



# Sextus Empiricus on Peripatetic Syllogistic

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Received 26 August 2024 | Accepted 27 August 2024 |

Published online 30 March 2026

## Abstract

This mainly historical paper provides a comprehensive discussion of the – heretofore neglected – evidence for Peripatetic syllogistic in Sextus Empiricus. The paper sets out to show that it is likely that in Sextus (and Apuleius) there is valuable evidence of a transitional period in later ancient logic that is marked out by a number of characteristics, which include the following: (i) A Peripatetic term ‘categorical syllogism’ is newly in use, but no term ‘hypothetical syllogism’ has been established yet. (ii) Stoic and Peripatetic logic are treated as complementing each other. (iii) The reversion of quantified propositions from predicate-subject to subject-predicate form is still fairly new. (iv) The so-called crocodile example is used to show that induction lacks the feature of concluding by necessity that is a defining mark of Aristotelian syllogisms. (v) The use of the expression *katholikê protasis* for categorical universal premise-propositions is distinctive of the period. (vi) The argument forms displayed by Sextus’ three examples appear to be indirectly related to the soon-to-appear Platonist hypothetical syllogistic. (vii) There are parallels that suggest that Sextus’ source belongs to the same historical period of logic as Apuleius’ source and as some probably recent source of Alexander of Aphrodisias’ *Prior Analytics* commentary (which is presented along with some later views and arguments, which may include Alexander’s own). Small differences between the three authors show that Sextus did not draw on the Greek handbook that was Apuleius’ source.

## Keywords

Aristotelian logic – Peripatetic logic – *Prior Analytics* – Sextus Empiricus – Alexander of Aphrodisias

### 1 Introduction

We can assume that at Sextus' time, and at the time when the sources for his logic chapters (*Outlines of Pyrrhonism* (= *PH*) 2, *Against the Mathematicians* (= *M*) 8) were composed, there existed handbooks that contained some elementary remarks on Peripatetic logic (*PH* 2).<sup>1</sup> They may have been works of the kind Apuleius translated into Latin (his *On Interpretation*), or alternatively more concise versions that summarized theories of more than one school; or of more than one subject, including logic, of the Peripatetic school.<sup>2</sup> These handbooks appear to have contained material that predates Alexander of Aphrodisias: traces of their material are present in Alexander's commentaries, but some of Alexander's terminology is more recent.<sup>3</sup> From what has survived, it seems that the authors of such handbooks may have had no direct acquaintance with Aristotle's *Organon*.<sup>4</sup> The handbooks may have evolved before, or side by side with, the early commentaries on the *Organon*, at a time during which the Stoics were considered the authority on logic and Aristotle's works were not easily accessible. This may also have been the period during which the idea took a foothold that Stoic-origin and Peripatetic-origin logics *complement* each other, rather than being competitors. It appears to be only at the threshold of the third century, when the four main philosophical schools, Platonists, Peripatetics, Epicureans and Stoics, are once again depicted as clear rivals (with Alexander being the head of the Peripatetic school), that Stoic logic is pitted against Peripatetic logic and sometimes against Platonist logic. Less than a generation before Alexander, Galen takes a position against the

1 There is very little literature on Peripatetic logic in Sextus. Julia Annas offers an excellent summary in her 1992, 222–225.

2 For Platonist philosophy, Alcinous is such a text. Sextus does not mention any Platonist syllogistic. This suggests that his sources predate Alcinous.

3 On Alexander see below and Bobzien 2014a.

4 See also Ramsay 2017, 35–36. Correia 2017a conjectures Theophrastus' *Prior Analytics* as a possible early source.

Stoics, but he also presents parts of their theory without criticism and does not universally denigrate Stoic logic.<sup>5</sup>

Sextus offers a good paradigm of the genre of texts in which Stoic and Peripatetic logic are presented separately and as possibly complementing each other. It is most likely that he drew what he writes about Peripatetic logic from a recent handbook.<sup>6</sup> He mentions Peripatetic logic as if it were just an aside to Stoic logic. The relevant texts are (i) a couple of passages on Peripatetic syllogistic (*PH* 2.163–166, 193–198) and (ii) a paragraph on Peripatetic conditionals (*PH* 2.112, for some details on the authorship of the latter see Bobzien 2025). Even jointly, and including Sextus' attempted refutations, the passages take up only a fraction of the space Sextus devotes to Stoic logic.<sup>7</sup>

There is one other text that appears to draw primarily on Peripatetic logic of the same period as Sextus' source. This is Apuleius' slim handbook on logic known as *Peri Hermeneias* or *On Interpretation* (= *Int.*). This work, too, presents Stoic and Peripatetic logic. In it the Stoics are criticized, except where

5 That the theories of Peripatetic syllogistic in Sextus and Apuleius are pre-Galen is further indicated by the fact that they do not have the distinction between categorical and hypothetical syllogisms, see below Sections 3 and 7.

6 'Sextus Empiricus mentions Aristotle and his followers quite often and attributes an elaborate doctrine of the "criterion" of knowledge to them, but his work shows no signs of a deep study of their writings and his knowledge of them seems to come from handbooks.' (Gottschalk 1987, quoted in Annas 1992, 203. So also Cambiano 1981). Annas, in her own words, 'set[s] out the case for a more complex picture of Sextus' relation to the Peripatetic school' (ibid.) and 'As Sextus uses the phrase "Peripatetic", it mostly serves to include [...] the distinctive views of Aristotle' (Annas 1992, 205) 'Sextus also clearly had access to another source of philosophical information about Aristotle apart from the school treatises, namely the "exoteric" works, which continued to circulate even after Andronicus' editions of the school works became widely available' (Gottschalk 1987, 1172, cited by Annas 1992, 210). There is no indication that Sextus' passages on Peripatetic syllogistic originated in Aristotle's 'exoteric' works.

