



Introduction

LUCA CASTAGNOLI AND PAOLO FAIT

I Plato's Logical Agenda

In late antiquity interpreters of Plato's philosophy insisted that the whole of logic was already present in his dialogues. All kinds of syllogisms were used by Socrates and his interlocutors, and it was left to Aristotle and his successors only to name, classify and formalise them.¹ This approach remained popular among interpreters until the first half of the twentieth century.² More recent historians of logic have protested that in order to 'discover' or 'invent' logic it is not sufficient to reason according to certain valid patterns, or to represent someone acting in this way in a fictional dialogue. But there is a sense in which Plato did play a key role in the birth and development of ancient logic, a role which is often underplayed in histories of logic. In his dialogues Plato identified and explored a number of central philosophical issues to which logical concepts and methods offered powerful responses, if not definitive solutions. In this way, he was an essential catalyst for the birth of logic: if ancient logic was the promised land, Plato was its Moses. He never set foot in it, but enabled others to see the destination. Of course, when setting this agenda, Plato was not operating in a philosophical vacuum; often he was engaging in original ways with problems raised or foreshadowed by some of his predecessors and contemporaries (on the 'prehistory' of logic see CHAPTER 1 – DENYER).

In what follows we identify and outline a selection of key issues which Plato broached and which shaped the later development of logic.

1 *Definition and Refutation*

In Plato's early dialogues, Socrates often asks a question of the form 'What is *F*?', where *F* is a moral virtue, e.g. piety (*Euthyphro*), courage (*Laches*) or temperance (*Charmides*), and tries to find the definition of *F* by testing candidate answers

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proposed by an interlocutor, in a conversation or dialectical exchange (*dialegethai*) in which Socrates asks questions and the interlocutor answers them. A number of essential requirements for something to count as a good answer to the ‘What is *F*?’ question emerge in the process (CHAPTER 6 – FERREJOHN).

The argumentative strategies adopted by Socrates in his quest for definitions fall into recognisable patterns that are certainly of interest for the historian of logic: conceptual analysis and induction play important roles, but the most distinctive test is the famous Socratic *elenchus* or ‘refutation’ (*elenchos*), a form of cross-examination in which *deduction* takes centre stage. The interlocutor is invited to put up a thesis (P) – often, but not necessarily, a definition – for discussion. Socrates then asks questions eliciting answers (Q, R) that he often proceeds to show to be at odds with the interlocutor’s original thesis because they logically imply the negation of P. In certain cases, however, what is deduced seems to be some falsehood, absurdity or contradiction, and Socrates’ aim seems to be an *indirect* rejection of the thesis, along the lines of a *reductio ad absurdum*, or a simple exhibition that the whole set {P, Q, R} is inconsistent.

In the early dialogues the *elenchus* is never analysed or precisely described, but it is rather exhibited in the concrete discussions as Socrates’ distinctive dialectical method. The *Gorgias* seems to be methodologically more self-conscious than other dialogues, since Socrates comes very close to a description of the logical structure of the elenctic method. There are some agreements and some necessary consequences of these agreements that do not agree with one’s original thesis; so, if one wants to stick to the latter, some of the previous agreements must be withdrawn. Plato’s terminology is far from nuanced, and the catch-all verb *homologeîn* plays a variety of roles, indicating in different contexts consistency of propositions, agreement between interlocutors, simple commitment to the truth of a claim, consistency of one interlocutor with himself.³ But the idea that the necessary consequences of one’s commitments act as a form of rational coercion is crucial. Even the verb *sullogizesthai*, which from Aristotle onwards would be central to the development of ancient logic, is sporadically used here and in other dialogues, but only in a couple of cases in the whole Platonic corpus with reference to deductive inference (e.g. *Gorg.* 498e); more often it indicates the mere *summing up* of the points agreed. Even if the verb is not a secure indication, in a few cases the description of the *elenchus* is reminiscent of Aristotle’s later definition of ‘syllogism’ (*sullogismos*). *Gorgias* 461d and 480b–e are interesting examples, but the closest description is perhaps in the *Charmides*: ‘and if you think that from my previous agreements it results that this is necessary (*touto anankaion einai sumbainein*), then I would rather withdraw some of those, and would not be ashamed to admit I had made a mistake . . .’ (164d).

