

Why Are There No Conditionals in Aristotle's Logic?

DAVID EBREY*

ABSTRACT Aristotle presents a formal logic in the *Prior Analytics* in which the premises and conclusions are never conditionals. In this paper I argue that he did not simply overlook conditionals, nor does their absence reflect a metaphysical prejudice on his part. Instead, he thinks that arguments with conditionals cannot be syllogisms because of the way he understands the explanatory requirement in the definition of a syllogism: the requirement that the conclusion follow because of the premises. The key passage is *Prior Analytics* I.32, 47a22–40, where Aristotle considers an argument with conditionals that we would consider valid, but which he denies is a syllogism. I argue that Aristotle thinks that to meet the explanatory requirement a syllogism must draw its conclusion through the way its terms are predicated of one another. Because arguments with conditionals do not, in general, draw their conclusions through predications, he did not include them in his logic.

KEYWORDS *Prior Analytics*, Aristotle, conditionals, wholly hypothetical, syllogism from a hypothesis

IN THE *PRIOR ANALYTICS* ARISTOTLE PROVIDES a term logic in which the premises are never conditionals; the conclusions are drawn entirely through predications between terms. The Stoics, by contrast, had a propositional logic with premises that can be conditionals. Aristotle's pupil and successor, Theophrastus, introduced something he called a "hypothetical syllogism," which captured some arguments expressed with conditionals, although he said that it was called a syllogism by analogy.¹ Alexander argued that Aristotle's logic without conditionals was superior to Stoic logic, and scholars have made proposals about why the Stoics may have thought theirs superior.² Galen happily embraces a term logic alongside a logic with conditional-like connections between propositions.³ Important work has

¹Alex. *APr.* 326,8–9. See Barnes, "Theophrastus," and *Truth, Etc.*; and Bobzien, "Wholly Hypothetical Syllogisms," and "Modus Ponens." I discuss the differences between hypotheses and conditionals in section 2.

²The main source is Alexander's commentary on the *Prior Analytics*, especially his commentary on I.1 and I.32. The classic debate on this is Mueller, "Stoic and Peripatetic Logic," and Frede, "Stoic vs. Aristotelian Syllogistic."

³Barnes (*Truth, Etc.*, chapter 4) treats this part of Galen's logic as quite close to Stoic propositional logic. Bobzien ("Hypothetical Syllogistic in Galen") and Morison ("Logic") each, in different ways, argue against such a view.

* David Ebrey is Assistant Professor of Philosophy at Northwestern University.

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been done on conditionals in Peripatetics and in Stoic logic, but there has not been a thorough treatment of why Aristotle, himself, did not include conditionals in his logic.⁴

Some have suggested that Aristotle allowed his account of science or metaphysics to constrain his logic. The first sentence of the *Analytics* tells us that the ultimate goal of the work is to understand scientific demonstration, and these demonstrations will be constrained by the nature of reality. If the basic scientific facts have one of Aristotle's basic predicative forms, in particular 'All As are Bs,' then our logic must be able to properly reflect our knowledge of these facts. In a classic article Ian Mueller puts the idea, as embraced by later Peripatetics, this way: "[A]ll scientific proofs are categorical syllogisms and . . . the inference schemata of the Stoics represented techniques of argument having no place in science."⁵ Gisela Striker, in her recent commentary, puts Aristotle's lack of conditionals this way: "His optimism with regard to syllogistic is likely to be mainly due to his metaphysical prejudice, according to which all states of affairs consisted in the presence or absence of attributes in the substances that are the foundation of everything else."⁶ As both Mueller and Striker no doubt realize, these are not good reasons for Aristotle not to include conditionals in his logic. He says that logic applies not just to scientific demonstration, but also to dialectic (e.g. 24a22–b15, 65a35–37), a context in which one's arguments need not perfectly mirror the structure of reality. It would be an artificial constraint on dialectic to say that it cannot use conditionals because scientific facts do not have the structure of a conditional. While Aristotle tells us that our ultimate interest in logic is for scientific demonstrations, he is clear that its applications are wider.

The lack of conditionals might then seem to be simply an oversight on Aristotle's part. He was, after all, the first person to formulate a formal logic. And he does not have a concept quite like our concept of a conditional, as we will see below. We could perhaps excuse him, then, if he simply did not consider the possibility that such sentences could play a role in logic. He made stunning progress nonetheless.

The problem with this view is that Aristotle discusses an argument with conditionals, says (correctly) that its conclusion follows of necessity, but denies that it is a syllogism (i.e. the sort of argument he is formalizing in the *Prior Analytics*). The key text is *Prior Analytics* I.32, in particular 47a22–40, where Aristotle considers two arguments that he says have conclusions that necessarily follow and yet are not syllogisms. The second of these arguments includes conditionals, does not seem to be missing any premises, and to us looks valid. Thus, while Aristotle did not have a clear example of a logical system with conditionals to reject explicitly, he does deny that this argument with conditionals is a syllogism, even while accepting that

⁴See especially Bobzien, "Wholly Hypothetical Syllogisms," and "Modus Ponens," for the developments in Peripatetic logic. The question of why Aristotle does not allow premises to be conditionals is separate from the question of whether Aristotle's syllogisms themselves should be thought of as conditionals. Łukasiewicz (*Aristotle's Syllogistic*) and Patzig (*Die Aristotelische Syllogistik*) claimed that Aristotle's syllogisms were conditionals, but this interpretation has been rejected since Smiley, "What is a Syllogism?" and Corcoran, "Aristotle's Natural Deduction System."

⁵Mueller, "Stoic and Peripatetic Logic," 184.

⁶Striker, *Prior Analytics I*, 213.

its conclusion follows of necessity. The question, then, is why he thinks that this argument is not a syllogism.

In this paper I argue that Aristotle does not allow a premise in a syllogism to be a conditional, or anything similar to a conditional, because he thinks such premises cannot be part of a proper explanation of why the conclusion follows. The key is Aristotle's tricky requirement that the premises of a syllogism be that *by which* (causal dative), or (equivalently) *because of which* (διά + acc.), the conclusion follows. You might think that this is only a formal requirement: the conclusion must follow because of the form of the argument and as long as the form is truth-preserving, the argument is a syllogism. I argue that Aristotle requires something that, in most ways, is stricter than such formal validity.⁷ In particular, he thinks that for the conclusion to follow because of its premises, it must follow from the way the premises' terms are predicated of one another; an argument whose conclusion necessarily follows, but not on the basis of predications, does not meet this requirement. Because arguments with conditionals generally do not draw their conclusions on the basis of predications, they cannot be used in syllogisms. Aristotle's explanatory requirement (i.e. the requirement that the conclusion follow *because of* the premises) is, in a way, a metaphysical requirement and, in a way, a formal one. It is metaphysical not because it requires the premises to capture the structure of scientific or metaphysical facts (a syllogism might not capture a fact at all since it might start from false premises); rather, it is metaphysical in that it requires a specific sort of connection, predication. But any argument is a syllogism if it preserves truth through predications, hence the requirement is, in another way, a type of formal requirement.

In the first half of the paper, I examine the key passage in I.32 and argue that Aristotle does not count this argument with conditionals as a syllogism because he thinks it does not meet the explanatory requirement in the definition of a syllogism. At the end of this section, I lay out some key features of this requirement, contrasting it with the explanatory requirement that applies to demonstrations. In the second half of the paper, I turn to why Aristotle thinks that arguments with conditionals cannot meet the explanatory requirement, whereas arguments that draw their conclusions on the basis of predications can meet it. In order to answer this question, I consider the arguments that Aristotle calls "syllogisms from a hypothesis." I argue that he does not think these are genuine syllogisms; appreciating why they are not helps us see why syllogisms must reach their conclusions on the basis of predications.

