ARISTOTLE ON ETHICAL EPISTEMOLOGY

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Abstract

Aristotle tells us explicitly in Book 6 of the *Nicomachean Ethics* that *phronēsis* (the most excellent psychic state in the ethical domain) is not *epistēmē* (the most excellent psychic state in the theoretical, scientific domain), but leaves us to wonder just what kind of knowledge *phronēsis* is if it is not scientific knowledge. I am interested in answering that question.

In the first chapter, I lay out Aristotle’s theory of scientific knowledge reflecting its description in the *Posterior Analytics*. There Aristotle tells us that having scientific knowledge is a matter of grasping the reason why something is true, i.e. it is a matter of knowing explanations. These explanations are packaged in the form of “demonstrative syllogisms” and they point to the nature of studied entities as being the primary explanation for any phenomena in which that entity is involved.

In the second chapter I recover the structure of ethical knowledge from what Aristotle has to say in Book 6 of the *Nicomachean Ethics*. I argue that ethical knowledge, too, consists in grasping explanations. But these explanations do not involve the natures of things. Rather, ethical explanations are facts grasped by excellent ethical agents as being moral reasons to act in one way or another. Happiness (*eudaimonia*) is one such reason, but some other facts such as "human beings are social animals" also have such moral force. I explain how these facts, and their explanatory role, set up ethical knowledge as having a structure similar to the structure of scientific knowledge.

The final chapter is devoted to the question of what points of contact exist between science and ethics. I argue that Aristotle conceives of practical wisdom as being “quasi-subordinate” to
certain domains of scientific knowledge because there are points of overlap with those domains where the science in question either contains a scientific explanation for some ethical fact or else the science in question relies on some fact as a first principle and the fact also features in practical wisdom as a starting point. This, I argue, is the limited sense in which there is anything scientific about Aristotle’s ethics.
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If I have learned anything from Plato and Aristotle, it is that one’s education begins very nearly with the beginning of one’s life. And so, just think of all the people I need to thank for getting me here. I can scarcely begin to scratch the surface.

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Hendrik Lorenz and John Cooper were especially influential in guiding me to the topic of Aristotle’s ethics and epistemology. Hendrik’s work on Aristotle’s conception of character virtue (arguing that it is, in part, a rational state) motivated me to wonder about that other, wholly rational state, *phronēsis*. Enlightening conversations with him about Aristotle’s moral psychology and the contents of the practically wise person’s knowledge laid the foundation for much of what is found here. John Cooper, too, inspired me to pursue greater understanding of the *phronimos’* knowledge and psychology. My interpretation of practical wisdom as centrally consisting in grasping explanations is a direct result of reading John’s work and talking with him about Aristotle. Every conversation I have had with him has left a lasting impression on me. I am deeply grateful that he has so generously shared his wisdom. Both Hendrik and John have been encouraging and insightful advisors—and generally wonderful people to have in my life—and I owe them more thanks than I can adequately express.

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I would also like to thank my parents, Monte and Kathi McDavid, who must have thought it strange when I first told them I wanted to be a philosopher, but who have encouraged me and supported me every step of the way. And, lastly, Keith Hankins has been a perfect friend and even better husband, showing me that our shared life truly is the good life.
Introduction

Aristotle was deeply skeptical about the practical utility of philosophy. He’s not one to mock his intellectual predecessors in the fashion that Aristophanes poked fun at Socrates, but he is quick to refute the opinion that the kind of wisdom that is distinctive of philosophers is even remotely useful for guiding practical decision making. Take for example this passage from the Politics (Pol.) in which Aristotle shares an anecdote about Thales:

There is a story told of Thales the Milesian and his financial scheme, which involves a principle of universal application but is attributed to him on account of his reputation for wisdom. He was reproached for his poverty, which was supposed to show that philosophy was of no use, but he knew by his skill in the stars (so the story goes) while it was still winter that there would be a great harvest of olives in the coming year; so, having a little money, he gave deposits for the use of all the olive-presses in Chios and Miletus, which he hired at a low price because no one bid against him. When the harvest-time came, and many presses were wanted all at once and of a sudden, he let them out at any rate which he pleased,
and made a considerable fortune. Thus he showed the world that philosophers can easily be rich if they like, but that their ambition is of another sort. He is supposed to have given a striking proof of his wisdom, but, as I was saying, his scheme for getting wealth is of universal application, and is nothing but the creation of a monopoly.¹

According to legend, Thales—the philosopher who famously asserted that “all is water”—applied his abstract, theoretical knowledge of the stars to the olive-production. But Aristotle deflates this legend and reduces Thales’ accomplishment to an ordinary business strategy that has “universal application.” It wasn’t philosophical wisdom that enabled Thales to make a fortune from the olive industry; it was his monopolization of the olive presses.² Whatever this story might have done to persuade ordinary Greeks that philosophy had practical usefulness, it did not move Aristotle.

The same attitude is expressed in the *Nicomachean Ethics (EN)* when Aristotle draws a sharp division between philosophical wisdom and *practical* wisdom, saying of the pre-Socratic philosophers Anaxagoras and Thales “and people of that sort” that “they are said to be wise, but not practically wise when we see them ignorant of what is advantageous to themselves.”³ To

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¹ *Pol. 1.11 1259a7–21*. For all the passages I provide from Aristotle, I have relied primarily on the translations found in the two volume *The Complete Works of Aristotle* edited by Barnes (1984). In some instances I have preferred wording in other translations. These are listed under “primary texts” in the Works Cited section. And on occasion I have provided my own translation. I make these choices without explicitly flagging them. The Greek text edition I use of the *Nicomachean Ethics* is Bywater (1894).

² Reeve (2014) misrepresents Aristotle’s recounting of this anecdote by suggesting that it is meant to count as a case of scientific knowledge having practical utility: “Knowledge of astronomy, for instance, helped Thales to make a killing in the olive business” (xxv).

³ *EN 6.7 1141b3–7*. 
whatever extent Thales really was able to navigate the olive industry, it was not his philosophical wisdom that guided him. So thought Aristotle, anyway.

We ought to feel alarmed by Aristotle’s sentiment on this score. How is it that one of the greatest philosophers, who developed one of the most influential ethical theories the world has ever known, how is this man in a position to doubt the practical value of philosophical wisdom? His ethical works themselves—the *Nicomachean Ethics*, the *Politics*, and the *Eudemian Ethics*—present carefully formulated theories of what good living consists in, described in general, rough outline so as to be sufficiently applicable to the particular circumstances anyone should find themselves in. These theories are drawn up and presented in the same fashion that Aristotle presents his scientific ideas. He seems to approach both types of inquiry with the same philosophical attitude. It is quite surprising that someone who applies philosophical treatment to moral questions is the same person who says philosophical wisdom has no practical utility.

Further, he tells us in Book 10 of the *Nicomachean Ethics* that the happiest life is the life of contemplation. In fact, he explicitly identifies philosophers as being most deserving of the name “happy.”

He who exercises his reason and cultivates it seems to be both in the best state of mind and most dear to the gods. For if the gods have any care for human affairs, as they are thought to have, it would be reasonable both that they should delight in that which is best and most akin to them (i.e. reason) and that they should

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4 Ibid. 2.2 1104a5ff.
5 Cooper (2012) puts this perfectly: “Aristotle developed a powerful conception of moral philosophy as a separate and essentially freestanding part of philosophy as a whole—separate from such “theoretical” philosophical topics as those concerning nature and divinity” (71).
reward those who love and honor this most, as caring for the things that are dear to them and acting both rightly and nobly. And that all these attributes belong most of all to the philosopher (tōi sophōi) is manifest. He, therefore, is the dearest to the gods. And he who is that will presumably be also the happiest; so that in this way too the philosopher (sophos) will more than any other be happy.⁶

Because the philosopher has knowledge of and contemplates things that are divine, he is in a position to live the happiest life. But we must get clear on what precisely Aristotle conceives philosophy and philosophical wisdom as being and, by contrast, what he conceives practical wisdom as being. Prior to pursuing clarity on this matter, confusion will persist. Only in seeing philosophical wisdom and practical wisdom side-by-side and in the form Aristotle imagines them to have will we be able to approach understanding why he believes them to be cast so far apart. This dissertation provides such side-by-side comparison.

Philosophical wisdom is one of the species of scientific knowledge, the other species being mathematical knowledge (of which there are the branches geometry, arithmetic, astronomy, etc.) and natural science (of which there are the branches physics, biology, etc.).⁷ When we understand philosophical wisdom as being a kind of scientific knowledge in this way, Aristotle’s insistence that philosophy has no practical utility begins to make some sense. As I will explain throughout this dissertation, Aristotle thinks of scientific knowledge as being widely different from practical wisdom. One is concerned with the essences of all the beings which have existence while the other is concerned only with those things which are good and bad for human beings; one consists in

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⁶ EN 10.8 1179a22–32.
⁷ Met E.1 1026a18–21.
grasping explanations as they are contained in special syllogisms while the other is expressed in the activity of deliberating; one has as its objects things which are universal and true of necessity while the other grasps things particular and variable, and so on. These differences create a deep divide between the two ways of knowing, and Aristotle’s epistemology is built around that divide.

Ultimately, what my dissertation shows is that the connection between philosophical wisdom (i.e. scientific knowledge) and practical wisdom is simply not what we might have supposed. Whereas Plato folds the two together in the image of the philosopher ruler, Aristotle holds them apart. Being practically wise is not identical to being philosophically wise, and the knowledge we have in virtue of being philosophically wise is not the knowledge we rely on in choosing good actions. That is, knowing, e.g., the proofs for geometrical theorems or the explanations for biological phenomena will not aid us either in knowing which actions we ought to choose in particular circumstances nor in carrying out our decisions.

Philosophical wisdom will contemplate none of the things that will make a man happy, for it is not concerned with any coming into being, and though practical wisdom has this merit, for what purpose do we need it? Practical wisdom is the quality of mind concerned with things just and noble and good for human beings.9

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8 EN 6.6 1140b31ff.
9 Ibid. 6.12 1143b19–21. Cooper (2012) has emphasized this—rightly, to my mind—as being the crux of the divide between the two kinds of knowledge: “We can begin to understand why Aristotle is so insistent that an understanding of human actions must be sharply distinguished from the understanding of other matters if we bear in mind that, as he frequently says, actions are always done for the sake of some good—in fact, some human good” (76).
It is not by being philosophically wise that we are practically wise. But philosophical wisdom does feature prominently in the happiest human life by being the body of knowledge exercised in the activity of contemplation (theoria). Being able to appreciate the value of contemplation (and of the knowledge which is exercised in that activity) is centrally important to having practical wisdom, then, since practical wisdom is knowledge of the goodness (or badness) of those things that are good and bad for human beings. Without any familiarity with contemplation, the practically wise person would be unable to judge its value and, therefore, unable to know it as a human good (the greatest good!). In this way, having philosophical wisdom and exercising it contributes to practical wisdom, by enabling a person to know its value. But it does not aid our judgments of ethical actions, and it certainly did not help Thales make a fortune from the olive presses.

Three chapters comprise this work. In the first, I lay out Aristotle’s account of scientific knowledge. I discuss the objects of that knowledge, and the way it is acquired, and I supply as many examples as can be mustered in order to make the theory intelligible. In the second chapter I turn to practical wisdom and lay out Aristotle’s account of that knowledge in just the same fashion that I laid out scientific knowledge. What emerges from this side-by-side comparison is that practical wisdom consists in grasping explanations, a feature that is central also to Aristotle’s

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10 This is Plato’s view, however.
11 EN 6.5 1140b20–21. “Practical wisdom (phronēsis) must be a state of the soul (hexin) with a true account (meta logou alēthous) that is capable of action (praktikēn) concerning human goods (peri ta anthrōpina agathā).” NB: I have preferred the text of ms. M and Γ which read “alēthous” instead of “alēthē,” the latter reading being preferred by Bywater.
12 I owe thanks to Cooper for helping me (in conversation) to see this point. He puts the point well in writing (2012): “[Philosophically inclined people] possess first hand, extensive, experience of the very great good for any rational being that, according to Aristotle’s analysis of human nature, is contained in the exercise of one’s intellectual powers, when they have been sharpened and deepened through such practice” (96). The contemplators themselves are in a position to experience the good, and as we will see in Chapter Two, experience is central to having knowledge (practical wisdom) of human goods, so it seems the philosophically wise person alone is positioned correctly for having the relevant practical wisdom.
theory of science. In this sense, then, practical wisdom and scientific knowledge have an important common trait: they are both ways of grasping explanations. But the explanations they grasp are in dramatically different domains and the explanations themselves are in different forms. Thus, the comparison isolates a similarity while simultaneously exposing deep differences. In examining practical wisdom just after having examined scientific knowledge, the differences will be most pronounced.

In the final chapter I ask, “What’s scientific about Aristotle’s ethics?” This is a question which might seem to have been preemptively answered by the comparison offered by chapters one and two. But, as I will make clear, there is a connection between them which is often overlooked. Looking back to the Posterior Analytics where Aristotle so carefully lays out his scientific theory, I focus on a relation called the “superordination-subordination relation” which he says holds strictly between scientific domains as a connection whereby one science contains an explanation for what the other science assumes as a principle. Therefore, I show that Aristotle is open to the idea that a version of this relation (“quasi-subordination”) might hold between a science and a non-scientific domain (he gives the example of geometry and medicine, and I explore this specific connection in detail). Extrapolating from this openness, I argue in the rest of that chapter that the practical domain and practical wisdom are quasi-subordinate to various scientific domains.

There is tremendous value in examining the contours of Aristotle’s ethical theory. All of his ethical treatises—the Eudemian Ethics, the Politics and the Nicomachean Ethics—grant us access

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13 APo 1.13 78b34-39.
14 Ibid. 1.13 79a15-16.
to his conception of the good human life. Happiness, he tells us, consists in living to a ripe old age having engaged in those activities which are distinctively expressive of our nature as human beings—specifically, those activities of the rational part of our soul, both of the theoretical (scientific) variety and the deliberative (practical) variety. Our lives are happy—indeed, we are happy—only if we are living lives that can be so described.

As it turns out, though, it is not sufficient for us merely to perform virtuous actions. We must perform virtuous actions in a virtuous way in order to achieve happiness. Three conditions must be met in order for an action to count as having been performed virtuously: (1) the agent must know that the action is virtuous and (2) choose the action (and choose it for its own sake) and (3) the action must be performed from a fixed character state.\textsuperscript{15} My dissertation is focused on the first of these three criteria. Granting that the good life consists in performing virtuous actions virtuously wherever those actions are called for, and that we must know that an action is virtuous if we are to perform it virtuously, I want to determine what it is to know that an action is virtuous and that it ought to be chosen.\textsuperscript{16}

Now, a keen reader of Aristotle might be suspicious right away that I have set my focus on the wrong aspect of Aristotle’s theory. In the lines that follow his setting out of the three criteria, he says the following:

Where the various crafts are concerned, these conditions are not factored in, except for the knowledge (\textit{to eidenai}) itself. But where the virtues (\textit{tas aretas}) are

\textsuperscript{15} \textit{EN} 2.4 1105a30–33.
\textsuperscript{16} In the quieter moments of life, when such actions are not “called for”—i.e., circumstances are not dire—we ought to be engaged in philosophy. This is because the philosophical life is the happiest without qualification, and the life of virtue or politics without philosophy is happy in a secondary way. Cooper (2012) discusses the relation between these two happy lives, pp. 137–143.
concerned, knowledge (to eidenai) has no weight, or only a small amount (ouden è micron ischuei), while the other conditions count not for a little but for everything (pan), i.e. these are the very conditions which result from often doing just and temperate acts.\textsuperscript{17}

Aristotle seems to be suggesting that we should not worry ourselves about the first condition—the condition which states that we must have some kind of knowledge about virtuous actions if we are to perform them virtuously. But I contend that he is pushing this condition to one side only temporarily and only because his immediate concern is to describe what virtuous action is and what virtuous character states are. Book 2 of the Nicomachean Ethics is entirely devoted to marking out the contours of character virtue, accounting for the way we acquire it (habitation), the motivations it is centrally related to (pleasing-seeking, pain-avoiding), and the actions which are productive of it and are counted virtuous by association (those actions which lie in a mean).\textsuperscript{18}

Aristotle is quite clear that this facet of his theory is, primarily, about the condition of that part of the soul which he says “has reason” in the sense of being capable of being obedient to reason—the non-rational (but not arational) part of the soul.\textsuperscript{19}

Of course, in this passage he does admit some space for knowledge in his account of virtue—“knowledge has no weight, or only a small amount.” I take it that this is a nod to the aspect of his theory developed in EN 6 which entangles character virtue with practical wisdom (phronēsis) in such a way that they are seen to be mutually complementary and presupposed. He

\begin{itemize}
  \item \textsuperscript{17} Ibid. 2.4 1105a33–b5.
  \item \textsuperscript{18} “Character virtue comes about from habits” (EN 2.1 1103a17); “we should take as a sign of [character] states the pleasure or pain that supervenes on acts (tois ergois)” (EN 2.3 1104b2–5); “temperance and courage are destroyed by excess and defect, and preserved by the mean” (EN 2.2 1104a25–27).
  \item \textsuperscript{19} EN 1.7 1098a5–7.
\end{itemize}
says, “It is not possible to be good in the strict sense (agathon einai kuriōs) without practical wisdom (phronēseōs), nor practically wise (phronimon) without moral virtue (ēthikēs aretēs).” The full possession of character virtue requires simultaneous possession of practical wisdom. A person cannot have one without the other. In this sense, knowledge does make up a “small amount” of the account of character virtue by providing the rational element of it that makes it complete. But, nevertheless, knowledge does not comprise the central components of character virtue. He puts this quite clearly towards the end of Book 6: “Just as in the part of us which forms opinions (epi tou doxastikou) there are two types, cleverness and practical wisdom, so too in the moral part (epi tou ēthikou) there are two types, natural virtue and virtue in the strict sense, and of these the latter involves practical wisdom.” Thus, when in this passage of EN 2.4 Aristotle pushes aside that criterion about knowledge, he seems only to be pushing it off for the sake of focusing on what is central and exclusive to the account of character virtue.

We are first given a glimpse of the crucial value of knowledge in the opening lines of EN 6, where Aristotle explicitly flags that he is resuming the discussion of the mean which was left off in Book 2:

Since we have previously said that one ought to choose that which is intermediate, not the excess nor the defect, and that the intermediate is as right rule says, let us discuss the nature of these dictates. In all the states of character we have mentioned

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20 Ibid. 6.13 1144b30–32.
21 Lorenz (2009) defends a reading of the EN according to which character virtues have this rational component. As he puts it, “Aristotle in the Nicomachean Ethics conceives of the virtues of character as rational states, states partly constituted by a well-informed, thoughtful quickness to grasp suitable reasons for acting in certain ways if and when such reasons arise” (178). The rational aspect of the character virtues is important to Aristotle’s account of them as being virtues “in the strict sense,” but it is also only “part” of their constitution, as Lorenz suggests.
[in Books 2 through 5], as in all other ones, there is a mark to which the man who has the rule looks, and heightens or relaxes his activity accordingly, and there is a standard which determines the mean states which we say are intermediate between excess and defect, being in accordance with the right rule. But such a statement, though true, is by no means clear; for not only here but in all other pursuits which are objects of knowledge (epistêmê) this is indeed true to say, that we must not exert ourselves nor relax our efforts too much nor too little, but to an intermediate extent and as the right rule dictates; but if a man had only this knowledge he would be none the wiser, e.g. someone would not know what sort of medicines to apply to the body if he were to say ‘all those which the medical art prescribes, and which are as the person possessing the art prescribes.’ Hence it is necessary with regard to the states of the soul also not only that this true statement should be made, but also that it should be determined what is the right rule and what is the standard that fixes it.23

This passage is our introduction to Aristotle’s account of practical wisdom (phronësis). Here he makes clear that the account he is going to provide will describe the kind of knowledge someone needs to have in order to be skilled and reliable in choosing those actions which lie in the mean between extremes. Such knowledge simply must be the knowledge of criterion (1). It must be this kind of knowledge—the robust and complete knowledge of a practically wise person—that guides us when we perform virtuous actions virtuously.

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23 EN 6.1 1138b18–34.
So it is true that Aristotle thinks that knowledge—the kind referred to in criterion (1)—is not central to the account of what a character virtue is, but we can still make sense of why he would include it on the list of criteria for performing virtuous actions virtuously. The practically wise person characteristically has this knowledge and he characteristically performs virtuous actions and, characteristically, in a virtuous way. Despite the fact that character virtue only partly consists in having this knowledge, practical wisdom is nevertheless central to virtuous living.24

I am interested not only in how we come to have such knowledge, but also in what is the epistemological and metaphysical status of this knowledge. That is, I aim to reconstruct Aristotle’s account of practical wisdom (phronēsis) by determining (1) the proper objects of practical wisdom, (2) which of our capacities is involved in knowing, (3) what are the conditions of knowing, e.g. a preponderance of evidence, and (4) how is it that we come to have that knowledge.

