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# Circular Justification and Explanation in Aristotle

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## Keywords:

Aristotle; knowledge; understanding; foundationalism; coherentism; demonstration

## Abstract

Aristotle's account of *epistēmē* is foundationalist. In contrast, the web of dialectical argumentation that constitutes justification for scientific principles is coherentist. Aristotle's account of explanation is structurally parallel to the argument for a foundationalist account of justification. He accepts the first argument but his coherentist accounts of justification indicate that he would not accept the second. Where is the disanalogy? For Aristotle, the intelligibility of a demonstrative premise is the cause of the intelligibility of a demonstrated conclusion and causation is asymmetric. Within the *Posterior Analytics* itself, Aristotle does not account for this, but elsewhere he develops the resources for doing so: the cause is what acts on a substrate to actualize a potential in that substrate, resulting in the effect. On the other hand, it may well happen that two propositions entail each other, in which case one may as well justify the one on the basis of the other as vice versa.

Is Aristotle a foundationalist or a coherentist? Such a question presumes that Aristotle has a general epistemology. But does he have one? If so, we would expect to see an account by which one could answer the 'What is knowledge?' question by means of a definition that would provide the basis for determining which cognitive states can be classified as knowledge, resolve conceptual puzzles concerning it, and explain why it is as it is. Within the *Posterior Analytics*, Aristotle follows Plato's *Theaetetus* in pursuing the project of providing such an account in regard to a variety of knowledge and scientific understanding (*epistēmē*). This work, accordingly, presents crucial aspects of Aristotelian epistemology. But Aristotle is well aware that *epistēmē* is but one kind of knowledge. Aristotle uses the verbs *gignōskein* and *eidenai* and their cognates to refer not only to *epistēmē* but to other kinds of veridical grasps of things as they are, which unlike *epistēmē* do not include a grasp of the explanation or cause, but nonetheless are backed up by the sort of justification that allows us to consider them instances of knowledge. Aristotle never engages in a single synoptic inquiry aimed at answering the 'What is it?' question in regard to these cognitive conditions taken as a whole, perhaps because he does not take them to constitute a single kind. The reconstruction of a general Aristotelian epistemology, which identifies, defines and works through the relations that hold among the various kinds of knowledge, remains an elusive and difficult goal. The web of varieties of knowledge is for Aristotle vast and complex, and no simple synoptic epistemological scheme is possible. Nonetheless, there is much in the Aristotelian texts to which we can appeal in an effort to reconstruct such an account. Although the intricacy of this epistemological network suggests that Aristotle is ultimately a kind of coherentist, it also prevents any easy categorization. The epistemological analyses that Aristotle provides are local, not global. But it is this feature that gives Aristotelian epistemology its richness and potential for philosophical insight. Aristotle resists the urge to oversimplify his account of knowledge, and his local analyses gain in richness when they are related to each other. One can profitably ask: Why does he consider one variety of epistemological analysis appropriate in regard to one variety of knowledge, while an analogous analysis, with the same structural features, is thought inapplicable in regard to another?

The present paper offers such an analysis. Aristotle offers an account of *epistēmē* that is foundationalist, insofar as the inferential structure of demonstrations (which mirror the logical relations that hold among those cognitive states that hang together to constitute *epistēmē*) rests on first principles that are not themselves demonstrated. In contrast, the web of dialectical argumentation that constitutes justification for scientific principles is coherentist, insofar as it is implicitly circular and without discrete independent foundations. Aristotle's argument for his foundationalist account of explanation is structurally parallel to that often given for a foundationalist account of justification. He accepts a foundationalist account of explanation, but his coherentist accounts of justification indicate that he would not accept a foundationalist account of justification. Why is this so? Where is the disanalogy?<sup>1</sup> I here argue as follows: to demonstrate a conclusion is to explain it, that is, to render it intelligible. For Aristotle, the intelligibility of a demonstrative premise is the cause of the intelligibility of a demonstrated conclusion, and it is for this reason that inference on the basis of a demonstrative premise serves to render intelligible a demonstrated conclusion. For Aristotle, causation is asymmetric. Within the *Posterior Analytics* itself, Aristotle does not account for this, but in the context of his natural philosophy he develops the resources for doing so: the cause is what acts on a substrate to actualize a potential in that substrate, resulting in the effect. The proposition that is the conclusion of a demonstration is in a sense potentially intelligible. When demonstrated on the basis of principles, that potentiality is actualized. The intelligibility of a demonstrative premise will never be caused by one's grasp of a proposition demonstrated on its basis. On the other hand, it may well happen that two propositions entail each other, in which case either proposition can be justified on the basis of the other. Circularity in justification is not excluded as it is in the case of explanation, for, according to Aristotle, the justification of the conclusion of a justificatory inference is not caused by the status of the premises as justified.

## II

Both foundationalist and anti-foundationalist epistemological arguments take inference to play, at times, a crucial role in being constitutive of knowledge. It is not always clear whether this inference is understood as historical (that is to say, that a certain line of inference was the efficient cause that led to the arrival of the cognitive state in question) or formal (that the inference somehow plays an ongoing role in constituting knowledge). If the inference plays a formal role, questions again arise as to whether it must exist only potentially (insofar as the knower in question could run through the inference, if he or she so desires—and in this case major questions arise in regard to the sense of ‘potential’ or ‘could’), or whether the logical structure of inference in some way exists as an actualized cognitive undergirding for the belief in question.

