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# Logical Hylomorphism in the Thirteenth Century



**Julie Brumberg-Chaumont**

**Abstract** This chapter is focused on thirteenth-century logical hylomorphism. It describes an original chapter in the history of logical form, when argument had “substantial forms,” namely syllogistic forms, and when logical matter did “matter,” as much as logical form, when defining the scope of logic and the essence of the syllogism. Various senses of logical “matter” are distinguished and the idea of a Latin “material logic” is defended. The study of a series of vexing issues, especially puzzles in modal syllogistic, shows how many arguments lingered in a “syllogistic limbo” at that period. The contribution of logical matter was such that the possibility of a logical “salvation” of these arguments, as syllogisms or as a formally valid arguments, remained undecided.

**Keywords** Form · Matter · Hylomorphism · Syllogism · Fallacies · Robert Kilwardby · Aristotle · Albert the Great · Alexander of Aphrodisias

**Mathematics Subject Classification:** Primary = 01A35, 03A05; Secondary 03B05, 03B45.

## 1 Introduction

The notion of logical hylomorphism was introduced by John MacFarlane [37]. The idea was to characterize, in the post-Kantian period and up to the present day, a set of logical theories which, through the notion of “form,” as opposed to the notion of “matter,” or content, sought to delimit the proper field of logic, defined as a formal discipline.

The use of the matter-form couple observed in earlier periods is quite different. Far from excluding matter from the field of logic, it rather instrumented the

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distinction between the formal and material parts of logic. It went as far as building a strong concept of logical hylomorphism during the thirteenth century, where a properly logical matter plays an essential role.

Rather than an opposition, medieval reflections organized a contrast between logical matter and form, based upon a tight interdependence. They explore their porosity, to a certain extent, even within arguments that were formally good, such as syllogisms. A properly logical concept of matter is built, as suggested by Kevin Flannery [31] about the logic of Alexander of Aphrodisias. He distinguishes between logical “matter,” and the import of ontological materials through the individual meaning of term, he calls “stuff.” The distinction is used in order to show, against Barnes [8], that Alexander displays a coherent position on logical form, although a different, “subtle” one with respect to modern views. Alexander’s logic is described as a “material logic.” A similar position has been studied for Syriac logic by Henri Hugonnard-Roche [32].

In the same manner, the first Latin commentators on in the *Sophistici Elenchi*, and then on the *Topics*, the *Prior Analytics* and the *Posterior Analytics*, tried to establish the role of syllogistic form, as independent from (one kind of) matter, in the necessary inference of the conclusion; but they also envisaged the parallel contribution of (one kind of) matter to the conclusion in a given syllogism, as well as the idea that (another kind of) matter could belong to the form, thereby developing a “material logic” in Latin.

These original characteristics shed some light on the violent debates that fed the philosophy of logic of the time, debates in which featured some authors defending an “extreme” hylomorphic position in logic. This approach allows us to better understand a number of apparently confusing positions, in particular the formulation of examples of arguments that would be formally conclusive, but nevertheless “thanks to matter” (see [45], p. 161–162 and p. 232; [42], p. 277–278); the idea that some non-syllogistic combinations could be turned into formally concluding argument by their matter; the rejection of some “fallacious Barbaras” as instantiations of a Barbara combination; or, again, some original solutions offered to the “two Barbaras problem” and to other modal syllogistic puzzles. Those various cases belonged to what I call a “syllogistic limbo,” where the extent of the logical sins they displayed and the possibility of a logical salvation remained undecided.

A general presentation of the form/matter distinction before the thirteenth century is offered in the second section. The third section contains a discussion of thirteenth-century logical hylomorphism, as well as a more detailed description of the notion of a material logic in Latin.<sup>1</sup> Arguments caught in a “syllogistic

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<sup>1</sup> Various texts and problems addressed in this chapter have already been studied in previous papers. This is especially the case for fallacious arguments following a Barbara combination (“fallacious Barbaras”). I have also emphasized the opposition between several approaches to logical hylomorphism during the thirteenth century, as illustrated by the debate between Albert the Great, the tenant of an “extreme hylomorphism” in the last phase of his career (1290s), and Robert Kilwardby, who tentatively defended a moderate position, but did not always stuck to a coherent theory (see [12, 14–16]). Some elements already found in those publications are summarized in the

limbo” are dealt with in the last two sections of this chapter, with a special attention dedicated to the “two Barbaras problem” in the fifth section.

## 2 The Early Distinction Between Logical Form and Logical Matter and the Puzzle of “Fallacious, Formally Defective Barbaras”

### 2.1 *Logical Form and Logical Matter in the Sophistici Elenchi*

The notion of “form” is absent from Aristotle’s works on logic.<sup>2</sup> The use of the form/matter distinction in the description of syllogisms was first introduced by Alexander of Aphrodisias, and then systematically adopted by late ancient commentators. It was transmitted to the Latin world in the early twelfth century, in texts by a commentator by-then called “Alexander.” “Alexander” is the anonymous author of now-lost commentaries on the *Sophistici Elenchi*, the *Prior Analytics*, and the *Posterior Analytics*, inspired by late ancient commentators, especially Philoponus (see [26] vol. II, p. 233–530 (esp. p. 346–347), and vol. III, p. 4–7; [28, 29]). It has been shown that the “Alexander” of the commentary to the *Sophistici Elenchi* is Michael of Ephesus [27].

The distinction has enjoyed a flourishing career in the philosophy of logic from that time until today.

Aristotle’s treatises on natural philosophy and metaphysics were not yet read in the twelfth century. In logic, only the *Isagoge*, the *Categories*, the *Peri hermeneias*, and the *Sophistici Elenchi* were extensively commented upon, while the *Topics*, the *Prior Analytics*, and the *Posterior Analytics* were only superficially or partially known, from the mid-twelfth century on.

Systematic discussions about the “form” and “matter” of syllogisms began in several anonymous texts from the end of the twelfth century and the beginning of the thirteenth century, in treatises on fallacies or in commentaries on the *Sophistici Elenchi*, by Anonymus Aureliensis I [25], Anonymus Aureliensis II [24], and Anonymus Cantabrigiensis ([5]; more on this topic in [16]), as well as in the first Latin commentary on the *Prior Analytics* so far identified, the Anonymus Aureliensis III [4], from the same period.

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two first sections, while the last two sections are focused on new materials, derived from puzzles in modal syllogistic.

<sup>2</sup> A passage in *Physics* 195 a16-21 has been identified by Jonathan Barnes (see [8], p. 40) where Aristotle presents the premises as the “matter” and the conclusion as the “form.” Another passage has been associated with it by Catarina Duthil-Novaes ([23], p. 340), in *Metaphysics* IV 1013b19-20. This passage rather suggests the notion of matter without mentioning it, in order to describe the relation between the premise and the conclusion.

The *Sophistici Elenchi* contrasts several times (a) sophistic refutations that are sophistic but nevertheless real syllogisms, and (b) sophistic arguments that are only apparent syllogisms. From late antiquity on, until today, this opposition has generally been understood in the light of *Topics* 1.1, so that (a) were described as real syllogisms starting from only apparently admitted premises and (b) as eristic arguments that are only apparent syllogisms, whether they start from only apparently admitted premises or really admitted premises.

“Alexander” applied the form/matter distinction to this classification, so that (a) were judged “only materially defective” and (b) were judged “formally defective” (whether also materially defective or not). This classification was generally adopted at the end of the twelfth century and beyond (till today, see [17], p. XXXVI and [21], p. 280).

