

The Hypothetical Syllogisms in the Greek and Latin Medieval Traditions^a

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Medieval logic, in standard histories of logic or in more specialised treatments of the subject, is usually presented in terms of the achievements of the logicians in the Latin West. The logical works of the Byzantine East are hardly studied in this connection, either because they are not considered interesting enough or because they fail to address the issues occupying their Western counterparts. But the hypothetical syllogisms, being a subject discussed by both the logicians of the West as well as those of the East, provide us with solid ground for comparing the two traditions and evaluating their respective contributions.

More specifically, what is to be considered here are the hypothetical syllogisms as they were dealt with in the texts of Byzantine and Western logicians from the 11th to the 14th century. Now, since most of our sources, especially of the Eastern tradition, are still unedited and since moreover a systematic scholarly analysis of their contents in general is not yet available, the results of this paper are tentative. Further research on additional texts and closer examination of those already known will eventually help to draw a more detailed picture of the relations between Eastern and Western views concerning logical questions and, in particular, concerning the development of hypothetical syllogistic.

Hypothetical Syllogisms in Antiquity

First some preliminary remarks on hypothetical syllogisms. Hypothetical syllogisms are valid inferences in which at least one premiss is a hypothetical proposition. Hypothetical propositions are complex propositions in which no constituent simple proposition is affirmed or denied.¹ In other words, conditionals, disjunctions, and negated conjunctions are

1. On hypothetical propositions, see Frede 1974a, 101-105.

a. I would like to thank Dr. Sten Ebbesen for his many helpful comments and suggestions.

hypothetical propositions, and syllogisms having at least one conditional, one disjunction or one negated conjunction as a premiss are hypothetical syllogisms.

There are some well-known passages in the *Prior Analytics* (*APr.* I.23 41a21-b1; 29 45a23-b20; 44 50a16-b4), in which Aristotle briefly considers syllogisms "from a hypothesis" (ἐξ ὑποθέσεως), as he calls them; namely, arguments which are "consented to by way of an agreement" (διὰ συνθήκης/δι' ὁμολογίας) and arguments "by reduction to the impossible" (διὰ τοῦ ἀδυνάτου).¹ He also names two specific types of syllogisms from a hypothesis, i.e. arguments "in accordance with a changed assumption" (κατὰ μετέληψιν) and "in accordance with a quality" (κατὰ ποιότητα), but the text does not make it sufficiently clear whether these arguments are the only subclasses of the class of arguments by way of an agreement or whether they are just two further classes of syllogisms from a hypothesis. For the central issue for Aristotle here is whether syllogisms from a hypothesis can or cannot be reduced to the three figures of the categorical syllogisms, and the discussion about the classification of syllogisms from a hypothesis is postponed for later. However, no extant book of Aristotle's takes up this subject in more detail.

Nevertheless, the evidence concerning the accounts of hypothetical syllogisms developed by Aristotle's pupils seems to be more promising; for in Alexander of Aphrodisias' commentary on the *Prior Analytics* there are substantial passages which help us to reconstruct the Peripatetic theory of hypothetical syllogisms (*in APr.* 261,29-266,5; 323,17-328,7; 389,29-390,19). Setting aside the question as to whether it was actually Theophrastus or Eudemus or some other associates of Aristotle's who worked systematically on the hypothetical syllogistic, and passing over the issue of the length and detailedness of the alleged Peripatetic treatises on this subject,² let me now focus on the main aspects of the Peripatetic tradition.

Following Aristotle's doctrine, the Peripatetic logicians regarded hypothetical syllogisms as depending for their validity on categorical syllogisms. But this did not stop them from producing an elaborate list of hypothetical syllogisms; in particular, it seems that the Peripatetics dealt

1. Striker 1979, 33-50.

2. Frede 1974a, 16-17; Barnes 1985, 559-562.

with four distinct groups of hypothetical syllogisms: syllogisms "in accordance with a changed assumption" (*κατὰ μετάληψιν*), "in accordance with an analogy" (*κατ' ἀναλογίαν*), "in accordance with a quality" (*κατὰ ποιότητα*), and reduction to the impossible. Scholars recently have made some plausible suggestions concerning the logical form of arguments in accordance with a changed assumption and of arguments in accordance with an analogy:¹

1. Arguments in accordance with a changed assumption are subdivided into two subclasses, namely syllogisms "in accordance with a continuity" (*κατὰ συνέχειαν*) and syllogisms "in accordance with a division" (*κατὰ διαίρεσιν*). The general form of hypothetical syllogisms of the first subclass can be represented by

If A, then B; but C; therefore D.

Two valid instances of that form are

If P, then Q; but P; therefore Q;

If P, then Q; but not Q; therefore not P.