7 Does Sextus draw on the same Peripatetic source in the remaining chapters on logic in *PH* 2 on induction, definition, division, common properties and sophisms? He does not mention the Peripatetics again. I think it *possible* that he took the two brief Aristotelian accounts of induction and definition in the next two chapters from the same source: the fleetingly mentioned brief Aristotelian account of induction in *PH* 11 204 ('make universals convincing on the basis of particulars') ties in with *PH* 11 195 and matches Aristotle, *Top.* 105a13–16 (noted also by Annas & Barnes 1994); the account of definition as 'accounts which show what it is for something to be a certain thing' (tr. Annas/Barnes) is also standardly Aristotelian (e.g. *Top.* VI 1, 102a3, *APo.* 11, 73a34–35, *Metaphysics* Z 4, 1030a6), and is presented in contrast with a probably Stoic definition. This contrast matches the approach in the section on syllogistic. It is possible, if slightly less likely, that Sextus drew on the same Peripatetic source in a sentence in the introductory chapter on division that distinguishes four kinds of division (*gignesthai* [...] *hekaston*). (For Sextus on definition and division see Vlasits 2026.) I doubt that the last six chapters of *PH* 2 go back to the *same* Peripatetic source.

they are thought to agree with the Peripatetics. The author clearly favours the Peripatetics.<sup>8</sup> Strikingly, almost all the information we obtain in Sextus has a parallel in Apuleius.<sup>9</sup> Since Apuleius' *On Interpretation* is more detailed and extended than the Sextus passages, this work can help shed light on Sextus' concise notes. I refer to the relevant parts as I go along.

## 2 Peripatetic Syllogistic: Sextus' Examples

Sextus offers three examples of syllogisms that were, he says, 'used mostly by the Peripatetics'<sup>10</sup> and that 'are called categorical syllogisms' (*PH* 2.163). These examples are informative. None of them is a standard Aristotelian syllogism (as introduced in *Prior Analytics* I. 1–7) either in form or in content.<sup>11</sup> Here is the first.<sup>12</sup>

### Example 1

The just is noble, the noble is good, hence the just is good.

τὸ δίκαιον καλόν, τὸ καλὸν <δὲ> ἀγαθόν, τὸ δίκαιον ἄρα ἀγαθόν.

*PH* 2.163

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- 8 It is disputed whether the text is by Apuleius. It almost certainly is translated from the Greek, and for most of the text presumably in the standard word-by-word translation. For these reasons, computational style analysis seems to me not to be decisive. (Apuleius is also known to have translated a lost treatise on arithmetic by Nikomachus, so there would be nothing unusual about him translating a logic text.) For my purposes, it is irrelevant whether the text is genuinely by Apuleius. The reader is free to read '[Apuleius]' or 'pseudo-Apuleius' for 'Apuleius'. Apuleius identifies himself as Platonist in the text (*Int.* IV). Plato's dialogue *Theaetetus* is referred to for the subject-predicate structure of propositions (*Int.* IV). This does not alter the fact that the logic presented is mostly Peripatetic. A more thorough Platonisation of Aristotle's logic seems to start only a couple of generations later.
- 9 'Almost': there are no parallels to Sextus' Examples 2 and 3 (see below), and there is a discrepancy regarding conditionals (see below Part II). So Sextus is unlikely to have drawn on Apuleius' immediate source. Emma Ramsey mentions several of the parallels between Sextus and Apuleius in the commentary portion of her 2017 on Apuleius. Correia 2017a and 2017b point out similarities between Alexander and Apuleius, suggesting Eudemos or Theophrastus as possible common source. He does not mention Sextus.
- 10 'Mostly': this suggests that other schools may have used such arguments as well. We have evidence for Platonists, and possibly for the Stoics, see below.
- 11 So noted by Annas (1992) for the last two.
- 12 Translations are my own.

This example resembles *modus Barbara*, and this is how Sextus treats it (*PH* 2.163). However, it contains no quantifying expressions, like ‘every’ (*pas* or *pan*), that mark out an Aristotelian proposition as universal; rather, the form of the sentences coincides with those that Aristotle calls indefinite in the *Prior Analytics*.<sup>13</sup> Premises and conclusion are sentences in which the subject expression is an abstract noun formed from a neuter adjective supplemented with the definite article. In line with Greek grammar, the predicate expression is simply a neuter adjective. Such sentences *without* quantified expression (‘the just is noble’, etc.) occur in a small number of texts that present Peripatetic or Platonist logic. Sextus’ Example 1 occurs verbatim also in Philoponus (*APr.* 257.11; cf. 36.21–22). Alcinous (158.38–41) uses the same argument, except with neuter plural expressions as an example of a first figure categorical syllogism and ascribes it to Plato, referring to the *Alcibiades*. The author of the Wallies scholium in the preface of Ammonius’ *Prior Analytics* commentary (x.13–14) has a matching argument with the quantifying expression ‘every’ (*pan*) added to each sentence, and he, too, attributes it to the *Alcibiades*. Such versions *with* the universal quantifying expression (*pan*) in each premise are more common. Apuleius has it in Latin (*omne iustum honestum, omne hoestum bonum; omne igitur iustum bonum est*, 203.13–14). The example also features in the Neoplatonists Proclus (*in Alcibiadem*, Section 318) and Olympiodorus (*in Gorgiam*, ch. 21, sec. 1). So far, these are all Platonist authors. In Alexander the two premises of Example 1 *with* quantifying expression are four times given as illustration of a syllogistic pair (*Alexander, in APr.* 46.24–28, 274.25–29, *in Top* 13.31–32), twice with the conclusion added.<sup>14</sup>

Sextus’ second and third examples are not standard Aristotelian syllogisms either.

#### Example 2 (two versions)

Socrates is human, every human is animate, hence Socrates is animate.

Σωκράτης ἄνθρωπος, πᾶς ἄνθρωπος ζῶον, Σωκράτης ἄρα ζῶον.

*PH* 2.164

13 E.g. *APr.* 24a17–23, with the example ‘pleasure is not good’ (τὴν ἡδονὴν μὴ εἶναι ἀγαθόν).

14 E.g. Alexander, *in Top.* 13.31–32 εἰ γὰρ ἐκ τῶν ‘πᾶν δίκαιον καλόν, πᾶν καλὸν ἀγαθόν’ συνάγεται τὸ ‘πᾶν δίκαιον ἀγαθόν’ [...] ‘For if from the [premises] everything just is noble, everything noble is good it is concluded that everything just is good [...]’ Annas (1992, 224) says about this example that it ‘is found in Alexander in *APr.* 46.17ff, where he is commenting on *APr.* 1 4, on the crucial role of the middle term, in a part of the *Prior Analytics* in which general issues are being debated before the characteristic forms of Aristotelian syllogism are brought in.’ She does not comment on the fact that in Alexander we have quantifying expressions added.

