

## Conviction, Priority, and Rationalism in Aristotle's Epistemology

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Aristotle is often portrayed as a certain sort of rational foundationalist, who thinks that all our scientific understanding (*ἐπιστήμη*) is justified on the basis of first principles, and that these first principles are themselves justified only by some brute, non-inferential form of rational intuition (*νοῦς*). It's typically admitted that experience and observation play an important role for Aristotle, and are in some way responsible for our coming to develop the rational intuition in question. But on the rationalist reading, only our rational intuition is epistemically relevant—experience and observation might be good ways to *bring about* or *cause* the right sort of intuition, but they cannot *justify* our grasp of principles in and of themselves.<sup>1</sup>

One of my aims in this paper is to challenge rationalist readings of this sort. This is no easy task: there are both direct and indirect motivations for thinking he adopted just the sort of view outlined above. The indirect motivation is that Aristotle never seems to offer us any description of the norms that would govern our inquiry into first principles. In *APo* II.19 we do get an account of the cognitive development leading from perception to a grasp of principles—but it may seem that this account explains only how principles come to be discovered, and not what justification we would have to believe them. For rationalists, *νοῦς* fills this void: *νοῦς* serves to sanction our principles as justificatory primitives, and thus allows us to justify the rest of our scientific understanding on their basis.

The direct motivation stems from two different claims Aristotle makes about scientific principles. First, he tells us that scientific principles are *prior* to the

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<sup>1</sup>Frede (1996: 172) and Irwin (1988: 132–36) provide characteristic examples of this kind of take on Aristotle's epistemology—but see also Anagnostopoulos (2009: 105–11) and Fine (2010: 136–55) for more recent arguments in its defense. Views in a similar spirit can be found in Ferejohn (2009: 66, 75), Le Blond (1939: 127, 136–39), and Ross (1949: 49–50). A word on terminology: for simplicity I will be referring to readings along these lines as *rationalist* readings, and to those who endorse them as *rationalists*. This should be understood as a form of rational foundationalism about justification: all justification must ultimately issue from our rational intuition of certain principles, and this intuition is not itself justified by other means.

conclusions we might demonstrate on their basis—that is, that our knowledge of demonstrated conclusions will depend on our knowledge of the principles from which they follow, but not vice versa (*APo* I.2 71b29-33).<sup>2</sup> Rationalists think this dependence reflects a form of *justificatory* precedence: first principles serve to justify everything we might demonstrate on their basis, but are not themselves justified by anything beyond our intuition of them.

The second direct motivation for rationalism stems from Aristotle's claim that we must be convinced of our principles "better" or more strongly than we are of their demonstrative consequences—to the point where we simply could not be convinced to give them up (*APo* I.2 72a25ff).<sup>3</sup> Rationalists may seem to have a good explanation for this requirement: if our intuition of principles serves as a basic source of justification for our demonstrated conclusions, then whatever justification we have for believing these principles will have to be stronger (or at least as strong) as our justification for believing the claims demonstrated on their basis. Thus on the rationalist view a person with scientific understanding of some domain will be most strongly convinced of her principles precisely because she appreciates their foundational justificatory role.

Rationalist readings of Aristotle have been criticized before.<sup>4</sup> But to my mind, the criticisms have not gone far enough. First, because they do not offer an adequate reading of Aristotle's remarks about priority and conviction—either they claim that these remarks are out of line with the rest of *APo*, or else that Aristotle has an unusual kind of conviction in mind, or that an expert's conviction merely concerns the *role* principles play as principles, rather than the principles themselves. And second, because they do not address the broader, indirect motivation for rationalist readings—namely, that Aristotle's description of our cognitive development seems to tell us only how we discover principles, not what justifies them, or what norms we would be bound to follow in our inquiry. In what follows I will address these difficulties head on. I will begin by arguing that Aristotle's remarks about epistemic priority and conviction do not, upon closer examination, make him a rationalist about justification. I will then argue that his account of our cognitive development is not, as rationalist readers assume, a purely descriptive story about the causal origins of our discovery of scientific principles. In doing so I hope to provide better grounds to resist an influential interpretation of the status of Aristotelian first principles. But I also hope to

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<sup>2</sup>On this point, see Irwin (1977: 211) or Irwin (1988: 124–25).

<sup>3</sup>On this point, see for instance Anagnostopoulos (2009: 107), Irwin (1988: 132), or Salmieri et al. (2013: 5).

<sup>4</sup>Most famously in Burnyeat (1981), but see also Bronstein (2016a: 128–29), Goldin (2013), or Lennox (2011) for more recent treatments of the key texts. Many of the criticisms are also implicit in Kosman (1973).

show that Aristotle had a nuanced and interesting view of the role principles play as a source of conviction, and of the relationship between our understanding of principles and the broadly perceptual knowledge upon which this understanding is grounded.

## 1 Scientific Understanding and Its Principles

In *APo* I.2, Aristotle defines scientific understanding as follows:<sup>5</sup>

[1] We think we understand something *simpliciter*, and not in the sophisticated, incidental manner, when we think we know of the explanation why something is the case, that it is its explanation, and also [know] that it's impossible for it to be otherwise. (71b9-12)

On this definition, we understand something when we know why it must be the case, and recognize the explanation why it must be the case *as an explanation*. Scientific understanding is thus a theoretically sophisticated state—to understand some scientific domain we must know the truths pertinent to that domain, but we must also know how to explain these truths, and appreciate their necessity and the explanatory role played by their explanations.

Aristotle goes on to explain that this sort of understanding is achieved by *demonstration*, a sort of deduction beginning from premises

[2] that are true, primitive, and immediate, and better known than, prior to, and explanatory of their conclusion; for it's in this way that the principles will be appropriate to what's being proved. There can be a deduction even when these conditions aren't met, but no demonstration, for it won't produce understanding. (71b20-25)

On Aristotle's view, then, a demonstration is a deduction that provides the person who grasps it with an *understanding* of its conclusion: we understand the things we can demonstrate. To count as a demonstration, a deduction must begin from premises which are true, primitive, and immediate. It's clear enough why Aristotle would want these initial premises to be true. To require that they also be *immediate*, or *unmiddled things* (*ἀμεσα*) is to require that they not have an explanatory "middle term," that is, given some premise *AaC*, that there be no term *B* such that *AaB* and *BaC* where *B* explains why *AaC*.<sup>6</sup> And to require that

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<sup>5</sup>Unless otherwise noted, translations are my own—though I've consulted Barnes (1993).

<sup>6</sup>Thus "All planets are non-twinkling" (*AaC*) would not be an *immediate* premise, as Aristotle makes plain in *APo* I.13. For *nearness to the earth* explains why planets don't twinkle—in this case the relevant syllogism (reconstructed slightly) goes "All planets are near the earth (*AaB*), all things near the earth are non-twinkling (*BaC*), so all planets are non-twinkling (*AaC*)." (Here I use *AaB* for "all As are B.")

these premises be *primitives* (πρῶτα) is to require that our understanding of these premises not depend, in some way, on our understanding of prior premises. One of my aims in what follows will be to spell out the exact sense of priority and dependence at play. On rationalist readings the priority Aristotle has in mind is (or includes) *justificatory* priority: our understanding of demonstrated conclusions is *justified* by our grasp of the premises from which our demonstrations begin, in a sense I will further specify below.

In addition to these three requirements, Aristotle tells us that demonstrative premises must be better known than, prior to, and explanatory of their conclusions. Though he doesn't make the point clearly here, Aristotle conceives of demonstrations as chains of explanatory syllogisms, and strictly speaking these last three requirements should be read as requirements on each of the *syllogisms* that appear in the context of a demonstration, rather than requirements on the demonstration as a whole. Read this way, his claim is that the premise pairs in each of the syllogisms appearing in a demonstration will have to *explain* that syllogism's conclusion. The premises in each of these premise pairs will moreover have to be *better known than* (γνωριμώτερα) and *prior to* (πρότερα) their corresponding conclusions—and our demonstrations will thus begin with the premises that are *most* prior (i.e. primitive) and *best* known.<sup>7</sup>

These explanatorily basic, primitive, and best known premises are the *first principles* (ἀρχαί) proper to some scientific domain, and the principles relevant to the passages I will be discussing are *definitions*.<sup>8</sup> Definitions state the essence of the natural kinds studied by some science—so for instance “triangles are three-sided rectilinear figures” might be a geometrical principle, if indeed this is what triangles are essentially, and something no further geometrical fact could explain. Since first principles cannot be explained and demonstrations explain their conclusions, first principles cannot be demonstrated. We therefore understand principles in a nondemonstrative way—in Aristotle's terminology we “intuit” or have νοῦς of principles.<sup>9</sup>

This demonstrative treatment of scientific understanding gives us a clear

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<sup>7</sup>All these relations are asymmetric and transitive. I'll be discussing the “better known” relation in more detail below; for now it's enough to note that, as it's being used here, the relation tracks explanatory priority.

