

## On Aristotelian 'Ἐπιστήμη as 'Understanding'

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Myles Burnyeat has claimed that Aristotelian ἐπιστήμη should be identified as understanding rather than as knowledge or scientific knowledge.<sup>1</sup> His rationale is that: (1) for Aristotle ἐπιστήμη centrally involved having knowledge of explanations or the capacity to give them;<sup>2</sup> (2) in English the proper expression for this kind of knowledge or capacity is 'understanding'; whereas (3) knowledge *per se*, at least according to most modern accounts, is a matter of having a justified true belief rather than an explanatory capacity. Burnyeat's proposal and supporting rationale have met with broad acceptance<sup>3</sup> and only an occasional dissent.<sup>4</sup> Some would even extend his thesis to include both Socratic and Platonic ἐπιστήμη.<sup>5</sup> In what follows, however, I argue that: (1) while in some portions of Aristotle's writings ἐπιστήμη designated a cognitive capacity appropriately identified as understanding, in others it did not; and (2) the most appropriate English expres-

<sup>1</sup> Aristotle is analyzing a cognitive state which is achieved by knowing explanations, and whether he is currently calling it ἐπίστασθαι or γινώσκειν the corresponding term for that state in philosophical English is "understand". Similarly: 'our proposal [is] to take seriously the idea of rendering ἐπίστασθαι/ἐπιστήμη in terms of understanding' (Burnyeat 1984, 107, 105).

<sup>2</sup> Burnyeat states the point in slightly different ways: '[Aristotle] then gives a further characterization of the cognitive state: *it centrally involves* (italics mine) the possession of an apodeictic proof or demonstration' (Burnyeat 1984, 98); 'Because ἐπιστήμη *involves* (italics mine) grasping the demonstration of necessary conclusions, it is grounded epistemologically on the premisses of that demonstration' (99). Similarly: 'it is because ἐπίστασθαι *involves* (italics mine) explanation that Aristotle insists on proceeding from principles which are true, primitive, immediate...' (110).

<sup>3</sup> Barnes 1994, 82 comments: 'It has been powerfully urged that *epistēmē*, at least in the *APst*, is in fact close to our own conception of understanding and distinct from our own conception of knowledge, so that my translation happily—and accidentally—hit upon the truth'. Cf. Lear 1988, 6; Ferejohn 1991, 50; Scott 1995, 96 and 96n11; Wilson 2000, 7. Burnyeat's view of ἐπιστήμη is mentioned by Taylor 1990, 116, although he adds a circumspect 'perhaps'. A view of Aristotelian ἐπιστήμη as understanding had already been proposed in Kosman 1973.

<sup>4</sup> Barnes 1994 concedes that the match-up between ἐπιστήμη and understanding is perhaps not perfect, and Smith 1989, 105 has noted the awkwardness of speaking of a specific discipline, say arithmetic, as an 'understanding'. Irwin 1988, 530n., has claimed that since giving an explanation is one way of showing that a belief is justified, it would be 'a mistake to suppose that [Aristotle] was not concerned with justification and knowledge'. But this criticism, even if successful, leaves open the possibility that Aristotelian ἐπιστήμη was closely linked with explanation, hence properly identified as understanding.

<sup>5</sup> Recently by Benson 2000, 210ff. and earlier by Moline 1981, 28-31 and Moravcsik 1979. Burnyeat 1990, 3 and 216-218 notes the relevance of concepts such as mastery and expertise to the questions raised in the dialogue's discussion of ἐπιστήμη, but mastery, expert knowledge, and understanding appear to be regarded as equivalent notions.

sion for Aristotelian ἐπιστήμη, in the fullest and most proper sense of the term, is neither ‘knowledge’ nor ‘understanding’ but rather ‘expert knowledge’ or ‘disciplinary mastery’.