Every human is animate, Socrates is human, hence Socrates is animate.

πάς ἄνθρωπος ζῶν, Σωκράτης δ' ἄνθρωπος, Σωκράτης ἄρα ζῶν.

PH 2. 196

### Example 3

Socrates is a human being, no human being is four-footed, hence Socrates is not four-footed.

Σωκράτης ἄνθρωπος, οὐδεὶς δὲ ἄνθρωπος τετράπους, Σωκράτης ἄρα οὐκ ἔστι τετράπους.

PH 2.197<sup>15</sup>

These two arguments are composed of a singular affirmative premise, a universal premise (affirmative in the second, negative in the third), and a singular conclusion (affirmative in the second, negative in the third). Here quantifier expressions are present. The form of Example 2 has a very remote semblance of *modus Barbara*, the form of Example 3 of *modus Celarent*:<sup>16</sup> instead of a universally quantified term in their first premise and conclusion, these sentences each have a singular subject term. Examples 2 and 3 appear to be the first – surviving – occurrences of arguments of this form as logical examples and the first ones attributed to the Peripatetics. Syllogisms of the forms of Sextus' Examples 2 (and 3?) are known from Peripatetic and Platonist texts. There is one parallel to Example 2 in [Themistius], except that it lacks the quantifying expression.<sup>17,18</sup>

15 'Socrates is four-footed', 'Socrates is not four-footed' are found in Aquinas, *On Interpretation*. 14. section 12. (Sextus' Example 3 as a whole appears to be unique in ancient Greek sources.)

16 *Modus Barbara*: Every A is B, every B is C, so every A is C; *modus Celarent*: Every A is B, no B is C, so no A is C.

17 'Obviously all the conclusions in this [chain argument] occur in accordance with the first figure as follows: Socrates is human, human being is animate, hence Socrates is animate; and again, Socrates is animate, the animate is ensouled, hence Socrates is ensouled; and again [...]' (καὶ δηλονότι πάντα τὰ συμπεράσματα ἐν τούτῳ κατὰ πρῶτον σχῆμα γίνεται οὕτως· Σωκράτης ἄνθρωπος, ὁ ἄνθρωπος ζῶν, Σωκράτης ἄρα ζῶν· καὶ πάλιν Σωκράτης ζῶν, τὸ ζῶν ἔμψυχον, Σωκράτης ἄρα ἔμψυχον· καὶ πάλιν [...]) [Themistius] *APr. Paraphrasis* 145.27–30. Platonists generally seem quite nonchalant when it comes to universal or indeterminate propositions. See also n. 26. This lack of a quantifying expression is also found in Aristotle's *Topics*, e.g. *Top.* 113b17–18 'If human is animate, the not animate is not human' (εἰ ὁ ἄνθρωπος ζῶν, τὸ μὴ ζῶν οὐκ ἄνθρωπος); cf. *Top.* 113b22–24.

18 There are no parallels to Examples 2 and 3 or their forms in Apuleius. But that text has 'Apuleius argues' and similar sentences with singular terms as examples for categorical

### 3 Peripatetic Syllogistic: Quantity

A couple of brief remarks on quantity in Sextus' passages: Sextus does not call the propositions of Example 1 universal propositions. He does not name them. (He refers to one premise as 'assumption', *lēmna*, in *PH* 2.163.) Our text suggests that in Sextus' Peripatetic source the two kinds of propositions in Examples 2 and 3 were called 'universal' propositions (*hē katholikē protasis*, *PH* 2.196, 197 (implied)) and 'particular' propositions (*hē kata meros protasis*, *PH* 2.195, 196, 197 (implied)), respectively. I note here only that *hē kata meros protasis* is not usually used for singular propositions.<sup>19</sup> For the Peripatetic universal propositions, we learn that it is a necessary condition for their soundness or correctness that they have no counterexamples (195).

Like Sextus (*PH* 2.196), Apuleius uses the terminology of universal and particular (*universales*, *particulares*, Apuleius, *Int.* III) for categorical propositions. Unlike Sextus, he seems to use these terms exclusively for propositions that contain a quantifying expression (*Omnis*, *nullus*, *quidam* III ff). Besides universal and particular categorical propositions Apuleius mentions indefinite (*indefinitae*) categorical propositions (ibid.). His example is 'animal breathes' ('*animal spirat*').<sup>20</sup> He explains the term 'indefinite', stating that it is not determined whether the sentence says that every animal breathes or that some animal breathes. It is considered ambiguous between the two.<sup>21</sup> Thus, Apuleius provides evidence that the propositions in Sextus' first Peripatetic example fit into a Peripatetic classification that is current at Sextus' time.<sup>22</sup>

Regarding terminology, Sextus' use of the expression 'universal proposition' (*katholikē protasis*) is of historical relevance, since it is rare in ancient Greek

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propositions (which Apuleius traces back to Plato and which he says are elements of hypothetical or conditional propositions, sentence quoted below, Part II). So the raw material for arguments like Examples 2 and 3 is present.

19 Aristotle uses *kata meros* regularly for (Aristotelian) particular premise-propositions in the *Prior Analytics* (e.g. 25a20, 25a20, 25a29, [...]).

20 Latin would not use definite articles in the way we find it in Aristotle's Greek example for indefinite premise-propositions.

