

Ammonius and Philoponus on the Activity of Syllogizing

Luca Gili | ORCID: 0000-0002-7689-9193

Philosophy Department, Faculty of Human Sciences,

Université du Québec à Montréal, Montreal, Canada

gili.luca@uqam.ca

Abstract

According to Philoponus, the activity of drawing syllogisms is a dynamic operation. Following the classical idea that actions are specified by their objects and habitual powers by their actions, Philoponus concludes that only a dynamic power can elicit the act of syllogizing. This power is identified with discursive reasoning (*dianoia*). Imagination, on the contrary, is a static power, that cannot elicit that particular motion of drawing a syllogistic inference. The issue, however, is not entirely uncontroversial, because Ammonius maintains that sophistical syllogisms can only be formed by imagination, since they involve “empty concepts” as terms and only imagination can form such concepts. In this paper I will reconstruct Philoponus’ and Ammonius’ theories about the “activity” of syllogizing, and I shall explain how Philoponus can deal with sophistical syllogisms in a consistent way.

Keywords

Ammonius – John Philoponus – Syllogistic – prior analytics – logic

1 Introduction

John Philoponus makes puzzling remarks on the status of logic in the very first lines of his commentary on Aristotle’s *Prior Analytics* (= *In An. Pr.*).¹ According

¹ John Philoponus’ (c. 490–c. 570) contributions to logic have long been underappreciated. While presenting Philoponus’ commentaries on Aristotle’s *Organon*, Carl Prantl wrote that the Christian commentator was “not an excellent mind” (“Johannes Grammatinus Philoponus

to Philoponus,² discursive reasoning (*dianoia*) is the only (human) faculty capable to make syllogisms, but dialectical and sophistical syllogisms are about ‘objects’ that are known through opinion and imagination and not through discursive reasoning (*dianoia*). In stating this, Philoponus departs from the teachings of his master Ammonius, who maintained that there is more than one

[...] schreib einen Commentar zur Isagoge und einen zu den Kategorien, welcher [...] in der Tradition in Verwirrung mit jenem des Ammonius gerieth; wichtiger als diese sind seine Commentare zu beiden Analytiken, wenn auch Philoponus gleichfalls kein hervorragender Geist ist, sondern mehr mit Abschreiben und Verwässern des Abgeschriebenen sich beschäftigte; er ersetzt wenigstens hiedurch einigermassen den Verlust an den Schriften Alexander's" Prantl (1855, 643); Dumitriu (1977, 299) repeats and probably plagiarizes Prantl's harsh judgment). In a similar vein, I. Bocheński observes that Ammonius and Philoponus are “of far lesser importance” (Bocheński 1968, 104; cf. also Bocheński 1956, 155) when compared to authors like Sextus Empiricus, who contributed little to logic. Bocheński was nevertheless able to recognize Philoponus' contributions to debate on the *inventio medii* (cf. Bocheński 1956, 254–255). The Kneales often refer to Philoponus in a more positive way (cf. Kneale & Kneale 1962, *passim*). The recent *Handbook of the History of Logic* edited by D. M. Gabbay & J. Woods (2004) does not include any reference to Philoponus or Ammonius. Among those who had a more sympathetic approach to late antique commentators on Aristotle's *Prior Analytics*, T.-S. Lee wrote on logic as a formal system in Alexander and Ammonius (cf. Lee 1984, 37–44), A. C. Lloyd, S. Ebbesen, M. Correia and J. Barnes devote engaging pages to the discussion of Philoponus' and Ammonius' opinions on the status of logic (cf. Lloyd 1990, 1–35; Ebbesen 1990; Correia 2004 and Barnes 2007, 454–457), and Freibert compares Ammonius' and Philoponus' opinions on the distinction of the faculties that draw syllogisms and reaches conclusions opposite to mine (in her opinion, both Ammonius and Philoponus distinguish the three types of syllogisms on the basis of their object, cf. Freibert 2017, 157–159 and Gili 2018). I wrote on Philoponus' analysis of the laws of conversions in Gili 2015. To this date, J. Łukasiewicz probably made the most enlightening observations on Philoponus' contribution to the characterization of logic as a formal discipline: “[t]here is another commentator, John Philoponus, who is also fully aware of the significance and importance of variables. He says that Aristotle, after showing by examples how every premiss may be converted, states some universal rules of conversion taking letters instead of terms. For a universal sentence is disproved by one example in which it is false, but is proved either by going through all particulars (which is an endless and impossible operation) or by stating an evident universal rule. Such a rule is given here by Aristotle in letters, and the reader is allowed to substitute (*hypoballein*) for the letters any concrete terms he wants” (Łukasiewicz 1957, 8). On Philoponus' life and works see Sorabji (1987); Verrycken (1990) and Wildberg (2018).

- 2 In this paper, I will refer to John Philoponus' commentary on the *Prior Analytics* as a source to reconstruct Philoponus' understanding of logic. As I shall stress later in footnote 8, Philoponus' commentary is *ek tōn sunousiōn Ammōniou tou Ermeiou* and is thus a freer discussion of topics that were originally dealt with within the context of Ammonius' teaching. Since this paper focuses on a doctrinal disagreement between the commentary by Ammonius and that by Philoponus, it seems safe to assume that the latter reproduces John's own contribution to a debate initiated by his master. It goes without saying that many doctrines expounded by Philoponus can be traced back to Ammonius, as we can easily demonstrate in the case of the commentaries on the *Prior Analytics*, since the commentary by the master is also extant.

faculty that can draw syllogisms.³ In Ammonius' view, the same faculty cannot draw demonstrative, dialectical and sophistical syllogisms. In this paper, I will argue that Philoponus chose to depart from his master's doctrine because he realized that Ammonius' theory could not explain why syllogistic is a *formal* discipline. I will show that Philoponus critically engages with the commentary tradition that preceded him in order to advance a philosophical claim about the *formal* character of logic. Thanks to this critical exegesis, Philoponus gave a decisive, though still underappreciated contribution to the historical development of logic.⁴

2 Philoponus on Different Types of Syllogisms and on the Only Faculty that Syllogizes

At the beginning of his commentary on Aristotle's *Prior Analytics*, John Philoponus observes that a syllogism is a type of knowledge (*gnōsis tis estin*). Knowledge is an intermediate point (*mesē*)⁵ and involves three poles: the knower, the known object and the intermediate point between these two, i.e. knowledge itself.⁶ Philoponus does not expand on this description of knowledge, but it seems reasonable to conclude that knowledge is a relational property involving both its *terminus ad quem* (i.e., the known thing) and its subject (i.e., the knower).⁷ This description of syllogistic echoes the opening lines of

3 For an introduction to Ammonius and his school see Griffin (2016) and Blank (2017).

4 For a recent reconstruction of the ways in which logic is said to be formal see Dutilh Novaes (2011). Dutilh Novaes stresses the historical importance of Alexander of Aphrodisias in presenting the *formal* character of logic as a 'matrix', but does not refer to Philoponus' contribution to the development of this logical notion. MacFarlane (2000) is a classical contribution on the notion of 'form' in logic. For a discussion of Alexander of Aphrodisias and Ammonius on logical form see Lee (1984, 37–44); on logical form and logical matter in the context of syllogistic see also Flannery (1995, 109–145) (the chapter is devoted to Alexander, but Ammonius' and Philoponus' conceptions are discussed on p. 117); Barnes (1990, 2006).