However these distinctions are made, foundationalist epistemological arguments have common structural features. All take as a fundamental epistemological premise that a proposition is known by virtue of its status as a conclusion of an inference (whether potential, past or present) all of the premises of which are other propositions which are themselves known. Circular chains of inference amount to a proposition having the status of both premise and conclusion. All conclude from this that a circular inference cannot constitute knowledge. Further, all presume that no line of inferences of infinite length can be mentally traversed (whether historically, potentially or actually), from which it follows that a proposition cannot be known by virtue of its standing as a conclusion of an inference of which all of the premises are known by virtue of their status as a conclusion of an inferential chain of similar character. Such foundationalist arguments conclude that a proposition that is inferentially known has this status only by virtue of its standing as the conclusion of an inference of which the ultimate premises are known independently of the inference.<sup>2</sup>

This argument form is often traced back to Aristotle.<sup>3</sup> In *Posterior Analytics* 1.2, Aristotle discusses a certain variety of knowledge called *epistēmē*. He tells us that one has *epistēmē* of a proposition by virtue of a variety of inference called a demonstration. The premises of a demonstration must be ‘prior’ to the conclusion in ways that Aristotle specifies: the premises express the cause of the state of affairs expressed by the conclusion (71b9-24), for which reason they answer the question ‘Why?’ concerning the conclusion and thereby render it intelligible.<sup>4</sup> Hence, no proposition is an object of *epistēmē* by virtue of a circular demonstration (1.3, 72b25-32). Demonstrations of infinite length cannot be mentally traversed; hence no proposition is an object of *epistēmē* by virtue of a demonstration of infinite length (1.3, 73a8-20). Accordingly, Aristotle concludes, there must be certain propositions that are known insofar as they can serve as ultimate premises of explanations, but are not themselves explained on the basis of any more fundamental premises. These are the first principles of the sciences (1.3, 72b18-25).<sup>5</sup>

Aristotle’s argument is structurally parallel to the general formulation for foundationalist arguments, which is clear if formulated as follows: A proposition is an object of *epistēmē* by virtue of its status as a conclusion of a demonstration, all of the premises of which are other propositions which are themselves objects of *epistēmē* (if only in a loose sense).<sup>6</sup> In a circular demonstration, were there such a thing, the *same* proposition would have the status of both premise and conclusion. Accordingly, there can be no knowledge on the basis of a circular demonstration. Further, no demonstration of infinite length can be mentally traversed; hence no proposition is an object of *epistēmē* by virtue of its standing as a conclusion of a demonstration in which all of the premises are themselves demonstrated (unless all of those demonstrations themselves are ultimately based on first principles). It follows that a proposition is demonstrated only by virtue of its standing as the conclusion of a demonstration of which the ultimate premises are principles that are objects of *epistēmē*, but only in a loose sense, as they are not demonstrated.

As noted above, a demonstration is a variety of inference that serves to explain a proposition, that is, to render it intelligible. Such a demonstration answers all questions of the form ‘Why is this the case?’. It does not have

the function of justification. That is to say, it does not answer the question 'How am I sure that this is the case?'. Aristotle's accounts of justification, according to which different kinds of conclusions are going to be justified by inferences varying in logical structure, differ from those that he gives of explanation.

We turn to the analysis that Aristotle gives of the justification of first principles. First principles are known as true, and as playing the role of first principles, by virtue of the sort of knowledge called *noēsis*. Within the *Posterior Analytics*, Aristotle's account of *noēsis* is twofold. First, he gives a genetic account of how one comes to be in this intellectual state (2.19, 99b35-100a14). This genetic account identifies perception, memory and the capacity for a proto-intellectual grasp of universals and regularities he calls experience (*empeiria*) as biological and psychological preconditions for *noēsis*,<sup>7</sup> and points to individual instances of perception, memory and the attainment of *empeiria* as efficient causes of *noēsis*. Secondly, he identifies *noēsis* as the intellectual disposition by which first principles are grasped—both grasped as true and grasped as playing the role of demonstrative first principles (2.19, 100b5-17). But the *Posterior Analytics* lacks an account of the inner logical structure of the justification of *noēsis* of a first principle. This has led to a tradition according to which it has no such structure: on this account, a first principle is directly grasped as true, and as a first principle, through a simple act of intuition.<sup>8</sup> If we follow such a line of interpretation, Aristotle is a foundationalist in regard to knowledge that principles are true and in regard to the knowledge that they are principles, in addition to being a foundationalist in regard to explanation.

There is, rather, evidence that Aristotle takes much justification, including the justification of principles, to be a matter of *coherence*, depending on the relationships of mutual entailment and consistency with other propositions accepted as justified and accordingly as objects of knowledge. As noted above, however, Aristotle never provides a single general or synoptic account of epistemic justification; we are rather given local analyses and remarks. For although he is a coherentist in regard to principles, Aristotle did not give a detailed account of the logical relations that are involved in the coherence that has a justificatory role, as have those contemporary epistemologists who adopted a coherentist standpoint.

I here discuss two of the local analyses from which Aristotle's thoughts on justification as coherence can be reconstructed.

At *APo* 1.13, 78a22-8, Aristotle distinguishes *epistēmē* of the *dioti* (the reason why) and *epistēmē* of the *hoti* (the fact); as *APo* 1.2, 71b9-12 made clear, only the former is *epistēmē* in the strict sense, since true *epistēmē* is explanatory insofar as it grasps the relevant cause of its object.<sup>9</sup> Scientific first principles, which include those definitions that express the essences of things and, accordingly, the causes of their regularly occurring attributes, are the epistemological foundations of the first variety of *epistēmē*. The latter variety of *epistēmē*, a grasp of its object that meets certain cognitive conditions but fails to meet the standards of explanation, is considered *epistēmē* only by extension. Aristotle states that this latter variety of *epistēmē* occurs by virtue of a demonstration which 'comes about by means of unmediated [predications], but not through the cause, but through the better known of those [predications] that convert' (1.13, 78a26-8).<sup>10</sup> What Aristotle has in mind is revealed by his much-discussed example of a scientific account of the appearance and proximity of the planets. Scientific understanding of the fact that the planets do not twinkle arises by virtue of a demonstration showing that this fact necessarily follows from the (presumably definitional) fact that the planets are (relatively) near, and the fact that what is relatively near does not twinkle. While one would explain the fact that the planets do not twinkle on the basis of their proximity (and the premise, presumably borrowed from optics, which would in turn provide an explanatory demonstration of it), the proximity of the planets would be inferred from the perceived feature that they do not twinkle, and the premise (arrived at through a generalization of perceptions) that what does not twinkle is near. The temporal order of research is as follows: one is first aware of the fact that planets do not twinkle, and then employs the premises that the planets are near, and that what is near does not twinkle, to explain what it is that one already, in some sense, knew. For he tells us that the conclusion

of the demonstration, that the planets do not twinkle 'is to be taken on the basis of induction or perception' (78a34-5).

