Introduction

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The Conference

The conference 'Logic, Dialectic and Science in Aristotle' was intended to bring together a variety of different interpretative approaches to Aristotle's logical works: formal studies of the logical theory in the Prior Analytics, attempts at understanding the nature of Aristotelian dialectic, interpretations of his theory of demonstrative science, and explorations of connections (or lacks of connection) between the doctrines of the Organon and Aristotle's other treatises. Our hope was that such a juxtaposition would make clearer just what has resulted from the last quarter century of scholarship on the Organon and, through our exchange of diverse viewpoints on a common set of texts, point to directions for future work. We leave it to readers of this collection to determine how well our hopes were realized.

Those attending the conference met for three days of discussions during May 24-26, 1991. Robert Bolton, Sarah Broadie, John Corcoran, Michael Ferejohn, James Lennox, Timothy Smiley, Gisela Striker, and Robin Smith presented papers. Cynthia Freeland, Alan Gotthelf, Donald Morrison, Ian Mueller, Richard Patterson, Lois Pineau, and Thomas Tuozzo served as Chairs of sessions. (Thomas Upton, who was also invited to participate, was unfortunately prevented from attending by a last-minute medical emergency.) The sessions were joined by a number of others who participated in discussions.

The Papers

The papers published here descend from those presented at the Conference, though in many cases they have been significantly revised, often to take account of points raised during discussion. Seven of the eight papers are reproduced here. Though there are many points of commonality, they may be divided into three groups.

One group focusses on Aristotle's logical system and its formal properties. In 'The Founding of Logic', John Corcoran addresses the issues of Aristotle's place in the history of logic and Aristotle's own philosophy of logic. Distin-
guishing a conception of logic as formal ontology, or ontic science, from a conception of logic as formal epistemology, or epistemic metascience, Corcoran maintains that the former of these has throughout history dominated much of mathematical thought (including ancient Greek mathematics and such recent work as Principia Mathematica). However, he sees the historical tradition of Aristotelian interpretation as generally taking Aristotle’s logic to be an epistemic theory: syllogisms make known the inferential relationship between premises and conclusion. Corcoran argues that Aristotle’s own conception of logic is as an epistemic metascience, not as a formal ontic science, and that it is on this basis that Aristotle deserves to be regarded as the founder of logic.

The second paper in this group, Timothy Smiley’s ‘Aristotle’s Completeness Proof’, has a much narrower focus. Recent work on Aristotle’s deductive theory has shown that, on plausible reconstructions, it is complete. However, some scholars have questioned whether Aristotle himself was even capable of raising the question of completeness, and it has generally been supposed that he did not give a completeness proof. Smiley argues that Aristotle not only did manage to formulate this question but also came relatively close to answering it with a true completeness proof. He reconstructs an attempted proof which he finds in Prior Analytics i 23, notes that there are ‘holes’ in this proof, and then proposes Aristotelian ways of filling in the holes. Along the way, he also suggests that there may be an important connection between Aristotle’s failure to take account of fourth-figure syllogisms and the probable ancestry of Aristotelian logic in Platonic division.

The third paper concerned with formal issues, Gisela Striker’s ‘Modal vs. Assertoric Syllogistic’, asks: why is it that Aristotle’s assertoric syllogistic was a remarkable success and his modal syllogistic a failure? To forestall protests, Striker first offers a vigorous defense of the claim that the modal syllogistic was a failure, pointing to glaring inconsistencies in its basic theses and in Aristotle’s treatment of examples. She then seeks an explanation of this failure by turning to the reasons why the assertoric syllogistic was successful. On her view, a careful examination of the examples in the Prior Analytics makes it clear that there is no uniform semantic analysis for the relationship ‘belongs’ that is fundamental to the assertoric syllogistic. However, Striker suggests that this is not a weakness but a strength of the system: Aristotle found that he could develop a successful theory of inference that ignored the various possible relationships subsumed under ‘belongs’ and took account only of forms of inference. The assertoric syllogistic thus manages to be metaphysically neutral. Striker then proposes that Aristotle may have been trying to find comparably neutral formal pictures of the modalities and, using them, to construct a generalized modal logic with a similar metaphysical neutrality. However, she concludes, he failed to do this. Strictly speaking, then, the modal syllogistic was a failure, though its conception shows Aristotle to have had sharp logical instincts: his failure, and attempts to supplant it with something better, have inspired an entire tradition of modal logic.
A second group of papers concerns demonstration and its connections with Aristotle's scientific and metaphysical views. James Lennox's 'Aristotelian Problems' calls attention to several texts in which Aristotle speaks of 'grasping problems' and asks: just what does Aristotle suppose we are grasping when we grasp a problem? Does the term 'problem' (πρόβλημα) mean the same thing in dialectical and in scientific contexts? Lennox argues that there is 'conceptual shift' as we move from science to dialectic but that this shift is entirely explicable on the basis of the change in context itself.

In a dialectical context, problems are subjects of debate: controversial propositions concerning which two participants in an exchange take opposing positions. Lennox proposes that an 'analogous' sense applies in scientific contexts: problems are objects of inquiry, that is, explananda for which demonstrations must be sought. 'Grasping problems' is then an essential element in the process of searching for first principles. To grasp the problems is to identify clearly just what those propositions are for which explanations are to be sought. Lennox argues that Aristotle's concern in Posterior Analytics ii 14 is the determination of procedures with which to do this. He also suggests that there may have been important links between problematic inquiry in this sense and the 'analysis' of Greek geometry.