5 Philoponus uses an adjective instead of a noun. I paraphrase his expression for the sake of clarity.

6 Freibert (2017, 168–169) discusses this passage.

7 There is some evidence for this claim in other passages of Philoponus' works. In his commentary on Aristotle's *Categories*, he describes scientific knowledge (*epistēmē*) as a type of knowledge (cf. *In Cat.* 132.9), and scientific knowledge belongs to the category of relatives (see e.g. *In Cat.* 117.15–20). If a species belongs to a given category, all the genera of said species are also subsumed under the same category, since categories are the highest genera of being. Hence, knowledge is also a relative term. For the formation of the notion of category as the highest predicate of being in late antiquity see Gili (2020); for a general overview of the reception of the doctrine of the *Categories* in Late Antiquity and further references to

his master Ammonius' commentary on Aristotle's *Prior Analytics*. According to Philoponus' account, his commentary on the *Prior Analytics* is inspired by his master's classes.⁸ Aside from the similar terminology, there is a philosophical

the debate see Hauer (2017) (Hauer focuses on the question of the *Categories*' aim and on the notion of 'predicate' in several Neoplatonic commentaries). Philoponus, however, also takes *epistēmē* to be a quality (cf. *In Cat.* 140.23 ff.) and does not seem to address the apparent inconsistency of Aristotle's text on the classification of *epistēmē*. When the commentator describes *gnōsis*, he presents it as a subjective concept or *ennoia* (cf. *In Cat.* 12.7–9: "*hoion tou Sōkratous estin onoma hē Sōkratēs phōnē, to de pragma autos ho Sōkratēs, hē de ennoia, hēn echomen en tē psychē, hē peri tou Sōkratous gnōsis*"), but does not specify whether the *gnōsis* is the psychological quality that represents the external object or rather the intentional content of this psychological quality. In other passages, Philoponus merely distinguishes between an absolute knowledge and an opinative one (cf., e.g., *In Cat.* 171.8–11). We shall stress in what follow that the particular knowledge that is syllogistic is better defined as a 'relational activity', i.e. as an activity that is *about* certain things. This terminological inconsistency concerning the uses of *gnōsis* seems never to have been addressed by Philoponus.

- 8 M. Wallies prints this subtitle for Philoponus' commentary: ΕΚ ΤΩΝ ΣΥΝΟΥΣΙΩΝ ΑΜΜΩΝΙΟΥ ΤΟΥ ΕΡΜΕΙΟΥ ("from the attendance at the teaching of Ammonius of Hermias"). The subtitle does not authorize us to maintain that Philoponus' exposition is inspired by his master's doctrines: as we shall see, Philoponus departs in one significant point from Ammonius (*pace* Schramm 2018: 246, according to whom "Philoponos' Kommentar kann man als Quelle für Ammonios heranziehen, da es sich hierbei genauso wie bei dem unter Ammonios' Namen überlieferten Kommentar um eine Nachschrift von dessen Vorlesung handelt und, soweit ein Vergleich möglich ist, kaum inhaltliche Unterschiede zu diesem aufweist"; Lee (1984, 43) accurately observes instead that "Philoponus ist kein bloßer Abschreiber seines Lehrers; er erlaubt sich nicht selten, ein paar Korrekturen vorzunehmen, was leider fast immer alles andere als bessere Ergebnisse bringt"). It should be noted that, even if Philoponus were to be the author of the subtitle, the word 'συνουσία', which I have tentatively translated with "attendance at the teaching", refers to a social intercourse which leaves either party free to have opposite opinions on any given topic (while *apo phōnēs* commentaries closely reproduce their sources, *ek tōn synousiōn* commentaries are a freer rendering of the teaching of the master, cf. Évrard (1965, 596): "Je me bornerai ici aux points que touche M. Westerink. Comme indice du rôle de Jean Philopon auprès d'Ammonius, il allègue, à la suite du P. Saffrey, le fait que les titres de ses Commentaires sur Aristote comportent toujours la mention ἐκ τῶν συνουσιῶν Ἀμμωνίου τοῦ Ἑρμείου. En fait, cette formule n'est attestée par la tradition manuscrite que pour quatre des sept commentaires conservés. Encore faut-il ajouter que, pour trois d'entre eux, la portée en est immédiatement restreinte par l'addition des mots μετὰ τινῶν ἰδίων ἐπιστάσεων, qui impliquent, vis-à-vis d'Ammonius, une certaine liberté dont on trouve d'autres traces, par exemple dans le *Commentaire à la Physique*"). For the distinction between *apo phōnēs* and *ek tōn synousiōn* commentaries see also Richard (1950). If we compare the two commentaries on the *Prior Analytics*, we notice that Philoponus is largely inspired by Ammonius, when they both describe that particular type of knowledge that is syllogistic. Some expressions are identical (the two poles, of which *gnōsis* is the intermediate point, are referred to as *to gignōskon* and *to gignōskomenon* in both authors), in other cases Philoponus paraphrases Ammonius' wording (as in the case of Ammonius' expression *tēn metaxu toutōn gnōsin* which becomes a predicative sentence stating that *hē de gnōsis mesē estī*). Elias summarizes Ammonius' and Philoponus' opinions on the tripartition of

issue that both commentators found worth engaging with. According to Aristotle, any human activity involves at least three elements: the agent's disposition towards the activity, the activity itself and the thing the activity is about. In Aristotle's view, different types of objects distinguish different activities and different human capacities correspond to type-different activities. If syllogistic is an activity, it can either be a unified one (and in that case it should be about the *same* type of object), or it is distinguished into different kinds of activity (which would in turn be about different types of things). Both Ammonius and Philoponus maintain that (i) there are different types of *syllogisms*⁹ and (ii) maintain that "syllogizing" is a human activity. Ammonius, however, infers from (i) that there must be specifically different "syllogistics", whereas Philoponus intends to show that a specifically unique activity of syllogizing is compatible with materially different types of syllogisms. These opposite solutions are arguably the outcome of the same exegetical method, that is supposed to clarify "Aristotle with Aristotle" and that leads to a systematic presentation of the Aristotelian philosophy.¹⁰ Arguably, neither Ammonius nor Philoponus would have developed their opposite considerations on the partition of syllogistic, had they not taken into account Aristotle's claim that the object determines the species of its corresponding act and, through the act, of the corresponding faculty. I will argue for this interpretative claim on the basis of several texts by Philoponus. If we were to limit ourselves to the opening lines of Philoponus' commentary on the *Prior Analytics*, we could be concluding that the Christian commentator did abandon the principle according to which habits and activities are specified by their corresponding objects, inasmuch as he establishes a discrepancy between the objects of syllogistic and syllogistic as an activity. While he engages in a critical confrontation with his

syllogistic in his commentary (cf. Elias, *In Analytica Priora*, 139.14–31 ; Freibert 2017, 169, n. 30 mistakenly thinks that Elias subscribes to this partition, whereas in his opinion there are *five* types of syllogisms, cf. Elias, *In Analytica Priora* 139.5–14). Interestingly, Elias does not mention the theme of syllogistic as a knowledge which is the intermediate point (*metaxu/mese*) between the knower and the known thing. Philoponus employs the tripartition of *ho ginōskōn*, *hē gnōsis* and *to ginōskomenon* in his commentary on Aristotle's *Posterior Analytics* (cf. Philoponus, *In Posteriora Analytica* 88.1–6).

