

**PRE-STOIC HYPOTHETICAL
SYLLOGISTIC IN GALEN'S *INSTITUTIO
LOGICA***

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reprinted from *The Unknown Galen*

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The text of the *Institutio Logica* (*IL*) or *Introduction to Logic* is not found in Kühn because its sole surviving manuscript was first published, not long after its discovery, in 1844, and thus too late for inclusion in Kühn. Moreover, some have thought the work to be spurious.¹ The reasons given for this assumption were on the whole unconvincing. I take it for granted that the *Institutio Logica* is by Galen.

In this paper I trace the evidence in the *Institutio* for a hypothetical syllogistic which predates Stoic propositional logic. It will emerge that Galen is one of our main witnesses for such a theory. In the *Institutio*, Galen draws from a number of different sources and theories. There are the so-called ancient philosophers (οἱ παλαιοὶ τῶν φιλοσόφων); there is the Stoic Chrysippus, whose logic Galen studied in his youth.² There are the 'more recent philosophers' (οἱ νεώτεροι), post-Chrysippean Stoics or logicians of other schools who adopted Stoic terminology and theory.³ There are from the 1st century BC the Stoic Posidonius and the Peripatetic Boethus, both of whom Galen may have counted among the 'more recent philosophers'. Again, in some passages Galen seems to draw from contemporary logical theories of non-Stoic make, presumably of Peripatetic or Platonist origin; and in others he explicitly introduces his own ideas.⁴ But apart from Plato, who is generously credited by Galen with the *use* of the later so-called second hypothetical syllogism, the only promising candidates for pre-Stoic proponents of a hypothetical syllogistic are the above-mentioned 'ancient philosophers'. In the following I concentrate on their theory.

There are four passages in the *Institutio* in which Galen mentions the ancient philosophers or, in short, the ancients: one on hypothetical premisses (*IL* 3.3-4), one on hypothetical syllogisms (*IL* 14.2), one on epistemology (*IL* 3.2, towards the end), and one on categorical syllogistic (*IL* 7.7).⁵ I assume that in the *Institutio*, when Galen says οἱ παλαιοὶ <i.e. τῶν φιλοσόφων> he always has the same philosophers in mind: that is, philosophers of the same period and of the same philosophical persuasion. I assume further that in the *Institutio* the only passages that report the views of the ancients are (i) those in which Galen explicitly

¹ E.g. C. Prantl, *Die Geschichte der Logik im Abendlande* vol. I (Leipzig 1855) 591-92.

² Cf. Galen, *On my own books*, 43 (Kühn xix).

³ Cf. J. S. Kieffer, *Galen's Institutio Logica* (Baltimore 1964) 130-32; J. Barnes, 'Form and Matter', in A. Alberti, ed., *Logica, Mente e Persona* (Florence 1990) 7-119, at 71-23.

⁴ E.g. in chapters 16-17 of the *Institutio*.

⁵ However, at the beginning of *IL* 3.2, with τοῖς Ἑλλήσιν ... τοῖς παλαιοῖς Galen presumably refers more generally to the Greeks some time before his own.

refers to them and (ii) those in which he uses the same specific terminology as that which he attributes to the ancients. This criterion provides one further passage, *IL* 3.1.

In the following, I first examine the two passages on the hypothetical syllogistic of the ancients in order to establish what this theory was – as far as this is possible from the *Institutio*; then I try to establish who the ancients were by looking at the remaining two *Institutio* passages, and at some other texts by Galen; third, I present some passages in non-Galenic sources that report elements of an early, non-Stoic hypothetical syllogistic and which provide close parallels to the minimal theory of the ancients in the *Institutio*; fourth I discuss a text that elaborates on a theory like that in Galen; and finally I briefly demonstrate how my reconstruction of the hypothetical syllogistic of Galen's ancient philosophers helps to solve some puzzles in the *Institutio*.

1. The theory of the ancients according to the *Institutio Logica*

First then, the *Institutio* passages that attribute elements of a hypothetical syllogistic to the ancients. From them we can collect the basic tenets of the hypothetical syllogistic of these ancients. At *IL* 14.2 Galen writes:

For such problems⁶ we mainly use the hypothetical premisses, which the ancients divided into those in accordance with a connection and those in accordance with a division.⁷

This sentence shows first that the ancients had at least some elementary theory of hypothetical premisses (προτάσεις). (In ancient logic πρότασις can mean either 'premiss' or something like 'proposition', and Galen oscillates between the two.⁸ For reasons that will become clearer in the following, I translate πρότασις as 'premiss' where it is part of the theory of the ancients.) Second, *IL* 14.2 shows that the ancients distinguished two basic kinds (εἶδη) of hypothetical premisses and called a premiss of the one kind a 'hypothetical premiss in accordance with a connection' (ὑποθετική πρότασις κατὰ συνέχειαν), and a premiss of the other kind a 'hypothetical premiss in accordance with a division' (ὑποθετική πρότασις κατὰ διαίρεσιν). This is confirmed by *IL* 3.3 (and 3.4, see below), although here the second type of premiss is called a 'dividing' (διαίρετική)⁹ hypothetical premiss:

Now, the ancients called a premiss hypothetical in accordance with a connection mostly in cases when we believe that something is, because something else is, but also in cases

⁶ The problems mentioned in the passage are whether certain things (fate, providence, gods, the void) exist – as opposed to whether things have certain properties.

⁷ ἐν οἷς προβλήμασι μάλιστα χρώμεθα ταῖς ὑποθετικαῖς προτάσεσιν, ἅς <εἰς τὰς> κατὰ συνέχειαν καὶ κατὰ διαίρεσιν ἔτεμον οἱ παλαιοὶ (*IL* 14.2).

⁸ πρότασις could mean 'premiss' e.g. at *IL* 7.1, 7.6 & 7.8, 8.1-3, 9.1-3, although the case is hardly ever clear-cut. (*IL* 8.3, lines 4-6, Kalbfleisch, shows Galen's uncertainty about what logical status a πρότασις has.) Theophrastus seems to have thought that πρότασις has several senses (Alex. *APr.* 11.13-16 'F (Fortenbaugh) 81A); Alexander was aware of the double meaning of πρότασις as premiss and proposition (Alex. *APr.* 44.17-21).