⁷Whether Aristotle ultimately requires a strict sort of formal, syntactic validity turns on some issues that need not be settled for the purpose of this paper. Morison ("Logical Form") argues that Aristotle did not have a notion of a formal language on which to base a syntactic notion of formal validity. While I agree that Aristotle lacks such a formal language, it seems possible to me that he could have a notion of formal, syntactic validity absent such a formal language. Malink ("Deduction in *SE* 6") argues for such an account. The claims made in this paper are compatible with either Morison or Malink's accounts: whether or not he requires strict syntactic validity, I argue that some formally valid arguments are excluded by his explanatory requirement. The notion of formal validity is not without its own difficulties. For a contemporary discussion, see Etchemendy, *The Concept of Logical Consequence*.

I. WHOLLY HYPOTHETICAL ARGUMENTS AND THE
DEFINITION OF A SYLLOGISM

Our key passage is in *Prior Analytics* I.32, at the beginning of the third and final major part of book I. Chapter 31 ends and chapter 32 begins with Aristotle's best summary of the structure of book I. Examining it will orient us and help us understand the goals of the chapter.

From the things said, it is evident what the demonstrations come from and how, and also what sorts of things one has to look for in the case of each problem. [I.32] After these things we must explain how we will reduce syllogisms to the aforementioned figures, for this part of the inquiry still remains. For if we consider how syllogisms come about, have the ability to find them, and then also analyze things that have already been produced into the aforementioned figures, our initial project would reach its end. At the same time it will turn out that what we have said before is confirmed, and it will be clearer that this is how things are, through what we are about to say now. For all that is true must agree with itself in every way. (46b38–47a9)⁸

Ἐκ τίνων μὲν οὖν αἱ ἀποδείξεις γίνονται καὶ πῶς, καὶ εἰς ὅποια βλεπτόν καθ' ἕκαστον πρόβλημα, φανερόν ἐκ τῶν εἰρημένων· πῶς δ' ἀνάξομεν τοὺς συλλογισμοὺς εἰς τὰ προειρημένα σχήματα, λεκτέον ἂν εἴη μετὰ ταῦτα· λοιπὸν γὰρ ἔτι τοῦτο τῆς σκέψεως, εἰ γὰρ τὴν τε γένεσιν τῶν συλλογισμῶν θεωροῖμεν καὶ τοῦ εὑρίσκειν ἔχοιμεν δύναμιν, ἔτι δὲ τοὺς γεγενημένους ἀναλύοιμεν εἰς τὰ προειρημένα σχήματα, τέλος ἂν ἔχοι ἢ ἐξ ἀρχῆς πρόθεσις. συμβήσεται δ' ἅμα καὶ τὰ πρότερον εἰρημένα ἐπιβεβαιουῦσθαι καὶ φανερώτερα εἶναι ὅτι οὕτως ἔχει, διὰ τῶν νῦν λεχθησομένων· δεῖ γὰρ πᾶν τὸ ἀληθὲς αὐτὸ ἑαυτῷ ὁμολογούμενον εἶναι πάντη.

It was not obvious from the beginning that this would be the structure of book I, but in broad outline it is accurate. In chapters 1 through 26, Aristotle tells us “from what premises the proof comes about and how.” Then in 27 he explicitly turns to the project of how to discover syllogisms. In chapters 32 through 45, he engages in the final project he says remains: analyzing ordinary arguments into the figures (which is where Aristotle gets his name for the work, “the Analytics”). At the end of I.45 he tells us that he is done with this project (although some material from book II seems to be relevant to it). I will argue that the rest of chapter 32 does what Aristotle says at the end of this passage that it will do: help confirm the earlier theory, according to which there are only three figures (none of which include conditionals).

The project that Aristotle begins in I.32 is a slippery one. He writes as if we are given ordinary arguments, either as part of dialectic or rhetoric, sometimes with premises left out (47a14–16). Our goal is not simply to evaluate the argument as it is, but rather to make the argument as it should be. A syllogism is the type of argument that we want to have, the goal of our reform. How do we determine which syllogism the original formulation *should* be transformed into? There is not a formulaic procedure within the logical system for these transformations; rather, we are translating an argument into the system. It is not clear that there always will be a single way to do this transformation; one may need to make a judgment call about what best captures the argument. The fact that we are supposed to supply

⁸All translations are my own, drawing from Smith, *Prior Analytics*, Mueller, *Alexander AP: I.32–46*, and Striker, *Prior Analytics I*.

missing premises suggests that we should not simply evaluate the argument as it is presented, but should give it a sympathetic formulation before evaluating it. I will call this process of taking ordinary arguments and turning them into syllogisms “reforming arguments.” The sort of sympathy involved is similar to that exercised when commenting on drafts of students’ papers, when you suggest better ways for them to present their arguments, even if you disagree with their conclusions.

With this background in place, we turn to the key passage for this paper, which comes later in chapter 32. Our focus is on the argument that later Peripatetics called “wholly hypothetical,” so called because the premises and conclusion were each thought to be hypotheticals.⁹ I will use ‘wholly hypothetical argument’ as a name for this argument without presupposing any particular interpretation of it. I offer a close translation of Aristotle’s compressed Greek, since some important interpretive matters depend on how exactly we understand it.

[Key passage] In some arguments it is easy to see what is lacking, but others escape our notice and appear to syllogize because something necessary results from what is supposed. For example, if one had assumed that if a non-substance is destroyed then a substance will not be destroyed, and that if those-things-out-of-which are destroyed, the-thing-out-of-them also perished—when these things have been laid down, it is necessary indeed that the part of a substance should be a substance, but this has not been syllogized through the things taken, but rather premises are left out. [Wholly hypothetical argument:] Again, if it is necessary, if a human is, for an animal to be and, if an animal, a substance, then it is necessary, if a human is, for a substance to be; but it has not yet been syllogized, since the premises are not related as we have said.

We are misled in cases like these by the fact that something necessary results from what is supposed, because a syllogism is also necessary. But ‘necessary’ is more extensive than ‘syllogism’: for every syllogism is necessary, but not everything necessary is a syllogism. Consequently, if something does result when certain things have been posited, one should not try straight off to lead it back <into the figures>. Instead, one must first get the two premises and next divide them this way into terms, and that term which is stated in both the premises must be put as the middle (for the middle must occur in both of them in all of the figures). (47a22–40)

ἐνίων μὲν οὖν ῥάδιον ἰδεῖν τὸ ἐνδεές, ἔνιοι δὲ λανθάνουσι καὶ δοκοῦσι συλλογίζεσθαι διὰ τὸ ἀναγκαῖόν τι συμβαίνειν ἐκ τῶν κειμένων, οἷον εἰ ληφθεῖη μὴ οὐσίας ἀναιρουμένης μὴ ἀναιρεῖσθαι οὐσίαν, ἐξ ὧν δ’ ἐστὶν ἀναιρουμένων, καὶ τὸ ἐκ τούτων φεῖρεσθαι· τούτων γὰρ τεθέντων ἀναγκαῖον μὲν τὸ οὐσίας μέρος εἶναι οὐσίαν, οὐ μὴν συλλελόγισται διὰ τῶν εἰλημμένων, ἀλλ’ ἐλλείπουσι προτάσεις. πάλιν εἰ ἀνθρώπου ὄντος ἀνάγκη ζῶον εἶναι καὶ ζῶου οὐσίαν, ἀνθρώπου ὄντος ἀνάγκη οὐσίαν εἶναι· ἀλλ’ οὕτω συλλελόγισται· οὐ γὰρ ἔχουσιν αἱ προτάσεις ὡς εἶπομεν.