A great deal of attention has been paid to Aristotle’s theory of practical wisdom.25 Unfortunately, it seems that all this discussion has done little to advance consensus among scholars about what Aristotle’s view is. A considerable degree of consensus has been found with regard to his scientific theory, however. We know that scientific knowledge has universal and necessarily true propositions as its objects (e.g. “All As are Cs”), and that we achieve scientific knowledge when we grasp the explanation of some proposition (e.g. “All As are Bs” and “All Bs are Cs,” when they are first principles of a scientific domain, together explain why All As are

24 This is only reinforced by Aristotle’s conception of character virtue and this special knowledge as being mutually complementary.
25 Cf. Burnyeat (1980); Cooper (2012); Henry and Nielsen (2015); Hursthouse (2011); Irwin (2000) and (1980); McDowell (2009); Reeve (2014); etc.
Further, we know that it is the scientific part of the rational soul (epistēmonikon) that is capable of knowing scientifically and that intuitive intellect (nous) is the psychic capacity which grasps the explanatory premises. Aristotle’s account of this kind of knowledge is detailed and comprehensive, and as a result of his thorough treatment, we understand the theory fairly well. We do not have any such comprehensive (and generally satisfying for Aristotle scholars) account of phronēsis.

The absence of a complete and satisfactory account of ethical knowledge from the literature has resulted in a significant confusion about Aristotle’s ethical theory. Much debate has sprung up around the question of why it is that Aristotle identifies phronēsis as a form of knowledge at all. In Book 6 of the Nicomachean Ethics, he tells us that phronēsis is a truth-tracking state, just as epistēmē is a truth-tracking state. But then he proceeds to identify and emphasize over and over again the ways in which phronēsis is thoroughly unlike epistēmē, culminating with the most certain declaration “phronēsis is not epistēmē.” We might be inclined to take this to mean that there is not sufficient overlap between ethical and scientific knowledge for a comparison to be fruitfully revealing of the structure of ethical knowledge, or else that there are no points of similarity at all. A solution to this puzzle would help us greatly in understanding Aristotle’s

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26 This syllogistic form is called “Barbara.” Not all syllogisms in this form are demonstrative syllogisms, as Aristotle explains in the Posterior Analytics. Only those which (i) contain a reason why for the conclusion of the syllogism and which (ii) have first principles of the science as premises—i.e. they isolate definitions of entities and/or common notions as being the reasons why. There are certainly Barbara syllogisms which fail to meet these criteria. Some will be syllogisms which fail to isolate a reason why but instead establish the fact, e.g. Aristotle says that the syllogism “what does not twinkle is near; the planets do not twinkle; therefore, the planets are near” is a syllogism which establishes the fact that the planets are near (APo 1.13 78a30ff.). And syllogisms in Barbara may also fail to be demonstrative if they do not provide explanation through first principles, but through propositions which themselves are explained by first principles (APo 1.2 71b20ff.).
28 EN 6.3 1139b14-17.
29 Ibid. 6.5 1140b1-2; Ibid. 6.8 1142a23-24.
epistemology in general, but also help us understand what is necessary for meeting the first of his three conditions for performing virtuous acts in a virtuous way. This is the key (or one of the keys) that opens the door to really understanding what Aristotle thinks is required for happy living and, perhaps, a key to happy living itself.

I do not conceive of myself as an impartial scholar in this work. My ethical commitments and my deep admiration of Aristotle set me up as a student and follower of his thought more than as a distant interpreter. In this sense, I conceive of the value of this dissertation as being not only in its capacity for contributing to scholarly interpretations of Aristotle—whatever that capacity might be—but also in its capacity for shedding light on, and offering answers to, ethical questions, relevant to human flourishing. I am won over by Aristotle’s insistence in Book 2 of the Nicomachean Ethics that our aim in ethical inquiry is not the mere possession of knowledge, but the ability to put that knowledge to practice and make our lives better. “For we are inquiring not in order to know what virtue is, but in order to become good, since otherwise our inquiry would be of no use.”

This sentiment has been a guiding thought throughout the writing of this dissertation.

30 Ibid. 2.2 1103b27–29.
Aristotle’s Theory of Science: The Paradigm of Knowledge

When Aristotle presents his account of ethical knowledge in Book 6 of the *Nicomachean Ethics*, he emphasizes repeatedly that ethical knowledge is unlike scientific knowledge. Much of what we end up learning about ethical knowledge is by way of contrast with the case of scientific knowledge. It appears, then, that Aristotle thinks it is helpful to be introduced to his conception of scientific knowledge before reaching for his conception of ethical knowledge. I will honor his implicit suggestion by describing his theory of scientific knowledge here in this chapter, before embarking on a discussion of ethical knowledge in subsequent chapters.

The aim here is to see his scientific theory in outline, but in those places where further details will be illuminating for our discussion of ethical knowledge, I will go into detail accordingly. I begin by explaining what Aristotle thinks scientists are up to. What is their essential activity? What does their knowledge consist in? There are two senses in which we use the word “science.” In one sense, we may refer to the activity of doing science, engaging in a process of
investigation that is in accordance with a particular method. But in the other sense we may refer to the body of knowledge that stands completed after all investigation is done. If we are speaking strictly, we might say that the former sense of “science” is better called “scientific inquiry” and the latter sense is better called “scientific knowledge,” but we do tend to use the one term in both ways. For Aristotle, however, the word “science”—which in Greek is epistêmē—refers to the following: (i) the body of knowledge that stands completed after all investigation is done and (ii) the mental state someone possesses in virtue of grasping and understanding that complete body of knowledge.31 There will be some places where I rely on our contemporary notions in order to best communicate what I take to be Aristotle’s ideas. For example, my first section in this chapter is called “the Aims of Science” and I mean “science” there in the sense of investigation—my question is, what are the aims of scientific investigation? It will be clear, though, just what Aristotle thinks science is. The purpose of this chapter is to provide a fairly precise description.

The key concept in this discussion (and throughout this dissertation, really) is explanation. For Aristotle, explanation is the heart and soul of science—and that goes for both of his senses of “science.” The body of knowledge that stands completed at the end of investigation is a cohesive and unified body because of the explanatory connections between the propositions that fill out that body. And the mental state that Aristotle also calls “science” is the knowledge state we possess in virtue of understanding those explanatory connections. What kinds of explanations count as scientific and what way of grasping them is requisite will be the focus of this discussion.

31 Shields (2007) presents these two senses of epistêmē in his glossary of terms for Aristotle, pp. 417. Lear (1988) helpfully illuminates the deep connection between the two senses: “This is not an equivocation or ambiguity. For a person who has learned geometry has the epistêmē as part of his soul. Indeed, it is because his soul has become the epistêmē—that he can be said to be a geometer,” pp. 7.
In addition to outlining the place of explanations in scientific knowledge, I will also describe Aristotle’s accounts of how we acquire scientific propositions, of the differences between separate scientific domains, and also of the connections between them.

1. The Aims of Science
In the *Posterior Analytics*, Aristotle sets out his theory of scientific knowledge. He explains that scientific inquiry is an activity aimed at discovering *why* some fact about the world is true. The scientist observes some phenomenon in the world and asks of it, “Why does this happen?” Then she investigates the phenomenon with the aim of discovering the cause or explanation for its occurrence. In other words, her scientific investigation is a search for a reason why, the discovery of which will satisfy her motivating question.

Once she grasps this explanation and understands just how it explains the phenomenon, she will finally have scientific knowledge.

[T1] We think we have scientific knowledge of a thing *simpliciter*, and not just accidentally in the sophistic way, whenever we think that we are aware both (i) of

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32 Aristotle says that this question is basically equivalent to the question “What is this?” The practical difference is that the “Why…” question (*dioti*) is answered with a demonstration while the “What is…” question is answered with a definition. Both of these answers are important to the science, however, because demonstrations will involve definitions, so that an answer to the “What is…” question is crucial to formulating an answer to the “Why…” question. Cf. Leunissen (2010) for an introduction to the distinction between these question types and their distinct roles in science.

33 Lear (1988) points out that the reasons why the scientist seeks “are not merely responses to man’s probings: they manifest the ultimate intelligibility of the world. ‘The why,’ therefore, penetrates to the world’s most basic reality” (26). I agree with Lear that Aristotle is a realist in his conception of scientific explanation. But I would qualify the claim that scientific reasons why penetrate to the “most basic reality” of the world. Aristotle appears to conceive of just one science—first philosophy or metaphysics—as doing such work because the first principles of this one science are absolutely unexplained by any other demonstrations, even demonstrations from other sciences. Not all sciences are so foundational. Optical science, for example, while having its own set of first principles from which its theorems are proven, nevertheless is subordinate to geometry on account of some of its principles being demonstrable through geometrical demonstrations (see my discussion below in . There is a sense, then, in which the first principles of optical science penetrate to come “most basic truths,” but only the most basic truths of optical science, i.e. the ones that concern the most basic optical phenomena. Only first philosophy penetrates to the “most basic truths” of the world as a whole.
the reason why a thing is so, that it is the explanation for the thing, and (ii) that the fact could not hold in any other way.\textsuperscript{34}

Imagine a scientist who asks the question “Why is the angle in a semicircle a right angle?” This is an example that Aristotle himself offers.\textsuperscript{35} The scientist goes about answering her question in the following way: First, she needs to convert the object of her question into a predicative proposition, so that she can investigate why that propositions holds. “Why is the angle in a semicircle a right angle?” becomes “the angle in a semicircle is a right angle,” where “right angle” is predicated of “the angle in a semicircle.” Second, the scientist needs to find out what it is that establishes the relation between the subject and predicate asserted in that proposition, i.e. what explains the relation between “the angle in a semicircle” and “right angle” such that “the angle in a semicircle is a right angle” is a true proposition. This second stage just is the project of discovering why.

Now, Aristotle gives us the answer to this particular scientific inquiry. He tells us that the explanation is found in the very nature of right angles: the defining form of “right angle” is “half of two right angles”—so all halves of two right angles are right angles—and all angles of semicircles are instances of halves of two right angles. Thus, it is the term “half of two right angles” which explains the relation between “the angle of a semicircle” and “right angle.” Or, to be more precise, it is the fact that the propositions “all halves of two right angles are right angles”

\textsuperscript{34} \textit{APo} 1.2 71b9-12.  
\textsuperscript{35} Ibid. 2.11 94a23. The angle in question here lies between two lines which extend from any given point on the edge of a circle and form a triangle together with the diameter of that circle. This triangle will be inscribed within a semicircle and so the angle in question is the “angle in a semicircle.”
and “all angles of semicircles are halves of two right angles” are both true that explains why all angles of semicircles are right angles.

This example is quite difficult as an introduction to his scientific theory, however, since it illustrates the demonstrative method through a rather recondite geometrical proof. For the sake of illustrating the point more clearly, I offer this example of my own design: Begin with asking “Why do female mammals remain with their offspring for quite some time after birth?” We convert the question into a proposition, yielding “female mammals remain with their offspring for quite some time after the offspring’s birth.” Here, “remaining with offspring” is predicated of “female mammals.” We now seek out what it is that explains the connection between these two terms. Examining the behavior of female mammals and reflecting on the very nature of those animals that we call “mammals,” we realize that all female mammals nurse their offspring with breast milk. In fact, mammals are so called because they possess mammary glands. And the activity of nursing can normally occur (as the function of nursing requires) only when the mother remains with her offspring. Hence, because “nursing of offspring” stands in a particular relation to each of “female mammals” and “remaining with offspring,” we say that the fact of these relations constitutes the explanation for why female mammals remain with their offspring for some time after birth. This relation between explanantia and explanandum can be formalized in the following way:

(1) All female mammals nurse their young offspring with breast milk.

(2) Nursing of offspring with breast milk can normally occur only when the mothers remain with their offspring.
(C) Female mammals remain with their offspring for quite some time after the offspring’s birth.

Science, according to Aristotle, is knowledge of explanations that are structured and grasped in this form.

The name Aristotle gives to argument of this form is “syllogism.” It is the explanatory form that Aristotle says is central to all science. The name is a gesture to his own discussion of syllogistic logic in the Prior Analytics where he shows, among other things, that when two propositions have a term in common in the way that “nursing offspring with milk” is common to the two propositions above, then the other terms in the propositions must be related to one another.36 The conclusion is explained by the premises just because the premises share a common term in the way indicated by the example of female mammals and their offspring.

But not all syllogisms are eligible for packaging scientific explanations. As Aristotle tells us in the Posterior Analytics, the syllogism by which we know scientifically is a “demonstration” (apodeixis) or a “demonstrative syllogism”: “By demonstration I mean a syllogism productive of scientific knowledge—a syllogism, that is, the grasp of which is in itself such knowledge.”37 What sets a demonstrative syllogism apart from an ordinary syllogism is that a demonstrative syllogism has premises which cannot, themselves, be demonstrated within the science in which they have an explanatory function. That is, the premises of a demonstration are “true, primary, immediate, better known than and prior to the conclusion […] Unless these conditions are

36 APr 1.4 25b32–35. “Whenever three terms are so related to one another that the last is contained in the middle as in a whole, and the middle is either contained in, or excluded from, the first as in or from a whole, the extremes must be related by a perfect syllogism.”
37 Apo 1.2 71b17–19.
satisfied, the basic truths will not be appropriate to the conclusion. Syllogism there may indeed be without these conditions, but such syllogism, not being productive of scientific knowledge, will not be demonstration." 38 So while it is true that some kind of explanation may be contained in the premises of all syllogisms, the explanation in scientific syllogisms is one which appeals to something absolutely fundamental within the domain—fundamental in the sense of being unexplained by any other demonstrations within the domain.

Aristotle names these fundamental propositions “first principles,” and very often they are statements of the essence or definition of entities studied in a science. 39 We can see this clearly in the example of female mammals remaining with offspring: it is the fact that genus mammal is defined and differentiated by the possession of mammary glands and the utilization of those mammary glands for the natural purpose of nursing offspring (and that nursing of offspring can normally only when the mammalian mothers remain with their young) that stands as the scientific explanation for female mammals remaining with their offspring for some time after birth. The scientist appeals to the essence of mammals in order to generate her explanation. And when a scientist appeals to these kinds of explanations, she has reached the upper limit of her search for reasons why. The definitions of entities within a domain of science stand as primary truths which cannot be explained or proven by any other demonstration in the domain.

Some “first principles” are not definitions, however. In Euclid’s geometry, for example, in addition to the 23 definitions we find in the Elements, there are five postulates and five common notions. The first postulate is “to draw a straight line from any point to any point” and the first

38 Ibid.
39 Apo 1.2 72a6: “To proceed from primitives is to proceed from appropriate principles (I call the same things primitives and principles).”
common notion is “things which equal the same thing also equal one another.” These statements certainly are not definitions of any terms within geometry, but they nevertheless play the role of *explanantia*. That is, Euclid appeals to these postulates and common notions in the course of proving his geometrical theorems. And, further, neither the postulates nor the common notions are ever proven to be true by any geometrical proof in the *Elements*. Euclid relies on these ten statements in just the same way that he relies on his definitions—as first principles of the science. Aristotle, too, conceives of first principles as being definitions together with some other statements relevant to a science.\(^{40}\) In *APo* 1.10, he says, “Of the basic truths used in the demonstrative sciences some are peculiar to each science, and some are common.”\(^{41}\) By “common” he means that some first principles can be used to explain theorems of more than one science, just as Euclid’s “common notions” could be employed as explanations of phenomena in various mathematical domains.\(^{42}\)

Each domain of science has demonstrative syllogisms that are constructed from the terms which are proper to that domain and, accordingly, explain the phenomena of that domain. Geometry has demonstrative syllogisms about lines, triangles, and other figures; astronomy has

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\(^{40}\) Lear (1988) has overlooked the place of common notions among Aristotle’s first principles. He restricts his discussion of scientific inquiry to those cases in which we are seeking “the why of a thing,” perhaps overlooking our investigations into the why of phenomena, and then says that “the form, which is the thing’s inner principle of change, provides us with the best understanding of what the thing most truly is and why it is the way it is [...] Aristotle did identify the why with an object’s nature or form” (27). I certainly agree with Lear that formal causes are the quintessential scientific *explanantia* for Aristotle, but we should not emphasize formal causes at the expense of ignoring the place of common notions among first principles. Reeve (2014) says that definitions are “the most important explanatory starting points,” leaving open what the other, apparently less important explanatory starting points might be (introduction, xxxvi). I take it that the common notions are no less explanatory than the definitions of a science, and so they have equal standing in importance.

\(^{41}\) *APo* 1.10 76a38–39.

\(^{42}\) In fact, Aristotle says that the “common” first principles are shared only by sciences within a single genus, and even then they are shared “analogously.” “For a truth of this kind will have the same force even if not used generally but applied by the geometer only to magnitudes, or by the arithmetician only to numbers.”
them about the movements of the stars; biology has them about living organisms. As such, each
domain has its own theorems and its own premises which explain those theorems, and in some
cases a few premises will be shared with another science. The aim of a given science is to find the
explanations for the phenomena with which that science is concerned, and so having scientific
knowledge will consist in (i) grasping as explanatory the definitions of entities that feature in those
phenomena and (ii) understanding that the phenomena could not be other than they are. These
are the conditions of having scientific knowledge, as Aristotle indicated in T1.

2. Two Ways of Knowing
Aristotle’s description of demonstrative syllogisms makes clear that whenever we know a
proposition P scientifically, we also necessarily know some other propositions as (containing) the
explanation for P. To put this another way, knowing a scientific theorem in the way that a scientist
knows it necessarily involves grasping the first principles which explain that theorem (and
grasping these first principles as explanatory: see condition (1) in T1 above, pp. 17). The proper
object of scientific knowledge, then, is the theorem. But since scientific knowledge of the theorem
is possible only through demonstration, it is also sensible to say that a person’s scientific
knowledge consists in grasping not just theorems, but the demonstrations that establish them. As
Aristotle puts it, “to understand something of which there is a demonstration non-incidentally is
to possess a demonstration of it.”43 Hence, while the theorem is the proper object of scientific
knowledge, a person must know more than the theorem alone.

When Aristotle selects the theorem as the genuine object of scientific knowledge in this
way, he likewise indicates that the first principles of the science are not known scientifically. This

43 APo 1.2 71b27ff.
is a curious suggestion, though, since he has already told us that the first principles are “true and primitive and immediate and more familiar than and prior to” the theorems. If the first principles of the science are not the proper objects of scientific knowledge—and, thereby, not known scientifically—but are nevertheless grasped in a way that is sufficiently firm and stable for grounding scientific knowledge, then what is the way in which we grasp them? How do we know first principles?

There are two conditions set on the way in which we must grasp first principles: (i) we must grasp them as explanatory and (ii) we must grasp them as unexplained within the scientific domain for which they function as first principles. Aristotle arrives at these conditions as a result of reasoning about the possibility of knowledge. In response to other (unnamed) philosophers who claim that all knowledge is demonstrative and that, as a result, we are forced to seek demonstrations ad infinitum in order to establish ever-prior explanations for the posterior explanations, Aristotle says:

[T2] Our own doctrine is that not all knowledge is demonstrative: on the contrary, knowledge of the immediate premises is independent of demonstration. The necessity of this is obvious, for since we must know the prior premises from which the demonstration is drawn, and since the regress must end in immediate truths, those truths must be indemonstrable. Such, then, is our doctrine, and in addition we maintain that besides scientific knowledge there is its originative source which enables us to recognize the definitions.45

44 Ibid. 1.2 71b22ff.
If all knowledge were demonstrative, then we would be required to know not only the theorems of a science through demonstration, but also the propositions which feature as premises in those demonstrative syllogisms. Knowing the premises demonstratively would necessitate the existence of further explanatory premises, and then we would be required to know those new premises through demonstration as well. Thus, when all knowledge is conceived as being demonstrative, we run into an infinite regress in which complete knowledge is never possible because more explanations and demonstrations are always needed. Aristotle denies the infinite regress by asserting that scientific explanation has some “immediate truths” which are grasped by the scientist as being the premises which explain their theorems and also as being indemonstrable within the science, i.e. as being upper limits of explanation.

So the grasp we have on first principles is not scientific knowledge, but we cannot have scientific knowledge without grasping first principles in this way. This is because scientific knowledge consists in knowing the explanation for proposition P and first principles just are the explanation. This distinction—between the way we know the theorem and the way we know the first principles—makes sense of Aristotle’s suggestion in APo 1.2, at the very beginning of his account of scientific knowledge, that while scientific knowledge is had through demonstration, “there may be another manner of knowing as well.”46 This second way of knowing turns out to be the non-demonstrative grasp a scientist must have on first principles. As T2 illustrates, this is the “knowledge of immediate principles [which] is independent of demonstration.”

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46 Ibid. 1.2 71b17.
Aristotle explicitly gives a name to this mental state by which a scientist grasps first principles in the final chapter of the second book of the *Posterior Analytics*.

[T3] The principles (*archai*) of demonstrations are more familiar, and all scientific knowledge involves an account. Hence there will not be scientific knowledge of the principles; and since nothing apart from intuitive intellect can be truer than scientific knowledge, there will be intuitive intellect (*nous*) of the first principles. This emerges both from our present inquiry and also because, just as demonstration is not a principle of demonstration, so scientific knowledge is not a principles of scientific knowledge. Thus if we have no other true kind apart from scientific knowledge, intuitive intellect will be the principle of scientific knowledge. And the principle will relate to the principles as scientific knowledge as a whole is related to its object as a whole.  