The next issue for medieval logicians was then to work the thirteen fallacies of the *Sophistici Elenchi* into this scheme, something that has never been achieved in ancient logic (see [26] I, p. 96–97). One had to decide which fallacies were real syllogisms, although materially defective, because of fallacious premise(s), and which were not syllogisms, that is, which were formally defective, because the form of the syllogism was not respected.

## 2.2 “Materially-Formally Defective” and “Formally-Formally Defective” Arguments in Anonymus Cantabrigiensis

The classification of fallacies according to material or formal defects represented a vexed issue since medieval commentators followed the ancient tradition that consisted in reformulating all the arguments and the examples found in Aristotle’s works (where they were not), in a syllogistic form, that is, according to the “useful combinations” described in the *Prior Analytics*.

As a consequence, a number of paralogisms in the commentaries to the *Sophistici Elenchi* were reformulated into arguments which followed syllogistic modes and figures, especially in “Barbara” (first mode of the first figure), but were nevertheless described as “formally deficient,” because they were classified as “apparent syllogisms.”

A stock example of this type of fallacy was initially introduced by Anonymus Cantabrigiensis, a mature master, who has probably taught the *Sophistici Elenchi* several times. For sake of clarity in the following discussion, I have labelled this argument **A1**. It runs as follows:

### Formally Defective Argument in Barbara:

**A1.** Every statue is [in] bronze, Every bronze is natural, Every statue is natural (*omnis statua est aes, omne aes est naturale, omnis statua est naturalis*).

This argument displays what is called in the *Sophistici Elenchi* a “fallacy of the accident.” It was an apparent syllogism, according to Anonymus Cantabrigiensis,

because the uniformity of predication from the beginning to the end of the argument is not respected (see [16]). One cannot indeed get rid of **A1** in the same manner as for the fallacy of equivocation, that is, by saying that a homonymous term, such as “dog” for the barking animal and for the constellation in the sky, is just not one term, but actually two, so that one ends up with a four-terms argument, and, consequently, not a syllogism. All the terms in **A1** would correspond to only one entry in a dictionary.

All the thirteen fallacies were actually described by Anonymus Cantabrigiensis as apparent syllogisms and as formally defective arguments. According to him, the *Sophistici Elenchi* “makes clear *what are the impediments (or sins: peccata) to syllogistic form, and how many they are*” (see [5], prologue). He explains how each part in the definition of the syllogism implies the rejection of each of the thirteen fallacies:

By these differences all sophistic refutations can be expelled. By saying “something else” (*aliud aliquid*), begging the question (*petitio principii*) is excluded; by saying “in virtue of what has been posited” (*per ea quae posita*), the fallacy of what is not a cause as a cause (*non causa ut causa*) is excluded; and by saying “by necessity” (*ex necessitate*), the incidence of all the other fallacies is prevented ([5], p. 11).

This means that **A1** is formally defective because the necessity condition of the syllogism is not realized, and the same goes for ten other fallacies.

One can read in *Sophistici Elenchi* 165a1–3 a short definition of the syllogism:

A syllogism is done from some things posited so that something else is said by necessity from those things that were posited.<sup>3</sup>

Anonymus Cantabrigiensis develops a standard exegesis in the “Alexandrian” tradition: the syllogism is a compound of form and matter, the matter is first the propositions and secondarily the terms propositions are made of (= “from some things posited”). An original element is introduced, however, by saying that the conclusion is the third part of the matter (see [16]).

The form is also threefold: the mood, the figure, and the *complexio*, that is, the necessary connection between the premises and the conclusion. “By necessity from those things that were posited” corresponds to this third part of the form. The introduction of a necessity condition, as a third *distinct formal* component, is a novelty. It is distinct *from the existence of a useful syllogistic combination*, as evidenced by the existence of some arguments that are necessary inferences though not displaying a correct syllogistic combination (as in the “not a cause as a cause” fallacy), and by the existence of other arguments that are displaying a correct combination, but are not necessary inferences, as in the case of **A1** and other similar fallacies. Necessity is an *added criterion* to figure and moods in the definition of the syllogism (see [16]).

Three types of fallacies are distinguished.

<sup>3</sup> A full definition is found in the *Prior Analytics* (24b17-19).

A first type of fallacies can be described as “formally-formally defective.” Despite their being expressed in a mode and figure corresponding to the Barbara combination, a defect in their form, due to a fallacy, prevents the arguments from displaying a necessary inference, as requested in a syllogism. As a consequence, this type of fallacies is a “fallacious formally-defective argument disposed according to syllogistic modes and figures.” Typically, it is an argument where a semantic ambiguity or variation in the terms prevents the syllogistic form being realized. Eleven out of thirteen fallacies belong to this category, among which **A1**.

The second type correspond to the “not a cause as a cause” fallacy. It is also a formally-formally defective argument, since the addition of a premise that had nothing to do with the inference of the conclusion causes the non-respect of that part of the definition of the syllogism which stipulates that the conclusion is necessarily drawn “from those things that were posited.” Because the conclusion is necessarily obtained notwithstanding the irrelevant additional premise, it nonetheless corresponds to a necessary inference, but not to a syllogistically obtained necessary inference. It is, however, only apparently disposed according to syllogistic modes and figures.

The third type can be described as “materially-formally defective” arguments. This is the “begging the question” fallacy. The fact that the conclusion is not different from the premises causes the non-respect of that third “material” part of the definition which stipulates that “something else,” the conclusion, must be drawn from the premises.<sup>4</sup> We have here a fallacious argument that is nonetheless a necessary inference, a real deduction, but not a syllogism, because the matter of the syllogism is not respected despite its being apparently disposed according to a correct syllogistic combination (for more details on those three type of formally defective fallacies, see [16]).

### ***2.3 A Split in the Logical Tradition: A Substitutional vs. Rich Concept of Syllogistic Form***

A rich concept syllogistic form was thus born<sup>5</sup> in the work of Anonymus Cantabrigiensis. It went beyond a substitutional approach, that is, the identification of the form of the syllogism to just syllogistic modes and figures, and the identification of the latter in real arguments just thanks to the substitution of letters instead of terms. The “necessity” clause in the definition of the syllogism is a distinct, additional

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<sup>4</sup> “Begging the question also produces a sophistic syllogism, that is: a fallacious one, even if nothing comes against the necessity [of the inference]. *Maybe it can be said that it fails according to the matter* even though no part in it is sophistic. It fails according to the matter because something is taken as being its matter that should not have been assumed” [5], p. 94).

<sup>5</sup> Or rediscovered, since already present in ancient commentators, especially in Alexander of Aphrodisias, as shown by Kevin Flannery [31] and in Syriac logic, as shown by Henri Hugonard-Roche [32].

one, which had to be satisfied, in addition to the respect of a “useful” combination. For the conclusion to be syllogistically obtained, it is required that the necessity be obtained by *the terms and the proposition ordered according to the moods and figures*, and not just by the *right combination of moods in figures*, as found in other texts, such as the Anonymus Aurelianensis II. By this formulation, some general semantic aspects of terms and propositions enter the conditions to be fulfilled for the form to be realized.

A sense of matter emerges here, which is part of syllogistic form. **A1** shows that some features in the general semantic content are to be taken into account to verify the satisfaction of the necessity condition: following syllogistic modes and figure is not enough. This means that the existence of a syllogistic form cannot be established without the “content” (“matter”) being taken into consideration: the general signification of concrete terms and the way they are predicated of one another.

