

Bronstein, David. *Aristotle on knowledge and learning: the Posterior analytics*.
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Bronstein's book is a welcome addition to the recent literature on Aristotle's *Posterior Analytics* (APo). The introduction (3-27)[[1]] argues, as has become orthodox (cf. Charles 2000, Ferejohn 2013), that Aristotle in the *APo* sets out to answer Meno's paradox: "One will learn either nothing or that which one already knows" (71a29-30, translated on p. 25). The remainder of the book argues that the *APo* presents three separate ways of learning (for which Bronstein refers to *Metaphysics A* 1, 992b30-3), which together avoid Meno's paradox. These three ways, Bronstein maintains, neatly structure the *APo* (largely paralleling Ross 1995). First, *APo* I is taken to concern learning by demonstration, as performed by expert scientists. This corresponds to Barnes' view that the *APo* is a pedagogical model for teaching and presenting knowledge (Barnes 1975), although Bronstein also argues that "demonstration is a source of new scientific knowledge for experts" (32). However, learning by demonstration presupposes two other types of learning. Second, *APo* II (especially 1-10 & 13) is said to discuss learning by definition, as performed by the inquirer. In learning by definition the inquirer moves from non-noetic to noetic knowledge (Bronstein derives the adjectives from $\nu\omicron\upsilon\varsigma$, cf. 9 n.16). Thus the inquirer becomes an expert, while in learning by demonstration the expert already has noetic knowledge. The third and final way, learning by induction, Bronstein unorthodoxly divides into two stages. A preliminary account (attained through perception) is what *APo* II 19 presents, while Bronstein argues that *APo* II 13 explains how the inquirer attains non-noetic knowledge of essences (227). Part 1 of Bronstein's book (chs. 2-4, pp. 31-66, and parts of ch. 11, pp. 177-185) discusses learning by demonstration, part 2 (chs. 5-12, pp. 69-222) discusses learning by definition, and part 3 (ch. 13, pp. 225-247) discusses learning by induction.

Bronstein's book contains a wealth of novel claims and arguments. Here I only have space to discuss a few of what I take to be the more important, some of which I do find problematic. However, most of my points concern *lacunae*, which, I am sure, can be filled in future work.

A laudable aim of the book (53, 57) is to provide a non-mysterious reading of $\nu\omicron\upsilon\varsigma$ (often misleadingly translated as intuition). Bronstein argues that *APo* II 19 only gives an account of perception (226-7). Instead he suggests that the "Socratic picture", especially *APo* II 13, presents the methods of attaining $\nu\omicron\upsilon\varsigma$. The end result is the state where the inquirer has complete knowledge of the essences, and this, Bronstein argues (based upon 100b5-17, with only a few references to *de Anima*), is $\nu\omicron\upsilon\varsigma$.

Essences play a key role in Bronstein's account, and especially important is his chapter 8 (108-130). This chapter argues that Aristotle held a five-stage order of inquiry, which Bronstein names "the Socratic picture":

- <v>1) Is S the subject of some inquiry, i.e. does S have an essence?</v>
- <v>2) What is S's (causally simple) essence?</v>

<v>3) Is there a cause that explains why P belongs to S?</v>

<v>4) What is the cause that explains why P belongs to S, i.e. what is the causally complex essence of P?</v>

<v>5) End result: complete expert knowledge (νοῦς) of S.</v></q>

The first stage is identified with learning by induction, and yields a preliminary account of the essence of S. Stages two to four are identified with learning by definition and yield a full account of the essences involved, while stage five is identified with learning by demonstration. I find this “Socratic picture” promising.

Unfortunately, considering its central place in the book, Bronstein never fully explains what he means by essence (Bronstein translates as essence all of the following Greek phrases: τί ἐστὶ; τὸ τί ἦν εἶναι; οὐσία; τὸ εἶναι; cf. 70). At some places, essence is equated with formal cause (8, 50, 55-56, 70, 103, 198) or “its explanatorily basic feature” (55), and is stated or expressed by a definition (56, 57). At other places, Bronstein says that between a subject and its essence there obtains a formal causal relation (60), and thus essence must be distinct from a formal cause. In sum, it is far from clear what essences are, or even in which ontological category they belong; elsewhere he seems to make Aristotle himself the culprit of this deficiency (Bronstein 2015:728 n.13). What is clear is that he thinks there are essences both for substances (his “model 1”) and attributes (his “model 2”), and he claims: “Every Model 2 demonstration is explanatorily grounded in a Model 1 demonstration” (9, 182; cf. also 49). This link can either be immediate, or mediate through several unstated demonstrations (cf. 49, n.30). In model 1 cases, Bronstein says we are looking for the essences of secondary substances viz. natural kinds such as *Human*, rather than primary substances such as Socrates (cf. 81). And the essence of *Human* is the answer to the question “What is a human being?” (82). Essences are discovered through division (for a species), induction (for a genus), and demonstration (for an attribute) (83, 138). At several places, Bronstein says that essences consist of several items (97) or elements (135) or parts (140, 151, 156-159). These turn out to be the genus and differentiae (minimally two, cf. 201-2), which are the terms of the definition: “The essences are of the form ‘GD₁...D_n’” (139). And the parts of an essence can themselves be essences, viz. the genus itself has an essence (193) and the differentiae can be attributes with essences (186). But then essence seems to collapse into (real) definition, but surely not in the sense of a linguistic entity (if it is to be a cause).