21 This resembles what Aristotle says at *APr.* 43a14–15 and in *Top.* III.6.

22 What kind of objects the terms 'the just', 'the noble', 'the good' in Example 1 are (or signify) is still an open question. They could be Aristotelian universals or Platonic ideas, as Doukas Kapantais reminded me. In Plato's philosophy, justice, nobility and goodness are ideas, and the argument then might express relations between ideas. Since Sextus introduces the examples as 'used mostly by the Peripatetics' and they are called categorical syllogisms, Platonic origin would make sense only if the example is an adaptation of Aristotelian logic for Platonist purposes as we find it later in Alcinous and Neoplatonists. This seems not to be the case here.

texts. It is absent in Aristotle. It occurs twice in Alexander's commentary on the *Topics* (*in Top.* 587.22, 590.18), a couple of times in his *Prior Analytics* commentary (*in APr.* 145.1, 297.18) and also in [Themistius]' paraphrase of that work. It occurs several times in Philoponus' commentary on the *Prior Analytics* (*in APr.* 201.24, 252.32, 325.21, 326.12 and a few more) and twice in Olympiodorus' *Parmenides* commentary. By contrast *katholou* is ubiquitous in commentaries on the *Organon*. The scarcity of the expression for universal propositions and its clustering in just three authors is some indication that here in Sextus we have possibly the beginnings of a specifically Peripatetic syllogistic that was soon overtaken by the more thorough sentence-by-sentence analysis of Aristotle's *Organon* in the commentaries.<sup>23</sup>

#### 4 Classification of Peripatetic Syllogisms: Categorical; First; Indemonstrable

Sextus' casual mention of several Peripatetic (or implied Peripatetic) terms in his presentation and attempted refutation of Peripatetic syllogistic points to several classifications of syllogisms. Additionally, the terminology is helpful for dating Sextus' source. We learn that Sextus' Peripatetic arguments were considered both arguments (*logoi*) and syllogisms. The latter can be inferred from the use of the adverb 'syllogistic' (*syllogistikōs*, *PH* 2.196) and from the facts that the examples are introduced as syllogisms (*PH* 2.163) and discussed as syllogisms (*PH* 2.193).

More specifically, we are told that the arguments '[...] are called categorical syllogisms' (*PH* 2.163). This use of 'are called' suggests that at the time the expression 'categorical syllogism' had not yet become a commonplace.<sup>24</sup> In Galen, Alcinous and most later texts, 'categorical syllogism' is one of a pair of terms, the other being 'hypothetical syllogism'. In Sextus' works on logic there is no mention of hypothetical syllogisms by name.<sup>25</sup> This supports the

23 Alcinous has *katholou* and *epi merous* 159.8–16. His example for a *katholou* proposition lacks the quantifying expression 'every' (*pan*), which Whittaker adds in his edition. Alexander's commentary on the *Prior Analytics* has a variety of expression for the particulars, including *kata meros*, *epi merous*, *en meri*. For the universal, we find mostly *katholou*. The times *katholikos* is used for premise-propositions or premise forms seems to be maximally six.

24 Expressions that are generally known, like *sunēmmenon*, *sullogismos*, are not introduced in this way.

25 *Hupothetikos* occurs only four times in Sextus and no occurrence is of hypothetical arguments or syllogisms: *PH* 1.164, 173, *M* 7.12, and as adverb at *M* 3.12.

hypothesis that Sextus' passage on Peripatetic logic is of a transitional period and belongs at the threshold just before the terminology of categorical and hypothetical syllogisms became part of late ancient logic. Apuleius presents only categorical syllogistic. As in Sextus, we do not find (any Latin equivalent of) the expression 'hypothetical syllogism'. In the text there is no indication of the existence of a second volume on hypothetical syllogistic authored by Apuleius' Greek source. This also squares with dating Apuleius' booklet in the period when Stoic and Peripatetic logic were regarded as complementary. Thus, what would have come closest to (mixed) hypothetical syllogisms, namely Stoic syllogisms, had no Peripatetic counterpart and there was felt no need yet to introduce one.

Even more specifically, we learn that Sextus' examples (or at least the first two) were called *first* categorical arguments (*PH* 2.166). This suggests that they would have been considered arguments of the (or a) first figure (or first mode of the first figure).<sup>26</sup> As we saw, the first example resembles *modus Barbara*. (With interpretation of the indefinites as particulars it would not be valid.) As such it would have been considered a first figure Aristotelian syllogism (in the first mode).<sup>27</sup> Why Examples 2 and 3 might be first categorical arguments is rather less obvious. For now, I just note that this is not simply an error on Sextus' part: [Themistius] Example 2, too, classifies this argument as in accordance with the first figure, and even adds an 'evidently' (*dēlonhoti*, above n. 17). In any case, the mention of first categorical arguments implies that it was known to, and possibly part of, Sextus' source and that there were also second and presumably third (figure) categorical arguments. Apuleius offers the distinction of Peripatetic syllogisms into three figures and fourteen modes, generally following Aristotle's syllogistic (Apuleius, *Int.* IX).

In Sextus, it is implied that a further term was used for his Peripatetic syllogisms. At the end of his discussion of Peripatetic syllogistic he writes: 'The rest of the arguments which the Peripatetics call "indemonstrable" (*anapodeiktos*) should be gone through in the same way' (*PH* 2.198). This implies that Sextus' Peripatetics called arguments like his three examples, or at least the last two, 'indemonstrable'. That the Peripatetics did call their categorical syllogisms of the first figure 'indemonstrable' is confirmed in Alexander (*in Apr.* 54.12).<sup>28</sup> We can see how Sextus' Example 1 could have been counted as

26 For Aristotle's formulation of first-figure syllogisms see *APr.* I 32, 47b1–7.

27 It is so classified – with neuter plurals rather than neuter singulars – by Alcinous (158.39–41, see above).

28 Aristotle uses *anapodeiktos* in his syllogistic with the sense 'undemonstrated' at *APr.* 53a32 and b2, (also). Elsewhere he uses it meaning 'indemonstrable'. In the *Eudemian*

a first mood first figure Aristotelian argument. It is less clear why Sextus implies that Examples 2 and 3 were indemonstrables (but see below). Moreover, Sextus' sentence implies there were more Peripatetic unprovable (moods of) syllogisms than those he offers. That there were more is confirmed by Apuleius, who notes that the first *four* moods of the first figure categorical syllogisms were called indemonstrables (*Int.* IX, *indemonstrabiles nominantur*). Apuleius adds that the designation as indemonstrables signified that those moods are evident and not in need of demonstration.<sup>29,30</sup>