We note that the definition of a planet is going to have at least two sources. The first is a pre-theoretical grasp of certain astronomical bodies, on the basis of a readily perceived commonality: that they do not twinkle. This allows the reference of the term 'planet' to be fixed. The second is on the basis of the syllogism of the fact that planets are near. The whole process is a matter of moving from what is epistemologically available to one at a pre-theoretical level (what Aristotle elsewhere calls 'what is more knowable to us') to explanatorily basic truths (what Aristotle calls 'more knowable by nature').

The epistemological process that Aristotle describes is circular. For the recognition of the fact that planets do not twinkle in turn rests on a recognition of which celestial bodies are planets, which recognition, at least in a scientifically adequate form, presupposes a noetic grasp of the essence of a planet which, although foundational in the order of demonstrative explanation, requires foundations of other kinds. For even if those items that are more knowable to us, items of perception, are epistemological foundations of a kind,<sup>11</sup> they are not ultimate foundations. For Aristotle, the givens of perception are not brute uninterpreted sense data, as they are according to the sort of foundationalism familiar from British empiricism. Rather, Aristotle makes clear that particulars are perceived as falling under a universal: we are told that perception is of the such (*toioutē*) (*APo* 1.31, 87b28-9), and when Callias is perceived, the content of that perception is 'human being' (*APo* 2.19, 100a17-b1).<sup>12</sup> Whatever processes, inferential or otherwise, lead to the acquisition of the universal 'human being', they are accordingly in a sense foundational to the perception of the particular human being as having this or that characteristic in need of explanation.<sup>13</sup> Further, in *Physics* 1.1 Aristotle is clear that different people will see the relevant universal at different levels of generality: just as the child calls all men 'father', so a novice biologist sees a creature as a spider while the experienced biologist will see it as a certain kind of spider, for example, a black widow. This identification might occur by virtue of a nominal definition (as in the case in which one identifies a black widow through the hour-glass marking, having heard that a black widow is a black spider with an hourglass on its abdomen);<sup>14</sup> but the grasp of a nominal definition seems a poor candidate for an ultimate epistemological foundation. If, on the other hand, the perceiver simply sees the creature as a black widow because the senses are somehow directly conveying its essence via the proper and common sensibles, then this induction, by which the universal is seen in the particular, is only possible for someone who has mastered the science that deals with it as part of its subject matter, that is, someone with a grasp of the relevant first principles. If there is any candidate for a justificatory foundation of scientific facts, it will not be perceived regularities, which demand interpretation on the basis of intelligible universals, but a grasp of the intelligible universal principles themselves. We have seen, however, that these principles are themselves justified as conclusions of syllogisms 'of the fact', which themselves start from perceptual truths. There is a circle within the network of justificatory inferences.<sup>15</sup>

Thus far we have been considering examples that Aristotle provides of inferences towards first principles (which ground demonstrations) on the basis of demonstrated conclusions. He here indicated a kind of epistemic circularity (according to which what is known is known on the basis of what is known) in the way in which he refers to the principles as better known by nature, while the demonstrated conclusions are better known to us. We are invited to relate the discussion in *Posterior Analytics* 1.13 of the logical structure of these two kinds of inference to what Aristotle says elsewhere about inferences to and from principles. At *EN* 1.4, 1095a30-b4, Aristotle alludes to the distinction between inferences towards and from principles, endorsing Plato's admonition always to be aware of which kind of inference one is pursuing. Scholars have generally taken this to be an allusion to the distinction between Greek geometrical analysis, in which one begins with the assumption of a known geometrical truth and proceeds to a previously unknown truth, and synthesis, which moves from this latter truth in order to show why the derivative conclusion holds, a distinction with which Aristotle shows

himself to be well aware when he compares deliberation to analysis and action to synthesis (*EN* 3.3, 1112b20-4). The precise sense of these distinctions is not entirely clear, but the gist is clear enough. Scientific reasoning in general, like geometrical reasoning in particular, is linear and foundationalist if one simply considers the structure of demonstration, but epistemic circles are generated if one inquires into the temporal generation of knowledge of such principles, as principles, and into the historical inferences by which the principles are arrived at and which persist as implicit epistemological foundations of those principles.<sup>16</sup>

Related to this distinction between basic facts, which are better known by nature, and derivative facts, which are better known to us, is the distinction between fundamental grasps of beings (which we could consider explanatorily foundational concepts) and initial inchoate grasps of things (which we could consider pre-scientific concepts); in *Physics* 1.1, these too are distinguished by calling what is basic to explanation better known by nature and what is first grasped in a non-scientific way what is better known to us.

Again, much remains unclear: what precisely is the relation between a grasp of something and those propositions that concern it?<sup>17</sup> Still, enough is clear to justify our imputing to Aristotle a kind of coherentist epistemology, once one considers more than the linear line of demonstrative explanation.

Evidence for this can also be drawn from Aristotle's famous remarks justifying the study of dialectic, when he notes that, because each science starts with its own first principles, the sciences are unable themselves to ground the grasp of their own principles: this grasp is to be provided by dialectical discussion, which is a 'path to the principles' (*Top.* 1.2, 101a37-b4). Dialectic is for Aristotle, as it was for Socrates, a kind of interactive reasoning that starts on the basis of a premise with which an interlocutor agrees. As codified by Aristotle, such a premise must be an *endoxon*, a belief that is either accepted from recognized authorities or is commonly held, and proceeds to generate an inconsistency in beliefs, requiring the rejection of either the adopted premise or another belief held by the interlocutor. It is controversial whether, in calling dialectic a path to the principles, Aristotle is taking dialectical argumentation to itself play a crucial methodological role in the upward path to principles that he calls *epagōgē*, or whether it is simply a pedagogical or rhetorical tool by which to convince another of those principles, already reached by the expert in the science in question. Either way, the line of inference pursued dialectically provides justificatory underpinning for at least some of those who come to grasp scientific principles as principles. And, as has been often remarked, dialectic, in whatever sense it is that allows it to serve as a path to the principles of the particular sciences, can at best assure one that his or her set of beliefs is provisionally consistent.<sup>18</sup> There is no ultimate guarantee that further dialectical inquiry might not reveal some latent inconsistency within that set, nor that the beliefs that are disposed of on account of dialectical refutation, in order to assure consistency with other beliefs, might not be the correct beliefs and the remaining beliefs a consistent set of incorrect beliefs. Justification through dialectic and as illustrated by Aristotle's own dialectical discussions is a matter of coherence and is without unquestioned foundations.

