

Aristotle on “dunatos” as a label for imperfect syllogisms

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Abstract: This paper discusses the following question: why was the term “dunatos” (“possible”) employed by Aristotle as an alternative label for imperfect syllogisms in his discussion of assertoric syllogistic? My answer ascribes to Aristotle a bottom up perspective, in which he stresses what is necessary in the premise-pairs to attain target conclusions of a given form within a given figure. I argue that “dunatos” is employed by Aristotle to stress that an imperfect syllogism is always one of the possible options to attain a conclusion of a given form within a given figure. I also argue that this picture sheds some light on Aristotle’s clarifications of the final clause in his definition of syllogism.

I. Introduction:

This paper intends to provide an answer for the following question: why did Aristotle employ the term “*dunatos*” (“possible”) as an alternative label for imperfect syllogisms in his discussion of assertoric syllogistic? After a brief survey of the issue (section II), I explain some important points underlying my interpretation (section III) and highlight the logical characteristics of syllogisms which I take as essential for answering my question (section IV). I explore passages that spot Aristotle’s concern with (what I call) a *bottom up* perspective, in which he stresses what is necessary in the premise-pairs to attain target conclusions of a given form (section V). I dwell on two key passages to argue that Aristotle’s terminology must be taken with more attention (section VI). Then I discuss how my interpretation can shed some light on Aristotle’s definition of syllogism (section VII) and of perfect and imperfect syllogism (section

VIII). I add an important clarification about how my interpretation preserves logical characteristics that are traditionally associated both with imperfect syllogisms and with the perfecting process (section IX). A short discussion of some additional objections (section X) precedes my conclusion: “*dunatos*” is employed by Aristotle to stress that an imperfect syllogism is always one of the possible options to attain a conclusion of a given form within a given figure.

II.

It is well known that Aristotle uses the term “*dunatos*” (“possible”) as an alternative label for imperfect syllogisms. At some point in *Prior Analytics* (henceforth, *APr.*) I.5, we read the following:

T1: 27a1-3:

“There cannot be a perfect syllogism in this figure in any way, but there will be a *possible* syllogism both if the terms are universal and if they are not.” (my translation, modified from Striker’s and Smith’s).¹

[27a1] τέλειος μὲν οὐκ ἔσται συλλογισμὸς οὐδαμῶς ἐν τούτῳ τῷ σχή-

[2] ματι, δυνατὸς δ’ ἔσται καὶ καθόλου καὶ μὴ καθόλου τῶν ὅρων

[3] ὄντων.

(Greek text always from Ross 1949).

We find the same terminology in the following chapter:

T2: 28a15-17:

¹ Except in this case, I will give the translation found in Striker (2009)—for, in this passage, the syntactical turn of phrase found in Smith (1989) is particularly important, although I do not follow Smith in his lexical options (“deduction” for *sullogismos* and “potential” for *dunatos*).

“Now in this figure too no perfect syllogism will come about, but there will be a *possible* syllogism both when the terms are universal in relation to the middle and when they are not” (Striker’s translation, modified).

[28a15] τέλειος μὲν οὖν οὐ γί-

[16] νεται συλλογισμὸς οὐδ’ ἐν τούτῳ τῷ σχήματι, δυνατὸς δ’ ἔσται

[17] καὶ καθόλου καὶ μὴ καθόλου τῶν ὄρων ὄντων πρὸς τὸ μέσον.

There are some uncontroversial facts about the notion of *dunatos* syllogism as it appears on T1 and T2:

(i) Aristotle introduces the word “*dunatos*” in such a way that makes clear its being equivalent (in these contexts) to “*ateles*”, *imperfect*.² This is confirmed in 41b33, besides T1 and T2. Thus, there is no doubt that the word (as employed in those Texts) refers to the moods Aristotle calls imperfect, in the second and the third figures.³

(ii) Some options for what this use of “*dunatos*” might mean can be easily discarded. First, Aristotle is not employing the word to cover invalid syllogisms: he clearly uses “*dunatos*” to refer to *valid* moods. This is also clear from fact (i), namely, that “*dunatos*” replaces “*ateles*” in the contexts in which it appears. Furthermore, it goes without saying that the use of “*dunatos*” in those Texts is not (and cannot be) any piece of the modal terminology that has already been introduced in *APr*: I.3 and will be employed in I.8-22. Aristotle is not thinking of syllogisms made out of sentences expressing contingency or possibility.

(iii) This use of “*dunatos*” appears when Aristotle discusses which premise-pairs turn out to be conclusive within the second and the third figure. Now, an important feature of Aristotle’s

² See Alexander 271.2-6—although the same Alexander shows himself confused in 76.12-17. Philoponus recognised the semantic fact in 255.28, but shows himself very confused in 255.32-256.8, not to say in 87.30 ff.

³ In this paper, I am talking about abstract moods with schematic letters—not about syllogisms with concrete terms. Thus, most occurrences of the term “syllogism” refer to abstract moods with schematic letters (not to syllogisms with *concrete terms*), and a similar story holds for “premises” and “premise-pairs” (I am talking about schematic premises such as *CaB*, *AeB* etc., but not about concrete sentences such as “Every horse is an animal”).

discussion is that most of his summarizing remarks have a twofold structure: he not only highlights that some premise-pairs are conclusive, but also stresses that, if there is a syllogism (delivering a given categorical form) in the figure at stake, its premise-pair must necessarily be included among the ones previously identified as conclusive.

It is fact (iii) that gives us the most important clue for grasping Aristotle's employment of "*dunatos*" in the Texts, as I will show.

III.

Three interrelated contentions underlie (or somehow constitute) my central claim in this paper—let me call them my assumptions. They come in a gradation, or can even be presented as one single assumption in three parts.

First (part of the) assumption:

1) When dealing with the notions of perfect and imperfect (or *possible*) syllogisms, Aristotle adopts what I call a "bottom up" perspective. He follows a criterion for calling a syllogism perfect or imperfect. But what criterion is that? I argue that Aristotle looks at a target conclusion of a given form (among one of the four categorical forms) and asks the following question: *how (i.e., by what means)* can a conclusion of that form be validly attained?

There are important additional remarks to fill up my point, but first let me respond to a natural reaction. In *APr.* I.4-6, Aristotle clearly follows a procedure in which he *starts with premise-pairs*, announces whether a conclusion of the appropriate form follows from a given premise-pair or not, and then explains why it does (or does not) follow. Thus, his procedure is not "bottom up", but *downwards*—in a pictorial context in which *up* corresponds to the premises and *down*, or *bottom*, corresponds to the conclusion. Indeed, I am not denying this.⁴ However, note that, whereas this downwards procedure is adopted by Aristotle to sort out which premise-pairs are conclusive and which are not (within each figure), calling a syllogism *teleios* or *dunatos*

⁴ I need not discuss whether Aristotle has some pedagogical or deeply methodological reason to follow this procedure. For discussion, see Morison 2011, 178-9.

(or *ateles*) does not consist in deciding whether the premise-pair is conclusive or not. Actually, the issue about conclusive premise-pairs is already solved and settled, when it comes to apply the adjectives “*teleios*” and “*dunatos*”.

My employment of “already” and “when” in the last sentence might suggest that I am talking about the actual order in which we read the items in Aristotle’s text. But this is not what I am saying. I am *not* suggesting that “*teleios*” and “*dunatos*” only appears in Aristotle’s text after he discusses the premise-pairs.⁵ My claim is about a *conceptual order*: the employment of the adjectives “*teleios*” and “*dunatos*” already *presupposes* that the moods in question are valid, i.e., that the premise-pairs that individuate them are conclusive. With the issue about validity (or conclusiveness of premise-pairs) already settled, Aristotle employs the adjectives “*teleios*” and “*dunatos*” to say something additional about the valid moods. Of course, the conclusiveness of premise-pairs has been established through a downwards procedure. But Aristotle’s additional point about a mood being *teleios* or *dunatos* is a different point and—this is my contention—does not need to stick with the downwards procedure. Thus, I argue that, when employing the adjectives “*teleios*” and “*dunatos*”, Aristotle *presupposes* that the mood in question is *valid* (and its premise-pair is conclusive) and *focuses on a different property* of the mood, a property related to the way in which the conclusion is attained *within the figure in question*.

Second (part of the) assumption:

2) When employing “*teleios*” and “*dunatos*” (or “*ateles*”), Aristotle has in the background the method of finding out a middle term for a target conclusion (outlined in I.23, 40b30-41a14). In order to call a syllogism perfect or imperfect, Aristotle looks at the target conclusion, which has one of the four categorical forms, and asks the following question: *how (i.e., by what means)* can a conclusion of that form be successfully attained? Now—given that Aristotle has that

⁵ Such a claim would be false: Aristotle already presents “*teleios*” (or “*ateles/dunatos*”) when he announces the results he is going to establish in the chapters (e.g. 25b35).

method in mind—his question turns out to be this: how can a conclusion of a given form be attained from a premise-pair with a suited middle term?⁶

My suggestion clearly fits Aristotle's discussion in *APr.* I.4-6. He always takes premise-pairs with a shared term—the middle term—and examines whether a conclusion (with the appropriate form) follows or not. With the conclusive premise-pairs sorted out, the question about the mood being *teleios* or *ateles* (or *dunatos*) emerges. And the answer to this new question hinges on some particular features of the relation between the target conclusion and the premise-pairs, as I will explain.