⁹ Also at *IL* 3.4. διαίρετική may be an expression introduced later as an abbreviation for κατὰ διαίρεσιν.

when we think that since something is not, something is, such as <when we think that since it is not night, it is day.¹⁰ (*IL* 3.3)

(For short I shall sometimes refer to the first type as 'connecting premiss', to the second as 'dividing premiss'.) From the formulations in *IL* 3.3 (τὸ ἕτερον εἶδος τῶν προτάσεων), and at *IL* 14.2 (ἄς <εἰς τὰς> κατὰ συνέχειαν καὶ κατὰ διαίρεσιν ἔτεμον οἱ παλαιοί) we can infer that the ancients distinguished exactly these two types of hypothetical premiss. At *IL* 3.3 we learn further about the first kind of hypothetical premisses that 'when we believe that something is, because something else is', then the premiss (i.e., I take it, the premiss we use to put forward this belief of ours) is a connecting hypothetical premiss. What is connected here are the 'something' and the 'something else'.

With respect to entire syllogisms, the *Institutio* suggests that the ancients had at least a rudimentary theory of hypothetical syllogisms, or more precisely, of syllogisms that come to be from hypothetical premisses. For the above-quoted passage at *IL* 14.2 continues thus:

The Stoics call the connecting hypothetical premisses conditional assertibles, and the dividing ones disjunctive assertibles, and they (i.e. the ancients and the Stoics) agree that two syllogisms come to be with the conditional assertible, and two with the disjunctive.¹¹

(The ancients would of course have said 'two ... with the hypothetical premiss κατὰ συνέχειαν, and two with the hypothetical premiss κατὰ διαίρεσιν.) Thus we can assume that the ancients held that two kinds of hypothetical syllogism come to be from connecting hypothetical premisses and two from dividing ones. Again, we can infer that the ancients distinguished exactly four basic kinds of hypothetical syllogisms (*IL* 14.2): as they had two types of hypothetical premisses and each provides two kinds of hypothetical syllogisms, we end up with four such kinds.¹²

The pair of expressions κατὰ συνέχειαν and κατὰ διαίρεσιν appears to be a distinguishing mark of the hypothetical syllogistic of the ancients: this terminology is sufficiently rare in ancient logic – in fact, the pair together never occur anywhere else in ancient logic,¹³ and Galen never ascribes it to anyone else. Assuming that the expressions are a distinguishing mark, we can add one further section, *IL* 3.1, as a passage in which Galen draws on the theory of the ancients.¹⁴ This section provides us with the following *general*

10 μάλιστα μὲν οὖν ἐπειδὴν ὑπάρχον τι πιστεύεται δι' ἕτερον ὑπαρχειν [ἢ] κατὰ συνέχειαν, ὑποθετικὴ πρὸς τῶν παλαιῶν φιλοσόφων ὀνομάζεται <ἢ> πρότασις, ἤδη δὲ καὶ ἐπειδὴν [μὲντοι] διότι μὴ ἔστι τόδε, εἶναι τόδε νοῶμεν, οἷον <διότι> νῆξ οὐκ ἔστιν, ἡμέραν εἶναι· μάλιστα μὲν οὖν ὀνομάζουσι τῶν τοιαύτην πρότασιν διαιρετικὴν (*IL* 3.3). del. ἢ Prantl; add. διότι Barnes et al.

11 καλοῦσι δὲ τὰς μὲν κατὰ συνέχειαν οἱ Στωικοὶ συνημμένα ἀξιώματα, τὰς δὲ κατὰ διαίρεσιν διεzeugμένα, καὶ συμφωνεῖται γε αὐτοῖς δύο μὲν γίνεσθαι συλλογισμοὺς κατὰ τὸ συνημμένον ἀξίωμα, δύο δὲ κατὰ τὸ διεzeugμένον (*IL* 14.2).

12 It has been suggested that συμφωνεῖται γε αὐτοῖς at *IL* 14.2 could be translated as '... and it is agreed that among them (i.e. among the hypothetical syllogisms) there are ...' or as '... it is agreed among them (i.e. the Stoics) that there are'. But the first would be a rather unusual reading of the Greek, and the second would make Galen say something that seems entirely unmotivated, since in the context of the sentence disagreements among the Stoics are not at issue at all. If either of these readings was what Galen intended, plainly we would have no evidence that the ancients had exactly four types of hypothetical syllogisms.

13 There are remnants and modifications of this terminology in several later Peripatetic and Platonist texts, but we do not find exactly this pair of expressions in any one text other than Galen.

14 The expression κατὰ συνέχειαν occurs also at *IL* 5.5, but the rest of that passage is undoubtedly Stoic.

connection (συνέχεια) and division (διαίρεσις) 'in accordance with which' the premisses come about (*IL* 3.3, *κατὰ συνέχειαν γίγνεσθαι*).

Whenever either a connection or a division holds between two things, this fact can be described in terms of a dependency that exists between these things or their being or not being (holding or not holding). This is clear from Galen's formulations, i.e. from his use of a participle construction (for that on which something depends) and a main clause (for that which depends on it).²¹ Thus, in the case of a connection, there is a dependency of one thing's being on another thing's being. This suggests a relation that is not symmetrical. In the case of a division, there is a dependency between one thing's being and another thing's not being. This can be put either as saying that one thing's being depends on another thing's not being, or as saying that one thing's not being depends on another thing's being (*IL* 3.1). This suggests a symmetrical relation.

The relation of dependency which the connecting and the dividing hypothetical premisses share could be described by the formula 'φ ὄντος, ψ ἔστι', where for φ and ψ the things (πράγματα) are put in, either taken affirmatively, or taken negatively – i.e. either A or 'A οὐκ / μὴ', etc. This formula 'φ ὄντος, ψ ἔστι' indicates a conditionality of sorts, and I believe that it is this conditionality which was captured by the ancient in the expression 'hypothetical' (ὑποθετικός). Note also that the passages leave no doubt that for the ancients the things put in for φ and ψ must differ from each other: recall e.g. the formulation at *IL* 3.1 'if something is, necessarily something *else* is'.