9 For an early distinction of these three types of syllogisms among Platonists see Alcinous, *Didaskalikos* 6.4 (Dillon 1993, 79–80 discusses the possible sources of Alcinous' several classifications of the types of syllogisms). The classification had certainly a 'Platonic' pedigree, but also Alexander of Aphrodisias adopts it (cf. e.g. Alexander Aphrodisiensis, *In Analytica Priora* 7.7–9), thereby confirming its accuracy in the eyes of future commentators of Aristotle's *Prior Analytics*.

10 There is a vast literature on the commentary strategy of late antique commentators. For more detailed references to the debate, I take the liberty to refer to Gili (2011, 11–28).

master, Philoponus seems to be stating that there no perfect correspondence between the knower and known thing. More specifically, Philoponus does not accept the idea that specifically different known things can only be known by specifically different knowing habits.

The syllogism is a type of knowledge. Knowledge is halfway between the knower and the known thing. Since there are three things, the knower, the knowledge and the known thing, it is possible to distinguish syllogisms according to each of these, i.e. on the basis of the knower, of the knowledge and of the known thing. And [we distinguish] on the basis of the knower thus: the knower is either intellect or discursive reasoning or opinion or imagination or perception. But the intellect and perception do not draw syllogisms:

- (i) the intellect does not, because it is more powerful than the simple [faculty] to syllogize (for this reason, also the divine Plotinus says about the intellect that it either grasps or it does not, and is in general not subject to error; in fact, either it grasps the objects with simple intuitions, or it does not grasp the principle, but in both cases it is not subject to error);
- (ii) perception does not syllogize because it is weaker than [the faculty] to syllogize.

But also, imagination does not syllogize, for if it is the fixation and the safe-keeping of what has been shown by perception, and if perception does not syllogize, also [the faculty] that guards what has been shown by perception will not syllogize. The syllogism is a motion from one [point] to another [point], because a different thing, which was not a given, is syllogized from a different [set of premises], but the imagination is the permanence and the safe-keeper of the sensible impressions and does not know anything more than what has received from perception. [The imagination] seems [to be] more similar to permanence than to motion, as its name also shows, because it is a certain *phaostasia*, i.e. a permanence of things that appear. Hence, the imagination does not syllogize either. Therefore, we are left with opinion and with reason. But if we learned that opinion is a conclusion of reason, it is clear that neither does opinion syllogize. Hence, the only possibility left is that, of all the knowing parts of the soul, only discursive reason syllogizes.¹¹

IOANNIS PHILOPHONUS, *In An. Pr.* 1.15–2.13

¹¹ All translations are mine unless otherwise indicated.

Philoponus observes that we can distinguish the types of syllogisms on the basis of three elements, i.e. the knower, knowledge itself and the known thing. In so doing, he follows Ammonius almost *verbatim*. Together with Alexander and Ammonius, Philoponus also maintains that there are three types of syllogisms, i.e. demonstrative, dialectical and sophistical syllogisms.¹² From these premises, it would be natural to conclude – as Ammonius does – that it is possible to distinguish between the different types of syllogisms (three ‘knowledges’) by looking at the (different) capacities that draw them (three ‘knowers’) or at the different objects that are dealt with by the different types of syllogisms (three ‘known things’). Philoponus, however, chooses a different approach and looks at each possible candidate for the intermediate knowledge to rule out all but “discursive reason” (*dianoia*). In Philoponus’ account, the human knowing capacity (*to ginōskōn*) is fivefold:

- (i) intellect (*nous*)
- (ii) discursive reason (*dianoia*)
- (iii) opinion (*doxa*)
- (iv) imagination (*phantasia*)
- (v) perception (*aisthēsis*)

Unlike the other terms, the Greek for ‘opinion’ (*doxa*) does not seem to refer to a faculty or disposition but rather to the very act of entertaining a belief.¹³ Similarly, *aisthēsis* refers to both the act of perceiving and the faculty of perception. Nevertheless, the context suggests that Philoponus is proposing *five* different capacities or dispositions by means of which human beings can grasp something of reality.

Following a distinction that was common among Neoplatonists, Philoponus distinguishes intellect from reason:¹⁴ while the former is the faculty of intuitive

12 To our knowledge, Alexander of Aphrodisias is the first commentator who clearly distinguished three types of syllogisms (cf. Gili 2011, 157–173, esp. 172). This doctrine was not as universally accepted as one might be tempted to think. Ammonius talks about “peirastic syllogisms” as a fourth kind of syllogisms, states that Plato made use of it, but Aristotle did not, and concludes that some people say that the peirastic syllogism is included in the sophistical type (cf. Ammonius, *In Analytica Priora*, 2.18–21). Elias distinguishes demonstrative, poetical, rhetorical, dialectical and sophistical syllogisms (cf. Elias, *In Analytica Priora* 139.5–14).

13 Cf. *LSJ*, sv.

14 The secondary literature on Plato’s divided line analogy is vast. Among recent contributions, see Byrd (2018); Echterling (2018); Rescher (2010). D’Hoine (2018) focuses on Proclus’ reception of the epistemology outlined by Plato with the imagine of the divided line and underlines the importance of this passage from Plato’s *Republic* within the metaphysical

grasping, the latter is discursive knowledge. Philoponus' partition echoes the analogy of the divided line of Plato's *Republic* (VI, 509d–511e) in many significant respects. Plato distinguishes a faculty to conjure about likenesses (*eikasia*), which is the lowest form of knowledge and possibly corresponds to Philoponus' imagination, from 'opinion' (*pistis*), discursive reasoning (*dianoia*) and intellectual understanding (*noēsis*). Even though there is no perfect correspondence in the choice of words, the conceptual framework seems to be the same.¹⁵ In Philoponus' view, 'syllogistic' consists in the very activity of drawing syllogisms and the faculty that draws all syllogisms cannot but be discursive thinking, because the intellectual grasp is motionless, whereas the lower levels of knowledge (opinion, imagination, perception) do not seem to perform any synthetic activity that involves concepts. The only human capacity the act of which is a *motion* from a term to another and that is appropriate to deal with *concepts* is discursive reason (*dianoia*).¹⁶

In his analysis of the knowing capacity (*to gignōskōn*), Ammonius lists only three faculties, i.e. the rational capacity (*to dianoētikon*), the opinative capacity (*to doxastikon*) and the imaginative capacity (*to phantastikon*).

system of the Neoplatonist philosopher. On Proclus' notion of logic see Lernould (1987) and Schramm (2018, 249–256). Schramm convincingly argues that Ammonius and Philoponus might have had Proclus' remarks on logic in mind while they were debating which faculty draws syllogisms (cf. Schramm 2018, 256–262).