Third (part of the) assumption:

3) Aristotle explores the question about being *teleios* or *ateles* (or *dunatos*) *within the domain of each figure on its turn*, instead of asking it in a general way (i.e., mingling the three figures together). What I mean is this: instead of asking (e.g.) “how can a conclusion in *e*-form be deduced from a premise-pair with a suited middle term *in general (in any of the three figures)?*”, Aristotle's underlying thought consists in asking “how can a conclusion in *e*-form be deduced from a premise-pair with a suited middle term *within this figure* (which happens to be at stake)?” As will be clear in my next steps, a key question for Aristotle to call a mood *teleios* or *ateles* (or *dunatos*) is this: “how many premise-pairs there are from which the *x*-conclusion can be attained *within this figure* (which happens to be at stake)?”

I need not (and will not) discuss why Aristotle adopts this figure-restriction to his question. One might wonder what kind of logical (or extralogical) advantage Aristotle could possibly have seen in adopting such a restriction. But my aim in this paper is modest, and purely exegetical: I wish to highlight a feature of Aristotle's thought that consistently explains—or so I hope—a recalcitrant problem about his terminology.

⁶ About this method, see Thom 1981, 27-8. I need not discuss here whether Aristotle claims in I.23 that all valid deductions must follow the method of finding a middle term etc. I do not believe that Aristotle is concerned with such a thesis. Actually, “*pas syllogismos*” at 40b20 should not be read as “every deduction”, but should be taken as restricted to the domain of arguments composed of categorical propositions. See discussion in Smith 1989; Smith 1994; Barnes 2012; Striker 1998, 210-1, 214; Steinkrüger 2015.

IV.

A feature of Aristotle's enterprise in *APr.* is most important for my purposes. The three figures can be contrasted with one another on the basis of (besides other things) this question: how many ways there are for each of them to attain each one of the successful results they attain? (By "successful result" I mean a valid conclusion in a given categorical form). The answer—as envisaged by Aristotle himself in 42b32-40 (keeping the problem of subordinated moods aside)—can be summarized in this way:⁷

First figure: each categorical form that can be concluded in the first figure can be attained *only in one way*, i.e., by means of only one premise-pair.

Second figure: each categorical form that can be concluded in the second figure can be attained *in two ways*, i.e., by means of two different sorts of premise-pairs.

Third figure: each categorical form that can be concluded in the third figure can be attained *in three ways*, i.e., by means of three different sorts of premise-pairs.

It is helpful to view these points in the Tables (cf. 42b32-40):

Tables: Notation: in (e.g.) "CaA", "C" is the subject, "A" is the predicate, so that the formula means "every C is A".

First Figure

⁷ This is what Aristotle himself stresses in 42b32-40—in full accordance with what he has done in I.4-6. There is a sharp problem with subordinated moods, e.g., *Barbari*: an *i*-conclusion can be derived from the premise-pair *BaA*, *CaB*, and this will turn Aristotle's claim in 42b32-40 false. Now, I will not discuss the vexing question of the subordinated moods. But I have a suggestion for dealing with it in general lines, at least as it concerns my purposes in this paper. I suggest that Aristotle had in mind something like this. If a premise-pair *P* is capable of delivering a *universal* conclusion, then *P* is *appropriate* to that universal conclusion *in the first place*. It will not be logically wrong to infer the subordinated particular conclusion from *P*, but it would be inappropriate to infer it when the universal could have been directly drawn. From a bottom up perspective, such considerations make sense: if one is interested only and exactly in a particular conclusion (not in a universal one), one should focus on the *minimal necessary* conditions to attain it, and a premise-pair that qualifies as *minimally necessary* thereby becomes an appropriate premise-pair in the first place. Consequently, if a particular conclusion can be deduced from a universal premise-pair, that deduction is only appropriate 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* (but not with the subordinated moods). I thank Paolo Crivelli and Justin Vlasits for informal discussions on this issue.

Forms of the target conclusion:	Premise-pairs delivering that conclusion	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>

Second Figure

Forms of the target conclusion	Premise-pairs delivering that conclusion	Mood
<i>CaA</i>	—	—
<i>CeA</i>	<i>AeB, CaB</i>	<i>Cesare</i>
	<i>AaB, CeB</i>	<i>Camestres</i>
<i>CiA</i>	—	—
<i>CoA</i>	<i>AaB, CoB</i>	<i>Baroco</i>
	<i>AeB, CiB</i>	<i>Festino</i>

Third Figure

Forms of the target conclusion	Premise-pairs delivering that conclusion	Mood
<i>CaA</i>	—	—
<i>CeA</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>

Take one categorical form as target conclusion within the first figure, e.g., an *a*-conclusion. There is no other way: you need a premise-pair of the form *BaA, CaB*. That premise-pair is, exactly, not only sufficient but also *necessary* to bring about the desired conclusion in the first figure.⁸

⁸ There will be more about this “sufficient/ necessary” terminology in the end of section V.

Now choose one categorical form as your target conclusion in the second figure—for instance, an *e*-conclusion. There are *two* premise-pairs available, *AeB/CaB* (delivering *Cesare*) or *AaB/CeB* (delivering *Camestres*). You can choose either option. And this makes each of the options *a possible option for you*. So the route leading (e.g.) to *Cesare* is just one of the *possible* routes. And there is no way of exhausting all the possible routes with a single mood, for each mood is individuated by the premise-pair it takes. Thus, in the second figure, a given conclusive premise-pair is (in our language) only sufficient but not strictly necessary to bring about the desired conclusion. And this contrasts with the situation in the first figure, in which a given conclusive premise-pair is not only sufficient but also strictly necessary to bring about the desired conclusion.⁹

Thus, I will argue that:

Claim 1: there is evidence in Aristotle’s text that he was very concerned with stressing those features of the premise-pairs within each figure;

Claim 2: those features of the premise-pairs in each figure are related to some aspects of the final clause of the definition of syllogism and, consequently, to some aspects of the definitions of perfect and imperfect syllogisms.

Claim 3: those features of premise-pairs explain Aristotle’s employment of “*dunatos*” as an alternative label for “imperfect”.

A bunch of passages from *APr.* I.4-6 shows Aristotle’s concern with stressing that the conclusive premise-pairs in each figure are also necessary (*sine quibus non*) to attain the target conclusions. More precisely, what can be named “necessary to bring about the desired conclusion” is the *set* of premise-pairs that exhausts the options for the desired conclusion. Aristotle’s language is flexible and very generous with presuppositions implicit in the context, even in his *Analytics*. Paying close attention to that feature of Aristotle’s language, I will argue that *some* uses of “*anankaion*” (“necessary”)—instead of referring to the conclusion (or to an

⁹ For the issue about subordination, see note 7.

abstract property of the inference as a whole)—refer to the premise-pairs and are in fact an abbreviated way of saying “necessary to bring about the desired conclusion”. The bearer of the predicate “*anankaion*” in most of those occurrences is exactly the *set* of premise-pairs that exhausts the options available for the desired deduction within a given figure. Now, in the first figure, that set is made out of only one premise-pair; but it is made out of more than one premise-pair both in the second and in the third figures (see the Tables).

V.

I start with Claim 1. In a passage from *APr*: I.4, we find this finishing touch in Aristotle’s treatment of universal premise-pairs in the first figure:

T3: 26a13-16.

“So if the terms are universal, it is clear when there will be a syllogism in this figure and when not; also, [it is clear] that, **if there is a syllogism, then the terms must necessarily be related as we have said**, and if they are so related, then there will be a syllogism”. (Striker’s translation, my bold).

[26a13] καθόλου μὲν οὖν ὄντων τῶν ὄρων, δῆλον ἐν τούτῳ τῷ σχή-
[14] ματι πότε ἔσται καὶ πότε οὐκ ἔσται συλλογισμός, **καὶ ὅτι ὄν-**
[15] **τος τε συλλογισμοῦ τοὺς ὄρους ἀναγκαῖον ἔχειν ὡς εἵπομεν,**
[16] ἂν τε οὕτως ἔχωσιν, ὅτι ἔσται συλλογισμός.

The most importance sentence for my purposes is highlighted in bold. The sentence expresses the “bottom up” perspective which—so I have suggested—is appropriate to understand Aristotle’s use of “*teleios*” and “*ateles*”/“*dunatos*”. I am not saying or suggesting that this sentence grammatically applies the term “*anankaion*” to premise-pairs. Actually, “*anankaion*” ranges over the infinitive clause and marks it as a logical consequence of the antecedent, expressed in the genitive absolute, as is most usual. But note that Aristotle’s remark is made from

a bottom up perspective: *if* there is a successful syllogism (i.e., concluding a universal predication, either affirmative or negative) in the first figure, *then*, the terms *must necessarily* be related as Aristotle has just described. Now, from this remark, it also follows that:

—if you want to attain a universal conclusion in the first figure, you *must necessarily* select the *right* premises as Aristotle has just described;

—the *right* premises for a given desired conclusion are *ipso facto* the premises that are *necessary* (i.e., *required*) for that conclusion.

