisely, a premise-pair (I will substantiate this claim more precisely below). The Greek “*anankaia*” (feminine) is used by Aristotle in some contexts as an adjective of “premise” (*protasis*) with the meaning of “required for an intended conclusion”. When Aristotle uses it as a neuter and absolutely, as he does in 24b22, he might be referring exactly to that characteristic of a premise (or a set of premises, or a premise-pair) that makes it an unreplaceable, required premise for an intended (valid) conclusion. Aristotle does use “*anankaia*”/ “*anankaion*” in these ways several times in *Topics VIII*, as well as in *Prior Analytics*.<sup>7</sup> I will try to show that a better understanding of Aristotle’s official definitions of syllogism, perfect syllogism and imperfect syllogism can be reached if we take “*anankaion*” at (iv.b) in this way.

But let me stress two philological points before proceeding in my argument. First, let me remove a possible mistake. Aristotle does use different expressions for “necessity” in (iii) and (iv.b), namely, “*ex anankes*” and “*anankaion*” respectively. But my point does *not* depend on this change in his expression, and this means that I am *not* claiming that Aristotle has carefully spelled out his clarification at (iv.b) in terms different from the ones employed at (iii). Had Aristotle used “*anankaion*” at 24b19 for the mere logical necessity (as he actually uses in 47a32 and in many other passages), my point would still stand.

Secondly, many readers might be scandalized by my claiming that in a space of three Bekker lines expressions that are almost the same undergo such a shift in their meaning. As a consolation to my readers, I stress that Aristotle proceeds in this way many times.<sup>8</sup> Instead of insisting in the

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<sup>7</sup> First, for “*anankaia*” as adjective (either explicit or clearly implied) of “*protasis*” in the sense of “required for an intended conclusion”, see *Topics* 155b19, 20, 29, 36; 156a10; 157a12; 159a20; 161b29 (see also 45a21 for “*anankaia*” as adjective of “*hodos*” in the sense of “method for finding a middle term or a premise-pair”). In other cases, the genitive plural and the context do not decide whether “*anankaion*” is a feminine adjective or a neuter being used abstractly, but this difference is immaterial to my point: see *Prior Analytics* 42a39; 47a19; 66a36. Besides, other cases of “*anankaion*” (neuter) which I claim to be equivalent to 24b22 can be found at 27a25, 53a35 and (more controversially) at 62a12-13. There is also an enlightening construal at *Topics* 162b1, as well as at 26a15 and 41b34. Some of these passages will be discussed in this paper.

<sup>8</sup> Let me point to some passages: first of all, at some juncture of *Prior Analytics* the same expression “*anankaion*” is first used to introduce the notion of premises necessary for an intended conclusion (47a19) and just four lines later (47a23) is used again but with the sense of valid inference or necessary consequence. Another examples: *Prior Analytics* 44b12, 13 (“*meson*”); *Metaphysics* 1054a10 (“*phusis*”); *Topics* 139a28, 30; 147b12, 13; 158a26-7 (“*horizomenon*”), 158a26 (“*erotomenon*”); *APo* 84a31-32: “*archas*” for *principles* (of demonstration) and then for *beginning*; *APo* 79a18 and 24: “*episteme*” for *science* or *discipline* (such as geometry) and then for *knowing* (the what it is); *APo* 76a29, 30: “*proton*” as adjective of an implied “*archon*” (plural genitive) and then for *major terms*.

(somewhat naive) assumption that a given term must not change its meaning in a given stretch of text, we must be more fine-grainedly sensitive to the context of each occurrence of the same term or expression.

Before proceeding to discuss the passages on “required premises” from *Topics* VIII, let me also advance that the expression “*tôî tauta einai*”, which corresponds to part (iv) of **TI**, is found in three other passages – one in *APr* (26a4-5), another at *Sophistic Refutations* (168b24) and another at *Topics* (161b30). In the last one, this expression is clearly and explicitly connected with the use of “*anankaia*” I am outlining. I believe the discussion of these passages will be very enlightening for understanding Aristotle’s definition of syllogism.

## II. To be “*necessary*” for an intended conclusion.

The term “*anankaia*” (feminine) is used in six passages from *Topics* VIII as an adjective of “premise” in the sense of “required for an argument (or syllogism) to be concludent”. In other words, calling a premise (or a set of premises) *anankaia* amounts to saying that, if a given argument is to be concludent about what it purports to conclude, that premise is *required*. In other words, calling a premise (or a set of premises) *anankaia* amounts to saying that, if the argument is to conclude what it purports to conclude, that premise must be a premise in the argument and cannot be replaced by a different premise or by a different sort of premise.

This point, of course, can still be taken in many ways. In *Topics* VIII, Aristotle is not very clear about what it is for an argument to be concludent. It seems plausible to argue that he is not restricted to the notion of mere validity. He seems concerned with other notions like relevance or cogency (at least as cogency can be understood within a dialectical debate). Now, at least for the concrete cases of argumentation Aristotle envisages at the *Topics*, one might say that a premise is required for a desired conclusion in virtue of its content (besides other things). Suppose, for instance, that someone aims at concluding that “some Brazilians are fair”, and suppose that she accepts (or knows that her interlocutor accepts) that “all friendly people are fair”. In this condition, it is easy to see that the required premise is that “some Brazilians are friendly people”.

Now, this might be suitable for the circumstances Aristotle describes in *Topics* VIII, which deals with dialectical argumentation. But when Aristotle advances part (iv) of his definition of syllogism at **TI** and attempts to clarify it by means of clauses (a)-(b) at **T2**, he seems to be thinking just in schemata (or moods) without any concrete terms. In this case, we cannot appeal to the notion of “being required for a conclusion” in the same way as before.

However, we can appeal to a *formal* or *abstract* notion of “being required for a conclusion”. Suppose, for instance, that someone wants to reach a conclusion of the form *CaA*, an universal affirmative conclusion relating the predicate *A* to the subject *C* (I prefer to write *CaA* instead of

*AaC* because translatability to natural language is easier)<sup>9</sup>. What one needs in order to reach that conclusion? There is no other way: one needs to assume (or guarantee) two premises of the predicative form *a*, with terms disposed in such an order as in the Aristotelian first figure. That is: if one wishes to conclude that “every *C* is *A*”, one needs a premise in which a middle term is predicated of every *C* (“every *C* is *B*”) and another premise in which *A* is universally predicated of the same middle term (“every *B* is *A*”) – and there is no other way of attaining the desired conclusion at least through the method of finding an appropriate premise-pair (more on this below).

As I have said, Aristotle is not very clear in *Topics* VIII about what it is for an argument to be concludent. Any way, despite differences between *Topics* VIII and *Prior Analytics*, I argue that it is plausible to transport a similar idea to the context of *Prior Analytics*, which is concerned with the validity of abstract forms of argument with schematic letters. In this context, we have no content in the sentences, we have no guiding rule about starting from *endoxa* etc., we are only concerned with the validity of the moods. In such a context, calling a schematic premise or a schematic premise-pair *anankaia* (–on) amounts to saying that, if a conclusion of a given form is to be syllogistically attained, that premise-pair must be the premise-pair in the mood and cannot be replaced by a different sort of premise-pair.

I will clarify this claim in the sections below, but let me advance something very important: I submit that “*anankaion*” in 24b22 – part (b) of **T2** – refers precisely to the requirement that marks a valid deduction as a *sylogism* (in the strictest sense of this word). As will become clear, my claim is packing three assumptions which I will further clarify, justify and substantiate. First assumption: the term “sylogism” refers in the context at stake to arguments which conform to that sort of schematic mood in which a given predicative (or categorical) form is deduced from a given pair of premises in which the extremes are related to a middle term. Second assumption: in sorting out which arguments are syllogisms in the strictest sense of the word as well as in sorting out syllogisms as perfect or imperfect, Aristotle takes an upward-looking standpoint (or, if you prefer, a “from bottom up” standpoint). I mean that he focuses on the ways or methods in which a given predicative (or categorical) form can be deduced from a premise-pair *in each figure*. Third assumption: when Aristotle focuses on the ways or methods in which a given predicative (or categorical) form can be deduced from a premise-pair, he focuses on *each figure on its turn*, but not on the overall sum of them. This means that the notion of a “necessary” premise-pair is *figure-sensitive*.

With these assumptions explicitated, I submit that:

- Claim 1 (C1): “*anankaion*” at 24b22 has (forms of) premise-pairs as its appropriate bearers;

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<sup>9</sup> In this point, I am departing from the usage consecrated in recent years, which seem to have stemmed from Patzig’s insistence that an inverted formulation mirroring the order of the terms with “*hyparchein*” favours the obviousness of perfect moods (see Patzig 1968, p. 51-59). About the dangers of schematic representation, see Rini 2011, p. 15. I think we should be rather careful with attempts to read too much into this inverted formulation (as well as with attributing formalism to Aristotle). See Barnes 1996, 184-6; Crivelli 2012, p. 117; Morison 2012, p. 178-9; Corkum 2014, p. 11-14.

- Claim 2 (C2): “*anankaion*” at 24b22 applies to a (form of) premise-pair if (and only if) an intended conclusion of one of the categorical forms *in a given figure* can only be attained through a premise-pair of that form.

A corollary of this is the following: if a premise-pair of a given form is “*anankaion*” in the sense intended at 24b22, it is not only *sufficient* but also *necessary* (in that figure) for reaching the target conclusion. When (as in the second and third figures) there is more than one form of premise-pairs for a *x*-conclusion in a given figure, what is properly described as “the necessary” is the set of all forms of premise-pairs able to deliver the conclusion with the targeted form; and, consequently, a given mood, which takes only one sort of those premise-pairs available, will be described as a “possible” syllogism. Thus, claim (C2) gives us the right clue to understand what follows in Aristotle’s text, namely, the distinction between perfect and imperfect syllogisms. Claims (C1) and (C2) must also be linked with the expression “because these things are so” (“*tôi tauta einai*”). But first let me explain another subtlety of Aristotle’s expression at T2: the usage of the verb “*genesthai*” at 24b22.