## 5 Induction, Crocodiles, and Stoic Influence in Sextus' Argument

In his discussion of what is in effect Aristotle's definition of 'syllogism', Apuleius talks about inductive inferences as a type of inferences that do not conclude by necessity (*Int.* VII 202.3–12). He produces the example of the crocodile moving its upper jaw when opening its mouth. Its function is to show that there is no necessity in the inductive inference from humans and other animals to the conclusion that all animals move their lower jaw when opening their mouth. (The ancients falsely assumed that crocodiles moved their upper jaw when opening their mouth.) We find this example also in Alexander, used for the same purpose (*in Apr.* 43.26–44.2).<sup>31</sup> Sextus has a very brief section on induction with no mention of crocodiles which matches Aristotle's view (*PH* 2.204).<sup>32</sup> However, he does use the crocodile example in his – attempted – refutation of the validity of the Peripatetic syllogisms exemplified by Examples 2 and 3 (*PH* 2.195–196). His refutation suggests some familiarity with the Peripatetic crocodile example that in Apuleius and Alexander we find in the context of the definition of 'syllogism', and also knowledge of the Peripatetic view that

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*Ethics*, he takes explicit note of the two senses of expressions with an alpha privative ending in '-tos' (*EE* 3.1, 1230b1–3). (See Barnes 1994, 95, Bobzien 2020, n 10.)

29 Bobzien 2020 has a detailed discussion of that passage.

30 At *PH* 2.193 Sextus refers to the Peripatetic arguments he discussed as *apodeiktikoi logoi*, as demonstrative arguments. As Annas 1992, 224 notes, Sextus here incorrectly uses the Stoic – and not the Aristotelian – notion of *apodeixis* (taken from his presentation of the Stoic division of arguments in *PH* 2.134–143) for Peripatetic arguments.

31 Cf. also Ammonius, *in Apr.* 28.32–29.2; Philoponus, *in Apr.* 34.21–26 and Barnes et al. 1991, 104 n. 12. The example is originally from *HA* 516 a 23–25, but it is unlikely that Sextus got it from there (see also Annas 1992, 225, n. 53).

32 Cf. also Alexander, *in Apr.* 43.28–44.2. Like Sextus, Alexander and Alcinous discuss induction (*epagōgē*) without mentioning the crocodile (Alexander, *ibid.*, Alcinous, 158.1–4).

induction proves the whole from the parts.<sup>33</sup> So, it is likely that Sextus' source also contained this anti-induction argument in the context of the Peripatetic definition of 'syllogism'.<sup>34</sup>

Historically it may be of interest that Sextus' own use of this Peripatetic example of non-necessarily concluding arguments contains several Stoic elements. The Stoic stock expression for a proper name, 'Dio' is used next to Plato and Socrates in the example (all three are common in Stoic logic), and the term 'sound' (*hugiēs*) is used for the correctness of a universal proposition. This use of elements of Stoic logic confirms that it was the common or predominant logic at the time.

## 6 The Reverse Statement of the Aristotelian Propositions

There is sufficient evidence for us to assume that Sextus' Peripatetics and Apuleius' logicians belong to the same era. We can say one further thing about this era. Apuleius explicitly remarks that there are two ways of presenting (Aristotelian quantified) categorical propositions. He notes that the Peripatetics express a universal proposition as 'A holds of every B' or as 'Every B is A'. A categorical syllogism (with *Barbara* as example) is either

- (1) A holds of every B
- (2) B holds of every C
- (3) A holds of every C

or presented 'backwards woven' (*pertextus retro*) as

- (1) Every C is B
- (2) Every B is A
- (3) Every C is A

33 PH 2.195 ἐκ τῶν κατὰ μέρος ἐπαγωγικῶς βεβαιούται; Aristotle, *APo.* 81a40–81b1 ἔστι δ' ἡ μὲν ἀπόδειξις ἐκ τῶν καθόλου, ἡ δ' ἐπαγωγή ἐκ τῶν κατὰ μέρος; Alex. in *APr.* 43.26–44.2, induction proves the whole from the parts, ἐκ τῶν μερῶν τὸ ὅλον ἢ πιστούμενόν τε καὶ δεικνύμενον.

34 The example could have been part of a section on induction (*epagōgē*), but this seems less likely, since our sources place it in the discussion of the necessity of a syllogism's concluding.

that is, with a reversal of subject and predicate expression and of the premises (see e.g. Bobzien 2000a, 250). Apuleius' own presentation of categorical syllogisms is in the 'backwards woven' manner. The formulation 'backwards woven' itself makes it clear that the description is given from a perspective of the original Aristotelian formulation. This, together with the fact that it is mentioned at all, suggests that when Apuleius' Greek source was written, the reversal of subject and predicate expressions was a fairly recent incident. In Sextus' brief report from Peripatetic logic, we encounter only the 'backwards woven' formulation. We can assume that neither authors' source belonged to the Aristotle commentator tradition, since the commentaries extensively comment on the original Aristotelian formulations; and that both belong in some indeterminate period after Theophrastus and (for reasons given earlier) shortly before Alexander, a time at which the second formulation had recently become the 'standard' way.

## 7 Sextus' Refutation of Examples 2 and 3

Summing up results so far: comparison of the Sextus passages on Peripatetic logic with Apuleius, Alexander and later ancient logic texts has shown that his source provided mostly standard handbook material. The comparison has also helped us in getting some idea about the relative time of composition of Sextus' source. We are still stuck with the following question: What motivated the strange selection of arguments that Sextus presents as Peripatetic categorical arguments (and as first and indemonstrable syllogisms)? Next I offer a very tentative answer in three steps.

The choice of Examples 2 and 3 enables Sextus to offer an easy – apparent – refutation of Peripatetic categorical syllogisms. It allows him to pit Peripatetic logic against itself. Aristotelian induction, he correctly notes, works from the particulars (*kata merous*), that is from individual cases, to the universal. If Dio, Plato, Socrates, etc., who are each human are each animate, all humans are animate (*PH* 195). But Example 2 works from that universal back to Socrates, that is to an individual, and an individual that was used to back up the universal by induction at that. Hence induction and the syllogism that is Example 2 jointly produce a case of circular reasoning. Sextus' argument is fallacious since induction does not yield results by necessity. Still, it provides a good explanation of Sextus' choice of Examples 2 and 3 instead of standard Aristotelian syllogisms. What it does not explain is why we have Examples 2 and 3 *at all* as Peripatetic.