So far the accounts of the hypothetical premisses are vague and unfamiliar to the modern logician. We reach more familiar ground when we look at Galen's examples at *IL* 3.4:

Thus a sentence such as 'if it is day, the sun is above the earth' is called a conditional assertible by the more recent philosophers, and a connecting hypothetical premiss by the ancients; and sentences such as 'either it is day or it is night' are called a disjunctive assertible by the more recent philosophers, and a dividing hypothetical by the ancients.²² (*IL* 3.4)

This passage makes it clear that – at least by Galen – the hypothetical premisses were considered as λόγοι, sentences, and thus as linguistic items. We can also infer from the examples that the connecting hypothetical premisses of the ancients must have had some kind of conditional form, and the dividing ones some kind of disjunctive form, and that they must be at least superficially comparable with the Stoic conditionals and disjunctions.²³

This information, together with the above-quoted passage from *IL* 14.2 gives us a very rough picture of the four types of hypothetical syllogism of the ancients. They had two types of hypothetical syllogisms with connecting hypothetical premiss, and two types with dividing

²¹ In fact, in our passages the main clause is an infinitival construction, depending on a verb of saying.

²² ὡς ὀνομάζεσθαι τὸν μὲν τοιοῦτον λόγον 'εἰ ἡμέρα ἐστίν, ὁ ἥλιος ὑπὲρ γῆς ἐστίν' συνημμένον ἀξίωμα κατὰ γ' τοῦ νεωτέρου φιλοσόφου, κατὰ μέντοι τοῦ παλαιοῦ πρότασιν ὑποθετικὴν κατὰ συνέχειαν· τοῦ δέ γε τοιοῦτου 'ἤτοι γ' ἡμέρα ἐστίν ἢ νύξ ἐστίν' διεζευγμένον μὲν ἀξίωμα παρὰ τοῖς νεωτέροις φιλοσόφοις, πρότασιν δὲ ὑποθετικὴν κατὰ διαίρεσιν παρὰ τοῖς παλαιοῖς (*IL* 3.4).

²³ We cannot infer that the ancients themselves used the examples Galen provides, nor do we have any particular reason to assume they were theirs. For all we know, they could have been 'term logical', as may be suggested by Boethius, who in his *De Hypothesis Syllogismis* seems to present a theory very similar to that of 'the ancients' in Galen (see below, Section 5), and also by the way Galen talks about conversion in a hypothetical πρότασις at *IL* 6.4.

hypothetical premiss (see above). We may now assume that the first two hypothetical syllogisms of the ancients were such that they could be conceived of as being similar to the first two Stoic indemonstrables:

- | | | | |
|--------------------------------------|------------------|----------------------------------------------|------------------|
| (1) If p, then q
Now p
Hence q | (A ὄντος B ἐστι) | (2) If p, then q
Now not q
Hence not p | (A ὄντος B ἐστι) |
|--------------------------------------|------------------|----------------------------------------------|------------------|

And the other two kinds of hypothetical syllogisms should be somewhat similar to the fourth and fifth Stoic indemonstrables:

- | | | | |
|-------------------------------------------|---------------------|-------------------------------------------|---------------------|
| (4) Either p or q
Now p
Hence not q | (A μὴ ὄντος B ἐστι) | (5) Either p or q
Now not p
Hence q | (A ὄντος B μὴ ἐστι) |
|-------------------------------------------|---------------------|-------------------------------------------|---------------------|

On the above assumption that the hypothetical syllogistic of the ancients comprises only those passages which Galen directly ascribes to them and those with the same distinctive terminology, it seems then that the features that are unique to this theory are the following:

1. There are exactly two main types of hypothetical premisses – as opposed to three or more. In particular no hypothetical premisses are (or have the linguistic form of) negated conjunctions, whereas both the Stoics and later Peripatetics and Platonists had syllogisms with a negated conjunction as main premiss.
2. The two types are called hypothetical premisses in accordance with a connection (κατὰ συνέχειαν) and hypothetical premisses in accordance with a division (κατὰ διαίρεσιν).
3. The relation of division (διαίρεσις) is considered as binary; the dividing premisses always have precisely two disjuncts.
4. Exactly four basic types of hypothetical syllogisms can be constructed from the hypothetical premisses, two with each type.
5. Each basic hypothetical syllogism has one hypothetical premiss, and one that is not hypothetical (and thus presumably categorical); otherwise the identification of these syllogisms with four of the Stoic five types of indemonstrable arguments would become quite incomprehensible.

There is however in the relevant passages of the *Institutio* nothing that tells us whether the hypothetical premisses and syllogisms of the ancients had a specific linguistic form or contained specific expressions, or what the 'things' were that are connected or divided in the hypothetical premisses. For instance, in the case of the first hypothetical syllogism, with the premisses we make statements about that if this is, that is, and about that this is, and with the conclusion we make a statement about that that is. If 'this' and 'that' are something like states of affairs, and 'is' means something like 'obtains', 'is the case', 'is true' or 'holds', the following could be a first hypothetical syllogism:

If *it/this is a human being*, then *it/this is rational*.²⁴
Now *it/this is a human being*.
Therefore *it/this is rational*

If p, then q.
Now p.
Therefore q.

²⁴ Here the first 'it' would be demonstrative and the remaining ones either demonstrative or anaphoric.

If 'this' and 'that' are rather terms (in the Aristotelian sense), and 'is/holds' means something like 'has application/holds of something', the following could be a typical first hypothetical syllogism:²⁵

If *human being* is/holds (of it/this),
then *rational* is/holds.
Now *human being* is/holds.
Therefore *rational* is/holds.

If A is/holds (i.e. of it/this),
then B is/holds.
Now A is/holds.
Therefore B is/holds.

This could perhaps also be expressed as:

If it/this is a *human being*, then it/this is *rational*.
Now it/this is a *human being*.
Therefore it/this is *rational*.

If this is A, then it/this is B.
Now this is A.
Therefore this is B.

Alternatively, the following could be a typical first hypothetical syllogism:

If A is/holds (i.e. of something),
B is/holds (of it).

Now A is/holds (of this).
Therefore B is/holds (of this).

If *human being* is/holds (of something), then *rational* is/holds (of it).
Now *human being* is/holds (of this).
Therefore *rational* is/holds (of this).

This could perhaps also be expressed as:

If something is A, it is B.

Now this is A.
Therefore this is B.

If something is a *human being*,
then it is *rational*.
Now it/this is a *human being*.
Therefore it/this is *rational*.