Scholars have understood “*genesthai to anankaion*” at 24b20 in the sense of “the coming about of the conclusion” (described as a necessary consequence). However, the verb “*genesthai*” can be taken in a very different sense, which is common usage in Greek: “to take the place of” or “to perform the function of”. Consider the sense of “turn out to be” in the following sentence: “Germany is the best country in Europe according to GDP per capita; but, according to HDI, Norway *turns out to be* the best”. The sentence does not describe any change or process in Norway; it only says that Norway takes the place of “best country in Europe” according to HDI criteria (instead of GDP criteria). Many usages of the Greek “*genesthai*” are like this usage of “turn out to be” and I submit that Aristotle’s usage of it at 24b20 is one of them.<sup>10</sup> First, the phrase “no term is required from outside” is clearly about the premises assumed in an argument; what “*genesthai to anankaion*” adds to this picture is that the premise-pair assumed in the argument *turns out to be* the necessary premise-pair for the intended conclusion. Thus, an argument (with predicative sentences, as was clearly assumed from 24a16-17) is a syllogistic one when its premises “take the place of” the necessary premises. The implied subject of the expression “*genesthai to anankaion*” is the premise-set assumed in an argument, described as a premise-set which lacks “no term from outside”, and the expression itself means that this premise-pair turns out to be the necessary one.<sup>11</sup>

### III. *Toi tauta einai* (“because these things are so”):

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<sup>10</sup> This use of “*gignesthai/ genesthai*” is common Greek. See some passages in Aristotle: 28b2, 79b18, 102b20, 122b2 (as a *foil* to understand this usage, compare 58b35, 60b38, which involves some real alteration in the premises in the course of some logical procedure).

<sup>11</sup> The same analysis holds for “*gignetai to anankaion*” at 27a25, which will be examined in Section VII as T8.

I argue that the expression “*tôi tauta einai*” – as it is used at *Topics* 161b30 and at *Prior Analytics* 24b20 in connection with “*anankaia*” in the sense outlined above – refers to the conditions under which an inference is not only valid, but also fulfills a further requirement which makes it a syllogism (in the strictest sense of this word: an argument in one of the figures, with three terms and two premises etc.). The further requirement is the following: in order for a (valid) argument to be a syllogism, it must have attained its conclusion by a premise-pair which is the “necessary one” for that conclusion.

I will discuss below more fine-grained conditions for this requirement – for instance, it is very important to stress that this notion of a “necessary premise-pair” is *figure-sensitive*. For the time being, though, let me emphasize that the expression “*tôi tauta einai*” at 24b20 refers exactly to the fact that the premises assumed in the argument are the premises required for the desired conclusion in the given figure.<sup>12</sup> Actually, the premise-pair assumed in an argument is the referent of the pronoun “*tauta*”. In order to understand my claim, consider that a valid conclusion can be said to have been attained either:

- “*tôi tauta einai*”: “by the fact that these and *precisely these* [*sc.* premises] are there [*sc.* are assumed];

- “*ouôi tauta einai*”: “not by the fact that these and *precisely these* [*sc.* premises] are there [*sc.* are assumed].

The first expression says that the conclusion follows from the fact that the premises assumed (“*tauta*”) are indeed the necessary ones. That is what we find at *Prior Analytics* 24b20-22 (**T2**). The second expression says that the conclusion – even being a valid one – does not follow from the fact that the premises assumed are precisely the necessary ones. In other words, to avoid ambiguity in the scope of the negation: the second expression says that the premises assumed (“*tauta*”) are not exactly the necessary ones, although they guarantee a valid conclusion. There is (at least) one superfluous premise assumed, so that if that premise is dropped, the same conclusion will still follow from the remaining premises. That is what we find at *Topics* 161b28-30:

**T3**: “Again, [*sc.* there is a criticism of an argument in itself] if a syllogism/deduction comes about even with some of its premises taken away. For sometimes more premises are

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<sup>12</sup> Crivelli 2012, p. 141 suggests that “*toi tauta einai*” might be paraphrased as “due to just *these* premises being present”. However, I do not agree with the way he connects “*toi tauta einai*” with the notion of “independence from external conditions”.



taken than those necessary, so that it is not in virtue of their being there [*ou tōi tauta einai*] that the syllogism/deduction comes about” (Smith’s translation, with modifications).<sup>13</sup>

There is a valid argument – a deduction in which the conclusion is indeed a necessary consequence of its premises. But at least one premise is superfluous and can be taken away without affecting the validity of the conclusion. The set of premises assumed is not precisely the ground by which the conclusion follows.<sup>14</sup>

Besides, the expression “*tōi tauta einai*” can still be used in a situation in which the intended conclusion does not follow from the premises. This is what we have at *Prior Analytics* I-4:

**T4:** “if the first follows all of the middle but the middle belongs to none of the last, there will be no syllogism of the extremes, since (i) nothing necessary comes about (ii) because these things are so [*tōi tauta einai*]” (26a2-5, Striker’s translation with one modification).

The premise-pair at stake is [*BaA, CeB*], which is the referent of the pronoun “*tauta*” (“these things” in Striker’s translation). A most important point here is that the intended conclusion has the form *CxA* – with *C* as subject and *A* as predicate – instead of any predicative relation between the extremes. Thus, no conclusion of the form *AxC* concerns Aristotle here (I will substantiate and justify this claim on section IV). This is why I have modified a small detail in Striker’s translation, which is more neutral and does not rule out a possible concern for conclusions of the form *AxC*.<sup>15</sup>

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<sup>13</sup> I prefer to translate “*syllogismos*” as “syllogism” (Striker’s option) instead of “deduction” (Smith’s option), since I disagree with all those who believe that the notion defined at *Prior Analytics* 24b18-22 is not the *syllogism* but a broader notion of *deduction*. See my footnote 1. I need not discuss here the issue whether Aristotle in the *Topics* have already developed the *Prior Analytics* notion of “*syllogismos*” or not. Perhaps Aristotle’s *Topics* did not have all the details developed in the *Prior Analytics*, but I do not believe that the distance between the two works is unbridgeable. It is clear that most of the arguments examined or prescribed at the *Topics* are composed of predicative sentences. Besides, Aristotle’s *Topics* is sensitive to the key-notion that the method of reaching the conclusion through an appropriate set of premises is what makes an argument to be a syllogism. See discussion in Smith 1994, Malink 2015.

<sup>14</sup> For brevity’s sake I will not examine “*toi tauta einai*” at *Soph. El.* 168b24, but I submit that also this occurrence of the expression has the same general import as the passages I discuss: “*tauta*” refers to the premises taken in an argument, and the whole expression means that those premises are indeed the ground for the conclusion. *Soph. El.* 168b24 might have some peculiarities besides this general gist, but it does not go against it. The occurrence of “*toi tauta einai*” in *Rhetoric* 1356b17 is even more difficult, but I submit that it can be understood in the same way.

<sup>15</sup> To be sure, Striker’s choice is the correct policy for a translator, since Aristotle’s text itself is not so clear. However, an interpretation of Aristotle’s text must take into account not only things brought from other contexts but also extra justifiable assumptions which help us to understand the coherence of Aristotle’s notions.

Now, if the intended conclusion must have the form  $CxA$ , it is correct to say that “nothing”, namely, no conclusion of the form  $CxA$ , follows from *that* premise-pair.<sup>16</sup>

Thus, what Aristotle presents at parts (iv)-(a)-(b) of its enlarged definition of the syllogism (24b18-22, *T2*) is a further condition that makes a valid deduction a syllogism in the strict sense. If this further condition is satisfied, then the argument (or, if you prefer, the deduction) is a syllogism (in the strictest sense of this word) because the conclusion follows from the fact that the necessary premise-pair was assumed.<sup>17</sup> The pronoun “*tauta*” in the expression “*tôî tauta einai*” at 24b20 picks up exactly the premise-pair assumed, which must be the required one for the desired conclusion in the figure at stake. There are two ways in which this requirement might fail:

- the premise-pair can be insufficient (or wholly inappropriate) for the intended conclusion, as when someone intends to attain a conclusion of the form  $CxA$  from the premise-pair [ $BaA$ ,  $CeB$ ];

- the premise-set assumed can contain one or more superfluous premises, which do not contribute in anything for the deduction of the conclusion.

Thus, if someone assumes more than the required premises, her inference might still be a valid one, but will not follow “*tôî tauta einai*” (161b28-30), that is: she will reach a valid conclusion, but her argument will not rest on the premises that are strictly required for that conclusion in that figure. There is a mismatch, in this case, between the premises assumed (“*tauta*”) and the premise-pair that is the strictly required one. Similarly, if someone assumes less than the required premises, he can still reach a valid conclusion, but not a syllogistic one – as when someone concludes that  $AeC$  by conversion from the sole premise  $CeA$ , or as when someone concludes  $AoC$  from the premise-pair [ $BaA$ ,  $CeB$ ].<sup>18</sup> Aristotle did not overlook the conclusion  $AoC$  when he has discussed the premise-pair [ $BaA$ ,  $CeB$ ] in *Prior Analytics* 26a2-9. Nor has he failed at realizing that this conclusion will be a necessary consequence of that premise-pair.<sup>19</sup> My point will become clearer in the next sections where I will discuss (a) the upward-looking procedure Aristotle adopts when introducing the notion of a syllogism and (b) the figure-confinement of this procedure. For the time being, let me just say that at 26a2-9 Aristotle was *only* looking for conclusions of the form

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<sup>16</sup> An exegetical detail of some importance here is that “*anankaion*” at 26a4 *need not* (or *should not*) be understood as equivalent in meaning and in argumentative function to “*anankaion*” at 24b22. Nor is “*anankaion*” at 26a4 the exact equivalent of the notion of necessary consequence as introduced with “*anankaion*” at 47a31ff. (and most probably introduced with “*ex anankes sumbainei*” at 24b19). Aristotle’s terminology should *really* be understood in its *context* (this is no surprise to anyone familiar with Aristotle’s shifting from “*anankaion*” as *apodeictic* to “*anankaion*” as *necessitas consequentiae* in his modal syllogistic). In 26a4, “*ouden anankaion sumbainei*” should be taken as equivalent to “no necessary (=valid) conclusion of the intended form, namely,  $CxA$ , follows”.

<sup>17</sup> From now on, keep in mind that my expression “necessary premise-pair” also implies that the premise-pair is sufficient for the desired conclusion. Since it is more important to get clearer about what “necessary” means in Aristotle’s text, I will prefer the expression “necessary premise-pair” instead of “necessary and sufficient premise-pair”.

<sup>18</sup> Aristotle recognizes the validity of the inference “ $BaA$ ,  $CeB$ , then  $AoC$ ” at *Prior Analytics* 29a21-26.

<sup>19</sup> *Pace* almost all scholars (see Striker 2009, p. 96). Kneale&Kneale 1960, p. 79, claim that defining the major term as predicate of the conclusion is incompatible with the method of testing the concludence of premise-pairs.

$CxA$  attainable through premise-pairs with the form  $[BxA, CxB]$ , which is what qualifies an argument as a first figure syllogism.