Later, I will argue in favour of taking some crucial occurrences of “*anankaion*” as referring to the exhaustive set of conclusive premise-pairs for a given *x*-conclusion in a given figure. But, for the time being, I am only stressing that Aristotle displays a real concern with the theoretical remark I have just spotted. Far from being an isolated, “curious” remark to be found in only one passage, it is found four more times in the systematic discussion of assertoric syllogistic (*APr.* I.4-7), and two more times in the metalogical chapters after the treatment of modal syllogisms (41b33-35; 42a11-12). We can generalize his point in the following way: *if* there is a successful syllogism of a given form (delivering a *given* categorical form in a *given* figure), *then* the terms *must necessarily* be related as he has established. Thus, the premise-pairs that have been established as conclusive also turn out to be necessary (*sine quibus non*) for the target conclusions in each respective figure. Thus, it is important to pay due attention to these passages.

We read the following in the final remarks of *APr.* I.4:

T4: 26b26-28.

“It is now evident from what has been said that **if there is a syllogism for a particular conclusion in this figure, then the terms must necessarily be related as we have said, for if they are related otherwise, no syllogism ever comes about.** (Striker’s translation, my bold).

[26b26] Φανερόν οὖν ἐκ τῶν εἰρημένων ὡς ἐὰν ἢ συλλογισμὸς ἐν

[27] τούτῳ τῷ σχήματι κατὰ μέρος, ὅτι ἀνάγκη τοὺς ὅρους οὕτως

[28] ἔχειν ὡς εἶπομεν· ἄλλως γὰρ ἐχόντων οὐδαμῶς γίνεται.

A similar comment is found in chapter I.5—twice. After exploring the universal premise-pairs and establishing the validity of *Cesare* and *Camestres*, Aristotle says the following:

T5: 27a23-25.

“It is evident, then, **that if there is a syllogism with universal terms, the terms must be related as we said at the beginning, for if they are related in some other way, the necessary does not come about**” (Striker’s translation modified, my bold).

[27a23] φανερόν οὖν ὅτι ἂν ἡ συλλογισμὸς καθόλου τῶν

[24] ὄρων ὄντων, ἀνάγκη τοὺς ὄρους ἔχειν ὡς ἐν ἀρχῇ εἶπομεν·

[25] ἄλλως γὰρ ἐχόντων οὐ γίνεται τὸ ἀναγκαῖον.

I will return to T5 to discuss a particular point in section VI. For the time being, let me proceed with the list of passages. The same *bottom up* remark is found again by the end of chapter I.5:

T6: 28a1-3.

“It is evident from what has been said that if the terms are related to one another as we have said, then a syllogism will come about of necessity, **and if there is a syllogism, it is necessary for the terms to be so related**”. (Striker’s translation, my bold).

[28a1] Φανερόν οὖν ἐκ τῶν εἰρημένων ὅτι ἐάν τε οὕτως ἔχωσιν οἱ

[2] ὄροι πρὸς ἀλλήλους ὡς ἐλέχθη, γίνεται συλλογισμὸς ἐξ

[3] ἀνάγκης, ἂν τ’ ἡ συλλογισμὸς, ἀνάγκη τοὺς ὄρους οὕτως ἔχειν.

The same idea is found in the final remarks of chapter I.6:

T7: 29a11-14.

“It is now evident for this figure too when there will or there will not be a syllogism. Also, that when the terms are related as we have said, a syllogism comes about of necessity, and that **if there is a syllogism, then it is necessary for the terms to be so related.**” (Striker’s translation, my bold).

[29a11] Φανερόν οὖν καὶ ἐν τούτῳ τῷ σχήματι πότε ἔσται καὶ πότε
[12] οὐκ ἔσται συλλογισμός, καὶ ὅτι ἐχόντων τε τῶν ὄρων ὡς
[13] ἐλέχθη γίνεται συλλογισμός ἐξ ἀνάγκης, **ἄν τ’ ἢ συλλογι-**
[14] **σμός, ἀνάγκη τοὺς ὄρους οὕτως ἔχειν.**

From T4 to T7, Aristotle’s expression does not significantly vary—nor does his thought. We can paraphrase his *bottom up* theoretical remark in this way: “if there is a syllogism, a logical consequence [of that fact] is that the terms [i.e., as arranged in the premise-pairs] must be arranged as I have established”. Now, a natural step stemming from this idea is to designate the right premise-pairs themselves as *necessary*. There is no mystery in this. If we accept a conditional, it is a natural move to refer to its consequent as a *necessary condition* for its antecedent. For instance: we accept that, for any X, if X is a human, then X has perception. Then it is a natural move to say that having perception is a necessary condition for being a human. If that is so trivial, why could there be serious resistance against taking the conclusive premise-pairs as *necessary conditions* for syllogisms in their respective figures, as Aristotle has stressed?

One might object: “employing that language will be very confusing and misleading, for a conclusive premise-pair is a *sufficient* condition to bring about the conclusion” (see Alexander

21.23-24). First of all: I am not denying that a conclusive premise-pair is a sufficient condition to bring about the conclusion (Actually, Aristotle says this emphatically in T3-T7). But I am calling our attention to an important fact: Aristotle's discussion also stresses that the right premise-pairs are *necessary* to bring about the conclusion, besides being *sufficient* for that. Actually, as I will argue, Aristotle's concern with stressing that fact is such that he even employs the term "*anankaion*" to refer to conclusive premise-pairs to convey this idea—this is what happened in T5 (besides other passages).¹⁰

I will dwell on this in the next sections, but first I emphasise that such an use of "*anankaion*" should not surprise us, for it follows trivial conventions of language. Of course, Aristotle identifies one use of "*anankaion*" in which the term refers to a condition that is not sufficient but only *sine qua non* for a given result (e.g. 1015a20-26), and we can surely find many occurrences of the term according to this pattern. However, this does not prevent Aristotle (or anyone) from using the same term, and similar ones, to refer to conditions that, in a given circumstance, turn out to be not only necessary (*sine qua non*) but also sufficient for a given result. We employ similar phrases in contemporary languages. When I am thirsty, I say to myself: "it is necessary to drink (namely, water or any other liquid with the relevant qualifications)". Now, in normal circumstances, drinking (water or any other liquid etc.) is not only necessary (*sine qua non*) but *sufficient* for quenching thirst, and no one would seriously reply that "you are wrong: drinking is not only *necessary*, but *sufficient* for quenching thirst". In the same way, in the abstract framework of a syllogistic mood, premise-pairs with appropriate middle terms are not only *sine quibus non* but also sufficient to bring about the target conclusion.

Thus, henceforth, whenever I write "necessary premise-pairs" (or something similar), keep in mind that my expression is picking up premise-pairs which, given the context, are *sufficient* and also *necessary* to bring about the target conclusion (of a given form) in its figure.

¹⁰ Important occurrences of "*anankaion*" will be discussed in the body of the paper. Actually, "*anankaia*" as adjective of "*protasis*" with the force of "required for an intended conclusion" is common in the *Topics*: 155b19, 20, 29, 36; 156a10; 157a12; 159a20; 161b29. In *APr.*, see "*anankaion*" in 42a39; 47a19; 66a36 and (more controversially) 53a35; (see also 45a21 for "*anankaia*" as adjective of "*hodos*").

VI.

A crucial expression for my argument is “οὐ γίνεται τὸ ἀναγκαῖον” in T5. Standard approaches would argue that it is natural to take that expression as *saying* that a conclusion does not follow, for Aristotle has employed the same expression to the same effect many times and “τὸ ἀναγκαῖον” is usually employed to refer to the conclusion as a necessary consequence following from the premises. I do not deny the *basis* for this claim of the standard approach: I am not denying that Aristotle has employed the same expression to the same effect many times, nor am I denying that several times “τὸ ἀναγκαῖον” is employed to refer to the conclusion as a necessary consequence following from the premises. But I argue that, in T5 particularly (and, as I will show, in other passages too), the information encoded in that expression is different—and, besides, is not incompatible with the *basis* of the standard approach.

T5 is a general comment about the valid moods delivering universal conclusions in the second figure. Aristotle has just explored the universal premise-pairs and established the validity both of *Cesare* and *Camestres*, which is equivalent to establishing the conclusiveness of the premise-pairs $[AeB/ CaB]$ and $[AaB/ CeB]$. These two premise-pairs count as “what is necessary (required)” for a universal conclusion in the second figure. The set of these two premises exhausts the possible options for attaining a universal conclusion in the second figure, whereas *each* of those premise-pairs, *taken in itself*, is a *possible option* for attaining that target. Now, I argue that the expression “*anankaion*” in T5 conveys this notion of *what is necessary* for an *e*-conclusion in the second figure, as captured in that *set* of two premise-pairs. Thus, “*anankaion*” does not pick up merely *one single* premise-pair isolated from the other. What Aristotle wants to say with “ἄλλως γὰρ ἐχόντων οὐ γίνεται τὸ ἀναγκαῖον” in 27a25 is exactly this: if the terms are arranged differently from those two premise-pairs, *what is necessary* (*i.e. required for the target conclusion*) *does not emerge*.