Similar possibilities can be conceived of for the other three types of hypothetical syllogism. The general uncertainty about what the ancient philosophers assumed to be the logical structure of their hypothetical syllogisms is frustrating. I have dwelt on this point, since I believe that it is important for our understanding of the development of a Peripatetic and Platonist hypothetical syllogistic that we make no rash assumptions about their original logical form; in particular, that we do not simply assume that they were understood to have the forms the Stoics later gave their indemonstrables, and which would be fitting for a propositional logic.

²⁵ If this possibility surprises you, compare Ammonius' introduction of hypothetical προτάσεις: ὑποθετικοῦ (i.e. ἀποφαντικοῦ λόγου) δὲ τοῦ σημαίνοντος τίνος ὄντος τὸ ἐστὶν ἢ οὐκ ἐστὶν, ἢ τίνος μὴ ὄντος τί ἐστὶν ἢ οὐκ ἐστὶν, ὡς ὅταν εἰπῶμεν 'εἰ ἀνθρώπος ἐστὶ, καὶ ζῷον ἐστὶν, εἰ ἀνθρώπος ἐστὶ, λίθος οὐκ ἐστὶν, εἰ μὴ ἐστὶν ἡμέρα, νύξ ἐστὶν, εἰ μὴ ἐστὶν ἡμέρα, οὐκ ἐστὶν ἥλιος ὑπὲρ γῆν.' 'The hypothetical (i.e. assertoric sentence) indicates what is or is not if something is, or what is or is not if something is not, as when we say "if it is a human being, it is an animal", "if it is a human being, it is not a stone", "if it is not day, it is night", "if it is day, the sun is not above the earth".' Here at least the first two examples, which are clearly Aristotelian, suggest a term-logical understanding of the hypothetical assertoric sentences.

2. Who were the παλαιοί? The evidence in Galen

I now turn to the question who the ancient philosophers were. In the present section, I consider the passages in the *Institutio* and in other Galenic writings. In the *Institutio* the ancients are contrasted in ch. 14 with the Stoics and in ch. 3 with 'the more recent philosophers', who use Stoic terminology. We can infer that the ancient philosophers (i) were not Stoics, (ii) were older than those Stoics, (iii) were older than those more recent philosophers.

Furthermore, we have some good reasons for assuming that the ancient philosophers were Peripatetics: first, the terminology they use is Peripatetic: e.g. πρότασις, 'hypothetical premiss', 'hypothetical syllogism';²⁶ second, the account of the hypothetical premisses in terms of things (πράγματα) is Peripatetic;²⁷ third, the predicate of holding (ὑπάρχειν) is used not of the truth-bearers (as the Stoics would do), but of those things;²⁸ fourth, the two things that are related in a hypothetical premiss must differ from each other, whereas for the Stoics they could be the same;²⁹ fifth, at *IL* 7.7 the ancient philosophers are said to distinguish three figures of categorical syllogisms, and these syllogisms and their classification are without doubt Peripatetic.

In addition, everything suggests that the ancient philosophers were *early* Peripatetics, i.e. Aristotle, Theophrastus, Eudemus, and their contemporaries.³⁰ And in the case of hypothetical syllogistic, since as far as we know Aristotle did not have such a thing,³¹ the ancients could only have been Theophrastus and Eudemus and their contemporaries. Thus in *On the doctrines of Hippocrates and Plato* 2.2.4, Galen says: 'the ancient philosophers (who are associated with) Theophrastus and Aristotle'³² and in his *On the Method of Treatment* 1.3 we read that Theophrastus was well-practised in logic.³³ Galen also tells us that he wrote a commentary in six books on Theophrastus' *On affirmation and negation* (περὶ καταφάσεως καὶ ἀποφάσεως), and three books on Eudemus' *On Speech* (περὶ λέξεως).³⁴ In the *Institutio* itself, at *IL* 3.2, Galen digresses briefly from his topic of propositional logic and introduces some epistemological terminology. Here, in the context of the difference between νοήσεις and ἔννοιαι, Galen says: 'there are also other (i.e. non-empirical) concepts, ... which are innate to all human beings; the ancient philosophers call these when they are expressed by

²⁶ Cf. Philop. *APr.* 242.24-243.10, and my 'Stoic Hypotheses and Hypothetical Argument', *Phronesis* 1997, 299-312. The expressions ἀπόφα[ν]σις, at *IL* 3.1, and πρόβλημα, at *IL* 14.2 also suggest a Peripatetic origin.

²⁷ Cf. Philop. *APr.* 242.27-8 (= F 111B), where, after having mentioned Theophrastus and Eudemus in the previous paragraph, Philoponus states that the Peripatetics call the things (πράγματα) things (πράγματα); cf. also [Amm.] *APr.* 68.4-5.

²⁸ Cf. Alex. *APr.* 156.29-157.2 (= F 100B) for the use of ὑπάρχειν by Theophrastus.

²⁹ See above, pp. 61-62.

³⁰ Theophrastus and Eudemus wrote books entitled Περὶ ἑρμηνείας, and 'Αναλυτικά (Philop. *Cat.* 7.20-22), and in particular Theophrastus wrote many more books on logic (Diog. Laert. 5.42 and 50). Of their contemporaries, we know that Phaenias of Eresus and Strato of Lampsacus wrote on logic. The first seems to have written works entitled Κατηγορίαι, Περὶ ἑρμηνείας, and 'Αναλυτικά (Philop. *Cat.* 7.20-22, Wehrli fig. 8), the second wrote, among other things, an introduction to the *Topics* and a treatise Περὶ τοῦ μᾶλλον καὶ ἧττον (Diog. Laert. 5.59-60).

³¹ Cf. also Amm. *Int.* 3.15-4.4, [Amm.] *APr.* 67.41-68.4.

³² παλαιοὶ φιλόσοφοι οἱ περὶ Ωεόφραστον τε καὶ 'Αριστοτέλην, *De placitis Hippocratis et Platonis* 2.2.4 ('F114).

³³ *De methodo medendi* 1.3 (= F 130).

³⁴ Galen, *On his own works* (*De libris propriis*) 11, 14: XIX 42, 47 K.

means of the spoken word, ἀξιώματα'.³⁵ This is clearly not the Stoic, and most probably a Peripatetic use of ἀξίωμα.³⁶ In particular, this account is similar to Theophrastus' account of ἀξίωμα, as preserved by Themistius *APost* 7.3-6 (= F 115), where we read: 'Theophrastus defines ἀξίωμα as follows: ἀξίωμα is a sort of belief (either about homogeneous matters ... or about absolutely everything ...) for these are as it were innate and common to all'.³⁷ Thus the passages on the ancient philosophers in the *Institutio* and in other Galenic writings suggest that they were early Peripatetics and that they included Theophrastus.