The general form of hypothetical syllogisms of the second subclass can be represented by

A or B; but C; therefore D.

Two valid inferences of that form are

P or Q; but P; therefore not Q;

P or Q; but not Q; therefore P.

2. Arguments in accordance with an analogy are more difficult to identify, but it seems that they can be represented by the general form

If A, then B; if C, then D; therefore if E, then F.

This type of argument actually has instances which parallel arguments in the three Aristotelian figures

If P, then Q; if Q, then R; therefore if P, then R;

If P, then R; if Q, then not R; therefore if P, then not Q;

1. Barnes 1985, 564-566; 569. Barnes suggests that the general form of arguments in accordance with an analogy is "As X is to Y, so Z is to W; but X is R to Y; therefore Z is R to W." I have elsewhere tried to refute this hypothesis, and support the view that the group of arguments in accordance with an analogy is the early Peripatetic equivalent of the group of wholly-hypotheticals; see Ierodiakonou 1990, 137-148.

If P, then Q; if not P, then R; therefore if not Q, then R.

In addition to this Peripatetic tradition the other tradition which needs to be studied in connection with the hypothetical syllogisms is, of course, the Stoic tradition. For, though the move towards a logic of propositions was probably initiated by the Peripatetic school, its full development first came with the Stoics. It is well- documented (e.g. Sextus Empiricus *M* VIII 224-227; *PH* II 157-158; Diogenes Laertius VII 80-81) that Stoic logic is based on five types of arguments called "indemonstrables" (ἀναπόδεικτοι) whose first premiss is a hypothetical proposition

If P, then Q; but P; therefore Q;
 If P, then Q; but not Q; therefore not P;
 Not both P and Q; but P; therefore not Q;
 P or Q; but P; therefore not Q;
 P or Q; but not Q; therefore P.

The Stoics declared these five valid inferences to constitute a complete list of basic inferences and to be the groundwork of any argument whatsoever.¹

But the development of the hypothetical syllogistic continues in the works of the Neoplatonic commentators, who offer a synthesis of Stoic and Peripatetic elements. A particularly interesting and characteristic example of a list of hypothetical syllogisms is to be found in Philoponus' commentary on the *Prior Analytics* (in *APr.* 240,21-247,32), a text which proves to be of significant help in tracing the origins of the Byzantine accounts of hypothetical syllogisms. Philoponus investigates hypothetical syllogisms while commenting on an Aristotelian passage according to which all syllogisms can be reduced to the universal syllogisms of the first figure, since every syllogism is formed through one or another of the three figures (*APr.* I.23 40b17-22). Philoponus attempts to specify the types of syllogisms alluded to in Aristotle's elliptical statement, and his comments touch upon most of the issues connected with the development of hypothetical syllogistic.

1. In addition, I have argued that the Stoic logicians also incorporated in their system a type of argument called the "three-component" (διὰ τριῶν) argument, which has the general form "If A, then B; if B, then C; if A, then C"; see Ierodiakonou 1990, 137-148.

In particular, after briefly recapitulating the formation of all categorical syllogisms through one or another of the three figures (*in APr.* 240,26-241,24), Philoponus undertakes to prove that hypothetical syllogisms are also "reduced" (*ἀνάγονται*) to these figures (*in APr.* 241,24-242,13). To accomplish that, he sets out to demonstrate the dependence of hypothetical on categorical syllogisms; that is to say, he declares that the "hypothesis" (*ὑπόθεσις*) in hypothetical syllogisms, namely the antecedent of the conditional premiss, is in fact the conclusion of a categorical syllogism. According to Philoponus, it is exactly in this indirect sense that hypothetical syllogisms are said to be reduced to the three figures of the Aristotelian syllogistic. Leaving aside the perplexing problems arising from the actual reduction of hypothetical to categorical syllogisms,¹ what deserves noticing in this introductory passage is that hypothetical syllogisms are discussed in the context of Aristotelian logic, and that they furthermore, are regarded as subordinate to categorical syllogisms. Philoponus certainly belongs to a tradition that needs to trace the origin of every logical development to Aristotle's authority.

Philoponus' list of hypothetical syllogisms classifies them into three groups: the wholly-hypothetical arguments (*δι' ὅλων ὑποθετικοί*), the hypothetical syllogisms in a narrower sense (*ὑποθετικοί*), and reductions to the impossible (*διὰ τοῦ ἀδυνάτου*). Passing over, on this occasion, an inquiry into the issues related to the classification of reductions to the impossible as a distinct group of hypothetical syllogisms, let me focus now on the remaining two groups of hypothetical syllogisms as presented in Philoponus' list.