Ἀπατώμεθα δ’ ἐν τοῖς τοιοῦτοις διὰ τὸ ἀναγκαῖόν τι συμβαίνειν ἐκ τῶν κειμένων, ὅτι καὶ ὁ συλλογισμὸς ἀναγκαῖόν ἐστιν. ἐπὶ πλέον δὲ τὸ ἀναγκαῖον ἢ ὁ συλλογισμὸς· ὁ μὲν γὰρ συλλογισμὸς πᾶς ἀναγκαῖον, τὸ δ’ ἀναγκαῖον οὐ πᾶν συλλογισμὸς, ὥστ’ οὐκ εἴ τι συμβαίνει τεθέντων τινῶν, πειρατέον ἀνάγειν εὐθύς, ἀλλὰ πρῶτον ληπτέον τὰς δύο προτάσεις, εἴθ’ οὕτω διαιρετέον εἰς τοὺς ὄρους, μέσον δὲ θετέον τῶν ὄρων τὸν ἐν ἀμφοτέραις ταῖς προτάσεσι λεγόμενον· ἀνάγκη γὰρ τὸ μέσον ἐν ἀμφοτέραις ὑπάρχειν ἐν ἅπασιν τοῖς σχήμασιν.

Our main question is why Aristotle thinks the wholly hypothetical argument is not a syllogism, but rather part of a broader class of which syllogisms are a special subgroup. Because Aristotle does not think it is a syllogism, he has no reason to

⁹Alex. *APr.* 326,22–24.

formalize such arguments in his logical system, since its aim is to provide a general account of syllogisms.

There are two broad possibilities for how to interpret the wholly hypothetical argument. Which interpretation we choose has crucial ramifications for our account of why the argument is not a syllogism. Aristotle may be considering an argument with roughly this structure:

Option 1:

If a human is, an animal is.

If an animal is, a substance is.

If a human is, a substance is.

For our purposes, it does not matter whether the terms are understood as subjects or predicates, so this option includes the possibility that the premises and conclusion be read like this: “If something is a human, something is an animal.”¹⁰ The important feature of option 1 is that the conditional links complete propositions and so the relevant alternative is this one:

Option 2:

If something is a human, it is an animal.

If something is an animal, it is a substance.

If something is a human, it is a substance.

Option 2 explicitly builds into the argument that the same thing is the subject of antecedent and consequent in each of the premises, i.e. the ‘it’ in the consequent is an anaphoric reference back to the ‘something’ of the antecedent. Susanne Bobzien, in her article on wholly hypothetical syllogisms, says that Aristotle must have understood it as option 2 because only then is it equivalent to a syllogism, namely Barbara.¹¹ Bobzien’s focus in that article is on the Peripatetics who came after Aristotle, and it was important to the development of their wholly hypothetical syllogisms that many of them saw this argument as logically equivalent to Barbara.

But there are good reasons to think that option 1 is the right reading of Aristotle. First, it is unlikely that the text literally *means* option 2.¹² If Aristotle had wanted explicitly to say that, he would have needed to use something like a pronoun or demonstrative.¹³ Instead, he used a genitive absolute (‘ἀνθρώπου ὄντος’), a construction used when the subject of the participle is (grammatically) different

¹⁰It could also be formulated ‘If there is a human, there is an animal.’ And it will turn out to make no difference whether you think that the genitive absolute as something like “when” or “since” instead of “if.” The account offered will explain why Aristotle does not have any such sentential connectives in his logic.

¹¹Bobzien, “Wholly Hypothetical Syllogisms,” 92–102. She frequently refers to it as the “quantified conditional” reading. ‘Barbara’ is Peter of Spain’s name for arguments of the form ‘C Belongs to all B’s/ B belongs to all A’s // Therefore, C belongs to all A’s.’

¹²Striker (*Prior Analytics I*) offers a different translation of this argument. Everyone else translates the genitives as conditionals, formed by a genitive absolute. Striker translates these clauses, “If what is a man is necessarily an animal, and what is an animal, a substance” (52). She says that this is how Alexander understands the passage (214–15). That does not seem to me to be the right reading of Alexander (cf. *APr.* 347,15–48,38). But, more importantly, it cannot be a literal reading of the genitive absolute, since a genitive absolute can be neither the subject nor the predicate of the clause it is contained in. Striker may be trying to provide something like the option 2 reading. But, if so, this ends up highlighting the difficulty in offering option 2 as a literal translation of the Greek.

¹³He also could have put ‘ἀνθρώπου ὄντος’ in the accusative instead of the genitive, thereby agreeing with the accusative subjective of the infinitive.

from that of the main verb. Given that Aristotle is in the process of reforming arguments, that is, putting them into the right form, we do not want to prematurely reform the argument for Aristotle by formulating it from the beginning as option 2. If Aristotle thinks of the argument as option 1, then its premises and conclusion are not equivalent to universal affirmative predications; instead, it is our job to transform its premises and conclusion into universal affirmative predications. Just as we sometimes need to supply entire premises to turn an argument into a syllogism, at other times we need to substantively change the premises that we have.

If option 2 helped us understand what Aristotle says about the argument, this would provide a good reason to be tempted by it. But, in fact, option 2 makes it harder to understand why he says that the wholly hypothetical argument is not a syllogism. The first premise in option 2 is equivalent to "every thing which is a human is an animal," which is equivalent to "all humans are animals."¹⁴ Using similar transformations on the other premise and conclusion, we can turn option 2 into a Barbara syllogism. This is why subsequent Peripatetics read the argument as option 2: most of them wanted the wholly hypothetical argument to be a syllogism. But, for this very reason, it speaks against Aristotle intending option 2, since he tells us that it is not a syllogism. He is trying to reform arguments, and there is no reason to expect the original argument to be equivalent to the reformed one; an argument with a premise missing is not equivalent to an argument that has the premise, even though the former should be turned into the latter. One might be tempted to say that Aristotle intended option 2, but did not see that it was equivalent to Barbara. But this undermines the main reason to read it as option 2. If Aristotle is not thinking of the argument as equivalent to Barbara, why not take the more natural reading of a genitive absolute, option 1? Elsewhere in these chapters (I.32–45) Aristotle never says that something is not a syllogism while treating it as logically equivalent to a syllogism. It would be strange if he were doing so here. The coherence of the rest of my account will provide further, indirect support for reading the argument as option 1.¹⁵

What, then, can we learn from what Aristotle says about the argument? Note that it is, by modern standards, valid. And Aristotle says that something results of necessity, but he denies that it is a syllogism. The crucial question is why he denies this. Michael Frede, in his classic article, and Robin Smith, in his commentary, suggest that some premises are left out (drawing on 47a28).¹⁶ They are right, in

¹⁴Assuming that there are some *F*'s and *G*'s. If not, the later Peripatetic project of reducing these syllogisms to categorical syllogisms fails, as Barnes "Theophrastus" points out (316–17).

¹⁵One might think that Aristotle thought of the argument as ambiguous between options 1 and 2. The important thing, for this paper, is that Aristotle does not think the argument is determinately option 2.

¹⁶Frede, "Stoic vs. Aristotelian Syllogistic," 115; Smith, *Prior Analytics*, 161–62. Neither Ross (*Prior and Posterior*) nor Striker (*Prior Analytics I*) addresses this question. It is not clear to me that 'ἐλλείπω' at 47a28 should be translated 'left out' rather than something like 'fall short.' The verb 'ἐλλείπω' frequently means "leave undone" or "fall short" rather than "leave out," and Aristotle often uses it this way. If this is what he means, then he is saying that the given premises fall short, i.e. are deficient, which is why we need to reform them. But regardless of what Aristotle means by 'ἐλλείπω,' he has no reason to think that there is a simple gap in the argument, where an additional step needs to be added. (Similarly, Smith and Striker translate Aristotle's use of 'ἐνδεές' earlier at 47a22 as 'missing' where 'lacking' or 'wanting' is a more neutral translation; 'missing' is not offered by the LSJ at all. Something can be lacking or wanting without being altogether absent.)

some sense, but it cannot be that additional premises are needed along with the ones we already have, since the conclusion already results from these premises and there are no apparent gaps in the argument—hence its formal validity, by modern standards. Rather, Frede and Smith can only be correct if there is something wrong with the premises we have. The appropriate premises have been left out.