- 15 Plato introduces the words *eikasia*, *pistis*, *dianoia* and *gnōsis* only in his final summary of the discussion of the degrees of precision of human knowledge in *Respublica* (= *Resp.* VI, 511e). It is worth noting that *gnōsis* and *nous* are used interchangeably (cf. *Resp.* VI, 511d) and *pistis* seems to be a synonym for *doxa* (cf. *Resp.* VI, 511d–e). Both Ammonius' and Philoponus' word choices are clearly reminiscent of this passage of the *Republic*, where *doxa* is said to be halfway (*metaxu*) the intellect (*nous*) and discursive reason (*dianoia*) (cf. *Resp.* VI, 511 d2–5). Ammonius uses the same term *metaxu* to refer to the position of "knowledge" (cf. Ammonius, *In Analytica Priora* 2.30). Plato states that "reason itself" (*autos ho logos*, i.e. *nous*) is said to "grasp" (*haptetai*) its object (cf. *Resp.* VI, 511 b3–4). Philoponus uses the same verb while describing the activity of *nous* (cf. Philoponus, *In An. Pr.* 1.22; Philoponus refers to Plotinus as the author who stated that *nous* grasps its object by means of a simple intuition and it is likely that he had Plato's word-choice in mind thanks to the mediation of Plotinus (cf. *Enneads*. 1.1.9 ll. 12–13). However, Philoponus chooses the verb *haptō*, like Plato, instead of Plotinus' *ephaptō*).
- 16 In his passage on the divided line analogy, Plato describes the activity of the intellect (*nous*) as a motion of the soul (cf. *Resp.* VI, 510 b4–9). Philoponus seems to present the intellect as motionless, thereby contradicting Plato's description on this point. Plato speaks of the motion of the intellect also in *Sophistes* 248d–e (if actions and passions are motions), but I stress the discrepancy between Philoponus' account of the intellect and the passage on analogy of the divided line because I maintain that the hypotext of Philoponus' discussion is *Resp.* VI, 509d–511e.

You would accurately grasp their differences [i.e., the differences between the types of syllogisms], if, having taken into account these three, the knower, the known thing, and what is between them, i.e. knowledge, you show the difference among syllogisms on the basis of each of these [three]. The soul is the one that knows the things down here by means of syllogisms and it has three faculties, namely it has the rational [faculty], the doxastic [faculty] and the imaginative [faculty]. [The soul] knows everything together with its cause in a scientific way and infallibly by means of the rational [faculty]; by means of the doxastic [faculty], [the soul] knows something correctly and something not correctly, because the opinion (*doxa*) does not have the firmness of discursive reason and sometimes comes close to imagination and stumbles; but imagination is about the phenomena and stumbles.

In An. Pr. 2.29–3.1

The three faculties are ranked according to their degree of certainty, as in the case of Plato's divided line (cf. *Resp.* VI, 511 e2–4: *eph' hois estin alētheias metechei, houtō tauta saphēneias hēgēsamenos metechein*).

Philoponus structures his presentation of the problem along Ammonius' lines and I think that he had to have his master's commentary on his working desk while he drafted the *Proemium*. For this reason, all the terminological differences are worth a closer look.

Ammonius is probably more precise in his word choices, inasmuch as he states that the human soul has three capacities (*hē psychē [...] tridunamos ousa*)¹⁷ and goes on to present each of these capacities with a substantivized adjective, thereby avoiding the ambiguity of the Greek *doxa* while presenting the opinative capacity. Later in his text, Ammonius introduces a stylistic *variatio* and replaces *to dianoētikon* with *dianoia*, *to doxastikon* with *doxa* and *to phantastikon* with *phantasia*. The context makes clear that *doxa* is nothing but *to doxastikon*, thereby dispelling any ambiguity of the word, that usually refers to the mental content of an opining mind rather than to the capacity of forming opinions. In all likelihood,¹⁸ Philoponus might have decided to use the word *doxa* to refer to a capacity rather than to a belief because of Ammonius' use.¹⁹ If this hypothesis is correct, Philoponus' choice to tacitly alter his master's list of faculties that bring about knowledge is a remarkable one. Ammonius states

17 Plato describes his four "capacities" listed in *Resp.* VI, 511e first as "dispositions" (cf. *Resp.* VI, 511 d4: *hexin*) and later as "affections" (*pathēmata*) of the soul (cf. *Resp.* VI, 511 d6–e4).

18 As a confirmation of this hypothesis cf. Philoponus, *In An. Pr.* 32.19–21, where he talks of the *doxastikon* as one of the rational parts of the soul.

19 Among his sources, both Plato (cf. *Resp.* VI, 511 d) and Plotinus (cf. *Enneads* 1.1.9 l. 4) were using *doxa* as a disposition/faculty.

that the soul has only *three* faculties, i.e. reason, opinion and imagination. Even if they were human capacities, intellect and perception are not faculties of a *tridynamos* soul but would be juxtaposed to the soul.²⁰

According to Philoponus, the function of being the ‘knower’ can also be exercised by the intellect and by perception, whereas Ammonius maintains that the soul is the knower (*to gignōskon entautha ta pragmata dia tōn syllogismōn hē psychē*).²¹ Admittedly, Ammonius specifies that the soul knows our surroundings, i.e. the material world (*entautha*).²² This leaves open the possibility that the intellect is also a knowing capacity of human beings, even though it only knows objects belonging to another world. This hypothesis could help us solve an inconsistency arising from other texts, where Ammonius proposes a different partition of the soul. In his commentary on Porphyry’s *Isagoge*, Philoponus’ master observes that there are two types of activities of the soul, i.e. knowing activities and the activities that we have in common with animals. The first include the intellect and Ammonius goes on by saying that these activities are *parts* of the soul and form the *gnōstikon* in us, i.e. our knowing capacity.

Furthermore, there are two activities of our soul, the knowing [activities], like the intellect, reason, opinion, imagination and perception, and the animal and appetitive [activities], like deliberation, spirit, and desire. The philosopher wants to systematize all the parts of the soul and to bring them to perfection and the knowing capacity in us is brought to completion by the theoretical [activities] and the animal [capacities] are brought to completion by the practical [activities].

AMMONIUS, *In Porphyrii Isagogen Sive Quinque Voces* 11.17–21

20 Where does Ammonius find this doctrine of the tripartition of the soul? Plato talks about three parts of the soul (cf. *Resp.* IV 435e–436b and *Phaedrus* 246a–b, cf. Singpurwalla (2019)) but the three parts do not match Ammonius’ list. Among the rare occurrences of the adjective *tridunamos*, Proclus (412–485) does not use it to qualify the soul (cf. *In Parmenidem* 1215, l. 11; *In Timaeum* 41, l. 20), Hierocles of Alexandria (active around 430 AD) does (cf. *Hieroclis in Aureum Pythagoreorum carmen commentaries*, ch. 6.4, l. 1). Didymus the Blind (c. 313–398) states that most people say that the soul is *tridunamos* (cf. Didymus Caecus, *Commentarii in Ecclesiasten* 337, l. 11), but he clearly refers to Plato’s partition (cf. Didymus Caecus, *Commentarii in Ecclesiasten* 337 l. 15). Ammonius was thus not the first to use the adjective *tridunamos* to describe the soul, but the extant evidence suggests that he was the first to do so in order to distinguish discursive reasoning, opinion and imagination as three different cognitive capacities of the soul.

21 It is worth noting that Plato’s distinction of four cognitive powers appears at the end (cf. *Resp.* VI 511e) of a discussion on knowledge and the objects of knowledge (cf. *Resp.* VI 509 b), as is the case for Ammonius and Philoponus.

22 Greek philosophers often use the adverb *entautha* to refer to things “down here” as opposed to things *ekei* (i.e., “up there”). See, e.g., Aristotle, *Metaphysics* 990b34.