3. Early Peripatetic hypothetical syllogistic according to other sources

Next, I look at our sources for early Peripatetic hypothetical syllogistic (other than the *Institutio*), in order to show that the surviving evidence of Theophrastus' and Eudemus' theories tallies amazingly well with the theory of the ancient philosophers as given in Galen's *Institutio*.

First, there are several texts that report that Theophrastus and Eudemus discussed hypothetical *sylogisms*; moreover, Theophrastus and Eudemus are the earliest philosophers for whom there is such evidence.³⁸ This certainly makes them good candidates for being Galen's ancient philosophers.

Second, in a passage in which he comments on Aristotle's remarks on 'the other syllogisms from an hypothesis' at *Prior Analytics* 41a37, and in which he mixes Stoic, Aristotelian, and Peripatetic terminology, Alexander of Aphrodisias (*APr.* 262.28-32 = F 112A) reports about the 'old' philosophers (οἱ ἀρχαίοι) that they said that Aristotle's 'syllogisms from some other hypothesis' (which Alexander also calls hypothetical syllogisms) were mixed from a hypothetical premiss and a probative (that is categorical) premiss.³⁹ Alexander identifies the hypothetical syllogisms of the 'old philosophers' with the Stoic types of indemonstrables.⁴⁰ Theophrastus is the only philosopher mentioned by name in the immediate context of the

35 τοιαῦται (i.e. the ἐννοιαὶ) δ' εἰσὶ καὶ ἄλλαι ... ἀλλ' ἐμφυτοὶ πᾶσιν ὑπάρχουσαι ...

36 Cf. Aristotle *Top.* A 172a27-30, *Met.* B.1 995b8, B.2 996b27-9, G3, 1005a24. The Stoics use the term ἀξίωμα in order to denote propositions, a fact Galen acknowledges shortly after, at *IL* 3.3.

37 ὁ γὰρ Θεόφραστος οὕτως ὀρίζεται τὸ ἀξίωμα· ἀξίωμα ἐστὶ δόξα τις ἢ μὲν ... ἢ δὲ ἀπλῶς ἐν ἅπασιν, ... ταῦτα γὰρ καθάπερ σύμφυτα καὶ κοινὰ πᾶσι.

38 The texts are Alex. *APr.* 389.31-390.3, Boethius *HS* 1.1.3-4, Philop. *APr* 242.14-20, and Al-Farabi *Int.* 53.6-12 (Kutsch and Marrow) (= F 111E, 111A-C). There is disagreement in the sources about the extent of this discussion, Boethius claiming that Theophrastus and Eudemus dealt with hypothetical syllogisms only briefly, Philoponus that they did so at length. I do not believe that Theophrastus and Eudemus wrote lengthy treatises on hypothetical syllogisms. For we would expect Alexander, who is our earliest surviving and main source on Peripatetic syllogistic, to have commented on this fact, but he does not. He only reports that Theophrastus and Eudemus mention Aristotle's 'other syllogisms from a hypothesis' (Alex. *APr.* 390.2). Besides, Boethius seems more reliable than Philoponus on this point, since – unlike the latter – he distinguished between Eudemus' and Theophrastus' views. (There is no evidence that any early Peripatetics discussed hypothetical προτάσεις separately from the hypothetical syllogisms. This squares well with my assumption that they considered hypothetical προτάσεις only in the context of hypothetical syllogisms, and thus as hypothetical premisses, and not independently as propositions.)

39 οὓς οἱ ἀρχαίοι λέγουσι μικτοὺς ἐξ ὑποθετικῆς προτάσεως καὶ δεικτικῆς, τούτ' ἐστὶ κατηγορικῆς. Here προτάσις should mean 'premiss', since the two kinds of προτάσις have their names according to their *function* in this Aristotelian type of a syllogism from a hypothesis. I have argued this point in detail elsewhere ('The development of *modus ponens* arguments in antiquity', *Phronesis* (2002, forthcoming).

40 Alex. *APr.* 262.28-32.

Alexander passage, and he is mentioned in the context of an interpretation of Aristotle's syllogisms from a hypothesis (Alex. *APr* 263.10-14). Theophrastus is hence most probably one of the 'old philosophers' of the passage, and most probably the old philosophers were elaborating on Aristotle's syllogisms from a hypothesis.⁴¹

The information in this passage about the old philosophers squares very well with that in Galen about the ancients. They must be Peripatetic philosophers. They discussed hypothetical syllogisms. These syllogisms had one hypothetical premiss, and one probative (that is, in Alexander's and Galen's terminology, categorical) premiss. They are compared by Alexander to the Stoic types of indemonstrable syllogisms, just as the hypothetical syllogisms of the ancients are by Galen (*IL* 14.2). Moreover, in the passage, as elsewhere, Alexander refers to the Stoic conditional premisses as 'the connecting one' (τὸ συνεχές, Alex. *APr.* 262.33, 263.6 and 22), and to the disjunctive premisses as 'the dividing one' (τὸ διαίρητικόν, Alex. *APr.* 264.7 and 10). As these terms are neither Stoic nor Aristotle's, they should have their origin in, or be derived from, the nomenclature of the third party mentioned in the passage, the 'old philosophers', Theophrastus and consorts. And they are nicely correlated to the terms κατὰ συνέχεια and κατὰ διαίρεσιν of Galen's ancients.⁴²

These striking parallels between Galen and Alexander point to the conclusion that Alexander's old philosophers (ἀρχαῖοι) in this passage are the same as Galen's ancient philosophers (παλαιοί) in the *Institutio*; that the theory of these old and ancient philosophers took its origin from Aristotle's syllogisms from a hypothesis; that they consisted of one hypothetical premiss and one categorical premiss; and that the latter was called 'probative' by them; furthermore, that the hypothetical premisses were either connecting or dividing and that the latter contained two disjuncts; that they were sufficiently similar to four of the five types of Stoic indemonstrables that later philosophers could identify them with these.