On the contrary, Anonymus Aurelianensis II considered that some of the fallacies were formally defective, while others were only materially defective, but perfectly all right syllogisms all the same. Obviously, the position was based on a different conception of the role of syllogistic matter. General semantic features, such as ambiguity or semantic variation, were considered as extraneous to the realization, or non-realization, of syllogistic form, while syllogistic form itself was only defined by the existence of correct modes and figures. One just need a pattern of syllogistic inference to be recognized as followed by a given argument through replacing the concrete terms by letters, or by considering the very same argument regardless of the meaning of terms.<sup>6</sup> Most fallacies are “materially defective” because of an ambiguous premise: they are perfectly all right syllogisms because “to be a syllogism requires nothing else than the conclusion being correctly inferred even if the propositions are ambiguous” ([24], p. 21). Only “begging the question” and the “not a cause as a cause” are explicitly excluded by this or that part of the definition, that is, parts corresponding to the form of the syllogism ([24], p. 26–27).

These discussions can be seen as a decisive turning point in the history of logical form. The form/matter distinction and the distinction of various senses of logical “form” and “matter” became instrumental. They made it possible to offer innovative medieval solutions for pending problems inherited either from Aristotle himself, from the Latin translations of his works, or from the tradition of ancient commentators. Some very important notions were introduced, which would be part of the discussions for centuries, such as the concept of a syllogism “in itself,” the syllogism *simpliciter* (the syllogism seen only from the point of view of its inferential power and expressed with letters, called “transcendent matter” during the thirteenth century), the distinction between formally and materially defective

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<sup>6</sup> “There is necessity of the combination where there is a useful mode and figure, and there is always a syllogism . . . where there is a necessity of the combination (*est necessitas complexionis ubi modus et figura est utilis; ubi vero est necessitas complexionis . . . semper est syllogismus*)” ([24], p. 25).



arguments, the classification of fallacies according to whether their defect is material or formal, and the identification of material and formal parts in the definition of the syllogism.

A split is observed in the logical tradition between, on the one hand, a purely syntactical theory of logical form, as defended by Anonymus Aureliensis II, where only some fallacies are formally defective, and, on the other hand, a richer notion of form, as read in Anonymus Cantabrigiensis, for whom all the fallacies are formally defective, whether displaying syllogistic modes and figures or not.

### 3 Thirteenth-Century Logical Hylomorphism: A “Material Logic” in Latin

The abovementioned split continued to be observed during the thirteenth century, a period when the notion of the syllogism “in itself,” the syllogism *simpliciter*, became widespread. An approach similar to that of Anonymus Cantabrigiensis is developed by Albert the Great in the last period of his activity, at the end of the thirteenth century, and in one set of anonymous questions on the *Sophistici Elenchi* (ca 1270), in which all the thirteen fallacies of the *Sophistici Elenchi* are clearly not syllogisms *simpliciter*. A theory similar to the one defended by Anonymus Aureliensis II, on the other hand, is found in the logical works by Robert Kilwardby, a great master at the university of Paris (1237–1245), with the results, at least, in his commentary on the *Prior Analytics*, that the definition of the syllogism excludes only some fallacies, while other fallacies are considered as perfectly all right syllogisms *simpliciter*. This is fully argued for the fallacy of accident (A1) and for the fallacy of equivocation.<sup>7</sup>

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<sup>7</sup> “There is . . . a doubt about the first mood [i.e. Barbara]. For it seems that it is a useless premise-pair, because it is possible to find terms for inhering in all and in none [i.e. *dici de omni* and *dici de nullo*]. Now it is self-evident that it is possible to find terms for inhering in all [“every man is an animal, every animal is sensitive, every animal is sensitive”, a/a/a]. And it is clear in this case that it is possible to find terms for inhering in none: every bronze is natural, every statue is [in] bronze (let it be so) and yet no statue is natural [a/a/a]. And it should be said that the counter-example is null. We are dealing here with **the syllogistic form in the most common matter**, which abstracts from probable necessary and apparent matters, so that the form as here dealt with can be found not only in dialectical and demonstrative syllogisms, **but in sophistic syllogisms** as well. Hence it should be said that be said that the conclusion, that is « Every statue is natural » [in A1] does follow according to the craft-man of this book, and if it doesn’t then the first premise should be denied according to him. **For the form is good according to him and it is not excluded from the syllogistic form as dealt with here.** And to make this clear, one should know that **sylogisms are of two sorts**, namely those whose necessity is topical, where from the major or the minor the conclusion follows necessarily — and such are demonstrative and dialectical syllogisms— and the other one is the one whose necessity comes from the sole combination (*complexio*), that is, it is caused by the due combination of terms and propositions one with the other, and this necessity is common to dialectical demonstrative and sophistic syllogisms. **We are dealing here with this necessity and form of the syllogism. The craft-man of this book takes the syllogism in abstraction, as well as the predication, in syllogistic propositions [i.e. propositions with**

This position was soon felt unacceptable, however, and it was not followed by Robert Kilwardby himself in the commentary on the *Sophistici Elenchi* that has been ascribed to him, nor in a slightly latter work, the *De Ortu Scientiarum* (see [15]). In this context, the thirteen fallacies were described as non-syllogistic and formally defective, a position which became actually standard during the second half of the thirteenth century, as we shall see in more detail below.

A rich definition of syllogistic form thus tended to be more widely accepted, while new problems surfaced about the extent to which logical matter should enter the definition of logical form, with the full discovery of the *Prior Analytics*, the *Topics*, and the *Posterior Analytics*, and of Aristotle's hylomorphic theories in natural philosophy, from the 1240s on.

### 3.1 Logical Hylomorphism in the Thirteenth Century

A new stage of the discussion was reached with the development of commentaries on the *Prior Analytics*, the *Topics*, and the *Posterior Analytics*, in addition to those on the *Sophistici Elenchi*, in newly born universities, during the first half of the thirteenth century. A stress was put on the definition of syllogistic form and of as syllogism “as syllogisms,” or syllogism *simpliciter*, as well as on the relationship between deduction and proof. Additional difficulties arose from the intricacies of the newly-recovered modal syllogistic.

This evolution went along the rediscovery of Aristotle's hylomorphic theory in biology, physics, and psychology. It was extended to syllogisms as logical compounds, as they originally were by Alexander of Aphrodisias, so that a full-fledged logical hylomorphic theory was born, as read especially in Robert Kilwardby's influential works. According to a by-then generally adopted theory developed by the Arabic philosopher Avicenna, matter, or, more precisely “general matter,” as much as form, was an “essential” part of the definition for compounds of which matter could not be separated from the form.

Logical writings from the thirteenth century literally abound with occurrences of the terms “matter” and “form.” Logical hylomorphism was adopted by all authors from this period. The distinction is used at multiple levels to describe, analyze,

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**transcendent letters**]. Hence, he takes being in abstraction from being [predicated] in its own right (*per se*) and being [predicated] by accident (*per accidens*), and thus he allows for predication by accident. Hence when it is argued ‘Every bronze is natural, every statue is [in] bronze’ [in **A1**], he should say either that the conclusion is true (albeit by accident) or else that the first premise is false (albeit by accident), but he would never deny the form of the argumentation” [39], p. 199–201; “There is another exposition of the stated definition that is customarily given, viz. that all sophistical fallacies are excluded... But this should not be granted. For the **formal syllogism**, dealt with in this book, whose matter is two propositions and three terms and whose form is mood and figure, **can be ‘saved’ (*salvari*) in a sophistic syllogism** as is clear here: ‘Every dog is running, everything that barks is a dog’ etc. [=a fallacy of equivocation]” [39], p. 81. The additions in square brackets are mine.

or divide terms, propositions, syllogisms, and logic itself. The syllogism is always understood as a hylomorphic aggregate of form and matter.

### 3.2 *‘MacFarlanian’ Logical Hylomorphism and Thirteenth-Century Logical Hylomorphism*

As already mentioned, the notion of logical hylomorphism was first introduced in the history of logic by John MacFarlan [37]. The idea was, with the notion of form, to delimit the proper field of logic as “formal.”