Aristotle notes in the passage that necessity is broader than being a syllogism. It is natural, then, to consider his definition of a syllogism in *Prior Analytics* I.1, which explicitly tells us how syllogisms relate to necessity. Doing so will help us determine what is missing from the wholly hypothetical argument:

[Definition of a syllogism] A syllogism is a *logos* in which, certain things being posited, something other than what was laid down results by necessity by [causal dative] these things being so. I mean by 'by these things being so' that it results because of these [διά + acc.], and by 'because of these' I mean that it requires no term from outside for the necessity to come about. (24b18–22)

συλλογισμὸς δὲ ἐστὶ λόγος ἐν ᾧ τεθέντων τινῶν ἕτερόν τι τῶν κειμένων ἐξ ἀνάγκης συμβαίνει τῷ ταῦτα εἶναι. λέγω δὲ τῷ ταῦτα εἶναι τὸ διὰ ταῦτα συμβαίνειν, τὸ δὲ διὰ ταῦτα συμβαίνειν τὸ μηδενὸς ἔξωθεν ὄρου προσδεῖν πρὸς τὸ γενέσθαι τὸ ἀναγκαῖον.

Aristotle only uses this exact phrase 'certain things being posited' (τεθέντων τινῶν) in two places in the *Analytics*, (1) in the definition of a syllogism and (2) near the end of this key passage in I.32, when he is explaining why the wholly hypothetical argument is not a syllogism. This provides further reason to think that Aristotle is alluding to this definition in the key passage. He says there that in both of the arguments, including the wholly hypothetical argument, certain things are posited and something results by necessity. Hence, by this definition of a syllogism, Aristotle must think that what was laid down does not result *because* of these premises, that is, it is not really *by* these things being so that the conclusion is reached. Why would this be?¹⁷

Frede says that *because of* (διά + acc.) here indicates "logical necessity," and so Aristotle is claiming in I.32 that the conclusion does not follow of logical necessity.¹⁸ Frede seems to think it does not follow of logical necessity because premises are left out of the argument. But, as we have seen, no further premises are needed for the conclusion to follow by logical necessity—at least, as we understand logical necessity. As the first person to develop a formal logic, Aristotle does not have a background notion of logical necessity that he can assume. The standard contemporary notion of logical necessity is that the conclusion necessarily follows on the basis of the structure of the argument, as determined by the syntactical

¹⁷In the key passage Aristotle says, "[B]ut it has not yet been syllogized, since the premises are not related as we have said." This might suggest that by I.32 he has added a new criterion for being a syllogism: it must be expressed using the canonical syllogistic formulation (see e.g. Striker, *Prior Analytics I*, 215). However, Aristotle has argued that all syllogisms are in one of the figures (see I.23); this is why he can determine that it is not a syllogism from the fact that it has not been related as they have said. (For a discussion of I.23, see Smiley, "Aristotle's Completeness Proof," and the next section.) A new condition has not been added to being a syllogism; rather, not being properly related is simply a sign that something is not a syllogism. These arguments with conditionals must still fail to meet one of the basic conditions for being a syllogism. In the next section I discuss the idea that Aristotle operates with both a broad notion and a narrow notion of a syllogism.

¹⁸Frede, "Stoic vs. Aristotelian Syllogistic," 116.

structure of the sentences, not the semantics of its terms. Given this notion of logical necessity, we should draw the opposite conclusion from Frede's: the *because of condition* cannot simply track logical necessity, since this argument follows by logical necessity, and yet Aristotle thinks the conclusion does not follow because of the premises. Frede's account of the *because of condition* in terms of logical necessity is the standard interpretation of its role in the definition of a syllogism, accepted by Smith (in his commentary on the *Topics*) and Striker; Alexander has a similar idea as well.¹⁹ Robert Bolton seems to be the only scholar who sees that this key passage in I.32 tells us that the *because of condition* in the definition of a syllogism cannot simply require logical necessity, since the argument is logically necessary and yet does not meet the *because of condition*.²⁰

Perhaps Frede or others would say that Aristotle is working with a different sort of logical necessity, one according to which the wholly hypothetical argument is not logically necessary. If so, it would be very different from our own notion of "logical necessity," so we would need some elaboration of what this other notion is. The account I offer here can be seen as providing such an elaboration (although I think it best simply not to use the potentially misleading term 'logical necessity'). Another option for someone with Frede's position would be to say that the *because of condition* only requires logical necessity (of a standard, contemporary sort) but Aristotle fails to notice that the wholly hypothetical argument is logically necessary. That seems unlikely; if someone has a standard notion of logical necessity, it is difficult to miss that the wholly hypothetical argument meets this requirement. Before simply attributing such a mistake to Aristotle, one would like some evidence that he thinks of this *because of* requirement simply in terms of logical necessity, without requiring anything else. But neither Frede nor anyone else provides such evidence. In the next section I develop an alternative account of this *because of* requirement, one that explains why Aristotle would think that this argument is not a syllogism.

In general, Aristotle (following Plato) thinks that the answer to a "because of what" question ("διὰ τί;") is a cause (αἰτία).²¹ Thus, for Aristotle the premises should be a cause of the conclusion following, since it is because of them (διὰ + acc.) that the conclusion follows. And in *Sophistical Refutations* 6, he says that premises are causes precisely because they meet this *by these things being so* condition for being a syllogism (I68b21–25).²² One must be careful since Aristotle's notion of a cause is

¹⁹Smith, *Topics I and VIII*, 44; Striker, *Prior Analytics I*, 80–81. Alexander has an interesting way of thinking about something like logical necessity: "For although the premises must indeed be explanatory of the conclusion if there is to be a syllogism, what is meant by the premises need not always be explanatory of what is meant by the conclusion . . ." (*APr*: 21,15–20; trans. Mueller). Alexander immediately goes on to discuss cases where the middle term is posterior rather than prior.

²⁰Bolton, "Dialectical Reasoning," 117–18.

²¹E.g. Aristotle, *Physics* II.3, 194b17–23; Plato *Phaedo* 97a7–9.

²²This *because of* requirement comes up in other contexts where Aristotle discusses syllogisms (for example, *Top.* VIII.11, 161b28–30; and *SE* 5, 167b21–36). However, this requirement is different from what is referred to in *Physics* II.3, 195a18–19, where Aristotle says that hypotheses are a sort of material cause of the conclusion. There he seems to use 'hypothesis' as another term for premise, which does not match how he uses this term in the *Prior Analytics*. But more importantly, in the *Prior Analytics*, he says that the premises explain the conclusion *following*, whereas in this *Physics* passage he says the hypotheses explain the conclusion.

not the same as the modern notion, but it can be useful to think that for Aristotle premises are causes. In particular, what appears to be the cause of something is sometimes not the cause. In this wholly hypothetical argument the conditionals may appear to be the cause of the conclusion following, but since Aristotle thinks that the conclusion does not follow because of them, he must think that in fact they are not the cause.

We can clarify this because-of-what condition in the definition of a syllogism by comparing it with the because-of-what requirement on demonstrations (*APo.* 71b9–12). Middle terms in demonstrations are causes of the conclusion; that is, they tell us because-of-what a conclusion holds. According to Aristotle's account of a syllogism, premises tell us because-of-what the conclusion follows of necessity. There are a couple of key differences between the because-of conditions in demonstrations and syllogisms. First, a syllogism can reach a false conclusion; there might be no cause of the conclusion holding because the conclusion does not, in fact, hold. But even in the case of true conclusions, a syllogism need not provide a genuine cause of the conclusion. For example:

All dogs are hairy.
All hairy things are alive.
 All dogs are alive.