Now, let us be careful. Of course, it is absolutely true that, “if the terms are related in some other way”, the desired conclusion does not follow. I am not denying this. But I argue that the

exact message encoded in the sentence “οὐ γίνεται τὸ ἀναγκαῖον” (in 27a25) is that *what is necessary (i.e., required in the premises for the target conclusion to follow) does not emerge*. In this particular context, the sentence of Aristotle’s text is not directly *saying* that a conclusion does not follow. What the sentence is *saying* is that, if the terms are arranged differently, the necessary (and, by the way, also sufficient) conditions for attaining the desired result are not met. Now, from the fact that this is exactly the message encoded in that sentence, it does not follow that Aristotle is abandoning the idea that successful conclusions are necessary consequences of their premises, nor does it follow that Aristotle does not use the expression “οὐ γίνεται τὸ ἀναγκαῖον” differently in different contexts.¹¹ Actually, in the context which T5 belongs to, there is plenty of evidence that Aristotle believes that successful conclusions are necessary consequences of their premise-pairs.¹² Aristotle’s having that belief is so clear that that there is no need to put on the expression “γίνεται τὸ ἀναγκαῖον” (in 27a25) the charge of expressing that belief. Furthermore—this is most important—, the fact that the necessary conditions for attaining the desired result are not met *actually entails* that the desired conclusion does not follow, so that my interpretation is actually giving Aristotle’s phrasing in T5 a greater expressive and explanatory power—for we can explain his employment of “*dunatos*” on this basis.

This is the gist. What the key sentence is *saying* in T5 according to my interpretation is such that entails what the traditional approach wants to preserve—so that my interpretation also preserves what the traditional approach wants to preserve. Moreover, what the key sentence is *saying* in T5 according to my interpretation conveys important information which the traditional approach is missing.

The same idea about *necessary premise-pairs* can be grasped from another passage in *APr.* I.5, which is an emphatic remark about *Cesare* and *Camestres* not being perfect syllogisms:

¹¹ See (e.g.) 26a6-7; 37b32; 38a6; 35a14; 35a18.

¹² This point is guaranteed by Aristotle’s expression “ἐξ ἀνάγκης συμβαίνει” (24b19) in the definition of syllogism.

T8: 27a15-18.

“It is evident, then, that a syllogism comes about when the terms are so related, **but not a perfect syllogism, for the necessary is completed [i.e., exhausted] not only from the initial assumptions**, but from others as well”. (Striker’s translation, modified, my bold).

[27a15] ὅτι μὲν οὖν γίνεται συλ-
[16] λογισμὸς οὕτως ἐχόντων τῶν ὄρων, φανερόν, **ἀλλ’ οὐ τέλειος· οὐ**
[17] **γὰρ μόνον ἐκ τῶν ἐξ ἀρχῆς ἀλλὰ καὶ ἐξ ἄλλων ἐπιτελεῖται τὸ**
[18] **ἀναγκαῖον.**

In section X, I will discuss how my interpretation of T8 is compatible with the definition of imperfect syllogism and with the logical properties traditionally ascribed to imperfect syllogisms. However, for the time being, let me explore how I understand T8.

First, T8 has something in common with T5: “τὸ ἀναγκαῖον” (both in 27a17-18 and 27a25) does not refer to the conclusion as a necessary outcome of the premises. I am not denying that in several other contexts “ἀναγκαῖον” *does indeed* refer to the conclusion as a necessary outcome of the premises.¹³ But in 27a17-18 and 27a25, the employment of the expression is different: “τὸ ἀναγκαῖον” introduces the general notion of *what is required* for the conclusion to come about—in other words, *what relation of terms is required in the premise-pair for the conclusion to come about*.¹⁴

¹³ See (e.g.) 26a4. Actually, “ἀναγκαῖον” is used in many ways even in short strings of texts—and Aristotle comfortably shifts from one use to another. For instance, in *APr.* I.32, 47a19, “ἀναγκαῖον” (in the genitive plural) is used with the force of *necessary/required* (for a target conclusion), but just some lines ahead, in 47a23, 26, 32 ff., is used to convey the notion of necessary consequence. Looking closer into the latter occurrences, we find diversity: in 47a23 (and 47a32), “ἀναγκαῖον” with “τι” seems to work as an adjective of the conclusion (as usual), but in 47a32, 33, 34, the word stands by itself as naming a kind of logical result (“valid inference” or something similar) that can be predicated of “συλλογισμὸς”.

¹⁴ For similar cases, see note 10.

On the traditional interpretation of T8, “τὸ ἀναγκαῖον” refers to the conclusion of an imperfect syllogism (or to the necessity of the consequence taken as an abstract notion) and the passage is taken as *saying* that the conclusion is not brought to perfection through the original premises alone—some additional steps must be added, namely, conversion of one premise etc.¹⁵ Now, my interpretation is not saying (nor implying) that we must get rid of those ideas about bringing a syllogism to perfection (whatever that means). Nor is it rejecting most features of Aristotle’s procedures in *APr.* I.4-6, such as proving the validity of *Cesare* and *Camestres* by applying some rules that brings back the first figure (cf. 27a12-13). I am just proposing that the exact message encoded in T8 is different.

According to my suggestion, “τὸ ἀναγκαῖον” in 27a17-18 expresses what is necessary in the level of the premise-pairs for the target conclusion to follow (within the figure that happens to be at stake). In other words, “τὸ ἀναγκαῖον” refers to the *set* of two premise-pairs (as we see in Table 2), the one delivering *Cesare* and the other delivering *Camestres*. I do not depart from traditional readings in taking “τὰ ἐξ ἀρχῆς” as a way to refer to the premises actually posited in a mood, i.e., the premise-pair that individuates the mood. But I depart from traditional readings of the verb “ἐπιτελεῖται” in 27a17. Traditionally, this occurrence of the verb is taken as referring to some procedure that applies to the original premise-pair of an imperfect mood, leading to its conclusion through a reduction to a perfect syllogism in the first figure.¹⁶ Again, I do not deny that Aristotle adopts procedures of that sort, which have a distinctive importance in his logical theory as a whole. But I argue that “ἐπιτελεῖται” in 27a17 is conveying a different, simpler idea: the idea that, in the case of *e*-conclusions within the second figure, *what is required for the conclusion to follow* is not—never—*exhausted* by the “original premises”, namely, by one single premise-pair which individuates one of the possible moods. That is exactly what makes *Cesare* and *Camestres* imperfect syllogisms (as the passage is stressing): they are *possible* syllogisms,

¹⁵ See Alexander 80.27-30; Philoponus 91.26-33.

¹⁶ E.g., in 28a5, 29b20 (more on this in section X).

i.e., each of them is one of the possible options for delivering the target conclusion in the second figure. Thus, τὸ ἀναγκαῖον (as the word is employed in 27a17-18) is *completed* or *exhausted* by both premise-pairs taken together. But a mood is individuated by the single premise-pair it takes. Thus, each single mood taken in itself *never exhausts* what counts as necessary.

In sections IX and X, I will discuss how my interpretation *is not incompatible* with traditional features ascribed to imperfect syllogisms and to the logical procedure of perfecting an imperfect syllogism. But, before that, I will discuss how my interpretation fits Aristotle's definitions presented at the end of *APr*. I.1.

VII.

How does my interpretation square with Aristotle's definitions of syllogism, of perfect and imperfect syllogism? My main contention is that “ἀναγκαῖον”, in three decisive occurrences (24b22, 24, 25), points to the premises (not to the conclusion or to the abstract notion of necessary consequence) and conveys the notion of *necessary conditions (which turn out to be sufficient too) for the conclusion to follow*. I start with the definition of syllogism, including the clarifications about its last clause.

T9: 24b18-22.

“[i] A syllogism is an argument in which, certain things being posited, something other than what was laid down results by necessity because these things are so. [ii] By ‘because these things are so’ I mean that it results through these, [iii] and by ‘resulting through these’ I mean that **no term is required from outside for the necessary to come about**”. (Striker's translation, modified, my bold).

“[24b18]

[i] συλλογισμὸς δὲ ἐστὶ λόγος ἐν

[19] ᾧ τεθέντων τινῶν ἕτερον τι τῶν κειμένων ἐξ ἀνάγκης συμβαί-

- [20] νει τῶ ταῦτα εἶναι. [ii] λέγω δὲ τῶ ταῦτα εἶναι τὸ διὰ ταῦτα
 [21] συμβαίνειν, [iii] τὸ δὲ διὰ ταῦτα συμβαίνειν τὸ μηδενὸς ἔξωθεν
 [22] ὄρου προσδεῖν πρὸς τὸ γενέσθαι τὸ ἀναγκαῖον.”

Since discussing T9 in every detail will require a much longer paper, I will only explain on what basic points I disagree with other interpretations available in the literature.

Most interpretations take T9 as defining a *broader* notion of deduction or valid argument. The details vary, but many scholars agree in taking Aristotle’s notion of syllogism emerging from his actual practice in *APr.* I.4-7 as *narrower* than what he was defining (whatever it is that he was defining).¹⁷ I disagree: Aristotle meant to define exactly the stricter notion of syllogism that emerges from *APr.* I.4-7, namely, arguments composed of predications in which a conclusion is attained through a premise-pair with an appropriate middle term, according to the three figures. One might discuss whether Aristotle’s definition has been successful or not. One might also discuss whether Aristotle did mean to provide us with a complete analysis of the definiendum—or was content with merely sketching some relevant features that characterise the syllogism as the specific kind of argument it is. Whatever one is going to make out of those issues, I need only pin down two important points.