On the contrary, medieval logical hylomorphism means that logic has to study both the formal parts and the material parts of logic. Furthermore, the *Posterior Analytics*, by providing a theory of demonstration, belonged to the material part of logic and was nevertheless seen as the crowning achievement of logical teaching, in the same manner as it was for ancient commentators. The birth of a strong concept of logical hylomorphism in the thirteenth century also meant that logical matter played an essential role in the very definition of logical form, because of the strong interdependence between form and matter.

Catarina Duthil-Novaes [23] has underlined how the definition of the form/matter relationship found in Mac Farlane’s work was mereological in essence. She has shown the limits of this approach for interpreting medieval theories. Although illustrated in later period, as in the logic of John Buridan in the fourteenth century ([34], p. 23 and 30), such an interpretation does not apply to the thirteenth century.

Form and matter are essential and inseparable aspects of that logical compound which is the syllogism, respectively, as the “formal cause” and the “material cause.” In the syllogism *simpliciter* (syllogistic formulas of the *Prior Analytics*), letters are not “variables,” contrary to what Joseph Maria Bocheński had suggested ([9], p. 69). They clearly belong to that matter which is part of the form in medieval logic. They are considered by our authors as terms, albeit “transcendental,” as they put it, and the syllogism *simpliciter* is a real syllogism. It is an example, albeit general, in the same way as concrete examples of arguments, as Katarina Ierodiakonou has pointed out for Aristotle himself [33]. They are “dummy letters” (see [8, 32]), that is, terms with indeterminate meaning, but meaning all the same. As shown by Paul Thom [42] medieval logic did not display a basic, “variational” conception of logical form, but a strong hylomorphic conception.

### 3.3 *Three Senses of “Matter” (Distinguished From “Stuff”) in Logic*

Logical matter is not any sort of content. As shown by Kevin Klannery [31], one must distinguish “matter” and “stuff” in the logic of Alexander of Aphrodisias. The

same applies to medieval Latin logical hylomorphism. A notion of “logical matter” is clearly distinguished from the pure and simple import of ontological materials by means of the individual meaning of terms, that is, “stuff.” There is a properly logical sense of matter in logic, a matter that “matters” for the very definition of logic. *The Posterior Analytics*, for instance, deals with syllogisms starting with scientific propositions that are in “necessary matter” in general, not with this or that individual scientific proposition according to its individual content, which is the job of the special science to which the proposition belongs.

As seen, the letters in the syllogism *simpliciter* were part of the matter of the syllogism. As such, there were called the “remote matter,” that is, the constituent part, of the “proximate matter” of the syllogism, the proposition (for Robert Kilwardby, see [43]).

This sense of matter is always considered as part of the form, whatever the authors considered.

The “proposition” is indeed one of the main senses of logical “matter” inherited from ancient logic.

The other sense is the “matter of the proposition,” that is, the “material modalities” of propositions, called “necessary,” “impossible,” and “contingent” matters. These matters were heavily used when discussing the square of opposition (for instance, in necessary and impossible matters, the contraries are contradictories). This sense of “matter” was often associated to “alethic modalities,” propositions in impossible matter being necessarily false propositions. Both kinds of modalities are present in the medieval versions of the notion of “material implication,” for instance, in Occam’s logic.

The sense of “matter” as “alethic modality” is generally not thought to be part of the form. Yet authors defending a radical logical hylomorphism would contend that a “false” matter does prevent syllogistic from being realized: false propositions are not the matter out of which a syllogism can be made, and necessary proposition are the propositions from which a fully realized syllogistic form is possible, as we shall see below, quoting a text by Albert the Great.

In Sects. 3 and 4 of this chapter, we shall see how some features belonging to matter in sense 2 (i.e. material modalities), namely, the existence of an “as-of-now” or of an “unrestricted” predication, can turn syllogistically disposed arguments into formally defective arguments, or can make non-syllogistic arguments formally valid ones. So far we have seen two senses of “matter”:

Logical matter in sense 1 = the matter of the syllogism = the proposition, regardless of its semantical content.

Logical matter in sense 2 = the matter of the proposition = the material modalities of propositions, connected to the relationship between terms, regardless of the individual signification.

As we have already seen when discussing the position held by Anonymus Cantabrigiensis, a third sense of “matter” emerged, concerned with some general semantic aspects of terms and copula, namely, the invariability of the signification of terms and of the mode of the predication of the copula, from the premises to the conclusion:

Logical matter in sense 3 = general semantic features of the terms and copula, regardless of their individual content.

This sense of matter was considered as part of the form by the authors following a rich concept of syllogistic form, as was more and more the case during the last quarter of the thirteenth century. In an important, anonymous Parisian commentary on the *Sophistici Elenchi* from the 1270s, some material conditions are introduced in the definition of the syllogism *simpliciter*, so that all the thirteen fallacies, be they due to the verbal expression (*in dictione*) or external to it (*extra dictione*), are classified as formally defective. Those clauses are similar to those found in Anonymus Cantabrigiensis (who, however, never discussed the syllogism *simpliciter*). They are as follows: 1) the unity of the terms (against the fallacies *in dictione*) and 2) the uniformity of the relationship of the middle term to the major and the minor terms (against fallacies *extra dictionem*, as the fallacy of accident **A1**). The form of the syllogism *simpliciter* is not the relationship between terms but “something of this relationship” (*forma syllogismi non est habitudo terminorum sed aliquid in habitudine*). The uniformity of the relationship is part of the material dispositions toward the form of the syllogism (*dispositiones materiales ad formam syllogismi simpliciter*). But it is “formal” (*formalis*) and its absence makes the fallacy of the accident (namely an argument such as **A1**) a formally defective argument, not a syllogism. The relationship between terms in the propositions (i.e., matter in sense 3), not just the proposition (matter in sense 1) is included in the material part of the form in the syllogism *simpliciter* ([6], p. 25–27).

### 3.4 *Tensions and Controversies over the Degree of Independence of Form From Matter*

The thirteenth-century approach to logic was fully hylomorphic as it focused on the interdependence between matter and form. But it was also interested in understanding the way logical form can function independently from matter, thereby guarantying the universality of logic, whatever the field of knowledge considered. Logicians of the time were heir to another, twelfth-century logical tradition. A strong distinction was indeed established by the twelfth-century logician Peter Abelard, between “imperfect inferences,” based on states of the words, “things,” (topics), and not resisting the substitution test (what we would call “materially valid inferences”), and “perfect inferences,” that is, syllogisms, where the conclusion is obtained independently from the content, thanks to the “combination” (i.e., the form) only, resisting the substitution test. Abelard tried here to break away from the prevailing tradition based on Boethius and inspired by Themistius’s ideas on topics, in which even syllogisms draw their inferential force from topics, or “topical relationships” between their terms (for an analytic presentation, see [37] Appendix).

A tension appears in the exegesis of the *Prior Analytics* in the thirteenth century. It can be seen in the formulation of two widely accepted complementary

“hylomorphic principles.” They are simultaneously found in the commentary on the *Topics* ascribed to Robert Kilwardby.