Let me return to the questions about “*toi tauta einai*”: what (if anything) part (iv) of Aristotle’s definition of syllogism is supposed to add to part (iii)? Does it really add something, or is it rather a redundant recasting of the same point made at part (iii)? Or is it a redundant rephrasing rather of the points included in part (iii) together with the point made in part (ii)? My full answer is the following: while parts (ii) and (iii) together impose some constraints on the sort of valid inferences to be called “syllogism” – namely, to have more than one premise and to have a conclusion different from the premises –, part (iv) adds the requirement that a valid inference would be called a syllogism only if it assumes as premises a premise-pair that is “the necessary one” for the intended conclusion.<sup>20</sup>

#### IV. *The method of the appropriate middle term:*

I have explained how we can make sense of a *formal* or *abstract* notion of “being required for a conclusion”. Now, with this in mind, I add a further claim: when Aristotle has advanced his definition of syllogism, his underlying question was similar to (if not the same as) what animates his approach at some passages such as *Prior Analytics* I 23 40b30-41a20 (as well as I 28). *Prior Analytics* I 23 is full of vexing issues, but all I need is to focus on one main feature of the passage 40b3-41a20. Aristotle’s basic question is the following: what is needed to reach a syllogistic conclusion of each of the four categorical forms? Actually, his approach involves three ingredients: (i) he has assumed the four categorical forms as the basic elements of his approach (why he did so, I need not discuss here); (ii) consequently, these four categorical forms exhausts the forms of the *problemata*, i.e., of the intended conclusions for which one must seek the premises; (iii) he is interested in a method in which a given categorical form is deduced by means of an appropriate middle term. I need not discuss whether Aristotle is concerned with arguing that this specific method of finding a middle term is the only way to attain valid deductions.<sup>21</sup> All I need is to stress

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<sup>20</sup> I agree with Irvine and Woods 2004 when they say that Aristotle’s definition of syllogism involves a condition of counter-monotonicity (for discussion, see Corkum 2014, p. 7): the premise-pair assumed must be precisely the required one, with no superfluous premise intruded in the premise-set. See Crivelli 2014, p. 141 for a suggestion along those lines. Thus, I disagree with Corkum 2014, p. 24, when he argues that stricter conditions such as that “adjacent premises must share a term” are not placed on “narrow syllogisms” by the definition of syllogism in 24b18-22. The enlarged definition of syllogism *T1-T2* (together with the clearly implied assumption that the arguments at stake are constituted of categorical forms, see 24a16-17, b 16-18) impose on syllogisms the condition that they must have the premise-pair that is the “necessary one”, which includes (besides other things) having a shared middle term. Aristotle’s definition of syllogism thereby is also vacinated against *ex falso quoadlibet* and against an account of logical validity that accomodates logical truths (see Read 1995, p. 55-60 for discussion).

<sup>21</sup> I need not discuss here the vexing question about whether Aristotle is claiming that all valid deductions must follow this method of finding a middle term and consequently must have the syllogistic form. I do not believe that Aristotle is concerned with such a strong (and wrong) thesis, but there is no room for discuss this hard issue at this paper. I do not agree with most scholars when they assume that “*pas syllogismos*” at 40b20 means “every deduction” – we must take into account that Aristotle’s claim is already restricted to “valid inferences consisting just of categorical propositions” (see Corkum 2014, p. 24). See discussion in Barnes 2012; Striker 1998, p. 210-1, 214.

that Aristotle was basically interested in reaching categorical conclusions *by a specific method*, which is: by finding the predicative relation that each extreme has with a common term (the middle term). The combination of these two predicative relations would result in the premise-pair which entails the desired conclusion. As is widely known, this method is clearly outlined in the following passage:

**T5:** “If one has to form a syllogism to show that *A* does or does not belong to *B*, it is necessary to assume that something is said of something. [...]. For let us say quite generally that there will never ever be a syllogism for one thing being said of another unless some middle term has been taken that is related in some way by predications to each of the two. [...] So one must take a middle term between the two that will connect the predications, given that there is to be a syllogism for this in relation to that” (40b30-31; 41a2-4; 11-13. Striker’s translation).

In order to make clear what Aristotle intended at those passages, I will take a contrast between a downwards-procedure and an upwards-procedure. I call a downwards-procedure a method in which, given a premise-pair arbitrarily chosen, one asks whether some conclusion necessarily follows from them. Aristotle’s procedure can be described in this way in some passages. By contrast, I call an upwards-procedure a method in which, from a given sentence taken as liable to be deduced – taken, in Aristotelian language, as a *problema* (43a17; 44a37; 50b5), namely, as an intended conclusion –, one asks how she can deduce it from premise-pairs. In other words, the upwards-procedure at stake is a method in which, given a predicative sentence taken as something to be deduced, one seeks for the predicative premise-pairs from which that sentence can be inferred as a valid conclusion.<sup>22</sup>

I am not claiming that the upwards-procedure interpretation should replace the downwards-procedure interpretation. Both approaches are useful.<sup>23</sup> But I claim that we need to give more attention to the upwards-procedure in order to understand certain features of Aristotle’s syllogistic. In *Prior Analytics* I 23-28, Aristotle’s upwards-procedure is depicted as a method that searches for the appropriate middle term, namely, that middle term whose relations to each of the extremes are

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<sup>22</sup> Thom 1981, p. 27-8, presents this method in terms of (what he calls) *strong relevance*, which is understood as a sort of variable-sharing. For a criticism of variable-sharing as an approach to relevance, see Read 1988, 121-8.

<sup>23</sup> But the downwards-procedure has been overestimated. See a critical assessment of it (specially when it is associated with other expectations coming from contemporary approaches) in Morison 2012, p. 178-9 ff.

(taken together) capable of deducing the intended conclusion.<sup>24</sup> Let me call this method (for easiness of reference) the Method of the Appropriate Middle Term.

Another important feature of this method is its confinement to each figure on its turn – the *figure-sensitiveness* of the notion of “appropriate premise-pair”. But first let me remark another important point, which is the fact that, once a given predication (in one of the four categorical forms) is taken as a *problema*, it *constrains the search for a middle term* (and for a premise-pair) in the following way: the middle term must be able to deliver a deduction of the problem in precisely the form in which it was taken. If we pay attention to this constraint, we can understand some “peculiar” features of Aristotle’s discussion of valid moods. For instance, we can understand his rejection of  $ae_1$  as concludent in 26a2-8.<sup>25</sup> At *Prior Analytics* I-4, Aristotle has taken the downwards-procedure I have mentioned: from a given premise-pair, he examines whether a valid conclusion follows or not. Scholars have been puzzled by Aristotle’s overlooking that  $AoC$  can be deduced from the pair  $[BaC, CeB]$ . I argue that there was no oversight or mistake from Aristotle’s part, for the downwards-procedure is not absolute: it should rather be complemented with constraints coming from the upwards-procedure. In the upwards-procedure, a problem – in which terms have a *fixed order* (one being the subject, the other being the predicate) – settles not only the form of the intended conclusion, but also (and consequently) the range of the appropriate premise-pairs. Now, the first figure is *by definition* the one in which (besides other things) the major term, which is the predicate of the conclusion, is predicated of the middle term, whereas the minor term, which is the subject of the conclusion, is subject for the middle term. Thus, a conclusion of the form  $AxC$  is not at stake in examining the valid moods of the first figure from the mere fact that predicative relations of the form  $CxA$  (but not  $AxC$ ) define the range of appropriate conclusions in that figure.<sup>26</sup>

#### V. *Figure-sensitiveness*:

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<sup>24</sup> The same concern with an upwards-procedure determines the strategies advanced at *Prior Analytics* I 28: if you want to prove that something belongs to something (in any of the four categorical forms), you must find out whether there is a common item between groups of terms that have a predicative connection with each of the extremes. I need not discuss the intricacies of *Prior Analytics* I 28. All I need is to stress that Aristotle’s interest in these proof-search strategies is more than a mere peculiarity of his “heuristic method”. The strategy of finding out an appropriate middle term is, I submit, at the core of the very notion of syllogism.

<sup>25</sup> I use the expression “ $ea_1$ ” to refer to the premise-pair made out of  $e$  and  $a$  (in this order) in the first figure, namely,  $[BeA, CaB]$ ; similar expressions follow the same pattern, where the numerals refer to the figure.

<sup>26</sup> Similarly, the distinction between *Cesare* and *Camestres* can be accounted for if one pays due attention to the central role the upwards-procedure has for Aristotle’s concerns. The intended conclusion has the form  $CeA$ , in which  $C$  is the subject and  $A$  is the predicate, and this fixed order of terms settles the range of predicative relations with a middle term from which it can be deduced. From this standpoint, it is clear that attaining the conclusion  $CeA$  by a premise-pair  $[AeB, CaB]$  is different from attaining the same conclusion  $CeA$  by a premise-pair  $[AaB, CeB]$ . A mere extensional approach, which is not Aristotle’s, is not sensitive to the fact that, for any given (non-empty) term replacing  $C$ , there is no  $B$ -term such that  $CaB$  and  $CeB$  would be true at the same time (and this is what makes *Cesare* a “possible” way of attaining the intended conclusion, along with *Camestres* as an equally “possible” way). Now, this is what Aristotle is concerned with, no matters if this entails that he was not the founder of formal logic in the strictest sense of the expression.

Now, to be more precise, I claim that Aristotle's method does not start with this abstract question: from which premise-pair(s) a given predication (in one of the four categorical forms) can be validly deduced?

Were Aristotle's question this abstract one, appropriate answers might be like the following ones: "an *e*-predication might be concluded through  $ea_1$ , through  $ae_2$  and through  $ea_2$  (delivering, respectively, *Celarent*, *Camestres* and *Cesare*)", "an *i*-predication might be concluded through  $ai_1$ , through  $aa_3$ , through  $ai_3$  and through  $ia_3$  (delivering, respectively, *Darii*, *Darapti*, *Datisi* and *Disamis*)" etc. The *content* involved in these answers is itself correct, but I argue that the underlying question such answers respond does not appropriately depict either Aristotle's concern or Aristotle's method. The reason is that Aristotle's method *restricts the question to each figure on its turn*: from which premise-pair(s) a given predication (in one of the four categorical forms) can be concluded *in this figure*?

It is not clear why Aristotle has assumed this figure-restriction as one feature of this proof-search method. One of the weak points of my approach is surely the fact that I cannot give a reasonable account for this. Surely Aristotle's reasons for this figure-restricted approach was not on the merely logical side. I am suggesting that Aristotle would not justify his approach by saying that this restriction to each figure on its turn was a purely *logical* advantage. Any way, my point is that this feature of his proof-search method can explain a lot of vexing things Aristotle says about syllogisms (and perfection) in his *Prior Analytics*.

Let us put ourselves in the standpoint of someone using the Method of the Appropriate Middle Term. Take the abstract schema for a predicative form:

$CxA$

where "*C*" is the subject, "*A*" the predicate, and "*x*" is replaceable by one of the four letters representing the four categorical forms ("*a*", "*e*", "*i*" and "*o*").

The first question for the Method of the Appropriate Middle Term would seem to be the following: how can I attain a syllogistic deduction of the form  $CxA$ ?

My point is that Aristotle's first move towards answering this question underlies his notion of syllogistic figure. There is no need to replace "*x*" with one of the four categorical forms to understand Aristotle's step at this abstract level. Aristotle's first move is that one can attain a syllogistic deduction in three ways (see *Prior Analytics* A-23, 41a14-16):

1) First, by finding a middle term which is predicated of the minor and is subject to the major (25b35-37, 41a14-15).