In the previous paragraph, I briefly mentioned Bronstein’s highly unorthodox view that Aristotle’s theory of definition requires every definition to have two or more differentiae. This is based upon Bronstein’s reading of 96a32-b1, where he finds a rule stating that any differentia must belong essentially to at least two separate species. Thus, no differentia is unique to any species. Rather, all species have a unique combination of differentiae. These differentiae are ordered, corresponding to a method of dichotomous division (204-210). Bronstein correctly states that Aristotle rejects dichotomous division in *Parts of Animals* I, but claims, mistakenly I think, that Aristotle is committed to this in *APo*. Because of this rule, Bronstein controversially argues that “rational animal cannot be the essence of human being” (202). I am afraid I do not see any textual evidence of Bronstein’s rule being a general exception-less rule, rather than one applicable to the definition of numbers (which 96a32-b1 discusses) and perhaps to some other subjects.

Another problem concerns the connection between universals and universal predications, more specifically Bronstein’s identification of the two (which he defends in passing towards

the end of the book; 236). First, one cannot then equate an essence with a universal, e.g. the secondary substance *Human*, because essence is most certainly not a universal predication. Thus Bronstein is barred from viewing essences as universals. This causes problems for his reading of 100a14-b5, where Aristotle says that “perception is of the universal”: Bronstein concludes that perception gives us the universal merely potentially (cf. 244-6). Second, this leads Bronstein to a problematical reading of many syllogisms. E.g., he attributes to Aristotle the premise: “Thunder belongs to all fire extinguishing” (152). As Bronstein himself remarks (152 n.23), this is clearly false. Aristotle (93b7-12) rather expresses something like “(All) thunder belongs to fire extinguishing”. Bronstein nowhere formalizes syllogisms into first-order logic, but his terminology seems to commit him to the falsehood that all cases of fire extinguishing have some thunder. However, in a brief footnote discussing lunar eclipses, he seems to suggest a different reading: “This is not to say that we are seeking whether the moon is always or usually undergoing an eclipse. Obviously it isn’t. Rather, as I shall argue, it means that we are seeking whether the moon’s being eclipsed admits of causal explanation, which involves seeking whether lunar eclipse is a regular (predictable) occurrence” (81 n.18). Regrettably he does not develop this suggestion, as he could have, into something like a view centred upon laws of nature (possibly allowing for exceptions).

A further problem is that while Bronstein aims at saying something about the whole of *APo*, he says very little or nothing about II 11-12 and 14-18. But, there is much to say about these chapters (as emphasized by Lennox 2014). And it is not at all evident that they can be fitted into Bronstein’s structural analysis of *APo*.

I was intrigued by Bronstein’s suggestion that in a demonstration efficient causes are parts of formal causes (98-99, 134 n.8). This view is in some sense stronger than Ross’ view that the other three causes are elements of formal causes (1949:640). It is stronger because Bronstein has a highly unorthodox view of efficient causation: namely, that efficient causation concerns all demonstrable and necessary attributes. I.e. it concerns not just cases like leaf-shedding (typically viewed as a process or event), but also cases like having internal angles of two right (47, 99-100). Unfortunately, Bronstein’s discussion of the relation between formal and efficient causation is too abrupt, and it might be a good idea to expand on this suggestion in future work.

I noticed one minor error, where Bronstein discusses the view that learning by demonstration works through discovering a cause which can be set out as the middle term in a demonstration. Bronstein rejects this possibility, as “no commentator that I am aware of thinks that this is what Aristotle calls ‘learning by demonstration’. (See Barnes 1975:84)” (33, n.13). While Barnes does not cite any representative of this view, he does say: “This view of the role of demonstration has, I think, been widely held[...].” (Barnes 1975:84). And Ross (1949) seems to be a clear representative of this view. Perhaps Bronstein means to say that he is aware of no *recent* commentator.

The book is very dense, and its arguments might easily have filled a volume of twice the size. Because of this abruptness, the reader might be dissatisfied with Bronstein’s discussion of many controversial issues. This is further exacerbated by the fact that discussion of secondary literature is confined to footnotes. However, the positive side of this is that the book is more available to non-experts and students – and even more so because all Greek words are transliterated in the main text and all quotes are translated into English (with the Greek in footnotes). The book also contains helpful diagrams and lists. Much of the discussion centres

around lengthy quotes from the *APo*, which are numbered from T1 to T58. A table of these texts, with the page number that they appear on, would have been helpful – especially as the author refers back to these texts throughout the book. To conclude, both non-experts, who can largely ignore the footnotes, and experts should find much of interest in Bronstein’s book. [[2]][[3]]

<v> [[1]] Pure numbers in brackets refer to pages of the volume under review. </v>

<v> [[2]] I want to thank Ludger Jansen for invaluable comments. </v>

<v> [[3]] Bibliography</v>

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