This text is difficult to interpret because it seems to imply that the intellect is not only an activity (*energeia*), but also a *part* of the soul (*panta ta tēs psychēs merē*). If it is a part, is it also a capacity? The problem needs to be unpacked. Ammonius explicitly states that the intellect, reason, opinion, imagination and perception (*nous dianoia doxa phantasia kai aisthēsis*) are *activities* (*energeiai*) of the soul. In the following sentence, he adds that any philosopher is supposed to bring to perfection *each part of the soul*, i.e., both the knower in us (*to en hēmin gnōstikon*) and the ‘animal’ part (*to zōtikon*). From the context, it is reasonable to infer that the knowing part reaches perfection through the exercise of the theoretical activities.²³ The expression ‘part of the soul’ is ambiguous in that it could obviously refer to the Platonic tripartition (for a late antique example, cf. e.g. Alexander of Aphrodisias, *In Topica* 410.11–13) or to the Aristotelian distinction of different capacities of the soul (cf. e.g. Aristotle, *De Anima* 433b1–2; cf. also Alexander of Aphrodisias, *In Metaphysica* 424.30)²⁴ or even to a distinction between rational and non-rational elements in the soul (cf. e.g. Aspasius, *in Ethica Nicomachea* 37.3). The expression *merē tēs psyches* (“parts of the soul”) is a *hapax* in Ammonius’ extant writings, but I think that the philosophical meaning of the passage entails that we should posit a part-capacity for each of the different perfecting activities. If intellect, reason, opinion, imagination and perception were the perfecting activities of a single part of the soul (e.g., of the ‘rational part’), it could be inferred that said part would not be perfect if all these activities were not to be performed at the same time. But it seems contrary to our common experience to maintain that we can both attain intellectual knowledge and opine or perceive at the same time. The above passage is not only consistent with but also invites an interpretation according to which we should posit a corresponding part/capacity for the *nous*-activity of the soul. This conclusion squares with the commentary on Aristotle’s *De Anima* written by John Philoponus but based on the lectures given by Ammonius.²⁵ In conclusion, Ammonius maintained that there are as

23 My translation presupposes this interpretation and supplies an implicit “activities” to translate *dia oun tou theōrētikou*.

24 On Aristotle’s theory of parts and capacities of the soul see Corcilius & Gregoric (2010). According to K. Corcilius and P. Gregoric, the parts of the soul are more fundamental capacities and there are less fundamental capacities that are not parts of the soul. For our purpose, it is important to stress that the parts of the soul are *capacities*. Interestingly, Ammonius might have distinguished different types of ‘parts’ of the soul, according to Philoponus’ *reportatio* (see on this the following footnote).

25 In Philoponus’ reconstruction, Plato was aware of the longer list of ‘parts’ of the soul that we find in Aristotle. If the text faithfully reproduces Ammonius’ teaching (but see again footnote 8 on the issue), there is no reason to doubt that for the latter the intellect is a part of the soul: cf. John Philoponus, *In Aristotelis De anima libros commentaria* 565.20–34.

many parts or capacities as there are activities of the soul. Since there are at least five theoretical activities, we are led to a further question. If the soul has other *parts* other than reason, opinion and imagination, why did Ammonius maintain that the soul is tripartite in his commentary on the *Prior Analytics*? The lack of textual evidence makes it difficult to answer to these questions.²⁶ It is not useless, however, to stress this internal contradiction that any charitable reader of Ammonius would have had to solve, if the issue was not already addressed by Ammonius himself.²⁷ And Philoponus was such a charitable reader. Philoponus chose not to consider the intellect as the *gnōstikon* that reasons by means of syllogisms, thereby following what Ammonius implies in his commentary on the *Prior Analytics*, where the soul is said to draw syllogisms and intellect is not included among the powers of the soul. But while discussing the candidates to the role of ‘knowing capacity’, Philoponus followed his master’s doctrine, as it is expounded in the latter’s commentary on Porphyry’s *Isagoge*, and states that the intellect is indeed a *ginōskōn*.

Philoponus’ interpretative strategy aims at critically engaging with the commentary tradition, and especially with Ammonius, with the aim of presenting the doctrines of previous commentators in a consistent way. The philosophical device to harmonize Ammonius’ seemingly conflicting opinions consists in omitting any reference to the soul. In this way, Philoponus does not have to specify whether intellect, reason, opinion, imagination and perception are acts (*energeiai*) or capacities (*exeis*) of the soul: he can simply describe them as ‘knowers’.²⁸

Philoponus’ exegetical approach, however, is not limited to the harmonization of his master’s doctrines. The Christian commentator is philosophically acute and does not abstain from departing from Ammonius if there is a significant doctrinal pay-off. Philoponus was consistently committed to the idea that

26 The answer to the question raised in the body of the text goes beyond the scope of this paper, but it seems reasonable to maintain that Ammonius himself did not see any contradiction in the two lists of part/capacities of the soul. The longer list is based on Aristotle’s *De Anima* and makes explicit what Plato hinted at in his writings (see again John Philoponus, *In Aristotelis De anima libros commentaria* 565.20–34).

27 The discussion in John Philoponus, *In Aristotelis De anima libros commentaria* 565.20–34 is aimed at solving this apparent contradiction in Ammonius’ extant writings. The author of the distinction between the two lists of capacities/parts of the soul may either be the writer Philoponus or Ammonius himself.

28 I am not implying that for Philoponus these “knowers” are not faculties of the soul. He states that explicitly later in his commentary on Aristotle’s *Prior Analytics* (cf. Philoponus, *In An. Pr.* 32.16–17). But in the *Proemium*, where he would have contradicted explicitly Ammonius, had he written that only a faculty of the soul syllogizes, Philoponus prefers to leave aside the characterization of each “knower” as a “part of the soul”.

logic has a *formal* character – an idea that Ammonius eloquently expounded, but the consequences of which might have been more evident to Philoponus. I suggest that John the Grammarian maintained that only discursive reason (*dianoia*) can make syllogisms in order to safeguard the formal character of syllogistic validity.

3 Philoponus on Logical Form

In his commentary on the *Prior Analytics*, Ammonius states that it is the soul that knows through syllogisms. It is reasonable to infer that, even if the intellect were in a position of being a *gignōskon* of some kind, it would not be such because it draws syllogisms. Ammonius adds that the types of syllogisms may be distinguished on the basis of the capacities of the soul that draws them. Hence, discursive reason makes scientific syllogisms, the opinative capacity makes dialectical syllogisms and imagination makes sophistical syllogisms.

Do infer the differences among syllogisms from the differences of these knowing capacities of the soul. The demonstrative and scientific [syllogisms] proceed by means of true demonstration in a scientific manner, e.g. I want to demonstrate that the soul is immortal and I say: the soul is self-moving; everything that is self-moving is eternally in motion; everything that is eternally in motion is immortal, hence the soul is immortal. The dialectical doxastic syllogisms proceed from reputable opinions, e.g. that lady is pale, whoever is pale has given birth, hence that lady has given birth. This is seemingly true and is also seemingly false. It is likely that the lady who has given birth is pale, but it is also likely that a lady who has not given birth [is pale] for some other reason. And also, in this [example]: so-and-so embellishes himself, whoever embellishes himself is an adulterer, hence so-and-so is an adulterer. It is possible that someone embellishes himself without being an adulterer. The sophistical [syllogisms] are imaginative and not apparent, e.g. what someone sees, this sees, someone sees the wall, hence the wall sees. The one-eyed sees; whoever sees has eyes; hence, the one-eyed has eyes. Let the very difference of these [syllogisms] be taken from the knowing [capacity], for it is taken from the powers of the soul that knows the things down here by means of syllogisms.