2) Secondly, by finding a middle term which is predicated both of the minor and of the major (26b34-39, 41a15).

3) Thirdly, by finding a middle term which is subject both to the minor and to the major (28a101-5, 41a15-16).

We have, thus, the general outlines of the three Aristotelian syllogistic figures. Such a method is still highly abstract. The next point is to replace “*x*” with one of the four categorical forms.

Now I reach an important point: I claim that Aristotle was thinking in a procedure in which each categorical form is taken as a problem *in each syllogistic figure on its turn*. What I mean is that this upward-looking method first asks, for instance, how can I deduce an *a*-conclusion in the *first figure*, then, how can I deduce an *a*-conclusion in the *second figure*, then, how can I deduce an *a*-conclusion in the *third figure*. One would then repeat the same method for *e*: how can I deduce an *e*-conclusion in the *first figure*, then, how can I deduce an *e*-conclusion in the *second figure*, then, how can I deduce an *e*-conclusion in the *third figure*. And so on. Alternatively, one might pick up each one of the three figures and ask at each time: in *this figure*, how can I deduce an *a*-conclusion, how can I deduce an *e*-conclusion, how can I deduce an *i*-conclusion, how can I deduce an *o*-conclusion. Of course, I am not claiming that this was the procedure actually taken by Aristotle either in *Prior Analytics* I 4-7 or in *Prior Analytics* I 23-28. I am claiming that, if we suppose such a procedure as a guiding-line, we can understand in a better way what Aristotle means with “*toi tauta einai*” and with calling a premise-pair “the necessary”. Or, to put my point more generally, if we suppose that Aristotle was concerned with a procedure along these lines, we can explain in a better way not only his expanded definition of syllogism but also his definition of *perfect* and *imperfect* syllogism. I believe that my general idea is clear now.

It can be very useful to put the results of such a procedure in the following tables:

**First Figure**

Forms of the conclusion	Premise-pairs deducing that conclusion	Name of the mood
<i>CaA</i>	<i>BaA, CaB</i>	<i>Barbara</i>
<i>CeA</i>	<i>BeA, CaB</i>	<i>Celarent</i>
<i>CiA</i>	<i>BaA, CiB</i>	<i>Darii</i>
<i>CoA</i>	<i>BeA, CiB</i>	<i>Ferio</i>

Relevant features of the first figure:

- (1) Every categorical form can be syllogistically deduced in this figure (cf. 26b30-33);
- (2) For each categorical form, there is only one premise-pair *appropriate* to deduce it in this figure (let me skip the issue about subordination) (cf. 42b32-33).

**Second Figure**

Forms of the conclusion	Premise-pairs deducing that conclusion	Name of the mood
<i>CaA</i>	<i>0</i>	
<i>CeA</i>	<i>AeB, CaB</i>	<i>Cesare</i>

	<i>AaB, CeB</i>	<i>Camestres</i>
<i>CiA</i>	<i>0</i>	
<i>CoA</i>	<i>AaB, CoB</i>	<i>Baroco</i>
	<i>AeB, CiB</i>	<i>Festino</i>

Relevant features of the second figure:

(3) Only negative categorical forms can be syllogistically deduced in this figure (cf. 28a7-9);

(4) For each categorical form deducible in this figure, there is *more than one* premise-pair appropriate to deduce it in this figure (cf. 42b34-35, 39-40).

### ***Third Figure***

Forms of the conclusion	Premise-pairs deducing that conclusion	Name of the mood
<i>CaA</i>	<i>0</i>	
<i>CeA</i>	<i>0</i>	
<i>CiA</i>	<i>BaA, BaC</i>	<i>Darapti</i>
	<i>BaA, BiC</i>	<i>Datisi</i>
	<i>BiA, BaC</i>	<i>Disamis</i>
<i>CoA</i>	<i>BeA, BaC</i>	<i>Felapton</i>
	<i>BoA, BaC</i>	<i>Bocardo</i>
	<i>BeA, BiC</i>	<i>Ferison</i>

Relevant features of the third figure:

(5) Only particular categorical forms can be syllogistically deduced in this figure (cf. 29a16-18);

(6) For each categorical form deducible in this figure, there is *more than one* premise-pair appropriate to deduce it in this figure (cf. 42b37-8, 40).

Points (1), (3) and (5) are trivially and universally stressed by any handbook. Now, even if the same is true for points (2), (4) and (6), appropriate attention is not paid to the special concern Aristotle shows for them. Aristotle's remark at 42b32-40 should be understood in connection with his insistence that, if there is to be a syllogism in a given figure, the terms must be related in the ways he has identified (namely, in the premise-pairs delivering the valid moods). In general, at the end of each of the three chapters expounding each of the figures, Aristotle stresses not only that the premise-pairs previously identified are *sufficient* to deliver a valid syllogistic conclusion, but also that they are *the necessary* routes to reach valid syllogistic conclusions in that figure (see 26a13-16,



26b26-28, 27a23-25, 28a1-3, 29a11-14). This remark of Aristotle's turns out to be capital to understand what he means by perfect and imperfect syllogisms. (More on this in the next section).

VI. *Perfect and imperfect syllogisms:*

One of the advantages of the approach I am suggesting is merely exegetical, but perhaps it is a considerable one: if I am right, I am in a better position to explain the coherence of Aristotle's definitions of *perfect syllogism* and of *imperfect syllogism*, as well as some vexing things he says about them.

First, my account of perfection and imperfection will be closely connected with the very definition of syllogism. In my account, the perfection of a syllogism will be an *entirely natural consequence* of its meeting the stricter conditions for being a syllogistic argument (namely, the fourth condition, introduced by the clause *tôî tauta einai*, i.e., the requirement according to which a syllogism must proceed from "the necessary" premise-pair). Conversely, the imperfection of a syllogism will be an *entirely natural consequence* of its *not* meeting the stricter conditions for being a syllogistic argument.

Second, my account will make sense of the notion of perfection without resting on controversial notions such as *evidence*. The distinction between perfect and imperfect syllogisms will rest on some characteristics of the upwards-looking procedure I have described, without affecting the validity of imperfect syllogisms and with no reference to such things as the (supposed) evidence for the validity of the conclusion.

Third – and this is the most conspicuous advantage of my approach – my account will give us a much better meaning for the contrast between "perfect" syllogism and "*dunatos*" syllogism in 27a1-3 and 28a15-17 (the passages where Aristotle introduces the valid moods of the second and of the third figure respectively; see also 41b33).

Let me examine closely the passage in which Aristotle defines perfect and imperfect syllogisms. The text runs as follows:

**T6** "Now I call a syllogism perfect:

- (i) if it requires nothing beyond the things posited
- (ii) for the necessity to be evident;

I call a syllogism imperfect:

- (iii) if it requires one or more things [*sc.* for the necessity to be evident]
- (iv) that are indeed necessary because of the terms laid down,
- (v) but have not been taken among the premises" (24b 22-6, Striker's translation).

I will carefully explain how I understand each element of this passage. It will be clear that I need to depart from the orthodox understanding of most expressions within it. It also goes without

saying that I do not agree with any current translation (like Striker's and Smith's). I will below present my own translation as a result of my gradual discussion.

#### VI.a) *Perfect syllogisms:*

First, I will discuss parts (i) and (ii) of **T5**, which spells out the notion of perfect syllogism. My discussion will focus on two claims: on the one hand, I read “*pros to phanentai to anankaion*” (24b24) according to my understanding of “*anankaion*” in the **T2**'s clause (iv.b) which elucidates the definition of syllogism; on the other hand, I reject the standard interpretation of “*prosdeomenon*” (24b23).

Let me first tackle the expression “*pros to phanentai to anankaion*”. I understand “*anankaion*” in 24b24 in exactly the same way as in 24b22. These occurrences of “*anankaion*” do not introduce the notion of logical necessity, which was captured with the expression “*ex anankes*” in part (iii) of **T1**. The term “*anankaion*” in 24b22 and 24b24 rather introduces the characteristic that premises of a syllogism must have: they must be the *required ones*, that is, the *ones* which cannot fail to be there because they cannot be replaced by any other: “*anankaion*” refers to the necessary premise-pair, without which the intended conclusion (of one of the four categorical forms) could not be attained *in that figure*.

In this same direction, “*to phanentai to anankaion*” (24b23) – “to display the necessary” – just means “to bring this characteristic to light”, or, more precisely, “to *display* premises which *do have* this characteristic”. A perfect syllogism is such that it does not lack any further term (which would not have been taken in the premises) in order to *exhibit* the characteristic of having the necessary premise-pair. In this sense, a perfect syllogism is such that it *instantiates unqualifiedly* the notion of syllogism as defined in the previous lines. (This direct and unqualified instantiation might be the reason why it is called “perfect”, but I need not insist on this detail).

Take the syllogisms Aristotle explicitly calls “perfect”: the four syllogisms of the first figure. Suppose we wish to attain a conclusion of the form *a* in the first figure, that is, using a middle term which is predicated of the minor and is subject to the major. The only way of reaching our aim is to pick up two premises of the form *a*. There is no other way. The uniqueness of this way of attaining the intended conclusion is what makes the premise-pair *aal* of *Barbara* “the necessary [premise-pair]”. A similar story holds for *Celarent* (and, if the trouble about subordinated moods is left aside, also for *Darii* and *Ferio*).

Now, one must be careful about what “*prosdeomenon*” means. The basic meaning of this verb was reasonably caught in the current translations: “to require” (Striker) and “to stand in need of” (Smith). But I must stress that there is a great difference in the ways in which something can be taken to be in need of something. The important question to see this difference is: in need of what *for what*? Suppose imperfect syllogisms lack and need, and perfect syllogisms do not, further premises. But what is the aspect in reference to which they are said to be (or not to be) “in need of

further premises”?<sup>27</sup> For any standard interpretation, the thing in reference to which a perfect syllogism is said to be “*not* in need of further premises” seems to be (a) either the mere logical necessity or validity as depicted in the expression “*ex anankes*” in part (iii) of the definition of the syllogism (24b19) or (b) the obviousness of this validity. Consequently, the thing in reference to which an imperfect syllogism is said to be “in need of further premises” must also be one of these two options. The first option is very embarrassing because it will ultimately lead to the undesired consequence that imperfect syllogisms are not valid – which is not part of Aristotle’s claims. In order to avoid this undesired and wrong result, scholars have attempted to supply a different answer, which picks up the second option above. Thus, one view is that the thing in reference to which a perfect syllogism is said to be “*not* in need of further premises”, far from being the mere logical necessity as depicted in the expression “*ex anankes*” in part (iii) of the definition of the syllogism (24b19), is the *evidence attached to the logical consequence*. Perfect syllogisms are thus taken to be the ones in which the validity of the conclusion is completely evident.<sup>28</sup> Another view is that the thing in reference to which a perfect syllogism is said to be “*not* in need of further premises” is the accuracy of the deductive steps through which the conclusion is validly attained. Thus, Corcoran (1974) argued that the best translation for “*teleios*” is “complete” (instead of “perfect”) because *complete* syllogisms are the ones in which the soundness of the conclusion is established from the premises alone, with no need of any extra deductive steps.