One important point convincingly established by Burnyeat is that Aristotle’s interest in knowledge is not congruent with the primary focus of modern epistemological inquiry. The accounts of ἐπιστήμη presented in his *Posterior Analytics* and *Metaphysics* say little about the conditions that might warrant a particular perceptual judgment (e.g., that the object I see before me is a dagger), or about the body of evidence or reasoning that might warrant adopting a belief about some factual matter (e.g., that Mr. Jones owns a Ford). Rather, Aristotle’s concern is to illuminate the capacity human beings possess when they know why certain features of the world are as they are, or why certain sorts of events occur as they do. Thus, if we are fairly to evaluate the merits of his account of ἐπιστήμη (as a capacity to construct demonstrations that is closely associated with teaching but distinct from sense perception) we should remember that what he was seeking to illuminate was not knowledge *per se*, or knowledge generally speaking, but rather a special ‘knowledge of the why’ or *explanatory* knowledge.

It must also be granted that there is some connection between Aristotelian ἐπιστήμη and understanding. We know a thing, Aristotle often says, when we know something else related to it—its ‘cause’, ‘reason why’, or ‘principle’:

As we have said, to know (τὸ εἰδέναι) what a thing is is the same as to know (τὸ εἰδέναι) the cause of its existence. (*APo* 93a4)<sup>6</sup>

We think we know (ἐπίστασθαι) when we know (εἰδῶμεν) the cause. (94a20)

Since knowing (τὸ εἰδέναι καὶ τὸ ἐπίστασθαι) takes place in every subject in which there are principles, causes, or elements, from the knowing (γνωρίζειν) of these. (*Physics* 184a1-3)<sup>7</sup>

To take two standard examples, we acquire knowledge of the nature of an eclipse when we discover the connection between the cessation of light and the interposition of an opaque body (*APo* 93a), and come to know the nature of thunder when we discover the connection between the noises in the heavens and the extinction of fire (93b). In these passages at least, ἐπίστασθαι (or having ἐπιστήμη) is a matter of connecting up one thing we know about the world with at least one other thing we know. And since understanding can be distinguished from knowledge *simpliciter* in virtue of having a complex or systematic character,<sup>8</sup> ἐπιστήμη, in these settings at least, can be spoken of in terms of understand-

<sup>6</sup> I follow the text for the *APo* given in Ross 1949.

<sup>7</sup> Similar remarks occur at *APo* 71b9-11 and 76a4-5, and *Meta.* 983a24-25.

<sup>8</sup> Cf. the view of understanding in Cooper 1994, 3: ‘It is possible to have knowledge of a bit or superficial kind, while we can only have understanding when we relate or connect bits of knowledge with other bits in a more or less coherent whole...understanding is concerned with relations and connections’. Similarly, Ziff 1972, 19: ‘If one is to speak sensibly of “understanding something”, that

ing, or at least a kind of understanding.<sup>9</sup> We *understand* an eclipse, or the nature of an eclipse, when we know that eclipses are produced by the imposition of an opaque body, and we *understand* thunder, or the nature of thunder, when we know that thunder results from the extinction of the fire in the heavens.

Yet Aristotle does not always employ *ἐπιστήμη* in connection with achieving or possessing understanding. He often uses it, for example, to designate the formal discipline or organized body of knowledge, i.e., a particular *ἐπιστήμη*. In the *Posterior Analytics*, arithmetic and geometry are the ones most frequently mentioned,<sup>10</sup> but we hear also about optics, mechanics, stereometry, harmonics, astronomy (all at 78b), and medicine (at 77a41 and 79a14). The opening paragraph of the work provides a typical example:

All instruction and all intellectual learning (μάθησις διανοητικῆ) come from pre-existent knowledge (γνώσεως). This becomes evident upon a survey of all the species of such instruction. For the mathematical sciences (αἵ τε γὰρ μαθηματικαὶ τῶν ἐπιστημῶν) and all other speculative disciplines are acquired in this way. (71a1-4)

While the ‘science’ or ‘formal discipline’ use<sup>11</sup> and the ‘intellectual capacity’ use are clearly related (since what one understands may represent either part or the whole of some field of inquiry), they are distinct—the former is an organized body of truths, a learnable subject, while the latter is a state or capacity which comes to be in the individual learner.