1. The four types of wholly-hypothetical arguments (*in APr.* 243,11-36) are all of the general form:

If A, then B; if B, then C; therefore if A, then C.

But Philoponus does not merely discuss the general form of these arguments; he also presents all four combinations that can be formulated so as to derive conclusions, in which the antecedent and the consequent are both affirmative or both negative or one is affirmative and one negative:

If P, then Q; if Q, then R; therefore if P, then R;

If P, then Q; if Q, then not R; therefore if P, then not R;

1. On the reduction of hypothetical to categorical syllogisms, see: Mueller 1969, 173-187; Frede 1974b, 1-32; Barnes 1983, 279-326.

If not P, then Q; if Q, then R; therefore if not P, then R;
 If not P, then Q; if Q, then not R; therefore if not P, then not R.

2. The second group of hypothetical syllogisms consists of five types of arguments that are said to be distinguished from the above by their conclusion, which simply states what is the case or what is not the case (*in APr.* 244,1-246,14). These five hypothetical syllogisms are further subdivided into those formed "in accordance with a consequence" (*κατ' ἀκολουθίαν*), and those "in accordance with a disjunction" (*κατὰ διάζευξιν*). In particular, the first and second hypothetical syllogisms are formed in accordance with a consequence and have the general form

If P, then Q; but P; therefore Q;
 If P, then Q; but not Q; therefore not P.

As to the three hypothetical syllogisms that are formed in accordance with a disjunction, they exhibit the following general form

Not both P and Q; but P; therefore not Q;
 P or Q; but P; therefore not Q;
 P or Q; but not Q; therefore P.

To understand the formation of these last hypothetical syllogisms, Philoponus finds it necessary to explain in detail the different kinds of disjunctive propositions. That is to say, he defines disjunction as a hypothetical proposition signifying some sort of "division" (*ἐν διαίρεσει ὑπόθεσις*), and he indicates that the disjuncts can be either "non-opposites" (*ἐπὶ τῶν μὴ ἀντικειμένων*; for example, man/dog/horse) or "opposites" (*ἐπὶ τῶν ἀντικειμένων*); in the case of opposite disjuncts, they can be either "direct" (*ἐπὶ τῶν ἀμέσων*; for example, odd/even) or "indirect" (*ἐπὶ τῶν ἐμμέσων*), and in the case of indirect opposites, they can be either "definite" (*ὠρισμένων*; for example, smaller/equal/larger) or "indefinite" (*ἀορίστων*; for example, white/grey/red). After specifying the various types of disjuncts, Philoponus stresses that the third hypothetical syllogism should be used in the case of non-opposites and indefinite indirect opposites, whereas the fourth and fifth hypothetical syllogisms should be saved for direct opposites and definite indirect opposites. In other words, he attempts here to justify the subdivision of hypothetical syllogisms in accordance with a disjunction into three different types of inferences, by claiming that the various kinds of disjuncts necessitate the formation of hypothetical syllogisms sometimes with

negated conjunction and sometimes with disjunction.

To summarise and to fully comprehend the formation of Philoponus' list of hypothetical syllogisms, let us stress finally its convergence and divergence from the previous logical traditions:

1. Philoponus follows the Peripatetic tradition in treating hypothetical syllogisms as secondary to categorical syllogisms, and in that some of the hypothetical syllogisms dealt with by him clearly are drawn from the Peripatetic tradition. However, although it may be the case that Philoponus' wholly-hypothetical arguments and the Peripatetics' syllogisms in accordance with an analogy have similar general forms, Philoponus' instances of such arguments are interestingly different from those produced in the Peripatetic tradition. For although the Peripatetics showed the correspondence between these arguments and categorical syllogisms by presenting three figures of wholly-hypothetical arguments, Philoponus simply works out the different argument forms of this kind available for the derivation of different conclusions. Thus, although the tendency to elaborate on the general form is common, the result in Philoponus' case is different from that of the Peripatetic tradition.

2. Though it is very likely that already Peripatetic logicians had discussed some of the hypothetical syllogisms belonging to the second group on Philoponus' list, it seems that Philoponus' source is the Stoic tradition. First, because the third hypothetical syllogism, which has as its first premiss a negated conjunction, was not mentioned in the Peripatetic treatises on hypothetical syllogisms, and second, because Philoponus' systematic list of five hypothetical syllogisms has its exact counterpart in the Stoic tradition of the five indemonstrables. But we need to qualify the last remark; for although Philoponus enumerates the five hypothetical syllogisms in the systematic Stoic order, he also finds it appropriate to subdivide them into the two subclasses which we already find in the Peripatetic accounts of hypothetical syllogisms.