We now return to our main question. Given that Aristotle rejects the possibility of an infinite or circular inference doing the work of explanation, how is it that he is able to consider an infinite or circular inference as providing a justification for a scientific first principle? If Aristotle's epistemology is not to be condemned as inconsistent in its principles, he must consider explanation and justification as having certain differences in their epistemological features that requires that the one but not the other be foundational.

### III

For Aristotle, the primary mode of priority and posteriority is causal. It is for this reason that causal explanations in the sciences are on the basis of truths that are taken to be primary (*prōta*) and are therefore considered to be principles (*arkhai*) (*APo* 1.2, 71b19-72a14). The priority is in respect to all of the varieties of causation: Aristotle is explicit that there are as many senses of the term 'principle' as there are of 'cause' (*Meta.* Δ.1, 1013a16-17).

This explains why a scientific principle is both an epistemological principle, in the order of explanation, and a principle, in the order of being.

The question before us is why it is the case that, epistemologically, there must be principles in regard to explanation but not in regard to justification. The close association between the notion of a principle and that of a cause suggests that the answer is to be found in an examination of how causation is operative in regard to knowledge. How exactly is it the case that a cognitive awareness of a principle causes one to understand a demonstrated conclusion scientifically, while the reverse is not the case, even if the principle and conclusion can be inferred on the basis of each other?

While most of the *Posterior Analytics* concerns the logical and conceptual relations that hold among those propositions studied by the sciences, there is one important remark that concerns the causal relations that hold among the cognitive grasps of those propositions. Although the remark holds crucial clues concerning our question, it needs to be treated with some caution, as Aristotle there, atypically, seems to confuse the order of explanation and that of justification (*APo* 1.2, 72a25-32):

Since being convinced of and knowing a fact comes about through having the deduction that we call a demonstration, and since this [i.e the conclusion] is the case when those [premises] on which the syllogism is based are the case, necessarily one not only already knows the primitives (either all or some of them) but knows them to an even greater extent. For when something belongs [to something else] that thing always belongs to that through which it belongs to a greater extent. For example, the reason why we love [another] is loved to a greater extent [than that other]. Accordingly, if we know and are convinced of [something] through the principles, we know them and are convinced of them to a greater extent, since we know and are convinced of posterior things through them.

Aristotle makes appeal to a principle, pervasive in Greek philosophy, that the cause must itself have what it imparts to that on which it acts, and must have it at least to the extent that it is found in the effect. According to this principle, dubbed the 'Transmission Model of Causality' by A. C. Lloyd,<sup>19</sup> causation proceeds by virtue of the causes' giving over what they have to the effect, as a fire warms an object by imparting its own heat or, to turn to Aristotle's own example, as lovability is imparted by an ultimate object of love to that which is loved for the sake of it. Similarly, Aristotle says, the proposition on the basis of which one knows another proposition must be known at least as much as that which is known on its basis. Aristotle's example of loveability is, to be sure, less intuitive than that of heat, but is in an important respect more apropos to the epistemological use to which Aristotle puts the principle. For in the case of both lovability and knowability, what is being transmitted from cause to effect is the relation that an object of cognition has to a cognizing subject. The causal nexus is wholly internal to this subject, for these objects are not changing in themselves: they are rather undergoing a Cambridge change.<sup>20</sup> The causal connection is rather to be understood as between one aspect of the subject and another: just as the subject's love of the end is responsible for his or her love of the means, the subject's cognitive grasp of the principle is responsible for (and hence is the starting point or principle for) his or her cognitive grasp of the conclusion.

The present passage concerns the necessity that demonstrative principles be cognitively prior to, that is, better known than, the demonstrative conclusions. Accordingly, we would expect that 'to know' (*eidenai*) here is synonymous with *epistasthai*, which would not be surprising, as Aristotle's epistemological terminology in the *Posterior Analytics* is often fluid. Aristotle's meaning would be that the cognitive state by which the knowing subject grasps the principle as intelligible imparts a similar character to the cognitive state by which the knowing subject grasps the conclusion as intelligible, for which reason the first cognitive state has at least as much of this character as the second.<sup>21</sup> The causal mechanism by which this imparting takes place is the explicit following of the inference expressed in a demonstration. It is hard to conceptualize this causal imparting; unlike other



varieties of causal transmission, such as the imparting of money or even heat, the process cannot be imaginatively represented. But, in employing the principle that the cause must have as much of the relevant character as does the effect, Aristotle points to a crucial feature of the causation at work: it is asymmetric. Just as a fire cannot be heated by the stone that it warms, the cause of the intelligibility of a proposition cannot have its intelligibility caused by that proposition. I suggest that it is this asymmetry that is at root behind Aristotle's rejection of the possibility of circular demonstration. A cause stands in an asymmetric relation to an effect; accordingly, a principle, that is, a proposition which serves to identify a cause, stands in an asymmetric relation to a demonstrative conclusion, that is, a proposition which identifies an effect.<sup>22</sup> Likewise, the cognitive grasp of the principle must stand in an asymmetric relation to the cognitive grasp of the demonstrative conclusion.<sup>23</sup>

We may extend Aristotle's analysis farther by asking why there is an asymmetry between cause and effect. Contemporary analyses of causation sometimes account for the asymmetry of cause and effect on the basis of their temporal asymmetry: an effect at  $t_2$  cannot cause the event at  $t_1$  which is its cause, because a present event cannot cause an event in the past. The asymmetry of 'time's arrow' is in turn either taken to be metaphysically basic, or is accounted for on the basis of the second law of thermodynamics, which posits the principle that entropy within a closed system never decreases. Aristotle does not have recourse to such a physical principle in explaining the asymmetry of causal relations, but outside of the *Posterior Analytics* Aristotle does offer an account of causation that explains the asymmetry under question. In *On Generation and Corruption* 1.7 and 1.9, Aristotle analyzes the relation between an efficient cause and an effect as that between what *actually* has character and that which *potentially* has it. This analysis is Aristotle's response to the Eleatic objection to the possibility of change, that it involves something coming to be from nothing. The response is twofold: first, the new character taken on by the subject of change was already present within that subject potentially; secondly, the potentiality is actualized only by virtue of the character, as actualized in another subject, which comes to stand in the appropriate relation, that of contact, with the subject of change. It is the asymmetry between actuality and potentiality which is for Aristotle conceptually and metaphysically fundamental. For motion is defined as an actualization (*Phys.* 3.1, 201a11), and time is defined as a quantitative feature of motion (*Phys.* 4.11, 219b1).