On other occasions Aristotle uses *ἐπίστασθαι* and *ἐπιστήμη* to designate nei-

which is to be understood must be characterized in such a way as to indicate that it is capable of the requisite sort of analytical data processing. So one speaks of understanding a statement, an utterance, a person’s behavior, the structure of a slab, and so forth’; and Moravcsik 1979, 56: ‘What we know are truths, and truths can be about any object in the universe. What we understand are systems of various sorts; in a world in which elements do not constitute the relevant structures there can be no understanding.’

<sup>9</sup> Not all uses of ‘understand’ mark the possession of knowledge of explanations or the ability to give them. One recognized meaning of the verb form, evident in assertions of the form ‘S understands that P’, is ‘to accept something as fact without any particular evidence, warrant, or justification’. In a usage note, Webster’s 1966, 2490, comments that ‘Understand is wider [than “comprehend”] in its use, ranging from the mere physical act of sensory perception or very casual considerations to a full and profound realization of inner nature, rationale, or significance.’ This aspect of the meaning of ‘understanding’ appears to have been overlooked in recent philosophical discussions (cf. Cooper 1994, 3: ‘If understanding is different from knowledge, it must be distinguished by what it adds to it’; Moravcsik 1979, 55: “‘Understand that’ constructions are semantically equivalent to the direct object constructions’; similarly, Burnyeat 1984, 131, speaks of knowing principles ‘in the way that goes with understanding’. And since one can have an incorrect understanding with respect to some matter, or be mistaken in one’s ‘understanding that p’, we must equate *ἐπιστήμη* (in at least some of its uses) with ‘having a correct understanding’, rather than ‘understanding’ simpliciter.

<sup>10</sup> For arithmetic: *APo* 75a39, 75b3, 76b8, 87a34-35; for geometry: *APo* 75a39, 75b3-20, 76b9, 77a40-b33.

<sup>11</sup> A broader term such as ‘discipline’ is required here since on occasion Aristotle allows for the possibility of achieving *ἐπιστήμη* in fields we would speak of as arts or crafts rather than as ‘sciences’ (cf. *Meta.* 981b5-10).

ther the achievement of explanatory knowledge, nor a specific discipline, but rather knowledge of an isolated fact, truth, or principle. Near the outset of the *Posterior Analytics* he addresses what had already become something of a classic epistemological puzzle: when we know the truth of a universal proposition do we also have knowledge with respect to every instance included under it? As is often the case with such puzzles, Aristotle responds: ‘in one sense, yes, but in another sense, no’. When we know that all triangles have interior angles equal to the sum of two right angles, but are unaware of the existence of a particular triangle to which this truth applies, there is a sense—albeit a rather strained one—in which we could be said to know something about the interior angles that triangle contains. But so long as we remain unaware of the existence of that triangle we cannot be said to know anything about it in any full-fledged or robust sense. What we do know, fully, is the truth of the universal statement that the sum of the interior angles of a triangle equals the sum of two right angles, and the verb Aristotle uses here (71a28) in connection with this single item of knowledge is ἐπίσταται. Although it is possible that one who knows the truth of this principle does so on the basis of a demonstration, this is not suggested here. The point is simply that one can ἐπίσταται the truth of a single proposition without having knowledge in any robust sense about everything included within its scope.

Aristotle also speaks of having ἐπιστήμη in connection with truths that could not possibly be known on the basis of other principles—the first principles themselves:

We hold that not all knowledge is demonstrative (οὔτε πᾶσαν ἐπιστήμη ἀποδεικτικήν)—but that of the immediate premisses is indemonstrable. (*APo* 72b18-20)

That which is capable of being otherwise cannot be the object of knowledge (ἐπιστήμη)...nor of insight (νοῦς), by which I mean the starting point of knowledge, or indemonstrable knowledge (ἐπιστήμη ἀναπόδεικτος) which is the grasp of the immediate premiss. (88b33-37)<sup>12</sup>

Even when he is engaged in distinguishing simple and complex forms of knowledge his wording makes it evident that thinks of both as instances of ἐπιστήμη or ἐπίστασθαι:

Knowing (ἐπίστασθαι) ‘the that’ and ‘the reason why’ differ, first, when both fall under the same science, under several different conditions. (78a23-24)