Of course, after investigating the Peripatetic and Stoic elements in Philoponus' list of hypothetical syllogisms, it is interesting to ask whether Philoponus has predecessors in his attempt to combine the two ancient logical systems and to create a coherent list of hypothetical syllogisms. But whether Philoponus in this is original or influenced by pre-

vious compilations should be left for another occasion.¹ What matters here is that this systematic synthesis of doctrines derived from various traditions represents a particular stage in the development of logical theory whose influence will last for centuries to come, well into the Byzantine era.

The Byzantines

The logical works of Byzantine scholars often contain some pages discussing hypothetical syllogistic. Such accounts usually form part of traditional commentaries, philosophical compendia, short treatises, or of scholia in the margins. Unfortunately, a great number of Byzantine manuscripts on logic are still unedited, and from these only a small proportion are taken into account here. But although the surveyed evidence is incomplete, it can still be regarded as sufficient to demonstrate common features and different trends prevailing among the Byzantine logicians. To present, and comment on, the Byzantine versions of hypothetical syllogistic, I shall discuss first eight relevant texts in the light of Philoponus' list, and then relate them to each other.

I. Anonymus Heiberg (11th century)

The anonymous compendium of philosophy edited by Heiberg (*Συνοπτικὸν σύνταγμα φιλοσοφίας* 30,16-32,7)² belongs to the beginning of the 11th century and constitutes the first known work of the Byzantine period to refer to hypothetical syllogistic.

Here hypothetical syllogisms are discussed after a survey of the three Aristotelian figures. They are said to derive their syllogistic validity from categorical syllogisms, and they are divided into six types of argu-

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1. Philoponus is certainly quite familiar with Ammonius' account of hypothetical syllogisms. As Ammonius' own work is lost, two anonymous treatises which come from his school need to be considered in order to get some idea about Ammonius' doctrine on the subject: The first is a small treatise on hypothetical syllogisms (*Περὶ ὑποθετικῶν συλλογισμῶν ἐκ τοῦ μονοβίβλου Ἀμμωνίου*), and the second a short work on the different types of syllogisms which contains some passages on hypothetical arguments (*Περὶ τῶν εἰδῶν πάντων τοῦ συλλογισμοῦ*); both these texts are found in the same manuscript transmitting Ammonius' commentary on the *Prior Analytics* and both are edited in Wallies' edition.
 2. On the date and authorship of this treatise, see Benakis 1988, 5; Ebbesen 1981, 262-265.

ments; namely, the first type has the same general form as wholly-hypothetical arguments, and the other five coincide with the standard five indemonstrables.

The account of the class of wholly-hypothetical arguments seems to follow not Philoponus, but an early Peripatetic account of this type of arguments; for the particular example of a wholly-hypothetical syllogism is compared to arguments in the first mode of the first figure, and then it is pointed out that such syllogisms can be constructed in accordance with all the categorical figures.

The presentation of the five indemonstrables follows the standard Stoic order and not Philoponus' subdivision into the two subclasses of hypothetical syllogisms, those in accordance with a consequence and those in accordance with a disjunction. It is only in the discussion of the second indemonstrable that there is an element not to be found in the early Stoic tradition; namely, the second indemonstrable is also called here "conversion with contradiction" (σὺν ἀντιθέσει ἀντιστροφή).¹

All the examples of hypothetical syllogisms are similar to Philoponus', apart from two additional illustrations of the fourth and fifth indemonstrables that are obviously of Stoic origin.

II. Michael Psellos (1018-c.1078)

There is a Vatican manuscript of the 14th century, Vat. gr. 209, which has in the margins scholia on the *Prior Analytics* by various commentators, among them so far unedited scholia by Michael Psellos. More specifically, in ff.120v-121r we find a small equally unedited treatise on the hypothetical syllogisms, explicitly attributed to Psellos. The same treatise is also to be found in another Vatican manuscript, Vat. gr. 243 ff.158v-159r.

The list of hypothetical syllogisms in this treatise starts with the group of wholly-hypothetical syllogisms (δι' ὅλου ὑποθετικοί), as these are for-

1. For conversion with contradiction, see: Aristotle, *Top.* II 8, 113b15-26; Alexander, in *APr.* 29,15-17; 46,6-8; in *Top.* 190,26-193,7; Galen, *Institutio Logica* VI 4, 14,15-21; <Ammonius>, in *APr.* 68,25-28. However, what differentiates <Ammonius>' text from the previous accounts on conversion with contradiction is the fact that only here there is an association with the Stoic indemonstrables, whereas in the other cases the discussion is focussed on the conversion of propositions.

mulated in Philoponus, but with the exception that only three of the four types are here presented.

The five Stoic indemonstrables follow as a different group of hypothetical syllogisms, being subdivided in Philoponus' manner into syllogisms "in accordance with a consequence" (ἐξ ἀκολουθίας) and syllogisms "in accordance with a disjunction" (κατὰ διάζευξιν), with a few comments concerning the different kinds of disjuncts.