First, the kind of argument being defined is constituted of *predications*. This result stems from Aristotle’s train of thought in the broader context of T9: he first defines *protasis*, then *horos*, then *sullogismos*, in such a way that selects the *predicative* sentence as the basic ingredient of the kind of argument in question.¹⁸ A second point is that “τῶ ταῦτα εἶναι” imposes an important restriction: *sullogismos* is not whatever kind of argument in which a conclusion results as a necessary consequence of the premises (even in that subclass of arguments composed

¹⁷ See Ross 1949, 291; Smith 1989, 110; Striker 2009, 79; Patzig 1968, 45; Mignucci 1969, 190; Kneale & Kneale 1960, 69; Lear 1980, 10-11; Barnes 2012, 366; Crivelli 2012, 125; Malink 2013, 29; Crubellier 2014, 14; Steinkrüger 2015, 1420.

¹⁸ On this I follow Alexander 17.6-8. I am grateful to Adam Crager for discussion on this point.

of predications); *sullogismos* is the kind of argument in which a conclusion results as a necessary consequence of *exactly those* premises (and not *any other*) being there as premises.¹⁹ T9 makes no explicit reference to the notion of an appropriate middle term, nor any restriction about the number of premises (besides the plural). However, it is clear that: [a] the unique ingredients of a syllogism are predicative sentences; [b] the “τῶ ταῦτα εἶναι” clause and (as I will argue) the ensuing elucidations mark off Aristotle’s concern with the way to attain the conclusion as a specific difference of the kind of argument in question.

The second point can be elucidated with a very brief contrast with the definition of syllogism presented in the *Topics* (100a25-27). Both definitions seems almost identical. The word ordering in their beginnings is slightly different, but this can be ignored. For, the relevant difference between them is that the *Topics* definition employs a different expression, “διὰ τῶν κειμένων” (100a26-27), instead of “τῶ ταῦτα εἶναι”. Many have taken these two expressions as strictly equivalent,²⁰ but I deny that. There are nuances between them, connected to the fact that each treatise stems from a different project.²¹

The *Topics* is a practical handbook about dialectical argumentation. Now, in a dialectical argumentation, part of the job is to hide your moves from the opponent. You must deduce the contradictory of the opponent’s thesis from *endoxa* premises (whatever “*endoxa*” means).²² But your opponent, who must defend the thesis, will certainly refuse a premise if she can easily see that the contradictory of the thesis will follow from it. This is why part of the strategy for a dialectical syllogism can perfectly well be the addition of auxiliary (or “non-necessary”)

¹⁹ “ταῦτα” has this force in “τῶ ταῦτα εἶναι” in 24b20. See Crivelli 2012, 141 (see also Alexander 23.1-2). Irvine and Woods 2004 understand T9 as involving a condition of counter-monotonicity. For a different approach, see Malink 2015, 286-293. Importantly, remember what I said in note 3. The expression “*exactly those* premises (and not *any other*)” refers to schematic premises such as “*CaB*”, “*AeB*” etc., not to premises with concrete terms (such as “no horse is a plant”).

²⁰ See Alexander (*in Topicorum I*), 13.25-31ff.; Bolton 1994, p. 116; Malink 2015, p. 286.

²¹ So I disagree with the view found in Alexander (*in Topicorum I*), 13.25-31ff.

²² I need not discuss *endoxa* here, but I follow Frede 2012. I am assuming (in line with Smith 1997 and many others) the view that dialectical arguments are, in the first place, those that must deduce the contradictory of the opponent’s thesis from premises that the opponent concedes because they are *endoxa*.

premises (see 155b20-28): premises for induction, for elucidation, but also for bulk and concealment. For, if the dialectical syllogism is a deduction of the contradictory of the opponent's thesis from premises conceded by the opponent, those kinds of auxiliary premises will make the opponent's resistance more troublesome.²³

But the scenario is different in the *Prior Analytics*. Aristotle is not concerned with the kind of argument that must deduce the contradictory of the opponent's thesis from *endoxa*. Aristotle is concerned with providing a universal account of the formal requirements that *any* syllogistic argument should meet. That is why *APr.* I.1-7 focuses on categorical forms and moods with schematic letters and no content. There is no room to examine all the intricacies of these issues here.²⁴ I need only pin down the following. The notion of syllogism at play in the *Prior Analytics* shares the following feature with the notion at play in the *Topics*:

[F] the premises are suited to trigger the logical following of the conclusion.

But Aristotle's discussion in the *Topics* suggests that the feature should be cashed out in the following way for dialectical argumentation:

[F.1] premises that really trigger the logical following of the conclusion must be assumed (but it is open for other kinds of premises to be assumed too: concealing premises etc.).

By contrast, T9 suggests that the same feature is cashed out in the *APr.* with an important nuance:

[F.2] *only* the premises that really trigger the logical following of the conclusion must be assumed.²⁵

My contention is that the expression “διὰ τῶν κειμένων” in 100a26-27 expresses [F.1], whereas “τῷ ταῦτα εἶναι” in T9 expresses [F.2]. This is how the “τῷ ταῦτα εἶναι” clause is not

²³ See *Topics* VIII.1, especially 156b27-30, 155b38-156a1, 156b5.

²⁴ For discussion, see Smith 1994, Malink 2015.

²⁵ The difference between [F.1] and [F.2] is merely a *nuance* that does not create any *gulf* separating two “notions” of syllogism. Syllogisms, for Aristotle, are arguments composed of predications, in which premises trigger the necessary following of the conclusion—but, in some contexts, only “necessary” premises are welcome, whereas, in others, “non-necessary” premises are welcome too. Furthermore, the *Topics* is aware of the restriction to “necessary premises” (see note 27, on 161b28-30), but that restriction is not on the center stage in dialectical argumentation.

equivalent to the expression “διὰ τῶν κειμένων” found in the *Topics*.²⁶ According to T9, *sullogismos* is the kind of argument (composed of predications) in which a conclusion results as a necessary consequence of *exactly those* premises, and not *any other*, being there as premises. Actually, one might say that the nuanced contrast with the expression found in the *Topics* was asking for clarification in T9—and Aristotle actually gives the clarification in two rounds (steps [ii] and [iii] of T9).²⁷

Therefore, the “τῶ ταῦτα εἶναι” clause stresses that *exactly those* premises (and not *any other*) must be assumed as premises for the deduction to be a *sullogism*. When Aristotle clarifies the “τῶ ταῦτα εἶναι” clause in step [iii] of T9, he employs the expression “γενέσθαι τὸ ἀναγκαῖον” to encode the idea that the premise-pair in the syllogism *turns out to be the required one* (similarly to “γίνεται τὸ ἀναγκαῖον” in 27a25, T5). The expression “γενέσθαι τὸ ἀναγκαῖον” in 24b22 is not expressing the abstract notion of necessary consequence (which, indeed, has already been encoded by “ἐξ ἀνάγκης συμβαίνει” in step [i] of T9), nor is it referring to the conclusion as a necessary result from the premises. Attention: I am *not* denying that the same expression is employed in other contexts to express the necessary consequence of the conclusion (e.g., 26a6-7). But that does not happen in T9.²⁸ Instead, in T9, when Aristotle elucidates what he meant with the “τῶ ταῦτα εἶναι” clause, the expression “γενέσθαι τὸ ἀναγκαῖον” focuses on the

²⁶ One might be tempted to object that step [ii] of T9 goes strongly against my reading, for it clarifies “τῶ ταῦτα εἶναι” by means of an expression (“διὰ ταῦτα συμβαίνει”) that is very similar to the expression found in the *Topics*. However, I deny that there is equivalence between “διὰ ταῦτα συμβαίνει” and “διὰ τῶν κειμένων”. I deny that not only on the basis of the “genitive/ accusative” difference, but also, and more importantly, because expressions like those are highly context-responsive and should be cashed out differently in different contexts (and even expressions that are literally the same are used differently in different contexts). In many contexts (including T9), pronouns such as “τοῦτο”, “τόδε” etc. are employed by Aristotle as a way to enhance a very particular reference to *exactly this thing* (not any other that might be similar etc.)

²⁷ Aristotle uses the “τῶ ταῦτα εἶναι” clause to express the same restriction in *Topics* VIII.11, 161b28-30, where “ἀναγκαῖον” is used exactly as in 24b22 (and 42a39, 47a19). Aristotle’s idea is simple. In some argumentation contexts, there is a syllogism, but with more premises than the required ones. The excess of premises does not affect the validity or its being a syllogism (as this notion is at play in the *Topics*), but it is not *in virtue of exactly those premises (not others) being posited* that the conclusion follows. However, this requirement—of positing exactly no more premises than the necessary ones—, which becomes crucial in the *Prior Analytics*, is not so in the theory of dialectical argumentation. In *Topics* VIII.11, this requirement is only one among several others on the basis of which bad arguments can be criticised. For a different view, see Malink 2015, p. 286ff.

²⁸ Aristotle’s language is very flexible even in the *APr*: For the diversity of uses of “ἀναγκαῖον”, see note 13.