Here I am translating the Greek word *nous* as “intuitive intellect.” This is certainly an imperfect translation, not least of all because Aristotle is not tracking our modern conception of “intuition” with his conception of *nous*. Nevertheless, *nous* is a state (*hexis*) of the scientifically capable part of the rational soul, so it is certainly an intellectual state, though it does not exhaustively account for what the scientific part of our soul can do—that part can also have scientific knowledge.  

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47 Ibid. 2.19 100b9.  
48 Aristotle describes the various activities and states of the soul in *EN* 6.1–3. See 1139a3 ff., referring back to 1.13 1102a26-28: “We said before that there are two parts of the soul—that which possesses reason, and the irrational. Let us now draw a similar distinction within the part which possesses reason. And let it be assumed that there are two parts which possess reason: one by which we contemplate (*theraumen*) the kind of things whose originative causes are invariable, and one by which we contemplate variable things; for where objects differ in kind the part of the soul answering to each of the two is different in kind, since it is in virtue of a certain likeness and kinship with their objects that they have the knowledge they have. Let one of these parts be called the scientific and the other the calculative.” *Nous*, we learn later in *EN* 6.7, can result in wisdom (*sophia*) when it is had in conjunction with
Thus, one part of our soul—the scientifically capable part (to epistêmionikon)—is host to the natural capability for both of these two different states of knowing. That one part of us is what does all the work when we are engaged in scientific inquiry and demonstrative syllogizing.

3. The Acquisition of Knowing States
There is a sense in which the description of the standards and structure of demonstration counts as explication of how scientific knowledge (and nous) is acquired. After all, Aristotle specifies that having scientific knowledge is a matter of knowing the explanation for proposition $P$ and that knowing that explanation in the requisite way is a matter of knowing it as the explanation and as unexplained within the science. When we understand these aspects of his theory of knowledge, then, we are immediately in a position to appreciate that having mastery of a domain just is a matter of grasping specific propositions in one or the other of these two ways, whichever way is appropriate for that proposition in the given domain.

But the question of how we acquire those propositions that will eventually be grasped as theorems and explanations remains important because we can still wonder how it is that a person first becomes familiar with facts like “female mammals remain with their offspring for some time after birth” or “all female mammals nurse their offspring.” That is, by what mechanisms or capacities do human beings pick up these propositions in the first place? Even if we can understand that knowing the propositions scientifically means grasping demonstrative syllogisms, our account may seem incomplete or unconvincing if we cannot tell a story of the
human trajectory from non-scientist to scientist, from no familiarity with objects or concepts like “mammals” to possession of demonstrative syllogisms.

Aristotle divides his discussion of acquisition between two separate treatises, the *Posterior Analytics* and the *Metaphysics.* In the final chapter of the *Posterior Analytics,* he provides an account of how we acquire those propositions which will turn out to be first principles. And in the very first chapter of the *Metaphysics,* he explains how it is that we acquire those propositions which will turn out to be theorems. As we will see, these accounts overlap on nearly every crucial point, but also differ in interesting and difficult ways. I will present the ideas from these two chapters separately, but I can say now, by way of noting the overarching narrative, that acquisition of universal propositions—first principles and theorems alike—begins with sense-perception and proceeds through stages of memory, experience, and a low-level kind of reasoning called induction.

### 3.1. The Acquisition of Nous

The aim of *Posterior Analytics* 2.19, Aristotle tells us, is to elucidate “how [the principles] become familiar and what is that state that becomes familiar with them.” Reflecting on the idea that it would be absurd both for us to already have the principles innately and for us to acquire the principles from no pre-existing knowledge, he arrives at the idea that there must be some other capacity in us—other than *nous* or scientific knowledge—by which we can become familiar with the propositions which we will grasp by *nous* once we have scientific understanding. This capacity is *perception,* and he says that it belongs to all animals. A thorough account of sense-

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49 *APo* 2.19 99b17–18.
50 Ibid. 99b26–34.
51 Ibid. 99b35–36.
perception, including a discussion of each sense-organ and its proper objects, can be found in *De Anima* 2, but here in the *Posterior Analytics*, Aristotle is satisfied with saying very little about the nature of sense-perception itself. He indicates that animals have it as a “connate discriminatory capacity,” a phrase which echoes the *De Anima* description of individual senses and reminds us that he thinks of perception as the primary means by which we differentiate objects and entities in the world (i.e. the means by which we differentiate this book from the desk upon which it sits and this ensouled person from that ensouled person). But that little phrase is the extent of his elaboration on perception in this text. He moves on quickly to *memory*, saying that some animals have an additional capacity to retain an impression of what they perceive. This extra capacity, he says, distinguishes animals which are capable of learning from those which are incapable. Hence, we have a story of the origin of learning and knowledge.

After memory, there arises experience (Aristotle does not indicate whether or not experience is a capacity belonging only to a subset of those animals with memory or to all of them):

[T4] From perception there comes memory, as we call it, and from memory (when it occurs often in connection with the same thing), experience; for memories that are many in number form a single experience. And from experience, or from the whole universal that has come to rest in the soul (the one apart from the many, whatever is one and the same in all those things), there comes a principle of craft

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52 Aristotle says of the senses of touch and sight that they “discriminate” among many things. E.g. “touch discriminates more than one set of qualities” (*DA* 2.6); “our power of smell is less discriminating and in general inferior to that of many species of animals [...] our sense of taste is more discriminating than our sense of smell” (*DA* 2.9); “darkness is invisible and yet is discriminated by sight” (*DA* 2.10).
knowledge and of scientific knowledge—of craft if it deals with how things come about, of scientific knowledge if it deals with their being.\textsuperscript{53}

Our initial engagement with the world is through perception, and because we also have a capacity for memory in addition to our capacity for perception, we store some (probably not all) of our sense-impressions as memories. When we have many memories of sufficiently similar phenomena, we have a capacity to extract what is similar among those memories. For example, if I have many sensory perceptions of apples—some being red apples, others green—and my memory has taken hold of those impressions and retained them, then I can review those memories, in a way, and find out what is the common denominator among them. As a result, I form the concept of an apple, having induced from the many instances of apple what properties are universally predicated of them all.\textsuperscript{54} This is the “single experience” which is formed from many memories, and it is the “universal” which comes to rest in the soul.

The final stage of this genesis story is the grasping of a universal proposition, an achievement that results from induction. Now, some Aristotle scholars have thought that the universal that we possess as a result of induction is grasped in the way that we grasp first principles. That is, some have thought that what we get from induction is \textit{nous}. But this cannot be Aristotle’s intention. He is clear in T4 that “from the whole universal that has come to rest in the soul […] there comes a principle.” In parallel with the sentence just prior, where he says “from

\textsuperscript{53} \textit{APo} 2.19 100a4–9.
\textsuperscript{54} Aristotle uses the example of the concept “animal” to illustrate the point: “When one of the undifferentiated things makes a stand, there is a primitive universal in the mind (for though one perceives the particular, perception is of the universal—e.g. of man but not of Callias the man); again a stand is made in these, until what has no parts and is universals stands—e.g. \textit{such and such} an animal stands, until animal does, and in this a stand is made in the same way” (\textit{APo} 2.19 100a15–100b5).
perception there comes memory [...] and from memory, experience,” we have every reason to think that he conceives of the stage at which we grasp something as a principle as being distinct from the stage at which we grasp something as a universal, in just the same way that grasping something through our capacity for experience is different from grasping it through our capacity for memory, and different still from grasping it through our capacity for perception. Rather, Aristotle is evidently claiming that there is some cognitive processing that occurs between the stage of grasping the universal and the stage of grasping it as a principle. He does not give a name to that process in this chapter, but we know from the preceding discussion which started at the beginning of the *Posterior Analytics* that the process in question just is the activity of coming to see a proposition in its explanatory role. The last and most significant stage of acquiring nous, then, is scientific inquiry and scientific knowledge itself. The stages of perception, memory, and experience and the processes by which we move between those stages constitute the account of how we become familiar with those propositions which will turn out to be the first principles once we engage in the scientific investigation and finally secure scientific knowledge.

### 3.2. The Acquisition of Scientific Knowledge

*Metaphysics* A.1 provides a parallel account of how we become familiar with those propositions which will turn out to be the theorems of science. But Aristotle’s strategy for explaining his view in this chapter is quite different from what we saw in the *Posterior Analytics*. For one thing, instead of focusing directly and explicitly on scientific propositions, his discussion is centered on the kinds of propositions that are known by expert craftsmen. He uses medicine as his primary example, and this is a body of knowledge that Aristotle certainly conceives as being a productive domain of expertise, not scientific, because it aims at the production of health in patients rather
than at truth alone. A second departure from the strategy of APo 2.19 can be observed in the way that Aristotle illustrates his conception of how we acquire the theorems of scientific knowledge by comparing the person of knowledge with the person of mere experience. No such comparison is made in APo 2.19.

Met. A.1 opens with an emphasis on the value of sense-perception in relation to our acquisition of knowledge. “All men by nature desire to know,” Aristotle says, and we see evidence of this in the fact that human beings love to engage in sense-perception, especially the sense of sight. “We prefer sight to almost everything else. The reason is that this, most of all the senses, makes us know and brings to light many differences between things.”55 The foremost utility of the senses, as noted here, is the same as what we saw in APo 2.19: the senses allow us to discriminate between objects and entities in our environment. Aristotle goes on to attribute sense-perception to all animals but memory to only some:

[T5] By nature animals are born with the faculty of sensation (aesthesis), and from sensation memory is produced in some of them, though not in others. And therefore the former are more intelligent and apt at learning than those which cannot remember; those which are incapable of hearing sounds are intelligent though they cannot be taught, e.g. the bee, and any other race of animals that may be like it; and those which besides memory have this sense of hearing, can be taught.56

55 Met. A.1 980a26–27.
56 Ibid. 980a28–980b25.
Memory is again identified as arising from perception and again tied to the capacity that some animals have for learning. Thus far, the description of sense-perception and memory matches what we have seen in the *Posterior Analytics.*

The next stage is experience. Aristotle says, just as in *APo* 2.19, that “from memory, experience is produced in men; for many memories of the same thing produce finally the capacity for a single experience.”\(^{57}\) And we are told that “experience seems to be very similar to science (*epistēmē*) and art (*technē*), but really scientific knowledge and craft knowledge come to men through experience,” an emphasis that mirrors the *APo* 2.19 assertion that our grasp of principles as principles comes from experience, but is not identical to experience.\(^{58}\) This is where we see the *Met.* A.1 discussion parting ways from that of *APo* 2.19. Where the latter concentrated on the processes and states through which we become familiar with those propositions which we will grasp through *nous* once we have scientific knowledge, the former is focused on acquisition of propositions that will be theorems and known scientifically.

That *Met.* A.1 is focused on theorem acquisition is evidenced by the contrast Aristotle draws between the craftsperson and the “man of experience”:

[T6] We think that knowing (*eidenai*) and understanding (*epaiein*) belong to craft knowledge rather than to experience, and we suppose craftspersons to be wiser than men of experience (which implies that wisdom (*sophia*) depends in all cases rather on knowledge); and this because the former know the cause, but the latter

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\(^{57}\) Ibid. 980b28–981a1.

\(^{58}\) Ibid. 981a1–5.
do not. For men of experience know that the thing is so, but do not know why,
while the others know the ‘why’ and the cause.59

Aristotle specifies that “men of experience” know “that the thing is so” and what they lack is the reason why. Putting this together with his conception of demonstrative syllogisms, as discussed in §1, we can see that what the man of experience lacks is a grasp of the premises in those syllogisms. Though he might be familiar in some way with the propositions which figure as premises, he does not know those propositions as premises which explain the conclusion. He does know the theorem—again, not as a theorem, because that would imply that he knows the proposition for its place in a demonstrative syllogism, but he has some kind of grasp on the proposition alone. He knows that the proposition is true.

Certainly the majority of us are “persons of experience” with respect to many domains of knowledge. With respect to geometry, for instance, we may remember from our high school classes, and so in a sense know that the square of the hypotenuse on a right triangle is equal to the sum of the squares of the other two sides. In the same sense we may know that the Pythagorean Theorem is true. But most of us are not in possession of the proof for that geometrical theorem. We do not know why the proposition is true, and in lacking the explanation, we fall far short of being geometers, ones who know in the sense of understanding geometry. Or, to elaborate on Aristotle’s medical example, those of us who attentively observe our friends when they are sick might know from experience that a specific treatment is effective in returning them to health, but insofar as we lack understanding of why this treatment is effective, we are only

persons of experience and not doctors. The doctor knows not just that the treatment is effective, but also why it is effective.

Now, these passages in Met. A.1 have the same potential as do those in APo 2.19 for misleading scholars into thinking that we possess craft knowledge or scientific knowledge of a theorem directly as a result of having the universal proposition that the experienced person grasps. In fact, perhaps, Met. A.1 is even more likely to mislead since Aristotle says there that Craft knowledge arises when from many notions gained by experience one universal judgment about a class of objects is produced. For to have a judgment that, when Callias was ill of this disease, this did him good, and similarly in the case of Socrates and in many individual cases, is a matter of experience, but to judge that it has done good to all persons of a certain constitution, marked off in one class (kat’ eidos), when they were ill of this disease, e.g. to phlegmatic or bilious people when aflame with fever, this is a matter of craft knowledge.  

Aristotle appears to be claiming here that what marks the difference between the man of experience and the person of craft knowledge is that the former knows some proposition P—say, “treatment T is effective in healing people with disease D”—holds true for a restricted range of cases, i.e. in the case of Callias’ disease, Socrates’ disease, and so on for a finite number of individual cases known by the man of experience. But the latter knows that proposition P holds true for all cases, i.e. they induce from the case of Callias’ disease, Socrates’ disease, and so on, that treatment T is effective in healing disease D for all instances of D, even those instances of

60 Ibid. A.1 981a5–12.
which they have no direct experience. In marking the difference between the man of experience and the person of craft knowledge in this way, Aristotle appears to be reneging on his commitment to thinking that the distinction rests in the contrast between possessing and not possessing the reason why. Instead, it appears the distinction rests on the contrast between possessing and not possessing the universal proposition.

The solution to this challenge is in Aristotle’s insistence that the craftsman knows that the treatment effectively treats certain people “marked off in one class (kat’ eidos).” The doctor’s grasp on the “one class” or kind is built into his explanatory understanding of why the treatment should be applied in those cases where it ought to be. The man of experience will apply the treatment to anyone he finds who exhibits the symptoms which he recognizes from previous cases (because he has come to believe that the treatment is appropriate in all such cases), but the doctor applies the treatment to those same people because he understands the causal relationship between being a member of a kind (e.g. a member of the class of people suffering from D) and being effectively treated with T. The difference might seem narrow, but it amounts to a difference between knowing a reason why and not. In other words, the difference underscores the most crucial element of Aristotle’s epistemology.

In any case, the means by which we acquire those propositions which will turn out to be theorems of our science (or our craft) is sufficiently clear. Sense-perception is the starting point of that acquisition, and the process depends on our capacity for memory and for extracting what is common among similar memories. But once that proposition has come to rest in our soul, we still have to do the science—i.e. find and grasp the reason why—before we will know the proposition as a theorem.
4. Differences between Sciences
Now that we have the basic structure of scientific knowledge on the table, we are prepared for thinking about different kinds of scientific inquiry and for observing the way in which Aristotle imagines his theory of science to be realized in highly abstract sciences like mathematics as well as physical, enmattered domains like that of the natural sciences. Consider geometry and biology, for instance. Geometry is concerned with plane figures and explains the behavior of those figures through first principles which define lines, surfaces, and angles. For example, Proposition 5 of Euclid’s *Elements* states “in isosceles triangles the angles at the base equal one another, and, if the equal straight lines are produced further, then the angles under the base equal one another.” The proof of this theorem depends on the definition of an isosceles triangle (Def. 20) and Common Notion 3 which states that equals remain when equals are subtracted from equals, as well as postulates and other, earlier proved propositions. Among all of these facts involved in this proof, including the theorem itself, we are hard pressed to find a single one which is not true universally and of necessity. When we are discussing entities in the domain of geometry, our subject matter is set firmly in place. There is no variation. What is true now of the angles in an isosceles triangle will be true of isosceles triangles everywhere and for all time (within the framework of Euclidean geometry, anyway).

The same cannot be said of the biological domain. The objects and phenomena studied by the biologists are, e.g., living bodies, respiratory systems, the fact that some animals are viviparous while others are oviparous. Biology, as an investigation, is aimed at finding reasons why for the physical constitution of living things, for the function of systems like respiration, and for the differences in how animals reproduce their kind. As a body of knowledge, biology is a set
of demonstrative syllogisms which exhibit those explanations. For example, a biologist has the answer to the question of why female mammals remain with their offspring for some time after birth. Their knowledge is expressed in the following demonstrative syllogism, given already above, pp. 19–20:

(1) All female mammals nurse their young offspring with breast milk.

(2) Nursing of offspring with breast milk can normally occur only when the mothers remain with their offspring.

(C) Female mammals remain with their offspring for quite some time after the offspring’s birth.

We see in this demonstration that the proposition “female mammals remain with their offspring for quite some time after the offspring’s birth” is explained by the relation of a middle term (“nursing of offspring with breast milk”) to two extreme terms (“female mammals” and “remaining with offspring”). In one sense we can say that it is the nursing that explains the truth of the proposition, but in a stricter sense it is explained by two premises together: that “nursing” is predicated of all female mammals and that “remaining with offspring” is predicated of nursing.

But what is interesting about this biological demonstration, and what sets it apart from the proofs we find in geometry, is that the conclusion is not universally true. There are certainly many cases of young mammalian offspring being separated from their mothers immediately upon birth. Instances of such separation are readily observable in our own species, but also among animals that are held in captivity in zoos, and it also sometimes happens in that wild that a mother rejects her offspring and refuses to nurse. The proposition that is explained by the biologist is not invariably true in the way that the geometer’s proposition about isosceles triangles
is invariably true. At most it tells us what behavior is normal and natural and occurs most frequently, but not how things always are. And yet, according to Aristotle’s conception of which domains of inquiry count as scientific and what scientific explanation itself consists in, biology is every bit as demonstrative as geometry. But how can these two sciences have equal standing with respect to demonstration when there is an apparent—and glaring—disparity in the metaphysical status of their theorems?

Some degree of resolution can be found by consulting a text from the *Nicomachean Ethics* where Aristotle identifies two separate parts of the rational soul and differentiates them according to differences in the subject-matter with which they are concerned.

[T7] Let it be assumed that there are two rational faculties, one whereby we contemplate those things whose first principles cannot be otherwise, and one whereby we contemplate those things which admit of variation; since, on the assumption that knowledge is based on a likeness or affinity of some sort between subject and object, the parts of the soul adapted to the cognition of objects that are different kinds must themselves differ in kind. These two rational faculties may be designated the scientific and the calculative parts, respectively.\(^{61}\)

The scientific part of the soul—which is the part engaged in both geometrical and biological inquiry—contemplates things “whose first principles cannot be otherwise.” We have seen that the first principles of science are the upper-limits of explanation, the most prior premises of demonstrative syllogisms, and that most of such premises specify the definitions or essences of

\(^{61}\) *EN* 6.2 1139a6–12.
entities known about in that science. In the examples of geometry and biology alike, the principles of demonstration fit that description. The geometrical proof of Euclid’s Prop. 5 appeals to the definition of an isosceles triangle. Geometrical knowledge consists in knowing the nature of an isosceles triangle to be explanatory of the fact that the two base angles in any isosceles triangle are equal to one another. In the biological demonstration of mammalian post-partum behavior, too, the explanation depends on the very nature of mammals, that the females of the species nurse their young offspring. These first principles are absolutely invariable because the nature of the entities in question (isosceles triangles and mammals) is invariable. The specification of what it is to be x cannot be other than it is. So one way of salvaging the status of biology as a science is to recognize that the first principles from which biological theorems are demonstrated are invariable and universally true in just the same way as first principles of geometry. Biologists and geometers, alike, are in the business of pointing to the fixed natures of things as being explanatory.

But this does little to make biology’s theorems compatible with Aristotle’s assertion in T1 that we have scientific knowledge “whenever we think that we are aware both (i) of the reason why a thing is so, that it is the explanation for the thing, and (ii) that the fact could not hold in any other way.” It is the second of these two conditions that appears to be unrealized—even unrealizable—by the biologist. How can a biologist know that the proposition “female mammals remain with their young offspring for quite some time after the offspring’s birth” is a fact which “could not hold in any other way” when in fact that proposition fails to be true in some individual cases?