I suggest that Aristotle conceptualizes explanation, effected through the following of a demonstrative inference, as an actualization of a potentiality, the asymmetrical structure of which mirrors the asymmetry of the epistemological status of the premises. Although the justification is likewise an actualization of a potentiality, as the cognitive subject has potential conviction (*pistis*) in the proposition in question and through the process of justification that potential is actualized, Aristotle does not take justification to proceed linearly, by virtue of a process in which a cognitive grasp of one proposition conveys its character to a cognitive grasp of another proposition.<sup>24</sup> Rather, belief or trust that a proposition is true, and that it serves as an ultimate causal and explanatory principle, arises under the appropriate conditions (sufficient experience and dialectical argumentation) on account of the *noēsis*, which is a process by which the subject elevates herself to a higher level of cognitive actuality. Aristotle understands *noēsis* as akin to vision: in a sense, the seen object and that which illuminates the medium are efficient causes of the act of vision, but it is not as though these conditions impart the activity of seeing to the subject the way in which the intelligible character of the explanatory premise is thought to impart its character of intelligibility to a demonstrative conclusion. Similarly, accrued experiences and the web of dialectical argumentation serve as the background conditions necessary for the actualization of *noēsis* and, as such, their coming to serve as its efficient cause, but it is not as though these conditions themselves possess and consequently impart the character of the cognitive state that they cause.<sup>25</sup> This is the root of the disanalogy between Aristotelian explanation, which is foundationalist, and justification, which is coherentist.

The reader will have likely noticed a problem with the above account. I have appealed to *APo* 1.2, 72a25-32, in which Aristotle argues that the principles of the sciences must be more known than the demonstrative conclusions, since the character of being known is imparted to the conclusions by virtue of a kind of causation. I have argued that this point (that the causes, as known within the cognitive subject, are the causes of the fact that the conclusions are known in a scientific manner) accounts for why Aristotle is committed to a foundationalist account of scientific understanding, while this is not the case in regard to justification. But the passage reads: 'If we know and are convinced of [something] through the principles, we know them and are convinced of them to a greater extent, since we know and are convinced of posterior things through them.' The term for 'to be convinced of' is *pisteuein*, from the same root as *pistis*, or trust. The term refers not to the state of understanding a proposition, by virtue of grasping it as intelligible, but to the state of holding that one's belief in the proposition is reliable. Hence Aristotle here seems to be speaking of belief in the propositions, and to be asserting that justification proceeds linearly, in which case the principles he is speaking of are principles of justification (as well as of explanation). It appears as though Aristotle accordingly endorses a foundationalist account of justification in the sciences.<sup>26</sup> If this is so, a diminished role needs to be granted to the 'syllogism of the fact' and Aristotle's assertion that dialectic provides a 'path to the principles' needs to be interpreted to mean not that dialectical reasoning constitutes the reasoning by which the proposition in question is justified, but a preliminary process by which one tests the adequacy of proposed principles.<sup>27</sup>

The passage is, however, anomalous, so I very much doubt that Aristotle does believe that there are self-evident truths that serve as ultimate bases of justification.<sup>28</sup> But Aristotle is so clear in *Posterior Analytics* 1.13 on the distinction between the order of justification and that of explanation that I am likewise hesitant to conclude that Aristotle simply goofed, or that the present passage derives from an earlier stratum of the *Posterior Analytics* than the rest of 1.2. I suggest, rather, that the conviction that is at issue here is not the conviction that the propositions are true but that they have their respective statuses within the science in question. The status of a proposition as explained depends on the status of the principles as explanatory. For this reason, one's knowledge that a proposition is explained depends on one's knowledge that the principles are explanatory.<sup>29</sup> In other words, our knowledge that a principle actualizes the potentiality of derivative conclusions to be intelligible serves to justify our knowledge that a principle is, in fact, a principle. So, I suggest, Aristotle is saying that, given an explanatory demonstration of a given conclusion on the basis of certain first principles, the conviction that the demonstration provides the correct explanation of the conclusion cannot exceed the conviction that the principles are both true and are, in fact, fundamental explanatory principles. Any doubts concerning the latter would infect the former. Aristotle, on this construal, is making a meta-epistemological point.<sup>30</sup>

<sup>1)</sup> The question has a parallel in contemporary epistemology. Manning 2003, 209 argues that if one takes explanations to rest on foundations that do not require explanation, parity of reasoning requires us to take justification to rest on unjustified foundations: 'Circular explanations do not explain anything. Rather, they incoherently treat the very same thing as in need of explanation (even if true) and as surd, so not in such need.' Manning is arguing against the epistemology of Keith Lehrer, whose position on these issues is rather complex. Although Lehrer is a coherentist in regard to justification, he takes the coherence that allows for a body of propositions to be justified to be a matter of how propositions 'hang together' in a noninferential way; he admits that 'proof' (that is, strictly inferential justification) cannot be circular. (I argue below that Aristotle does hold that some inferential circles constitute sufficient justification within the context of the sciences.) Lehrer does indeed take a kind of explanation to require an explanatory foundation, but it is not clear that he has in mind the same sort of explanation as does Manning. For Manning takes the 'things' that do the explaining to be of a kind that itself admits of explanation; that is, they are propositions. But in the text with which Manning takes issue, Lehrer is not concerned with the project of finding propositions that explain why other propositions are true. He is rather seeking an explanation of the reliability of one's belief in a proposition one thinks is justified via coherence. Lehrer finds this explanation in a principle of 'self-trust' in the reliability of one's own

rational thinking, and admits that, although the principle is a foundation of the explanation of cognitive reliability, it can itself be justified only in a circular manner. (See Lehrer 1997, 1-23.) As such, the sort of the explanation that he has in mind is an account that clarifies the methodological presuppositions of justificatory reasoning, not the isolation of propositions that serve as ultimate causal principles, as in Aristotelian explanation. Accordingly, Manning and Lehrer are speaking at cross-purposes: Lehrer is not speaking of the sort of explanation that is itself a proposition such as to be itself in need of explanation. Although Manning's insistence that justification and explanation are both in need of foundations misses its intended target, the epistemology of Lehrer, it poses an apt challenge to the asymmetry between the two in Aristotle's thought.