## 8 Sextus and Aristotle

Let us look at some elements in Aristotle's *Prior Analytics* that could have been considered forerunners of Sextus' Peripatetic syllogisms. As regards Example 1, we saw that the only authors that produce the whole argument with indefinite premises were Platonists. Nevertheless, Peripatetic origin cannot be precluded. We know that in the *Prior Analytics*, Aristotle is not clear on whether the indefinite premise-propositions are to be understood as particular or as universal, and that occasionally he appears to use them as if they are universals.<sup>35</sup> Besides, we find all three terms of Sextus' Example 1 including a version of its first premise, *and without any quantifying expressions*, in a sentence of Aristotle's *Eudemian Ethics* (1249a7–8) 'to the noble and good person the naturally good is noble, for *the just is noble*'.<sup>36</sup> And although in the *Prior Analytics* I.4 (26a28–29) Aristotle treats indefinite propositions as particulars, at I.27 (43a14–15) he is less certain, and in the *Topics* he uses them repeatedly as if they are universals.<sup>37</sup> So Sextus' treatment of Example 1 as if it was in the form of *Barbara* could well have been considered in line with Aristotle's own use of indefinite propositions. So, there is enough material in Aristotle to make it plausible that early Peripatetics introduced Example 1 into logic.

What about Examples 2 and 3? Aristotle offers premise-propositions with singular terms and, in particular, with 'Socrates' both in the *Categories* (chs. 10 and 11, Socrates is ill, well, blind) and in *De Interpretatione* (ch. 7, Socrates is white/not white, wise/unwise, human, biped). In chapter 33 of *Prior Analytics* I, Aristotle discusses two fallacies that contain a singular-term premise and conclusion (*APr.* 47b15–40). The singular terms are 'Aristomenes' and 'Miccalus'. The arguments are fallacious. According to Gisela Striker they are based on an ambiguity between a singular premise on the one hand and an indeterminate premise in universal or particular use on the other (Striker 2009, 216–218). Being fallacies, these two arguments would not have functioned as Peripatetic models for Sextus' arguments. However, if one takes the universal reading of the ambiguity, they provide an argument that shares a form with Example 2: 'Miccalus is educated (*mousikos*) Miccalus. [Every] educated Miccalus will

35 See e.g. Striker 2009, 77, 193–194, 216–218.

36 διότι τῷ καλῷ καὶ ἀγαθῷ καλὰ ἐστὶ τὰ φύσει ἀγαθὰ. καλὸν γὰρ τὸ δίκαιον. Also Arist. *Top.* 141a21 τὸ γὰρ δίκαιον καλόν τι and *Magna moralia* 2 ch 9.2 lines 4–5: ἐπὶ γὰρ τῆς ἀρετῆς τὸν καλὸν καὶ ἀγαθὸν λέγουσιν, οἶον τὸν δίκαιον καλὸν καὶ ἀγαθὸν φασί, τὸν ἀνδρεῖον. Also Aristotle, *Rhet.* 141a21 τὸ γὰρ δίκαιον καλόν τι.

37 In *Top.* III.6, though, he explains the ambiguity of indefinite sentences between universal and particular.

perish tomorrow. Miccalus will perish tomorrow.' (ὁ γὰρ Μίκκαλός ἐστι μουσικός Μίκκαλος. [...] φθείριτο γὰρ ἂν αὔριον μουσικός Μίκκαλος) (*APr.* I 33, 47b32–34). So, the form of Example 2 is lurking in the *Prior Analytics*. With a bit of imagination, one can see Sextus' Example 2 *itself* lurk in *Prior Analytics* I. In chapter 27 (*APr.* I 33, 43a25–32), Aristotle mentions that singular terms, here 'Cleon' and 'Callias', cannot be predicated of anything, but that 'Callias' for instance can have 'human' and 'animate' predicated of him. Then, as an example of a term that can be both predicated of other terms and have terms predicated of it, we get 'human', and – implied – the premise-propositions 'human is predicated of Callias' and 'animate is predicated of human'. This last Aristotelian observation provides the following premise pair if one forges the two cases into premises with subject-predicate term order: 'Callias is human' and 'Every human is animate'. The conclusion that follows from these premises is 'Callias is animate'. The pairing of terms in this conclusion had just been given as the second example of predication of Callias. Thus, one can construct from Aristotle's text an example of an argument that shares the form of Sextus' Example 2 and differs only in its singular subject term. The Peripatetics of the generations after Aristotle could have effortlessly constructed Example 2 from that passage. Another passage of note is in *Prior Analytics* II.21. There Aristotle illustrates why the two premises of a syllogism need to be considered jointly. We learn that with the first premise 'every mule is sterile' considered alone, without considering what appears to be the second premise, i.e. that 'this [female] here is a mule' (with 'sterile' for A, 'mule' for B and 'this [female] here' (*hautē*) for C, it seems), one may mistakenly think that 'this [female] here is pregnant'. This passage, too, suggests that Sextus' Example 2 has roots in Aristotle and that later Peripatetics could have generalized from it.<sup>38</sup>

Hence Peripatetic origin makes sense for all three of Sextus' categorical syllogisms.

## 9 Sextus' Peripatetic Syllogisms and Hypothetical Syllogistic

Even though Example 2 may have seemed easier to refute for Sextus than other Aristotelian syllogisms, we still face the question why, instead of standard Aristotelian categorical syllogisms, Sextus offers three examples of which none is typical for Aristotle. Towards an answer to this residual question, the relation between Sextus' examples and hypothetical syllogisms is pertinent. As it

<sup>38</sup> For in depth discussion of a similar kind of example in *APr.* II 21, 67a13–21 and *APo.* I 1, 71a19–29 see Morison 2009.

happens, the only examples we obtain, and implicitly the only argument forms, are those for which soon after we find modified versions that are expressed in terms of hypothetical syllogisms.

For Example 1, there are corresponding examples that use ‘indefinite’ conditionals instead of ‘indefinitely quantified’ categorical propositions. Such arguments have the form

If something is F, it is G; if something is G, it is H, hence if something is F, it is H.