AMMONIUS, *In Aristotelis Analyticorum Priorum Librum I Commentarium* 3.1–17

In the above passage, Ammonius seems to implicitly states that Plato might be regarded as the philosopher who discovered syllogisms, because the example

of a 'scientific syllogism' seems to reproduce the argument for the immortality of the soul advanced by Socrates in the *Phaedrus*.²⁹ Ammonius establishes a correspondence between the degrees of certitude of the knowledge of each of the three capacities of the soul and the degrees of certitude of the conclusions of demonstrative, dialectical and sophistical syllogisms. His phrasing, however, suggests that one can distinguish the types of syllogisms from the number of the faculties of the soul. In so doing, Ammonius inverts the Aristotelian principle according to which the type of the activity determines the type of its corresponding power or capacity and the type of the object determines the type of its activity. The Latin scholastic motto sums up well the idea: 'potentiae specificantur per actus, actus per objecta'.³⁰ In his commentary on Aristotle's *De anima*, Philoponus, who claims to be reporting the doctrines of his master Ammonius, endorses the principle.³¹ In his commentary on the *Prior Analytics*, however, Ammonius states that the species of a given object is determined by its corresponding power or capacity, the activity of which is about said object. This doctrine is at odds with the above-mentioned Aristotelian principle and Ammonius' claim is grounded on an unorthodox epistemology.³² But there is a further philosophical reason to abandon Ammonius' claim.

29 Cf. Plato, *Phaedrus* 245 c – e. In the long Platonic tradition, there had been an effort to show that Plato did employ all types of syllogisms expounded by Aristotle in his *Prior Analytics*. For an early proponent of this attitude see Alcinous, *Didaskalikos* 6.3–11 (on the possible sources of Alcinous see Dillon (1993, 82–83)). In a similar vein, Philoponus suggests that Plato uses hypothetical syllogistic in the *Phaedo* (cf. Philoponus, *In An. Pr.* 241.34–242.7).

30 Aristotle explicitly endorsed this principle in *De Anima* B, 4, 415a14–22.

31 Cf. Iohannes Philoponus, *In Aristotelis De Anima libros Commentaria* 263.25–264.2 and 264.3–266.2. See especially 264.32–33 (*tēn men oun dunamin horizomenoi chreian echomen tēs energeias*, "when we define a faculty we need the actuality") and 264.36–265.1 (*palin tēs energeias kata ton auton logon protera esti ta antikeimena*, "and according to the very same definition, the objects are prior to actuality").

32 Ammonius distinguishes the types of syllogisms also on the basis of their objects, cf. Ammonius, *In Analytica Priora In Analytica Priora* 3.19–22. According to him, some objects are always existent and unchangeable, others are not existent, as in the case of the goat-stag or *blityri*, others are partly existent and partly non-existent (*pē men onta pē de ouk onta*), as in the case of things that undergo generation and corruption. Ammonius does not develop this classification any further, but one might wonder whether it is a very helpful one. It is obviously consistent with core Platonic tenets to claim that demonstrative syllogisms can only be about unchangeable objects and Aristotle himself might have some difficulties in presenting scientific syllogisms, i.e., syllogisms with necessary premises and conclusions (according to *Analytica Posteriora* A, 2), that are about changeable things, unless for him the science of nature can only be about the *propria* of changeable beings. One could also see why Ammonius would say that there can only be opinative syllogisms about corruptible beings, because Plato maintained that there is no science of the sensible world. However, it is difficult to understand whether Ammonius would have

Contrary to his master Ammonius, Philoponus maintains that it is only discursive reason (*dianoia*) that makes syllogisms, even though the *matter* of the different types of syllogisms is offered by different capacities of the soul. In so doing, Philoponus is implicitly distinguishing between the *form* and the *matter* of a syllogism.³³

So far interpreters have been focusing on the debate concerning the status of logic to outline the distinction between logical matter and logical form in the Alexandrian commentators.³⁴ In Ammonius' and Philoponus' reconstruction, the Peripatetics maintained that logic is an instrument of philosophy, whereas the Stoics maintained that is a part of it.³⁵ As Correia (2004) argues, this is tantamount to stating that for Alexander an "empty" logic, i.e. a syllogistic that is of no use in the context of philosophical research, would be meaningless and superfluous.³⁶ In other words, Alexander was never considering logical forms without their matter, even though he recognized that the validity rests on the syllogistic form, not on the matter of any valid syllogism. In M. Correia's

consistently maintained that sophistical syllogisms are only about non-existing things, like the goat-stag or *blityri*. If he did, his position would have been tantamount to say that, if fallacies are sophistical syllogisms, there cannot be fallacies involving terms that have an extra-mental reference, i.e. all fallacies are about *entia rationis*. Freibert (2017, 178–180) fleshes out Ammonius' doctrine of "empty concepts" (*leere Begriffe*) and stresses that imagination is the only faculty that can form empty concepts inasmuch as it joins together incompatible properties, as in the case of the goat-stag. One could object, however, that imagination is also the faculty of preserving images that are formed out of sense data. Therefore, from the premise that imagination is the faculty that makes sophistical syllogisms, it does not follow that sophistical syllogisms are about "empty concepts" or empty representations, unless one were to adopt an unorthodox characterization of imagination, according to which this faculty can generate only empty representations. There is no evidence, however, that Ammonius understood imagination in these terms.

33 Correia 2004 is an insightful paper on the matter/form distinction and the status of logic in Philoponus. See also Lee (1984, 42–43); Lloyd (1990, 17–27) and Schramm (2018) for the logical matter/logical form distinction in Philoponus.

34 Aristotle seems to introduce the distinction between logical form and logical matter in his *Physics* B, 3, 195a15–19. Philoponus' commentary on this passage (cf. Ioannes Philoponus, *In Aristotelis Physicorum libros tres priores commentaria* lib. 11, 246.24–247.6), however, does not dwell on the distinction between logical form and logical matter, that the Alexandrian commentators outline mostly in the context of the debate on the status of logic.

35 Cf. Ammonius, *In Analytica Priora* 9.36–10.34 and Ioannes Philoponus, *In An. Pr.* 6.19–9.20. As a representative of the Aristotelian position, Ammonius and Philoponus most certainly had Alexander in mind (cf. Alexander Aphrodisias, *In Analytica Priora* 1.3–4.29). For a discussion of these passage see Correia (2004) and Schramm (2018, 263–267).

36 Cf. especially Alexander Aphrodisias, *In Analytica Priora* 4.28–29.

wording, Aristotle conceives of logic as “formal”, not as “formalistic”.³⁷ The Stoics, on the other hand, observe that arts or sciences are about objects that can be regarded either as constitutive elements or as parts of these arts and sciences.³⁸ Since philosophers are definitely dealing with logic, logic should be either a constitutive element (*morion*) or a part (*meros*) of philosophy. A constitutive element shares the goals and the material object of other parts of the same art/science. Logic, however, seems not to be sharing goals or matter with any other part of philosophy. Therefore, the Stoics conclude, logic is a part of philosophy. In Philoponus’ reconstruction, the Stoics look at logic as a system and are interested in developing all the theorems of this system. Alexander, on the other hand, maintains that logical theorems that do not have any application are superfluous, because logic is nothing but the underlying deductive tool of every science and of every inquiry. Ammonius and Philoponus maintain that logic is both a part and an instrument of philosophy and believe that also Plato understood the nature of logic in this way. In Philoponus’ summary, logic “without [its] matter will be a rule and an instrument, but [when it is taken] together with things and [its] matter, it is a part [of philosophy]” (*In An. Pr.* 9.19–20). As Correia (2004) points out, Alexander and Philoponus do not seem to understand the instrumentality of logic in the same way. Alexander thinks of logic as an instrument, because he looks at its use with a given matter. Philoponus thinks that the instrumentality of logic means that it is a “rule” for our reasoning and that Aristotle looks at the instrument independently of its matter.