There are four kinds of question that we ask, and they correspond to the things that we know (ἐπιστάμεθα): the question of fact, the question of reason or cause, the question of existence, and question of essence. (89b23-25)

Ἐπιστήμη that is of both the fact and the reasoned fact, as con-

<sup>12</sup> In *APo* ii 19 we are told that while we can have νοῦς of first principles, we can have no ἐπιστήμη of them, but clearly this is not always Aristotle’s way of speaking.

trusted with knowledge (ἐπιστήμης) of the former without the latter, is more accurate and prior. (87a31-32)

Several texts indicate that Aristotle also thought of ἐπιστήμη as requiring more than simply the gaining of understanding. His most extended discussion of the nature of ἐπίστασθαι and ἐπιστήμη, in *Posterior Analytics* i 2 begins in the expected way:

We think that we know (ἐπίστασθαι) each thing in an absolute or unqualified way (ἀπλῶς) as opposed to the accidental way in which the sophist knows,<sup>13</sup> when we think we know (γινώσκειν) the specific reason why some state of affairs is as it is, that it is the reason, and that the state of affairs cannot be otherwise. (71b9-12)

But he then adds:

We shall discuss later whether there is also another way of ἐπίστασθαι, but what we now assert is that we do indeed know by demonstration. By ‘demonstration’ I mean a ‘syllogism ἐπιστημονικόν’, and by this I mean ‘that in virtue of which, by having it, ἐπιστάμεθα’. If, then, τὸ ἐπίστασθαι is such as we posited, then it is necessary that demonstrative ἐπιστήμη be from things that are true, primary, immediate, better known than, prior to, and explanatory of the conclusion. (71b16-22)<sup>14</sup>

Thus the intellectual capacity under consideration here—‘unqualified ἐπίστασθαι’—represents an exceptional achievement: we cannot be said to ἐπίστασθαι until we have acquired a syllogistically structured grasp of premises that are necessarily true, ‘primary’ (not deducible from other premisses), ‘immediate’ (not explainable through any other ‘middle term’), ‘better known than’ (deal with more basic principles), prior to (perhaps the same as ‘better known’), and explanatory of the conclusion (that is, make reference to causes rather than their effects). The inclusion of ‘primacy’ and ‘immediacy’ in this list (and reaffirmed at 71b26-27) indicates that what Aristotle has in mind here is nothing less than achieving a complete grasp of a subject—i.e., knowledge of a field all the way back to its foundational principles. We may speak of such an achievement as gaining ‘understanding’ of a sort (perhaps a ‘total’ or ‘in-depth’ understanding of a given discipline) but clearly not every instance of understanding will be able to satisfy the conditions for Aristotle’s preferred or ‘gold standard’ form of ἐπιστήμη.

Elsewhere Aristotle asserts that ἐπιστήμη requires becoming a proficient

<sup>13</sup> ‘Unqualified’ ἐπίστασθαι, as Barnes 1984, 89 and Ross 1949, 508-509 explain, involves (among other things) knowing that an attribute belongs to its subject as such (e.g., that the interior angles of a triangle *qua* triangle—as opposed to *qua* scalene or *qua* equilateral—are equal to two right angles).

<sup>14</sup> At *APo* 88b31 (as well as at *NE* 1140b32 and *Meta.* 982a22) Aristotle also requires that the propositions contained within demonstrative ἐπιστήμη must be both affirmative and commensurately (i.e., convertibly) universal.

demonstrator, more specifically, becoming adept at demonstrating the truth of whatever admits of proof within the discipline, as well as identifying those (first) principles for which no further proof is possible:

It is the business of experience to furnish the principles that belong to each subject. I mean, for example, that astronomical experience supplies the principles of astronomical science (ἀστρολογικῆς ἐπιστήμης); for once the phenomena were adequately grasped, the demonstrations of astronomy were discovered. Similarly with any other art or ἐπιστήμη. Consequently, if the attributes of the thing are apprehended, our business will be to exhibit readily the demonstrations (τὰς ἀποδείξας ἐτοιμῶς ἐμφανίζειν). For if none of the true attributes of things have been omitted in the historical survey, we should be able to discover the proof and demonstrate everything which admits of proof, and to make that clear, whose nature does not admit of proof. (*APr* 46a17-27)<sup>15</sup>