<sup>8</sup>At 72a15ff Aristotle tells us that first principles also include *axioms* (ἀξιώματα) and *suppositions* (ὑποθέσεις). We can ignore this wrinkle here, however, since Aristotle's claims about the priority and explanatory role played by principles are typically read as claims that concern definitions.

<sup>9</sup>For νοῦς as a kind of nondemonstrative understanding, cf. *APo* I.3 72b18-21. The fact that νοῦς grasps principles doesn't in itself tell us anything about the role νοῦς plays in our *learning* these principles: it only tells us that once we know them in the right way we have νοῦς. Rendering νοῦς “intuition” can obscure this fact, but I will use this traditional translation for lack of a better alternative, and also because it's the translation rationalists usually favor.

picture of what it takes to understand the propositions that make up some scientific domain: begin with the truths in this domain that can't be explained, and demonstrate those that can through a series explanatory syllogisms meeting the conditions outlined above. Demonstrations will make manifest the explanations for our demonstrated truths as explanatory *middle terms*. They will also make manifest the *necessity* of our conclusions: demonstrated propositions will involve some reference to the *essence* of their subject, and thereby reveal the attributes the subject *must* have if it really is to be the kind of subject it is. So someone who knows how to demonstrate something knows that it must be the case, and knows its explanation in its explanatory role—the two conditions on understanding set out in [1]. Scientific understanding of some domain can therefore be conceived as a form of demonstrative expertise, or a “disposition to demonstrate” the truths pertinent to that domain, as Aristotle puts it elsewhere (*EN* VI.3 1139b31-32).

Such demonstrative expertise is only possible for someone with an intuition of the principles from which demonstrations begin. And this intuition, Aristotle tells us in *APo* II.19, emerges from a type of cognitive development that begins with perception, evolves (thanks to our mnemonic abilities) into a form of practical experience (*ἐμπειρία*), and eventually results in a grasp of universal explanations for what we perceive, and in particular of first principles—our ultimate explanatory bedrock.<sup>10</sup> The interpretive disagreement between rationalists and their opponents concerns the role played by intuition in this account. Rationalists think our intuition of principles serves to *sanction* our principles as epistemic primitives, thereby allowing us to *justify* our demonstrative conclusions on their basis. Their opponents think our intuition of principles does not itself confer any special justificatory status on our demonstrative conclusions.<sup>11</sup>

<sup>10</sup>I won't be discussing the many interpretive difficulties surrounding this account here—see Gasser-Wingate (2016) for an attempt to address the main ones. Below I will say a bit more about our perceptual beginnings and the role they play in our learning—on which see also Bronstein (2012), Modrak (1987: 157–77), or Moss (2012: 153–54).

<sup>11</sup>Naturally these positions are not exhaustive—many other accounts of justification in Aristotle have been given. Some think justification ultimately issues from perception, and so take Aristotle to be an *empiricist* foundationalist (I take it views in this spirit are expressed in Bolton (1987: 151ff), Bolton (1991: 16–17), Gotthelf (1987: 229–30), and McKirahan (1992: 257ff)). Others think that Aristotle is not a foundationalist at all—that he conceives of justification as a matter of coherence between our beliefs, and even allows for a kind of justificatory circle between our perceptions and our grasp of principles (see Goldin (2013) for a recent expression of this view). Others yet think Aristotle takes the establishment of principles to be achieved dialectically, and to be a matter of coherence with *ἐνδοξα* which need not be empirically-grounded (a view that goes back at least as far as Owen (1961)). In many cases these views stem from broader debates about the role of dialectic and the nature of *ἐνδοξα* in Aristotle, and whether or not they could be a source of justification for scientific principles—a helpful review and critique of which can be found in Frede (2012). At the end of this paper I will explain in more detail how what I have to say here would

Now, it should be noted up front that the notion of justification invoked by rationalists is a highly restrictive one. After all, there is surely some everyday sense in which we can justify our beliefs in demonstrable conclusions without the sophisticated sort of demonstration described above. For example we might be justified in believing that planets don't twinkle simply because we've observed this to be the case—even if we aren't yet able to supply a *demonstration* of this fact from astronomical principles. So our intuition of principles could not be our ultimate source of justification in any humdrum, everyday sense.

The rationalist thought, rather, must be that scientific understanding admits of a special *kind* of justification, and that *this* justification issues from our rational intuition of demonstrative principles, and nothing else. So while we might, in some loose sense, justifiably believe that planets don't twinkle before being able to demonstrate it—because we've observed this, say, or heard it from an expert—we will not thereby possess the sort of justification had by someone who understands, on the basis of a demonstration, that planets don't twinkle. The rarefied justification available to such an expert, on the rationalist view, is justification properly understood.<sup>12</sup> And it's on this sense of justification that principles cannot be justified—except, that is, by our intuiting them in some brute, non-inferential way.

If this is right, there is strictly speaking no justification outside the context of a demonstration. But rationalists need not dismiss Aristotle's description of our cognitive development on that account. On their view, the path from perception to *voûs* might still be of *genealogical* or *psychological* interest—as a record of the *causes* of our coming to form some intuition. Here is how two prominent rationalists put the point:

Experience and familiarity with appearances are useful to us as a way of approaching first principles; they may be psychologically indispensable as ways to form the right intuitions. But they form no part of the justification of first principles. When we come to have the right intuition we are aware of the principle as self-evident, with no external justification. That is its real nature, and that is what we grasp after we have used ordinary methods

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bear on some of these views. But for now my target is the sort of rational foundationalism most explicitly defended in Frede (1996) and Irwin (1988).

<sup>12</sup>Everyday justification could then be treated as an approximation of the sort of expert justification at play here. At any rate, this seems to me something rationalists *should* allow. Irwin, however, tells us without qualification that “in claiming that the principles are known through themselves, Aristotle cannot simply mean that nothing else is needed to justify them within the demonstrative system; he must also mean that nothing else is needed to justify them at all” (1988: 132). But this cannot be right. For surely we can have beliefs whose contents match those of definitional principles, and which are justified in an everyday sense—e.g. the belief that triangles are three-sided rectilinear figures.

of inquiry. The acquisition of *nous* is not meant to be magical, entirely independent of inquiry. Nor, however, is it simply a summary of the inquiry, or a conclusion that depends on the inquiry for its warrant.<sup>13</sup>

[T]o the extent that [Aristotle's account of our cognitive development] is a natural process based on perception, the relation between our perceptions and our knowledge of first principles, or whatever knowledge we have by reason, is a natural, a causal, rather than an epistemic relation. Our knowledge of first principles is not epistemically, but only causally, based on perception. And this is how Aristotle can be an extreme rationalist and still constantly insist on the fundamental importance of perception for knowledge.<sup>14</sup>

Thus on this sort of view perception and experience, necessary though they may be to *bring about* our cognitive development, are not states that provide the specific sort of justification or epistemic support first principles require. It's only when we intuit these principles—and thereby appreciate their role as justificatory primitives—that they provide the proper sort of basis for our demonstrative conclusions.

Now, rationalists do not say much about the notion of justification they invoke when making claims of this sort. This makes their view somewhat elusive. But we can see, at a minimum, that they rely on a distinction between the “causal” or “psychological” contributions of various states, on the one hand, and their “epistemic” or “justificatory” role, on the other—a distinction which can be understood on the model of our contemporary distinction between the context of discovery and the context of justification. Here is Popper on the topic:

The initial stage, the act of conceiving or inventing a theory, seems to me neither to call for logical analysis nor to be susceptible of it. The question how it happens that a new idea occurs to a man—whether it is a musical theme, a dramatic conflict, or a scientific theory—may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge. This latter is concerned not with questions of fact (Kant's *quid facti?*), but only with questions of justification or validity (Kant's *quid juris?*). Its questions are of the following kind. Can a statement be justified? And if so, how? [...] Accordingly I shall distinguish sharply between the process of conceiving a new idea, and the methods and results of examining it logically.<sup>15</sup>

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<sup>13</sup>Irwin (1988: 136).

<sup>14</sup>Frede (1996: 172).

<sup>15</sup>Popper (1959: 7–8). I think Popper is right to mention Kant as an influence here. In a similar vein, here is Frege on discovery and justification in mathematics: “the question of how we arrive at the content of a judgement should be kept distinct from the other question, Whence do we derive the justification for its assertion?” (1884: 3). For a similar take on rationalist readings of Aristotle, see Lennox (2011: 27).

So as Popper sees things, the psychological or cognitive underpinnings of our learning are matters of fact, and on their own these could not tell us anything about why we should believe certain claims, or how we should conceive of their justification, which are inherently normative questions. On this model, stories about our cognitive development might describe how we come to form some thought or articulate some idea, but epistemic norms like justification simply would not apply in this context.