“antecedent” of the syllogism (which turns out to be the premise-pair) and ascribes an important feature to it: the “antecedent” is such that it does not lack anything at all in order to *turn out to be the required one*.²⁹ Of course, if the premise set turns out to be the required one, the conclusion follows with logical necessity. No one would deny that. However, section [iii] of T9 is not *saying* that the conclusion follows from necessity—actually, that was *already said* by the “ἐξ ἀνάγκης συμβαίνει” in section [i] of T9 (and that expression is not the one asking for elucidation in T9). Instead, section [iii] of T9 is *saying* that the premise set meets the requirements (“it lacks no term in order to become what is required”), and a consequence of the premises’ meeting the requirements is that the conclusion follows necessarily.

Thus, the gist of T9 concerning the expression “γενέσθαι τὸ ἀναγκαῖον” is the same as the gist of T5. What the key expression is *saying* in T9 according to my interpretation (“the premise set lacks no term in order to become what is required”) is such that entails what the traditional approach wants to preserve (“the conclusion follows necessarily”). Moreover, what the key expression is *saying* in T9 according to my interpretation conveys important information which the traditional approach is missing.³⁰

Surely, T9 is sketchy, the expression “τῶ ταῦτα εἶναι” sounds unclear (for Aristotle himself felt the need to elucidate it in two rounds), no full analysis of the definiendum has been given. But the message of T9 is clear enough: the syllogism is a specific kind of valid argument in which the conclusion follows from the fact that *the right premises (and only them) have been selected*. As I said, the pronoun “ταῦτα” in “τῶ ταῦτα εἶναι” must be taken with the force of

²⁹ More on this use of “γενέσθαι” in notes 33 and 39. I hope it is clear that I am using “antecedent” here (with inverted commas) in an extended, loose sense (for predicative premises are related to the syllogism as the antecedent is related to the conditional, that’s all). I am not suggesting nor assuming that syllogisms can be reduced to conditionals. For discussion, see Ebrey 2015.

³⁰ We should not discard the possibility that Aristotle has consciously chosen a *smart* formulation (an *asteion*—see *Rhetorics* 1412b4): “γενέσθαι τὸ ἀναγκαῖον” means at once *that the premise-set turns out to be the required one*, and *that the conclusion follows as a necessary consequence*. This will be a clever way of elucidating the “τῶ ταῦτα εἶναι” inasmuch as it shows that, in the kind of argument being defined, the necessary consequence is tied to specific requirements on the “antecedent”, which must be the required premise-pair. Aristotle is really good in formulating this kind of *asteia*.

“*exactly these ones, not those others*”. And Aristotle elucidates this force of the expression “τῷ ταῦτα εἶναι” in step [iii] by stressing that the premises posited in a syllogism *turn out to be the required ones*. Moreover, the fact that the syllogism is an argument made out of predicative sentences, as is clear from the context, ensures that the right premises turn out to be predications. Thus, there is no big jump in reading T9 already in the light of the method of finding out premise-pairs with appropriate middle terms.

VIII.

In this picture, Aristotle’s definition of syllogism results better connected with the ensuing definitions of perfect and imperfect syllogisms—in such a way that we can also make perfect sense of his employment of “*dunatos*” as equivalent to “*ateles*”. This is what we read (in this case, I start with the Greek, for reasons that will be clear as the reader proceeds):

T10: 24b22-26.

[24b22] [i] τέλειον μὲν οὖν

[23] καλῶ συλλογισμὸν τὸν μηδενὸς ἄλλου προσδεόμενον παρὰ τὰ

[24] εἰλημμένα πρὸς τὸ φανῆναι τὸ ἀναγκαῖον, [ii] ἀτελεῖ δὲ τὸν προσ-

[25] δεόμενον ἢ ἐνὸς ἢ πλειόνων, [iii] ἃ ἔστι μὲν ἀναγκαῖα διὰ τῶν

[26] ὑποκειμένων ὄρων, οὐ μὴν εἴληπται διὰ προτάσεων.

This is what we find in Striker’s translation:

“[i] I call a syllogism perfect if it requires nothing beyond the things posited **for the necessity to be evident**; [ii] I call a syllogism imperfect if it requires one or more things [iii] that are indeed **necessary because of the terms laid down**, but that have not been taken among the premises”.

This is my translation *cum* paraphrase:

“[i] I call a syllogism perfect if it requires nothing beyond the things posited for **displaying what is necessary**; [ii] I call a syllogism imperfect if **it requires [or lacks] one or more things, [iii] things which are indeed necessary for the terms of the problem**, but that have not been taken among the premises”.

The controversial expressions have been highlighted in bold. First, I take “τὸ ἀναγκαῖον” in 24b24 (and the plural in 24b25) as having the same force as in T5, T8 and T9: it stands for *what is required to attain the target conclusion*. (There is no explicit restriction to *each figure on its turn*, but I argue that such a restriction is presupposed in the context). Secondly, “φανῆναι τὸ ἀναγκαῖον” has the force of *displaying what is required to attain the target conclusion*. The idea is simple: a perfect syllogism is perfect exactly because it has, and *displays*, the premise-pair that is strictly required for the target conclusion.³¹ Look at Table 1 again (if necessary): there is only one option to attain the target conclusion for each categorical form in the first figure, and the perfect syllogisms are those individuated by the premise-pair that is strictly “the required one” for its target conclusion.³² Accordingly, the expression “γενέσθαι τὸ ἀναγκαῖον”, as employed in the elucidation of the “τῷ ταῦτα εἶναι” clause, can be smoothly cashed out in the following way for a perfect syllogism: its premise-pair turns out to be exactly the required one.³³

On the side of imperfect syllogisms, I take “ἀναγκαῖα” in 24b25 as standing for *what is required to attain the target conclusion* (as in T5, T8 and T9). Furthermore, I do not interpret “ὑποκείμενοι ὅροι” (in 24b26) as standing for the premises *taken* in a given mood. The same (or a highly similar) expression is employed by Aristotle in other passages to stand for the terms of

³¹ I will discuss some objections in the next sections.

³² For the trouble with subordinated moods, see note 7.

³³ This use of “γενέσθαι” has the force of *turn out to be what something exactly is*. Similar example: scholars are praising a good student, then they turn to you and ask “who are you?”; you reply: “I turn out to be her supervisor”. Examples of this use of “γίγνεσθαι” in Aristotle: *Caelo* 298b4; *APr.* 25b36; *Topics* 101b25; *Nicomachean Ethics* 1098b20.

the target conclusion.³⁴ Actually, the verb “ὑποκεῖσθαι” is employed by Aristotle to express not only the *laying down of premises* but also the *setting something as target* (in this case, the conclusion).³⁵ It is the philosophical interpretation of the context (if anything) that will settle which of these options is the case.

Standard interpretations take step [iii] of T10 as referring to necessary *consequences* of the premises of an imperfect mood, which have not been taken as original premises but *will be taken* as additional premises in the process of perfecting the imperfect syllogism³⁶—e.g., if *Cesare* is in question, step [iii] is understood as referring to the proposition that results from converting its major premise, which delivers the reduction of *Cesare* to *Celarent*. Now, I need not reject any detail of the *perfecting* operations that Aristotle describes in I.5-6 (more about this in the next sections). I am only denying that T10 is talking about them. I argue that step [iii] of T10 refers to the premise-pairs which were *not* taken in a given imperfect mood, but are included in the *set of premise-pairs* that counts as *the necessary for the target conclusion*.³⁷

Look at the Tables for clarification. Let us focus on *Cesare*, which is an imperfect mood individuated by the premise-pair [*AeB*, *CaB*]: “ἀναγκαῖα” in step [iii] in T10 will refer to the *other premise-pair* available in the Table, namely, [*AaB*, *CeB*], which individuates a different

³⁴ See 42a27 (also, although controversial: 45b5, 45b17, 64b12).

³⁵ See 42a27. In many cases, even if the verb stands for *stating a premise*, the premise is taken as *something to be further elucidated, proved or explained* (in the course of an ensuing argument); see (e.g.) *Physics* 260b24; *Caelo* 286a21, 30; *Parva Naturalia* 447a17, 458b33; *Nicomachean Ethics* 1104b27, 1129a11. We also find “ὑποκείμενον” standing for *what is to be explained* (e.g., *Physics* 211a6, *Caelo* 306a11).

³⁶ See Alexander 24.2-5, 76.5-11; Philoponus 100.13; Smith 1989, 117; Barnes 2007, 381; Striker 2009, 103. An additional problem for the standard reading of T10 is that step [iii] cannot accommodate all the procedures employed in proving the validity of imperfect syllogisms: there is no way of saying that (e.g.) the contradictory of the conclusion (assumed for reduction *ad impossibile*) is a necessary *consequence* of the original premises. This difficulty also spoils the presumed parallel between T10 and T12, which I will discuss in section X.

³⁷ I take “*dia* + genitive” in 24b25 as equivalent to “*dia* + accusative” (see Bonitz 1961, 177a38-45). There is nothing mysterious in saying that the terms of the conclusion are the source for the necessity of the premise-pairs; it is natural to say “these premises are *necessary* because this conclusion—not a different one—is the target conclusion”.

mood and, therefore, *has not been taken* in *Cesare*.³⁸ Accordingly, step [ii] in T10 is just saying that (e.g.) *Cesare* lacks one of the premise-pairs included in the set that exhausts what counts as *necessary* for the target conclusion. An imperfect mood does not display *all that is necessary for the target conclusion*, because there is *more than one* premise-pair available for delivering the target conclusion, but a mood is individuated by the *single* premise-pair it takes. Thus, the expression “γενέσθαι τὸ ἀναγκαῖον”, as employed in the elucidation of the “τῶ ταῦτα εἶναι” clause, can be cashed out somewhat differently for an imperfect syllogism: its premise-pair does not turn out to be *exactly the required one*, but it plays the role of *what is necessary*.³⁹ This is how the definition of syllogism together with the ensuing clarifications applies smoothly to imperfect syllogisms.