As Burnyeat and others have recognized, developing such a capacity requires more than simply becoming aware of the principles and proofs which constitute a discipline.<sup>16</sup> We must also become so familiar with the subject that the entire nexus of truths and proofs becomes internalized within our minds, or ‘second nature’ to us. As Aristotle puts it, the mind of the knower must ‘grow together’ with the discipline (*NE* 1147a22: δεῖ γὰρ συμφυῆναι). In short, ἐπιστήμη in this context requires not merely achieving an *understanding* of a subject but also becoming proficient in establishing the interconnections among its component truths. And when he requires that one know a subject all the way to its first principles as well as full become completely proficient in demonstrating all its demonstrable truths it becomes apparent that the ἐπιστήμη Aristotle is seeking to define here is really expert knowledge, or the complete mastery of a discipline.

We can gain some perspective on this striking feature of Aristotle’s account by reminding ourselves of some features of the use of ἐπιστήμη among his predecessors and contemporaries. From the time of the Homeric poems forward the verb ἐπίσταμαι had commonly signified the acquisition of mastery with respect to different kinds of physical and intellectual skills.<sup>17</sup> In Homer the verb typically

<sup>15</sup> Cf. *NE* 1139b31-32: ἡ μὲν ἄρα ἐπιστήμη ἐστὶν ἕξις ἀποδεικτικῆ—‘ἐπιστήμη, then, is a demonstrative capacity’.

<sup>16</sup> Burnyeat 1984, 130 comments: ‘There is such a thing as intellectual habituation as well as moral habituation, and in Aristotle’s view both take us beyond mere knowing to types of contemplative and practical activity which are possible only when something is so internalized as to have become one’s second nature.’ See the informative accounts in Burnyeat 1984, 126-131; Kosman 1973, 379 ff., and Byrne 1997, 185-189.

<sup>17</sup> Chantraine 1968, 360 traces the verb form ἐπίσταμαι to ἐπί plus ἵσταμαι (a middle form of the verb ἰστάω/ἵστημι meaning ‘stand, place, or stop’, with a loss of aspiration and contraction), meaning ‘to place or put oneself above or over a thing’, initially in connection with physical activities such as throwing the javelin, playing the lyre, dancing, waging war, etc. Both Plato and Aristotle suspected a connection between ἐπίσταμαι and ἵστημι, but opted for the idea of ‘standing still’ or ‘com-

means 'being able' to do something, 'knowing how', or 'being highly skilled' in a thing, and only rarely does it mean anything like 'knowing that something is the case'.<sup>18</sup> The same holds true for ἐπίσταμαι throughout much of archaic Greek poetry.<sup>19</sup> And in what has been thought the earliest appearance of the noun form ἐπιστήμη, Bacchylides speaks of 'the ten thousand ἐπιστᾶμαι (Doric for ἐπιστήμαι) of man', where the context indicates these are specific skills or crafts:

Various are the paths men seek that will lead them to conspicuous fame,  
And ten thousand are the crafts (ἐπιστᾶμαι) of man.  
For one thrives in golden hope because he has expertise (σοφός)  
Or is honored by the Graces or skilled (εἰδώς) in divination,  
And another because he can pull the dappled bow against all.  
(Fr. 9 Edmunds)

Snell has characterized the meaning of the verb throughout this period as designating 'practical activity which remains wholly in the sphere of ability', with ἐπιστήμη connoting 'not simply factual knowledge, but knowledge which makes it possible to engage in activity or possess a skill'.<sup>20</sup> During the classical period ἐπιστήμη would come to be used with reference to what we would characterize as propositional or factual knowledge, but it continues to be used in situations where a translation in terms of 'skill' or 'expertise' would be more appropriate.<sup>21</sup>

ing to a halt', i.e., when perception, memory, and opinion have 'settled down' they become knowledge. See *Phaedo* 96b, *Cratylus* 437a; Aristotle, *Physics* 247b11 and *Posterior Analytics* 100a-b.