Such arguments are found regularly in logic texts of post-Galenic antiquity, often under the name ‘wholly hypothetical syllogisms’.<sup>39</sup>

We find a connection between these two kinds of arguments in Sextus himself. At *M* 11.8 he reports: ‘for the one saying “man is a mortal rational animal” says *the same thing* in meaning,<sup>40</sup> though different in expression, as the one saying “if something is human, it is a mortal rational animal” (ὁ γὰρ εἰπὼν ‘ἄνθρωπος ἐστὶ ζῶον λογικὸν θνητόν’ τῷ εἰπόντι ‘εἴ τί ἐστιν ἄνθρωπος, ἐκεῖνο ζῶόν ἐστι λογικὸν θνητόν’ τῇ μὲν δυνάμει τὸ αὐτὸ λέγει, τῇ δὲ φωνῇ διάφορον) (*M* 11.8). The context (*M* 11.8–13, esp. 9) offers evidence that the singular noun without article ‘human (being)’ is understood as universal, that is, as including every human being. The context also shows that Sextus reports a Stoic view, and the passage implies that the universally quantified propositions were taken to express the same, or at least an equivalent, content as the corresponding conditional propositions. Chrysippus called these corresponding propositions indefinite conditionals.<sup>41</sup>

In the Stoic view, what is said (*legei*) in an affirmative sentence is the proposition (*axiōma*, e.g. DL 7.66). For the Stoics, then, the universal ‘categorical’ and the indefinite conditional seem to express the same proposition, with the conditional formulation recommended by the Stoics. Sextus’ text suggests that such propositions were referred to as ‘universal’ (*katholikon* [i.e. *axiōma*]), and that this *included* the case where they are expressed as conditionals. We find the term ‘universal propositions’ used with the *indefinite conditional formulation* in several places, so it cannot just be an error (*M* 11.8, 9, 10, 11; 1.86, Epictetus,

39 Alternatively, they are called syllogisms through three [i.e. hypotheses]. (See Bobzien 2000b for their historical development and sources.) Alcinous, *Didascalikos* 159.7–24, Philoponus, *in APr.* 243, 23–27 have some examples.

40 Or ‘potentially’ or ‘in principle’.

41 See on this point also Bobzien & Shogry 2020.

*Diss.* 2.20.2–3).<sup>42</sup> I take this as sufficient evidence that there was some connection between the Peripatetic universal proposition (*katholikē protasis*) and the Stoic universal assertible (*katholikon axiōma*). Whether the rarely used term *katholikon* moved from Stoic to Peripatetic theory or vice versa, I cannot say. Still, it helps us understand the relation between Sextus' presentation of the Peripatetic syllogisms and the correlated later syllogisms with conditionals: at least some philosophers would have considered them as two ways of expressing the same – or an equivalent – argument. Note that, even though Stoic doctrine *may* have had an impact on the Peripatetics here, there is no evidence that the Stoics themselves accepted such arguments as *sylogistic* in either form(ulation).<sup>43</sup> So Example 1 has a 'hypothetical' correlate that *may* be based on elements taken from Stoic logic, but that is itself (as far as we know) not a Stoic syllogism, and that is later attributed to Theophrastus (and Eudemos).<sup>44</sup>

This leads to another piece of the puzzle we can add. Not only do we know that Theophrastus wrote about some arguments that were later called wholly hypothetical syllogisms; we also know that he claimed that these arguments could be reduced to what would later be called first-figure categorical syllogisms.<sup>45</sup> So, in addition to the – probably Stoic-origin – two possible formulations of *katholika*, there is a Theophrastean connection between Aristotelian 'categorical' syllogisms and early Peripatetic arguments with three conditional premises of sorts.<sup>46</sup>

Examples 2 and 3 similarly point to a development that includes both Peripatetic and Stoic elements. Some sources present arguments in which a conditional takes the place of the universal of Example 2:

42 See also Crivelli 1994, n. 36, Bobzien 1996, Barnes 1997, Caston 1999, 195–199, esp. 197.

43 E.g. Bobzien 1996.

44 Cf. Bobzien 2000b.

45 Alexander, *in APr.* 326.8–12, 20–22, 328.2–5, Philoponus, *in APr.* 302.6–19, Latin Scholium T 13D (Arist. Lat. vol. 3.4 320.7–16 Minio-Paluello), see Bobzien 2000b, 104–105 for details.

46 In the *Prior Analytics* Aristotle himself offers as a valid but non-sylogistic argument 'if what is human is necessarily animate, and what is animate, a substance, then what is human is necessarily a substance' (*APr.* I 47a28–31). This argument appears to have three conditional or hypothetical premisses and it can be considered as the forerunner of the wholly hypothetical syllogisms. (πάλιν εἰ ἀνθρώπου ὄντος ἀνάγκη ζῶν εἶναι καὶ ζῶου οὐσίαν, ἀνθρώπου ὄντος ἀνάγκη οὐσίαν εἶναι· ἀλλ' οὕτω συλλελογίσταται· οὐ γὰρ ἔχουσιν αἱ προτάσεις ὡς εἴπομεν) (*APr.* I 47a28–31), cf. Bobzien 2002. But Aristotle does not say that such arguments can be reduced to (categorical) syllogisms.

Socrates is human; if something is human, it is animate; hence Socrates is animate.<sup>47</sup>

and we can easily construct such a correlate for Example 3:

Socrates is human; if something is human, it is not four-footed; hence Socrates is not four-footed.

Such arguments, at least in their positive form, are known to have been accepted by some Stoics (Augustine, *De dialectica* III, Cicero, *De Fato* 12–14). By the above-mentioned Stoic content equivalence reported in Sextus *M* 11.8–13, the Stoics would also have accepted the original Example 2 as alternative, non-ideal, formulation of valid arguments. Probably they would have accepted the original Example 3, too: In Epictetus' *Dissertations* (2.20.2–3) it is implied that a negative universal of the form 'no S is P' had a conditional correlate 'if something is S, it is not the case that that thing is P'.<sup>48</sup>

Based on Galen's report that some Peripatetics, including Boethus of Sidon, ranked hypothetical syllogisms as primary over categorical ones (Galen, *Institutio logica*, VII.2), I like to think that there was a discussion between Stoics and Peripatetics about the primacy of categorical syllogistic and Stoic syllogistic before Alexander, with some Peripatetics arguing, in line with Theophrastus, that arguments like the hypothetical correlates to Examples 2 and 3 can be reduced to the categorical Examples 2 and 3. Alas, our surviving texts provide no conclusive evidence for this.