A third further piece of evidence comes from Boethius' *On hypothetical syllogisms* (*HS*) and is about Eudemus:

Eudemus holds that the hypothesis from which the hypothetical syllogisms obtain their name is said in two ways: for either (a) through a hypothesis of things consistent in themselves something which can in no way happen is accepted in such a way that the argument leads toward the end (destruction?) of the thing; or (b) the consequence which is posited in the hypothesis is revealed (established?, indicated?) by virtue of a connection or by virtue of a division.⁴³ (Boeth. *HS* 1.2.5, p. 212 Obertello)

I am far from sure how the (b)-clause of this sentence should be rendered (we have to imagine Boethius translating from the Greek), but in any case the passage is important for several reasons:

41 E.g. Theophrastus in *his Analytics*, see Alex. *APr.* 389.31-390.3.

42 I believe that they are Alexander's (or a predecessor's) coinage of two Peripatetic terms for the two types of hypothetical premisses (i.e. *linguistic* items), which he derived from the early Peripatetic terms for the *ontic* relations Galen talks about.

43 Hypothesis namque unde hypothetici syllogismi accipere vocabulum duobus (ut Eudemo placet) dicitur modis. aut enim (a) tale acquiescitur aliquid per quamdam inter se consentientium conditionem, quod fieri nullo modo possit, ut ad suum terminum ratio perducatur; aut (b) in conditione posita consequentia vi coniunctionis vel disiunctionis ostenditur. (Boeth. *HS* 1.2.5, p. 212 Obertello)

(i) Eudemus says of the (kind of) hypothesis which is 'said in two ways', that it is it from which the hypothetical syllogisms get their name. This implies that Eudemus thought that such a hypothesis was commonly part of a hypothetical syllogism. The context of the Boethius quote (Boeth. *HS* 1.2.6 and 7) suggests that the origin of the Eudemian hypotheses of clause (a) are (the hypotheses from) Aristotle's *reductiones ad impossibile*,⁴⁴ and that the origin of the Eudemian hypotheses of clause (b) are (the hypotheses from) Aristotle's 'other syllogisms from a hypothesis', which Aristotle mentions e.g. at *Prior Analytics* 41a38 and 50a16-28. Hence I assume that the Eudemian hypotheses both of clause (a) and (b) were so-called because they were understood as *premisses* in *hypothetical* syllogisms – in contrast to being a special type of proposition; and that the ones of clause (b) are those items that are (possibly by Theophrastus, possibly later) also called hypothetical premisses;⁴⁵ they are then functionally the same sort of items as the hypothetical premisses of the ancients in Galen's *Institutio*.

(ii) The Boethius passage tells us that Eudemus distinguished two types of hypotheses of his second kind: those in which a consequence is indicated or established by a *coniunctio*, and those in which a consequence is indicated or established by a *disiunctio*. With the pair of expressions *coniunctio / disiunctio* Boethius could translate either the pair of expressions for ontic relations, *συνέχεια* and *διαίρεσις* by virtue of which the consequence is *established/revealed* (in which case we have the same distinction as that of the ancients in Galen's *Institutio*);⁴⁶ or he could render a pair of expressions for types of hypothetical premisses, such as *συνημμένον* and *διεzeugμένον*,⁴⁷ in which case these hypotheses *indicate* the consequence.⁴⁸ Either way, it is clear that the hypotheses themselves are linguistic items. The parallel to Galen's connecting and dividing hypothetical premisses is obvious.

(iii) Perhaps most interesting is Eudemus' point that for every hypothesis of this second Eudemian type (i.e. from clause (b)) there is a *consequentia*, a consequence, and that this consequence is indicated both in conditional *and* in *disjunctive* premisses. (Or, that such a consequence can be established either by a connection *or* by a *division*.) I assume (a) that this consequence is the relation of dependency that is described in the formulations of the kind 'φ ὄντος, ψ ἐστι' in Galen;⁴⁹ (b) that this consequence is what gives rise to the expression 'hypothesis' or 'hypothetical premiss',⁵⁰ and (c) that it is this consequence which justifies the inference of the conclusion from the premisses in a hypothetical syllogism. (There is a parallel to this point in Galen's *Institutio* at *IL* 14.10, where Galen says that 'the syllogisms that come to be from hypothetical premisses are completed in accordance with a transition

44 These are one kind of the syllogisms called 'from a hypothesis', cf. Arist. *APr.* 40b25-6.

45 Cf. the Alexander passage just discussed.

46 See also Philoponus (*APr.* 245.6, cf. 10), who calls the disjunctive premiss of a hypothetical syllogism a *ὑπόθεσις κατὰ διαίρεσιν*. This draws a direct connection from Eudemus' hypotheses to the hypothetical premisses Galen's ancients.

47 Or τὸ συνεχές and τὸ διαιρητικόν.

48 *ostenditur* could be a translation of σημαίνειν or ἐμφαίνεσθαι, meaning 'indicated'; this would provide a parallel to Amm. *Int.* 3.32-4.1, 73.30-2, 74.2-3.

49 This is perhaps corroborated by the fact that Boethius, when explicating Eudemus' second type of hypothesis, says '<propositiones> quae vero a simplicibus differunt illae sunt, quando aliquid dicitur esse vel non esse, si quid vel fuerit vel non fuerit' (*HS* 1.2.7).

50 Amm. *Int.* 74.2-5 draws this connection explicitly.

(μετάβασις) from one thing to another by means of an ἀκολουθία or a μάχη. Although Galen uses his own terminology (ἀκολουθία and μάχη instead of συνέχεια and διαίρεσις), the restriction to two things ('one thing' / 'another') in the hypothetical premisses points to the ancients as originators of this transition-theory.⁵¹ The 'transition from one thing to another by means of an ἀκολουθία or a μάχη' could be the same thing as Eudemus' *consequentia* which is posited in the hypothesis <and> is established/revealed/indicated by virtue of a connection or by virtue of a division'. (However, this is conjecture only.)

As a result of this survey of non-Galenic sources on early Peripatetic (not wholly) hypothetical syllogisms, we can state that in them we find on the one hand parallels for virtually everything Galen attributes to the ancient philosophers and on the other nothing that is incompatible with their position. We have thus every reason to assume that these sources report parts from the same general theory.

Let me illustrate the resulting theory of hypothetical syllogisms of the ancient philosophers as it presents itself now. Take a later so-called first hypothetical syllogism, with a linguistic form of the kinds suggested above in Section 1.