Tellingly, all the examples in Psellos' treatise are to be found in Philoponus.

III. Ioannes Italos (1023-c.1085)

In his treatise on dialectic (Περὶ διαλεκτικῆς 36-38, 20,3-22,2), Ioannes Italos gives a short account of hypothetical syllogistic in three paragraphs. Leaving aside the last paragraph discussing reduction to the impossible, let us briefly comment on the first two, in which we find a list of hypothetical syllogisms.

A striking feature of this list is that wholly-hypothetical arguments are not mentioned at all. The five Stoic indemonstrables become the basic types of hypothetical syllogisms, illustrated by examples similar to Philoponus' examples. These five arguments are divided in the Peripatetic manner into two groups, of which the first contains two hypothetical syllogisms with a conditional premiss, and the second three hypothetical syllogisms with a disjunctive premiss. However, the precise form of the second group of hypothetical syllogisms never becomes clear. For although there is an elaborate distinction between the different kinds of disjuncts, like the one found in Philoponus, Italos gives only one example with disjunction and does not specify the forms of the other hypothetical syllogisms.

IV. Nicephoros Blemmydes (1197-c.1272)

In Nicephoros Blemmydes' renowned compendium of logic (Ἐπιτομὴ Λογικῆς 973-980) there is a lengthy section on hypothetical syllogistic which comprises a unified list of six types of hypothetical syllogisms, of which the first five are the five indemonstrables and the sixth represents the group of wholly-hypothetical arguments.

The five indemonstrables are presented in their standard Stoic order and form, but they are subdivided in the Peripatetic manner into syl-

logisms "in accordance with a continuity" (κατὰ συνέχειαν) and "in accordance with a disjunction or a conflict" (κατὰ διάζευξιν/διάστασιν), and all different kinds of disjuncts are discussed exactly as in Philoponus' text. The second indemonstrable is also said to have the characteristics of "conversion with contradiction" (σὺν ἀντιθέσει ἀντιστροφῇ), and an interesting remark is added, namely that the simple propositions of the first and second indemonstrables can be negative as well as affirmative; this last elaboration of the first two Stoic indemonstrables results in four different forms of argument for each of these types of hypothetical syllogisms.

The group of wholly-hypothetical arguments is presented simply as the sixth type of hypothetical syllogisms, but it is illustrated by four examples which represent all the different formulations found in Philoponus' commentary.

Blemmydes uses the same examples as Philoponus, but adds some further examples, most of which certainly are of Stoic origin.

V. Manuel Holobolos (13th century)

The Byzantine philosopher of the 13th century Manuel Holobolos is known as the translator of Boethius' *De Hypotheticis Syllogismis* and *De Topicis Differentiis*. But Holobolos does not simply translate the Latin text into Greek; he also comments on Boethius' work, and adds his views on the issues discussed. In particular, Holobolos' translation of *De Hypotheticis Syllogismis* contains interesting scholia in the margins¹ and an extra paragraph on hypothetical syllogisms.

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1. Two examples of scholia in the margins are here presented in order to make clear the type of Holobolos' intervention in Boethius' text:
 - i. Commenting on the passage in which Boethius claimed that the premisses of hypothetical syllogisms need to be proved through a categorical syllogism, Holobolos gives the diagram of a first figure syllogism whose conclusion is the antecedent of a conditional premiss belonging to a hypothetical syllogism (p.177).
 - ii. In the passage where Boethius dealt with syllogisms of the type of wholly-hypothetical arguments and presented their three figures parallel to those of categorical syllogisms, Holobolos finds it necessary to give the diagrams of the three figures of hypothetical syllogisms (p.181).

Holobolos' brief account of hypothetical syllogistic, at the end of Boethius' text, involves a list of nine hypothetical syllogisms that exhibits an interesting feature; namely, it presents Philoponus' list of hypothetical syllogisms in all its detail with the help of diagrams. Hence, we get first the four types of "wholly-hypothetical syllogisms" (δι' ὅλου ὑποθετικοί), and then the five standard indemonstrables exhibited in two subclasses, namely syllogisms "in accordance with a consequence" (κατ' ἀκολουθίαν) and those "in accordance with a disjunctive" (κατὰ διάζευξιν). But it should be mentioned that in Holobolos' diagrams there is no provision for the representation of the different kinds of disjunctive propositions.

The examples are all the same as in Philoponus' commentary.

VI. Ioannes Pediasimos (14th century)

In Ioannes Pediasimos' commentary on the *Prior Analytics*, there is a brief note referring to hypothetical syllogistic (43,31-45,8).