This is a syllogism but not a demonstration because its middle term is not a cause of the conclusion holding.²³ It is not the case that dogs are alive because they are hairy.

In what sense, then, is there a because-of relation in a syllogism? The middle term in a demonstration indicates why the conclusion *is the case*, whereas a syllogism's premises indicate why the conclusion *follows* of necessity.²⁴ In other words, a syllogism's premises indicate why the conclusion is true *given that* these premises are true. In the definition of a syllogism the 'by them being so' [causal dative] modifies the 'following' (συμβαίνει), not the conclusion; in a syllogism, it is because of the premises that the conclusion *follows*; it is not because of them that it *is true* (in fact, it might not be true).²⁵ The beginning of the definition uses a genitive absolute, 'τεθέντων τινῶν,' translated 'certain things being posited,' which leaves unclear what relation, if any, the premises have to the conclusion following. Without the 'by them being so' you might think that there need not be any specific connection between the following and the things posited. The causal

²³Aristotle provides examples in *APo* I.13.

²⁴The difference between these two different sorts of explanations parallels Aristotle's distinction between necessity simpliciter (which play a role in modal syllogisms) and necessity since certain things are so. Aristotle thinks that the conclusion of an assertoric syllogism has the latter kind of necessity, the necessity of the conclusion given the premises. Note that there is a genitive absolute in the definition of a syllogism, which mirrors Aristotle's term for this latter kind of necessity: necessity since certain things are so (τινῶν ὄντων ἀνάγκη). For a classic discussion of these two types of necessity, see Patzig, *Die Aristotelische Syllogistik*, chapter 2.

²⁵We can think of *following* as a two-place relation between premises and a conclusion. In a syllogism, the premises are the cause of the relation holding. This might seem strange: how can one of the relata, the premises, explain why the relation holds? We can think of this as similar to how kicking, for example, is a two-place relation between two things (a kicker and a thing kicked) and one of the relata explains why this relation holds: the kicker explains why there is a kicking (cf. Plato, *Euthyphro* 10a–c: it is because of the thing carrying that there is a being carried). It is, in fact, not unusual for one of the relata to explain why a relation holds.

dative clarifies what the relation must be: the conclusion must follow because of the premises laid down.

2. WHY IS THE WHOLLY HYPOTHETICAL ARGUMENT NOT PROPERLY EXPLANATORY?

We have two questions to address: How do a syllogism's premises explain the conclusion following? And why do the wholly hypothetical argument's premises fail to meet this requirement? As mentioned earlier, in this part of the *Prior Analytics* Aristotle is explaining how to take ordinary arguments and reform them to become syllogisms. In doing so, we may need to exercise some discretion about how best to turn the original argument into a syllogism; there will not be a recursive procedure for the translation. In the case of the wholly hypothetical argument, the most obvious reform is to change the premises to "all humans are animals" and "all animals are substances," and to change the conclusion to "all humans are substances," thereby turning it into a Barbara syllogism.

Thus, we can put the question this way: why would Aristotle think the conclusion of a Barbara syllogism follows because of its premises, whereas the conclusion of the wholly hypothetical argument does not? The problem seems particularly acute since the wholly hypothetical argument looks structurally the same as Barbara. Both seem to have this same basic form:

$$\begin{array}{l} AxB \\ \underline{BxC} \\ AxC \end{array}$$

They both involve linking three things through a single relation, x ; the conclusion follows because this relation, x , is transitive. In Barbara, the relation is universal affirmative predication and the things connected are terms; in the wholly hypothetical argument, the relation is a conditional and the things connected are sentences. Both arguments could be seen as good for the same basic reason: they result from three things linked by a transitive relation. Why allow one transitive relation to form a syllogism but disallow the other?²⁶

A useful first step is to consider arguments that are formally valid by modern standards, but where a conditional seems to hide something that by modern standards would, at most, be a non-logical defect in an argument. For example:

If humans are animals, dogs are mammals.
Humans are animals.
 Dogs are mammals.

While this argument is valid, there are reasons to be concerned about it precisely because of its use of a conditional. We are given no indication why dogs' being mammals is connected to humans' being animals. That connection is stipulated

²⁶As I discuss later in this section, Aristotle does not have the concept of a conditional. We can rephrase this question without referring to conditionals. Whatever the relation is in the wholly hypothetical argument, it seems to be transitive and the argument seems to be good because this relation is transitive. So why think that the conclusion of Barbara follows because of its premises, but not that of the structurally analogous wholly hypothetical argument?

without any explanation. One would do well, in this case, to look for some sort of universal affirmative sentence that underwrites the conditional, acting as a covering law. The fact that there is no such universal claim casts doubt on the conditional itself.

While this example puts us on the right track, it does not show us what categorical statements have and conditionals lack. The advantage of requiring categorical statements cannot be to ensure that the conditionals are true; the premises of a syllogism need not be true. Nor can it be that the premises need to be argued for using categorical claims; the premises of a syllogism need not be argued for.

The example points us to the fact that standard conditionals link whole propositions and that, because of this, they mask how the propositions are linked. In what follows, I argue that Aristotle does not allow conditionals, or anything else that links whole propositions, in syllogisms because they do not indicate how the propositions are linked through predications between terms. I argue for this, in part, by examining the arguments Aristotle calls “syllogisms from a hypothesis” (I.23, I.29, I.44).²⁷ These arguments at first might seem to present a challenge to my account since they involve something at least conditional-like and they seem to be syllogisms. However, scholars are divided about whether these syllogisms from a hypothesis really count as syllogisms for Aristotle.²⁸ I will argue that they are not proper syllogisms for Aristotle and that the reason they are not helps us understand why he does not allow syllogisms to contain conditionals (or anything similar to a conditional).

Let us start with a brief overview of syllogisms from a hypothesis. Aristotle thinks of *reductio ad impossibile* as a type of syllogism from a hypothesis that is equivalent to a categorical syllogism in terms of what it can prove (I.29). By contrast, he thinks that the other syllogisms from a hypothesis require a prior agreement (I.44, 50a32–35). We agree in advance that successfully arguing for p is sufficient to establish q (hence agreeing that if p then q) and then go on to prove p using a syllogism. From this we reach our conclusion, q . This conclusion, we are told, is not reached from a syllogism, but rather from a hypothesis (41a38–41, 50a17–19, 50a25–26).

There are two main reasons to think that syllogisms from a hypothesis are syllogisms: (1) one of his terms for them, ‘syllogisms from a hypothesis,’ clearly suggests that they are syllogisms, and (2) Aristotle clearly classifies them as syllogisms in I.23, as part of his argument that all syllogisms can be reduced to one of the three figures (40b23–25, discussed below). The main reasons not to

²⁷For further discussion of *reductio ad absurdum* arguments—a species of syllogisms from a hypothesis—see *APr.* II.11–14. Syllogisms from a hypothesis are also discussed in *APo.* II.6 and throughout the *Topics*.