To resolve this interpretational issue, we must maintain focus on the fact that biologists are explaining phenomena, in part, by appealing to the natures or essences of entities. That is, the
biologist identifies the *form* of a thing as being the cause of its behavior. For example, the form of deciduous trees causes them to lose their leaves in winter because it just is in the nature of deciduous trees to do so. However, the form of a substance is not its only part. Every substance has *matter* in addition to its form, and while there are certain behaviors that are necessarily caused by a substance’s form, matter does not cooperate in every expression of that causal necessity. Matter, being the unwieldy and indeterminate *stuff* that it is, interacts with and responds to forms in irregular ways. Thus, wherever we find an enmattered substance, we should not expect that substance to behave perfectly in keeping with what is entailed by its form. The matter of the substance has a capacity for interfering with such expression. Nevertheless, it is true to say that particular behaviors are entailed by the form. It is in this sense that it will be true to say that a certain behavior such as “deciduous trees lose their leaves in winter” and “female mammals remain with their young offspring for some time after birth” are behaviors that “could not be otherwise.” It is because these behaviors of deciduous trees and female mammals follow from their natures.

We should not entirely brush aside the differences between mathematical sciences (like geometry) and natural sciences (like biology), though. The distinction between the status of objects of natural scientific study as enmattered and status of objects of mathematical study as *un*-enmattered is not enough to demote biology from counting as a science, but it does insert a stark contrast between the two kinds. As Aristotle notes in *EN* 6.8, because mathematical entities exist “by abstraction,” it is possible for a young person to master the field, i.e. have scientific
knowledge of geometry or arithmetic. But the same cannot be said of any natural science because the first principles of biology and physics and chemistry all come from experience, and a person cannot acquire the requisite experience until they are grown. Knowledge of natural science requires a great deal of experience in observing the objects and entities known in natural science (which, in turn, requires a great deal of time). The difference between study of enmattered entities and un-enmattered entities is profound, then, but still leaves room for both to be fully scientific on the Aristotelian conception.

5. Connections between Sciences
Aristotle conceives of yet another way of thinking about distinct domains of science in relation to one another. There are some points of contact between two separate sciences where the theorem of one science functions as a premise in another science, so that the two sciences have an important overlap. Aristotle introduces this relation between scientific domains in the following way:

The fact that a thing is so and the reason why it is so differ when they are investigated by different sciences. This occurs in the case of problems related to one another as subordinate and superordinate (thateron hupo thateron), as when optical problems are subordinated to geometry, mechanical problems to stereometry, harmonic problems to arithmetic, the data of observation to astronomy.  

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62 Ibid. 1142a11-16.  
63 APo 1.13 78b34-39.
The questions of a science are its “problems” and the answers to them are provided in the explanations contained in its demonstrative syllogisms. The problems that uniquely belong to one science can in some cases be counted “subordinate” to the problems of another science. For example, some questions about vision—the “problems” of optical science—and their explanations are subordinate to questions about figures and lines—the “problems” and explanations that are proper to geometry. And what it means for one set of problems to be subordinate to another, as Aristotle says here, has something to do with the distinction between “the fact that a thing is so” and the “reason why it is so”. Somehow, the science dealing with one of the sets of problems treats something as an unexplained fact while the other treats this same thing as subject to an explanation.

Aristotle goes on to say that when a science utilizes a proposition merely as a fact, the fact functions as a “first principle” in the science. It is one of the premises in a demonstrative syllogism. It does the work of explaining something, but it is not itself explained within that science. Alternatively, when a science utilizes a proposition in the way of determining the “reason why something is so,” it is positioning that proposition as the conclusion of a demonstration. That proposition is the thing explained by the science. It is a theorem. Thus, when there is overlap between two sciences with one science knowing the “reason why” of a proposition and the other science knowing merely the “fact that” the proposition is true, the overlap is between a theorem of the one science and a first principle of the other.64 The subordinate science is always the one

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64 Frede (2011) endorses this interpretation of the superordination-subordination relation. But McKirahan (1978) and Lennox (1986) have a different view. They claim that the mathematical proof is actually part of the subordinate science—a mathematical component of the science—so that it is a theorem of the subordinate science that is explained by the proof that belongs properly to the superordinate science. This cannot be right, however, since it violates Aristotle’s view about (i) where the boundaries between sciences lie and what role first principles play. For
which takes the proposition as mere fact, i.e. as a first principle. It is subordinate, then, because there is another science (the one which contains the “reason why” of the proposition), which contains an explanation for its first principle. To borrow the example provided by Aristotle, geometry works out the explanation for why something is true, and optical science takes that something as a first principle without itself working out why it is true.65

I call this sharing of a proposition between two domains of science the “superordination-subordination relation.” The name—derived from Aristotle’s language when he says that one science is “under” (hupo) another—is not meant to suggest an evaluative priority of one science to another. Instead, it describes an explanatory priority, namely that one science has an explanation for what the other science can accept only without explanation. The subordinate science here—the one which accepts facts without explanation—is no less a science than the superordinate science, however. This is because (i) the subordinate science utilizes those facts for building its own demonstrative syllogisms, thereby meeting Aristotle’s standards of science, and (ii) the superordinate science itself has to accept some facts without explanation, its own first principles. The two domains are on even ground with respect to their scientific status. It is only with respect to the overlap of propositions and consequent explanatory priority that one is called superordinate and the other subordinate.

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(i), by insisting that a mathematical proof about lines and angle functions also as an optical proof about appearances and angles of vision, the interpretation disrupts the idea that each science has its own distinctive set of objects and terms. And for (ii), it denies that optical science (or any subordinate science) has its own set of first principles which are unexplained within the science and which do explanatory work—if geometry becomes the upper limit of explanation, where does optical science end?

65 Aristotle specifies that mathematical sciences are superordinate wherever this relation is found. Here it is the business of the empirical observers to know the fact, of the mathematicians to know the reasoned fact; for the latter are in possession of the demonstrations giving the causes, and are often ignorant of the fact. (APo 1.13 79a2-4)
It is also potentially misleading to suggest that what is shared between two domains is precisely the same proposition. If it is true that each domain of science deals in its own unique set of terms, syllogisms, and theorems, how can it also be the case that two distinct domains share a proposition? In truth, the shared proposition has one form in the superordinate science and another form in the subordinate science. Specifically, the proposition which functions as a first principle in the subordinate science is an instance of the proposition functioning as a theorem in the superordinate science. Geometry shares a proposition with optical science, for example, but what geometry deals in (abstract figures, lines, points) differs from what optical science deals in (objects of sight, visual range). For geometry to be superordinate to optical science in the sense of explaining the reason why of some fact that optical science assumes without explanation, there must be some translation from geometrical notions to optical notions.

Take for example the translation of a geometrical proposition into an optical proposition in Euclid. The things that are labelled “Propositions” (Protaseis) in Euclid’s Elements are theorems of his geometry. Euclid provides a proof for each of these theorems by relying on the definitions (horoi) and postulates and common notions which he has taken as first principles of the domain. In other words, Euclid conceives of these first principles as explaining the truth of his geometrical theorems. His geometrical science is, roughly, a representation of Aristotle’s theory of science in general. Likewise, Euclid’s Optica (his text that lays out optical science in the same way that the Elements lays out geometry) features a set of first principles and then a one-by-one examination of each of the theorems of optical science and their proofs from first principles.\textsuperscript{66} Optical science,

\textsuperscript{66} Euclid does not provide a label for the theorems of the Optica. Instead, he numbers them off (“a, b, c, d,...”). Nevertheless, we ought to think of these as being theorems just the same as the “Propositions” (Protaseis) of the
too, is carried out by Euclid in an Aristotelian spirit. More importantly for the purposes of this discussion, however, there is a point of overlap between Euclid’s geometry and his optical science that illustrates Aristotle’s conception of the superordination-subordination relation. Proposition 24 of the *Elements* is a theorem of geometry (and, hence, is explained by a geometrical proof) but is translated into optical notions and featured as a first principle of optical science in the form of Definition 4 in the *Optica*.⁶⁷

Let us look first at the optical definition so that we can get clear on what the “fact” is which optical science accepts without explanation but for which geometry knows the reason why.

*Opt* DEF 4: And [let it be assumed] that those things seen within a larger angle appear larger, and those seen within a smaller angle appear smaller, and those seen within equal angles appear to be of the same size.⁶⁸

When you take the space within which an eye sees to be a cone with the apex of that cone being in the eye (or on its surface) and the base of that cone being the object seen,⁶⁹ there will be some angle which describes the opening of the cone in relation to any object within the field of vision.⁷⁰

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⁶⁷ *Elements* because the scientific procedure is just the same, i.e. Euclid demonstrates proofs that appeal to the optical horoi in the just the same way that he demonstrates geometrical proofs that appeal to geometrical horoi.

⁶⁸ For further discussion of Euclid and pre-Euclidian geometry/science for how they compare with Aristotle’s scientific epistemology in the *Posterior Analytics*, see McKirahan (1978).

⁶⁹ It has been noted by many that this is, in fact, not a definition. It is an axiom. Nevertheless, it functions as a first principle.

⁷⁰ This is the content of Definition 2 in the *Optica*.

⁷¹ This angle is found by taking a cross section of the cone from the apex to the center of the base so that there is a triangle which has the height of the cone as one side, the radius of the base as a second side, and the slant height of the cone as the third. By doubling the angle between the height and slant height, you find the opening angle of the cone.
The opening angle varies according to the size of the object seen plus its distance from the eye's surface. An object very large and very near the eye (e.g. a car two feet away) will be seen within a very large angle, and a small and far off object (e.g. a squirrel climbing a tree across the street) will be seen within a much smaller angle. And yet an object which is very near the eye (e.g. an ant two inches away) would also be seen within a relatively large angle, and a very large object which is quite far off (e.g. the sun viewed from earth) will be seen within a smaller angle.

On Euclid’s view, appearances do not have absolute magnitudes. The ant does not appear to be 5 millimeters in length, nor the sun 1.4 million kilometers. Instead, the apparent magnitude is comparative. What the eye compares is the magnitude of the base of each cone of vision as if the bases were equidistant from the eye, as if each cone had the same height. Of course, cones of vision rarely have the same height. The difference in height between the cone within which we see an ant and the cone within which we see the sun is about 93 million miles. But the eye does not take in this information about the height of the cone. It compares all objects as if they were

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71 Brownson (1981) characterizes the seven definitions of the Optica as “collectively [offering] a geometrical description of the formation of appearances in terms of relative size, shape, and position. The basic principle exhibited in the work is that size of appearance is a function of the size and distance of objects from an observation point,” pp. 166.

72 We must be careful not to mistake the judgment that the sun is such and such size with its appearance. We know from science class that the sun is larger than any object on earth, thus we judge it to be larger than the ant. But appearance alone, prior to judgment represents the sun as smaller than the ant.
seen within cones of identical heights, as if the objects were equidistant from the eye. For cones with equal heights, the larger the opening angle, the larger the base. Thus, the appearance in the larger angle appears larger.

This axiom of optical science is accepted by the optician as fact and, qua optician, he need not seek the reason why it is so. Nevertheless, there is an explanation. Euclid provides the explanation in his proof for *Elements* 1, proposition 24.

**PROP 24:** If two triangles have the two sides equal to two sides respectively, but have the one of the angles contained by the equal straight lines greater than the other, they will also have a base greater than the base.

Euclid proves this proposition by showing that two triangles, \( \triangle ABC \) and \( \triangle DEF \), which have sides \( AB, AC \) equal to \( DE, DF \), but with angle \( \angle BAC \) greater than \( \angle EDF \), side \( BC \) will be greater than \( EF \).

The proof explains the relationship between angles and opposing sides within triangles. Specifically, it explains why the side becomes larger as the angle becomes larger, smaller as the angle becomes smaller, given that some other features of the triangle remains fixed—namely, the length of the other sides.

This feature of triangles is transferable to cones. When two cones have equal heights, and the opening angle of one is larger than the opening angle of the other, then the base of the one will be larger than the other, correspondingly.\(^73\) Definition 4 states precisely this, except it does

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\(^73\) The height of a cone is determined the length of the axis from apex to base (the axis is a straight line about which the cone has rotational symmetry, it passes through the apex and the center of the base). The axis is like the side of a triangle, with the angle between the axis and the base always being 90° because the axis meets the base perpendicularly. The base is the second edge of the triangle, and the slant edge of the cone is the third. Comparing two cones by comparing these internal triangles, we can see that the equal heights will make for one side being equal to one side. And the right angle at the intersection of the axis and the base fixes the length of the slant edge so that it changes in proportion with changes in the width of the base (*Elements* 1, proposition 47; the change in the base it what matters because the height is fixed). The right angle is a substitute for the second set of equal sides (per
so using optical terminology. Instead of “opening angle,” we have “the angle within which things are seen”—which just is, for Euclid, an “appearance.” The theorem of geometry that is Euclid’s Proposition 24 of the *Elements* is reformulated as Definition 4 of the *Optica*, and this Definition 4, in turn, is used as a first principle in the demonstration of optical theorems. For example, Euclid explicitly appeals to Definition 4 in the proof of *Optica* proposition 5. Optical science, then, is built upon first principles which, though those principles can be explained, are not explained within the domain of optical science. The geometer knows why the angle of vision impacts the apparent magnitude of objects, but the optician knows only that it does so. Though the terminology is not identical, the fact which is assumed by optical science is the thing for which geometry has an explanation. Thus, geometry is superordinate to optical science because they “share” this proposition, formulated one way as Proposition 24 in the *Elements* and formulated another way as Definition 4 of the *Optica*.

A similar story can be told for all instances of the superordination-subordination relation. Wherever two scientific domains are related in this way, they share a proposition via a translation of terms, by substituting out the terms which are proper to the superordinate science for the terms which are proper to the subordinate science. In building this picture, Aristotle is able to explain

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*Elements* 1, prop 26). Since the opening angle of a cone can be found by simply doubling the angle between the axis and the slant edge, this application of 1, prop 24 to the triangle internal to a cone serves to prove that a larger angle subtends a larger base not just in triangles, but also in cones.

Brownson (1981), 166.

75 *Optica* “e” (Proposition 5, Euclid does not explicitly give the title “protaseis” to the set of theorems in the *Optica*, despite having done so in the *Elements*) states: “Objects of equal size unequally distant appear unequal and the one lying nearer to the eye always appears larger.” Euclid draws two objects (lines) of equal size and parallel in relation. The eye is positioned to view the objects in such a way that the objects are the base of the cone of vision, but one object is further away from the eye. So we are to imagine two cones of vision, one which has a larger opening because the object is nearer the eye. Euclid gets his conclusion (that the object nearer the eye appears larger) by appealing to Definition 4. It is not merely the relative distance from the eye that explains one object’s appearing larger than the other, then. It is the distance plus the size, which in turn determine the opening angles within which the objects are seen.
how it is that some sciences are explanatorily prior to other sciences (by providing a reason why for some of the phenomena of the other sciences) while still allowing that each separate domain is meaningfully distinct and complete unto itself. It is not absolute explanatory completeness that establishes the divisions between domains, but the subject matter, the entities and phenomena with which they are concerned.

Let this discussion suffice as an outline of Aristotle’s theory of scientific knowledge. There is a great deal more that could be said to describe the contours of his theory, but it is enough for my discussion that we understand the place of (i) explanation, (ii) first principles, and (iii) perception, memory, and experience, in the structure and acquisition of knowledge. As I turn in the next chapter to describing Aristotle’s theory of ethical knowledge, some points of contrast should and will stand out. We will see that ethical knowledge is not had through demonstration as is scientific knowledge, that the propositions known by the person of ethical knowledge are not universals, and that ethical knowledge is more than just possession of truth, it is also the ability and psychological commitment to act according to that truth. But many similarities will stand out, too: ethical knowledge consists in grasping explanations and it is a state that arises in us as a result of interacting with the world, forming experience, and then appreciating the way in which some phenomena explain other phenomena. As such, it will become clear why scientific knowledge is a paradigm case of knowing for Aristotle. It sets the standard for what knowing consists in, even in areas like the ethical.
2

The Structure of Practical Wisdom

When Aristotle pronounces at the beginning of the *Metaphysics* that “all human beings desire by nature to know,” he meant more than just that we seek understanding of mathematics and physics and cosmology. In *Met* E.1, he identifies two domains of human thought (*dianoia*) in addition to the scientific: there is productive thought (*poiētikē*), which concerns the coming into being of things which are up to us to create, and practical thought (*praktikē*), which concerns the actions that we perform in the course of pursuing our natural human end of happiness. We engage in the first of these kinds of cognitive activity whenever we are building houses, playing pianos, cooking boeuf bourguignon, diagnosing and treating patients, and engaging in countless other activities that are aimed at producing something we find valuable or which can be traded for something valuable. The second kind of cognitive activity—practical thought—is best conceived as *ethical*. It is the thinking involved in determining what we should do. This is an

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76 *Met*. A.1 980a21.  
unending enterprise for us. We have certain goals in our lives, and practical thinking is the way we work out how to realize those goals. In some cases this is a matter of specifying just what a realization of the goal would look like in our lives, e.g. if my goal is be a good wife to my partner, I would think about what actions are characteristic of flourishing marital relationships. And in other cases we think not about what actions constitute our goals, but what we need to acquire or do as means to achieving them. Reflecting on the means to a good marriage, I think about the need for reserving a great deal of my time to be spent with my partner, about what kinds of specific projects we might undertake that would enrich our shared life, and about what kinds of investments I need to make now in order to provide both of us with a stable and good life later. And Aristotle is not content to say that we merely engage in thinking about these matters of human concern. He insists also that we are capable of mastering these matters and perfecting the part of ourselves that engages in each kind of thought.

It is in Book 6 of the Nicomachean Ethics that Aristotle identifies states of mastery that corresponds to each of these kinds of thought. Mastery over that domain about which we have productive thought (or mastery over a single one of these domains, e.g. house-building) is named “craft knowledge” (technē), and mastery over the practical domain is named “practical wisdom” (phronēsis). Each of these states is, according to Aristotle, a way of firmly and reliably grasping truth about the world. In fact, he sets both craft knowledge and practical wisdom alongside scientific knowledge as being “states by which the soul ‘truths’ (hois aletheuei hē psuchē)” — I depart from normal English usage here by using “truths” as a verb in order to reflect Aristotle’s choice

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78 EN 6.4 1140a1ff.
of a simple, common verb that is derived from the Greek noun “truth” and means “to tell the truth.” Aristotle’s choice of this verb conveys that what these states of mastery do is grasp the truth or get things right with regard to the domain to which they correspond. Aristotle is committed, then, to the idea that knowledge is possible in more areas than just science. Although we should expect to find differences between scientific knowledge and the other kinds of expertise, it is no less true to say of Aristotle that he thinks human beings are capable of knowing about those things which are within their control (productive and practical matters) every bit as much as they are capable of knowing about things which are not (scientific matters).

In this chapter, I will explore Aristotle’s conception of these non-scientific forms of knowledge. My primary concern is to describe practical wisdom and to recover what I believe has been lost or overlooked by Aristotle scholars: the sense in which practical wisdom consists in knowing reasons why. In recovering the explanatory structure of practical wisdom, I will reveal an important and profound similarity between practical wisdom and scientific knowledge—they both count as kinds of knowledge in virtue of the fact that they consist in grasping explanations. But I will simultaneously draw out the differences between the kinds of knowledge, too. The interest and novelty of this discussion lies in its situating practical wisdom in Aristotle’s epistemological framework in such a way that we can understand why he conceives of it as a form of knowledge and can also see clearly why it is not a form of scientific knowledge.

In order for my characterization of practical wisdom as consisting in knowing explanations to be true, at least one thing is certain: there must exist explanations in the practical

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79 Ibid. 6.3 1139b15–17.
domain and those explanations must have upper-limits *a la* scientific first principles. We saw in the last chapter that Aristotle conceives of explanatory knowledge—at least in the case of science—as impossible if there is not some point at which explanation comes to an end. Without an upper-limit of explanation, we are compelled to seek explanations ad infinitum in every case, so that nothing ever receives an ultimately grounded and satisfying explanation. The same argument must apply to practical wisdom if it, too, is a kind of explanatory knowledge. Thus, just as I discussed the “first principles” of scientific knowledge in Chapter One, I will discuss the ethical equivalent of these—what I call “starting points” of practical wisdom—in this chapter. Throughout, I will do as Aristotle does by relying on craft analogies in order to illustrate small and large points alike. In all instances I aim to represent crafts and craft mastery in a light that reflects Aristotle’s theory of craft knowledge. In so doing I will be effectively building an account not only of practical wisdom, but also of craft knowledge, and thereby cover both of Aristotle’s non-scientific forms of knowledge.

The place to start, I imagine, is with identifying the proper objects of the knowledge we have in the practical domain and identifying what kinds of explanations stand as reasons why those objects of knowledge are true. But before we make this true beginning, we must pause to consider why Aristotle thinks practical wisdom must be separate in kind from scientific knowledge. Without considering his reasons for this distinction, we cannot properly understand any motivations for recovering an account of practical wisdom, nor can we fully appreciate how strange but also wonderful it is that Aristotle counts practical wisdom as a kind of knowledge at all. Thus, let us reflect on what makes science so fundamentally different from ethics before we set out to recover a positive account of practical wisdom.
1. Practical Wisdom is not Scientific Knowledge
Aristotle begins his remarks about the differences between practical wisdom and scientific knowledge in the most dramatic of ways: by assigning them to separate parts of the soul. That is, he tells us that scientific knowledge—indeed, scientific thought—is so wholly distinct from practical wisdom and practical thought that there must be two different parts of us that possess and exercise each. We find this assertion in EN 6.2 where Aristotle provides a cursory diagram of the soul, outlining the human soul with no more detail than is requisite for an ethical treatise.