Pediasimos' list of hypothetical syllogisms shares with Philoponus' account the same division into the group of "wholly-hypotheticals" (δι' ὅλου ὑποθετικοί) and the group of the five indemonstrables subdivided into the syllogisms "in accordance with a disjunction" (κατὰ διάζευξιν). Here the second indemonstrable is again called "conversion with contradiction" (σὺν ἀντιθέσει ἀντιστροφή), and the three kinds of syllogism last on the list are formulated on the basis of Philoponus' distinction of the different kinds of disjunctive propositions.

Quite generally, Pediasimos' examples closely follow Philoponus' text.

This brief survey of Byzantine accounts of hypothetical syllogisms is far from complete. To show, however, that it is reasonably representative, let us consider two additional treatises, both anonymous, the first edited and the second still unpublished.

VII. Anonymus I

A small treatise on hypothetical syllogisms (Περὶ τῶν ὑποθετικῶν καλουμένων συλλογισμῶν) which is transmitted following Philoponus' and Leon Magentinos' scholia on the *Prior Analytics* and right after an anonymous synopsis on syllogisms has been edited by Trincavelli as the

work of an unidentified author, whom I name for the time being Anonymus I.

Here the list of six hypothetical syllogisms contains the five Stoic indemonstrables, which interestingly enough retain their Stoic nomenclature (ἀναπόδεικτοι), subdivided in the Peripatetic manner into the syllogisms "in accordance with a continuity or a consequence" (κατὰ συνέχειαν / κατ' ἀκολουθίαν) and those "in accordance with a disjunction" (κατὰ διάζευξιν) with the distinction of the different types of disjuncts. As to the sixth hypothetical syllogism, it has the general form of wholly-hypothetical arguments (δι' ὧν ὑποθετικοί), and no further explanation is given.

Standard though it may be, this treatise on hypothetical syllogistic has the following interesting features: here, too, the second indemonstrable is called "conversion with contradiction" (σὺν ἀντιθέσει ἀντιστροφῇ), the third indemonstrable becomes fifth, and the wholly-hypotheticals are said to be introduced by Alexander.

All the examples are also the standard examples used in the treatises on hypothetical syllogisms.

VIII. Anonymus II

There is a Vatican manuscript of the 13th century, namely Vat. gr. 316, which contains in ff. 165v-166r a small treatise on hypothetical syllogisms (Περὶ τῶν ὑποθετικῶν συλλογισμῶν). It is ascribed by Cereteli to Ioannes Italos, but as there is no such indication in the manuscript itself, and more importantly, as this account of hypothetical syllogistic greatly differs from that in Italos' other work, I prefer for the time being to refer to the author of this treatise as Anonymus II.

His list of nine hypothetical syllogisms is similar to Philoponus' list; for it contains the four types of wholly-hypothetical arguments and the five standard indemonstrables. However, there is no subdivision of the indemonstrables into two subclasses, and there is no elaborate distinction between different kinds of disjunctive propositions.

On the other hand, all the examples are similar to the examples used by Philoponus.

The Byzantines. Conclusions

To conclude, even if it is too early to state definite results until all relevant texts have been properly studied, it is clear already now that the Byzantine lists of hypothetical syllogisms exhibit common patterns:

1. All Byzantine treatises of hypothetical syllogisms represent a combination of two different logical traditions, even if references to the original sources are rare. In such compilations sometimes the Stoic element prevails, whereas sometimes the Peripatetic view is dominant. It seems most likely that this synthesis follows the paradigm of the amalgam produced by the Neoplatonic philosophers, and that in particular Philoponus represents a major, if not the major, source for the Byzantine tradition.

2. Apart from Anonymus Heiberg, no Byzantine account of hypothetical syllogisms mentions, let alone stresses, the dependence of hypothetical on categorical syllogisms. It seems that Byzantine scholars acknowledge the autonomy of hypothetical syllogistic.

The West. Boethius

Turning now to the contemporary logical discussions in the Medieval West, the obvious place to search for the main source of influence on them certainly is Boethius' *De Hypotheticis Syllogismis*. For until the twelfth century the logical texts generally available to the Latin Occident were Aristotle's *Categories* and *On Interpretation*, Porphyry's *Isagoge*, and Boethius' works.¹

Boethius' initial claim (I, I 3, p.206) that no Latin writers said anything about hypothetical syllogisms makes sense only if one takes into consideration the account of hypothetical syllogisms presented in this treatise. For Boethius himself points out that the main ideas of the *De Hypotheticis Syllogismis* originate in the early Peripatetic school² and concern chiefly syllogisms of the general form

If A, then B; if B, then C; therefore if A, then C.