Now, however ingenious and elegant those proposals are, I find difficult to square them with what Aristotle seems to be saying or implying.

In my proposal, the thing in reference to which a perfect syllogism is said to be “*not* in need of” is rather the requirement of displaying precisely the “necessary premises” for the desired conclusion – that is, the requirement introduced by the clause “*toi tauta einai*” at part (iv) of Aristotle’s definition of the syllogism (*T1*), as clarified in part (b) of the enlarged definition (*T2*). Actually, this requirement is what Aristotle stresses with “*pros to phanēnai to anankaion*”, which I rather translate as “for the necessary [*sc.* premise-pair] to be displayed” or “in order to display the necessary [*sc.* premise-pair]”.

Thus, *Barbara* (for instance) is called “perfect” because its premises are exactly the required ones for the intended conclusion. This means that the premise-pair [*a, a*] in the first figure *exhausts* the premises capable of leading to the desired conclusion: this premise-pair meets the requirement

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<sup>27</sup> Barnes 2007, p. 383, has addressed the right question: “Imperfect syllogisms need something which perfect syllogisms don’t need: they need and don’t need it *for what end or purpose?*” (my italics). I do not agree with Barnes’s answer (“in order for its validity to be known”, *ibidem*), though.

<sup>28</sup> See Philoponus 36.19-37.2; Ammonius 32.30-32; Patzig 1968, p. 46-57; Kneale&Kneale 1965, p. 73; Mignucci 1969, p. 226-7; Lear 1980, p. 2, 5; Patterson 1995, p. 56, 145, 208-14; Barnes 2007, p. 385; Crivelli 2012, p. 129. Another question which I will not address here is *why* first-figure syllogisms (and, specially, *Barbara* and *Celarent*) are taken to be evidently valid. Barnes 2007, p. 384-447 gives a full discussion of the attempt to relate evidence to the *dictum de omni et nullo*. A main difficulty of such an approach is that other moods not recognized as perfect (as *Datisi*) would turn out to be perfect as well (see Crivelli 2012, p. 130 for a suggestion along these lines).

posited in part (iv) of the definition of syllogism: it is “the one”. i.e., “the one which is uniquely required”. This premise-pair shows immediately and unqualifiedly that the condition of bringing the required premises was fully achieved.

(The same point can be repeated for *Celarent*, *Darii* and *Ferio*).

(There is a difficulty with subordinated moods – for instance, *Barbari* as an option for deducing an *i*-conclusion in the first figure –, but for the time being let me put this difficulty out of the picture. I will address it in my Section VII below).

#### VI.b) *Imperfect syllogisms*:

My discussion of imperfect syllogisms will be even more unorthodox. Let me quote the passage from **T5** again for the sake of clarity and easiness of reference (I will start with Striker’s translation, but my interpretation will depart so much from the orthodoxy that I will need to present a different translation as the outcome of my discussion):

**T6**: “I call a syllogism imperfect:

(iii) if it requires one or more things [*sc.* for the necessary to be displayed]

(iv) that are indeed necessary because of the terms laid down,

(v) but have not been taken among the premises” (24b 24-26, Striker’s translation, except for the brackets).

I believe that it is uncontroversial that “for the necessary to be evident/ displayed” (from 24b24) must be supplied as implicit in part (iii) of this passage – for otherwise the contrast between perfect and imperfect syllogisms will not refer to a common requirement and will be even more difficult to understand. Part (v) of the passage above has some uncontroversial element too: it describes something (either a premise-pair or a set of premises) which was not taken in the original premises. However, the same thing to which (v) refers was characterized as “necessary” in part (iv), and this is full of controversy.

As it comes to part (iv) of **T5**, I claim that “*anankaia*” there (24b25) has the same force as “*anankaion*” in 24b22 and 24b24: it means “required for the conclusion at stake” and has the notion of premise-pair as its bearer. Besides, I claim that the expression “*hupokeimenon horon*” in this context *does not refer to terms laid down in the premises*, but rather to the terms that constitute the *problema*, that is, the terms of the intended conclusion. If someone takes this to be implausible and asks for parallel passages, I appeal to the usage of “*hupokeimenon*” at *Prior Analytics* 42a27, 45b5, 17, 64b12: “*hupokeimenon*” is used for the *problema*, i.e., the sentence one is trying to deduce by

means of an argument. Even if these passages are not enough to support my claim, they clearly show that my proposal is not so implausible as it might seem from the orthodox standpoint.<sup>29</sup>

Now, one might object that, even if “*anankaia*” has the force I am proposing and even if “*hupokeimenoï horoi*” also has the force I am proposing, the construction of the preposition “*dia*” with genitive could hardly be accommodated within this proposal. But I respond that this objection does not seem compelling, first of all, because traditional approaches are also faced with the (not serious) challenge of explaining that “*dia* + genitive” is to be taken as equivalent to “*ek* + genitive” or “*dia* + acusative”. Secondly, there are many occurrences of “*dia* + genitive” that are pretty much equivalent to “*dia* + accusative”.<sup>30</sup> Thirdly, there is nothing mysterious in saying that the terms of the conclusion to be deduced (i.e., the *problema*) are the source for the necessity of the premise-pairs to be used in the deduction, and this allows or entitles one to say that “these premises are necessary because *this* conclusion (and not a different one) is the conclusion to be deduced”. Fourthly, there is a somewhat similar construal (although with “*dia* + accusative”) in *Topics* 159a20 with the same basic force: “*ta dia ten thesin anankaia*” refers to the set of premises (or probably to the premise-pairs) which are necessary for the sake of the conclusion (the conclusion corresponding to the claim, *thesis*, to be defended in a dialectical argument). Consequently, the overall meaning of part (iv) of **T5** is precisely to point to the thing which an imperfect syllogism is said to be “in need of”, namely, the premise-pairs which are required for the intended conclusion in a given figure. I explain in a moment how this must be understood.

As it comes to section (iii) of **T5**, I claim that *prosdeomenon* in 24b24-5 means the same as in 24b23: to be in need of, to lack. But the thing in reference to which an imperfect syllogism is said to be “in need of something” is, again, rather the requirement of displaying precisely the “necessary premises” for the desired conclusion – that is, the requirement introduced by the clause “*tōi tauta einai*” at part (iv) of Aristotle’s definition of the syllogism (**T1**), as clarified in part (b) of his enlarged definition (**T2**). Now, this does not mean or imply that an imperfect syllogism, in lacking *the* (presumed) necessary premise-pair for the intended conclusion, fails at attaining a valid conclusion. This will not be consistent with imperfect syllogisms being valid ones. Aristotle’s phrasing of parts (iii)-(v) of **T5** should rather be understood as presupposing an interesting and relevant feature of the second and the third figure. In these figures, each predicative form that can be validly attained in the conclusion can be so attained *by more than one premise-pair in that figure* (see the corresponding tables at the end of section V). It is a well known fact that an *e*-predication

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<sup>29</sup> I am not claiming that “*hupokeimenon*” has systematically this same force all around, not even in the *Prior Analytics*. The term “*hupokeimenon*” is very sensitive to context: it can refer to (i) a proposition assumed as premise; (ii) a proposition to be proved (equivalent to “*problema*” and “*prokeimenon*”, 42a27, 45b5, 17, 64b12); (iii) a proposition assumed as premise in a *reductio ad impossibile* (= “*hypothesis*”, cf. 62a27), (iv) the subject-term of a predicative sentence (e.g., *Topics* 115a3); (v) substance-terms as basic subjects of predicative sentences (83b21). This list covers only the *Organon*. Outside the logical works, “*hupokeimenon*” is still used to point to the underlying matter, to the objects of one of the four senses etc. Scholars should be very careful with context-sensitiveness of Aristotle’s terms.

<sup>30</sup> See Bonitz 1961, 177a38-45.

can be concluded in the second figure either by means of the premise pair *ea2* (delivering *Cesare*) or by means of the premise pair *ae2* (delivering *Camestres*). Similarly, an *o*-predication can be concluded in the second figure either by means of the premise pair *ei2* (delivering *Festino*) or by means of the premise pair *ao2* (delivering *Baroco*). And so on for the third figure.

This is the most relevant feature of the “syllogistic system” to understand Aristotle’s definition of an imperfect syllogism. In the case of second figure and third figure moods, there is more than one premise-pair available for attaining a given conclusion. There are two or three. Consequently, what is picked up by the expression “necessary” at 24b20, 24b25 when applied to second and third figures syllogisms is not a *unique premise-pair* (as it is the case for the first figure), but rather a set of two (for the second figure) or three (for the third figure) premise-pairs. Now, as moods are individuated by the premise-pairs which constitute them, it is impossible for one and the same mood to pick up *at once* all those premise-pairs included in the set described as “necessary”. It would be meaningless to say that a mood such as (for instance) *Cesare* has not only this but also that premise-pair. Now, since there are *two* premise-pairs available for each kind of conclusion that can be deduced in the second figure (see Table at the end of Section V), imperfect syllogisms in the second figure lack *one* of these premise-pairs while positing the other. Similarly, since there are *three* premise-pairs available for each kind of conclusion that can be deduced in the third figure (see Table at the end of Section V), imperfect syllogisms in the third figure lack *two* (i.e., more than one, cf. 24b25) of these premise-pairs while positing the remaining one. These facts explain perfectly well the peculiar phrasing of step (iii) of **T5**: imperfect syllogisms lack one (in the second figure) or more than one (in the third figure) premise-pair available for deducing the intended conclusion in that figure.

Therefore, it is not true to say that imperfect syllogisms lack one (or more than one) premise which would be required for making the conclusion *evident* or for making the deductive steps *complete*. All Aristotle means is that imperfect syllogisms lack one or two premise-pairs which are included in the set that exhausts the available ways of attaining the target conclusion in a given figure. Such a set of premise-pairs is the bearer of the expression “necessary” in the case of the second and third figures. Consequently, it is true to say that an imperfect syllogism is such that it does not exhaust the “necessary” premises-pairs for the intended conclusion: the premise-pair individuating a given imperfect mood is only sufficient but not necessary for deducing the intended conclusion.

Taken all this together, my alternative translation or paraphrase of Aristotle’s definition of imperfect syllogisms will run as follows:

**T6:** “I call a syllogism imperfect:

(iii) if it lacks one or more things [= premises-pairs]

(iv) that [*sc.* taken together] are the necessary ones for the terms to be proved,

(v) but have not been taken among the premises” (24b24-26).