The rationalist reading of Aristotle, then, is that justification only occurs in the context of a demonstrative science. Anyone might look at the sky and observe that planets don't twinkle. But this would tell us how our beliefs about planets are formed, and nothing more. Only through a demonstration can such a belief be *justified* (in the strict sense) and thus become a piece of scientific understanding. And *that* sort of justification—the justification had by someone with understanding—must ultimately be grounded in an intuition of certain basic principles from which all demonstrative conclusions derive. So there are really two claims here: first, that Aristotle conceives of justification in this highly restrictive sense—a sense on which you cannot be justified in believing something you haven't intuited or demonstrated—and second, that Aristotle thinks an expert's rational intuition of her principles must be the ultimate foundation for any such justification.

Direct and indirect arguments have been made for these claims. The direct arguments aim to show that there is some part of Aristotle's account of scientific understanding that is well understood in terms of justification, conceived of as a norm that applies exclusively in the scientific context, after a grasp of principles has been achieved—and that Aristotle is a rational foundationalist about this sort of justification. The indirect arguments begin by noting that Aristotle never spells out any norms that would govern nondemonstrative inquiry, and infer from this, on principles of charity, that he must have intended his account of our cognitive development as a psychological description only. I think rationalist arguments fall short in both cases. In the following two sections I will focus on the direct evidence. I'll address the indirect arguments in the next.

## 2 Understanding & Priority

Recall that Aristotle's principles are *primitives*; that is, *prior* to whatever we demonstrate on their basis. It's agreed by all that principles are *explanatory* primitives. But on the rationalist view principles are also justificatory primitives: they serve both as our ultimate explanations and, when properly understood, as our ultimate source of justification. This is supposed to follow from the use to which Aristotle puts his notion of priority when discussing our knowledge of

principles and their demonstrative consequences—which he does most clearly in the following passage:

[3] they [=the premises in our demonstrations; first principles most of all] must be explanations and better known and prior [relative to our demonstrated conclusions]—explanations because we only understand something when we know its explanation, prior since they are explanations, and known beforehand not only in the sense that we comprehend what they mean, but also that we know them to be the case. (*APo* I.2 71b29-33)

Aristotle is elaborating here on three of the requirements on demonstrative premises presented in [2]. The first requirement is that these premises serve (via their shared middle term) as *explanations* for the conclusion being demonstrated. This follows straightforwardly from the requirement that demonstrations yield understanding, together with the definition of understanding in [1]. The second requirement is that these premises be *prior to* the conclusion derived on their basis: Aristotle simply states that this must be the case since the premises are explanations. The third requirement is that these premises be *better known than* the conclusion derived on their basis. Aristotle’s discussion here is hard to follow: in his explanation “known beforehand” (*προγνωσκόμενα*) has replaced “better known” (*γνωριμώτερα*), but it’s not immediately clear why these two would relations would correspond, or why we would have to know the premises of our demonstrations before their conclusions.

Before addressing this difficulty, it’ll be important to consider the next few lines, where Aristotle elaborates on these last two relations:

[4] Things are prior and better known in two ways; for it isn’t the same to be prior by nature and prior in relation to us, nor to be better known and better known to us. I call prior and better known in relation to us items which are nearer to perception, prior and better known *simpliciter* items which are further away. What is most universal is furthest away, and the particulars are nearest. (71b33-72a5)

Things can thus be prior and better known in two ways: according to an objective, “natural” order of explanation, on the one hand, and according to the order in which *we*, as non-experts, might go about learning things—i.e. typically starting from what we perceive.<sup>16</sup> In passage [3], Aristotle clearly means to tell us that

<sup>16</sup>Unlike what’s better known “by nature,” what’s better known “to us” depends on the subject—as Aristotle makes clear at *Top* VI.4 141b36ff and in passage [10], below. As I understand the claim here, perceptual knowledge is the knowledge that is (typically) better known to us *early on*, before we have made any progress in our inquiry. Different things can become better known to us as our inquiry progresses. We count as experts (i.e. have understanding) when what’s better known to us just is what’s better known by nature. But since Aristotle is *contrasting* what’s better known to us with what’s better known by nature, he presumably does not take “us” to be experts in this passage.

principles are prior and better known *by nature*: he often emphasizes that scientific principles are the things farthest from perception and most universal.<sup>17</sup> And this natural order is precisely the order explanatory demonstrations are meant to preserve. So the kind of priority proper to first principles must track explanatory priority—things are prior and better known by nature when they’re closer to the fundamental explanatory grounds for some scientific domain (so that principles are primitive and best known by nature).

Now, Aristotle *also* tells us, in [3], that principles will have to be known before their conclusions—that we will have to comprehend what they mean but also know that what they express is true (*εἰδέναι ὅτι ἔστω*; cf. *APo* I.1 71a11-16). This is a puzzling claim for him to make. For Aristotle’s demonstrative theory is not meant to describe how we first *learn* things—we might come to appreciate facts differently once we can demonstrate them, and thereby come to understand things we already knew in an ordinary way, but demonstration is not a way to discover facts of which we were ignorant in our pre-demonstrative state.<sup>18</sup> So it’s not clear why we would have to know principles *before* learning their demonstrative consequences. Indeed Aristotle often tells us the opposite—he tells us that principles are the *last* things we would discover, and that their discovery requires our already having gathered the facts pertinent to the scientific domain in question.<sup>19</sup> To take a simple example, it might be definitional that planets are heavenly bodies near the earth. But it’s plausible that we’d learn this *after* observing that planets don’t twinkle, and indeed *infer* it from our observations—even though the planets’ proximity to the earth explains what we observe.

Rationalist interpreters take this as evidence that Aristotle is telling us two distinct things in passages [3] and [4]. First, that an expert’s principles serve as *explanatory* primitives, and second, that they serve, when intuited, as basic sources of justification (as *epistemic* primitives).<sup>20</sup> Since the priority at play in

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<sup>17</sup>See for instance *Top* VI.4 141b36ff, *Met* A9 992b24ff, or *Met* Z3 1029b3ff.

<sup>18</sup>Arguably coming to understand what we already know counts as a form of learning for Aristotle—cf. Bronstein (2016a: 31–42). My point here is only that we do not go from ignorance to knowledge by demonstration.

<sup>19</sup>See for instance *APr* I.30 46a17-27, *APo* II.1 89b29-31, *HA* I.6 491a7-14, or *PA* II.1 646a8-12.

<sup>20</sup>The second point need not follow from the first: in some cases we might initially know *p* without knowing anything about what might explain it, and then infer *q* as an explanation for *p*. The explanatory and epistemic orders would thus be opposite: *p* would be epistemically prior, but explanatorily posterior, to *q*. (In our example above, the planets’ non-twinkling would be epistemically prior, but explanatorily posterior, to their being near the earth—our observation that planets don’t twinkle justifies our belief that they are near the earth, but their being near the earth explains why they don’t twinkle.) On the rationalist reading, then, Aristotle is taking a stance in affirming that for an expert these two orders coincide—though there is of course a difficulty in stating things this way since rationalists think there is strictly speaking no justification for anyone but an expert. See Irwin (1988: 124–25, 134–36) for a more elaborate defense of these points.

[3] is priority “by nature,” this would mean that an expert’s intuition of first principles is objectively the right basis for justifying demonstrated claims, in addition to being (objectively) the right basis for explaining them. Thus on the rationalist reading, the claim that principles must be “known before” their conclusions is meant to guarantee that an expert’s scientific understanding be *justified* in the right sort of way—and the characterization of these principles as “prior” to their demonstrative consequences is simply an expression of this justificatory precedence.

But what Aristotle actually says about epistemic priority (or “priority in knowledge”) tells against interpretations of this sort. Here is the relevant passage in Aristotle’s lexicon—the only place the notion is clearly spelled out:

[5] Things are called prior in another sense, on which what’s prior in knowledge is [treated] as if it were also prior *simpliciter*. Of these the things prior in account are different from those prior in perception, for in account universals are prior, and in perception particulars. (*Met* Δ11 1018b30-34)

Aristotle distinguishes two senses of epistemic priority here: epistemic priority “in account” (*κατὰ τὸν λόγον*) and epistemic priority “in perception” (*κατὰ τὴν αἴσθησιν*). This distinction is plainly meant to mirror the distinction (in [4]) between things prior by nature and things prior to us: in both cases, universals are prior in one sense (in account, by nature), and particulars in another (in perception, to us).

Both forms of priority fall under a general definition: to say that *p* is epistemically prior to *q* is to say that our knowledge of *p* doesn’t depend on our knowledge of *q*.<sup>21</sup> In this definition “knowledge” is invoked in a *generic* sense, and the two species of epistemic priority in [5] correspond to the species of knowledge involved.<sup>22</sup> If the knowledge in question is *understanding*, then epistemic priority tracks explanatory priority: *p* can’t be prior to *q* if *q* is part of the explanation why *p*, for then our understanding *p* would depend on our understanding *q*. This species of epistemic priority (epistemic priority “in account”) is just a correlate of priority “by nature.” However if the knowledge in question is knowledge of a

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<sup>21</sup>It’s a bit later, at *Met* Δ11 1019a1ff, that Aristotle indicates that all senses of priority are cases in which certain things can exist without others, but not vice versa; so that, in the epistemic case presented here, it would be possible for some knowledge to exist in a subject without some other knowledge existing in that subject, but not vice versa. So “depends” in this formulation is shorthand for “depends for its existence.”