1. Ebbesen 1982, 101-127; Lewry 1981, 90-134.

2. On Boethius' contribution to the preservation and transmission of Peripatetic logic, and in particular of the doctrine on hypothetical syllogisms, see Barnes 1981, 84-85.

The elaboration of hypothetical syllogistic on which Boethius prides himself is found in the second and third book of his treatise, and consists mainly in distinguishing three figures of the wholly-hypotheticals corresponding to the three figures of the categorical syllogism; also, in enumerating the sixteen syllogistically valid moods of each figure, which we obtain if we distinguish different forms for the affirmation and the negation of each constituent proposition.

In other words, the subject here is the systematic calculus of inferences of the form of wholly-hypotheticals and not the Stoic indemonstrables. For only at the beginning of the second book of the *De Hypotheticis Syllogismis* is there a discussion about two types of arguments which are not wholly-hypothetical, but have the general form of the first and the second indemonstrable. In fact, of these two types Boethius forms first two groups of arguments, each consisting of four different elaborations of the respective indemonstrable, by changing again from affirmative to negative the various clauses of the premisses; furthermore, three additional groups are introduced consisting of arguments whose first conditional premiss either has a complex antecedent or a complex consequent or both. However, it may be the case that Boethius even here draws on Peripatetic sources. For it has been argued that arguments with the logical form of the first and second indemonstrables were not unknown to the Peripatetic logicians. After all, these inferences should not be regarded as of Stoic origin, because, according to Boethius, the negation of the first premiss is not, as it should be if we follow the Stoic view on negation

It is not the case that (if P, then Q)

but rather

If P, then not Q.

Thus the Stoic indemonstrables are not to be found in Boethius' *De Hypotheticis Syllogismis*. On the other hand, in his commentary on Cicero's *Topica*, Boethius (*in Cic.Top.* 358) presents an extended list of the Stoic indemonstrables as these are attested in the Latin tradition going back to Cicero (*Top.* 57) and reformulated in different versions in the works of Marius Victorinus (Cassiodorus, *Inst.* 119,3-4), Martianus Capella (IV 419-420), and Isidorus (*Etym.* II 28,23).¹ However, since

1. On the extended list of the Stoic indemonstrables, see: Ierodiakonou 1993, 187-200.

this list is not incorporated in Boethius' *De Hypotheticis Syllogismis*, his claim to originality, at least among Latin writers, proves to be justifiable.

But apart from the fact that Boethius' sophisticated account of the wholly-hypothetical arguments is to be found in a different treatise from his remarks on the Stoic indemonstrables, there is another important issue concerning Boethius' transmission of hypothetical syllogistic. Boethius' conditional premisses in the wholly-hypothetical arguments are of the form

Si est A est B,

namely they contain variables which are more likely to represent terms than propositions. In fact, there are in his treatise no examples to the contrary, and the constant stress on the similarities between the hypothetical and the categorical syllogisms with their three figures and respective moods shows that Boethius does not comprehend hypothetical syllogistic as the logic dealing with the relationship of propositions as such, but as a neglected instance of the Aristotelian logic of terms. After all, hypothetical syllogisms are said also by Boethius to depend for their syllogistic validity on categorical syllogisms in the sense that the truth of their hypothetical premisses can be established only by means of a categorical syllogism (I, II 3-5, p.212).

The Middle Ages

Now before I undertake to briefly survey the medieval logical texts from the 12th to the 14th century discussing hypothetical syllogisms, two general remarks should be made concerning the available evidence. Scholastic logic has come down to us in various writings of which only a small part is accessible in critical editions, while the rest still remains either unedited or in inadequate old editions. Hence, unless one is a specialist in Western medieval logic, relevant material easily is overlooked, and even in the best case conclusions at this point can only be provisional. For instance, according to the secondary literature,¹ there is a treatise on hypothetical syllogisms by Albert the Great (c.1200-1280), which allegedly constitutes a paraphrase of Boethius' *De Hypotheticis*

1. Boehner 1952, 3-4.

Syllogismus; but since no information is given concerning the manuscript which preserves this unedited treatise, nothing can be really said about this text. Furthermore, it is important to note that in some of the important logical textbooks of the West there is no section devoted to hypothetical syllogisms; even if there is a discussion of hypothetical propositions, corresponding to the relevant section in Aristotle's *On Interpretation*, it does not necessarily introduce the issues concerning hypothetical syllogistic. To name but a few, this is the case in John of Salisbury's (c.1120-1180) *Metalogicon*¹ 15, in William of Sherwood's (c. 1200/10-c.1266/72) *Introductiones in Logicam*, in Peter of Spain's (c. 1210/20-1277) *Summule Logicales*, and in Lambert of Auxerre's (fl. 1250) *Logica*.