<sup>18</sup> Cunliffe 1963, 149-150. The following are completely typical: 'Many Arcadian warriors skilled in making war' (ἐπιστάμενοι πολεμίζειν, *Il.* ii 611); 'Who knew how to fashion (ἐπίστατο...τεύχειν) all kinds of ornaments' (*Il.* v 60); 'Far the best of the Aetolians, skilled in the javelin (ἐπιστάμενος ἄκοντι, *Il.* xv 282). There appear to be only two recognizably non-skill uses of ἐπίσταμαι in Homer: *Od.* iv 730, where ἐπιστάμεναι σάφα θυμῷ seems to mean 'knowing clearly in your mind or heart (when Odysseus went on board the ship)', and *Od.* xiv 359, where ἀνδρὸς ἐπιστμένου refers to 'a wise or sagacious man'. But even here the possibility of a practical orientation cannot be excluded.

<sup>19</sup> Cf. 'skilled (ἐπιστάμενος) in the lovely gift of the Muses' (Archilochus Fr. 1 Diehl); 'I burned and cut the pig, for I am not poorly skilled' (κακῶς ἐπίσταμαι, Semonides 24); 'who skillfully (ἐπισταμένως) brings a great quarrel to an end' (Hesiod, *Theogony* 87); 'well and skillfully (ἐπισταμένως) denying guilt about the cattle' (*Hymn to Hermes* 390); 'another through his learning in the gifts of the Olympian muses, skilled (ἐπιστάμενος) in the measure of their lovely art' (ἱμερτῆς σοφίης, Solon Fr. 1); 'It is well to sit beside one skilled in every form of expertise' (σοφίαν πᾶσαν ἐπιστάμενον, Theognis 563-564); 'Those mules know how to lead the way (ὄδδὸν ἀγεμονεῦσαι...ἐπίστανται) since they were victors at Olympia' (Pindar, *Olympian* vi 25-26); 'Since you, Hieron, rightly know (ἐπίστα) how to understand the point of the sayings of earlier times' (Pindar, *Pythian* iii 80-81); 'For you, goddess, know how (ἐπίστασαι) to both give and take gentleness with exactitude and in a timely manner' (Pindar, *Pythian* viii 6-7).

<sup>20</sup> Snell 1924, 82-83: 'einer praktischen Betätigung und steht noch voll in der Sphäre des Könnens...ἐπιστήμη nicht lediglich das Wissen um ein factum, sondern die Kenntnis, die eine Tätigkeit ermöglicht eine Fertigkeit, ein Können'.

<sup>21</sup> Cf. Thucydides: 'But they fought with brute strength and fury, rather than with skill

A fascination with the forms of ‘human expertise’ can be seen running through much of 5th- and 4th-century Greek literature.<sup>22</sup> Sophocles’ ‘hymn to fearfully clever man’ in the *Antigone* (332-367) recounts progress made in the arts and sciences but cautions that skill differs from moral conscience. Plato’s mythical account of the origins of civilization in the *Protagoras* (320-322) is presented in connection with the question of whether ‘the political art’ is open only to a talented few or lies within the grasp of the average citizen. The author of the Hippocratic treatise *On Ancient Medicine* boasts that medicine has already made many discoveries, is in possession of a method and its starting points (ii 1-5), merits being called an art (τέχνη, iv 5-6), and has already achieved exactitude in a number of areas of inquiry (xii 8-10). In several early dialogues Socrates regards with more than a grain of scepticism the claims of the Sophists to have advanced rhetoric to the level of an ἐπιστήμη (cf. *Protagoras* 313ff., *Gorgias* 449), and to be able to provide individuals with all-round ‘moral and political excellence’ (καλοκάγαθία) through instruction (cf. *Laches* 186c, *Gorgias* 484, *Protagoras* 319, *Meno* 91, etc.). Given the breadth of interest in the different forms of human expertise, and the various controversies spawned by newly emerging ἐπιστήμαι, it would have been remarkable if questions relating to ‘expertise’ or ‘expert knowledge’ turned out to be irrelevant to philosophical accounts of ἐπιστήμη, especially for a thinker like Aristotle who expressly values the views held by earlier thinkers or ‘the many and the wise’.