<sup>22</sup>I thus agree, on the surface, with Barnes’ analysis: “there is an obvious analysis of ‘*P* is primitive,’ viz. ‘there is no *Q* prior to *P*,’ i.e. ‘there is no *Q* from which knowledge of *P* must be derived’” (1993: 94). However Barnes seems to take the “knowledge” in his formulation to be *ordinary* knowledge. I think this is a mistake: “knowledge” is used in a generic sense, and only one species of priority involves ordinary knowledge.

different sort, then epistemic priority need not track explanatory priority: our knowing  $p$  might depend on our perceiving  $q$ , even if it turns out that  $p$  explains  $q$ . This species of epistemic priority (epistemic priority “in perception”) is a correlate of priority “to us,” or at least, priority to us as we typically stand at the beginning of our inquiry, when we are not yet experts in the relevant domain. To keep this distinction straight I will use “prior<sub>e</sub>” for the former kind of epistemic priority, and “prior<sub>t</sub>” for the latter.<sup>23</sup>

It’s plain that principles are primitives in the sense that they are most prior<sub>e</sub>. This leaves it open that principles would *not* be primitives in the sense that they are most prior<sub>t</sub> (i.e. primitive “to us,” where “we” are beginners). Indeed, we should expect them not to be. For on Aristotle’s definition, as reconstructed above, the knowledge that is most prior<sub>t</sub> is a form of knowledge that does not depend for its existence on our already having knowledge *of any sort*—and Aristotle explicitly tells us that this form of knowledge is provided by perception (*APo* II.19 99b32-35, on which more below). What Aristotle is saying in [3], then, is only that principles are most prior<sub>e</sub>, which is just to say that our understanding of these principles does not depend on our understanding of anything else. And this simply follows from the fact that principles are explanatory primitives: our understanding of them could not depend on any further piece of understanding, for *that* understanding would then serve as part of an explanation for principles that are, by definition, unexplainable.

So it’s no surprise that Aristotle, in [3], tersely invokes our principles’ explanatory role to support the claim that these principles must be prior to demonstrated conclusions (*πρότερα, ἔπειρ αἴτια*, 71b31). Nor is it surprising that Aristotle often uses “immediate” (i.e. unexplainable) and “primitive” interchangeably.<sup>24</sup> This is not just a loose manner of putting things: the fact that our principles are explanatory primitives directly entails their status as epistemic primitives in account—i.e. as most prior<sub>e</sub>. It does not entail, however, that they are most prior<sub>t</sub>. In fact it suggests the opposite, since Aristotle clearly thinks we learn explanations after learning what they explain, and so learn principles last of all.

Aristotle’s claim in [3], then, is only that the sort of explanatorily-sensitive knowledge that constitutes an *understanding* of some demonstrated conclusion (as Aristotle describes it in [1]) will depend on an explanatorily-sensitive understanding of the *premises* from which that conclusion is derived: to recognize the explanations for certain conclusions *as explanations* will require recognizing

<sup>23</sup>The choice of subscripts here is meant to reflect Aristotle’s own labels (“in account,” “in perception”). As I understand him, Aristotle has in mind *explanatory* accounts, specifically, and is invoking perception as a source of knowledge that would *temporally* precede the development of any other, more sophisticated kind of knowledge—in inexpert subjects, that is.

<sup>24</sup>This is true throughout *APo*, but for some clear examples see 71b27, 72a7, 72b20, or 75b39.

certain premises *as explanatory primitives*. Thus the sense in which an expert must “know” principles before knowing her conclusions is, specifically, that she must *understand* her principles before *understanding* her conclusions—which is just to say (on my reading of [5]) that principles are prior<sub>e</sub> and better known by nature, in the sense at play in [4]. Intuition, on this view, is just an understanding of principles as explanatory primitives, not something that supplies our demonstrative conclusions with a special sort of justification.

If this is right, Aristotle’s discussion of priority does not itself indicate any concern with the justificatory structure of scientific understanding. Principles are indeed epistemic primitives (most prior<sub>e</sub>), but this is just a reflection of their status as *explanatory* primitives. Since Aristotle is a foundationalist about explanation, he is a foundationalist about this sort of epistemic priority. But nowhere does he suggest that the principles that serve as ultimate explanations for an expert’s demonstrative conclusions would *also* have to serve as the ultimate reasons an expert invokes as justification for her various demonstrative conclusions, as rationalists would have it. For all Aristotle says here, an expert might be justified in believing that planets don’t twinkle because she has observed it, even if her observations do not explain their non-twinkling. Indeed his emphasis on perception’s supplying our most prior<sub>t</sub> knowledge suggests just such a view.<sup>25</sup>

### 3 Understanding & Conviction

Aside from Aristotle’s discussion of priority, the main place he may seem to exhibit rationalist tendencies is in his description of an expert’s conviction about her principles and their consequences. Here is the key passage:<sup>26</sup>

[6] Since you must know and be convinced of something [you demonstrate] by having the sort of deduction we call a demonstration, and there is such a deduction in virtue of those things being true—the things from which [the deduction] proceeds—you must not only know the primitives beforehand (all or some of them) but also know them *better*. For something always holds better of that because of which it holds, for instance, that because of which we love is better loved. So since we know and are convinced of [some conclusion] because of the primitives, we know better and are better convinced of these [primitives], because it’s because of them that we know and are convinced of posterior things. (*APo* I.2 72a25-32) [...]

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<sup>25</sup>Suggests but does not establish—for the dependence between temporally prior and posterior knowledge is not spelled out in much detail here. Rationalists might thus insist that perception is indeed most prior<sub>t</sub>, but that this is because it serves as a causal starting-point for the rest of our learning, not because it serves to *justify* anything—a response I will address in more detail below.

<sup>26</sup>On this passage see for instance Anagnostopoulos (2009: 107), Irwin (1988: 132), or Salmieri et al. (2013: 5). I elide a small portion of it that does not affect the main conclusions.

Anyone who's going to have understanding through demonstration must not only know the principles better and be better convinced of them than what's demonstrated—there must also be nothing more convincing or better known for him among the opposites of the principles (from which there will be a deduction of the contrary mistake), since anyone with *simpliciter* understanding cannot be convinced otherwise [is ἀμετάπειστος]. (72a37-b4)

Thus first principles are not just explanatory primitives, and grasped by an expert as such—they are also, it seems, the things an expert is most *certain* about, to the point where nothing could convince her of their falsity. The level of conviction an expert displays towards various propositions will moreover correspond to their demonstrative priority: her conviction will be strongest in the case of first principles, and less and less strong as we move down the explanatory tree formed by their demonstrative consequences. For, as Aristotle explains, an expert will be more convinced of the causes of the things she's convinced about—and ultimately all her demonstrative conclusions hold *because* of certain principles, and so an expert will be convinced of these most of all.

The sort of “conviction” or “trust” (πίστις) at play here is not something that merely describes the confidence an expert might subjectively display towards her principles and their consequences.<sup>27</sup> When Aristotle says that an expert is most convinced of her principles, he means that an expert is most convinced of her principles *qua expert*: an expert's expertise is manifested in her taking her principles to be more secure than their demonstrative consequences. And part of what it is to be an expert is to be convinced of things that are, objectively, the things of which one ought to be convinced—an expert trusts the things that are objectively trustworthy. So to say that an expert will πιστεύειν *X* “more” or “better” than *Y* (or that for an expert *X* will be πιστότερον than *Y*) is to say that her belief in *X* will be held more strongly than her belief in *Y* because *X* and *Y* should be believed to just that degree.<sup>28</sup>

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<sup>27</sup>Aristotle uses πίστις to refer both to a cognitive state (a conviction, or a strongly held belief), and to the factors that contribute or ought to contribute to the development of such a state—so that, for instance, an argument or a speaker's character might count as types of πίστις. For the first sense, see e.g. *APo* 90b14 and *DA* 428a20, or, in its more common verbal form (as in [6]) *Rhet* 1356a6 or *Rhet* 1366a11. For the second, see e.g. *Rhet* 1354a15 or *Rhet* 1355a4-5. For more on Aristotle's usage, cf. Grimaldi (1957).

<sup>28</sup>I remain neutral here on whether we should identify πίστις with belief, and also on the relationship between πίστις and cognitive states like δόξα or ὑπόληψις. What matters here is that we can πιστεύειν things to various degrees, and that there is no restriction on the object of our πίστις (so that we can πιστεύειν demonstrative premises and conclusions, but we can also πιστεύειν any everyday fact). For more on the relationship between πίστις and belief, see Moss and Schwab (forth).

Now, rationalists may seem to have a plausible explanation for this claim: an expert will trust her demonstrative principles more than their consequences because she takes her intuition of these principles to *justify* whatever she derives on their basis. On this sort of view the justificatory role played by an expert's intuition of principles explains the confidence she displays towards these principles and their consequences. And the fact that first principles serve as justificatory primitives explains why an expert would never be convinced of competing alternatives, or seek to ground her conviction about principles in anything else: the expert is ἀμετάπειστος simply because there is no source of justification more basic than her intuition of principles.