I. Garlandus Compotista (Early 12th century)

The earliest detailed treatment of hypothetical syllogistic in the Medieval West is probably the one in the sixth book of Garlandus Compotista's *Dialectica*. It deals extensively with hypothetical syllogisms in Boethius' manner. In fact, not only in the preface of his treatise Garland explicitly names his sources, namely Aristotle and Boethius, but there also are instances in the account on hypothetical syllogisms (e.g. III 84,36-37; VI 144,6-7; VI 144,18f) in which it becomes obvious that he closely follows Boethius' *De Hypotheticis Syllogismis*. As to the list of hypothetical syllogisms, when Garlandus presents all of Boethius' elaborations of the wholly-hypothetical arguments in the three figures, his examples clearly illustrate the fact that the variables used in such arguments are to be understood as term-variables and not as propositional variables.

II. Peter Abelard (1079-1142)

The only place in his numerous writings on logic in which Peter Abelard deals with hypothetical syllogisms seems to be his *Dialectica*. Scholars have claimed that among its immediate sources are the com-

1. The only reference made by John of Salisbury to the hypothetical syllogisms is a critical remark, according to which Boethius' efforts to supply the shortcomings of Aristotle by treating hypothetical syllogistic are said to be inadequate (IV. 21, pp. 187-188).

mentaries and monographs on logic by Boethius; and indeed, the second book of the fourth tractatus which deals with the hypothetical syllogisms actually proves to be little more than a paraphrase of *De Hypotheticis Syllogismis*.

III. Walter Burleigh (c.1275-1344/5)

The *Tractatus Longior* of Walter Burleigh's logical work *De Puritate Artis Logicae* contains a fairly detailed exposition of the issues concerning hypothetical syllogistic, but always under the influence of Boethius' relevant treatise. That is to say, after discussing hypothetical propositions, Burleigh has three chapters presenting the different moods of the three figures of wholly-hypothetical arguments; the only difference between these chapters and Boethius' treatment in *De Hypotheticis Syllogismis* is mentioned by Burleigh himself, namely the order of the second and the third figure.

IV. William of Ockham (c.1285-1347/9)

At the final chapter of part one of the third part of William of Ockham's voluminous *Summa Logicae* there is a brief discussion devoted to hypothetical syllogisms. In it only arguments of the form of the first indemonstrable are treated.

To summarise, the medieval logicians of the Latin West did not further develop hypothetical syllogistic, but simply followed Boethius' account of hypothetical syllogisms in his treatise *De Hypotheticis Syllogismis*. Thus, hypothetical syllogistic in the West preserved almost nothing of the Stoic tradition; it was mainly the logic of the Peripatetic school elaborated by Boethius which was studied and commented on. Although new interesting related subjects were introduced by the Western logicians, as for example the theory of consequences,¹ hypothetical syllogistic always remained close to the Aristotelian logic of terms and not to the Stoic system of propositional logic.

Greek versus Latin. Conclusions

1. For the affinity of the theory of consequences with the hypothetical syllogistic see: Green-Pedersen 1984, 272-273.

After presenting the logical texts on hypothetical syllogisms both of the Latin West and of the Byzantine East, it is now time to draw some conclusions as to their interrelation. It has become clear that while the Western logicians followed Boethius' version of Peripatetic logic, their Byzantine colleagues favoured a compilation of different traditions in which the Stoic logical system also survived. Hence, the accounts of hypothetical syllogisms transmitted in the West and in the East are quite different, but in neither case is there any claim of originality.

On the other hand, there are instances where the two medieval traditions meet: First, Manuel Holobolos' translation of Boethius' *De Hypo-theticis Syllogismis* shows that the Byzantine scholars were also aware of the importance of this text. What is interesting, however, is that after the translation of Boethius' text, Holobolos thought it still necessary to add to this text the list of hypothetical syllogisms which was usually presented in the Byzantine treatises. Second, in Nicephoros Blemmydes' logical compendium the first two indemonstrables are not discussed only in their general form, but six other arguments are here formulated by changing the affirmation either of the antecedent or of the consequent or of both into a negation. This is the only Byzantine text which discusses different types of the first and the second indemonstrable, and it is quite interesting that the same elaboration is found in Boethius, and therefore in most Western treatises on hypothetical syllogisms.

So let us conclude with a negative result: hypothetical syllogisms are a logical subject that attracted the attention of both Western and Byzantine scholars, but the exchange of their ideas in this area seems to have been extremely meagre, and for all we know so far, onesided. The Byzantines were willing to learn from the West. But obviously they thought, as far as hypothetical syllogistic is concerned, they might as well go back to Boethius and translate him, rather than a Medieval Latin treatment of the subject.

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