Importantly, however, the Socratic *elenchus* is much more than its logical structure. In particular, it engages the opinions of Socrates’ interlocutors more deeply than a test of the latter’s logical acumen. Socrates’ key assumption is that, for his interlocutors, to harbour contradictory beliefs within their souls

on matters of such an importance is an existential failure. Moreover, the logical structure itself only indicates that the *elenchus* proves inconsistency, while some interpreters think that in Socrates' hands it is a much more powerful tool, as Socrates sometimes feels entitled to conclude that his cross-examination has demonstrated that the interlocutor's thesis is *false* (*Gorg.* 473b, 479e). In Plato's early dialogues the *elenchus* is then presented as the main tool of inquiry into the truth on the most important matters.⁴

2 *Dialectical vs Sophistical and Rhetorical Approaches to Argument*

In the eyes of the non-experts, Socrates' *elenchus* could be easily confused with the 'logic chopping' typical of other forms of adversarial dialogue which had become popular in Greece, and especially in its political and cultural capital, Athens, in the fifth century BCE. One recurrent concern of Plato's dialogues is to distinguish the activity and goals of Socratic dialectic from those of other figures who engaged in the art of speech and argument (*logos*). This concern intersected with the project of differentiating the genuine philosopher from a heterogeneous group of self-proclaimed experts and teachers, including sophists, erists and rhetoricians. The emphasis of the sophistic art on winning the debate, independently of the truth of one's thesis or strength of one's reasons, overlaps with a distinction that Plato draws between 'dialectic', on the one hand, and 'eristic' or 'antilogic', on the other. In 'dialectic' (*dialegesthai*) the interlocutors cooperatively aim to get closer to the truth through joint examination of their views; 'eristic', 'agonistic' or 'antilogic' debaters, on the contrary, only want to prevail, at any cost, in a zero-sum competition of arguments (*Resp.* 5.454a–c; *Euthd.* 272b). (On the agonistic background of the birth of logic in ancient Greece see CHAPTER 1 – DENYER.)

Although Plato is especially interested in denouncing the dubious motivations behind the sophists' practices, and the existential risks of adopting them, he also starts to reflect on the sophists' forms of argument. In the *Sophist*, he describes the sophist as a consummate 'master of appearances': the sophist has an 'expertise in deception' (266d) which consists in *appearance-making*. The sophist imitates genuine wisdom by creating short *logoi* (speeches or arguments) that merely *appear* to force the interlocutor to contradict (*enantiologeîn*) himself through some kind of word-illusion (265b–268d). How exactly this appearance is produced, and how exactly the sophistic *logoi* fall short of the status of the genuine refutations they imitate, is not explained in the *Sophist*, or anywhere else in Plato's corpus. But the *Euthydemus* provides us with an instructive series of examples when the two brothers Dionysodorus and Euthydemus offer a public display of their eristic art.

The distinctive goals and methods of sophists and erists are set apart by Plato from those of what he calls, in the *Sophist*, 'noble sophistry'. This type of sophistry resembles in aims and methods the elenctic method of the Socrates

of Plato's early dialogues: in a genuine refutation of someone who thinks he knows what he actually does not know, 'they [the 'noble sophists'] collect his opinions together during the discussion, put them side by side, and show that they conflict with each other at the same time (*hama*) on the same subjects (*peri tōn autōn*) in relation to the same things (*pros ta auta*) and in the same respects (*kata tauta*)' (230b). This comes close to offering a rigorous definition of what a contradiction is (see, similarly, *Resp.* 4.436b–c), and the various clauses listed here will be central to Aristotle's formulation of the Principle of Non-Contradiction in *Metaphysics* 4 and to his analysis of the various ways in which a contradiction can be merely apparent (CHAPTER 11 – CASTAGNOLI).

Like sophistry, rhetoric is also pitted against dialectic time and again in Plato's corpus. Although there is a formal distinction between the long monologues of the rhetoricians and the short question-and-answer exchanges typical of dialectic, the key difference lies in their purpose: whereas the philosopher who engages in dialectic is happy to be refuted if that leads him closer to knowledge and understanding (*Gorg.* 457e–458a), the practitioner of rhetoric aims to *persuade* others, instilling mere beliefs, and not knowledge, in the audience, while appearing knowledgeable (459d–e). Because of its lack of knowledge of the subject matters it engages with, rhetoric is then not a craft or expertise (*technē*), but a mere 'knack' (*empeiria*) in 'flattering' and pleasing the audience. Just as cookery is a knack that pleases the body, whereas medicine is a craft that really takes care of it, rhetoric merely pleases the soul, whereas philosophy (the real political art) takes care of it. Rhetoric is then reduced to the lowly status of mere 'counterpart' (*antistrophos*) of cookery and is not a genuine rival of philosophical dialectic (465d). The 'true rhetoric' that later on, in the *Phaedrus*, will be embraced as a craft is something completely different, that only a philosopher can possess, because it requires knowledge of the truth and of the nature of the soul of the audience, in order to be able to 'lead' it in the most effective way. The boundaries between this true rhetoric and dialectic thus become extremely blurred (276e–277c).