This is not the only possible explanation for Aristotle's remarks. Some critics of rationalism have argued that the passage is anomalous, and that, given Aristotle's overall emphasis on our grasp of the *explanatory role* of demonstrative premises and conclusions, we should take the conviction at play here to reflect an expert's confidence *that her principles are explanatorily basic*, and *that demonstrations explain their conclusions*. The point of [6] would then be that an expert's confidence that some demonstration explains its conclusion will not exceed her confidence that the principles from which this demonstration begins are explanatory primitives—any doubts about the status of our principles will lead to doubts about the explanations our demonstrations are meant to provide.<sup>29</sup> Other critics have sought to draw a close conceptual connection between the claim that certain things are “better known by nature” and the claim that an expert will be “more” or “better” convinced of these things. On this reading, to be convinced of principles “more” just is to take them to be more fundamental than their demonstrative consequences, and there is a difference in kind between this form of conviction and that provided outside the context of demonstrative science.<sup>30</sup> Thus in the sense of conviction that corresponds to the natural order of knowledge, principles are most convincing—and this is supposed to be importantly different from the sense of conviction that attaches to our beliefs in the order of learning, as things are “known to us” before we have any demonstration of them (that is, as they are prior<sub>t</sub>).

Though I sympathize in different ways with each of these views, neither seems to me completely adequate. The first simply says something Aristotle does not:

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<sup>29</sup>For this reading, see Bronstein (2016a: 128) or Goldin (2013: 211–13).

<sup>30</sup>Burnyeat, for instance, though he does not say much about the distinction between them, thinks Aristotle has two notions of conviction—one associated with demonstration from principles, and one associated with experience (1981: 128). In a similar spirit McKirahan takes the “more” (μᾶλλον) in Aristotle's formulation to mean “more fundamentally,” rather than “stronger,” so that in [6] Aristotle would be telling us only that “knowledge of principles is primary, that of conclusions derivative” (1992: 35).

the claim is that an expert will trust her *principles* most of all, not that she will trust the *status* of her principles, or the fact that her principles are principles. Aristotle is careful when formulating claims about explanatory status in *APo*—witness his definition of understanding in [1] as knowledge “of the explanation why something is the case, that it is its explanation.” He clearly has a distinction in mind here between knowing an explanation and knowing an explanation *as an explanation*. It seems uncharitable to suggest that he is simply being careless and assimilating the two when discussing conviction.<sup>31</sup>

As for the second approach, Aristotle never indicates that the sort of conviction displayed by an expert would be different in kind from the sort of conviction we might display in other contexts, when confronted with arguments or evidence that fall short of demonstration. On a straightforward reading, to be *more* convinced of something is simply to have a greater *degree* of conviction about it, not to be convinced of it as of something more fundamental, in a manner accessible to an expert only.<sup>32</sup> At a minimum, more would have to be said to describe the sort of conviction at play in the demonstrative context, and how it differs from that available to non-experts.

The key to doing so, I think, is to see that Aristotle’s views on conviction are more nuanced than what passage [6] suggests on its own. Consider, for instance, his remarks about conviction and observation in the following methodological passages:<sup>33</sup>

[7] [The followers of Empedocles and Democritus], because of their love of these [principles], fall into the attitude of men who undertake the defense of a position in argument. For holding their principles as truth, they submit to everything that follows, as though some principles did not require to be judged from their results, and above all from their end. And that end, which in the case of productive understanding is the product, in the case of our understanding of nature is the phenomena, which are always authoritatively given by perception. (*DC* 306a11-17)

It’s a strike against the followers of Empedocles and Democritus, then, that they fail to abandon their principles in the face of conflicting phenomena. In a similar vein, Aristotle tells us in *GA* that:

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<sup>31</sup>Bronstein claims that something is more convincing to an expert when it’s better known and explanatorily more basic, and that we become convinced of principles by appreciating their explanatory role (2016a: 128). This is compatible with thinking that our conviction concerns the principles themselves, even if the *source* of our conviction is their explanatory role. But it leaves unexplained what the conviction itself amounts to, and doesn’t tell us *why* an expert would be so convinced—a question to which rationalists may seem to have a clear reply.

<sup>32</sup>A point Goldin is right to stress (2013: 212n28).

<sup>33</sup>The translation here is adapted from Stocks’.

[8] This is what seems to hold for the generation of bees, both from argument and from the things that are thought to be their characteristics. These characteristics haven't yet been sufficiently grasped, and if some day they are, we should then be more convinced by perception than arguments, and by arguments only if what they show agrees with the phenomena. (*GA* 760b27-33)

Or again, in *GC*, that:

[9] Lack of experience makes you less able to take a comprehensive view of the agreed upon [facts]. That's why those who are at home with natural [phenomena] are more able to lay down the sorts of principles that are [systematically] connected; while those who, from much [abstract] reasoning, have become unobservant of the [underlying] subject matter, are too quick to "prove" things with an eye towards [just] a few observations. (*GC* 316a5-10)

These sorts of remarks are typical—Aristotle makes them often.<sup>34</sup> And they seem to suggest that principles are not premises we should be *absolutely* certain about, in the sense that we would believe them *whatever their consequences*. Demonstrations and their principles, these passages suggest, are worth believing only to the extent that they appropriately recover and explain our observations. If this is right, the claim that an expert must be ἀμετάπειστος and convinced of her principles more than their consequences should not rule out her giving up these principles were it discovered that they conflict with what we can observe.

Implicit in Aristotle's treatment of conviction, then, lies a separation between two distinct *sources* of conviction: conviction that stems from *argument*, on the one hand, and conviction that stems from *perception* or *observation* (broadly construed) on the other. There's good independent evidence for separating these two sources of conviction when reading [6]: in the *Topics* Aristotle often affirms that someone with understanding cannot be convinced out of her conclusions, but always qualifies the claim by saying that an understander cannot be so convinced *by argument* (ὑπὸ λόγου).<sup>35</sup> This qualification is significant: not all our forms of knowledge are arrived at by argument, and *perceptual* knowledge in particular

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<sup>34</sup>Apart from the passages in the main text, see *DM* 698a11-14, where Aristotle emphasizes that universal explanations must always accommodate (or "fit," ἐφαρμόττειν) the particular phenomena they explain, and also *EN* X.8 1179a16-22, where a similar sentiment is voiced concerning our conviction about general ethical claims. Earlier in *DC* a similar charge is leveled at the Pythagoreans: "they are not seeking for theories and causes to account for the phenomena, but rather forcing the phenomena and trying to accommodate them to certain theories and opinions of their own" (293a25-27).

<sup>35</sup>This is true of all but one occurrence of the term, which appears eleven times, and always in connection with the state of understanding (that the ἐπιστήμων is ἀμετάπειστος seems to be idiomatic—see *Top* 130b16, 133b29ff, 134a1ff, 134a35ff, 134b16). Apart from these occurrences, the

is often distinguished by Aristotle from λόγος-involving cognitive states.<sup>36</sup> So one way to understand passage [6] in light of Aristotle’s methodological remarks is to take it to be concerned with just one source of conviction: conviction by *pure* argument, that is, by forms of argument that do not invoke as evidence our observations, or the fit between our observations and certain general principles. An expert might thus be convinced to give up certain principles on broadly empirical grounds, either because her principles directly conflict with observed phenomena, or (less directly) because they fail to explain some of our observations. She will not be so moved, however, by arguments that would aim to undermine her principles some other way—purely verbal or sophistical arguments, say, or arguments relying on dialectical modes of reasoning, or invoking general theoretical considerations extending beyond her domain of expertise.<sup>37</sup>

Being an expert, then, does not require *fanaticism* about your principles. It doesn’t even require that your overall conviction in some specific fact *increase* from your having a demonstration of it—you need not become more confident that planets don’t twinkle when you learn to demonstrate it. What a demonstration needs to do is only increase a certain *kind* of conviction: conviction that is commensurate with our resistance to refutation by purely argumentative means—that is, by arguments that do not invoke our observations or the fit between principles and the observations they are meant to explain. Understood this way, passage [6] is telling us that an expert would be less likely to give up, when faced with a presumed counterargument, the claims that play a more significant explanatory role in her demonstrative system: it would take a stronger argument to make an expert give up on her explanantia than it would to make her give up what they explain. This is a sensible point, and a point that is quite compatible with her being open to giving up her principles under certain circumstances (in particular when they conflict with or fail to explain our observations).