[T1] We said before⁸⁰ there are two parts of the soul: that which grasps reason (to logon echon) and the non-rational (to alogon). Now let us in the same way divide the part that has reason. And let it be assumed that there are two parts which grasp reason, one of these is the part by which we study the sorts of things whose principles (archai) cannot be other than they are, and the other of these parts is that by which [we study the sorts of things whose principles] are variable. For, in relation to things which differ in kind, the part of the soul which is suited to each is different in kind since it is on the basis of a certain likeness and appropriateness that their knowledge (gnosis) belongs to them. Let one of these parts be called the scientific (to epistēmonikon) and the other the calculative (to logistikon), for to deliberate (bouleuesthai) and to calculate (logizesthai) are the same, and no one

⁸⁰ This is a reference to EN 1.13 1102a26ff. where Aristotle provides a similar sketch of the soul. In that context Aristotle is specifying what details must be known by a “student of politics” in order for them to have a clear grasp on the conception of happiness offered in EN 1.7 as well as the nature of virtue (1102a5–10). In Book 6, Aristotle does not explicitly say that these details of the soul are part of a student or good agent’s knowledge, but we might draw that conclusion on our own, especially in light of what he says in Book 10 about the place of both practical activity and theoretical (or scientific) activity in the good life.
deliberates about things which cannot be other than they are. The result is that the
calculative part is one part of the rational soul.\textsuperscript{81} Following this division, Aristotle goes on to say that these parts can be perfected or developed in such a way that they will possess a virtue that is proper to each. Now this is where things get interesting. In one sense, the virtues that belong to each of these parts are the same, but in another sense they are different. The similarity comes from the fact that, for anything which has a virtue, its virtue is relative to its characteristic work, and the characteristic work of both the scientific part and the calculative part is truth.\textsuperscript{82} But they are thrust apart again by the fact that scientific part pursues truths that cannot be otherwise, that hold universally, and that proceed from the very nature of things which have being, and the calculative part on the other hand pursues truths that are variable, particular, and in the domain of human activity.

For example, the 17\textsuperscript{th} theorem of Euclid’s geometry states that “in any triangle the sum of two angles will be less than two right angles,” and this fact is universally true because every triangle will exhibit this property of having any two of its angles sum to less than two right angles. Likewise, the fact “cannot be otherwise” not just because every triangle will exhibit the quality, but because it is \textit{in the nature of triangles} to be this way. The fact proceeds from the way triangles are in themselves. A practical fact (one which captures something true about human activity) will neither be universally true nor be invariable. That “this man is sitting”—which might seem like the sort of thing that cannot be otherwise since it is a matter of fact whether this man here is sitting or standing—even this fact admits of variability because “sitting” is predicated of the man

\textsuperscript{81} EN 6.2 1139a5–15.
\textsuperscript{82} EN 6.2 1139a16–17, “the virtue of each thing is the excellence proper to its characteristic work (\textit{to ergon to oikeion}); 1139b12, “the characteristic work of both intellectual parts (\textit{amphoteron ton voetikon}) is truth (\textit{aletheia}).”
now, but is not predicated of him always.\textsuperscript{83} There was a time when he was not sitting, and there will be more occasions still on which he will not be sitting again. In this sense, the fact comes to be and goes out of being and therefore is metaphysically distanced from propositions like the fact about the sums of angles in triangles. All facts in the practical domain are like the proposition “this man is sitting.” They are variable because they come into being and go out of being again.

It is understandable, then, why Aristotle identifies all of scientific knowledge, craft knowledge, and practical wisdom, as “states by which the soul truths” and nevertheless identifies them as virtues of different parts of the rational soul.\textsuperscript{84} Scientific knowledge is the state we possess when we understand why the world is the way it is. By grasping the natures of things as explanations for the phenomena in which they are involved, we come to have a deep understanding of the world, and this just is scientific knowledge. By grasping demonstrative syllogisms, we understand the precise explanatory role of facts about natures, and we understand their universality and invariability. I have described this kind of knowledge at length in Chapter One. It should come as no surprise to find that it is the virtue of the scientific part of the soul.

Practical wisdom and craft knowledge, on the other hand, are states of mastery respective to things which are variable. Because house-building and dancing and performing ethically good actions are all activities carried out in particular situations with particular materials and particular features surrounding them, the activities themselves are particular. And while it is true that these particular actions can be grouped according to the kind to which they belong (e.g. the

\textsuperscript{83} \textit{Cat.} 5 4a21ff. “The same statement seems to be both true and false. Suppose, for example, that the statement that somebody is sitting is true; after he has got up this same statement will be false.” This same example is relied on again in the \textit{Physics} where Aristotle says of “sitting” that it is a “separable attribute” which means that it may come to be predicated of a subject and may also cease to be predicated of a subject (1.3 186b20–22).

\textsuperscript{84} \textit{EN} 6.3 1139b15.
house-building kind or the virtuous kind), the craftsman and the practical agent alike are less concerned with action kinds than they are with the particular actions themselves, for their knowledge is exercised in the actions themselves and actions are particulars. Much variability rests in the things known by the craftsman and practical agent, then. When a house-builder knows that it is best to lay the foundation of a home on such-and-such spot and build it in such-and-such way, his knowledge is sensitive to nearly innumerable factors in his environment. The composition of earth below the site, the frequency and/or likelihood of below-freezing temperatures and the presence of water, whether or not the future home owners desire a basement, etc., are all moving factors, and different situations will see different combinations of these parameters. In this sense, then, when the house builder knows that he should lay such-and-such foundation, what he knows is variable and particular. The same is true for all the other crafts and also for the knowledge of the practical agent who is constantly on guard for new salient information in each new situation he meets.

Because of the particularity and variability of the things that are objects of productive and practical thought, we are unable to know them through demonstrative syllogisms.85 As emphasized in the previous chapter, demonstration is a special mode of knowing reserved for those things whose explanations do not vary. We know demonstratively when we know both why something is so and also that it cannot be otherwise.86 A different kind of reasoning and knowing is reserved for things in the productive and practical domains, then, and this is what Aristotle is pointing to when he discusses deliberation. As we saw in T1, to deliberate

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85 Ibid. 6.5 1140a33–35.
86 Ibid. 6.3 1139b19–22.
(bouleuesthai) is the same as to calculate (logizesthai), which suggests deliberation is a process of working out which course of action is best by weighing different options against one another, bringing various factors into consideration, and measuring benefits here against costs there. This is the mode of reasoning appropriate to domains that are populated distinctively with particulars (in contrast with the scientific domain which is populated with universal natures of things) and to domains that demand attention to those particular as such. When we must take many particular facts into consideration, we must carefully sift through them, comparing them and making sense of them in relation to one another. Deliberation, Aristotle tells us in T1 above, is the mode of reasoning distinctive of the calculative part of the soul, so it is no wonder that craft knowledge and practical wisdom have their home in the calculative part.

These are the differences between scientific knowledge on the one hand and practical wisdom (and craft knowledge) on the other. The former is demonstrative (exhibited in the form of demonstrations), which means that its principles are universal and invariable and that it is a state of the scientific part of the rational soul. The latter has variable principles and is concerned with actions, which means that it is a state of the calculative part of the soul. With this psychological sketch on the table, we can now proceed with determining just what kind of truth is the concern of practical wisdom and why, despite its belonging to a separate part of the soul, it counts as a form of knowledge alongside scientific knowledge.

2. The Proper Objects of Knowledge in the Practical Domain
When it comes to determining just what kind of knowledge practical wisdom is, the place to begin is to look at what its proper objects are. As Aristotle says in T1, the contours of knowledge are determined by its subject matter. So just as we examined scientific knowledge by considering first
what kinds of things a scientist knows, we should examine practical wisdom by looking at what kinds of things are known by the practically wise person. Such a person is, on Aristotle’s account, distinctively skilled in deliberation.

[T2] It is thought that the characteristic mark of the practically wise man is to be able to deliberate well about what is good and expedient for himself, not in some particular respect, e.g. about what sorts of things conduce to health or to strength, but about what sorts of things conduce to the good life in general. This is shown by the fact that we credit men with practical wisdom in some particular respect when they have calculated well with a view to some good end which is one of those that are not the object of any craft. It follows that in the general sense also the man who is given to deliberating (bouleutikos) has practical wisdom.87

Good deliberation, Aristotle goes on to tell us, is the kind of reasoning that (i) alights upon the best course of action and (ii) gets there by correct means.

Aristotle goes on to summarize this by saying that practical wisdom is a state of the soul “with a true account” (meta logou alēthous), which suggests that it consists in knowing reasons why. This is brought to light primarily through comparison with Aristotle’s discussion of epistemology in other texts. For example, in *Metaphysics A.1*, he emphasizes that a craftsperson is distinct from a “man of experience” because the former knows why something is true while the latter does not.88 Aristotle expresses this one thought in several distinct ways: one way is by saying that the craftsperson is in possession of the “reason why” (dioti), another is by saying he

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87 EN 6.5 1140a25–31.
88 Met. A.1 981a13ff.
knows the “cause” (aitia), and the last is by saying the he has an “account” (logos).89 “We view [craftspersons] as wiser [than people with mere experience] not in virtue of being such as to act, but in virtue of having the account (logon) for themselves, i.e. knowing the causes (tas aitias gnōrizein).”80 Having an account consists in knowing explanations, and so when Aristotle says in EN 6 that practical wisdom is “with a true account,” he must mean that a practically wise person is in possession of correct (i.e. true) explanations. Accordingly, practical wisdom is a body of knowledge that enables a person to recognize choice-worthy actions as choice-worthy, i.e. to know that this particular action A is to be done and to know why it is to be done.

Knowing the why here centrally comprises practical wisdom, then. Just as the man of experience fails to be a craftsperson just in virtue of failing to grasp a relevant explanation, a moral agent also fails to have practical wisdom when he fails to grasp the reason why some action is choice-worthy and good. To know merely that such-and-such action ought to be done is just to have ordinary ethical thoughts and beliefs. As Rosalind Hursthouse has put this, “Any minimally well-brought-up Aristotelian child knows that one ought to do what is courageous, not what is cowardly, what is temperate, not what is licentious, etc., and can understand and apply such rules to some extent. What is special about the [practically wise person’s] knowledge is the special understanding he brings.”91 What sets the practically wise person apart just is his grasp on the reason why certain actions are choice-worthy.

89 Aristotle does use all of these formulations in the Met. A.1 passage. The lines are 981a29, 981a28, and 981a15, respectively.
90 Met. A.1 981b5–6.
91 Hursthouse (2011), pp. 47.
Now, the *why* that is grasped by the practically wise person is something I will discuss later in this chapter. In carrying out that discussion I will more robustly defend my interpretation that practical wisdom has an *explanatory* structure, just the same as scientific knowledge. But first we must say more to specify the proper objects of practical wisdom. Again, the practically wise person “deliberates well about what is good and expedient for himself,” and what it means to deliberate well is to make the right choice of action among options and to make this choice through correct reasoning. Simply put, then, the practically wise person is knowledgeable with respect to the choice-worthiness of actions. Of course, he cannot know what particular action is choice-worthy *prior* to deliberation, for that would undermine the idea of good deliberation being the characteristic work of the practically wise person. Instead of being knowledgeable of the choice-worthiness of this particular action which is to-be-chosen, then, practical wisdom must be knowledge of what that choice-worthiness consists in, the kind of knowledge that enables a person to recognize exactly what they have been looking for, even if they have not seen this particular instantiation of it ever before.

As Aristotle’s opening remarks in *EN* Book 6 indicate, what the practically wise person knows about choice-worthy actions is that they lie in the mean between two extremes. That is, the action that a person ought to decide upon is the one which rests somewhere between excess and deficiency, and the practically wise person has an understanding of the rightness of actions so described. He understands the fact of their lying in the mean to be a *reason why* they ought to be chosen. That this is the correct specification of what the practically wise person knows is evidenced by the opening lines of Book 6 which I have already quoted in the introduction to this work:
[T3] Since we have previously said that one ought to choose that which is intermediate, not the excess nor the defect, and that the intermediate is as right rule says, let us discuss the nature of these dictates. In all the states of character we have mentioned [in Books 2 through 5], as in all other ones, there is a mark to which the man who has the rule looks, and heightens or relaxes his activity accordingly, and there is a standard which determines the mean states which we say are intermediate between excess and defect, being in accordance with the right rule. But such a statement, though true, is by no means clear; for not only here but in all other pursuits which are objects of knowledge (epistēmē) this is indeed true to say, that we must not exert ourselves nor relax our efforts too much nor too little, but to an intermediate extent and as the right rule dictates; but if a man had only this knowledge he would be none the wiser, e.g. someone would not know what sort of medicines to apply to the body if he were to say 'all those which the medical art prescribes, and which are as the person possessing the art prescribes.' Hence it is necessary with regard to the states of the soul also not only that this true statement should be made, but also that it should be determined what is the right rule and what is the standard that fixes it.\(^\text{92}\)

So begins Book 6 of the *Nicomachean Ethics*, in which Aristotle provides the most comprehensive description of practical wisdom to be found anywhere in his corpus. When he specifies right away that what we are investigating in our study of practical wisdom is an account of “right reason

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\(^\text{92}\) EN 6.1 1138b18–34.
and the standard that fixes it,” it clear that this is the proper object of that knowledge. Practical wisdom itself is a firm grasp on right reason, the kind of grasp that enables a person to employ reason in the course of deliberating about what particular actions are choice-worthy.

From T2 and T3 together, we are made to imagine that the practically wise person deliberates and makes decisions not with some kind of prescience about what action is best, but rather according to an informative and ever-applicable standard. This standard is an instrument against which the practically wise person determines which actions rest suitably near an intermediate mark between extremes, and just as an archer must increase the tension on his string or let it go more slack according to what is required for hitting his target, so too the practically wise person pursues the activities of his life always making adjustments in order to strike his final end.

Of course, on Aristotle’s account, none of this is intelligible at all unless we have some sense of what the practically wise person’s end is. The discussion of happiness in EN Book 1 is intended to set this out. There, we learn that human beings are all united in at least this one aspect of their lives: happiness (eudaimonia) is their final end and they desire all things for the sake of happiness. The practically wise person, too, has happiness as his final end. This is not what sets him apart, though. Rather, what makes the practically wise person so excellent at living is his ability to purposefully and stably realize his end. He knows that happiness, for himself and for all human beings, consists in living a certain way, specifically in living a life of rational activity on the basis of virtue. And in his daily encounters with situations and circumstances that require

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93 Ibid. 1.4 1095a18–20.
him to act, he is exceptional in his ability to aim at and strike the action which best embodies this specification. His knowledge consists, in part, in his ability to do this.

I will argue in the remainder of the chapter that the practically wise person has knowledge of how best to live (both in the general sense and in the particular) through understanding \textit{why} the actions he chooses are the ones most choice-worthy. Beginning with an identification of what propositions play the role of upper-limits of explanation, or “starting points,” of ethical knowledge, I will argue that practical wisdom consists in knowing reasons why. In the end, I aim to show that practical wisdom has the same basic structure as scientific knowledge and that this reveals why Aristotle treats practical wisdom as a form of knowledge at all.

3. What are the Starting Points of Practical Wisdom?

According to Aristotle, the ethical domain has its own set of starting points.\footnote{Scholars have generally agreed that “starting points” is a better translation of \textit{archai} in the ethical domain because it resists the inference that these ethical \textit{archai}—whatever they turn out to be—will function as premises in demonstrations. Aristotle emphasizes repeatedly in Book 6 of the \textit{Nicomachean Ethics} that demonstrations are possible in the scientific domain, but not in the ethical domain. So to the extent that the translation “first principles” has taken on the technical, scientific meaning of “being a premise in a demonstrative syllogism”, it is inappropriately employed when discussing ethics. I will follow this norm by using “starting points” as a translation of \textit{archai} when discussing ethics; “first principles” for science.} In this section I will identify what those starting points are. This is no small task. There are several passages in the \textit{Nicomachean Ethics} which feature the word “\textit{archē}” — the same word Aristotle used in the \textit{Posterior Analytics} in referring to the “first principles” of a science and, so, perhaps the name he wants to give to those propositions in the ethical domain that are explanatory of the choice-worthiness and goodness of actions. The problem with these passages is that they seem not to carve out the same set of “\textit{archai}” in every case. We are compelled to ask—at each new instance of the word—\textit{archē}
of what? That is, when Aristotle points to some particular archē or set of archai, we must pause to consider just what the activity or end point is for which these are corresponding starting points.95

The first instance of the word in the EN occurs at 1.4 just after Aristotle has both presented the idea that there is some final end for the sake of which all reasoned human activities are taken up and also suggested that happiness (eudaimonia) is that end.96 He first says that what he wants to do is “examine those opinions [about what happiness consists in] which are most prevalent or seem to be reasonable (dokousas echein tina logon).”97 Then, seemingly all of the sudden, Aristotle abruptly interjects with a thought he attributes to Plato about the difference between “arguments (logoi) from starting points (apo tōn archôn) and those to starting points (epi tas archas).”98 This seems to be a general and highly abstract claim, but occurring in the context of searching for the right conception of happiness, it suggests that Aristotle thinks that there are some arguments from an account of happiness and others to an account of happiness—meaning that happiness is an archē, or the conception of it we arrive at will be an archē anyway. Now we ask, archē of what?

The answer depends importantly on Aristotle’s conception of what happiness consists in. He tells us in EN 1.7 that it is “activity of the rational part of the soul on the basis of virtue, and if there are more virtues than one, the best and most complete of them.”99 Happiness, construed in

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95 This strategy for finding the starting points of the ethics is widely different from the strategy employed by Nielsen (2015) who identifies four kinds of principles in the ethics (happiness, definitions of character states, principles of action, principles/rules of conduct) mostly according to what she thinks is “important” (35–37). I will pick out starting points according to Aristotle’s use of the word archē and according to whether or not the facts therein identified have some explanatory role in the ethics.

96 EN 1.1 1094aff. “Every art and every inquiry, and similarly every action and every decision, is thought to aim at some good (agathou tinos ephiesthai dokei).” And “in name perhaps there is agreement among the majority on this point: for the many and the sophisticated alike say that it is happiness (tēn eudaimonian), and they suppose that living well and acting well are identical to happiness” (EN 1.4 1109a17–20).

97 Ibid. 1.4 1095a28–30.

98 Ibid. 1.4 1095a30–32, emphasis mine.

99 Ibid. 1.7 1098a16–18.
this way, is a starting point (archê) because “it is for the sake of this that we all do all the other things we do (ta loipa panta pantes prattomen), and a starting point (archên) and cause (aition) of good things is, we assert, something honorable and divine.”\textsuperscript{100} When we ask, then, of what happiness is a starting point, the answer is that it is the starting point for why we engage in all our activities, i.e. it is an explanation for that engagement. It is our ultimate reason why. And, further, since Aristotle says that it is a “cause of good things” and not merely a cause (or explanation) which we appeal to even when we engage in bad activities, the explanatory role of this starting point is objectively grounded (by the actual goodness of activities) rather than subjectively grounded (by perceived goodness). Thus, happiness is a starting point explanatory of the actual goodness of good actions.

In this way, when we point to happiness as a reason why, we are effectively building arguments “from starting points.” It is with happiness in focus that we can explain why we choose this or that action. But what might Aristotle mean when he says that there are also arguments “to starting points”? This seems to be a gesture to the discussion which establishes his conception of happiness, the so-called “function argument” of \textit{EN} 1.7 which points to common matters of experiences (like the difference between plants and human beings) as reasons for thinking that happiness must consist in performing those actions which are expressive of rationality. Certainly that argument is “to the starting point” as opposed to “from the starting point.”

\textsuperscript{100} Ibid. 1.12 1102a2–4.
In between the first introduction of happiness as an *archē* (in *EN* 1.4) and the explication of what it is starting point for, Aristotle identifies what looks to be a different set of *archai*. He says that the “adequately prepared student of lectures about what is noble and just and, generally, about political matters needs to have been brought up well in their habits (*tois ethesin ēchthai*), for the fact that (*to hoti*) is the starting point (*archē*) and if this is sufficiently clear then there is no need for the reason why (*tou dioti*) as well.”

Again, we ask “starting point of what?,” and since these starting points are identified as quasi-prerequisites for Aristotle’s lectures in ethics and politics, we might say that they are the starting points of moral learning. They are facts such as “I ought to keep promises,” “I ought to be honest,” and “I ought to provide what assistance I can to those who are in need”—facts which are imparted to us by our parents in the course of growing up and which we appeal to when deciding how to act. They are imparted to us by our parents if we have been brought up well, in any case. When we enter Aristotle’s classroom, these facts become the basis of our learning. It is enough for us to start with the facts, and what Aristotle teaches us is why the facts are so. We learn the *explanations* for why we ought to be honest and keep promises, etc. These facts—the starting points of moral learning—are not starting points of practical wisdom, though, because practical wisdom consists, at least in part, in understanding why they are true.