If A (is/holds), B (is/holds).	hypothetical premiss (ὑποθετική πρότασις)
Now A (is/holds).	probative premiss (δεικτική πρότασις)
Therefore B (is/holds)	conclusion (συμπέρασμα)

Here the hypothetical premiss is connecting (κατὰ συνέχεια), the connection (συνέχεια) being intended to hold between the things A and B. There is indicated to be a dependency of B on A, which can also be described as 'A ὄντος, B ἔστι'; and it is this indicated dependency which makes the premiss hypothetical. Once A('s being) has been proved, the dependency allows the transition from A('s being) to B('s being), or the inference of B('s being). The case of the later so-called second hypothetical syllogism is perhaps a little more complex. Take

If A (is/holds), B (is/holds).	hypothetical premiss
Now B (is/does) not (hold).	probative premiss
Therefore A (is/does) not (hold).	conclusion

Here, again, a connection (συνέχεια) is intended to hold between the things A and B, and there is indicated to be a dependency between A and B that can be described as 'A ὄντος, B ἔστι'. This dependency is now meant to allow the transition from B's not being to A's not being (or from 'not B' to 'not A'). But how? There are two possibilities. Either this was just assumed to be an obvious power of the connecting hypothetical premisses. This could have been justified with reference to Aristotle's *Topics* 111b20-23, where Aristotle argues that if one wants to refute something, then one must examine what it is that is if the point at issue is, since then, when we prove that what follows from the point at issue is not, we will have rejected the point at issue. Alternatively, the early Peripatetics believed that the second

⁵¹ Galen himself, like the later Peripatetics and Platonists, allows for a plurality of disjuncts in hypothetical propositions.

hypothetical syllogism was in need of prove. We know that this is what Galen thought.⁵² This proof could have been the reduction to a first hypothetical syllogism by means of contraposition (*ἀντίστροφη*) in arguments, i.e. in this case by replacing the second premiss by the contradictory of the conclusion, and the conclusion by the contradictory of the second premiss. Galen describes this type of contraposition at *IL* 6.5, and as Aristotle recognized this kind of reduction, we can assume that the early Peripatetics were familiar with it, too.⁵³ I do not know which of these two views of the second hypothetical syllogism was the early Peripatetics one. If it was the second, then the justification of the inference of A's not being from B's not being would have been derivative of that of the first hypothetical syllogism. But note that in either case there will be no hypothetical syllogism for which a sentence of the kind 'If A is not, B is not' is required as premiss, and that we can thus trust that Galen reported the ancients correctly, when at *IL* 3.1 he gave the three possibilities 'Α ὄντος Β εἶναι', 'Α μὴ ὄντος Β εἶναι' and 'Α ὄντος Β μὴ εἶναι' for hypothetical premisses, but not a fourth, 'Α μὴ ὄντος Β μὴ εἶναι'. It is only later, when the hypotheticals are conceived of as propositions rather than premisses, that the fourth possibility naturally suggests itself, from a combinatorical point of view; and indeed we find it added in Ammonius and Boethius.⁵⁴

No question of reduction arises in the case of the dividing hypothetical syllogisms. Take

A or B (is/holds).	hypothetical premiss
Now A (is/holds).	probative premiss
Therefore B (is/does) not (hold).	conclusion

Here the hypothetical premiss is dividing (*κατὰ διαίρεσιν*), the division (*διαίρεσις*) being stated to hold between the things A and B. There is indicated to be a dependency between A and B, which can e.g. also be described as 'Α ὄντος, Β μὴ ἔστι' (Galen, *IL* 3.1, 3.5). Once A has been proved, this dependency allows the transition from A's being to B's not being. (The case of the other type of dividing hypothetical syllogism works *mutatis mutandis* in the same way. In this case, the dependency would perhaps rather be described as 'Α οὐκ ὄντος, Β ἔστι', to make apparent the possibility of a transition from A's not being to B's being.) The relation being one of exhaustive and exclusive disjunction, one could imagine that each phrase indicates one half of the – symmetrical – dependency.

We can then add some further characteristics of the hypothetical syllogistic of the ancient philosophers to the list of Section 1. It seems confirmed that for the ancients the *ὑποθετικὰὶ προτάσεις* were conceived of as hypothetical premisses, i.e., as items whose only function was that of premisses in hypothetical syllogisms; furthermore, that in the hypothetical premiss of every hypothetical syllogism a relation of dependency is indicated (as stated at *IL* 3.1 and 3.3), which is based on either a relation of connection or a relation of division, and which is – canonically – expressed in the form of a conditional or a disjunction, respectively. And it is this relation of dependency (plus, in one case, possibly contraposition of argument) which

52 Cf. *IL* 8.2: *κατὰ μὲντοι τὰς ὑποθετικὰς προτάσεις οἱ μὲν ἄλλοι πάντες οἱ ῥηθέντες ἀρτίως ἀναπόδεικτοὶ εἰσι καὶ πρῶτοι πλὴν τοῦ προσλαμβάνοντος μὲν τὸ τοῦ λήγοντος ἀντικείμενον, ἐπιφέροντος δὲ τοῦ ἡγουμένου τὸ ἀντικείμενον· οὗτος γὰρ μόνος ἀποδείξεως δεῖται.*

53 On the other hand, at *IL* 8.2 (see previous note) Galen uses mainly Stoic terminology, and this suggests that he is drawing from a source later than the early Peripatetics.

54 Amm. *Int.* 3.11-15 and Boethius *HS* 1.2.7; cf. Philop. *APr* 243.11-13.

justifies the transition from the second premiss to the conclusion, or the inference of the conclusion, and which gives the hypothetical premisses (and the hypothetical syllogisms) their name. As to the origin of this early Peripatetic hypothetical syllogistic, it may be part of Aristotle's pupils' attempt at systematizing their teacher's 'other syllogisms from a hypothesis', perhaps with recourse to some pertinent passages from the *Topics*.⁵⁵

On the negative side, we can note that there is no mention ever of the question of whether the hypothetical premisses were thought to have truth-values, and if yes, what their truth-criteria were. Nor is there sufficient information to allow us to decide whether the things (πράγματα) that are relevant for the syllogistic form of the arguments were generic things like human and animal, which hold of other things, or rather something like states of affairs, which simply hold or obtain. In sum, there is no evidence that we have anything like a 'propositional logic' even in a very wide sense, that is where the units relevant for the logical form of the arguments are propositions or whole sentences.