Now, one might object here that a true expert should in fact never give up her principles. For while she would indeed be impervious to persuasion by pure argument, she would *also* have all the observable facts relevant to her domain of expertise at her disposal, and thus be impervious to persuasion on the basis of new empirical evidence. That is, new empirical evidence *could*, in principle, force

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term only appears three times in the Aristotelian corpus: in passage [6], in the *Metaphysics* (where necessity is said to be ἀμετάπειστόν τι, because it’s contrary to the movement that follows choice and reasoning, Δ5 1015a32-33), and in the *Magna Moralia* (where it’s suggested that an *opinion* might resemble understanding if it’s very firmly held and ἀμετάπειστον, 1201b6). The association of understanding and unpersuadability goes back at least as far as *Timaeus* 51e1-4.

<sup>36</sup>As the passages in the main text already suggest—but see also Karbowski (2016: 120), as well as the discussion below on Aristotle’s prior knowledge requirement and its limits.

<sup>37</sup>On this latter point see Karbowski (2016: 126–32).

an expert to give up her principles—but no such evidence is forthcoming, since an expert by definition knows everything there is to know about her domain. Thus one might object that the followers of Empedocles Aristotle criticizes in [7] are simply not *experts*, or that what they take to be principles are simply not principles. And if they were experts, absolute devotion to their principles would indeed be appropriate.

But while it may be true that on Aristotle's view experts (experts in the fullest sense, who know all there is to know about some domain) never give up their principles, this would not reflect any kind of fanaticism on their part. For these experts do not change their minds as a matter of fact, not as a matter of policy. In other words, they would be *open* to revising their principles if empirical evidence were brought to their attention that conflicted with these principles. It's only that, as a matter of fact, no such evidence exists.

What all this shows, I think, is that passage [6] and the requirement that an expert be *ἀμετάπειστος* should not be taken to suggest that an expert's intuition of her principles provides a justificatory bedrock for her demonstrations. It is reasonable to think that an expert would be more convinced of explanatorily prior premises: these premises explain a broader range of phenomena, and giving them up means abandoning a broader portion of our demonstrative understanding—something that *should* require a stronger argument. But it remains clear that, as a matter of policy, principles should be given up when they lead to conclusions that conflict with observed phenomena: pure arguments could not sway an expert, but new observations could (even if they don't). Aristotle couldn't allow this if an expert's intuition of her principles served as her most basic source of justification. That would rule out any scenario in which it would be reasonable for her to give up on these principles. Yet Aristotle plainly thinks there are such scenarios—scenarios where our perceptually-based conviction that something is the case should lead us to reject principles that would deny it, or fail to explain it.

This already establishes, to my mind, that perception must play more than the “purely causal” role rationalists assign it—even setting aside the details of Aristotle's account of our cognitive development. For perception here is meant to provide a criterion for the adequacy of our principles: our demonstrative theories are based on principles whose status as principles depends on their ability to recover and explain our observations. I don't see how this could be squared with readings on which the contributions of perception are to be understood in merely psychological, descriptive terms, and excluded from playing any justificatory role.

So far, then, I've argued we should reject the direct motivation for rationalism: what Aristotle says about priority and expert conviction does not support rationalist theses, and even seems to provide some evidence against them. I now want to address the indirect motivation for the view, according to which Aristotle's

official account of our learning, as he presents it in *APo* II.19, only tells us about the causal origins of our inquiry into principles, and that he must therefore have intended our intuition of them to play the sort of justificatory role a purely causal story could not.

#### 4 Perceptual Beginnings

Aristotle announces in the opening lines of *APo* that “all intellectual teaching and learning proceed from preexisting knowledge” (71a1-2).<sup>38</sup> The sense in which the preexisting knowledge is “preexisting,” or such that we can “proceed” from it to further knowledge is never explicitly spelled out. At times, Aristotle seems to think that we are proceeding from a *state* with certain contents to a state with different contents, or to a different state with the same contents.<sup>39</sup> At others, he seems to think that certain *propositions* (or subpropositional *terms*) proceed from others, regardless of whether or not this is grasped by anyone.<sup>40</sup> The Greek itself is open to a range of different interpretations, for all Aristotle is saying is that something (a state, or proposition, or term) is, or comes to be, from (ἐκ) something else.

Now, for someone with scientific understanding, the “from” relation between states like νοῦς and ἐπιστήμη is plainly meant to correspond to the “from” relation between propositions grasped in these states—a relation that will mirror the objective explanatory relation between the facts corresponding to the propositions in question. But the distinction Aristotle draws in [4] between epistemic priority *to us* (what’s prior<sub>t</sub>) and epistemic priority *by nature* (what’s prior<sub>e</sub>) carries over in this context as well: the knowledge displayed by an expert proceeds *from* knowledge that is prior<sub>e</sub>, and so corresponds to the objective explanatory order, while for the rest of us what we know proceeds *from* what is prior<sub>t</sub>—something that might vary from person to person, or for the same person from one stage of her learning to the next, but ultimately must begin from perception.

So when Aristotle says that all our intellectual learning is based on preexisting knowledge, he doesn’t just mean that, within the context of an axiomatized demonstrative science, we will begin with first principles and proceed by inferring

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<sup>38</sup>When he speaks of *intellectual* (διανοητικῆ) teaching and learning in these lines, Aristotle means to include all non-perceptual forms of learning—cf. Mignucci (1975: 2–3).

<sup>39</sup>For states with different contents, see for instance *APo* 71a8-9 (induction proceeds *from* particular cases to something universal), or *APo* II.19 as a whole. For different states with the same content, see for instance *APo* 71a24ff (understanding something *simpliciter* proceeds *from* understanding that same thing universally).

<sup>40</sup>For propositions, see for instance the requirements on demonstration presented in [1] (demonstrative conclusions follow *from* premises that are better known, explanatory, etc). For terms, see for instance *APo* I.4 73a34ff (the essence of triangle is *from* line, and the essence of line *from* point).

explanatorily posterior conclusions *from* these principles. The requirement holds quite generally, for scientific understanding and non-scientific knowledge alike. And for the non-expert, the sort of knowledge on which learning depends will generally *not* be the knowledge which is objectively prior—for as Aristotle explains in the following passage, the learning process involves *making* what's prior by nature prior to us:

[10] learning proceeds in this way for all, namely, through that which is less known by nature to that which is more known [by nature]: and just as in practical matters our function is to make what's actually good good for each, [proceeding] from what's good for each, so too [in theoretical matters our function is] to make things better known by nature better known to ourselves, [proceeding] from what's better known to ourselves. (*Met* Z3 1029b3-8)

Our goal as learners, then, is to make what's better known and prior by nature better known and prior to us. Our paths towards this ideal cognitive state must begin from what's best known to us before any learning has occurred—that is, from the things that are most prior<sub>r</sub>, which are those closest to *perception* (cf. [4] and [5]). We make epistemic progress by moving from this initial knowledge to what is better known by nature—that is, towards the most prior<sub>e</sub> objective explanatory grounds for what any beginner might observe.

Recall that, for rationalists, such explanatory knowledge “derives” or comes “from” perception in a rather thin sense: perceptual knowledge is the *causal* starting-point for the cognitive development that eventually leads to an intuition of principles, but it does not justify any of the more advanced stages we reach on its basis (including our intuition of principles). For our path *towards* what's better known by nature is part of the context of discovery, and thus a matter of descriptive psychology—only once the principles are in place can we speak of norms like justification. This was the indirect motivation for thinking that *voûs* itself would have to play a justificatory role: the justification for believing our demonstrated conclusions must come from *somewhere*, and perception, experience, and other states involved in our learning matter only as part of a context of discovery that could not supply it.

But a closer look at Aristotle's invocation of perception in *APo* II.19 shows this cannot be right. Consider, first, how Aristotle frames his account of our cognitive development as an alternative to a certain kind of innatist view:

[11] [One might wonder:] is it that the states [i.e. those whose objects are first principles], not being present in us, come to be in us, or is it rather that they are present in us without its being noticed? It'd be absurd if we did have such states [from birth]—for then we'd have pieces of knowledge more exact than demonstrations without its being noticed. (99b25-27)

The kind of view Aristotle calls absurd in this passage is one on which we would always understand principles, though we would not always realize that we do. On such *innatist* views, our knowledge of principles would always be present in our souls in a latent form, and some sort of recognition process would then serve to make this latent knowledge manifest—which is precisely what Platonic recollection is meant to do.

Aristotle, then, thinks it absurd that our understanding of principles would exist in some latent form—exact forms of knowledge must be manifest, and our understanding of principles is the most exact knowledge we can achieve.<sup>41</sup> If our understanding doesn't already exist in some latent form, it must be *derived* from some other (less exact) preexisting knowledge (99b28-32). Since all non-perceptual knowledge must itself be based on further preexisting knowledge, Aristotle concludes that

[12] we must possess some sort of capacity, but not one which will be more valuable than these [advanced] states in respect of exactness. And this certainly seems to be the case for all animals: they have an innate discriminatory capacity called perception. (99b32-35)

Perception, then, is a capacity that gives rise to perceptual knowledge—the basic knowledge from which the rest of our learning must ultimately begin.