Thinking about these starting points of moral learning does point in the direction of some proper starting points of practical explanation, however. Students enter Aristotle’s classroom

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101 Ibid. 1.4 1095b4–7.
102 Burnyeat (1980) says that “the contrast here between having only ‘the *that*’ and having both ‘the *that*’ and ‘the *because*’ as well, is a contrast between knowing or believing that something is so and understanding why it is so. […] The man who knows for himself is someone with ‘the *because*’—in Aristotle’s terms he is a man of practical wisdom equipped with the understanding to work out for himself what to do in the varied circumstances of life” (71).
with facts and through the lectures they are given access to reasons why which explain those facts, and this education conveys understanding of the practical domain, i.e. it eventually leads to practical wisdom. The explanations that the students learn will themselves be starting points, then, or at the very least they will include some starting points. The starting points of moral learning are facts that the students know as being more familiar to them, but what they learn later will be starting points without qualification and will be proper upper limits, and the ultimate grounding of ethical explanations, so will constitute a significant part of practical wisdom. They include, for instance, that “just action is good,” “virtuous action is fine,” and “generous action is good” — facts which explain why we should keep promises, be honest, and provide assistance to those in need.

These properly explanatory starting points which are learned by a student of ethics overlap to some extent with what Aristotle calls, in a third relevant usage of archai, the “starting points of action.”103 These, he tells us, are starting points by being “that for the sake of which actions are done” — and this turns out to be the object of rational wishing (boulēsis). Every time we decide on a particular action to perform, we are choosing it as a means to some further end that we have. As Aristotle tells us in EN 3.2-4, we always start with a wish, and then we deliberate about how to realize the wish, and finally we decide on an action. Thus, the “starting point of action” is the end we wish for—or, as Aristotle puts it, “that for the sake of which an action is done.”

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103 See EN 6.5.1140b16-20.
For the starting points of actions which are to-be-done (archai tōn praktōn) are in
the that-for-the-sake-of-which actions are done (to hou heneka ta prakta), but the
starting point (archē) is not apparent to the man who has been ruined by pleasure
or pain, neither that he ought to decide and act for the sake of it (toutou heneken)
nor that it is the reason why (dia tout'h). For vice is destructive of the starting
point.104

Not everyone grasps the true “starting points of action.” If a person has been brought up poorly,
then he will take pleasure in the wrong sort of things and will be pained by things he ought not
to be pained by, and so he will wish for things he ought not wish for. Accordingly, this poorly
brought up moral agent does not grasp the true starting point of action, the end which a
practically wise person would wish for, an end that is choice-worthy and good.

In this passage, Aristotle identifies the “starting points of action” as being reasons why (dia
tout'h). And, just as he clarified in the case of happiness that it is not apparent goodness but actual
goodness that is explained by happiness being rational activity on the basis of virtue, so too he
specifies that not just any end has the status of being a reason why and starting point of action—
only those ends which are wished for as a result of being properly brought up and made to
understand what actions are good and bad. This is evidenced, also, by the EN 3 explication of
what wishing consists in:

That wish is for the end has already been stated; some think it is for the good,
others for the apparent good. Now those who say that the good is the object of

104 Ibid. 6.5 1140b16–20.
wish must admit in consequence that that which the man who does not choose
correctly wishes for is not an object of wish (for if it is to be so, it must also be good;
but it was, if it so happened, bad); while those who say the apparent good is the
object of wish must admit that there is no natural object of wish, but only what
seems good to each man. Now different things appear good to different people,
and, if it so happens, even contrary things. If these consequences are unpleasing,
are we to say that absolutely and in truth the good is the object of wish, but for
each person the apparent good; that that which is in truth an object of wish is an
object of wish to the good man, while any chance thing may be so the bad man, as
in the case of bodies also the things that are in truth wholesome are wholesome
for bodies which are in good condition, while for those that are diseased other
things are wholesome— or bitter or sweet or hot or heavy, and so on; since the good
man judges each class of things rightly, and in each the truth appears to him? For
each state of character has its own ideas of the noble and the pleasant, and perhaps
the good man differs from others most by seeing the truth in each class of things,
being as it were the norm and measure of them. In most things the error seems to
be due to pleasure; for it appears a good when it is not. People therefore choose
the pleasant as a good, and avoid pain as an evil.105

Not every wish is for the true good, but some are (specifically, the wishes of a virtuous and wise
moral agent are good), and so we can see again that Aristotle conceives of the difference between

105 Ibid. 3.4 1113a15-b2.
apparent and actual good as being crucially operative in his theory. In this case, the actual goods are operative by being ends which are truly worth wishing for and by being reasons why we should choose this or that action.\footnote{We should be cautious here in the way we conceive of these “actual goods.” The “actuality” or “truth” of an action being good is variable. Aristotle illustrates this with examples in \textit{EN} 1: “Uncertainty surrounds the conception of the Good, because it frequently occurs that good things have harmful consequences: people have before now been ruined by wealth, and in other cases courage has cost men their lives” (1.3 1094b16–19). And then he secures it as part of his theory in \textit{EN} 6: “It has been said before that the soul has two parts, one rational and the other irrational. Let us now similarly divide the rational part, and let it be assumed that there are two rational faculties, one whereby we contemplate those things whose first principles are invariable, and one whereby we contemplate those things whose principles admit of variation” (6.2 1139a3–8).}

Now, many of the ends wished for by virtuous moral agents will be things like “keeping my promise” or “being honest”—desires which are acquired through a good upbringing and a good education in ethical theory. Incidentally, these are also the starting points of moral learning. But Aristotle suggests that we can wish for things even less determinate than this. When we enter an ethical situation we can wish to perform a generous action or a kind action or, even more generally, a virtuous action. The (rational) thought that “generous action is good” or “kindness is fine” inspires a (rational) wish in us to perform actions of that type, and then we can proceed to deliberate about what would constitute generosity or kindness or virtue in our given circumstances. As such, the “starting points of action”—which are, strictly, the ends we wish for—can in some cases overlap with those starting points which we learn from Aristotle’s lectures and which explain why we should keep promises and be honest, etc. That is, in some cases, the very same proposition—e.g., “generous action is good”—which explains why we should choose particular actions is also the proposition which inspires us to have a rational wish to do it. But this does not occur in every case. Most often, a virtuous moral agent will wish for a more determinate action, e.g. to defend the life of his general on the battlefield, to provide a good
education for his children, to comply with the advice of his doctor, etc. Thus, while there is some overlap between the “starting points of action” and the “reasons why” which are learned by Aristotle’s students, the overlap is far from perfect. So while all of the “reasons why” learned by the students will be explanatory starting points of practical wisdom, only some of the “starting points of action” will be so. When the starting point of action is something like “generous action,” it is an upper-limit of explanation—explanation stops there because further questions why do not stand in need of answering by the practically wise person—but when the starting point of action is “to defend my general on the battlefield,” the practically wise person will be in a position to explain why that end is desirable (because it is a case of courageous action and courageous action is good, presumably).107

The “starting points of action” have a unique explanatory role in Aristotle’s ethical epistemological framework, then. While happiness is the final cause of the goodness of actions in a global sense, the “starting points of action” are final causes in a more local sense. They explain the choice-worthiness of an action which is a means to an end by showing that action both to be a means and to be a means to an actually good end. The practically wise person will have a grasp on this relationship between end and means when he is deliberating (an activity he is characteristically excellent in carrying out), and he will know his end to be a reason why he should choose some action or another.

107 This is a point I came to see through Cooper (1975): “If [the virtuous person’s] commitment involves knowing what he is doing and why he is doing it, he must be able, to some considerable degree, to explain and even justify himself (since, on Aristotle’s view, virtue entails “practical wisdom” and this entails knowing what conduces to a good life” (9).
Up to this point, we have put three basic varieties of starting points on the table. One of
the varieties seems only to have one member of the kind: happiness—or Aristotle’s conception of
happiness as activity of the rational soul on the basis of virtue. This is the “starting point and
cause of good things.” The second variety is the set of explanatory starting points that we come
to understand as a result of Aristotle’s ethical teaching—or, to be truer to the spirit of Aristotle’s
theory, as a result of living in the world, engaging in ethically significant actions, thinking
rationally about the value of various actions, and working out the explanations for why some
actions are choice-worthy and others not. Aristotle does not give a name to this second set of
explanatory starting points, but he identifies them as the reasons why which explain the facts that
which are grasped by a well-prepared student. And the third type is a subset of the “starting
points of action”—that subset which is desirable for its own sake. I have dismissed the “starting
points of moral learning” and many of the “starting points of action” from consideration because
they do not meet our criteria for being upper-limits of explanation.

Aristotle introduces a fourth variety in EN 6.11. Earlier, he says that “practical wisdom is
not knowledge of universals only, but it needs also to be familiar with particulars.”\(^{108}\) What these
“particulars” are is illustrated first with an example of someone who “knows that light meats are
digestible and healthy but is ignorant about which sorts (\(poia\)) of meat are light.”\(^{109}\) The example
pinpoints a relevant “particular” (“this kind of meat is light”) and also describes the way in which
such particular facts figure in practical knowledge: we must be familiar with particulars if we are
to put our decisions into action. So one role for particulars is that of minor premise in practical

\(^{108}\) EN 6.7 1141b14–15.
\(^{109}\) Ibid. 6.7 1141b18–21.
syllogisms. They are necessary for linking practical thought to specific, determine actions in the circumstances in which they occur.

In the following chapter of EN 6, Aristotle widens the role of these particulars, using a different example. “Error in deliberation may be either about the universal or about the particular—in supposing either that all heavy types of water are bad or that this particular water is heavy.”110 Particulars shift from being relevant only after we have deliberated and decided (necessary for putting our decisions into action) to being relevant during deliberation. Practical reasoning can fail if it does not sufficiently well take these particulars into account. For example, if a soldier ignores the particulars of the specific battle he finds himself in—e.g. that his army is half the size of the enemy army, the other army is on horseback, his shield is broken in half—he will not do well in deliberating about how to act in that battle.

And then a few chapters latter, in EN 6.11, Aristotle finally gives these particulars the name “archai.”

Intuitive intellect (nous) is concerned with the most extreme items in both directions. For there is intuitive intellect, but not an account (ou logos), of the primary definitions and of the things that are most extreme, i.e. there is intuitive intellect of unchanging and primary definitions with respect to demonstration (kata tas apodeixeis), but in practical matters [intuitive intellect] is of the most extreme thing and of what can be otherwise and of the minor premise, for these are the starting points (archai) of the end (tou hou eneka).111

110 ibid. 6.8 1142a20–23.
111 ibid. 6.11 1143a35–b4.
Two important features of Aristotle’s account come out in this passage. First, in identifying particulars as “starting points of the end” and giving them an important place in successful deliberation, Aristotle is attributing an explanatory role to these facts that is different, still, from the two modes of explanation we have seen in the first and second kinds of starting points. “Particulars” are explanatory in the sense of making a certain action good in the circumstances. The convergence of all the particulars creates a complex network that produces the choice-worthiness of the required action. We can say that the details of the situation are the reason why that action is good.

But we must think carefully about what the “particular” facts are which Aristotle is discussing. He uses the example of “this water is heavy,” which may appear to be a demonstrative statement pointing to a determinate instance of water and predicating of that water that it is heavy. But he also uses the example “these kinds of meat are light,” which does not point to a determinate instance of meat at all, but makes a claim about kinds of meat, that they are light or not. In counting both of these types of propositions as “particular,” Aristotle invites us to think that there is actually a wide range of propositions that may be “starting points of the end” and thereby feature importantly in good deliberation. It is not just the radically particular “this is…” that is accounted for. There is room also for propositions like “spinach is healthy,” “spending quality time with children contributes to their emotional and psychological well-being,” “exposure to sunlight positively impacts mood,” and “coffee consumption also positively impacts mood,” just to name a few. Granted, we might think of these as the “universals” which Aristotle already takes to be centrally relevant to good deliberation, but universals come at different levels of generality, so it seems that propositions of this kind, in which something is stated about more
or less specific types of things, in addition to radically particular propositions, are part of a good deliberator’s knowledge set. And it is by explaining the choiceworthiness of a specific action in relation to the end that we call these propositions “starting points.”

The passage above has a second important feature, though. In it, Aristotle identifies the intellectual state by which we grasp the “starting points of the end.” He says that it is “intuitive intellect” (nous), a state of the soul which was determined in Chapter 1 to be the state by which we grasp the first principles of science. Thus, a nice parallel is established between scientific knowledge and practical wisdom, then, when Aristotle suggests that scientific first principles and practical starting points are grasped by the same power of the soul. But we should be cautious in reading this literally. As already discussed, nous is a state of the scientific part of the soul, as evidenced by the fact that it does the work of grasping the essences of scientifically known objects (that is, it grasps certain universals). We should be wary, then, when Aristotle says that nous also grasps propositions which are particular and which feature in practical wisdom, which he says is a state of the calculative part of the soul. It seems he must be pointing to some state which is analogous to the scientific nous but which is not precisely the same state of the soul. We might call this new, practical state “practical nous” since it does the same work as scientific nous (it grasps the starting points) but is a state of the calculative, not the scientific, part of the soul.

I have identified four basic kinds of starting points, then, each of which is explanatory of something different from the rest. Happiness is a starting point of good things and reference to it explains, through final causation, the goodness of things which are actually good. In Aristotle’s classroom (or through general ethical learning), we can pick up the explanatory starting points which he calls the “reasons why” for those “facts that” which well brought-up people grasp.
Third, the beliefs we have about the value of virtuous action and virtue itself motivate us to desire actions under those descriptions ("generous action," "kind action," etc.) and, thus, are "starting points of action" which explain, through final causation, why a particular action ought to be chosen and done. And, lastly, various propositions—particular and more general—which feature in good deliberation are "starting points of the end" and explain why it is that a specific action will produce or realize the end (a kind of efficient cause, maybe).

In the remainder of this chapter, I will argue that all of these varieties of starting points are, in one way or another, the proper starting points of practical wisdom, in a way parallel to how the first principles of science are principles there. I will discuss examples from each category, taking them one by one so as to be thorough, and illustrating the way in which they explain what I have already identified as the "proper objects" of practical wisdom: the choice-worthiness and goodness of certain actions. The following propositions will be discussed:

1. Happiness is activity of the rational part of the soul on the basis of virtue.\(^{112}\)

2. Virtuous action is fine.\(^{113}\)

3. Human beings are social animals (\textit{politika}—literally, suited for life in a \textit{polis}).\(^ {114}\)

4. The sources and causes of virtue states are the same as their destruction.\(^ {115}\)

5. We become temperate by abstaining from bodily pleasures.\(^ {116}\)

6. The characteristic work (\textit{ergon}) of human beings is rational activity.\(^ {117}\)

\(^{112}\) EN 1.7 1097b24ff.; 10.5 1176a4ff.

\(^{113}\) Cf. "Courage is a fine thing (\textit{kalon}). Indeed the end (\textit{to telos}) is also fine. For each thing is defined by its end. Indeed, the courageous man endures and acts on the basis of courage (\textit{kata tēn andreian}) for the sake of the fine (\textit{kalou heneka})" (EN 3.7 1115b21–24).

\(^{114}\) Pol. 1.2 1253a2–3.

\(^{115}\) EN 2.2 1104a26–27.

\(^{116}\) Ibid. 2.2 1104a33–34.

\(^{117}\) Ibid. 1.7 1097b24ff.; 10.5 1176a4ff.
7. For each activity, there is a pleasure proper to it.\textsuperscript{118}

8. This is bread; This is light meat; This is heavy water.\textsuperscript{119}

In order to see the way in which all of these propositions are starting points of practical wisdom, we need to establish two things: (i) that they are explanatory of truths about the proper objects of practical wisdom and (ii) that they are unexplained within the domain of ethics. In the next section I will take up task (i) and in §5 I will take up (ii).

\textbf{4. The Explanatory Role of Ethical Starting Points}

Aristotle defines \textit{phronēsis} as “a state of the soul that is with a true logos (\textit{meta logou alēthous}) and is such as to act with regard to human goods.”\textsuperscript{120} “With a true logos” in this passage is generally translated variously as “with reason” or “reasoned,” and it means, first of all, that this psychic state consists in grasping an account which captures the truth about objects in the relevant domain. In the case of practical wisdom, those objects are actions which are choice-worthy and good. Such reasoning is carried out by considering the way in which various facts about the ethical situation at hand and facts about human nature and psychology stand as reasons why this action is to be chosen and another action is not. In a word, \textit{phronēsis} is “with reason” because it a mental state that we have once we have grasped explanations, reasons why. Aristotle makes this clear when he contrasts cases of good deliberation with cases of poor deliberation.

Now to have deliberated well is thought to be a good thing; for it is this kind of correctness of deliberation that is excellence in deliberation, that which tends to attain what is good. But it is possible to attain good even by a false syllogism and

\textsuperscript{118} Ibid. 10.5 1176a4–5.
\textsuperscript{119} EN 3.3 1113a1; Ibid. 6.7 1141b19; Ibid. 6.8 1142a23.
\textsuperscript{120} Ibid. 6.5 1140b20–22.
to attain what one ought to do but not by the right means, the middle term (horon) being false; so that this too is not yet excellence in deliberation—this state in virtue of which one attains what one ought but not by the right means.\textsuperscript{121}

Truly good deliberation—the kind that is characteristic of the practically wise person—must be carried out through a process of appealing to reasons and explanations. In some instances, this will be a process of constructing true syllogisms which feature true middle terms. This echoes Aristotle’s discussion of middle terms and syllogisms in the \textit{Posterior Analytics} and portrays \textit{phronēsis} as knowledge that is, at least some of the time, had through grasping middle terms, i.e. knowledge that depends on understanding explanations. But not all deliberation is so rigid. In fact, reflecting on the kind of thoughts and reasoning that I utilize in deciding how to carry out my life, I seem mostly to take facts and desires and perceptions into account very loosely, as counting in favor of a specific action but not as figuring in a logical form that has an proposition as its output. All the same, in so far as I truly \textit{know} that an action is the correct one for me to choose in a given situation, I must also know \textit{why} it is correct.

Aristotle offers the same account in \textit{Metaphysics} A.1. His aim there is to distinguish the “man of experience” from the “master craftsman” by pointing out the ways in which their knowledge differs.

We think that knowing (\textit{to eidenai}) and understanding (\textit{to epaiein}) belong more to craft knowledge (\textit{technē}) than to experience (\textit{tēs empeirias}), and we suppose craftsmen to be wiser than men of experience, so that knowledge (\textit{to eidenai}) goes

\textsuperscript{121} Ibid. 6.9 1142b20–26.
together with wisdom (sophian) in every domain (pasi). And this is because the
former know the cause (aitia), but the latter do not. For men of experience know
only the fact that a thing is so, but craftsmen know the reason why, and the reason
why is also the cause. For this reason, we think that master craftsmen in each craft
are more worthy of honor and know in a truer sense and are wiser than manual
workers because they know the causes of what is done, while the latter, like lifeless
things, do what they do, as fire burns—but while lifeless things perform each of
these by nature, manual workers perform through habit.122

Practical knowledge—the kind of knowledge that people have in relation to producing goods
and performing actions—is here depicted as consisting in knowing explanations. Without
knowledge of explanations, a person might still stably act well and reliably produce quality
goods, but the quality of their activities will be a result merely of having become accustomed to
acting in a certain kind of way. Children are seen behaving as such when they say “please” in
wanting something and “thank you” when they get it. They have been trained by their mothers
and fathers to develop the habit of parroting these words, but they do not really understand why
it is right to say them. They don’t grasp the explanatory force of the value of politeness. But when
they grow older and they do come to understand politeness as a value and to see it as a good
reason to exercise good etiquette when asking for and receiving things from others, then they will
not be acting merely out of habit. Their little bit of wisdom will drive their action. Having practical
knowledge, then, is not merely a matter of having seen a lot in life. Experience alone, however

122 Met. A.1 981a24–b5.
vast it may be, is insufficient for making a person wise in any domain of practical activity. The experience must go together with grasping an explanation, an account (logos) that stands as a reason why a person should act in one way or another.123

But how are propositions 1–7 from the previous section expected to fulfill the role of explanation in this schema? How can a fact such as “happiness is activity of the rational part of the soul on the basis of virtue” in any way explain the choice-worthiness of ethical actions? Fortunately, Aristotle’s discussion throughout Book 1 of the *Nicomachean Ethics* makes clear how the explanation works in relation to this proposition in particular. Aristotle conceives of this statement as specifying what the human good consists in. And the human good, he tells us, is the final end of all human activity, both because everything else we choose is for the sake of happiness and because we never choose happiness for the sake of something else.124

Happiness, then, is a final cause of the choice-worthiness of actions. If we ask a practically wise person, after he has performed some activity, “why did you choose that specific action?,” one of the explanations he will point to is that for the sake of which he performs all actions. This is because the practically wise person, more than anyone else, is in a position to understand how happiness—so conceived—is a cause of all good things attainable by human beings. We saw happiness in this role in the previous section, where happiness was identified as the “starting point of good things” and, therefore, a cause and explanation of the goodness in human actions.