4. A later elaboration of the hypothetical syllogistic of the ancients

I now add a further point of support for my claim that Galen's ancient philosophers were early Peripatetics including Theophrastus and Eudemus, and that they had the basic theory I have sketched. Boethius, in his treatise *On Hypothetical Syllogisms*, maintains that he elaborates on Theophrastus' and Eudemus' hypothetical syllogistic (*HS* 1.1.3-4); and his theory of those hypothetical syllogisms that are formed from one hypothetical and one categorical premiss (*HS* 2.1.7-4.3; 3.10.3-11.7) is indeed an elaboration of a theory that shares all the main characteristics of the one I have reconstructed for Galen's ancients.⁵⁶ Moreover, among later ancient authors Boethius (in *HS*) is – almost – unique in doing so.⁵⁷ Here are the main points of agreement:

1. By *propositio* (which is his translation of πρότασις) Boethius often intends premiss, not proposition.⁵⁸
2. The theory contains only conditional and disjunctive hypothetical premisses; in particular, there is never a formulation of a dividing or disjunctive premiss as a negated conjunction.
3. The two types of premisses are referred to as *per connexionem propositio* (*HS* 3.11.6, cf. 1.3.4, 2.4.3) and as *per disiunctionem propositio* (*HS* 3.10.3, 4, 5). These two expressions could be translations of ὑποθετική πρότασις κατὰ συνέχειαν and ὑποθετική

⁵⁵ I have pursued the question of the origin of Peripatetic hypothetical syllogistic in detail in my 'The development of *modus ponens* arguments in antiquity', *Phronesis* (2002, forthcoming).

⁵⁶ The elaboration consists in the main in Boethius' working through all the permutations one obtains for the four types of syllogism by substituting negative (component) propositions for either or both of the affirmative ones of the 'basic forms'. I have a hunch that this elaboration goes back to Porphyry, but as I am unable to prove this, I just mention it here.

⁵⁷ The only other passage I know of is a long scholium to Aristotle's *Analytics*, which is closely parallel to Boethius' *HS*; cf. my 'A Greek parallel to Boethius' *De Hypothesis Syllogismis*', *Mnemosyne* IV.3, 285-300.

⁵⁸ Cf. *HS* 2.1.1 *propositio vel sumptum* and *HS* 2.2.1, 2.2.2, 2.2.3, 2.10.6 and 2.11.1, where Boethius uses *propositio* for the first (and hypothetical) premiss, and *assumptio* for the second (and categorical) premiss of hypothetical syllogisms.

πρότασις κατὰ διαίρεσιν. (Boethius does not add 'hypothetical' (condicionalis), since in books two and three of *On Hypothetical Syllogisms* he talks about hypothetical premisses only.)

4. 'si A non est, B est' is (said to be equivalent to) a disjunction 'aut A est aut B est' (*HS* 3.10.4 end). This mirrors the relation between the description of the consequence in 'A μὴ ὄντος, B ἐστὶ' and the disjunctive formulation in the hypothetical premiss 'ἤτοι A ἢ B' in Galen.

5. Boethius introduces four basic types of hypothetical syllogisms. They all consist of one hypothetical and one categorical premiss. Two are composed with a connecting hypothetical premiss, two with a dividing one.⁵⁹

6. Most of the examples Boethius uses are pre-Stoic (and Peripatetic, that is, they resemble those in Aristotle's *Prior Analytics* and *Categories*): e.g. *si homo est, animal est, aut aeger est aut sanus*.⁶⁰

To sum up, the theory which Boethius announces as an elaboration of Eudemus' and Theophrastus' theories is closer to the position that Galen attributes to the ancients than any other extant source.

5. Solving two difficulties in Galen's *Institutio Logica*

If we assume that Galen's ancient philosophers were early Peripatetics, including Theophrastus and Eudemus, and that they had the minimal(ist) theory of hypothetical syllogistic I have argued they had, then we can shed some light on two difficulties in the *Institutio*, one at *IL* 3.3 and one at *IL* 3.5.

At *IL* 3.5 we learn that those philosophers who focus on the nature of the things rather than on linguistic form, i.e. the non-Stoic logicians, would call the sentence 'If it is not day, it is night' a disjunction, and not, as we may have expected, a conditional. The reason for this should now be apparent. The relation between things on which an inference with this sentence as premiss would be based is a division (διαίρεσις); and the formulation 'If it is not day, it is night' reveals the relation of dependency (in a division) which makes possible the transition (μετάβασις) from second premiss to conclusion, and which was described in the account of the dividing hypothetical premiss as 'τίνος οὐκ ὄντος, τὸ ἐστὶ' (*IL* 3.1).

At *IL* 3.3 we learn that the ancients called a premiss which we use when we think that since this is not, this is, a dividing (i.e. disjunctive) premiss; and thus not as we may have expected, a connecting (i.e. conditional) premiss. Again, the reason should now be clear. The relation at issue is a division (διαίρεσις), and the passage describes what we think in terms of the relation of dependency which enables us to make the transition from one thing's not being to another thing's being. It does not give us the canonical (or any) form of dividing hypothetical premisses. In fact, we do not know whether the early Peripatetics had something like canonical formulations for hypothetical premisses. If they did, they may well have

⁵⁹ He distinguishes eight (or ten) subtypes for each of these four. There is no parallel to this sub-distinction in our sources for early Peripatetic hypothetical syllogistic.

⁶⁰ Cf. *HS* 2.2.2 *si homo est, animal est*; 2.2.3 *si est nigrum, album non est*; 2.2.6: *si animal non est, non esse hominem*; 2.3.3 *si est homo, animal est*; 2.3.5 *si est nigrum album non est*; 3.10.6 *aut aeger est aut sanus*, and similarly 3.11.1-2, 4-5.

involved the use of 'if' for connective premisses and of 'or' for dividing premisses. In any case it seems that the Peripatetics did not have a syntactic definition of hypothetical premisses. What determined whether a premiss is connecting or dividing is the relation that is assumed to hold between the things: when this relation is a division, the premiss is dividing; when it is a connection, the premiss is connecting. In this sense, the approach of the early Peripatetics in Galen is semantic, not syntactic.

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