But both Alexander and Philoponus stress the *formal* character of logical validity in the context of the discussion of the status of logic.³⁹ For Philoponus,

37 Cf. Correia (2004, 252), with references to MacFarlane (2000, 250) and Łukasiewicz (1957, 15). Correia refers to Aristotle, *Physics* 193a4–9 as evidence that for Aristotle it would not be possible to produce “a proper syllogism by using mere letters” (Correia 2004, 251).

38 Cf. Iohannes Philoponus, *In An. Pr.* 6.26–28.

39 For Alexander’s description of the formal character of logical validity see Alexander Aphrodisias, *In Analytica Priora* 6.16–21. Philoponus does not describe the syllogism as a ‘matrix’ (*typos*) in his *corpus*. Like Alexander, he maintains that the ‘syllogism’ is the ‘genus’ of several types of arguments, i.e. scientific, dialectical and sophistical syllogisms. While commenting on Aristotle’s statement that it is necessary to focus first on syllogism and later demonstration (Aristotle, *An. Pr.* A 4, 25b28–29), Philoponus observes that a presentation on syllogisms is “more general” than a presentation on demonstrations, cf. Ioannes Philoponus, *In An. Pr.* I 71.26–31). Dutilh Novaes (2011) offers a useful taxonomy of the ways in which logic is said to be “formal” and distinguishes the form understood as a “matrix”, i.e., as a scheme (an idea that seems to capture Alexander’s intuition, as Dutilh Novaes 2011, 307 observes) from form understood as introducing topic-neutrality or inferential rules (these latter characterizations appear to better represent to Philoponus’ ideas).

logic is formal because is general and normative and because the validity of its theorems do not rest on their matter. Interestingly, Philoponus uses the adjective “general” (*katholikos*) and the adverb “in a general way” (*katholikōs*) also to explain why Aristotle employed letters in his syllogistic.⁴⁰

Having shown that each of the propositions converts by means of examples, in order to avoid that one may think that the discourse about the conversions is valid because of the matter of the assumed propositions or because some other reason (it is not clear whether there are no examples in which the abovementioned conversions do not take place), he gives here general rules by taking letters instead of terms, so that each one may take the matter one wants to replace the letters, because the demonstration has been advanced in general and immaterial way (*aulōs*) about the letters.

IN AN. PR. 46.25–47.1

Philoponus is certainly working with materials that can be traced back to Alexander,⁴¹ but it is clear from texts like the above one that he brings a personal contribution to stress that logic is formal. If logic is formal, whenever we *do* logic we make the same type of operations, i.e., we draw valid inferences. Since the validity of an inference does not rest on its matter, demonstrative, dialectical and sophistical syllogisms are all equally valid. The operation of drawing a syllogism is thus *formally* identical regardless of its type and it is reasonable to conclude that only one faculty can perform this activity. Philoponus offers detailed arguments to prove that discursive reasoning is the faculty that draws syllogisms,⁴² but it is worth stressing that there is a hidden premise in his analysis: there cannot be more than a single faculty that syllogizes, because to draw demonstrative or dialectical or sophistical syllogisms is *formally* the same operation. The operations of the intellect or of the opinative faculty are formally different from the activity of syllogizing inasmuch as they do not involve a middle term (cf. Philoponus, *In An. Pr.* 32.19–21). The presence of a middle term is a formal characteristic of all valid arguments, as Philoponus will argue later in his commentary (cf. Philoponus, *In An. Pr.* 241.5–24). Whenever

40 There has been a debate on Aristotle’s use of letters in the context of his syllogistic. Scholars either maintained that letters are first-order variables (Łukasiewicz 1957) or that they are individual constants (cf. Frede 1974). For an overview of the debate and a discussion of the relevant texts see Barnes (2006) (who sides with M. Frede).

41 Cf. Alexander Aphrodisias, *In Analytica Priora* 53.28–54.2.

42 Cf. Iohannes Philoponus, *In An. Pr.* 31.30–32.24.

we connect terms to form a proposition and we connect propositions to form a syllogism, we make use of a faculty that operates in a discursive way. This faculty is discursive reasoning, *pace* Ammonius.

4 Conclusion

Philoponus looks at the activity of syllogizing as a formally unified activity, that can deal with materially different types of syllogisms. The formal unity of the activity entails that there should be but one faculty of the souls that syllogizes, i.e., discursive reasoning (*dianoia*). A syllogism is a connection of two or more propositions in order to infer a third proposition (cf. Philoponus, *In An. Pr.* 64.10–32) and this is a *formally* unique type of valid inference that we encounter while we demonstrate or argue dialectically or sophistically. Unlike Ammonius, Philoponus seems to be more aware of the fact that stressing the formal validity of syllogisms entails that the activity of syllogizing cannot be type differentiated. Ammonius maintained that different faculties of the soul make different types of syllogisms: discursive reason makes demonstrative syllogisms, the opinative capacity makes dialectical syllogisms, and imagination makes sophistical syllogisms. Philoponus has a precise understanding of the *formal* character of logical validity and stresses that demonstrative, dialectical and sophistical syllogisms are *formally* identical, even though they deal with different *matters*. The psychological corollary of this logical claim is that the operation of syllogizing is identical in all types of syllogism being considered. If there is only one operation, there must be also one single capacity of the soul that deals with syllogisms, i.e., reason. Scholars maintained that Philoponus gave a substantial contribution to the history of logic by stressing the *formal* character of logical validity. In this paper, I showed that this logical intuition was supported by a consistent and rigorous philosophical theory about the operation of syllogizing.

Acknowledgements

I presented a first version of this paper at the conference “Logic and Exegesis” organized by Pieter d’Hoine, Jan Opsomer, and Irini-Fotini Viltanioti on January 10–11, 2019 and a second version at UQÀM within the “Travaux en cours” seminars on October 16, 2019. I thank my Leuven respondent, Jonathan Greig, and Mauro Bonazzi, Katerina Ierodiakonou, Luc Faucher, Dario Perinetti for

their comments on these occasions. I thank Alberto Kobec, Michael Schramm, and the two anonymous reviewers of the journal for their objections and remarks on later versions of the paper. Remaining mistakes are only mine.

Bibliography

Primary Texts

- Ammonius. In *Porphyrii Isagogen Sive Quinque Voces*. A. Busse (ed.), 1891. Berlin: Reimer.
- Ammonius. In *Aristotelis Analyticorum Priorum Librum I Commentarium*. M. Wallies (ed.), 1899. Berlin: Reimer.
- [Didymus the Blind.] Didymos der Blinde, Kommentar zum Ecclesiastes (Turapapyrus), Teil VI, G. Binder & L. Liesenborghs (eds.), 1969. Bonn: R. Habelt.
- [Philoponus.] *Ioannis Philoponi in Aristotelis analytica priora commentaria*. M. Wallies (ed.), 1905. Berlin: Reimer.
- [Philoponus.] *Ioannis Philoponi (olim Ammonii) in Aristotelis categorias commentarium*. A. Busse (ed.), 1898. Berlin: Reimer.