Several recent studies have shown how Socrates’ seemingly paradoxical ‘disavowal of knowledge’ in the *Apology* and other early dialogues can be consistently read not as a denial of all knowledge (or of knowledge in general), but rather as a denial of the special kind of knowledge that marks someone as an expert in a particular subject or discipline.<sup>23</sup> When Socrates’ remarks are understood in this way, the ἐπιστήμη he denied he had turns out to be identical with a σοφία or ‘expertise’ in virtue (ἀρετή)—the expert knowledge of virtue, grounded in a grasp of its essential nature (cf. *Laches* 190, *Meno* 71b, 110b), that would enable a person to act always for the best.

(ἐπιστήμη) (i 49); ‘As soon as we have brought our skill (ἐπιστήμην) to a parity with theirs, in courage, assuredly we shall be superior’ (i 121); similarly i 122; ii 87; vi 18, 68, 72; vii 21, 37, 62, 63, 64. Similarly Sophocles, *Philoctetes* 1057: ‘For we have with us Teucer who has this skill (ἐπιστήμην, viz., in archery) and Euripides, *Meleager* Fr. 522 (Nauck), where weaving and skill at arms are called ἐπιστήμαι. For ἐπιστήμη as ‘knowledge’ without further specification, Liddell and Scott 1976 cites Sophocles, *Oedipus Rex* 1115: ‘But with respect to knowledge (ἐπιστήμη) you have the advantage since you have seen the shepherd before’; *Antigone* 721: ‘I say that it is best by far if a man is altogether full of knowledge (ἐπιστήμης), but that since things are not accustomed to go that way, it is also good to learn from those who advise well’; among others.

<sup>22</sup> For a more detailed account of this literature, see Guthrie 1969, 60-63 and 79-84.

<sup>23</sup> See Leshner 1987, Reeve 1989, Woodruff 1990, and Smith 1998. Cf. Smith 1998, 131-132: ‘Socrates is talking about the conditions of expertise, not about the conditions of knowledge *per se*... He is investigating the conditions under which one can be said to know a subject, the conditions under which one can be said to be an expert in a field. Knowledge of this sort will turn out to involve a complex combination of knowledge of propositions, knowledge of skills, and knowledge of things, though the differences among these three kinds of things are never emphasized.’



The concept of ‘expert knowledge’ also figured prominently in a number of Plato’s dialogues. In the *Meno* Socrates says of a slave boy who has just been given an explanation of how to double the size of a square:

These opinions have now just been stirred up like a dream, but if he were repeatedly asked these same questions in various ways (πολλάκις τὰ αὐτὰ ταῦτα καὶ πολλαχῆ), you know that in the end his knowledge about these things would be as accurate as anyone’s (τελευτῶν οὐδενὸς ἦτον ἀκριβῶς ἐπιστήσεται). And he will know it (ἐπιστήσεται) without having been taught but only questioned and finding the knowledge (τὴν ἐπιστήμην) within himself? (85c9-d4, Grube trans.)

Achieving ἐπιστήμη, in other words, requires not merely understanding the proof Socrates has set out, but developing a high degree of proficiency in answering various questions about it. We encounter a similarly high standard in *Republic* vii when Plato describes the person who has ἐπιστήμη about the Good as being able to run ‘the gauntlet of all tests...holding on his way through all without tripping in his reasoning—the man who lacks this power, you will say, does not really know (εἰδέναι) the good itself or any particular good, but if he apprehends any adumbration of it, his contact with it is by opinion not knowledge’ (οὐκ ἐπιστήμη, 534b, Shorey trans.). At various points in the *Theaetetus*, *Sophist*, and *Statesman*, ἐπιστήμη comes much closer to the achievement of professional competence or mastery in a discipline than to knowing a single fact or the truth of a single proposition.<sup>24</sup>

When, at the outset of the *Metaphysics*, Aristotle reviews the ways in which ἐπιστήμη is ascribed to individuals, he speaks both of knowing individual truths and of possessing a high level of expertise in a given field:

those with experience know that the thing is so, but do not know why, while the others know the ‘why’ and the cause. Hence we think that the master workers (ἀρχιτέκτονας) in each craft are more valuable and more knowledgeable and wiser (μᾶλλον εἰδέναι...σοφωτέρους) than the manual workers, because they know the causes of the things being done. (981a28-b2)