²⁸Alexander (*APr.* 260,19–23, and 390,9–18) and Bobzien (“Modus Ponens,” 370–72) think they are not syllogisms. Slomkowski (*Aristotle’s Topics*, 128) Striker (*Prior Analytics I*, 174) and Crivelli (“Syllogisms from a Hypothesis,” 179–81) think they are. Lear (*Logical Theory*, 41–43) thinks that they meet the definition of a syllogism but that Aristotle has reasons not to want to count them as syllogisms. Smith (*Prior Analytics*, 141–42) thinks that *reductio* is not strictly speaking a syllogism, so he thinks that at least some syllogisms from a hypothesis are not strictly speaking syllogisms (since *reductio* is a type of syllogism from a hypothesis).

take them to be syllogisms are: (3) he repeatedly says that their conclusions are *not* reached from a syllogism, but rather from a hypothesis, and (4) at the end of I.23 he clearly indicates that they only involve one syllogism, a syllogism for the antecedent of the conditional:

And the same holds for all other arguments from a hypothesis, for in all of them *the* syllogism is for the substituted proposition, while the initial thesis is concluded through an agreement or some other kind of hypothesis. (41a38–41b1; emphasis added)

ώσαύτως δὲ καὶ οἱ ἄλλοι πάντες οἱ ἐξ ὑποθέσεως· ἐν ἅπασιν γὰρ ὁ μὲν συλλογισμὸς γίνεται πρὸς τὸ μεταλαμβάνομενον, τὸ δ' ἐξ ἀρχῆς περαίνεται δι' ὁμολογίας ἢ τινος ἄλλης ὑποθέσεως.

As Bobzien notes, the use of the definite article clearly indicates that there is only one syllogism, and it is for the substituted proposition, not for the conclusion of the syllogism from a hypothesis.²⁹

We should accept the arguments for not taking syllogisms from a hypothesis to be genuine syllogisms, in part because we can provide alternative explanations for the signs that indicate that they are syllogisms. As for (1), their name indicating that they are syllogisms, Aristotle sometimes describes them differently, calling them arguments that “conclude from a hypothesis” (περαίνονται ἐξ ὑποθέσεως, e.g. 50a39). Aristotle may be inheriting the term ‘syllogism from a hypothesis’ from the Academy. (The idea of arguing from a hypothesis goes back at least to Plato’s *Meno*, 86e–87e).³⁰ Aristotle would then use the term because it is the standard term in the Academy, although “argument that concludes from a hypothesis” is, in fact, a more accurate description. Bobzien offers another suggestion: that Aristotle calls them syllogisms from a hypothesis because they *include* a syllogism as a part, rather than because they are themselves syllogisms. In any event, if Aristotle’s description of them clearly indicates that they are not syllogisms, then we can overlook his name for them.

But what of (2), Aristotle’s classifying them as syllogisms at the beginning of I.23? This is a delicate issue, since he does not do what he leads us to expect at the beginning of I.23. He says at the beginning,

It is clear from what has been said that the syllogisms in these figures are perfected through the universal syllogisms in the first figure and reduced to these. But that this will be so for any syllogism without qualification will become evident now, when we have proved that every syllogism comes about in one of those figures.

It is necessary that every demonstration as well as every syllogism prove that something belongs or does not belong, either universally or particularly, and further either probatively or from a hypothesis.

Ὅτι μὲν οὖν οἱ ἐν τούτοις τοῖς σχήμασι συλλογισμοὶ τελειοῦνται τε διὰ τῶν ἐν τῷ πρώτῳ σχήματι καθόλου συλλογισμῶν καὶ εἰς τούτους ἀνάγονται, δηλὸν ἐκ τῶν εἰρημένων· ὅτι δ' ἀπλῶς πᾶς συλλογισμὸς οὕτως ἔξει, νῦν ἔσται φανερόν, ὅταν δειχθῇ πᾶς γινόμενος διὰ τούτων τινὸς τῶν σχημάτων.

²⁹Bobzien, “Modus Ponens,” 370.

³⁰Smith (*Prior Analytics*, 141–42) makes this suggestion, but about a subspecies of syllogisms from a hypothesis: *reductio* arguments.

Ἀνάγκη δὴ πᾶσαν ἀπόδειξεν καὶ πάντα συλλογισμὸν ἢ ὑπάρχον τι ἢ μὴ ὑπάρχον
δεικνύναι, καὶ τοῦτο ἢ καθόλου ἢ κατὰ μέρος, ἔτι ἢ δεικτικῶς ἢ ἐξ ὑποθέσεως. (40b17–25)

One could reasonably expect, from this introduction, to learn that every syllogism from a hypothesis comes about in one of the three figures. After all, he says that every syllogism comes about in one of those figures, and he then divides syllogisms into probative ones and those from a hypothesis. But, instead, he argues that syllogisms from a hypothesis *include* a syllogism that can be reduced to one of the three figures. In fact—and this is the crucial point—if Aristotle included syllogisms from a hypothesis as genuine syllogisms, then he would *fail* to prove what he says at the beginning that he is going to prove and what he triumphantly claims to have done at the end of the chapter (41b1–5): that every syllogism comes about in one of the three figures. Syllogisms from a hypothesis themselves do not come about in one of the three figures. On the other hand, if he does not count them as syllogisms, then we can explain why he thinks he has succeeded in his task. He is saying that all syllogisms are in one of the three figures—both the standard probative syllogisms, and the syllogisms that are found within syllogisms from a hypothesis.³¹

Given, then, that syllogisms from a hypothesis are not, strictly speaking, syllogisms, what can we learn from them? Bobzien emphasizes, quite rightly, that what makes something a syllogism from a hypothesis is not simply its linguistic or logical form; rather, the sentence that we would describe as a conditional must involve an agreement in order for the argument to count as a syllogism from a hypothesis. By contrast, an argument is valid, by modern standards, whether you agree to its premises or not. To put it more generally, whether something is a syllogism from a hypothesis is determined, in part, by what else has happened within a certain discourse.³² For this reason, it would be a mistake to think that Aristotle is describing conditionals as we understand them. He does not have a term for conditionals that categorizes them by their linguistic or logical form.

The question, then, is why Aristotle thinks of these arguments (typically expressed using a conditional) in this way. There are reasons for him to treat the conditionals in such arguments as agreements or other things following under the category of supposition, and so only having a place in dialectic. These conditionals do not tell us *why* p leads to q . They ask us simply to accept this fact. As mentioned earlier, Aristotle says that in a syllogism from a hypothesis the conclusion is not deduced but rather agreed upon; he treats deduction as the relevant alternative to agreement (41a38–41, 50a17–19, 50a25–26). Perhaps an argument in one of the figures could be used to reach the conclusion q from p , but in an argument from a hypothesis, we do not do this; we simply agree that p is sufficient for q . Aristotle thought that these sentences, expressed with what we call a conditional, assert precisely what a syllogism is supposed to show.³³ Thus, he had no reason

³¹Further evidence that he does not think syllogisms from a hypothesis are genuine syllogisms is found in I.23 at 41a2–4, where he insists that the conclusion of every syllogism is reached through a middle term. I discuss this passage below.

³²Bobzien, “Modus Ponens,” 366–72. She identifies what is agreed to as the hypothesis. There is much debate about what the hypothesis is (for a discussion, see Striker, “Syllogismen ‘aufgrund einer Hypothesen’”). For purposes of this paper, I am staying neutral on this issue.

³³For a similar idea, see Lear, *Logical Theory*, 43.

to develop a category for conditionals within his logical system. It is not that he lacked a notion of a conditional and so thought they could not be involved in syllogisms. Merely lacking a notion of a conditional would not give him reason to deny that the wholly hypothetical argument is a syllogism. Rather, the order of explanation is the other way around: he thought that arguments that included (what we call) conditionals could not be syllogisms, and so there was no reason to develop a notion of a conditional within his logical system.

It might seem that Aristotle, in treating a syllogism and an agreement as two different ways to link propositions, is confusing arguments with conditionals. In an argument, one should be able to use the premises to justify the conclusion, whereas this is not necessary in a conditional; a conditional simply links two propositions. But this category—the category of propositions linked without justification—is precisely what Aristotle does not think should be allowed in syllogistic argumentation. It does not matter that conditionals would be in a different logical category from arguments; he would not allow propositions linked in any such way to play a role in a syllogism.