Aristotle cannot mean here that perceptual knowledge merely *causes* or *prompts* the rest of our learning. For he intends his account as an alternative to Platonic innatism—the view that our understanding is latent within us, and can be made manifest by recollection (or some like process). And Platonic innatism is *compatible* with the view that the development of scientific understanding is prompted by some of our perceptions. Indeed, Plato articulates just such a view in a number of his dialogues. In the *Phaedo*, we are explicitly told that we recollect by perceiving likenesses of the Forms, because our perceptions make us aware of the fact that these likenesses are *deficient*—in perceiving equal sticks, for instance, we are made aware of their *deficient* similarity to the Equal:<sup>42</sup>

But from our perceptions we must think ‘everything in our perceptions is striving to reach that thing, what Equal is, but falls short of it.’ Or how do we put it? —Just so.

Then before we began to see or hear or otherwise perceive, we must have possessed knowledge of what the Equal itself is, if we were about to refer the equals from our perceptions to it, thinking that all such things strive to be like it, but are inferior. —That's right.

(75a11-b8)

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<sup>41</sup>Or at least it must be manifest to us that we already knew exact things *at some point during our learning of them*—a more charitable reading defended in Bronstein (2016b).

<sup>42</sup>The translation here is adapted from Grube's, following Sedley (2006) in a few places.

On this sort of picture, then, we learn by recollecting, and everyday perceptions prompt our recollection. They do so in part by making us aware of their shortcomings: by perceiving equal sticks we are made aware that the sticks we perceive fall short of the Equal. And this is not just one of many possible ways we could learn about the Forms. Socrates and Simmias agree that perception is the *only* way we could begin the recollection process—and that perception is therefore a *necessary* prerequisite for any advanced knowledge of the Forms (*Phaedo* 75a5-7).<sup>43</sup>

The same point is brought out in a parallel discussion of perception's role in our learning at *Republic* 523a-525a. In this passage Socrates is trying to impress on Glaucon the critical role arithmetic plays in the guardians' education, as a subject well suited to "draw the soul away from the realm of becoming and towards the realm of being" (521d3-4). Arithmetic is well suited for this purpose because it allows us to distinguish the one from the many, and in particular to think of something as one specific sort of thing, separate from others. One of the key ways in which such distinctions are useful, Socrates explains, is that they allow us to sort out the contents of certain confusing perceptions—the perceptions he calls *summoners*:

Some perceptions don't summon the intellect to look into them: things are already being adequately discerned by perception. But others do exhort it in every way to look into them, because perception isn't yielding anything sound.

(523a10-b4)

The ones that don't summon the intellect are those that don't wander off into an opposing perception at the same time. The ones that do wander off this way I call *summoners*—whenever perception doesn't reveal *this* any more than its opposite, whether the things impressed upon it be near or far away.

(523b9-c4)

So not *everything* we perceive is confusing—to borrow Socrates' example, when perceiving fingers our perceptions do not tell us they are also *non-fingers* (523c5-6). But some of the things we perceive do "go off into an opposing perception," so that for instance some finger might be perceived to be big but also small, or hard but also soft (523e), or, one presumes, two sticks equal but also not (cf. *Phaedo*

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<sup>43</sup>Or at least, perception is a necessary prerequisite *for us*, given our embodied state. For as Socrates makes clear, it would be better to investigate reality unfettered by our bodily constraints—as lovers of learning our souls are "imprisoned" in our bodies, and forced to examine things "as through a cage," but in the ideal case—a case unavailable to us humans—we would proceed without attending to perceptible things at all (82d9-83a3). On this point cf. Bedu-Addo (1991: 46).

74b6-c3).<sup>44</sup> Because of their perplexing reports, such perceptions “summon our intellect” to further investigate them, using arithmetic to determine “whether each of the things announced are one or two” (524b4-5), and eventually recognize big and small as separate things, not “mixed up” the way perception reports them to be (524c6-8).

On the Platonic view expressed in these texts, we need perceptions to prompt our recollection of the Forms. Thus in some sense, the view *agrees* with Aristotle’s claim that advanced knowledge must come “from” perception—and indeed Plato uses the very same language we find in *APo* II.19: it’s ἐκ τῶν αἰσθησεων that we are prompted to think of perceptual deficiency, and thereby refer our perceptions to the knowledge of Forms we go on to recollect (*Phaedo* 75a7, 75a11; cf. *APo* 99b29, 100a3). But the knowledge of the Forms we recollect is entirely different from our perceptual knowledge, and not something we would infer from what we perceive. For our knowledge of the Forms is something we’re already meant to possess, in some latent form, at birth—*before* we perceive anything at all. And perception contributes to our recovering this knowledge only by compelling us to reflect on its own deficiencies: our perceiving certain particulars causes us to think that what we perceive falls short of some other reality, and thereby puts us on the path towards recollecting our knowledge of this other reality. Thus perception does *cause* the rest of our learning, but it doesn’t do so by supplying the knowledge from which our knowledge of Forms would be inferred. Nor does it serve as a source of *value* for this more advanced knowledge: that we must begin from perception is a lamentable fact of life for embodied creatures like ourselves, not something that would supply the knowledge we recollect as a result of our perceptions with any sort of epistemic standing.

If Aristotle’s account of our learning is going to challenge the sort of innatist portrayed in [11], perception must be more than the causal mechanism Plato already takes it to be. For innatism is compatible with perception’s being a causal starting-point for our learning—and Aristotle’s account of the origins of our learning would thus hardly be a challenge if it were intended in “purely causal” terms. The context for *APo* II.19 therefore makes it plain that Aristotle takes perception to be an epistemically *valuable* capacity—a capacity whose exercise supplies the basic knowledge from which more advanced forms of knowledge are derived, and is itself a source of value for this more advanced knowledge.

Now, it might be objected here that a more deflationary reading of Aristotle’s challenge is possible, on which his point in [12] would simply be that perception

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<sup>44</sup>And this is not because only one of these qualities is accurately perceived: Socrates is careful to specify that even under ideal conditions we might see a finger as both big and small, or feel something as both hard and soft (523b5-8).

is a *sufficient* causal prerequisite for the rest of our learning: we do not need to posit, in addition, the existence of innate knowledge to explain how our learning might get started. That would be enough to distinguish his view from those of Platonic innatists, even if we read Aristotle's account of our development in purely causal terms, as rationalists would have it—innatists think perception and innate knowledge are jointly sufficient to cause the rest of our learning, while Aristotle thinks perception can do the job alone.<sup>45</sup>

But I think there are good reasons to resist readings of this sort. Consider, first, the emphasis in Platonic innatism on the *inadequacy* of perception: perception is portrayed as something we should strive to turn away from—an inherently deficient mode of apprehension that promotes our learning only by awakening our intellect to make sense of its confusing reports. On this picture innate knowledge is not just one of two causal prerequisites for our learning. It serves to *correct* or *sort out* what perception alone could not make clear. We should expect Aristotle's own account of our learning to be responsive to this concern. To insist that perception is sufficient as a starting-point for our learning, in this context, is also to say (perhaps implicitly) that it provides a *valuable* form of knowledge, even without the corrective assistance of the intellect.

And there is good evidence Aristotle held just such a view. He consistently portrays the practical experience we develop on perceptual, non-intellectual grounds as an epistemic *achievement*—as something that is not only prompted by perception but that is epistemically good *because* it is perceptually grounded.<sup>46</sup> In [12] itself, Aristotle identifies perception as a capacity to *discriminate* (99b35)—just the sort of thing that would, for a Platonic innatist, require the use of the intellect. A bit later in *APo* II.19, he tells us that although we perceive particulars, our perceptions are “of universals,” and that this explains how these universals might come to “make a stand” in our souls (100a15-b1). However exactly we understand this difficult claim, it clearly suggests that our perceptions' universality would help us *establish* advanced universal knowledge, rather than just bringing it about.<sup>47</sup>

Consider also a broader dialectical point. In the *Phaedo* already we find a developmental story similar to the one Aristotle is advancing in *APo* II.19: in his

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<sup>45</sup>Thanks to an anonymous reviewer for suggesting this.

<sup>46</sup>See for instance his discussion of experience at *Met* A1 981a13-15, or *EN* 1143b11-14, where Aristotle tells us accumulated experience might give us “an eye to see things right” even when we cannot demonstrate them. Of course Aristotle does think intellectual forms of learning will yield a higher form of wisdom, and demonstrations the highest form of all. The key point is that perceptual learning is valuable nonetheless—and perhaps uniquely valuable when it comes to our knowledge of particulars (cf. *Met* A1 981b11).