- <sup>2)</sup> See for example Armstrong 1973, 150-61; Fumerton 2010.
- <sup>3)</sup> See for example Rescher 1974, 697-8; Moser and vander Nat 2002, 32; Irwin 2010, 240-1.
- <sup>4)</sup> See Mourelatos 1967; Kosman 1973; Burnyeat 1981; McKirahan 1992, 4.
- <sup>5)</sup> An alternative account of demonstration is put forward by Tierney 2001. According to Tierney, a demonstration serves to reveal those predications that are implicitly present in the *ti esti* of the subject; on his view, demonstration reveals what is already in some sense known, and the account of demonstration offered in the *Posterior Analytics* is not concerned with identifying the foundations by which new knowledge arises, and supports neither a foundationalist nor a coherentist account of Aristotle's epistemology. A similar view is put forward by Harari (2004, 130), according to whom the middle term of a demonstration offers a full exhibition of the essence of a kind studied by a science, and thereby allows one to have conceptual understanding of that essence. (It should be noted that she employs the term 'understanding' to refer to cognition of the content of a concept, not the cognitive state that allows one to give an explanation.) In my view such interpretations of the priority of the principles (as unanalyzable parts of the *ti esti*) unduly de-emphasize Aristotle's demand that the principles express the ontological *causes* of the facts expressed by demonstrative conclusions. Tierney would likely respond that Aristotle takes the reason why a subject has an attribute to lie in the *ti esti* of that attribute (153), but Aristotle asserts that some demonstrable features have causes, revealed in demonstration, in subjects that are ontologically different from those features. On this see Goldin 1996, 101-36.
- <sup>6)</sup> Aristotle shows a willingness to use the term *epistēmē* in regard to indemonstrable first principles at *APo* 1.2, 71b16-17 and 1.3, 72b18-19.
- <sup>7)</sup> Bronstein 2012, 29-62 argues that the primary goal of the chapter is to establish perceptual knowledge as the preexisting knowing that is the basis for demonstrative knowledge.
- <sup>8)</sup> See for example Irwin 1988, 134. Irwin takes this account of the grasp of first principles as direct and noninferential, as found in the *Posterior Analytics*, to be in tension with *Top.* 1.2, 101a36-b3, and holds that Aristotle resolved the matter only in his later writings.
- <sup>9)</sup> *Epistēmē* of the *dioti* of a fact involves *epistēmē* of the *hoti* that that fact is necessary, as Harari 2004, 117 points out. But this does not affect my analysis, as the justification of the necessity of the fact comes about by means of a demonstration whose principles are already recognized to be necessary; the necessity of such principles, like their truth and their status as principles, is implicitly justified in a coherentist manner.
- <sup>10)</sup> Here, and throughout, all translations are by the author.
- <sup>11)</sup> As is emphasized by Bolton 1999, 98.
- <sup>12)</sup> See Bronstein 2012, 55-6, arguing that the universal that is said to come to a stand at *APo* 2.19, 100b19 is the intelligible content implicit in perception and actualized by induction. Harari 2004, 30-2 points out that when Aristotle talks of the perception of universals, he is using *aisthanesthai* in a different sense from the way he uses the term when talking of the perception of sensibles, and points to *EN* 6.9, 1142a26-9 as a passage in which Aristotle explicitly makes the distinction.
- <sup>13)</sup> See Taylor 1990, 127-8: '[T]he process of concept acquisition envisaged by Aristotle takes as its basic data perception of individual instances of kinds such as man or horse. If such perception is to be totally

reliable, as the theory requires, then the perceiver must already have a certain sort of knowledge of what men or horses are like.'

- <sup>14)</sup> On my view a nominal definition is what Aristotle calls *ti sēmainei ho logos ē to onoma* at *APo* 2.7, 92b6-7, and *logos tou ti sēmainei to onoma ē logos heteros onomatōdēs, hoion ti sēmainei trigōnon* at 2.10, 93b30-2. See Demos and Devereux 1988; Goldin 1996, 66-9, 91-4, 108-18; and Charles 2003.
- <sup>15)</sup> Marko Malink has suggested to me that *APo* 1.3, 73a4-6 ('So it turns out that those who say that demonstration is circular say nothing other than that, given A, A is the case. It is easy to prove anything in this way') speaks against ascribing to Aristotle a coherentist account of justification. But the sort of inferential circle against which Aristotle is here arguing is linear; I am ascribing to Aristotle the recognition of a non-linear web of inferences that serves to justify a whole body of propositions that fall under a science.
- <sup>16)</sup> This conclusion is also drawn by Kosman 1973, 387-9. There will be no such inferences if we go beyond what the text explicitly says and see such principles, when arrived at, as self-certifying, unrevisable, and hence no longer in need of any epistemological grounding.
- <sup>17)</sup> For an account that minimizes the importance of this issue, see Barnes 1994, 259-71.
- <sup>18)</sup> See for example Irwin 1988, 49-50.
- <sup>19)</sup> Lloyd 1976.
- <sup>20)</sup> For Aristotle's awareness of Cambridge changes, see Williams 1989.
- <sup>21)</sup> A corollary to this is that the more intelligible the premises by which one comes to scientific understanding of a fact, the more intelligible that fact is, by virtue of that scientific understanding. This is made explicit at *APo* 1.9, 76a18-25, where Aristotle asserts that one has greater scientific understanding (*epistatai mallon*) when the scientific understanding arises from a grasp of higher causes, for which reason scientific understanding is greater, and indeed is greatest (or special) (*epistēmē ekeinē eiē kai mallon kai malista*) when it derives from a grasp of uncaused principles.
- <sup>22)</sup> That the asymmetry between demonstrative premise and conclusion is rooted in the asymmetry of cause and effect is recognized by Barnes 1978, 280-1.
- <sup>23)</sup> Bronstein (*forthcoming*) rightly points out that this passage tells against the initial view of Barnes, that Aristotle takes demonstration to have a primarily pedagogical role, as it is unable to account for the passage. (See Barnes 1969, 145-6—rewritten, but to the same point, in Barnes 1975, a revised version of the article, at 84.) On this view, demonstration is an *exposition* of already determined causal structures: it is the same lesson that identifies for students the principles and derivative conclusions, and reveals for them the causal connections between the former and the latter. Aristotle is not speaking of learning as a *process* by which the conclusion gains intelligibility on the basis of that of the premises. The demonstrative structure of the argument that reveals the causal relations, and accordingly the status of demonstrative conclusions as explained are initially revealed. (Barnes 1994, pp. xviii-xix, partially retracts this view of demonstration as *exclusively* pedagogical, and recognizes the explanatory role demonstration has in revealing causal connections.) In contrast to Barnes' initial view, Bronstein's account has demonstration lead, not to new knowledge of a fact, but to a new recognition of the causal connections among already established facts. I agree with his general account of the role of demonstration. But, although Bronstein appreciates that Barnes' initial view of demonstration as pedagogical is unable to account for 72a25-32, he does not himself offer an explanation of this passage, a passage which is problematic because it suggests that there is a kind of linear causation by which cognition of principles does directly cause a new kind of cognition of the conclusion.
- <sup>24)</sup> I am here in agreement with Matthen 1987, 9-10: 'The constraints placed on the starting points are constraints relevant to the operation of the causal processes that produce knowledge, rather than to epistemological requirements concerning justification. That is, Aristotle does not seem to be trying to *justify* one's confidence in (or knowledge of) a conclusion by appealing to the greater confidence that one attaches to the premisses from which one derives that conclusion. Rather he is claiming that the degree to which one knows a proposition is a result of a transference of knowledge from premisses to conclusion, much as the warmth of the coffee I am drinking was transferred to it from the stove with