We now have our basic account of why Aristotle did not include conditionals in his logic: because they simply connect propositions, rather than including the claims needed to show how the propositions are connected. But how do Aristotle's syllogisms provide this connection? And why is the connection found in syllogisms better than that found in conditionals? To answer these questions, let us return to the end of the key passage in I.32, immediately after Aristotle says that "necessity" is broader than the "syllogism":

Consequently, if something does result when certain things have been posited, one should not try straight off to lead it back <into the figures>. Instead, one must first get the two premises and next divide them this way into terms, and that term which is stated in both the premises must be put as the middle (for the middle must occur in both of them in all of the figures). (47a35–40)

This is part of Aristotle's explanation of what is wrong with the wholly hypothetical argument. He thinks that something results of necessity from the wholly hypothetical argument, but its terms are not predicated in such a way that they lead to the conclusion. To reform it, we need to identify clearly the middle term, which provides the structural link between the basic propositions. By contrast, a conditional does not draw a connection through a middle term; to use a conditional, on its own, is simply to assert a connection between claims.

Aristotle's syllogisms draw their conclusion from the connections within simple propositions. Aristotle has a robust notion of simple propositions: the basic propositions from which more complex claims are built. In *Prior Analytics* I.1, he says that every *protasis* affirms or denies something of something. (The term '*protasis*' is typically translated 'premise,' although occasionally he uses it for propositions that are not part of an argument.) In *De Interpretatione* he calls these simple assertions (17a20–22). And directly before introducing his definition of a syllogism in I.1 he says that terms are that into which a *protasis* is resolved, with the addition of 'to be' or 'not to be' (24b16–18). The arguments in the three figures have a structure such that one simple proposition follows from two others of necessity, because of the connections between the terms.

In a syllogism the conclusion follows of necessity because of this structural connection within the simple propositions, through a middle term. Aristotle's term logic requires that the sub-sentential connections in two propositions lead, necessarily, to a third proposition. The antecedent and consequent in a conditional like "If humans are animals, dogs are mammals" are not joined through sub-sentential connections. One cannot expect the consequent of a conditional to follow from structural connections within the antecedent. By contrast, in a syllogism, the conclusion follows simply from the structural connections in the premises. The key issue, then, is what Aristotle thinks a syllogism must do and what it need not do. A syllogism need not explain why a premise is true. The premises should be supplied by the scientist or dialectician, drawn from sources appropriate to their project. But a syllogism does need a structure such that one simple sentence necessarily follows from the others. We do not get this with conditionals. Someone who asserts a conditional simply asserts that two simple sentences are connected, without showing why they are connected; by contrast, someone who asserts a syllogism asserts two simple sentences whose structure is such that another simple sentence must follow.

Recall that we are looking for an explanation of the conclusion *following*, not an explanation of the conclusion being the case, which is what a demonstration provides. Thus, the claim is not that the middle term is a cause of the conclusion (as is the case in a demonstration). Rather, premises appropriately connected through a middle term explain why the conclusion *follows*, unlike premises that are conditionals. We learn why a simple proposition follows when we are given simple propositions whose predications have a structural connection through a middle term resulting in the conclusion.

We can now see one relevant difference between Barbara and the wholly hypothetical argument. The sub-sentential connections in Barbara are simpler than the sentential connectives in the wholly hypothetical argument. They are simpler in terms of their compositional role, since simple sentences are partially composed of terms. In fact, predication is the simplest sort of connection in Aristotle's logical system. Hence, Aristotle's logic draws its conclusions on the basis of its most basic connections. This allows for a division of labor, where the simple sentences are provided by the dialectician or scientist, and then logic takes over and tells us what syllogisms can be drawn from these basic sentences.

Aristotle may also be influenced by the fact that predication is a rather different relation than implication. A conditional creates a link between two things without telling us what links them. A claim like "All humans are animals" not only links two things, but also tells us the nature of the link: predication. Each of the humans *is* an animal. By contrast, the sentence 'If a human is, an animal is' does not tell us that the human is the very thing that is an animal: for all it says, there could be one human and a different animal. Perhaps when a human comes into existence, a distinct animal simultaneously comes into existence. Or perhaps a prerequisite for a human is that there be some animal that already exists. Put simply, we are not told how these two claims are linked. But when we learn that all humans are animals, we are told a specific relation that connects humans to animals. Knowing what the connections are provides a more specific answer to why the conclusion

follows.

To put it slightly differently, it is not clear that a conditional picks out some fixed sort of relation found in the world. This is the respect in which Aristotle's view can be seen to be drawing upon a sort of metaphysical claim. It is not clear that implication is a real relation between things, as opposed to a blanket term that can apply due to a number of quite diverse relations: predication, being a prerequisite, cause and effect, temporal sequences, two effects of the same cause, and so forth. If you are trying to understand why the conclusion of an argument follows, it may well seem insufficient for one step in the argument simply to be that one thing implies the other. It is not surprising that Aristotle thinks that such claims do not really tell us *because of what* the conclusion follows.

The issue is not specific to material conditionals. Even if we consider a non-material conditional that indicates an explanatory connection between the antecedent and consequent, such a conditional does not specify what connects the antecedent and consequent. Being told that the consequent holds because of the antecedent is quite different from actually being told what, precisely, links the two. In a syllogism, the predications found in the premises indicate how the two terms in the conclusion are linked: they are linked through the specific ways they are predicated of the middle term or the middle term is predicated of them. In fact, anyone who finds appealing the idea of not using material conditionals in logic should find Aristotle's account particularly attractive. Such a person wants an explanatory link between antecedent and consequent. Aristotle actually identifies how the sentences are linked (through the middle term), rather than simply indicating that there is an explanatory link.

Aristotle's explanatory requirement in the definition of a syllogism is neither purely formal nor driven by his account of science or metaphysics. The conclusion must result from the structure of the connections between terms; in this way, it is a type of formal requirement.³⁴ But Aristotle does not count every argument as a syllogism if its conclusion necessarily follows from the structure of its premises; thus, he is not providing a purely formal requirement. Syllogisms are a type of argument that follow on the basis of the predications between terms. The special thing about predication is not that it mirrors the structure of science or reality, but that it is the simplest connection within the logical system, and it tells us specifically how the simplest items within the logical system, terms, are linked.³⁵

³⁴See n. 7 for further discussion of whether this should strictly count as a syntactic requirement.

³⁵We can now see why it matters how we interpret the wholly hypothetical argument. Suppose we had read it as option 2, i.e. as involving premises like "if something is a human, it is an animal," where the anaphoric 'it' refers back to "something." In that case, there would be a sub-sentential connection between the antecedent and the consequent of the conditionals and the conclusion would follow through the predications within the conditionals. On the reading I have provided, the problem with the wholly hypothetical argument is that the terms are not linked in such a way that the conclusion necessarily follows; instead, the links are between whole propositions. One striking feature of the Peripatetic development of wholly hypothetical syllogisms, as carefully laid out by Bobzien, "Wholly Hypothetical Syllogisms," is that we do not have unambiguous evidence of a completely propositional account of these until Philoponus in the sixth century C.E. Perhaps part of the reason the Peripatetics were not drawn toward developing a propositional account is because of a strong sense (either conscious or subconscious) that proper syllogisms require a sub-sentential connection through a middle term.

After Aristotle mentions the need for a middle term at the end of the key passage, he spends the rest of I.32 discussing the role played by middle terms. First he reminds us of the position of the middle term in each of the three figures (47a40–b7). Then he tells us that the same term must occur multiple times to have a syllogism (48b7–9). And finally he says that we can use the conclusion to help us determine which figure the argument is in, in addition to the position of the middle term (48b9–14). Thus, after Aristotle tells us that the wholly hypothetical argument is not a syllogism and that we must analyze the argument into its terms, he spends the rest of the chapter discussing the structural role of middle terms in syllogisms.