3 *Geometrical Reasoning as a Model for Philosophical Argument and Inquiry*

The *Meno* is often classified as a 'transitional' dialogue between Plato's early Socratic dialogues and the mature 'middle-period' dialogues. It can be seen as intriguingly transitional also with reference to Plato's proto-logical reflections. The dialogue starts as a definitional inquiry into the essence of virtue (*aretē*), pursued through the familiar method of the *elenchus*. When all his answers are refuted, Meno, an enthusiastic student of the sophist Gorgias, advances an argument that has come to be known as Meno's Paradox: since Socrates disavows any knowledge of the nature of virtue, and the *elenchus* has revealed that Meno does not know it either, how will they be able to inquire any further

into virtue? If you don't know at all what X is, you will not be able to look for X, and you would not be able to recognise X as what you were seeking anyway, even if you should chance upon it (*Men.* 80d–e). The logic of the argument has been widely discussed.⁵ Despite calling Meno's argument 'eristic', Socrates does not denounce any fallacy in it; he addresses it by introducing the 'theory of recollection' (*anamnēsis*), according to which discovery through inquiry will be possible by recollecting knowledge that our immortal souls possessed before birth (81a–d).

There is disagreement as to what exactly recollection is meant to account for, and how; one possible reading is that it is meant to explain the human unique capacity for abstract a priori reasoning, the capacity for grasping the logical relationships of consequence and inconsistency between different propositions,⁶ putting it at the centre of the process of acquisition of knowledge. When asked to show how learning through recollection is possible, Socrates questions one of Meno's slaves concerning the geometrical problem of how to double the area of a given square; despite the fact that he was never taught geometry, with the aid of diagrams and of Socrates' leading questions, the slave finally manages to grasp the correct solution to the problem without simply being told by Socrates. In the process, the slave realises that some of the answers he initially gave are inconsistent with other things he believes to be true, and finally he manages to 'see' that the diagonal of the original square matches the length of the side of a square double the size. Crucially we are told by Socrates that the slave does not yet *know* this solution, but only has dream-like *true beliefs* about it; we are also told that the slave could reach knowledge 'if he were repeatedly asked these same questions in various ways' (85c–d).

After the discussion of recollection the question of how to inquire about something in the absence of any knowledge of it is tackled by the introduction of the so-called method of hypotheses, borrowed from the geometers (86e–89a): we can put down a 'hypothesis' and see what would necessarily *follow* (*sumbainein*) from it if the hypothesis were true (for example, if we hypothesise that virtue is knowledge, then necessarily virtue will be teachable). We can then further investigate what other, higher hypothesis would need to be true for the first hypothesis to be true (for example, if we hypothesise that virtue is unqualifiedly beneficial, then necessarily virtue will be knowledge).

Later in the dialogue we find a distinction that helps to address the questions of what the slave was lacking at the end of geometrical discussion and of why the application of the hypothetical method to the question whether virtue is teachable does not deliver knowledge. Unstable true beliefs become knowledge (*epistēmē*) only when they are 'tied down' *aitias logismōi*, namely, by 'reasoning' or 'calculating' (*logismos*) the reason or explanation why (*aitia*) they are true. This is, we are told, what was previously called 'recollection' (97d–98a). The passage is tantalisingly brief, but the *logismos* language indicates that some kind of deduction is necessary for knowledge, and the

reference to an *aitia* suggests that the premisses need to be somehow explanatory of the truth of the belief to be known or understood. The metaphor of ‘binding fast’ or ‘tying up’ is itself suggestive of the force of logical necessity.⁷ It is possible to conjecture that what the slave was still unable to do was to *demonstrate*, starting from geometrical definitions and first principles, *why* the diagonal of a square doubles the square. An explanatory argument which does not go all the way back to first principles seems insufficient, however, since otherwise the reasoning that virtue is teachable because it is knowledge should already deliver knowledge of the teachability of virtue, if we assume the truth of both premiss and conclusion.