Let me stress again the meaning of step (iv) of **T5**. It is important to remark that Aristotle’s point relies on the assumptions that:

(a) *more than one* premise-pair is *available* for the desired conclusion in the second and in the third figure (see the Tables at the end of Section V);

(b) two (in the case of the second figure) or three (in the case of the third figure) premises-pairs *exhaust* the ways to attain a given conclusion in each of these figures (see the Tables at the end of Section V);

(c) so that the whole set which exhausts the ways to attain the desired conclusion in each figure is what is precisely presented as “the necessary”;

(d) each mood which is described as imperfect can only take one premise-pair, by the very fact that moods are individuated by the premise-pair they take.

Thus, according to (c), Aristotle means that, for a desired  $x$ -conclusion in a given figure, a set of premises-pairs is “necessary” in the sense that the premises-pairs in this set are the only ones that can be used for reaching the desired conclusion. That is, this set of premise-pairs *exhausts* the pairs which can deduce the intended conclusion *in the figure at stake*. Now, in the first figure, such a set has only one element, but in the second and in the third it has more than one element. Consequently, in the case of second and third figures, the premises-pairs of this set, taken together, are called “necessary”: the set cannot be another one. But each premise-pair included in this set is not “necessary”, being only a sufficient condition for deducing the intended conclusion.

There is a considerable amount of evidence for Aristotle’s special concern with stressing point (c), namely, that a set of premise-pairs *exhausts* the pairs which can deduce an intended conclusion *in a given figure*.<sup>31</sup> When he finished his examination of universal premise-pairs in the first figure (having presented *Barbara* and *Celarent* as valid moods and dismissed *ae<sub>1</sub>* as incapable of delivering any conclusion of the intended form  $CxA$ ), he adds: “so if the terms are universal, it is clear when there will be a syllogism in this figure and when not; it is also clear that if there is a syllogism, the terms must necessarily be related as we have said, and if they are so related, then there will be a syllogism” (26a13-16, Striker’s translation). His point is not yet (c), but that the premise-pairs  $[BaA, CaB]$  and  $[BeA, CaB]$  are not only sufficient for concluding  $CaA$  and  $CeA$  respectively, but also necessary. Now, in a precisely symmetrical juncture in his expounding the universal second figure syllogisms, a similar remark delivers point (c): the premise-pairs  $[NeM, XaM]$  and  $[NaM, XeM]$  are not only sufficient but also (taken together) necessary for concluding  $XeN$  in the second figure (I will quote it and examine it in section VII as **T7**). Aristotle cannot be saying that each of those premise-pairs is by itself sufficient and necessary for attaining an *e*-

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<sup>31</sup> See Patterson 1995, p. 211: valid moods are sufficient and necessary conditions for a syllogism in a given figure.

**conclusion** in the second figure. What he means is that, each of them being by itself sufficient, the set coming out of them presents what is necessary for concluding  $XeN$  in the second figure.

Furthermore, at the end of each chapter dedicated to each of the three figures (*APr* I 4-6), Aristotle presents the same pattern of concluding remarks: he first stresses that the concludent premise-pairs identified in the chapter are “the necessary” for the syllogistic conclusions attainable in that figure; then, he proceeds to stress that the syllogisms in the figure at stake are all perfects or imperfects; he finally recapitulate which categorical forms can be concluded in that figure (see 26b26-33; 28a1-9; 29a11-18).

In order to make the point clearer, take some syllogisms Aristotle explicitly calls “imperfect”: the syllogisms with *e*-conclusions of the second figure. Suppose we want to deduce an *e*-conclusion in the second figure, that is, by means of a middle term which is predicated both of the minor and of the major. There is more than one way of reaching our aim. We can either choose a middle term which is predicated of all the minor but of none of the major (and so get a syllogism in *Cesare*) or choose a middle term which is predicated of none of the minor but of all of the major (and so get a syllogism in *Camestres*).

Thus, what makes *Cesare* the syllogism it is is the fact that it assumes *e* and *a* as premises – in this order, relating the middle term respectively to the major and to the minor term. A syllogism in *Cesare* cannot assume at the same time *a* and *e* as premises – in this order, relating the middle term respectively to the major and to the minor. At this point our Tables at the end of section V can prove very useful. Thus, *Cesare* is a valid syllogism. But *Cesare* is called “imperfect” because, although it has *one* of the two available premises-pairs for reaching an *e*-predication as conclusion in the second figure, it is *defficient* (“*prosdeomenon*”) of the other premise-pair: the same conclusion might have been reached through a different deduction, namely, the deduction traditionally called *Camestres*. In this way, *Cesare* does not (and cannot) have a premise-pair which would turn out to be *exactly* the required one. *Cesare* does not exhibit *the* required premise-pair – because in the second figure there is *not only one*, but *more than one* premise-pair available for the intended conclusion.

One of the advantages of my approach is that it explains very well a vexing feature of Aristotle’s text: when he introduces *Cesare* and *Camestres* together as valid moods in the second figure, he describes each of them as a “*possible* syllogism” but not as a “*perfect* syllogism” (27a1-5; note that the adjectives are in the singular). In my account, this feature of *Prior Analytics* A-5 is not only comprehensible but also coherent with Aristotle’s definitions at **T1-T3**. *Cesare* does not meet *in a perfect way* the requirement posited in part (iv) of the definition of syllogism. **It does not instantiate unqualifiedly the notion of a syllogism as defined (and clarified) by the final clause “*tôi tauta einai*”**, but this is far from meaning that *Cesare* is invalid or is not a syllogism. Its premise-pair, [ea2], leads to a valid conclusion, but it does not show that the condition of having assumed the required premises was fully achieved. Now, this condition *cannot be achieved by any single*



*syllogism* in the second figure, because there is more than one premise-pair able to lead to the same conclusion: there is  $[e, a]$  as well as  $[a, e]$ . *Cesare*'s failure in meeting this condition *does not affect its validity* nor, I submit, its evidence. *Cesare* is still valid and I would say that it is as "evident" as *Celarent*, but it is only *one of the possible ways* of attaining the desired conclusion in the second figure: that is why Aristotle calls it (along with *Camestres*) a "possible syllogism" (27a2; cf. 41b33). "Possible", in this case, has nothing to do with the necessity of the consequence, nor with a mere "potentiality" related to the need of filling the deductive gaps towards the conclusion.<sup>32</sup> "Possible" only means that *Cesare* is one of the possible methods available for anyone willing to reach the intended conclusion in that figure.

#### VII. *Discussing some objections:*

There are at least three sorts of objections that might be addressed against my view. First, even if my construal of 24b18-26 has some seductive power, there are passages from *Prior Analytics* that seem to confirm a more traditional view, namely, that a syllogism is imperfect if and only if the necessity of the conclusion, or its evidence, depends somehow on further steps which were not assumed in the premises. See for instance 27a15-18, 23-25; 28a5-7; 29a15-16 (I restrict myself to passages in the assertoric syllogistic, keeping modal syllogistic apart). Secondly, subordinated moods like *Barbari* and *Celarent* conflict with my claim that there is only one premise-pair for deducing each of the four categorical forms in the first figure. Thirdly, my view gives no central importance to the procedures which occupy most of Aristotle's exposition at *Prior Analytics* I 4-7, namely, the perfecting of second- and third-figure syllogisms into first-figure syllogisms. Most of the compelling strength of rival interpretations like Corcoran's rests on the fact that they explain in a better way what Aristotle is doing in these perfecting procedures and why they are important in the syllogistic system. Besides, standard interpretations about the perfecting procedure seem also more fitted to those same passages in which Aristotle seems to explain the imperfection of a syllogism in terms of its needing extra steps either to reach the conclusion with no deductive gaps or to make the validity of the conclusion evident.

To give a full reply to each of these objections would make this paper too long. However, I shall at least indicate the general outlines for reasonable responses. I will give more attention to the first line of objection, since my highly unorthodox construal of the passage 24b24-26 (the definition of imperfect syllogism) might be weakened if I do not try to dispel standard interpretations of some other key-passages.

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<sup>32</sup> Patzig 1968, p. 46, understands "*dunatos*" as "a potentially *perfect* syllogism". It is not clear what Patzig means: after the reduction is made, does the imperfect syllogism vanish and give place to a perfect one (like water being potentially air vanishes when it turns out into actual air)? Or the imperfect syllogism still subsists as an individuated syllogism different from the perfected ones? Only the first option would make sense, but it would be very misleading (see Barnes 2007, p. 382, quoted at note 22XX). See also Barnes 2007, p. 379.

Let me start with the second line of objection: the problem raised by subordinated moods like *Barbari* and *Celaront*. I have claimed that a perfect syllogism is so called because its conclusion is deduced by means of *the* necessary premise-pair: this premise-pair seems to be unique in its power to deliver the intended conclusion. However, there is a serious trouble with particular (*i/o*) conclusions. Why someone aiming at an *i*-conclusion in the first figure, for instance, should resort uniquely to the premise-pair [*BaA, CiB*], yielding *Darii*? Why she could not resort to the premise-pair [*BaA, CaB*], which also yields *Barbara*? If she could appeal to the latter as a genuine deductive resource, the claim that *Darii* is perfect will not any more fit into my picture (and a similar story will hold for *Ferio*).

First of all, it is important to remark that the general problem of subordinated moods is not restricted to the first figure. In the second figure, for instance, both universal concludent premise-pairs, namely, [*AaB, CeB*] and [*AeB, CaB*], are capable of delivering an *o*-conclusion as well. The issue is different, though, since neither *Camestres* nor *Cesare* is declared to be a perfect syllogism. But my point is that (i) those premise-pairs would in principle be able to yield an *o*-conclusion as well so that (ii) an *o*-conclusion might be attained in the second figure not only by *Baroco* and *Festino*, but also by the two subordinated moods resulting from those premise-pairs. Point (ii) has some pressure if we look at the third figure, in which an *o*-conclusion might be reached not only by *Bocardo* and *Ferison*, but also by *Felapton*. Note that the premises of *Felapton* relate to those of *Ferison* in the same way as the premises of *Celaront* relate to those of *Ferio* (as well as they relate to those of *Bocardo* in a similar way as the premises of *Camestres* relate to those of *Baroco*).

It is important to remark that Aristotle does not seem to recognize the subordinated moods. At *Prior Analytics* A-26, he stresses that *i*-conclusions are attained in the first figure *only in one way* (cf. 42b37), that *o*-conclusions are attained in the first figure *only in one way* too (cf. 42b39) and that *o*-conclusions are deduced in the second figure *in two (not in four) ways* (cf. 42b39-40). The last remark is important to see that Aristotle is not pretending to ignore subordinated moods just in order to keep his story about perfect first-figure syllogisms consistent. One way of dealing with this difficulty might be similar to standard approaches to the fourth-figure problem: scholars sometimes just argue that Aristotle has mysteriously overlooked it. I do not think this would be a satisfactory answer.