IX.

Is my proposal strictly incompatible with properties traditionally ascribed to perfect and imperfect syllogisms? I will show that my proposal should not be taken as incompatible with most (if not all) of those properties.

There are many interpretations about perfect and imperfect syllogisms, and about what is exactly involved in the process that Aristotle sometimes describes as “perfecting” an imperfect syllogism. Notwithstanding, there are common traits found in any interpretation, for instance, that perfect syllogisms are superior to imperfect ones, and that their superiority cannot be cashed out in terms of mere validity (for both kinds of syllogisms are valid). Aristotle’s definition of perfect syllogism (as standardly viewed) suggests that their superiority is linked to their being

³⁸ The plural (“ἀναγκαῖα”) can be taken as distributive: for *each* imperfect syllogism, there is (at least) one necessary item that it lacks. But the plural can also be taken as gesturing towards the fact elucidated in the Tables, namely, that, for imperfect syllogisms, there are actually *several* options for premise-pairs delivering the target conclusion: *two options* (in the second figure) and *three options* (in the third figure).

³⁹ The verb “γενέσθαι”, in this case, has the force of *turning out to be F by playing the role of F*. Imagine students sharing a house and ascribing tasks to each one according to the days of the week. You cook on Fridays. Then you can say about yourself: “On Fridays, I turn out to be the cook”. For similar examples of “γίγνεσθαι” in Aristotle: *Interpretation* 21b26, 29; *Topics* 102b25; *Physics* 262a25; *Caelo* 310b10; *Motu* 702b5; *Gen. Anim.* 727b25.

more evident. However, any student of syllogistic can complain—with good reason—that Aristotle does not seem justified in saying that (e.g.) *Celarent* is more evident than *Cesare*.⁴⁰ In order to make sense of the claim that (e.g.) *Celarent* (by being a perfect syllogism) is more evident than *Cesare* (as an imperfect syllogism), one needs some further assumption, such as (e.g.) a given regimented formulation according to which the position of the terms in the premises will account for the superiority of perfect syllogisms.⁴¹ But—one might object—relying on a regimented formulation introduces a formalism that hardly seems to be present in Aristotle’s discussion. Alternatively, one might follow Corcoran (1974) in understanding perfection as the absence of deductive gaps between the premises and the conclusion, given the inference rules of the system. In that case, “*teleios*” should be translated as “complete”, and “*ateles*” as “incomplete”, and the process of perfecting an imperfect syllogism should be taken as the process of filling in the deductive gaps and thereby completing the incomplete syllogism.⁴² A third option (in general lines) approaches the clause “*phanenai to anankaion*” in 24b24 in a different way: not in terms of bringing the consequence to light, but in terms of *making clear* inasmuch as something *explained* becomes *clearer*. The idea is that perfect syllogisms are such that their validity can be explained (and so becomes clearer) from their premises alone (with no extra assumptions), whereas the validity of imperfect syllogisms is explained not from their premises alone, but with extra assumptions.⁴³ It has also been suggested that perfect syllogisms have these properties because they stem directly from *basic principles* in the system (such as the *dictum de omni*), whereas imperfect syllogisms are more remotely connected with the basic principles.⁴⁴

⁴⁰ See Morison 2015, 110-1.

⁴¹ See Patzig 1968, 51-9; Crivelli 2012, 130; Ebert 2015. Perhaps an ancestor on this direction is the notion of “*τάξις*” in Ammonius 32.36-37.

⁴² See Corcoran 1974; Smith 1989; Smiley 1973, 137-8; Lear 1980, 10.

⁴³ See Morison 2015, 125, 162; Crivelli 2012, 129-30.

⁴⁴ See Barnes 2007, 384-447; Crivelli 2012, 130-1.

There is no room to offer a full discussion of these interpretive options. Actually, a simplified picture is enough for my purposes here. Thus, putting aside interpretive discrepancies (alluded to inside the parenthesis below), I will concentrate on a *minimal* contrast between the logical characteristics of the two groups of syllogisms:

—*Perfect syllogisms*: the explanation of why they are valid never requires anything besides their premises (for either they are principles themselves or they hang directly on the basic principles in the system, or the position of their terms in a regimented formulation make the consequence evident); even if they can be transformed into imperfect syllogisms (cf. I.45), such a procedure is never understood as a reduction to something prior.

—*Imperfect syllogisms*: the explanation of why they are valid requires further items besides their premises (for they are more remotely connected with the basic principles in the system etc.); and that explanation will always lead back to the first figure as something prior.

Now, my contention is that we can perfectly well separate two different issues:

(1) whether perfect and imperfect syllogisms *do* have the logical characteristics depicted in the minimal contrast above;

(2) whether ascribing those characteristics to them strictly depends on how we interpret Aristotle's definition of perfect and imperfect syllogisms in T10.

Now, my answer to (1) is positive: I accept the minimal contrast between perfect and imperfect syllogisms as formulated above. But my answer to (2) is negative. The minimal contrast between perfect and imperfect syllogisms can be grasped independently of their definitions in T10.⁴⁵ Now, given that T10 is supposed to *define* what perfect and imperfect syllogisms *essentially* are, my previous distinction between two questions must be complemented by a further distinction:

⁴⁵ Suppose (counterfactually) someone reading a truncated text, in which T10 is missing. Is that reader doomed to fail at grasping the minimal contrast between perfect and imperfect syllogisms, as formulated above? I do not think so. The reader will be able to grasp the contrast from Aristotle's discussion in *APr.* I.4-7. Perhaps she will have more difficulty in assembling the pieces together, but she will be successful.

(Q1) whether perfect and imperfect syllogisms *do* have those logical characteristics (as depicted in the minimal contrast above);

(Q2) whether being a perfect (or an imperfect) syllogism essentially amounts to having those logical characteristics (and nothing else), so that being a perfect (or an imperfect) syllogism should be defined as having them.

Again, my answer to (Q1) is affirmative: perfect and imperfect syllogisms do have the characteristics contained in the minimal contrast. But my answer to (Q2) is negative: the essential being of perfect and imperfect syllogisms (as defined in T10) does not amount to having those characteristics.⁴⁶

Now, some passages can be taken as refuting exactly my answer to (Q2): they have been taken as evidence in favour of a traditional reading of the definitions in T10. I will deal with those passages in the next section. For the time being, I explain how my interpretation of the definitions in T10 is compatible with the features standardly ascribed to perfect and imperfect syllogisms.

This is how I understand the compatibility (let me employ the label “my Contrast” for easier reference):

My Contrast:

—*Perfect syllogisms:*

[i] *according to the definition in T10*, perfect syllogisms are those syllogisms in which the target *x*-conclusion can be delivered by only one premise-pair within the figure it belongs to, such that the premise-pair in question turns out to be (besides being sufficient to deliver the *x*-conclusion) *necessary* to deliver the *x*-conclusion in that figure;

[ii] *according to many things said in APr. I.4-7*, the explanation of why perfect syllogisms are valid never requires anything besides their premises (for they hang directly on the basic principles).

⁴⁶ Thus, I disagree with those who take being perfect as essentially equivalent to being evident (Patzig 1968, Ebert 2015, Patterson 1995, 208-214).

—*Imperfect syllogisms:*

[i'] according to the definition in T10, imperfect syllogisms are those syllogisms in which the target *x*-conclusion can be delivered by *more than one* premise-pair within the figure it belongs to, so that any given premise-pair that individuates a valid mood (although being sufficient to deliver the *x*-conclusion) never turns out to be strictly *necessary* to deliver the *x*-conclusion in that figure: it is only one of the *possible* options to deliver the *x*-conclusion in that figure.

[ii'] according to many things said in *APr. I.4-7*, the explanation of why imperfect syllogisms are valid always requires further items besides their premises (for they are more remotely connected with the basic principles), and that explanation will always be in terms of premises that lead back to the first figure.

There is more to be said about the relation between the definitions ([i], [i']) and the logical properties of the syllogisms ([ii], [ii']). The next section will expand this point by discussing some crucial passages.

X.

One might object: T8 proves that my reading of the definitions in T10 (and, consequently, in T9 too) is wrong, for T8 says that being an imperfect syllogism *amounts to* having those characteristics captured in [ii'] above. Moreover, there are other passages that seem to tell in favor of the traditional view and, thereby, confirm this objection against my reading. As I have already discussed T8, I start with the other passages.

T11: 29a14-16:

It is also evident that all syllogisms in this figure are imperfect, **for all of them are perfected by adding some things**" (Striker's translation, my bold).

[29a14]

φανερὸν δὲ καὶ ὅτι πάν-

- [15] τες ἀτελεῖς εἰσὶν οἱ ἐν τούτῳ τῷ σχήματι συλλογισμοὶ (πάν–
 [16] τες γὰρ τελειοῦνται προσλαμβανομένων τινῶν).