which it was in contact. And just as the coffee is not as warm as the stove that heats it, the conclusion is not as well-known as the premisses that make it known.' Matthen does not here say what he takes being better known to consist in, but insofar as he emphasizes the role of demonstration as revelatory of causes, he must mean something like 'being more intelligible'.

- <sup>25)</sup> Note that, on my construal, light is an efficient cause of vision, but is not the sort of efficient cause that imparts its own character to the caused, since light does not see. Given that active intellect is understood to play the role in *noēsis* that light does in vision, this is a powerful reason for not understanding the active intellect to itself be a cognizing agent. I am, however, agnostic on the issue of whether Aristotle would have endorsed this conclusion.
- <sup>26)</sup> Cf. Irwin 1988, 127-9, who takes justification in Aristotle to be a matter of the *transmission* of certainty. His evidence for this is *APo* 1.3, 72b36-73a6, where Aristotle rejects the possibility of circular *demonstration*. As demonstration is for Aristotle a mode of inference with unique features by virtue of which it is explanatory, this passage cannot be taken to be evidence for Aristotle's views concerning the possibility of circular justification; nor can it be used as evidence that Aristotle rejects justification through coherence. Barnes 1990, 75-9 likewise misses the point of the argument against circular demonstration in *Posterior Analytics* 1.3, as he understands it to be primarily concerned with excluding the possibility of circular justification in the sciences.
- <sup>27)</sup> See Smith 1997, 52-4.
- <sup>28)</sup> See the discussion of *APo* 1.2, 72a25 ff. at Burnyeat 1981, 127-8. Burnyeat realizes that the passage poses a potential threat to his account according to which demonstration offers explanation, not understanding. He addresses the issue by citing *Topics* 6.4 in support of the view that someone who believes a proposition on the basis of a grasp of first principles has conviction different in kind from that of someone whose belief is on the basis of experience. Such a difference is qualitative. But the term *mallon* is most naturally read as an indication that Aristotle ranks the conviction of a first principle as quantitatively greater. Burnyeat suggests that Aristotle must here think that the conviction of the former is somehow stronger or more steadfast, but it is hard to see why Aristotle might think so. (For one suggestion, along the lines of Burnyeat's interpretation, see McKirahan 1992, 34-5, according to which, when Aristotle says that there is 'more' *pistis* in the principles, he is saying that the expert knows '“more fundamentally” or “more basically,” in the sense that knowledge of principles is primary, that of conclusions derivative'; Aristotle's point is that '[e]xperts are more committed to their knowledge of principles than to their knowledge of what depends on them'. Aristotle sometimes expresses himself loosely, so this is a possible interpretation. Below I offer what seems to me a more likely interpretation.)
- <sup>29)</sup> On *noēsis* as that by which one apprehends a principle as an explanatory principle, see Kosman 1973, 383; Leshner 1973; and Tuominen 2011.
- <sup>30)</sup> Earlier versions of this paper were read at Yeshiva University, the annual meeting of the Society for Ancient Greek Philosophy at Fordham University Lincoln Center, and the Marquette University Summer Seminar on Aristotle and Aristotelianism. I am grateful to those audiences and an anonymous reader for *Phronesis* for incisive comments and questions. I am also indebted to Kimberly Engels for editorial assistance.

## References

- Armstrong D. M. *Belief, Truth, and Knowledge* 1973 Cambridge
- Barnes J. 'Aristotle's Theory of Demonstration' *Phronesis* 1969 14 123 152
- Barnes J. 'Aristotle, Menaechmus, and Circular Proof' *Classical Quarterly* 1978 26 278 292
- Barnes J. *The Toils of Scepticism* 1990 Cambridge
- Barnes J. *Aristotle's Posterior Analytics* 1994 Oxford (tr.)
- Barnes J. Barnes J., Schofield M. & Sorabji R. 'Aristotle's Theory of Demonstration' *Articles on Aristotle* 1975 Vol. 1 London 65 87 *Science*
- Bolton R. Sim M. 'The Epistemological Basic of Aristotelian Dialectic' *From Puzzles to Principles? Essays on Aristotle's Dialectic* 1999 57 106 (Lanham, Md.)