4 *Dialectical Understanding vs Hypothetical Thought in the Republic*

In the *Republic* Plato offers an extended discussion of human cognition which includes the first representation of ‘geometry and her sister crafts’ as systematic bodies of knowledge structured in a hierarchical way, with starting-points, intermediate steps and conclusions. The crucial logical relations are again vaguely described by the ubiquitous verb *homologeîn*: geometers ‘arrive at a conclusion in an in-agreement way’ (*teleutōsin homologoumenōs*: *Resp.* 6.510c), but it is clear that Plato is imprecisely conveying very important intuitions about the nature of an axiomatic system. Famously an admirer of geometry and mathematics, in books 6 and 7 of the *Republic* Plato is surprisingly keen to signal two capital shortcomings of these tightly structured disciplines: (1) their whole systems rest on hypotheses that are not sufficiently justified, because they are only agreed upon by the specialists without an account (510c); moreover, (2) the specialists crucially use visual diagrams (510d). Geometry is granted a high cognitive status because it investigates the intelligible square and the diagonal themselves, not sensible objects or diagrams (510d), but it carries out its proofs through diagrams whereby it is still too close to perception. Therefore, it is not ranked as ‘intellection’ (*noēsis*, 511d), or indeed ‘knowledge’ (*epistēmē*, 7.533d), but only as ‘discursive thought’ (*dianoia*) (6.511c–d, 7.533d).

Accordingly, even if geometry is a consistent body of propositions, Plato thinks that without justification it may possess only the coherence of a dream (533b–c), being a *homologia* and not yet a science. Elsewhere he notices that sometimes, in mathematics, inconspicuous errors in the starting-points do not prevent the many consequences from being mutually consistent (*homologeîn allelois*: *Crat.* 436d). Mathematics is thus in need of a foundation, which it is the task of dialectic to provide. The latter progressively *eliminates* hypotheses by subsuming them under more encompassing claims until it eventually reaches an un-hypothetical starting-point of everything, the form of the Good (*Resp.* 7.533c–d). Then there is the way back, from the highest starting-point to what is lower down, a process that, unlike ordinary geometrical proofs, does not use visual images but relies uniquely on a grasp of the

forms (6.511b–c). There are thus two directions of inquiry: one is ascensional and regressive, and moves from the hypotheses to what is higher up. The other is from the starting-point to its consequences. Many translators and interpreters agree that *homologia* at 510c and 533b indicates a logical relation: consistency or even logical consequence. However, the fact that *homologia* may only indicate the mere agreement among mathematicians is a strong indication of the lack of precision in Plato's description of logical notions (whether this is also indication of his limited grasp of them is a different question).

'Hypothesis', which we have seen introduced in the *Meno*, is the key dialectical term in a group of dialogues discussing Plato's doctrine of forms: in particular the *Phaedo*, the *Republic* and the later *Parmenides*. The existence of forms is assumed in the *Phaedo* as a hypothesis to be tested in two ways which are not to be confounded in the way in which 'antilogicians' typically did: one is the test of the *consequences* (*hormēthenta*), to see whether they concord or discord (*sumphonei ē diaphonei*) (100a, 101d–e). Here interpreters struggle to understand whether these consequences can be *logical* consequences, despite the fact that simple propositions normally do not imply contradictory consequences, and whether concordance can simply be logical consistency. The other method of testing is by seeking higher hypotheses, in a way strongly reminiscent of the ascensional method of the *Republic*.⁸ The examination of the consequences of hypotheses such as 'if the one is . . .', 'if the one is not . . .', 'if the many are . . .', etc. is the task of the second part of the *Parmenides*. This particular version of the method may have been originally developed by Zeno of Elea to defend Parmenides' monism by refuting the opposite standpoint ('If things that are are many, then they must be both like and unlike', 127d–e). Maybe inspired by the *Parmenides*, Aristotle is reported to have credited Zeno with the discovery of dialectic (D.L. 8.57; cf. 9.25, S.E. M. 7.7).