The sentence in bold is given as an explanation for the claim that all valid moods in the third figure are imperfect: they all are perfected “by adding some things”, and those additional things seem to be the steps by which their validity gets explained. Thus, one might claim that T11 is actually *cashing out* what it is to be an imperfect syllogism in terms of being perfected by the addition of the further steps that explain their validity. And this would count against my proposal of keeping the definition ([i’]) and the minimal logical characteristics ([ii’]) as distinct from each other.

A similar passage from *APr*: I.5 seems to give a much stronger objection against my proposal:

T12: 28a4-7.

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

- [28a4] δῆλον δὲ καὶ ὅτι πάντες ἀτελεῖς εἰσὶν οἱ ἐν τούτῳ τῷ σχήματι
 [5] συλλογισμοὶ (πάντες γὰρ ἐπιτελοῦνται προσλαμβανομένων
 [6] τινῶν, ἃ ἢ ἐνυπάρχει τοῖς ὅροις ἐξ ἀνάγκης ἢ τίθενται ὡς
 [7] ὑποθέσεις, οἷον ὅταν διὰ τοῦ ἀδυνάτου δεικνύωμεν).

The sentence “πάντες γὰρ ἐπιτελοῦνται προσλαμβανομένων τινῶν” in 28a5-6 is literally repeated in 29a15-6 (T11), but here Aristotle gives us more details: the additional items are “things that are necessarily inherent in the terms etc”. This last sentence has been taken as

referring back to (and rephrasing) Aristotle’s definition of imperfect syllogism in 24b25-6 (understood in the standard way): the terms in question are the terms posited in the premises (not the terms of the target conclusion), and the additional things are either *necessary consequences* of those premises (“inherent” in them) or hypothetical assumptions.

I *agree* that the expression “ἂ ἐνυπάρχει τοῖς ὅροις ἐξ ἀνάγκης” cannot be taken in the way I take the definition of imperfect syllogism (T10). This expression in T12 surely refers to additional steps that must be taken in proving the validity of imperfect moods—such as (e.g.) the conversion of the major premise of *Cesare* reducing it to *Celarent*. However, I deny that our understanding of T12 in this way should affect my proposal for the definition of imperfect syllogism (T10).

I explain my point with more detail. Both T11 and T12 present the perfecting procedure (understood as a proof of validity that leads back to the first figure) as a justification for calling the moods in question imperfect. So far, so good. What I reject is the belief that both Texts are *cashing out* what it is to be an imperfect syllogism in terms of being liable to the perfecting procedure—as if item [i’] in my Contrast were irrelevant (or even “inexistent”).

Now, remember that both T11 and T12 are the immediate sequence of passages (respectively, T7 and T6) in which Aristotle has adopted the general *bottom up* perspective on which item [i’] depends: “if there is a syllogism, it is necessary for the terms to be so related” (28a3; 29a13-14). But, in the second and the third figure, the necessary (for the conclusion to follow) is never exhausted by one single premise-pair: each of the valid moods is one of the *possible* options for delivering the target conclusion. And this is [i’] in my Contrast.

Thus, what Aristotle says in T11 and T12 about the perfecting procedure (which brings together the logical characteristics of the imperfect moods, [ii’]) should not be taken as a supposed rephrasing of (or allusion to) the definition of imperfect syllogism. Far from being a *cashing out* of what it is to be an imperfect syllogism in terms of the logical characteristics contained in [ii’], Aristotle’s move just points to the correlated characteristics ([ii’]) as a justification for the claim that those moods are imperfect ([i’]).

Parallel cases might help. Suppose the following remark in geometry: “[i] the figure inscribed here is a triangle; [ii] for it has 2R”. Step [ii] gives good justification for the claim in step [i] (and even *some* explanation in terms of *causa cognoscendi*), but it is not the case that step [ii] is *cashing out* what it is to be a triangle in terms of having 2R. Actually, having 2R is not the essence of the triangle, but a *per se* attribute of it. Another example is the following jest by a teacher: “[i] all animals inside this room are humans; [ii] for they are all capable of becoming literate”. It is well known that being capable of becoming literate is a *proprium* of humans, not an essential feature of them (cf. *Topics* 102a18-22). Therefore, what is going on in both T11 and T12 is not a *cashing out* of what it is to be an imperfect syllogism.

At this point, a natural objection might be raised against my interpretation of T8—more precisely, against my way of taking the expression “ἐπιτελεῖται τὸ ἀναγκαῖον” in 27a17-18. As my last paragraphs show, I am happy with taking the verb “ἐπιτελοῦνται” in T12 in the traditional way, namely, as referring to the *perfecting* process by which the validity of an imperfect syllogism is explained. But I have claimed that the same verb has a different force in T8: “τὸ ἀναγκαῖον” being its grammatical subject, the verb conveys the idea that what is necessary in the level of premises for the conclusion to follow has not been *exhausted*. One might object that it would be more likely to take the verb behaving in the same way in both occurrences.

One might believe that it is natural to expect perfect uniformity in Aristotle’s use of language. But, unfortunately or not, such uniformity is not there to match our expectations. Aristotle’s language is very flexible and context sensitive.⁴⁷ Concerning the verb in question, I point to a third occurrence in which it cannot be translated either as in T12 or as I have proposed for T8.

T13: 26b28-30.

⁴⁷ See note 13. If I had more room here, I could provide an appendix with hundreds of cases showing both flexibility and context sensitiveness.

“It is also clear that all syllogisms in this figure are perfect, for they all **reach their conclusion** through the initial assumptions” (Striker’s translation).

[26b28]

δη-

[29] λον δὲ καὶ ὅτι πάντες οἱ ἐν αὐτῷ συλλογισμοὶ τέλειοί εἰσι·

[30] (πάντες γὰρ ἐπιτελοῦνται διὰ τῶν ἐξ ἀρχῆς ληφθέντων)

Aristotle is talking about the perfect syllogisms in the first figure. For these syllogisms, there is no *perfecting* procedure. It is not possible to *bring* these syllogisms to *perfection*, for they are already perfect. Striker’s translation is responsive to these particularities in the occurrences of the verb. In 26b30, the verb (applied to first figure syllogisms) has been translated as “reach their conclusion”, whereas in 28a5, the same verb (applied to second figure syllogisms) has been translated as “being brought to perfection”. But, if the verb has a different force, or a different hue, when applied to different kinds of syllogisms in different contexts, why should we stick with the expectation that it cannot have a third force, or hue, in T8?

Moreover, I emphasize that there is no equivocation or dodgy shift in the employment of the verb. These three occurrences of the verb (26b30, 27a17, 28a5) do preserve the same core meaning: *turn out to be perfect/complete*. A more specific cashing out of the core meaning comes from the application of the verb to different items in different contexts—but such a *cashing out* is far from being equivocation or irresponsible shift. It is, actually, how natural languages work.

Thus, applied to first figure syllogisms (26b30), the verb can be directly cashed out as *turning out to be perfect*, or, if one prefers, *turning out to be completely successful* in delivering its end-product.⁴⁸ Now, according to the definitions of syllogism and perfect syllogism, the end-product to be delivered is not only a valid conclusion but a valid conclusion attained by the right premise-pair. This is exactly what the perfect syllogisms of the first figure deliver, on Aristotle’s eyes at least. On the other hand, imperfect syllogisms do not deliver exactly the same end-

⁴⁸ Remember the use of “turn out” in “I turn out to be her advisor” (turning out to be what something is), note 33.

product: they deliver a valid conclusion, but they deliver it by one of the possible options to attain it. Therefore, the verb “ἐπιτελοῦνται” applied to second figure syllogisms (28a5) can be cashed out as *becoming perfect* or *being brought to perfection*, for their *turning out to be perfect* does not correspond to what they immediately are in themselves, but to a real process, namely, their reduction to a first figure syllogism.

When the same verb is applied to “τὸ ἀναγκαῖον” in the negative sentence in 27a17 (T8), the same core idea is still preserved. As I argued (section VI), “τὸ ἀναγκαῖον” introduces the notion of what is necessary (in the premises) for the conclusion to follow. Since there is more than one premise-pair delivering the *e*-conclusion in the second figure, and each mood can only take one single premise-pair (for a mood is individuated by the premise-pair it takes), it follows that neither of those two moods, taken singly, will ever *exhaust* τὸ ἀναγκαῖον. Aristotle expresses this thought by saying that τὸ ἀναγκαῖον does not *turn out to be complete* in *Cesare* (or in *Camestres*): τὸ ἀναγκαῖον is not exhausted by just one single premise-pair.

Thus, my proposal about T8 is consistent with taking the verb “ἐπιτελοῦνται” in T12 in the standard way, namely, as referring to the *perfecting* process by which the validity of an imperfect syllogism is explained.

XI.

Therefore, this is the answer I provide to the question raised in this paper: Aristotle employs the adjective “*dunatos*” (in 27a1, 28a16 and 41b33) to point out that an imperfect syllogism is one of the possible options to attain a conclusion of a given form within a given figure. This peculiar employment of the adjective is restricted to each figure on its turn and

shows Aristotle's concern with stressing what is necessary in the level of premise-pairs for a conclusion of a given form to follow.⁴⁹

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