In this text, the logician considers the objection according to which if the matter is defective the form cannot subsist, nor can the compound. The answer does not consist in questioning a fundamental hylomorphic principle according to which matter and forms are both essential parts and that a logical form (as any other Aristotelian substantial form) cannot be realized in whatever matter, (= principle 1), to which Robert Kilwardby fully subscribes. It consists in saying that the syllogism *simpliciter* indeed possesses an essential matter (i.e., the “letters”) which cannot fail. The matter of dialectical and demonstrative syllogisms can fail, but it is incidental to them as syllogisms, so that matter can vary without destroying the form (=principle 2):

We wonder whether if the eristic syllogism is a syllogism even if it is defective according to matter. This seems not to be the case, since every compound of form and matter is such that if matter, or form, is defective, the compound is defective; this is because each form does not appeal to any matter, but to its own matter. This is why a syllogism made from one false [premise], or two false premises [= “Quoniam syllogisms”, see below § 4, **A3**], is not a syllogism, i.e. because matter is defective.

The solution is that the essential matter in the syllogism consists in the three terms and the two propositions: if this matter [= “matter” in sense 1] is missing, the syllogism does not subsist. From another point of view, there is a matter which is incidental to the syllogism: this is the three terms and the two propositions considered according to characterizations that those propositions as admitted [= contingent, dialectical premises], [or] true and necessary [= necessary, demonstrative premises] ; if this matter [= matter in sense 2] is defective, then there can well be a syllogism [= principle 2], because the matter is incidental ([46], p. 132–133).

The matter of the syllogism in sense 1 is essential, whereas the matter of the syllogism in sense 2 is accidental. The thesis defended is not that a given matter in sense 2 is incidental to the syllogism *simpliciter*, which would be trivial, but that it is incidental to the syllogism (be it dialectical or demonstrative) of which it is the matter, that is, incidental to it “as a syllogism.” If this matter is defective, the syllogism remains a syllogism by virtue of the matter in sense 1, which guaranties its syllogistic being. The matter of the syllogism *simpliciter* is thus materially “underlying” any given concrete syllogism; it substitutes for the concrete matter if the latter is defective. A similar idea is conveyed in the commentary on the *Prior Analytics* (see [39], p. 1096–110; see [43], p. 136–137) about “Quoniam syllogisms” (syllogisms from false premise(s) with true a conclusion, see below § 4, argument **A3**).

Those two widely spread principles can be formulated as follows:

*Principle 1, the hylomorphic principle:* a logical form cannot be realized in any matter but in the matter which is appropriate to it: if this matter is defective, the form, and then the compound, is also defective.

*Principle 2, the form/matter distinction principle:* a only-materially defective syllogism can remain a syllogism all the same (provided it is a matter that can be separated from the form, i.e., it is incidental to the form).

Some authors tried to emphasize, with the distinction between the form and the matter of syllogisms, the interdependence of the form and the matter of syllogisms, sometimes at the risk of blurring their difference. Others, on this same basis, tried to show how the conclusion is obtained in syllogisms on the sole basis of the form, called the “necessity of the consequence (*necessitas consequentiae*),” in an autonomous way with respect to the matter of the syllogism, be it a “necessary matter,” and then called the “necessity of the consequent (*necessitas consequentis*).”

Logical matter and logical form were thus distinguished in analysis, though interdependent and inseparable to a certain extent. The problem was to ascertain to which extent they were so, for which types of syllogisms, and in connection to which definition of the form and to which definition of the matter. The problem was especially considered in connection with the notion of a syllogism “in itself,” the syllogism *simpliciter*.

What can count as the form of the syllogism and what can count as the matter also depended on the “ontology” of logical objects one was willing to defend, regarding the syllogism *simpliciter* of the *Prior Analytics*, as well as the relationships between the latter and actual arguments, i.e. between inferences and proofs.

The issue quickly became controversial. A radical hylomorphic theory appeared, which make even “only materially defective syllogisms,” that is, syllogisms starting from false premises, not real syllogisms. The position, which Robert Kilwardby tried to avoid in the above-quoted text, is indeed found in Albert the Great’s works: it was condemned in 1277 at Oxford under the authority of Robert Kilwardby:

A syllogism that fails (*peccat*) according to the matter is not a syllogism, Oxford, 18<sup>th</sup> of March 1277, ([20], p. 558).

Syllogisms with “failed matter” are syllogisms starting from false premise(s), for instance: “Every statue is natural, Hercules’s is a statue, Hercules’s is natural.”

The idea behind Albert the Great’s thought<sup>8</sup> was that the substantial form of syllogism, in the same manner as in the case of natural beings, in the framework of a strong hylomorphic theory, had only one possible matter which would allow its complete actualization. In the same manner as you cannot have a substantial form of man in a dead body, you cannot have a syllogism made of a false matter, but only the external configuration, *figura*, as opposed to real form, *forma*. This position also relied on the notion that the syllogism “in itself” is just an abstraction, that is, not an

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<sup>8</sup> See for instance Albert’s commentary on the necessity condition in the definition of the syllogism in the paraphrase on the *Topics*: “‘By necessity’[in the definition of the syllogism] one must understand the necessity of the consequence that is called inference by some logicians. This inference is obtained though the right ordering of the middle term according to the figure and the mode, **so that the middle term is the cause of the inference of the conclusion because its relation to the extremes makes the connection between them** ... with ‘certain things being posited’ he means the propositions as following a form according to a perfect position [but this can not be done] **if it is not potentially of this form in the matter**. So one must admit that in **the syllogism that fails according to the matter it is not perfectly and really the case that [the conclusion necessary follows] ‘certain things being posited’ [i.e. it does not follow the definition of the syllogism]** [2], p. 239.

independent item in the world of logical ontology, contrary to what was contended by Robert Kilwardby,<sup>9</sup> but only a form in need of instantiation (see [12, 14, 15]).

The 1277 condemnation shows how the generality of the content to be taken into account in logical “matter” was difficult to establish, as was the relationship between matter in sense 3 and matter in sense 2, especially when taken as regarding alethic modalities. Taking into account matter in sense 2, especially if it leads to taking into account the truth values of premises, could be considered a logical mistake, where elements from the “stuff,” ontological ingredients, were smuggled in the field of logic: this was probably Robert Kilwardby’s opinion.

### 3.5 *Further Puzzles: A Material Logic in Latin*

Whatever the position held about the “hot topic” of syllogisms from false premises or about the syllogistic nature of fallacious Barbaras, all thirteenth-century authors displayed a strong hylomorphic conception of logical form. They generally offered a “material logic” in Latin, following Henri Hugonnard-Roche’s insights about Syriac Aristotelian logic [32].

*Pace* Bohener,<sup>10</sup> the notion of a material logic does make sense. The existence of such variety of a logic can be argued in two ways.

In a rather trivial sense, thirteenth-century logic is “material” because logic deals as much with the material parts as with the formal parts of logic, and because the material part of logic is the most important one. As already said, the *Posterior Analytics* belonged to the material part of logic, since it teaches material conditions that must be satisfied by the premises, in addition to the formal ones already established by the *Prior Analytics*: the treatise was considered the culmination of logic as a whole, that is, as a general science and a method for all other sciences.

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<sup>9</sup> “The syllogism that is dealt with in the *Prior Analytics* is separable according to its being from both [the dialectical and the demonstrative syllogisms], for the **sylogism that is in transcendent matter (as in the terms a, b)** has neither probable matter nor necessary matter” [39], p. 36; “So even though the syllogism in itself about which [Aristotle] is concerned in the *Prior Analytics* is formal with respect to the dialectical and demonstrative syllogism, nevertheless it does not seem that it should be said that the *Prior Analytics* is only about the form of the syllogism; rather it considers the matter as well as the form of the syllogism in general. Accordingly the syllogism in itself is formally constituted in act as a being pre-existing the dialectical and the demonstrative syllogism. . . . It abstracts from them according to its being, insofar as there can be instances of it in general terms” [39], p. 40–42.