<sup>24</sup> In the *Theaetetus* Socrates describes the task at hand as discovering what is ‘meant by saying that an account added to true judgment becomes knowledge in its most complete or perfect form’ (τὴν τελεωτάτην ἐπιστήμη γεγονέναι, 206c4-5). Similarly, in the *Sophist* (253 ff.), the Eleatic visitor asserts that in grammar and music as in philosophy only a few people will know all the possible ways in which letters, notes, or kinds can be combined with one another. Philosophical dialectic, described as ‘a particular ἐπιστήμη’ and ‘perhaps the most important ἐπιστήμη of all’ (253b9, 253c4-5), is defined as ‘knowing how to discriminate by kinds’ (διακρίνειν κατὰ γένος ἐπίστασθαι, 253e1-2), i.e., knowing which of the kinds can enter into combinations with others and which must stand apart. The same model of letters and syllables is employed in the *Statesman* (278) to help explain ‘what happens to us in relation to the acquisition of ἐπιστήμη’ (277d7). The view that Platonic ἐπιστήμη was to a significant degree a matter of having expertise, expert knowledge, or mastery of a subject is defended in Nehamas 1985, Fine 1979, and Smith 1998, 158-161.

and we think that art is more truly ἐπιστήμη than experience is (τὴν τέχνην τῆς ἐμπειρίας ἡγούμεθα μᾶλλον ἐπιστήμη εἶναι), for artists can teach and men of experience cannot. (981b5-10)

We may infer from the mention of the physician at *Meta*. 981a17 that Aristotle intends for this analysis to apply the medical art: despite the fact that it is the individual whom the physician must treat and cure, ἐπιστήμη is most properly credited to those who know the universal principle and the cause.<sup>25</sup> Yet when he alludes at 981a3 to the view of Polus (a student of the sophist Gorgias) that ‘experience made art’ (981a3), and to ‘the inventor of any art’ (981b13) it becomes clear that his thesis is meant to hold true generally: one who is able to operate on the basis of knowledge of causes, principles, or theory must be regarded as more knowledgeable, and his set of capacities is more truly ἐπιστήμη, than one who operates only on the basis of experience. In addition, a person whose knowledge is based on principles of the greatest explanatory power must be thought of as the one who most has ἐπιστήμη, or most ἐπίσταται:

he ἐπίσταται to a greater degree (μᾶλλον) who knows (εἰδώς) from higher causes, for he knows (οἶδεν) from prior premisses when he knows (εἶδη) on the basis of causes that are themselves uncaused: hence if he knows to a greater or greatest degree (μᾶλλον οἶδε καὶ μάλιστα), his knowledge would be knowledge to a greater or greatest degree. (ἐπιστήμη... μᾶλλον καὶ μάλιστα, *APo* 76a19-24; cf. *Meta*. 982a32-b3)

It is clear, then, that Aristotle recognized a hierarchy among different kinds of ἐπιστήμη—from knowledge of individual truths, to a complex explanatory knowledge (or understanding), to a high level of explanatory knowledge, to the attainment of complete mastery of a discipline (having knowledge all the way back to the first principles and complete proficiency in demonstration).

In so far as ἐπιστήμη had different connotations in different portions of Aristotle’s writings it would be a mistake to try to find a single English expression to cover all its uses. ‘Knowledge’, ‘science’, ‘scientific knowledge’, ‘understanding’, ‘mastery’, and ‘expertise’ may all be suitable choices, depending on the context. But if we wish to say what Aristotle meant by ἐπιστήμη in the fullest and most proper sense of the term, our best choice would be neither ‘knowledge’ nor ‘understanding’ but rather ‘expert knowledge’ or ‘disciplinary mastery’.<sup>26</sup>

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<sup>25</sup> As Frede 1990 explains, Aristotle is here staking out a position on a dispute of long standing in ancient Greek medicine between those who thought of medical expertise as entirely the product of practice and experience, and those who would assign an essential role to grasping general concepts and principles.

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