5 Later Developments of Dialectic in Plato

In the *Republic* (5.454a1–9) and the *Phaedrus* (255c–256c) Plato associates dialectic with a systematic method for searching for definitions by dividing genera or kinds into their sub-kinds until the items to be defined are reached. Especially prominent in the *Sophist* and the *Statesman*, where the reader finds lengthy illustrations, the method of division (*diairesis*) has a special strength: it enables a dialectician to proceed systematically through an ordered and finite sequence of operations: given a genus, immediately subordinate kinds must be found that exhaust the divided kind and are mutually disjointed. This division is repeated on the sub-kinds until the item to be defined (or an indivisible kind) is identified. Great attention is paid to 'dividing the genus at the right joints and not splintering any part like a bad butcher' (*Phaedr.* 265e1–3). If this non-algorithmic task is carried out correctly, all the nested kinds defining the item under investigation will be displayed in a structure revealing their natural order.

Later logic textbooks represented these structures as downward-branching trees. Division is primarily a method of definition, but it also enables the dialectician to articulate a complete classification of the items belonging to the genus. It is perhaps the most successful of Plato's contributions to the methodology of science. Most ancient philosophical schools deployed it, and versions of the method have been widely applied in biological taxonomy.

Another later development of Plato's dialectic is more discrete and thereby difficult to identify. We might describe it as a new focus, emerging in certain dialogues, especially the *Theaetetus*, the *Sophist* and the *Philebus*, not on forms generally taken, but on certain forms playing a special role in accounting for the logical structure of the combinations and division of other forms. Plato never attempts a definition of such items, but he may allude to these kinds when he describes the 'common items' (*koina*) at *Theaetetus* 186d: being, similar, dissimilar, same, different, beautiful, ugly, good and bad. In the *Sophist* Plato illustrates the objects of dialectic by pointing to an analogy with grammar and music. He suggests that the dialectician will study kinds behaving like the vowels, because the latter run through the other letters and enable them to combine. He gives an example of such kinds in the following discussion of the five most important kinds (*megista genē*) – change, stability, same, different and being – among which being and different are often identified by interpreters as vowel-kinds (254d–259e).⁹ Gilbert Ryle drew attention to the role of the *koina* in Plato's later dialectic, emphasising their peculiar methodological status, the fact that they are 'topic neutral' (thus applying to any subject) and that they are later developed in Aristotle's dialectic (see below).¹⁰ Several interpreters have picked up and developed Ryle's important insight.

6 Truth and Falsehood

As we have seen, in Plato dialectic encompasses a number of different ways of inquiry into the truth. Truth is itself a charged and multifaceted concept which intersects with Plato's conception of being and reality, and how we access them. From this point of view, Plato's reflections on truth are deeply embedded in his metaphysics and epistemology. However, Plato also raised a central question in philosophy of logic: what does it mean for someone to think or say something true? What makes a thought or a statement true? A connected, and to us less familiar, question with which Plato had to grapple was 'how is it even possible for us to think or say something false, anyway?' In several dialogues, including the *Euthydemus*, the *Cratylus* and the *Theaetetus*, Plato tentatively and inconclusively discussed a number of puzzles about the very possibility of falsehood and contradiction, advanced by some of Plato's predecessors and contemporaries and ultimately springing from Eleatic metaphysics and rooted in the famous Parmenidean veto on thinking and speaking of 'what is not' (*DK* 28B6). These puzzles tread on certain confusions prompted by different

uses of the Greek verb ‘to be’ (*esti*), which include existential, predicative and veridical nuances,¹¹ and on the conflation between *naming* or *referring to* something, on the one hand, and *predicating* something of it, on the other. In the *Sophist* Plato finally offered a solution to these puzzles and an explanation of how a sentence can be true or false, by explaining the status of non-being and by clarifying the nature of predication, first drawing the key syntactic and semantic distinctions between names/subjects and verbs/predicates (CHAPTER 7 – CRIVELLI).¹²

This survey has adopted a plausible and influential developmental narrative of Plato’s work. But the ingredients of Plato’s dialectic tend to blur the division of periods. For example, even if it loses its central role, the *elenchus* does not disappear from Plato’s horizon in the middle and late dialogues. In the *Republic* fully trained dialecticians deploy a certain kind of *elenchus* to test the definition of the form of the Good (534b–c). As we have seen, *elenchus* is also praised as ‘noble sophistry’ in a late dialogue such as the *Sophist*. Conversely, the method of division can already be identified in an early dialogue such as the *Gorgias* (463e–466a).