<sup>47</sup>For a Platonic innatist, by contrast, our perceptions seem to establish nothing at all (or at least nothing coherent) without our recollection of innate knowledge.

autobiography, Socrates declares that he became dissatisfied with certain forms of causal explanation, and presents as an example the view according to which “the brain provide our senses of hearing and sight and smell, from which come memory and opinion, and from memory and opinion which has become stable, comes understanding” (96b5-8).<sup>48</sup> If Aristotle were simply reiterating a variant on this account as a record of the causal antecedents to scientific understanding, he would be rather blithely disregarding Socrates’ concerns about causal explanations of our learning—concerns raised just a few moments after he articulates his own account of learning as recollection.<sup>49</sup> A charitable reading of Aristotle’s response to Platonic innatism should not ascribe to him such neglect, and should therefore not be understood in purely causal terms. So while [12] might, in isolation, allow for the sort of “purely causal” reading rationalists endorse, the broader dialectical context makes this reading an implausible one. I therefore think that perception should be taken to play an epistemically significant role in Aristotle’s account—which is not to deny that it *also* serves as a causal starting-point for the rest of our learning.

Now, I have not said much so far about what it would be for perception to be “epistemically significant” for Aristotle, or how we should understand its role as an epistemically “valuable” cognitive state. I have argued that perception is not a mere prompt for the rest of our learning. But how then should we understand its role? One might think Aristotle endorses a non-rationalist version of foundationalism—with perception as the foundational source of justification, rather than our rational intuition of principles. Or one might read Aristotle as more of a coherentist about justification, who would not privilege any belief on etiological grounds alone.<sup>50</sup>

I do think Aristotle is a certain sort of foundationalist about perception. He is a foundationalist in the sense that perception supplies us with our most prior<sub>t</sub> knowledge: the only knowledge the existence of which does not depend on the (temporally) prior existence of any other knowledge. I’ve argued here that this

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<sup>48</sup>Of course this is not exactly Aristotle’s account of our learning—but on the surface it is very similar to it, and the similarities would have been clear to his audience. For more on the parallels between the two, see Adamson (2010). (When I describe the sort of explanation Socrates rejects as “causal,” I mean it in the sense of efficient causation, which is the sense relevant to the rationalist view. There are difficult questions about what sort of causal account Socrates did endorse, but what matters here is that he did not find records of efficient causes satisfactory.)

<sup>49</sup>To my mind this shows that recollection is not intended as a “purely causal” account of our learning: perception does cause the rest of our learning, but our innate knowledge of Forms is not posited as just another necessary cause to get our learning started (though it may be that as well). If Plato’s innatist account is not understood in purely causal terms, Aristotle’s challenge to it should not be understood in such terms, either.

<sup>50</sup>Thanks to an anonymous reviewer for pressing me to clarify these points.

dependence is not a merely causal matter: part of what makes experience and more advanced forms of knowledge epistemically valuable is that they are formed on the basis of perception, which is itself a valuable source of knowledge about the world. This does, to my mind, make perception a source of *justification* for more advanced forms of knowledge, though one's take on this point will, unsurprisingly, depend on how one understands talk of justification.<sup>51</sup>

But it does not yet make Aristotle a perceptual foundationalist in a stronger sense, on which perception would be our *unique* source of justification. For Aristotle does plainly allow for other sources of justification, or at least for modes of justification that would not strictly derive from what we perceive. Recall, for instance, that Aristotle thinks we can develop conviction “by argument” in a manner that might conflict with what's perceptually convincing. And recall that conviction “by perception” might itself require more than what perception justifies on its own. In [7]-[9], Aristotle tells us that our principles are vindicated by their ability to explain some body of observational evidence—so it seems clear from these passages that he takes *explanatory power* to play some justificatory role, or at least contribute to our conviction about our principles.<sup>52</sup> Now, clearly our observational evidence plays a critical role here: it's what our principles are meant to explain, and thus serves as an ultimate authority against which they should be assessed. But to be an ultimate authority is not to be a unique, foundational source of justification.<sup>53</sup> So I think we should allow that perceptual knowledge, for Aristotle, plays a foundational justificatory role in the sense that more advanced forms of knowledge could not be justified without it. But we should also allow that other, more theoretical considerations will contribute to the justification we have for our scientific principles—considerations which might be different for different domains of inquiry, and might not in every case be motivated on purely empirical grounds.

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<sup>51</sup>Perhaps rationalists will insist that perception is “epistemically valuable” only in a derivative sense—that it doesn't yet allow us to justify things in the specific way they envision. But rationalists typically do not specify what it is they envision, except by contrasting norms like justification with a “purely descriptive” context of discovery. One thing I hope to have shown here is that this dichotomy does not give us the resources to make sense of everything Aristotle has to say. If we restrict talk of justification to the realm of demonstrative science, we will still need to account for the sort of epistemic notions Aristotle posits for non-expert forms of knowledge (e.g. the prior<sub>t</sub> relation, or conviction by perception). Justification as rationalists understand it is too blunt a norm to capture his use of these notions.

<sup>52</sup>A point further supported by the discussion of the role explanation and definition play in our inquiry in the second half of the *Analytics*—on which see e.g. Bronstein (2016a) and Charles (2010).

<sup>53</sup>One might, as in Quine (1961: 41), endorse a form of confirmation holism and nonetheless take the “tribunal of sense experience” to be the final test of our beliefs (taken as a “corporate body,” without any unique linear justificatory ordering between them). Or one might consider experience an ultimate authority without taking any position on its etiological role, as in Gupta (2006: 3-5).

Exactly what these considerations are and how they play out in Aristotle's broader epistemology is more than I can touch on here. But I do hope to have established that there is such a thing as perceptual justification, or at least that Aristotle takes perception itself to be an epistemically *valuable* state, which we use to *establish* more advanced forms of knowledge—a relatively modest claim, but one which does rule out views on which perception and non-demonstrative forms knowledge play no justificatory role whatsoever, and so rules out the sort of rationalism that was my main target.<sup>54</sup> I also hope to have established that Aristotle took perception to be an *autonomous* source of conviction—a source of conviction that does not depend on our having prior intellectual knowledge at our disposal.<sup>55</sup> This is one of the main lessons of his methodological remarks, and, I've argued, a key part of his rejection of Platonic innatism. Finally, I hope to have shown that Aristotle took perception to be an *authoritative* source of knowledge—a source of knowledge that would take *precedence* over theoretical considerations. For he makes it clear that when certain principles do not fit our observations, the principles should be rejected, rather than the observations explained away. This should cast some doubt on views on which perception plays a merely secondary epistemic role, as well as views on which dialectical reasoning about *ἔνδοξα* might serve to establish scientific principles irrespective of their empirical credentials.<sup>56</sup>

## 5 Conclusion

Aristotle is often cast as a rational foundationalist. It's easy enough to motivate this sort of view: Aristotle tells us that an expert's knowledge of her demonstrated conclusions depends on her intuition of certain principles, and that this intuition does not itself depend on any of its demonstrative consequences. He tells us that an expert will be unshakably convinced of the truths she can demonstrate—and of the truth of her principles above all. The *structure* of scientific understanding is given by an asymmetric and transitive priority relation, which is ultimately grounded in our rational intuition of principles.

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<sup>54</sup>More broadly, it rules out readings of *APo* II.19 on which Aristotle would be concerned with merely psychological questions, whether or not that makes him a rationalist—cf. Hamlyn (1976).

<sup>55</sup>I thus take his views on perceptual conviction to tell against the sort of picture articulated in Goldin (2013), on which perception would depend on a prior intuition of principles to play any significant epistemic role.

<sup>56</sup>I take this conclusion to be sympathetic to the reading of dialectic (and the emphasis on *peirastic* dialectic) defended in Bolton (1999), *contra* Irwin (1988), Owen (1961), and others. Of course many further questions can be (and have been) raised about *ἔνδοξα* and Aristotle's conception of dialectic. My claim here is only that an account of the probative role played by dialectic would have to take into consideration the fact that principles must recover and explain our observations.

The main claim in this paper is that we should not, for all that, think of this rational intuition as a unique, foundational source of justification. What Aristotle has to say about the priority of first principles, and the sense in which our understanding *depends* on them can be well understood in terms of these principles' explanatory role. Likewise his remarks about expert conviction. Indeed, on a common way of thinking about justification an expert's intuition of principles *can* be justified—or defeated by countervailing empirical evidence.

The indirect case for rationalism should be resisted as well. For Aristotle explicitly frames his account of our prescientific learning as a response to Platonic innatism. And the only charitable way to read his emphasis on our perceptual beginnings, in this context, is to take perception to serve an epistemically significant role—as a capacity whose exercise would not only prompt the rest of our cognitive development, but also supply us with a valuable (if limited) form of knowledge, from which more advanced knowledge might be inferred.

A number of questions might still be raised about the source and nature of perception's epistemic value, and how it differs from the other forms of justification an expert might provide. What I hope to have shown is that these questions are pertinent ones—matters of justification are not, for Aristotle, restricted to the province of demonstrative science and the basic intuition upon which such science must be based. For Aristotle, perception itself is an autonomous and authoritative source of justification, and perceptual knowledge grounds even our most advanced forms of scientific understanding.<sup>57</sup>

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<sup>57</sup>Earlier versions of this paper were presented at workshops at Boston University, Dartmouth College, Providence College, and at the Orange Beach Epistemology Workshop. I am very grateful to members of these workshops for their comments. I am also grateful to two anonymous reviewers for their extremely helpful suggestions and comments.

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