Michael Ferejohn's purpose in 'The Immediate Premises of Aristotelian Demonstrations' is to argue that there is a crucial break in the argument of the Posterior Analytics at the beginning of i 4. Up until that point, Aristotle has been stating general epistemological constraints that any theory of justification must satisfy. From that point on until the end of the work, Aristotle's goal is to provide a theory which satisfies these constraints. Ferejohn sees the resulting theory as 'foundationalist' in two ways, or better at two levels. First, with respect to demonstrated knowledge (ἐπιστήμη ἀποδεικτική), Aristotle holds that justification must consist in derivation from known propositions that cannot be derived syllogistically from any other known propositions. These foundational propositions are the logical starting-points. But these logical starting-points in turn rest on other epistemic starting-points, from which they are justified in a non-demonstrative way.

Ferejohn's major goal is to 'bring into alignment' two passages: i 2, 71b19-22, which lays out the six conditions on demonstration, and i 5, 74a34–b5, which discusses the notion of one term A belonging to another 'qua itself'. Aristotle tells us in i 2 that in the ultimate premises of demonstrations, the predicate must belong to the subject 'immediately'. Some scholars have argued that immediacy is a strictly extensional notion: 'Every A is a B' is immediate just in case it is true but there is no middle term C 'between' A and B. But there are difficulties about making sense of this notion in the case of convertible propositions. There is also an unclarity about the relationship between immediacy and another of the conditions Aristotle specifies in i 2: that the premises of demonstrations must be 'prior' to their conclusions (and in general that the first premises of Aristotelian sciences must be absolutely prior to everything else).
Some interpreters suppose that immediacy and primitiveness are two names for the same condition, but i 13 raises a difficulty for this. Ferejohn argues that the *qua itself* criterion is actually part of immediacy, so that ‘A belongs to B’ is immediate only if A belongs to B *qua itself*.

A final group consists of two papers about Aristotle’s theory of dialectic and its relationship to his other logical doctrines. The issue Robert Bolton addresses in ‘The Problem of Dialectical Reasoning (Συλλογισμὸς) in Aristotle’ is: does Aristotle think that dialectical reasoning can provide anyone with epistemically adequate grounds for thinking that anything is true? Bolton finds that interpretations of Aristotelian dialectic have generally been of two types: ‘gymnastic’ views, according to which dialectic cannot establish anything, and ‘Platonic’ views, according to which dialectic not only can, but must, be the means of establishing the first principles of sciences. Bolton argues instead for a middle course: a ‘Socratic’ view that dialectic can be used to establish its conclusions, though not to establish them scientifically. He maintains that although some dialectical arguments are ‘gymnastic’ exchanges with a strongly competitive character, it is also possible for dialectical arguments to be ‘peirastic’. Drawing on his earlier work, Bolton holds that peirastic dialectic is a kind of argument that rests on premises known to the parties to the discussion and, more broadly, to people in general; since dialectical arguments are supposed to be valid, it follows that peirastic is capable of providing a type of epistemically adequate support for its conclusions. In the course of his argument, Bolton argues at some length for a much narrower interpretation of Aristotle’s definition of *Συλλογισμὸς* than is common elsewhere (including the other papers in this collection). On Bolton’s construal, not only must a *Συλλογισμὸς* have more than one premise and a conclusion that is distinct from each of its premises, it must also have premises the warrant for which does not presuppose a warrant for the conclusion, and its premises must not simply entail but, in some sense, explain its conclusion.

Robin Smith’s ‘Dialectic and the Syllogism’ rests on a much broader interpretation of the *Συλλογισμὸς*. Smith takes Aristotle at his word when he claims that the theory of ‘arguments in the figures’ in the *Prior Analytics* is the unique correct theory of inference applying to all types of argumentation and asks: what, then, is the relationship between dialectical arguments and that theory? In particular, why does this theory make no appearance in the *Topics*? Smith proposes that the difference between the *Analytics* and the *Topics* is sufficient to explain this. Aristotle’s purposes for developing the syllogistic theory of the *Prior Analytics* were, on Smith’s interpretation, largely proof-theoretic, driven by the concerns of the *Posterior Analytics*. By contrast, the goal of the *Topics* is to present a practical method for discovering arguments which will be effective in establishing a particular conclusion from premises that will be conceded by a particular opponent. These divergent concerns give rise to divergent, but not inconsistent, results: the theory of the *Prior Analytics* would have been unwieldy as the basis for a dialectical method, while the
methods of the *Topics* are not of sufficient theoretical depth to serve the purposes of the *Analytics*. Accordingly, whatever may have been the case about the order in which Aristotle developed these views, he could consistently have subscribed to them both at the same time.

One feature that is prominent in earlier work is notably absent from the essays in this collection: they give very little attention to hypotheses about Aristotle's development and their use in the explanation of supposed inconsistencies in the treatises. This is perhaps most clearly illustrated by the final two papers. Notwithstanding their divergent interpretations, Bolton and Smith both conclude that the differences in purpose of the *Analytics* and the *Topics* are completely sufficient to explain the (apparent) divergences between the accounts of the συλλογισμός in the two works.

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