## 10 Some Results and Conclusions

(i) The selection of Peripatetic syllogisms reported in Sextus is thus of historical interest for several reasons. First, they are not standard Aristotelian syllogisms, although for both kinds of syllogism there are seeds to be found in the *Prior Analytics*. Second, for both kinds there existed associated arguments

47 This example with the conditional is common in medieval philosophy, e.g. Walter of Burleigh, in the early 12th century. Paulus Venetus, *Logica Parva* 202 also has the example, and it occurs also in Ockham (Stump 1988; Martin 1992; Gabbay & Woods 2008; Schierbaum 2014). In David the Invincible's *Prior Analytics* commentary (surviving as an Armenian translation of the Greek) we find 'This person is a dandy; all dandies are adulterers; so, this person is an adulterer', there implied to be a perfect (non-abbreviated) syllogism (David, *APr*: Lect IX.8–9, Topchyan 94–95).

48 Cf. Bobzien 1996.

that had an indefinite conditional instead of a universal premise (or an indefinite premise understood as universal), one of them known for the Stoics and later ancient logic, the other resembling arguments later connected with Theophrastus. Third, the presentations of the examples, including some of the expressions used, are closer to Stoic formulations than to Aristotle's. It is probable, then, that in Sextus (*PH* 2 and *M* 11) we witness some approximation of elements of Stoic and Peripatetic logic and an assimilation of Stoic and Peripatetic theories of arguments.<sup>49</sup>

We know that in the 2nd century BCE, Academic Sceptics had studied Stoic logic (Carneades 214/3–129/8 BC);<sup>50</sup> that in the 1st century BCE some Stoics were familiar with Aristotle's *Categories*; that first-century Platonists had knowledge of Stoic logic, and that at Galen's time Peripatetics and Platonists were acquainted with Stoic logic.<sup>51</sup> It is thus possible that the Peripatetic syllogisms in Sextus are at least in part the product of such philosophers that were familiar with Stoic logic, and that the choice in Sextus' source of just these syllogisms rather than the standard Aristotelian syllogisms may also have been influenced by a Stoic perspective on syllogistic; moreover that the choice was not directly influenced by the lengthy commentaries on Aristotle's *Prior Analytics* of the kind Alexander produced less than a generation after Galen. So, just shortly before Galen, certain Peripatetic arguments were available that, it seems, would have been considered 'translatable' or 'transformable' into what were later called hypothetical syllogisms. Some of these may have been arguments of Stoic origin. All of them would have been intelligible to the Stoics.

(ii) We saw that probably for all three of Sextus' examples correlated syllogisms with indefinite conditionals were known and that these correlates were in late(r) antiquity called 'hypothetical syllogisms'. Galen, Alexander, Alcinous and later Platonists portray Peripatetic-Platonist logic as encompassing categorical & hypothetical propositions and categorical & hypothetical syllogisms. By contrast, as I indicated earlier (Section 4), none of the terms 'hypothetical argument', 'hypothetical syllogism' or 'hypothetical premise-proposition (*protasis*)' occurs in Sextus. Nor is there in Sextus' logic books evidence for Peripatetic hypothetical syllogisms under a different name, either as examples or by description. (Hypothetical arguments and syllogisms are absent also in

49 The introduction of a Peripatetic conditional (see Bobzien 2025) may be another such case.

50 Also in the 2nd century BCE Critolaus, in Rome with Diogenes of Babylon, criticized the Stoics.

51 Boethus, *Categories* commentary; Plutarch, *E apud Delphi*; Galen; Apuleius; Aulus Gellius.

Apuleius.) These facts, together with Sextus' placement of Peripatetic categorical syllogistic right next to his discussion of the Stoic indemonstrables suggest that when Sextus' source was written, Peripatetic categorical syllogistic and Stoic syllogistic based on Stoic indemonstrables may have been regarded as complementing each other. Something similar is still implied in Galen, where we find Chrysippus' indemonstrables as a kind of remnant in his otherwise mostly non-Stoic *Institutio logica*.

(iii) Pulling all the evidence together, we can say that it is likely that in Sextus (and Apuleius) there is valuable evidence of *a transitional period in later ancient logic* that is marked out as such by a number of characteristics, which include the following:

A Peripatetic term 'categorical syllogism' is newly in use, but no term 'hypothetical syllogism' has been established yet.

Stoic and Peripatetic logic are treated as complementing each other.

The reversion of quantified propositions from predicate-subject to subject-predicate formulation is still fairly new.

The crocodile example is used to show that induction lacks the feature of concluding *by necessity* that is a defining mark of Aristotelian syllogisms.

The use of the expression *katholikē protasis* for categorical universal premise-propositions is distinctive of the period.

The argument forms displayed by Sextus' three examples appear to be indirectly related to the soon-to-appear Platonist hypothetical syllogistic.

There are parallels that suggest that Sextus' source belongs to the same historical period of logic as Apuleius' source and as some probably recent source of Alexander of Aphrodisias' *Prior Analytics* commentary (that is presented along with some later views and arguments, which may include Alexander's own). Small differences between the three authors show that Sextus did not draw from the Greek handbook that was Apuleius' source.

(iv) Compared with the discussion of Stoic logic, Peripatetic logic is given only a tiny bit of space in Sextus *PH* 2. In his more extended book on logic (*M* 8) there is no mention of Peripatetic logic at all. Since Sextus' *Against the Logicians* is likely earlier than his *PH* (e.g. Bett 2005, Bett 2015, Bobzien 2014b), Sextus may have found or made use of a handbook with information about

Peripatetic logic only after he had finished *M* 8. This hypothesis also helps explain another discrepancy between the two texts, *PH* 2 and *M* 8, namely that in *PH* 2, Sextus introduces a Peripatetic definition of the conditional, while in *M* 8 he does no such thing (see Bobzien 2025).

### Acknowledgements

Thanks go to the audience at my talk on Peripatetic logic in Sextus at the Workshop *Sextus' Logic in Context*, in particular Gisela Striker, Justin Vlasits, Doukas Kapantais, Ben Morison and Marko Malink.

### Issue and Editors

This article is part of the special issue “Scepticism and Argument: Sextus Empiricus on Logic”, edited by Máté Veres and Katerina Ierodiakonou.

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