<sup>10</sup> “Logic as we understand it is formal, that is to say it studies the form or the structure of inferences and their elements. Hence to speak of “formal logic” is, in scholastic terminology, a nugatio or tautology. **To speak of “material logic” is a simple contradiction.** In this we are in harmony with the scholastic logicians, for scholastic logic too is interested only in the formality or structure of discourse. Hence it does not recognize the distinction between formal and material logic” [10], p. XVI.



But thirteenth-century logic is “material” in yet a much more intriguing sense: this is because matter can not only prevent syllogistically disposed arguments from being formally valid arguments, real syllogisms, as already seen with the “materially-formally defective Barbaras” (**A1**), but also because matter can turn non-syllogistic argument into formally valid ones. Moreover, matter can contribute to the necessary inference of the conclusion, even inside formally valid arguments, that is, syllogisms.<sup>11</sup>

This material logic can be observed in a series of borderline cases with which logicians of the time had to struggle, especially in the field of modal syllogistic, to begin with the famous problem of the “two Barbaras.”

Those arguments belonged to what can be labelled “a syllogistic limbo,” that is, arguments on the verge of syllogistic validity, where sins against the definition of syllogisms could be observed in various degrees.

## 4 Arguments in a “Syllogistic Limbo”

This section distinguishes various types of arguments that lingered in the syllogistic limbo of thirteenth-century logic. They are just briefly described, while some of them are more extensively dealt with in the next section.

Arguments in syllogistic limbo were either **A**, arguments following a syllogistic combination without being considered formally valid, that is, unconditionally formally valid, for every matter or **B**, arguments following a non-syllogistic combination that can be considered formally valid, though under material conditions.

Type **A** has already been mentioned, with the study of **A1**. Additional examples are given. Some of them also belong to assertoric syllogistic, others to modal syllogistic. **A2** is one of the famous “two Barbaras.”

### 4.1 Type A: “Not-Formally-Valid-Syllogistically-Disposed Arguments”

As seen in previous sections, one type of “not-formally-valid-syllogistically-disposed arguments” are the “fallacious Barbaras,” of which **A1** is a good example.

#### **A1=Fallacious Barbaras**

“Every statue is (in) bronze (be it the case), Every bronze is natural, every statue is natural”

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<sup>11</sup> See [15] for the occurrence of this puzzling idea in Robert Kilwardby’s commentary on the *Prior Analytics*.

Another case is constituted by some the mixed syllogisms in LXL (necessity/assertoric/necessity), where the assertoric proposition (X) is “as-of-now” (*ut nunc*). These formally defective syllogisms were often considered also as fallacious (see below § 5 and [13]). The “as of-now” assertoric propositions could be either formed with proper names, as “as-of-now” terms, such as “Socrates” (A2/b), or with an accidental term as a subject, such as “white” (A2/a). They were considered as possibly momentarily or counterfactually true. The proposition with a proper name was problematic because of the existential import generally ascribed (but not always) to singular propositions (see [13]).

**A2** = Mixed syllogisms in LXL, where the assertoric proposition does not satisfy a “material condition,” that is, it is “as-of-now (*ut nunc*).”

**A2/a** “Every man is necessarily an animal, everything white is a man (be it the case), everything white is necessarily an animal.”

**A2/b** “Every man is necessarily an animal, Socrates is a man, Socrates is necessarily an animal.”

**A2/a** is one the “two Barbaras” in ancient logical tradition (for the other Barbara see below, §5, **D**). In the two abovementioned examples, a false conclusion is obtained from two true premises. More on this argument will be said in the next section.

A third case is represented by “Quoniam Syllogisms” (see *Anal pr* II, 2-4), that is, syllogisms with false premise(s) and a true conclusion, where, according to Aristotle, the true conclusion (which is known to be true on other ground than its being inferred, since the premises are false) is obtained “not necessarily” (*Anal Pr* II, 57a37-38).

**A3**= “Quoniam Syllogisms” (false premise(s)/true conclusion, syllogistic mode, and figure)

“Every man is a washing machine, every washing is an animal, every man is an animal.”

In this syllogism, you can put whatever middle term you want, it always works: “Every man is Z, every Z is an animal, every man is an animal”: the conclusion is obtained, and it is true whatever you put instead of Z, be it a “washing machine” or whatever else.

This case was sometimes compared to the case of useless combinations (see below **B3**).

#### **4.2 Type B. “Non-Syllogistic-Formally Valid Arguments (Thanks to Their Matter)”**

**B1**= Mixed syllogisms in BarbaraXLL, where the assertoric proposition satisfies a “material condition,” that is, it is “unrestricted (*simpliciter*)”

“Every animal is sensitive, every man is necessarily an animal, every man is necessarily sensitive.”

More on this argument will be said in the next section.

Logicians also refer a special case of useless combination (**a/a** in the second figure), that is, the “Caenus argument” (*Anal po* 78 a 1 ff.): BaA, BaC, AaC, where the conclusion is obtained thanks to the matter. The conclusion is obtained because in scientific propositions, **a** propositions can be converted (since the middle term is the causal definition of the major: (“Everything that consists in a multiple proportion develops quickly”/“Everything that develops quickly consists in multiple proportion”). **B2** can thus be reduced to a Barbara argument.

**B2**= the Caenus argument (*Anal po* 78 a 1 ff.)= useless combination in the second figure turned into a Barbara syllogism thanks to the matter.

“Everything that consists in a multiple proportion develops quickly, fire develops quickly, fire consists in multiple proportion”

Aristotle also deals with “useless combination,” for instance, the **a/e** combination in the first figure. A conclusion in **a** or in **e** can arise, depending on the terms taken, according to Aristotle.

This lead commentators, to begin with Alexander of Aphrodisias, to think that the conclusions are obtained “thanks to the matter”:

**B3**= Useless-materially concluding syllogistic combinations

“Every man is an animal, no dog is a man, every dog is an animal (**a/e/a**)”

“Every man is an animal, no washing machine is a man, no washing machine is an animal (**a/e/e**).”

The fact can a “**a** proposition” or a “**e** proposition” (see *Anal pr* 26a3-9) can follow was considered by Aristotle as a proof that this combination was useless, and consequently not admitted as valid.

The thirteenth-century syllogistic limbo is peopled by many other types of arguments. We shall see additional examples in the following section (arguments **C, D, E, F**). The abovementioned series of examples is intended to show the variety of the cases that were discussed, as well as the fact the “two Barbaras problem” is only one element in the discussion, which must, and indeed was, connected to other syllogistic puzzles of the time.

## 5 A Case Study: The “Two Barbaras” Problem

### 5.1 *The Distinction Between “As-of-Now” and “Unrestricted” Assertoric Propositions in Mixed Modal Syllogistic*

The “two Barbaras problem” is concerned with an “as-of-now (*ut nunc*)” vs. “unrestricted (*simpliciter*)” distinction. It is inspired by some remarks found

in Aristotle's *Prior Analytics*, book I, chapter 15, dedicated to XMM (assertoric/possible/possible) combinations (*Anal pr* I, 15, 34b 7-12). A distinction is drawn between two types of assertoric predications. Aristotle says that *ut nunc* predications should not be included:

We must understand "belong to all" (=de inesse) not as restricted according to time, such as "now" or "at such-and-such a time" (= *ut nunc*), but in an absolute (*unrestricted/simpliciter*) sense; for it is by means of premises taken in this latter way that we produce our syllogisms. ([7], p. 32).

Aristotle employs the distinction in order to reject the use of an argument in X (as-of-now) MM as a possible counterexample to the BarbaraXMM combination, so that the invalidity of the latter would be exposed.

If we accept *ut nunc* assertoric proposition, which we should not, we could end up with an argument (apparently) in XMM where the two premises are true, and the conclusion is false:

C\*="Everything moving is a man (be it the case); every horse is possibly moving, every horse is possibly a man"<sup>12</sup>

(A similar example with "moving," "animal," "man" is also given).