- Bronstein D. 'The Origin and Aim of *Posterior Analytics* II.19' *Phronesis* 2012 57 29 62
- Bronstein D. 'Aristotle's Theory of Demonstration Revisited' *Metascience* (forthcoming)
- Burnyeat M. Berti E. 'Aristotle on Understanding Knowledge' *Aristotle on Science: The Posterior Analytics* 1981 Padua 97 139
- Charles D. *Aristotle on Meaning and Essence* 2003 Oxford
- Demos D. & Devereux D. 'Essence, Existence, and Nominal Definition in Aristotle's *Posterior Analytics* II 8-10' *Phronesis* 1988 33 133 154
- Fumerton R. Zalta E. N. 'The Regress Arguments for Foundationalism', part 1 of his 'Foundationalist Theories of Epistemic Justification' *The Stanford Encyclopedia of Philosophy* 2010 [Summer 2010 Edition], URL = <http://plato.stanford.edu/archives/sum2010/entries/justep-foundational/>
- Goldin O. *Explaining an Eclipse: Aristotle's Posterior Analytics 2.1-10* 1996 Ann Arbor
- Harari O. *Knowledge and Demonstration: Aristotle's Posterior Analytics* 2004 56 Dordrecht The New Synthese Historical Library
- Irwin T. *Aristotle's First Principles* 1988 Oxford
- Irwin T. Dancy J & Sosa E. 'Aristotle (384-322 BC)' *A Companion to Epistemology* 2010 240 244 (Malden, Ma.)
- Kosman L. A. Lee E. N., Mourelatos A. & Rorty R. 'Understanding, Explanation, and Insight in the *Posterior Analytics*' *Exegesis and Argument* 1973 Assen 374 392 (*Phronesis* Supplementary Volume 1)
- Lehrer K. *Self Trust: A Study of Reason, Knowledge, and Autonomy* 1997 Oxford
- Leshner J. 'The Meaning of ΝΟΥΣ in the *Posterior Analytics*' *Phronesis* 1973 18 44 68
- Lloyd A. C. 'The Principle That the Cause Is Greater than Its Effect' *Phronesis* 1976 21 146 156
- Manning R. N. Olsson E. J. 'The Dialectic Illusion of a Vicious Bootstrap' *The Epistemology of Keith Lehrer* 2003 Dordrecht 195 216 (Philosophical Studies Series 95)
- Matthen M. Matthen 'Introduction: The Structure of Aristotelian Science' *Aristotle Today: Essays on Aristotle's Ideal of Science* 1987 Alberta 123
- McKirahan R. *Principles and Proofs: Aristotle's Theory of Demonstrative Science* 1992 Princeton
- Mourelatos A. P. D. 'Aristotle's Powers and Modern Empiricism' *Ratio* 1967 9 97 104
- Moser P. K. & vander Nat A. *Human Knowledge: Classical and Contemporary Approaches* 1987 New York
- Rescher R. 'Foundationalism, Coherentism, and the Idea of Cognitive Systematization' *The Journal of Philosophy* 1974 71 695 708
- Smith R. *Aristotle's Topics: Books I and VIII* 1997 Oxford
- Taylor C. C. W. Everson S. 'Aristotle's Epistemology' *Companions to Ancient Thought* 1990 Vol. 1 Cambridge 116 142 *Epistemology*
- Tierney R. 'Aristotle's Scientific Demonstrations as Expositions of Essence' *Oxford Studies in Ancient Philosophy* 2001 20 149 170
- Tuominen M. 'Back to *Posterior Analytics* II 19: Aristotle on the Knowledge of Principles' *Apeiron* 2011 43 115 144
- Williams C. F. W. 'Aristotle on Cambridge Change' *Oxford Studies in Ancient Philosophy* 1989 7 41 57

2) See for example Armstrong 1973, 150-61; Fumerton 2010.

3) See for example Rescher 1974, 697-8; Moser and vander Nat 2002, 32; Irwin 2010, 240-1.

7) Bronstein 2012, 29-62 argues that the primary goal of the chapter is to establish perceptual knowledge as the preexisting knowing that is the basis for demonstrative knowledge.

8) See for example Irwin 1988, 134. Irwin takes this account of the grasp of first principles as direct and noninferential, as found in the *Posterior Analytics*, to be in tension with *Top.* 1.2, 101a36-b3, and holds that Aristotle resolved the matter only in his later writings.

11) As is emphasized by Bolton 1999, 98.

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from the way he uses the term when talking of the perception of sensibles, and points to *EN* 6.9, 1142a26-9 as a passage in which Aristotle explicitly makes the distinction.

- 13) See Taylor 1990, 127-8: '[T]he process of concept acquisition envisaged by Aristotle takes as its basic data perception of individual instances of kinds such as man or horse. If such perception is to be totally reliable, as the theory requires, then the perceiver must already have a certain sort of knowledge of what men or horses are like.'
- 16) This conclusion is also drawn by Kosman 1973, 387-9. There will be no such inferences if we go beyond what the text explicitly says and see such principles, when arrived at, as self-certifying, unrevisable, and hence no longer in need of any epistemological grounding.
- 18) See for example Irwin 1988, 49-50.
- 19) Lloyd 1976.
- 24) I am here in agreement with Matthen 1987, 9-10: 'The constraints placed on the starting points are constraints relevant to the operation of the causal processes that produce knowledge, rather than to epistemological requirements concerning justification. That is, Aristotle does not seem to be trying to *justify* one's confidence in (or knowledge of) a conclusion by appealing to the greater confidence that one attaches to the premisses from which one derives that conclusion. Rather he is claiming that the degree to which one knows a proposition is a result of a transference of knowledge from premisses to conclusion, much as the warmth of the coffee I am drinking was transferred to it from the stove with which it was in contact. And just as the coffee is not as warm as the stove that heats it, the conclusion is not as well-known as the premisses that make it known.' Matthen does not here say what he takes being better known to consist in, but insofar as he emphasizes the role of demonstration as revelatory of causes, he must mean something like 'being more intelligible'.
- 26) Cf. Irwin 1988, 127-9, who takes justification in Aristotle to be a matter of the *transmission* of certainty. His evidence for this is *APo* 1.3, 72b36-73a6, where Aristotle rejects the possibility of circular *demonstration*. As demonstration is for Aristotle a mode of inference with unique features by virtue of which it is explanatory, this passage cannot be taken to be evidence for Aristotle's views concerning the possibility of circular justification; nor can it be used as evidence that Aristotle rejects justification through coherence. Barnes 1990, 75-9 likewise misses the point of the argument against circular demonstration in *Posterior Analytics* 1.3, as he understands it to be primarily concerned with excluding the possibility of circular justification in the sciences.
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