A possible way of dealing with the difficulty from subordinated moods will be to say that “*anankaion*”, as used in contexts like 24b22, points to *minimal* conditions required for the intended conclusion in a given figure, rather than to *unique* conditions. The idea behind this suggestion would be the following: in order to attain an *i*-conclusion in the first figure, one should assume the premise-pair [*BaA, CiB*] *rather than* [*BaA, CaB*] because, even if both are good enough for the intended conclusion, the former will rely on the minimal conditions required for it. However, at this level of abstract considerations, this suggestion will not do, for a similar situation, from the point of view of the upward-looking method, occurs in the third figure, but there Aristotle does not hesitate

in recognizing different individual moods for each premise-pair. In order to deduce an *i*-conclusion in the third figure, the premise-pairs  $[BaA, BaC]$ ,  $[BaA, BiC]$  and  $[BiA, BaC]$  are equally good and each of them is recognized as delivering an official mood, namely *Darapti*, *Datisi* and *Disamis*. And a similar story holds for an *o*-conclusion in the third figure. Thus, an appeal to this abstract notion of minimal conditions for an intended conclusion will not solve the trouble.

A comparison between the figures might suggest a better option. There is a relevant asymmetry between the concludent universal premise-pairs (i.e., concludent premise-pairs composed of two universal categorical forms)<sup>33</sup> in different figures. Note that, in the first figure, the premise-pair  $[BaA, CaB]$  actually delivers a universal conclusion, an *a*-conclusion, and the premise-pair  $[BeA, CaB]$  also delivers a universal conclusion, an *e*-conclusion. Similarly, in the second figure, the premise-pairs  $[AaB, CeB]$  and  $[AeB, CaB]$  yield a universal conclusion too, an *e*-conclusion. But this is not true about the universal premise-pairs in the third figure:  $[BaA, BaC]$  yields only a particular *i*-conclusion, and  $[BeA, BaC]$  yields only a particular *o*-conclusion.

Now, these facts suggest that Aristotle might have relied on some reasoning like the following. If a premise-pair is capable of deducing a universal conclusion, then this premise-pair is *suited* to that universal conclusion *in the first place*. Of course, it will not be logically wrong to infer the subordinated particular conclusion from the same premise-pair, but Aristotle seems to be resting on some *extra*-logical standpoint: even if it is not logically wrong, it would be inappropriate or unfitting or unexpedient or (why not) silly to infer the particular conclusion when the universal could have been directly drawn. If one is interested only in a particular conclusion (not in a universal one), one should take the appropriate and comensurate premise-pair in the first place. Consequently, if a particular conclusion can be deduced from a universal premise-pair, that deduction is *appropriate* only if there is no universal conclusion which could be drawn from the same universal premise-pair. This is exactly what happens with *Darapti* and *Felapton*.

This story might seem an *ad hoc* manoeuvre to save Aristotle from inconsistency in calling *Darii* and *Ferio* perfect syllogisms. My consolation is that the problem of subordination is a vexing one for rival interpretations as well, so that they are not better off at this juncture.

I address now the first line of objection: there are many passages that seem to confirm the standard view about a syllogism being imperfect because some extra steps are needed either to reach the conclusion with no deductive gaps or to make the conclusion evident.

Let me start with a remark Aristotle makes after presenting the universal valid moods of the second figure. The text reads as follows:

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<sup>33</sup> The description “universal premise-pairs” picks up what Aristotle refers to at 26a13, 27a3, 23-24, 28a17-8: premise-pairs composed of two universal categorical forms, either *a* or *e*.

**T7** “It is evident, then, (i) that a syllogism comes about when the terms are so related, but not a perfect syllogism, (ii) for the necessity is brought to perfection (iii) not only from the initial assumptions, but from others as well” (27a15-18, Striker’s translation).

Striker’s translation captures the standard interpretation. First of all, standard interpretations believe that “*to anankaion*” (27a17-18) refers to the conclusion *as* a logical consequence of its premises,<sup>34</sup> with the result that the expression “*epiteleitai to anankaion*” should be understood in the sense of *perfecting* the conclusion (either in Corcoran’s sense of filling in the deductive gaps, or in Philoponus/Patzig’s sense of making the conclusion evident). Accordingly, the items described in step (iii) of **T7** would be the original premise-pair and the additional premises attained by conversion or assumed for *reduction ad impossibile* in the method of perfecting imperfect or incomplete syllogisms.<sup>35</sup>

However, the text can be understood very differently. First, the occurrence of “*to anankaion*” (27a17-18) can well be taken in the same way as those in 24b22 – in step (b) of the enlarged definition of the syllogism – and 24b24, 25 – in the definition of perfect and imperfect syllogisms. In this way, “*to anankaion*” introduces the abstract requirement that the conclusion must proceed from a necessary premise-pair. Now, the items mentioned in step (iii) of **T7** refer rather to the set of premise-pairs available for the intended conclusion in that figure, namely, the premise-pairs [AeB, CaB] and [AaB, CeB], which together are “the necessary ones” for an *e*-conclusion in the second figure. Thus, if the mood under consideration is *Cesare* (for instance), “the initial assumptions” refer to the premise-pair [AeB, CaB], while “the others” refers to the premise-pair [AaB, CeB], which was not taken and could not have been taken in *Cesare* because a mood is individuated by the premise-pair it assumes. If this is right, the expression “*epiteleitai to anankaion*”, far from referring to the “proof of the validity” or to the process of completing the deductive gaps, introduces the idea of *exhausting the ways of reaching the intended conclusion*, in other words, the idea of exhausting the set of premise-pairs available for the intended conclusion in the figure at stake. As I have argued, “the necessary” in this case refers to a set of two premise-pairs: this set is what is labelled “necessary”, but no single mood can exhaust it because each mood can only take one premise-pair.

The translation of the passage according to my view will be the following:

**T7\*** “It is evident, then, (i) that a syllogism comes about when the terms are so related, but not a perfect syllogism, (ii) for the necessary is exhausted [i.e, fully covered] (iii) not by the assumed premises *alone*, but by others as well” (27a15-18).

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<sup>34</sup> Smith 1989, p. 116. See also (although on a different but similar passage) Ammonius 32.28-30.

<sup>35</sup> See Philoponus 91.26-33 (which confirms what he has said at 37.6-16).

A very similar story holds for the remark Aristotle presents a few lines below:

**T8** “It is evident, then, (i) that if there is a syllogism with universal terms, the terms must be related as we said at the beginning, (ii) for if they are related in some other way, (iii) the necessity does not come about” (27a23-25, Striker’s translation).

The point of contention is step (iii): again, I argue that “*to anankaion*” at 27a25 should be taken in the same way as in 24b22, 24, 25, namely, as referring to the abstract requirement that the premise-pair assumed must be the necessary one. The verb “*ginetai*” should not be taken in the sense of “[a valid conclusion] comes about”, but in the sense of “turn out to be” as I have explained earlier in section II. The whole expression “*ou ginetai to anakaion*” rather means that, with terms taken differently, the resulting premise-pairs do not turn out to be the necessary ones (alternatively, but with the same philosophical result, the expression “*ou ginetai to anakaion*” might be taken to mean that the necessary premise-pair does not come about if premises are taken differently). My alternative paraphrase will run as follows:

**T8\*** “It is evident, then, (i) that if there is a syllogism with universal terms, the terms must be related as we said at the beginning, (ii) for if they are related in some other way, (iii) [the premise-pairs resulting from them] don’t turn out to be the necessary” (27a23-25).

Steps (ii) and (iii) are saying precisely that, if the premise-pairs are different from the ones previously presented as concludent, they are not included in the set labelled “the necessary premise-pairs” or, in other words, the premise-pair posited will not turn out to be one of the required premise-pairs for the intended conclusion.

There are two other passages very similar to each other:

**T9** “It also clear that all the syllogisms in this figure are imperfect, for (i) all of them are brought to perfection (ii) by adding some things that are either necessarily inherent in the terms (iii) or assumed as hypotheses, as when we give a proof through the impossible” (28a4-7, Striker’s translation).

**T10** “all of them are perfected by adding some things” (29a15-16, Striker’s translation).

It is hard to deny that steps (i)-(iii) of **T9** are describing the procedure which is usually called “perfecting an imperfect syllogism”. There is little controversy about the steps of the procedure, but

a lot of controversy about its meaning and its function. The procedure might involve conversion of a premise posited in the original syllogism or assumption of the contradictory of the conclusion for reduction through the impossible. Presumably the items mentioned in step (ii) of **T9** are the additional premises obtained by conversion of the original ones: these additional premises are somehow contained in the original premises.<sup>36</sup> It is highly controversial, though, what is the purpose and the final outcome of this procedure. But before discussing these points, let me focus on two possible moves against my claims.

First, one might argue that step (i) of **T9** tells against my interpretation of step (ii) of **T7**: when Aristotle says in **T9** that imperfect syllogisms are brought to perfection, he makes it clear that he is talking about the result achieved in the conclusion, not about some requirement concerning premise-pairs. Second, one might argue that step (ii) of **T9** tells against my implausible interpretation (and in favour of the standard interpretation) of steps (iv)-(v) of **T6**. When Aristotle makes it clear in **T9** that an imperfect syllogism should be perfected by means of some additional assumptions, he also makes it clear that those additional assumptions are necessarily contained or packed in the original premises, which obviously implies that they were not among the original premises, but are necessary consequences of them.

My reply is that there is a telling difference between step (i) of **T9** and step (ii) of **T7**. The same verb is used, of course: “*epiteleisthai*”, which is standardly translated as “being brought to perfection” or something like that. But the subject attached to the verb in each occurrence is different: in **T7**, the subject is “*to anankaion*”, whereas in **T9**, it is “*pantes*” [*sc.* all imperfect syllogisms]. Someone might desire that the same verb preserves its meaning when applied to different subjects, but the fact is that languages, including Aristotle’s, actually behave in a different way: the same verb can have different meanings when applied to different subjects. Thus, I need not deny that **T9** is describing the perfecting of an imperfect syllogism. What I do deny is that step (ii) of **T7** must *a fortiori* be talking about the same thing because the verb is the same.

This reply clears the way to my response to the other objection, namely, that step (ii) of **T9** tells in favour of the standard interpretation of steps (iv)-(v) of **T6**, as if Aristotle were saying in the latter that an imperfect syllogism stands in need of some additional assumptions, which were not taken in the premises, but are necessary consequences of them. Now, I do not deny that perfecting an imperfect syllogism is a procedure in which additional premises are taken. Nor do I deny that these additional premises are indeed (at least in the applicable cases) necessary consequences of the original premises. Nor do I deny that Aristotle is making precisely these points in steps (i)-(ii) of **T9**. What I do deny is that **T6** should be understood in the light of passages like **T9**. One thing is to define an imperfect syllogism as a mood in which, from a given set of premise-pairs which exhausts the “necessary” ways to deduce the intended conclusion, only one pair was taken, while the other

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<sup>36</sup> Philoponus 100.13; Smith 1989, p. 117; Barnes 2007, p. 381; Striker 2009, p. 103.

pairs were not taken (because a single syllogistic mood can take only one premise-pair). Another thing, quite different, is to describe a procedure in which a given conclusion yielded by an imperfect syllogistic mood can be brought to perfection.