"Everything moving is a man" is taken as a true proposition here because the argument is formulated in counterfactual world where it would be the case that everything that moves is man. This is the reason why it was labelled a "as-of now" proposition by ancient and medieval commentators.

Aristotle's position is unclear. He seems to present the restriction as a general one (see [40], p. 132–133). But he himself does not respect it, since he has previously used an example with a *ut nunc* assertoric proposition as a counterexample in order to discard the XLL combination as useless, in Chapter 9, as we shall see below. As a consequence, one does not know if the interdiction about introducing *ut nunc* assertoric propositions is formulated in general, for all mixed modal syllogisms, or for those precisely at hand in Chapter 15 only, where the middle terms can have a larger extension than the major terms (See [41], p. 147–148).

As for medieval Latin logicians, they have certainly understood the rejection of *ut nunc* assertoric propositions to be applied to more mixed modal syllogisms than just the XMM combination. Robert Kilwardby explicitly relies on "what Aristotle says in the text (*sicut dicit Aristoteles in textu*)" to apply the idea of a compulsory unrestricted assertoric proposition for all L/X mixed modal syllogisms, despite the fact that the notion of an unrestricted assertoric proposition does not appear in the original text in *Prior Analytics* I, 9, 30a22, where the LXL combination is introduced. The subject must be essentially taken as subordinated to the predicate (*subiectum est essentialiter sub predicato*), ([39], p. 316).

<sup>12</sup> The asterisks indicate that the argument is not accepted by Aristotle as a counterexample to the BarbaraXMM.

## 5.2 The “Two Barbaras” Problem

By contrast with the LXL combination, the XLL combination is said by Aristotle in *Prior Analytics* to be not a good combination, because it suffers from the existence of counterexamples. One of them is argument **D**:

**D**: Everything animal is moving (be it the case)<sup>13</sup>; every man by necessity is an animal; every man by necessity is moving” (*Prior Analytics* I, 9, 30a30-33 ; see the formulation by Robert Kilwardby [39], p. 312).

This is problematic since one cannot see why “as-of-now” assertoric propositions could be authorized in order to forge counterexamples in this case, and why not in others, that is, why the same type of counterexamples could not be forged to contest the validity of the XMM, but also of the other, mixed modal necessary combination, namely, LXL.

From the Aristotelian example **D**, examples were indeed forged in the tradition of the commentaries of the *Prior Analytics*, in order to question the validity of LXL combinations too: those are arguments **A1/a** and **A2/b** already mentioned.

The two combinations, LXL and XLL are the two “Barbaras” discussed in the tradition. The problem was indeed to explain why **D** would be a counterexample to XLL, so that the combination is invalid, while **A2/b** would not be a counterexample to LXL, since it has no counterexample whatsoever according to Aristotle. Alternatively, in case **A2/b** would be indeed considered as following a LXL combination, the combination would be valid even though it apparently suffers from the existence of a counterexample, which would be quite disastrous.

The only solution has consisted is blocking **A2/b** as possibly a counterexample to LXL, in the same manner as Aristotle has blocked **C** for the XMM combination: it is not a counterexample since it is a non-authorized instantiation of the LXL combination, where an unrestricted assertoric proposition is demanded.

## 5.3 The “As-of-Now vs. Unrestricted Syllogistic Rule”

It is in this context that Latin logicians have used a pre-existing rule, the “as-of-now vs. unrestricted rule,” while other paths have been followed by Alexander of Aphrodisias, Philoponus, Ps-Ammonius,<sup>14</sup> and yet another one by Averroes,<sup>15</sup> in order to save the coherence of Aristotle’s mixed modal syllogistic.

The rule also blocks **A2/a**, which has been also forged as a counterexample to LXL in the medieval tradition, where proper names were pervading in logic and

<sup>13</sup> “Everything animal is moving” is taken as a true proposition here because the argument is formulated in counter-factual world where it would be the case that every animal is moving.

<sup>14</sup> See [31], p. 53–108 and [43], p. 21 ff.

<sup>15</sup> See [30], p. 71–74; [36], p. 21, p. 32–35; [44], p. 95.

in syllogistic, in addition to **A2/b** already formulated by ancient commentators. There have been several formulations of the rule, especially an early one, dedicated to solve logical puzzles connected to existential import and consequences from universal to singular propositions (see Brumberg-Chaumont. Forthcoming).

The syllogistic version of the rule can be formulated as follows:

**“As-of-now vs. unrestricted syllogistic rule”**: From a necessary major and an as-of-now assertoric minor, no necessity proposition follows (or: only an as-of-now assertoric conclusion follows). If a necessary conclusion is indeed inferred, it is a fallacy because there is a variation in the predication of the middle term.<sup>16</sup>

As a consequence, logicians adopting the “as-of-now vs. unrestricted syllogistic rule” are faced with:

**A1/a\* and A1/b\***= non-instantiations (and therefore no counterexamples) to the LXL combination, which is then “useful,” but to be (materially) reformulated as LX(unrestricted)L.

**D**= instantiation (and therefore counterexample) to XLL.

**C\***: non-instantiation (and therefore no counterexamples) to XMM, which is then “useful,” but to be (materially) reformulated as X(unrestricted)MM.

**B1**= instantiation of the X(unrestricted)LL combination, which, so formulated, could be judged valid.

**E** = instantiation of the LX(as-of-now)X (as-of-now) combination, which although not mentioned by Aristotle, could be valid, since it satisfies the “as-of-now vs. unrestricted syllogistic rule.”

“Every man is necessarily an animal, Socrates is a man, Socrates is an animal.”

All in all, the theory offers quite a labyrinthine account of the relationship between syllogistic argument, logical form, and matter.

The validity of some useful combinations in the *Prior Analytics* is defended by formulating material conditions that bear upon recognized Aristotelian syllogistic forms. Some features of the matter in the assertoric proposition are taken into account: the terms of the proposition must be in such and such relationship, an essential one, as for “man” to “animal,” “able-to-laugh” to “man” (but not the other way around). If not satisfied, they turn the argument into a formally defective argument. **A2/a** and **A2/b** must indeed be considered as such, that is, as formally defective, if they are to be disqualified as instantiation of the LXL combination, so that the latter does not have a counterexample. The same goes for the Aristotelian example **C**. The LXL combination must be reformulated with the material condition entering the syllogistic form, namely, in LX(unrestricted)L.

Those material features clearly belong to “matter” in sense 2, that is, to the material modalities of the propositions.

On the contrary, the same features of matter make useless combinations, such as XLL, a productive combination, namely a combination which, provided some

<sup>16</sup> See [19], p. 197. See also [18] and [13] for a detailed discussion.

material conditions are satisfied, necessarily yields a given type of conclusion. This is the case for X(unrestricted)LL Barbaras (argument **B1**), while the X(as-of-now)LL would have to be rejected (argument **D**).

They also can turn unacceptable combinations, such as LX(as-of-now), into productive combinations, provided that a material clause about the assertoric conclusion being also as-of-now is formulated (argument **E**).

In addition, it seems that the presence of a mix up of unrestricted and as-of-now predications makes **A2/a**, **A2/b**, and **C** formally defective and fallacious arguments, although syllogistically disposed, while the absence of such mix up makes arguments following useless syllogistic combinations, such as **B1** and **E**, formally valid. If it is the case, one cannot but suspect that even basic assertoric Barbara syllogisms also could be invalid and fallacious arguments, if made up with a mix of as-of-now and unrestricted assertoric premises, as in **F**. Syllogistic theory would fall apart as a whole.