Aristotle is even more emphatic about the importance of middle terms in I.23 when discussing probative syllogisms, before turning to syllogisms from a hypothesis:

For let us say quite generally that there will never ever be a syllogism for one thing said of another unless some middle term is taken that is in some way related to each [of the other terms] by predication.

ὄλως γὰρ εἴπωμεν³⁶ ὅτι οὐδεὶς οὐδέποτε ἔσται συλλογισμὸς ἄλλου κατ' ἄλλου μὴ ληφθέντος τινὸς μέσου, ὃ πρὸς ἐκάτερον ἔχει πῶς ταῖς κατηγορίαις. (41a2–4)

Here Aristotle is emphatic that the two terms in the conclusion of a syllogism must always be related through a middle term—which explains why he says, later in the chapter, that the conclusion of a syllogism from a hypothesis is not reached by a syllogism. Some interpreters claim that ‘syllogism’ has two different meanings for Aristotle in the *Prior Analytics*: one for the categorical syllogism and another, broader term for anything that meets the definition of a syllogism.³⁷ They could claim that Aristotle is only using the narrower sense here. But Aristotle never says that the term has two meanings. And this interpretive strategy ends up creating a problematic gap in Aristotle’s account, where he starts the *Analytics* talking about syllogisms in a broad sense, but then only provides a theory for syllogisms in the narrow sense and, in chapters like I.23, switches between the two meanings.³⁸ Such interpretations are motivated by the apparently narrow claims that Aristotle makes about syllogisms, such as the one above. But the account I have offered allows us to avoid the need for—and the difficulties with—such an interpretation. Aristotle has just one notion of a syllogism in the *Prior Analytics*, one that is consistently narrow, in the sense that the conclusion must always be reached through the predications between terms. He never means to be capturing every argument that we would consider to be formally valid.

Is there any indication in Aristotle’s definition of a syllogism that he is looking for this sort of structural connections between terms? I argued earlier that in his definition of a syllogism Aristotle is not simply requiring logical necessity, as we understand it, when he says that the conclusion must follow “by [causal dative] these [premises] being so.” He is not simply requiring logical necessity since the wholly hypothetical argument follows of logical necessity, as we understand it, but

³⁶Accepting (along with Striker) Smiley’s reading (in “Aristotle’s Completeness Proof”) of ‘εἴπωμεν’ for ‘εἴπομεν.’ This is not necessary for my reading of the passage.

³⁷Lear, *Logical Form* 41–43; Striker, *Prior Analytics I*, e.g. 174; Slomkowski, *Aristotle’s Topics*, 128.

³⁸Striker (*Prior Analytics I*, 174) notes two such switches in I.23.

Aristotle thinks it is not a syllogism. In the definition of a syllogism, after Aristotle glosses 'following by these being so' as "following because of these," he glosses the latter, in turn, as "no term is required from outside for the necessity to come about." If you thought that Aristotle was trying to define logically valid arguments, as we think of these today, this gloss in terms of "no outside terms" is something of an embarrassment: the talk of terms is overly narrow, because sometimes arguments are valid on the basis of propositional connections. But if Aristotle is pointing to another sort of explanatory connection—not based simply on a truth-preserving syntactic structure, but rather on the structure of predicative relations between terms—then it makes perfect sense to say that the argument must have all of the terms needed for the conclusion to result. An argument that we would consider formally valid, but which leaves out terms needed to draw its conclusion on the basis of predications, would not be a syllogism. Thus, Aristotle indicates at the very beginning of the *Analytics* that he thinks the conclusion of a syllogism must follow because of the terms involved.

This gloss of the explanatory requirement as requiring no outside terms is closely connected to Aristotle's next topic, after the definition of a syllogism: perfect and imperfect syllogisms.³⁹ We can better understand this "no outside terms" condition if we compare it to his account of perfect and imperfect syllogisms.

I call a syllogism perfect if it requires nothing else besides the things taken for the necessity to be evident, imperfect if one or more things are needed, which are necessary by the terms laid down, but which are not taken by the premises. (24b23–26)

τέλειον μὲν οὖν καλῶ συλλογισμὸν τὸν μηδενὸς ἄλλου προσδεόμενον παρὰ τὰ εἰλημμένα πρὸς τὸ φανῆναι τὸ ἀναγκαῖον, ἀτελεῖ δὲ τὸν προσδεόμενον ἢ ἑνὸς ἢ πλείονων, ἃ ἔστι μὲν ἀναγκαῖα διὰ τῶν ὑποκειμένων ὄρων, οὐ μὴν εἴληπται διὰ προτάσεων.

Aristotle's language here is very similar to that in his requirement that syllogisms have no outside term. In both cases the argument requires nothing (μηδενός) in addition (προσδεῖν). In a syllogism, it requires nothing from the outside (ἔξωθεν); in a perfect syllogism, it requires nothing else (ἄλλου). And in both cases nothing is required for the necessity to do something (πρὸς . . . τὸ ἀναγκαῖον); in the case of a syllogism, nothing is required for the necessity *to come about* (τὸ γενέσθαι), and in the case of a perfect syllogism, nothing is required for the necessity *to be evident* (τὸ φανῆναι). Imperfect syllogisms are still syllogisms; they do not require outside terms for their conclusion to come about. They require other premises to make their necessity evident—as we learn in the following chapters, the conversion rules may need to be applied to the premises—but these new premises will have the same terms as the old ones (i.e. terms already inside the syllogism, since a syllogism requires no terms from the outside). What the discussion of perfect and imperfect syllogisms throws into clearer relief, then, is that this *no outside terms* condition keeps open the possibility that we need to convert the premises to make the necessity evident, while telling us that the terms must be sufficient for the conclusion to follow.⁴⁰

³⁹For a similar idea see Striker, *Prior Analytics I*, 81.

⁴⁰Aristotle must be including how the terms are predicated of one another here, since the terms, on their own, would not lead to any given conclusion (for example, because the same terms could be involved in affirmative or negative premises).

We can now see why Aristotle says at the beginning of chapter 32 that this discussion confirms his previous account, according to which every syllogism can be reduced to syllogisms in one of the three figures. Other arguments may lead necessarily to their conclusion, but they do not provide the right sort of explanation of the conclusion following.

3. CONCLUSION

Aristotle's goal in the *Prior Analytics* is not to give an account of every argument whose conclusion follows of necessity due to its form. Instead, he thought there was a type of explanatory connection found in certain arguments, a better explanation for the conclusion following. His logic is designed to capture this. He thinks that even if the conclusion of an argument follows of necessity (as is the case in the wholly hypothetical argument), we still have to examine it further to find a structural link in the way the terms are predicated of one another. Doing so lets us see if the conclusion follows from the basic predications in the simple propositions. When we use a conditional we assert that there is a connection between sentences; Aristotle's logic is meant to show why sentences are connected. Thus, he had no reason, within his logical system, for developing something like our modern notion of a conditional. The lack of conditionals is not a simple oversight on his part. Aristotle had good reasons, given how he thinks of syllogisms, for not including conditionals in his logic.⁴¹

BIBLIOGRAPHY AND ABBREVIATIONS

Abbreviations of Alexander of Aphrodisias's Work

APr. On Aristotle's *Prior Analytics*

Abbreviations of Aristotle's Works:

APo. Posterior Analytics

APr. Prior Analytics

SE Sophistical Refutations

Top. Topics

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⁴¹I have received valuable feedback on previous drafts of this paper from Susanne Bobzien, Rob Bolton, Victor Caston, Brad Inwood, Joe Karbowski, Sean Kelsey, Marko Malink, Riccardo Strobino, and the audiences at the University of São Paulo and the 9th Annual Aristotle and Aristotelianism conference at Marquette University.

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