At last, let me say something about “perfecting an imperfect syllogism”. There is little doubt, I hope, about what we are referring to: we are referring to the procedures described, for instance, in *Prior Analytics* 27a6-9. From the initial premises of *Cesare*, the major premise is converted, yielding then the premise-pair of *Celarent*. So far, so good. But there is a lot of controversy about the exact meaning and role of this procedure. Some scholars believe that the procedure is intended as a *proof of the validity* of the mood at stake.<sup>37</sup> Others argue that it is just a matter of making evident the necessity of the conclusion, or that the procedure aims at filling the deductive gaps in reaching the conclusion.<sup>38</sup> Now, I need not contend that the procedure actually offers a proof of the validity of the moods at stake, but I do not think that perfecting an imperfect syllogism has anything to do with *correcting some amendable flaw* in the imperfect syllogism. According to Corcoran 1974, p. 91-2, 109, for instance, the procedure is understood as *completing* the deductive steps from the premises towards the intended conclusion. On his view, an imperfect syllogism, such as *Cesare*, has some deductive gaps to be amended by the procedure. In my view, there is no *amendable* flaw in an imperfect syllogism. They are imperfect because they assume only one premise-pair from a set of possible premise-pairs appropriate for the intended conclusion, but this “flaw” is *not amendable* because a syllogistic mood can only assume *one* premise-pair, since it is individuated by the premise-pair it assumes.

But, then, what it means “to brought an imperfect syllogism to perfection” or “to perfect an imperfect syllogism”? It only means to perform some operations upon the original premise-pair so that the same conclusion is now basically attained through a first-figure perfect syllogism (sometimes with the addition of some further operations). For every imperfect syllogism with a conclusion of the form  $CxA$ , some operations performed upon the original premise-pair (or, in the more complicated case of *reductio*, the assumption of the contradictory of the original conclusion) can deliver a first-figure perfect syllogism which either will directly yield the same conclusion  $CxA$  (as for *Cesare*, *Festino*, *Darapti*, *Felapton*, *Datisi*, *Ferison*) or will yield it through some additional steps like conversion (as for *Camestres*, *Disamis*) or *reductio ad impossibile* (as for *Baroco*, *Bocardo*). But there is no much sense in saying that these operations “perfect the imperfect syllogism”:<sup>39</sup> an imperfect mood *qua* imperfect is not liable to emendation, because its imperfection

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<sup>37</sup> Lukasiewicz 1951, p. 43-5; as well as (with some reserves) Patzig 1968, p. 134-5. See also extensive discussion in Barnes 2007, p. 384-447.

<sup>38</sup> Corcoran 1974, p. 91-2, 109; Smiley 1973, p. 137-8; Lear 1980, p. 10; Smith 1983, p. 224; Andrade-Lotero & Novaes 2012, p. 391; Malink 2013, p. 31.

<sup>39</sup> At this point I agree with Barnes 2007, p. 382: “If a syllogism is once perfect, then it is always perfect; and if it is once imperfect, then it is always imperfect. Aristotle’s use of the verb ‘to perfect’ is, at best, misleading”. See a different account in Crivelli 2012, p. 129.

is a matter of taking just one of the premise-pairs appropriate for the intended conclusion. Once the perfecting operations are performed upon the original premise-pair of a mood, one gets thereby a different mood: if one wished to perfect the original mood, she has not succeeded in it, since the original mood was gone.

After all, I do not believe that my picture is incompatible with viewing the so called perfecting operations as delivering proofs of validity for the imperfect moods. I don't need to get rid of this notion. The perfecting operations can still be taken as a procedure in which the validity of the imperfect moods is proved by means of the first-figure syllogisms. Conversely, first-figure syllogisms can still perform the function of basic rules of inference, or (if one prefers) axioms, or simply more basic moods in term of which the validity of the others are systematically proved. My contention is that this role of first-figure syllogisms as "principles" in the proofs of validity is not *by itself* what makes them to be called *perfect*.<sup>40</sup> Accordingly, the fact that the validity of imperfect syllogisms can be proved by means of the first-figure perfect syllogisms is not *by itself* what makes them to be called *imperfect*.<sup>41</sup> A further support for this claim is the fact Aristotle acknowledges (in *Prior Analytics* I 45) a reverse reduction: perfect first-figure syllogisms are reduced to imperfect syllogisms. Indeed, at 50b6-7, 9-13, he presents the reduction of *Celarent* to *Cesare*; in 50b13-16; he acknowledges the reduction of *Ferio* to *Festino*; in 50b35-28, he describes the reduction of *Darii* to *Datisi* and, at last, in 50b38-40, that of *Ferio* to *Ferison*. Usual attempts to get rid of this supposed contradiction is to argue that "reducing" (*anagagein*) in 50b6 is not the same technical notion as "perfecting" (*epiteleiousthai*) at *Prior Analytics* I 4-7, or to introduce developmental approaches such that *Prior Analytics* I 45 turns out to be a juvenile and sketchy treatment of the same subject considered at *Prior Analytics* I 4-7.<sup>42</sup> Perhaps an extra advantage of my view is that there is no contradiction to get rid of. And I can agree that "reducing" (*anagagein*) is *somehow* different from "perfecting" (*epiteleiousthai*). The former notion is more general and can be taken in *either direction*, whereas the latter is more specific and can only be taken in *one direction*: "reducing" only means attaining the same conclusion from a mood different from the original one, whereas "perfecting" means attaining the same conclusion from a perfect mood (i.e., from a premise-pair that is *tout court* the necessary one). Thus, "reducing" can be used to describe either a reduction of a perfect syllogism to an imperfect one (as in 50b6-16 etc.) or a reduction of an

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<sup>40</sup> Lukasciewicz 1959, p. 44, makes a complaint about the "special terminology" of Aristotle's in calling perfect syllogisms "perfect" (but not "axioms"): but Aristotle's point in calling them "perfect" has nothing to do with the role they play in the "axiomatic system".

<sup>41</sup> I am sympathetic to the view expressed by Lear 1980, p. 7: "[...] these questions – of what it is that makes first figure syllogisms perfect and whether or not the second and third figure syllogisms are less obviously valid – though of interest themselves, are irrelevant to the development of Aristotle's programme".

<sup>42</sup> See different views in Patzig 1968, p. 47 (*APr* I.45 as giving an alternative axiomatic system); Smith 1989, p. 177; Striker 2009, p. 239-240.



imperfect syllogism to a perfect one, whereas “perfecting” can only be used to describe a reduction of an imperfect syllogism to a perfect one.

### VIII. *Conclusion:*

In short, the imperfection of imperfect syllogisms: (i) does not affect their validity, (ii) has nothing to do with a further need of *filling the deductive gaps* in the deduction of the conclusion (against Corcoran’s ingenious but exegetically implausible interpretation), (iii) has nothing to do with epistemological concepts such as *evidence* (against Patzig); (iv) has something to do with some extra-logical concerns of Aristotle’s.

The last point is important. A full discussion of it will require another paper (especially because I do not rely on standard views about Aristotle’s theory of demonstration in the *Posterior Analytics*), but I will indicate the general lines which I believe might be pursued for attaining a reasonable picture. My suggestion is that perhaps Aristotle’s reason for calling syllogisms *imperfect* has something to do with the main reason for his choosing the syllogism as a tool for scientific demonstrations. In my view, Aristotle’s reason has nothing to do with merely logical properties syllogisms have on their own and on their reciprocal relations. Aristotle’s reason is rather the fact that their triadic structure (involving a middle term etc.) makes them suitable for displaying causal relations, which, on Aristotle’s view<sup>43</sup>, should be spelled out as triadic relations (with *explananda* formulated as predications) and are at the hardcore of his notion of scientific demonstration.

In this line, perhaps Aristotle’s reason for calling syllogisms *imperfect* has something to do with his concern about the uniqueness of appropriate causal relations.<sup>44</sup> Perhaps a more promising suggestion is to say that Aristotle was rather (mis)guided by some analogy between requirements for a scientific demonstration and requirements for a syllogistic deduction. These requirements can be taken as *uniqueness* or *necessity* requirements in the following way: as scientific knowledge of a given explanandum (cast in predicative form) must proceed from a cause that is “the necessary one” for the fully appropriate explanation of its explanandum and therefore is also *unique* for such an explanation, in the same way a perfect syllogistic deduction must proceed from a premise-pair the form of which is the “necessary one” and therefore *unique* for deducing the conclusion at stake. But this is a mere analogy between these two *uniqueness* requirements.

### *Acknowledgements:*

Earlier drafts of this paper were discussed (since 2007) in Campinas, Rio de Janeiro (Federal University of Rio de Janeiro, then Catholic University of Rio de Janeiro), Porto Alegre, Goiânia,

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<sup>43</sup> There is no room to argue for this view here, but I take Aristotle’s remarks at 90a9-14 as the general program for “regimenting” causal relations into a triadic structure, in which *explananda* should be cast as a predication and a cause must be taken as a middle term.

<sup>44</sup> About the uniqueness of appropriate causal relations, see Angioni 2018.

Curitiba, and Stanford. At different times of its development the paper has benefited a lot from critical discussion and encouragement from Alan Code, Paolo Fait, Ricardo Santos, Phil Corkum, Luiz Carlos Pereira, Philip Steinkrüger and André Porto. I am also very grateful to my student Felipe Weinmann for very enlightening discussions on many technical points. I am also indebted to many suggestions, criticisms and comments addressed at different times by David Charles, Michail Peramatzis, Stephen Read, Paolo Crivelli, Marko Malink, Vivianne Moreira, Oswaldo Chateaubriand and Guido Imaguire.

### ***Abstract:***

I discuss Aristotle's definition of syllogism as it is formulated in *Prior Analytics* 24b18-20. I also considers Aristotle's elucidations about the clause "because these things are so" as well as his definitions of perfect and imperfect syllogisms (24b20-26). I argue for that Aristotle's definition is suited to the narrow notion of syllogism (instead of being wide enough to cover other forms of argument or deduction). My main point is to understand the clause "because these things are so" as referring to premise-pairs and as introducing the requirement that a premise-pair must be "the necessary one" for an argument to be a syllogism. With this approach, Aristotle's definitions of perfect and imperfect syllogisms can be better understood as natural corollaries of his definition of syllogism avoiding most of the vexing troubles about that subject.

**Keywords:** Syllogism; perfection; logical necessity; validity; relevance.

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