**F**= Barbara X(unrestricted)/X (as-of now): useful combination?

“Every man is an animal, everything moving is a man, everything moving is an animal”

Last but not least, the “as-of-now vs. unrestricted syllogistic rule” does not explain, on the principle, why **D** could be a counterexample against the XLL combination and why **A2/a** (or **A2/b**) cannot.

#### 5.4 The “Appropriation Rule” by Robert Kilwardby

Robert Kilwardby indeed refuses the “as-of-now vs. unrestricted syllogistic rule” and offers another solution.

He acknowledges in his commentary on the *Prior Analytics* that Aristotle uses arguments with as-of-now assertoric propositions as authorized counterexamples to useless combinations (= argument **D**). He also admits that one does not see why XLL combinations could not be accepted, provided that the X proposition is unrestricted, formulating the argument **B1** ([39], p. 323–324).

As a consequence, he offers another, much more powerful solution, based on the “appropriation rule” ([39], p. 323–324; see [45], p. 160–162).

By this rule, the *very formulation* of arguments like **A2/a**<sup>17</sup> and **A2/b** is barred, because the presence of a necessity major demands an unrestricted minor in the LXL combination. The rule does not apply to the XLL combination because the necessity proposition, being in the minor, does not “govern” the conclusion ([39], p. 324).

The “appropriation rule” is followed by Albert the Great in his commentary on the *Prior Analytics* (See [1], p. 573A) during the 1250s, that is, when he was in

<sup>17</sup> On singular propositions in Kilwardby’s syllogistic, his rejection of singular terms as “as-of-now” terms, and his solution to *sophimata* connected to existential import, see [13].

his “Kilwardbian” period (in the 1250s), before he adopted more radical views on logical hylomorphism.<sup>18</sup> It is mentioned by an anonymous thirteenth-century commentator on the *Prior Analytics*,<sup>19</sup> as well as by a newly discovered English discussion on a logical puzzle (*sophisma*), as I have recently shown (see [13]).

If the “appropriation rule” formulated by Robert Kilwardby does offer a better solution to the “two Barbaras problem” than the “as-of-now vs. unrestricted syllogistic rule,” it does not get rid of all the abovementioned problems regarding the relationship between form and matter. It also creates new difficulties.

One pending question is, for instance, the logical status of arguments like **A2/a** and **A2/b**: even if they are forbidden, nothing prevents us from formulating them all the same. We would then have no idea of their logical nature, as failed-syllogistically disposed syllogisms. In the same manner, we are unsure of the logical status of arguments such as **E** or **B1**.

In addition, Robert Kilwardby’s syntactical notion of the form of a syllogism *simpliciter* as defended in the same text, namely, in the commentary of the *Prior Analytics*, in order to defend arguments such as **A1** as perfectly all right syllogisms do not hold any longer. The same goes for the way one can check if a given argument indeed follows a useful combination: substituting concrete terms with abstract letters does not mean that that the argument actually follows the combination in question. Cases such as **A2/a** and **A2/b** show that the “reverse” permutation criteria used in order to defend **A1** as a syllogism does not hold any longer, and that additional conditions are to be taken regarding the matter of the proposition (matter in sense 2). As underlined by Paul Thom, the “appropriation rule” makes the “contextual approach” enter the definition of validity, and Robert Kilwardby’s approach to syllogistic not “entirely formal,” so that “we see Kilwardby operating with a concept of syllogistic form different from the modern concept of logical form” (See [43], p. 161).

One could reconstruct Kilwardby’s position about XLL arguments with an unrestricted assertoric major, that is, argument like **B1**, saying that they are valid, and even “formally valid,” though “unsyllogistic,” as proposed by Paul Thom ([45], p. 233–234). This implies that the logician would think of a general pattern according to which arguments such as **B1** are conclusive.

About the same argument, Albert the Great, however, explicitly says (in his “Kilwardbian period”) that if an argument in XLL happens to be conclusive, because the assertoric major happens to be unrestricted, it would be only thanks to its matter, and not to its form:

From such a combination [X/L] a conclusion in a necessary mode does not follow, or, **if it appears to be following**, it would not be as a result of a syllogistic force (*virtus syllogistica*), **but thanks to matter (*gratia materiae*)** and because of the relationship of the terms ([1], p. 521A).

<sup>18</sup> Albert often professes a very different position in his later works, as in paraphrases on the *Topics* and on the *Sophisiti Elenchi* (see [12], p. 372–373).

<sup>19</sup> The anonymous commentary on the *Prior Analytics* in the ms. Bruges Stadbibliothek cod. 509 edited in [38], p. 260.



**B1** is thus not seen as formally-though-not-syllogistically-valid, but as an argument where matter “concludes.” However, the “material logic” here developed by Albert does not mean that the difference between the conclusive force of matter and that of form is blurred, as can be seen in the above-quoted text. Alexander of Aphrodisias defends exactly the same position as that of Albert when he deals with Aristotle’s words in *Anal pr I*, 9, 30a15 ff. (“It **sometimes** results that the syllogism is necessary when just one premise is necessary . . .”):

And it is ridiculous to think that he [Aristotle] says “sometimes” because the conclusion of such a combination is necessary in the case of certain material terms. **For on this way <of looking things>, nothing would prevent one from saying that even non-syllogistic combinations are syllogistic “sometimes”, for they will be found to yield a conclusion in the case of certain material terms** [Here **Caenus argument** (=B3) is taken as an example of a materially conclusive argument: the major converts because of the matter] ([3], p. 60).

This means that the Alexandrian notion of a “material logic” might be understood in a slightly different way than it has been described by Henri Hugonnard-Roche about Aristotelian logic in Syriac, that is, as a tentative demarcation of what is material and what is formal within formally concluding arguments, as well as asserting the irreducible non-syllogistic nature of materially concluding arguments.

### Conclusion

In a later stage of the discussion, all instantiations of LXL combinations seems to have been more and more admitted. Robert Kiwardby’s appropriation rule is rejected in the early fourteenth-century commentary on the *Prior Analytics* ascribed (falsely) to John Duns Scot ([35], p. 151–154). It is also rejected, during the thirteenth century, in one version of a *sophisma* (logical puzzle) by Boethius of Dacia (ca 1260/1270). The Parisian master generally rejects any kind of “as-of-now/unrestricted syllogistic rule” that would restrict the possible instantiations of the LXL combination. Contrary to the previously admitted position, **A2/b** and even **A1** are judged perfectly all-right Barbara syllogisms ([11], p. 195).

The position became standard. It is found in William of Ockham’s theory of syllogism, where the necessary rejection of at least some of the fallacies, such as the fallacy of equivocation, as well as the fallacies of amphibology, of composition and division, and of absolute and relative, are just “listed” as excluded in the definition of the first figure. Fallacies such as **A1** are perfectly all-right syllogisms and the nominalist logician harshly criticizes his thirteenth-century predecessors (see [47], III p. 12–15). The change in the strategy for distinguishing formally defective and non-formally defective fallacies is connected to the abandon of the thirteenth-century rich, hylomorphic concept of syllogistic form, and the adoption of substitutional definition of logical form and logical matter. This position better fits a general theory of consequence which is not guided anymore by the idea that arguments do have substantial forms and that they are syllogistic in essence: a variety of conceptions of logical form had emerged in the fourteenth century, none of them being considered the “substantial form” of the argument (see [22]). Because such a substitutional definition cannot enter into the content of the matter with which the form is filled up, the exclusion of undesired species of apparently-syllogistically-

disposed arguments cannot be metaphysically grounded on the essence of the syllogism, as it has been the case since the turn of the twelfth century.

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