II Aristotle

Crediting Aristotle with the invention of logic should not hide the fact that his momentous contribution is the result of a constant engagement with Plato’s dialectical and methodological ideas. Sometimes he just brings Plato’s solutions to full fruition by developing and interpreting them. In other cases, he rejects a Platonic tenet outright. But, typically, Aristotle retains the shell of Plato’s scientific and dialectical doctrines, while transforming their contents to the point of overturning them.

Aristotle’s dialectic is the art of arguing deductively from plausible premisses (*endoxa*) on any problem proposed (*Top.* 1.1, *SE* 34). Taken very abstractly, a problem is a question of the form ‘P or not P?’ The structure of the *elenchus* (direct and indirect) is clearly recognisable in the last book of the *Topics* and explicit in the *Sophistical Refutations*, where a refutation (*elenchos*) is defined as ‘the syllogism of the contradictory’ of the thesis upheld by an opponent. Aristotle describes dialectic as a sort of training, but aspects of the Socratic *elenchus* survive in what Aristotle calls *peirastikē* or ‘examinative’ dialectic (*SE* 2 and 11); this is presented as the art of probing the pretence of knowledge of the respondent starting from the latter’s own beliefs, and without necessarily possessing oneself the knowledge in question (*SE* 2, 165b4–6; 11, 172a21–27). This was at least one of the tasks of the Socratic *elenchus*, and Socrates is mentioned at a crucial juncture: he took up the role of the questioner but did not answer – because ‘he agreed that he didn’t know’ (*SE* 34, 183b7). Aristotle’s assumption is that one is expected to undergo the peirastic probe only if one

stakes a claim to knowledge. Since Aristotle thinks that his pupils are attending his teaching in order to acquire knowledge, he trains them to answer, and in particular to be prepared to ward off and rebut the tricks of the sophists. Indeed it is a typical aim of the sophists to attack and outsmart the true experts even without possessing themselves the relevant knowledge.

Dialectic that is practised for ‘training’ (*gymnasia*), on the other hand, is more impersonal: a thesis can be attacked or defended without a real commitment to its truth, and the premisses proposed by the questioner must be granted if they are plausible and the respondent cannot provide any objection. Here too the Aristotelian respondent is more active than Socrates’ interlocutors (*Top.* 8.4–6).

The logical structure of dialectic is clarified thanks to a new and precise definition of the ‘syllogism’ (*sullogismos*) and of the role it plays in dialectic; Aristotle describes this as his most important innovation (CHAPTER 2 – FAIT; CHAPTER 8 – CASTAGNOLI AND FAIT). Moreover, in the *Sophistical Refutations* the definition of the syllogism provides a set of criteria for distinguishing a real syllogism from an apparent one; the definitions of syllogism and refutation become principles of classification of sophistical arguments. Aristotle clearly builds on Plato’s analysis of appearance in the *Sophist* and draws materials from Plato’s *Euthydemus*, but his approach is novel and transformative (CHAPTER 11 – CASTAGNOLI).

In the *Posterior Analytics* Aristotle develops an account of knowledge (*epistēmē*) based on demonstration (*apodeixis*), defined as a kind of syllogism, and provides the first detailed description of an axiomatic system where truth and necessity are transmitted from the principles to their consequences, and to the consequences of consequences, by demonstration (CHAPTER 6 – FERREJOHN; CHAPTER 9 – BOWN). Geometry and mathematics are presented as examples of such systems, but do not seem to have a privileged position. Aristotle’s scientific principles are still called ‘hypotheses’ as in the *Republic*, but are no longer provisional. They cannot be proved from superior principles, nor can they be deduced from their consequences in a circular way (*APo.* 1.3). Rather they are grasped by *nous*, ‘intellection’, without any further appeal, although Aristotle’s *nous*, if compared with Plato’s *noēsis*, is rather weakened: not a high-rank mental power or the culmination of Platonic recollection, but just a form of inductive grasp provided by lower faculties, such as perception and memory of things perceived (*APo.* 2.19). Aristotle’s thinking about the starting-points of knowledge is acutely aware of the problems raised by the *Meno*, especially Meno’s Paradox (explicitly mentioned at *APo.* 1.1, 71a29, and *APr.* 2.21, 67a21). Moreover, Aristotle’s idea of demonstration as a causal explanation, where the cause is the middle term of a syllogism, can be seen as a precise interpretation of the *Meno*’s puzzling notion of the ‘reasoning/calculation of the cause’ (*aitias logismos*).

Aristotle advocates a strict departmentalisation of the sciences, which are identified by their subject matters, which are natural kinds. Each science has its