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123 David Charles’ discussion (2000) of this passage rightly emphasizes that “master craftsmen” do not need to have “theoretical ideas” about the nature of things in their domain. A doctor, Charles offers as an example, “must have some idea of what health is, but she does not need to understand it in terms of basic science” (153). I absolutely agree with this interpretation of Aristotle’s theory of practical knowledge, but want to emphasize that it is not mere grasping of universals that is of concern for Aristotle. It’s grasping them as explanations.

124 Ibid. 1.7 1097a34ff.
And it is not just the apparent goodness in actions that the practically wise person grasps—though the actions he chooses do appear good to him\textsuperscript{125}—but the actual goodness. The conception of happiness as rational activity on the basis of virtue is an objective explanation of objective goodness, then. And practically wise persons understand it as such. They understand that the choice-worthiness of the particular action they have chosen and done is, in part, explained by the final cause that is happiness.

Proposition 2— that virtuous action is fine—is explanatory by filling out the content of the end we wish for when deliberating about specific actions.\textsuperscript{126} It is in relation to this end that the means available to us count as better or worse. It is a final cause, then, in similar fashion to how happiness is a final cause, but narrower in scope. An action’s being choice-worthy and good in relation to a whole life-narrative is explained by its capacity for realizing the conception of happiness we see described in EN 1.7, but an action being choice-worthy and good in relation to some specific end we wish for is explained by its capacity for realizing, or making more determinate, that end. It is of utmost importance, then, that a moral agent get the end right. That’s why propositions like “virtuous action is fine,” “temperance is good,” “excessive and deficient actions are bad,” etc., are part of the practically wise person’s knowledge. Knowing the value of fine and good actions is a cornerstone of good moral reasoning, on Aristotle’s view. When sketching the profile of the very best moral agent—someone who has mastered the art of living

\textsuperscript{125} Ibid. 3.4 1113a29–31.

\textsuperscript{126} Interestingly, Vlastos (1994) casts this proposition among several others—“temperance is a virtue,” “virtue is good,” etc.—which he calls “moral commonplaces” of Socrates’ time and which are allowed by Socrates to be relied on as moral presumptions in elenchus. Vlastos says that elenchus transforms these propositions into “(non-presumptive) elenctic knowledge.” It is interesting to see the place of this Aristotelian ethical starting point in the Socratic-Platonic schema.
well—Aristotle insists that the ability to “see” the good and to wish for and choose what is fine are all central to the identity of such a person.\textsuperscript{127} The \textit{phronimos} is not merely guessing when he chooses some particular action under the description “fine.” He is choosing it with the knowledge that is so, and he chooses it for that reason.\textsuperscript{128}

The remainder of the propositions are explanatory in a different way. They capture general facts about human nature and human behavior or particular facts about situations we sometimes find ourselves in, and they explain the choice-worthiness of a particular action by being salient factors that make that action—and no other action—the right one to choose. In the previous section, I suggested that this might be a kind of “efficient causation” because the convergence of salient general facts and particular features of the situation creates a complex network of facts that in part produces the choice-worthiness and goodness of the action.\textsuperscript{129}

It should be relatively easy to see how the proposition “human beings are social animals” is explanatory in this way. Aristotle himself, in \textit{Politics} 1.2, indicates that this fact explains, at least in part, why a person ought to organize his household in specific ways, cultivate a certain form of relationship with his servants, another with his wife, still another with his children, and immerse himself in the customs of law and justice.\textsuperscript{130} “For man, when perfected, is the best of

\begin{footnotes}
\item This excellent moral agent is called the “spoudaios” or “phronimos”—the former name referring to someone who has good moral character, the latter to someone who has \textit{phronēsis}, a difference which is obscured by the fact that Aristotle says good moral character is impossible without \textit{phronēsis}, and vice versa. The ability to “see” the good—a literal perceptual capacity—is described in \textit{EN} 3.4, which is also the place where the \textit{spoudaios} is said to wish for the true good.
\item Here I am echoing two of the three conditions that Aristotle sets out for an action to count as being done virtuously, cf. \textit{EN} 2.4.
\item Of course, a complete account of the choice-worthiness and goodness of that action will include reference also (i) to happiness and (ii) to the end the agent wishes for.
\item \textit{Pol.} 1.2 1252a24ff.
\end{footnotes}
animals, but, when separated from law and justice, he is the worst of all.” 131 The fact that we naturally live together in groups that are organized and regulated by legislative constitutions has bearing on what happiness will consist in for us. A life of solitude is inhuman, and therefore unhappy. Thus, the practically wise person, who is certainly in a position to appreciate this fact if anyone is, will choose those actions which contribute to the flourishing of his household and allow him active compliance with the law. And, if we were to ask him after he has performed such an action, why he has done so, he will answer us that such activities are befitting social animals. Such activities allow social animals to flourish.

Propositions 4 and 5 are explanatory in a peculiar way. Because practical wisdom is aimed not merely at knowing which actions are choice-worthy, but also at actually acting well, part of the practically wise person’s knowledge will involve knowing how to get oneself into such a state as to stably desire good action. Proposition 4 tells us that such a state (i.e. a virtuous state) is produced and maintained by repeatedly performing good actions. This is a description of Aristotle’s conception of “habituation,” the process by which we develop moral sensibilities on his view. 132 And it is an obvious explanation for the choice-worthiness of actions which produce the virtue states. Repeated instances of eating moderately “produce” the virtue state of temperance both by diminishing the agent’s pain in eating either more or less than she had previously been accustomed to and by replacing that pain with pleasure in eating the right amount. Thus, eating moderately is a choice-worthy action for the immoderate eater because it brings her closer to correcting her disposition.

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131 Ibid. 1.2 1253a31–32.
132 Aristotle describes his theory of habituation in Book 2 of the Nicomachean Ethics.
Proposition 5 reiterates the same principle: “We become temperate by abstaining from bodily pleasures.” The refusal of bodily pleasures is, in general, the way that human beings acquire the virtue. Like proposition 4, this fact explains why abstinence is choice-worthy when a person is in the process of habituating herself toward virtue. The practically wise person knows well how best to habituate himself and others, so it is certain that he knows these starting points which are explanatory of choice-worthiness in actions through the way that certain actions contribute to the process of habituation.

Propositions 6 and 7 are complementary in their explanatory capacity. That “the characteristic work of human beings is rational activity” and that “for each activity there is a pleasure proper to it” together explain why there is a unique pleasure that completes the activity of contemplation as well as all the virtuous activities, and why those pleasures are worthy of pursuit. Of course, we can enjoy other pleasures, but the pleasure that is proper to rational activity is the pleasure that is strictly proper to us. “Whether, then, the complete and blessed man has one or more activities, the pleasures that complete these will be said in the strict sense to be pleasures proper to man, and the rest will be so in a secondary and fractional way, as are the activities.” 133 For the practically wise person, this explains why the pleasures of rational activity are so great and why they are to be regarded as true and good pleasures that may be pursued. 134

133 EN 10.5 1176a26–28.
134 This proposition is also apparently at work at EN 3.11 1118a1ff. where Aristotle identifies temperance as being properly concerned with the bodily pleasures of touching and tasting, and not with seeing, hearing, or smell. To over indulge in pleasures proper to touching and tasting is “brutish,” Aristotle says, because they are not the pleasures proper to man’s characteristic work (rational activity). These are the pleasures that “the other animals share in, which therefore appear to be slavish and brutish.” Albertus Magnus (2008) has noted the explanatory power of the fact that there is a pleasure proper to each activity in relation to this passage in Book 3. “The proper operation of a human is to live according to reason, and, according to the Philosopher in the third book of the Ethicus, the generative operation and the operation of taste work in opposition to this. This is why childish sins consists in these things and why a human takes scant pleasure in them.”
The last set of propositions—“this is bread;” “this is light meat;” “this is heavy water”—are explanatory along two dimensions. Both of these roles are generally well recognized in the literature, but it seems that the difference between these explanatory dimensions has not been observed. First, they are capable of functioning as minor premises in practical syllogisms. That is, when I have come to the decision that I ought to eat light meat for lunch, the proposition “this is light meat”—when it is true—connects with my decision through a shared term (“light meat”) to produce my action of eating the light meat for lunch. The proposition is the content of a perception I have of my immediate environment (“this” right here in front of me is “light meat”). In this way, propositions attained by perception are explanatory through their role as minor premises.

But “this is bread” or “this is light meat” can have explanatory weight in a second way. When I find myself in some specific situation in which I have some wish (say, to eat a healthy lunch), these propositions which describe my immediate environment play a crucial role in my deliberation. In order to discover the best means to my end of eating healthily, I must be aware of what my options for eating are. That “this is bread” and “this is light meat” will, thus, be salient facts which I will take into consideration as I approach a decision.\(^ {135} \)

Each of the propositions discussed in this section stands in relation to the practical domain in a way that is similar to how first principles stand in relation to science. They explain why something is true. Of course, in science, the *explanandum* is a theorem which simply captures a true predicative relation between entities in the world, while in the practical domain, the

\(^ {135} \text{This explanatory function of particulars has been more than adequately described by McDowell (2009) who, unfortunately, defends an account of practical wisdom according to which such explanations are the *only* contents of the practically wise person’s knowledge.} \)
explanandum is the choice-worthiness or goodness of an action. The scientist’s task is to determine what it is about the nature of those entities that makes them relate to one another as they do, but the practical agent’s challenge is somewhat different. They must grasp an explanation, but the explanation is not in the nature of the action. It is in the moral force of facts like what happiness consists in, the value of virtuous action, the salient features of a particular situation. These facts have moral force in different ways—some by being final causes, others by being efficient causes (or some other kind of cause than final). And so there is not a general formula for conveying the precise structure of practical explanations—there is too much variation among them for there to be an accurate and also general account. But what certainly is clear is that the practically wise person knows why the actions he chooses are the ones that are good, and if we ask him for an explanation, he will point to the kinds of facts that have been discussed here.

5. Ethical Starting Points as Unexplained by Practical Wisdom
The explanatory role of these propositions is but one of two features that establish their status as starting points. Just as scientific first principles are both explanatory of theorems and unexplained by the science to which they belong, ethical starting points must not only stand in the minds of good ethical agents as reasons why certain actions are choice-worthy, but also be unexplained in the ethical domain by any prior reasons why.

This is a difficult feature to establish for some ethical starting points. Many of them are facts that make positive claims about the nature of human beings or the psychology of adolescents and adults, and these claims are in turn explained by science. Aristotle is unmistakably committed to this view. Many propositions which are sprinkled throughout the Nicomachean Ethics also appear in his scientific texts as results of scientific investigation. For example, the sixth
proposition on the list in §3 is an object of inquiry in Aristotle’s *De Anima*, his psychological treatise. In *DA* 2.3, we are told that:

> Of the psychic powers, some kinds of living things possess all, some less than all, others one only. Those we have mentioned are the nutritive, the appetitive, the sensory, the locomotive, and the power of thinking. Plants have none but the first, the nutritive, while another order of living things has this plus the sensory. If any order of living things has the sensory, it must also have the appetitive; for appetite is the genus of which desire, passion, and wish are the species; now all animals have one sense at least, i.e. touch, and whatever has a sense has the capacity for pleasure and pain...\(^\text{136}\)

Aristotle proceeds with this method of division and definition, eventually arriving at what is distinctive of *human* living things. “Certain kinds of animals possess in addition the power of locomotion, and still another order of animate beings, i.e. man and possibly another species like man or superior to him, the power of thinking, i.e. mind.” In the discussion surrounding these passages, Aristotle tells us that the student of psychic forms must begin by finding definitions for each form and investigating the properties of those forms, and then to work back even further to define thinking and perceiving and the other faculties of soul. By identifying some *explananda* and a method for seeking explanations, Aristotle is describing how to construct demonstrations in psychology. And, as he makes clear, one of the theorems of this domain is the form and characteristic work of human beings. Psychology provides a reason why, then, for proposition 1.

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\(^{136}\) *DA* 2.3 414a29ff.
I will say much more about this phenomenon of ethical facts (even starting points) featuring as *explananda* or otherwise in Aristotle’s scientific works. That we find such overlap between treatises—and, indeed, between domains of inquiry that are conceived as being as different as scientific thought and practical thought—provokes us to wonder what relationship Aristotle imagines there to exist between science and ethics, even after he has said that they are the concern of separate parts of our soul.

I do not think this issue is unimportant, as evidenced by the fact that I will dedicate an entire chapter to it. But for our purposes here in this chapter, we should be content with what Aristotle says in several places throughout the *Nicomachean Ethics* about seeking explanations only so far as they are useful to the subject matter at hand. Following his explication of what happiness consists in, Aristotle says that “we must remember what has been said before, and not look for precision in all things alike, but in each class of things such precision as accords with the subject-matter, and so much as is appropriate to the inquiry.”¹³⁷ He follows with an illustration of this directive as it applies to carpentry, saying that carpenters and geometers both study right angles, but in different ways, and this is why the carpenter needs to know only as much about right angles as is useful while the geometer needs to know about the very nature of triangles.¹³⁸ The same point is made a few chapters later when, in specifying what a student of politics must know, Aristotle says that some facts about the soul must be known, but “just to the extent which is sufficient for the questions we are discussing, for further precision is perhaps something more laborious than our purposes require.”¹³⁹ It is clear from these passages that Aristotle thinks that

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¹³⁷ *EN* 1.7 1098a26–29.
¹³⁸ ibid. 1.7 1098a29ff.
¹³⁹ ibid. 1.13 1102a23–26.
learning the scientific explanations that correspond with ethical starting points advances our scientific understanding, not our practical understanding.\footnote{John Cooper (1975) says that the starting points in ethics get some explanation because ethical reasoning proceeds through dialectic and the starting points of dialectic are supported by some reasons—specifically “dialectical reasons” (68). Cooper takes the definition of happiness that stands as a conclusion of the ergon argument to be one such dialectical starting point. The ergon argument itself is an instance of providing “dialectical reasons,” then. Like some others, then, Cooper takes the starting points of action to be the starting points of ethical knowledge.}

In fact, for ethical knowledge to even count as a body of knowledge at all for Aristotle, it must be the case that it has its own set of propositions which stand as stopping points of explanation. For, as we saw in Chapter One with Aristotle’s refutation of those who claim that demonstration must go on \textit{ad infinitum}, knowledge is possible only if explanation stops somewhere, so wherever we find a body of knowledge, we will also find first principles or starting points which function as the upper limits of explanation for that body of knowledge. Seeing how Aristotle identifies \textit{phronēsis} as a truth-tracking state of the soul that is mastery of the ethical domain in the way that \textit{epistēmē} is mastery of science, \textit{phronēsis} must be a kind of knowledge and, therefore, have its own upper limits of explanation. Without starting points, ethical knowledge would depend on explanations that go on \textit{ad infinitum}, thus precluding the possibility of actually knowing the “because” that experience in life and Aristotle’s lectures and even perception purportedly impart.

One feature of Aristotle’s theory seems to present a problem for this view, though. As we saw earlier, when he introduces happiness as a starting point, he says that there are arguments both “to” and “from” the starting points.\footnote{\textit{EN} 1.4 1095a30–32.} My discussion in this chapter has focused almost exclusively on those arguments that are “from” the starting points because those are the
arguments that function as explanations for the choice-worthiness of actions. But insofar as there is also some argument “to” any or all of the starting points, we might think that they do not have the status of being unexplained within the practical domain. This would defeat my claim that the starting points I’ve identified here stand in relation to the practical domain as the first principles stand in relation to science. It is an essential feature of first principles that they are unexplained within the scientific domain to which they belong. The starting points of ethics, then, must also be unexplained by any arguments or account that constitute practical wisdom.

So what are these “arguments to starting points” (oi logoi epi tas archas) and do they violate the status of starting points as unexplained? I contend that they do not amount to full-blown explanations and that they leave the starting points unexplained but elevate them to the status of “well-established.” Let us focus on the argument “to” Aristotle’s conception of happiness, since this is the starting point in focus when he makes the distinction between arguments to and from arguments in the first place. It is clear that the argument to happiness is the “ergon argument” of EN 1.7. This much-discussed argument moves from claims about the characteristic work of human beings (rational activity) and the good for all things which have a characteristic work (accomplishing the characteristic work well) to a general outline of what happiness consists in (rational activity on the basis of virtue). The claims are taken by Aristotle to support his general conception of happiness, and scholars have often noted that the support is easily recognized as having the logical form of premises supporting conclusions. What we have in the ergon argument is a formal (or easily formalized) argument “to” a conception of happiness (a starting point).

But Aristotle is quite clear that this “argument” does not constitute a proof or explanation of happiness. At the end of EN 1.7, just after he has laid out the ergon argument, Aristotle asks us
to be satisfied with this rough sketch of happiness and not to seek more precision than is necessary.

Nor must we demand the cause (tēn aitian) in all matters alike; it is enough in some cases that the fact (to hoti) be well-established (deichthēnai), as in the case of the first principles (tas archas); the fact (to hoti) is a primary thing and first principle (proton kai arche). Now of the first principles we see (theōrontai) some by induction, some by perception, some by a certain habituation, and others too in other ways. But we should try to investigate each set of principles in the way natural to them, and we must take pains to determine them correctly, since they have a great influence on what follows. For the beginning is thought to be more than half of the whole, and many of the questions we ask are cleared up by it.¹⁴²

The ergon argument has established Aristotle’s conception of happiness, but not by isolating causes. It has established the fact that happiness consists in rational activity on the basis of virtue. And, further, we should not be surprised that the fact of happiness being rational activity is established through an argument. Different starting points are acquired in different ways, and it seems that this argument is a means of acquisition appropriate to the fact of what happiness consists in. So the argument does not violate the status of this fact as a starting point, then. The argument “to” this starting point merely indicates the means of grasping the truth of the proposition. It is not an argument that isolates a cause. What the practically wise person knows is that happiness is rational activity on the basis of virtue and the way in which this fact explains

¹⁴² Ibid. 1.7 1098a33–b8.
why certain actions are choice-worthy. I will say more about how we acquire the starting points of practical wisdom in the next chapter.

I have argued in this chapter that, despite all of Aristotle’s warnings about the differences between scientific knowledge and practical wisdom, he ultimately conceives of the two forms of expertise as sharing a common core. They are both ways of knowing that essentially involve knowing reasons why. Of course, the mode of explanation is different for each. Whereas scientific knowledge involves knowing natures as explanatory of various phenomena, practical wisdom involves knowing our ends to be reasons for acting in certain ways and features of specific situations (along with general facts about nature and psychology) as making particular actions choice-worthy. The part of us that does this latter kind of knowing—the calculative part of the rational soul—has its own distinctive virtue when it grasps the truth about what is good and what is bad for human beings. And though this kind of truth is quite different from the universal and invariable truths about the world that make up the scientific domain, it is not so difficult to see how and why Aristotle would set both ways of knowing alongside one another as excellent states of our minds and souls.

The upshot of this interpretation is that we can see why it is that Aristotle conceives of ethical knowledge as something profound and profoundly difficult to acquire. It requires that we understand the moral force of certain facts about human beings and about the world around us, that we see those facts as reasons why we should choose certain actions and do them. In the same way that a geometer’s knowledge consists in knowing geometrical theorems through the first principles of geometry, the practically wise person’s knowledge consists in knowing which actions are choice-worthy through the starting points of ethics. What we are left to wonder, at this
point anyway, is what further relationship might persist between science and ethics. Is the practically wise person made even more practically wise if he masters science? Does scientific knowledge expand through gaining practical expertise? In the next chapter I will explore these questions.
What’s Scientific about Aristotle’s Ethics?

Up to this point I have discussed and described scientific knowledge and practical wisdom in parallel. Such parallel discussion befits the subject matter because the two kinds of expertise have several features in common—e.g., they are both states by which the rational soul grasps and understands certain truths and they both consist in knowing reasons why—and yet the metaphysical properties of their separate domains, as well as the fact that one is aimed only at knowing truth while the other is aimed at action, determine them always to be cast apart, never to find convergence.

In this chapter I will disrupt this picture of two parallel tracks of expertise. I will focus on those propositions mentioned in Chapter 2 which may appear, at least on their face, to be scientific propositions which Aristotle has smuggled into his ethics. I will point to a connection between science and ethics which has been thus far overlooked in our study of Aristotle. That connection is what I call “quasi-subordination” for its similarity to the “superordination-subordination
relation” that Aristotle uses to describe the way that two scientific domains link together and which I discussed in Chapter 1 of this work. As I explained there, one science is superordinate to another when it contains a demonstrative syllogism explaining a proposition which functions as a first principle in the other science. For example, geometry is superordinate to optical science because geometry contains the scientific explanations for one or more first principles of optical science. The optical scientist must accept one or more propositions as unexplained—this is what it is to grasp a first principle—despite the fact that a scientific explanation does exist, contained in the demonstrative syllogisms of geometry. Or, at the very least, knowing the scientific explanation is not a requirement of optical science, and if the optical scientist were to pursue the explanation in geometry, she would end up possessing geometrical knowledge and would do nothing to expand her knowledge of optical science.