Secondary Literature

- Barnes, J. 1990. Logical Form and Logical Matter. In: Albeti, A. (ed.), *Logica, Mente e Persona*. Florence: Leo S. Olschki, 7–119.
- Barnes, J. 2006. Osservazioni sull'uso delle lettere nella sillogistica di Aristotele. *Elenchos* 26(2), 277–304.
- Barnes, J. 2007. *Truth, etc. Six Lectures on Ancient Logic*. Oxford: Oxford University Press / Clarendon.
- Blank, D. 2017. *Ammonius*. In: Zalta, E. *The Stanford Encyclopedia of Philosophy* (Winter 2017 Edition). URL: <<https://plato.stanford.edu/entries/ammonius/>>
- Bocheński, I. M. 1956. *Formale Logik*. Freiburg—Munich: K. Alber.
- Bocheński, I. M. 1968. *Ancient Formal Logic*. Amsterdam: North-Holland Publishing Company.
- Byrd, M. 2018. Mathematics, Mental Imagery, and Ontology: A New Interpretation of the Divided Line. *The International Journal of the Platonic Tradition* 12(2), 111–131.
- Corcilius, K. & Gregoric, P. 2010. Separability vs. Difference: Parts and Capacities of the Soul in Aristotle. *Oxford Studies in Ancient Philosophy* xxxix, 81–119.
- Correia, M. 2004. Philoponus on the Nature of Logic, *Apeiron* 37(3), 247–258.
- D'Hoine, P. 2018. The Metaphysics of the “Divided Line” in Proclus: A Sample of Pythagorean Theology. *Journal of the History of Philosophy* 56(4), 575–599.
- Dillon, J. 1993. Alcinoüs. *The Handbook of Platonism*, translated with an Introduction and Commentary by J. Dillon. Oxford: Clarendon Press.

- Dumitriu, A. 1977. *History of Logic. Volume I*. Tunbridge Wells: Abacus Press (Original: Dumitriu, A. 1975. *Istoria Logicii*. Bucharest: Editura didactica).
- Dutilh Novaes, C. 2011. The Different Ways in Which Logic is (Said to Be) Formal. *History and Philosophy of Logic* 32(4), 303–332.
- Ebbesen, S. 1990. Philoponus, 'Alexander' and the Origins of Medieval Logic. In: Sorabji, R. (ed.), *Aristotle Transformed. The Ancient Commentators and their Influence*. London: Bloomsbury, 445–461.
- Echterling, T. 2018. What Did Glaudon Draw? A Diagrammatic Proof for Plato's Divided Line. *Journal of the History of Philosophy* 56(1), 1–15.
- Évrard, É. 1965. Jean Philopon, son Commentaire sur Nicomaque et ses rapports avec Ammonius (à propos d'un article récent). *Revue des Études Grecques* 78(371/373), 592–598.
- Flannery, K. 1995. *Ways into the Logic of Alexander of Aphrodisias*. Leiden: Brill.
- Frede, M. 1974. Stoic vs. Aristotelian Syllogistic. *Archiv für Geschichte der Philosophie* 56, 1–32.
- Freibert, B. 2017. *Die aristotelische Logik—erklärt von ihren antiken Interpreten. Studien zu Literatur und Erkenntnis*, 10. Heidelberg: Universitätsverlag Winter.
- Gabbay, D. M. & Woods, J. 2004. *Handbook of the History of Logic. Volume 1. Greek, Indian and Arabic Logic*, Amsterdam.
- Gili, L. 2011. *La sillogistica di Alessandro di Afrodisia. Sillogistica categorica e sillogistica modale nel commento agli Analitici Primi di Aristotele*. Hildesheim: Georg Olms.
- Gili, L. 2015. Il confronto di Giovanni Filopono con Alessandro di Afrodisia intorno al problema della conversione delle proposizioni. *Elenchos* 36(2) 317–339.
- Gili, L. 2018. Freibert, B. 2017. Die aristotelische Logik—erklärt von ihren antiken Interpreten. Studien zu Literatur und Erkenntnis, 10. Heidelberg: Universitätsverlag Winter. *Bryn Mawr Classical Review*. URL: <<https://bmc.brynmawr.edu/2018/2018.04.60>>
- Gili, L. 2020. *Categories in Alexander of Aphrodisias*, *Ancient Philosophy* 40(2), 453–468.
- Griffin, M., 2016. Ammonius and His School. In: Falcon, A. (ed.), *Brill's Companion to the Reception of Aristotle*. Leiden: Brill, 394–414
- Hauer, M. 2017. The interpretation of Aristotle's *Categories* in the Neoplatonic Commentary Tradition. In: D'Anna, G. & Fossati, L. (eds.), *Categories. Histories and Perspectives*, Studien und Materialien zur Geschichte der Philosophie 93. Hildesheim: Georg Olms, 35–48.
- Kneale, W. & Kneale, M. 1962. *The Development of Logic*. Oxford: Clarendon Press.
- Lee, T.-S. 1984. *Die griechische Tradition der aristotelischen Syllogistik in der Spätantike*. Göttingen: Vandenhoeck & Ruprecht.
- Lloyd, A. C. 1990. *The Anatomy of Neoplatonism*. Oxford: Clarendon Press.
- Lernould, A. 1987. La dialectique comme science première chez Proclus. *Revue des Sciences philosophiques et théologiques* 71(4), 509–536.

- Łukasiewicz, J. 1957. *Aristotle's Syllogistic from the Standpoint of Modern Formal Logic*. Oxford: Clarendon Press.
- MacFarlane, J. 2000. *What does it mean to say that logic is formal?*. Ph.D. Dissertation, University of Pittsburgh.
- Prantl, C. 1855. *Geschichte der Logik im Abendlande*. Erster Band. Leipzig: H. Hirzel Verlag.
- Rescher, N. 2010. On the Epistemology of Plato's Divided Line. *Logos and Episteme* 1(1), 133–164.
- Richard, M. 1950. ΑΠΟ ΦΩΝΗΣ. *Byzantion* 20, 191–222.
- Schramm, M. 2018. Aristotelische Syllogistik und platonische Dialektik: Das Logik-Konzept der alexandrinischen Kommentatoren. In: Strobel, B. (ed.), *Die Kunst der philosophischen Exegese bei den antiken Platon- und Aristoteles-Kommentatoren*, Berlin: De Gruyter, 245–273.
- Singpurwalla, R. 2019. Plato and the Tripartition of Soul. In: Sisko, J. E. (ed.), *Philosophy of Mind in Antiquity: History of Philosophy of Mind*, Volume 1. London: Routledge, 101–119.
- Sorabji, R. 1987. John Philoponus. In: Sorabji, R. (ed.), *Philoponus and the Rejection of Aristotelian Science*. Ithaca, NY: Cornell University Press, 1–40.
- Verrycken, K. 1990. The Development of Philoponus' thought and its Chronology. In: Sorabji, R. (ed.), *Aristotle Transformed. The Ancient Commentators and their Influence*. London: Bloomsbury.
- Westerink, L. G. 1961. Elias on the Prior Analytics. *Mnemosyne* 14(2), 126–39.
- Wildberg, C. 2019. John Philoponus. In: Zalta, E. (ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition). URL = <<https://plato.stanford.edu/entries/philoponus/>>.