Aristotle tells us that there are many instances of two bodies of knowledge making contact in this way, where a knower of one domain grasps a reason why for something known only as a fact in the other domain. Besides geometry and optical science, he lists the following pairs: arithmetic and harmonics, stereometry and mechanics, and astronomy and observational data about the relative positions of stars, planets, and other astronomical entities. But he also provides some examples of scientific domains standing in this relation to non-scientific domains. The example of geometry and medicine stands out in the *Posterior Analytics*, and geometry and carpentry are connected in the *Nicomachean Ethics*. These connections between science and non-science are instances of what I will call the “quasi-subordination” relation, and I will argue in this

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143 *APo* 1.13 78b34-39.
chapter that Aristotle conceives of practical wisdom as being one of the bodies of knowledge, alongside several of the crafts, which is eligible for standing in this relation to science.

I will proceed by first exploring the quasi-subordination relation and the ways in which it differs from the strict superordination-subordination relation. In this discussion, I will build a case for the idea that practical wisdom should be considered eligible for connecting with scientific knowledge through the quasi-subordination relation. Some of the starting points of practical wisdom are linked to science through a formal relation wherein a scientific domain contains an explanation for the propositions which functions as an ethical starting point. When we understand this connection between science and ethics, the picture of scientific knowledge and practical wisdom as being parallel and never converging will fall away. We will see points of overlap. Ultimately, I aim to show that this reading of Aristotle provides a crisp and concise answer to the question of why Aristotle seems to be bringing scientific propositions into his ethics, while also preserving the careful distinctions he marks out between the two domains.

1. Quasi-Subordination
In §5 of Chapter One (the section called “Connections between Sciences”) I described a relation which Aristotle says stands as a formal connection between separate scientific domains. I called this the “superordination-subordination” relation because Aristotle says that it is a link between sciences which are “one of them under the other” (thateron hupo thateron).\(^\text{144}\) When two sciences are “one of them under the other” in this special way, Aristotle tells us, one of them contains a “reason why” for what the other contains only as a “fact that”. Now, whenever a practitioner in a particular scientific domain is in possession of a scientific “reason why,” this means that she

\(^{144}\) Ibid. 1.13 78b36–37.
grasps a demonstrative syllogism that explains the truth of some proposition. And when a practitioner in some scientific domain knows only the proposition itself—and lacks the “reason why”—this means that she grasps the fact (or proposition) without a demonstration and that she must know the fact as explanatory of other facts in the domain, i.e., as a first principle. Facts feature in scientific knowledge only in one of two ways: as explanandum (the thing to be explained, i.e. the theorem) or as explanans (the thing doing the explaining, i.e., ultimately a first principle). If a fact fails to have one of these two roles, it does not properly belong to the science at all. Aristotle provides a short list of pairs of sciences that are connected in this way: optical science is subordinate to geometry; harmonics is subordinate to arithmetic; mechanics to stereometry; observational data the relative positions of stars, planets, and other astronomical entities to astronomy. In Chapter 1, I provided an example from Euclid’s geometry and optics that illustrated how Aristotle might have imagined the relation to hold between those sciences.

Importantly, Aristotle emphasizes that the superordination-subordination establishes only an imperfect overlap between scientific domains. Because the subject-matter of each science is distinct from every other, and the subject-matter determines what terms feature in the

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145 It’s true that some propositions which feature as theorems of a science can be pulled into the proofs for other theorems (cf. Euclid’s Elements where some theorems are appealed to in the proofs of many other theorems), but it would be false to say that such propositions are known only as facts by scientists who have knowledge of these domains. In fact, even in the proofs where earlier proved theorems are wheeled in as premises, the proof implicitly relies on the earlier proof of that theorem for completing the demonstration. Demonstration is incomplete if it fails to explain from first principles, so any proof that relies on some premise which has itself been earlier proven in the science will necessarily depend on that earlier proof for completeness. In any case, those propositions which are known only as facts (contra knowing them as reasons why or contra knowing the reason why of them) are facts which function as first principles.

146 At APo 1.33 88b30ff., Aristotle explains that there are certainly some facts which are objects neither of scientific knowledge (epistēme) nor intuitive intellect (nous) but which are nevertheless facts. These are the objects of opinion (doxa) and insofar as they belong to the practical domain or to one of the productive domains, they may be part of the practically wise person’s knowledge or the craftsperson’s knowledge, but they cannot be part of science.

147 Frede (2011) interprets the superordination-subordination relation as I have described it here, pp. 118.
propositions of a science, there will not be a one-to-one correspondence between propositions featuring in one science and those of another. So then, when the scientist working in, say, geometry knows the “reason why” for a proposition in optical science, the geometer does not know the optical proposition as such. As a geometer, she knows proofs for theorems about triangles and perpendicular lines, etc., but the optical proposition features terms like “angle of vision” and “appearance.” Whatever the geometrical proof might be that explains the corresponding proposition in optical science, it will be a proof that explains the behavior of entities studied by optical science, but it will do that explaining without actually referring to the optical entities. Aristotle explains this in the following way:

It is for the empirical scientists (tôn aisthētikôn) to know the fact and for the mathematical scientists (tôn mathēmatikôn) to know the reason why; for the latter have the demonstrations of the explanations, and often they do not know the fact, just as those who consider the universal often do not know some of the particulars through not having paid attention to them (anepiskepsian). These connections have a perceptible existence though they are manifestations of forms. For the mathematical sciences concern forms: they do not demonstrate properties of a substratum, since, even though the geometrical things are predicable as properties of some perceptible substratum, it is not as thus predicable that the mathematician demonstrates properties of them. (APo 1.13 79a3-7)

Geometry is concerned with forms, but optical science is concerned with “properties of a substratum” (specifically, the substratum of light, appearances, and vision). These are related “just as” universal to particular: the mathematical form is instantiated in the optical substratum.
Thus, some of the terms which feature in optical propositions are particular, enmattered instantiations of the universals expressed in geometrical propositions.

Accordingly, those propositions which function as first principles of optical science and which are also explained by “reasons why” in geometrical demonstrations have a “universal” and unenmattered counterpart in geometry. The overlap between sciences is not the sharing of a proposition, then, but rather a special relation of instantiation between two propositions that belong properly to separate sciences.

\[
\begin{align*}
\text{All As are Bs} \\
\text{All Bs are Cs} \\
\hline
\text{All As are Cs} & \rightarrow & \text{All Xs are Ys} \\
\text{All Ys are Zs} & \quad & \text{All Xs are Zs}
\end{align*}
\]

The scientist who works in the domain that is concerned with As, Bs, and Cs, grasps a demonstrative syllogism which explains why “All Xs are Ys” is a true proposition, and the former science is in a position to explain the proposition of the latter science just because “All Xs are Ys” is an enmattered instantiation of “All As are Cs,” which is a theorem of the former science. Take as an example of an “All Xs are Ys” proposition the following law of optical science: The “Law of Reflection” states that “a ray of light is reflected from a surface at an angle that is equal to the angle at which it arrived upon that surface (i.e. the angle of reflection is equal to the angle of incidence.”\textsuperscript{148} This is an instantiation of the geometrical theorem that the shortest distance from

\textsuperscript{148} This optical proposition, though not identified by Euclid in his list of principles at the beginning of the Optica, is appealed to in the proof of Proposition 19 in that work (“To know how great is a given elevation when the sun is not shining”). In that proof, when he appeals to the Law of Reflection, he says that he intends it “as it has been said in
point A to point B through some point C, which lies on a straight line $\overline{DE}$, is the path according to which the angle between $\overline{AC}$ and a line perpendicular to $\overline{DE}$ at point C is equal to the angle between $\overline{BC}$ and the same perpendicular line.

![Diagram of a light ray path](image)

Light rays always travel along the shortest distance between two points, and as this geometrical theorem illustrates, when the path traveled must go through a point on a line (or make contact with a surface, as light does when it is reflected off a mirror), the angle of approach to that point is equal to the angle of departure in relation to an imaginary line that is perpendicular to the line or surface on which that point lies. Where geometers are concerned with abstract entities like line segments, points, and angles between line segments and perpendicular lines, the optical scientist is concerned with the path of the light ray, the angle of incidence, and the angle of reflection. The propositions convey the same basic idea, but in relation to different entities, the one set of entities being abstract forms of the other. We can see, then, what it is for one science to be “under” another. It is for it to be a study of entities which are instantiations of the entities studied by a more abstract science.

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the *Catoptrica* which might suggest that he thinks of the Law as a theorem which has been proven in that work, and indeed we have a text called “*Catoptrica*” which features the statement of the Law as a theorem. But this work is now considered pseudo-Euclidean, so we cannot be sure how Euclid had the Law figuring in his own *Catoptrica*. 
It comes as a bit of a surprise, when Aristotle is describing his superordination-subordination relation, that he suggests that this relation is not restricted to the scientific domain. There are many sciences (epistēmai) related in this way that are not under one another, as medicine is to geometry. It is the doctor’s business to know that circular wounds heal more slowly, the geometer’s to know the reason why. (APo 1.13 79a15-16)

When it comes to healing wounds, doctors—i.e. people who have acquired the technē of medicine—stand in a special relation to a set of facts about wounds and how best to treat them. Specifically they grasp those facts—they “know” them—as fairly accurate portrayals of the way their patients’ wounds have responded to various treatments. That is, the doctor does not know why wounds of certain shapes heal at different rates, but he knows from experience that they do so. It is not his job to know why. He is a perfectly capable doctor without knowing why. The explanation is in the geometer’s domain, and, likewise, the geometer can be perfectly competent in geometry without knowing that wounds of certain shapes heal at different rates. His concern is to work out the reason why abstract entities like lines and circles and other figures behave the way they do. He need not know the way his geometrical theorems are instantiated as particular, enmattered properties of bodies constituting the medical substratum.

Certain scientific domains can hold explanations for more than just other scientific domains, then. Some scientific demonstrations explain non-scientific facts, and even though it cannot be the case that the non-scientific domain is properly subordinate to the scientific domain (because the domains make contact in this way too seldom for one to be properly “under” the other), nevertheless it can be “quasi-subordinate.” The “quasi-subordinate” relation features
explanatory priority and a sharp distinction between what is known by one domain (the reason why) and what is known by the other (the fact), but it lacks the aspect of fitting one domain “under” another.

So how is it that geometry can explain this medical fact about wounds anyway? Well, we must get clear, first, on what precisely the medical fact is. Wounds heal through the process of new skin growth, and the growth proceeds from the edges of the wound toward the center, reaching completion only when the new, healthy skin covers the entire area of the wound. So when Aristotle says of doctors that they know that “circular wounds heal more slowly,” he must mean that the process of growth of new skin from the edges of a circular wound toward the center takes longer than that same process in wounds of other shapes. The accepted view among Aristotle’s commentators is that geometers can explain why longer lines are required for joining the edges of a circle than, say, the edges of a square. It is because the circle lacks angles. In the words of Thomas Aquinas, “the geometrician knows why this is so, i.e., because the circle is a figure without angles. Hence, the parts of a circular wound do not draw near to each other in such a way as to be easily joined together.”\(^{149}\) To illustrate this, we can draw two figures which are of equal size, i.e. have the same area.

\[^{149}\text{Aquinas (Trans. Ralph McInery, 2008).}\]
Let the area for the circle be $\pi r^2$, so the area of the square is also $\pi r^2$. To join the edges of the circle with the shortest possible line that crosses the most interior part of the figure, draw a straight line from one point on the circle’s circumference, through its center point, and to the other side of the circle (represented by the line with arrows in the circular figure above). In other words, draw the circle’s diameter, a length which equals twice the radius, $2r$. For the square, the shortest distance between the edges that runs through the most interior part of the figure will be equal to the length of one of the square’s sides: the square root of the area, $\sqrt{\pi r^2}$ or $r\sqrt{\pi}$ (represented by the line with arrows inside of the square figure above). The diameter of the circle $(2r)$ is greater than the square’s side $(r\sqrt{\pi})$ for any value $r$. It is important to emphasize that the line must be the shortest possible line that crosses the innermost point of the figure because wounds, which comes in a variety of shapes, all heal in the same basic way: new skin grows over the wound, starting at the periphery of the wound and working its way in. A wound is completely healed when the new skin covers the inner most point of the wound, and so the distance to this innermost point, from the nearest side(s) determines how quickly the wound will heal. As this geometrical “proof” suggests, the distance that new skin needs to cover on a circle is greater than the distance that

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150 Alternatively, we could compare the circle and the square when they are equal with respect to circumference rather than area (which is shown above). The circumference of a circle is $2\pi r^2$, so our square, too, has a circumference of $2\pi r^2$. To join the most remote edges on the circle, again we draw the diameter, $2r$. And for the square, the length of its side will be equal to the length between the most remote edges and its side will be one fourth of its circumference: $\frac{1}{4}(2\pi r^2) = \frac{\pi r^2}{2}$. $2r$ is greater than $\frac{\pi r^2}{2}$. Either way we account for the equality of the figures, then, (whether by setting the area as equal or by setting the circumferences as equal) the distance which must be covered in order to join the edges of the circle will be longer than the distance which joins the edges of the square. For what it’s worth, Philoponus of Alexandria (Trans. McKirahan, 2012) attributes the view to Aristotle that geometers run the proof using isoperimetric figures (equal with respect to circumference). But the proof that he cursorily describes only makes reference to the fact that circles have the largest area of isoperimetric figures, and so it will obviously take longer for a circular wound to heal because the wounded area is greater. “[...] Geometers state the cause of this—that circles contain the greatest area of any isoperimetric figures. For among isoperimetric figures those that have more sides always contain a greater area. And since the circle is the limit of polygons, it contains the greatest area of all figures.” Philoponus himself dismisses this explanation in favor of one that involves “joining the edges of the circle.”
must be covered in square wounds. And though it does not explicitly prove the same for wounds of all other shapes, the proof does in fact go through in the same way because the area of a figure and the shortest possible line through its center point both increase as its number of sides increase, with the circle being the limit of increasing the number of sides. Thus, for any circular wound, that wound will heal more slowly than wounds of other shapes because the shortest distance between a circular wound’s edges is greater than the distance between edges of other wounds.

So it is easy to see why Aristotle has marked the division between geometry and medicine where he has. A doctor can hardly be expected to be familiar with these mathematical equations and comparative analyses of the dimensions in different figures. What the doctor knows is that when he finds a circular wound on a patient, he can expect that wound to take a while to heal, longer than an angular wound would take. To expect the doctor also to know the geometrical explanation—which deals in abstract figures, not wounds as such—is really to expect too much. Not only is geometrical reasoning outside the domain of medicine, but it does nothing to enhance the doctor’s medical skill.\footnote{One might think that I am contradicting the distinction between “men of experience” and “master craftsmen” that Aristotle discusses in Met. 1.1. He says, “Men of experience know that the thing is so, but do not know why, while the others know the ‘why’ and the cause. Hence we think also that the masterworkers in each craft are more honorable and know in a truer sense and are wiser than the manual workers, because they know the causes of the things that are done.” So it might seem that the doctor I am discussing is merely a man of experience since, after all, he knows that circular wounds heal slowly only through experience—he knows only the fact, and he does not know the explanation. But perhaps we could imagine a doctor who is master of his craft, thereby knowing the explanation for the fact in question. This is quite the wrong way to think about the Metaphysics passage, however. Aristotle is clear that the master craftsmen know the cause of “things that are done,” and these are the activities of their respective crafts. For the doctor, a “thing that is done” might be the issuing to a patient of several weeks’ worth of gauze and other materials for tending a wound that will heal slowly. That is the thing done, and the doctor knows the causes, or explanations, of this: that circular wounds heal relatively slowly is one such explanation. (Health is another explanation, the final cause.)}
“technical” because it is a technē; “productive” because it “produces” or “makes goods (poiein).

Unlike science, which aims at knowledge and reveres knowledge as a good in itself, productive activity aims at making things. Medicine, for example, is aimed at making health, i.e. producing health in patients. Dancing is aimed at making beautiful, rhythmic movements with the human body. Exercise is aimed at making the body strong. The knowledge and skill necessary for producing health—or dancing well, or acquiring and maintaining strength, or effectively producing what any of the other technai are for at making—that knowledge and skill is not valuable for its own sake. The value is derived from that knowledge’s potential for enabling an agent to make whatever their art is for making.

The differences between productive activity and science run deeper still. Although Aristotle conceives of the rational part of the human soul as unified in this one respect, that it is distinctively human to have rational capacities, and so the activity of the rational part is the characteristic activity of human beings, he nevertheless divides that rational part in two and assigns productive reasoning to one part and scientific reasoning to the other. The calculative part (logistikon) reasons about how to produce things (like health or houses), while the theoretical part (epistēmonikon) does science. The assignment to separate parts of the rational soul is due to the fact—Aristotle tells us—that one part investigates matters which are universal, invariable,

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152 This “characteristic activity” is the human ergon (“work” or “function”) which Aristotle defines in EN 1.7 as “activity of the rational part of the soul,” and use as a premise in his argument that the human good (i.e. happiness) is to perform this activity well, i.e. to perform virtuous actions. Also, it is perhaps, strictly speaking, incorrect to say that humans alone have rational capacities, since Aristotle suggests at several points in EN 10.7 that the theoretical part of our rational capacities is something divine or, at least, the most divine within us. So this part of ourselves and the activity in which that part engages (contemplation) would not be unique to humans, but shared with the gods. Still, Aristotle is impressed that the rational capacities, taken together, are sufficiently uniquely human that they should comprise what is characteristic of humans.

153 EN 6.1 1139a4–8.
and true of necessity while the other part is concerned with things variable and particular. The theoretical part grapples with universal truths, of course. That is the part of us that solves equations in calculus and conducts geometrical proofs. The activities of the theoretical part are aimed at knowledge. We take pleasure in the mere knowing of geometry. But the calculative part is at work when we are assembling our latest purchase from Ikea or planning a dinner party. It is the part of us that solves practical problems by working out plans that will help us meet a goal of producing something. When our calculative part lands upon a solution, a precise plan for producing our desired good, we do not take pleasure as we do when we have theoretical understanding. Instead, our pleasure is held off until we have actually carried out the plan and the good is produced.¹⁵⁴

For Aristotle, however, the primary difference between the geometer and the doctor appears to arise neither from the fact that they aim at fundamentally different kinds of ends nor that they characteristically engage different parts of the rational soul. It arises from the fact that one is concerned with entities that are universal and true of necessity while the other is concerned with things particular and variable. That the geometer’s knowledge can be expressed in demonstrative syllogisms which can be constructed only from universal propositions, sets her knowledge widely apart from the doctor’s knowledge which cannot at all be captured in demonstrative syllogisms. In order to master medicine—or any craft for that matter—a person must work immersed in variation, learning to respond to the particular features of what is presented to her. It will not do to think abstractly or universally about the human body for how

¹⁵⁴ Or, in cases where the goal is in the very activity (like dancing), we take pleasure in the action itself.
it functions ideally. Doctors do not treat abstract patients; they treat the peculiarities and nuances of the flesh and bone person in their consultation room. The epistemological account of productive knowledge as well as the metaphysical status of the things known in those domains is, therefore, dramatically at variance with the epistemological and metaphysical status of matters known in scientific domains.

Given that scientific knowledge and craft knowledge are so dramatically different along all these dimensions, what should we make of Aristotle’s suggestion that a kind of craft knowledge (medicine) can stand in relation to a kind of scientific knowledge (geometry) in the way that two sciences may be related? Should we think that Aristotle is only meaning to illustrate the scientific relation through a more familiar example, but without intending us to think that science can actually be connected to what is non-scientific? Pressure around this question mounts when we notice that Aristotle has described the quasi-subordination relation as holding between “sciences” (epistēmai). “There are many sciences (epistēmai) related in this way that are not under one another, as medicine is to geometry.” In the context of the Posterior Analytics and Aristotle’s description of his theory of scientific knowledge, the use of the word epistēmē strongly suggests that we should read the passage as strictly referring to scientific knowledge. So should we dismiss the geometry-to-medicine example of the quasi-subordination relation as non-literal?

I think not. First, Aristotle often uses the word “epistēmē” to refer to bodies of knowledge which are not actually scientific by the standards of his theory. For example, in the Nicomachean Ethics, despite the fact that he devotes much of Book 6 to carefully carving up epistēmē, technē, and

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155 APo 1.13 79a15.
phronēsis as distinct bodies of knowledge (and states of the rational soul), he is nevertheless inclined in the rest of the treatise to occasionally use the word epistēmē broadly to refer to each and every one of these kinds of knowledge. In Book 2, when discussing virtue’s status as a mean between excess and deficiency, he says,

Every knower (epistēmōn) avoids excess and deficiency, and seeks the mean and chooses this, and it is the mean not in the action but relative to us. Indeed, if every knowledge (epistēmē) accomplishes its characteristic work well by looking towards the mean and guiding its works (ta erga) to [the mean] … 156

Aristotle is here discussing the nature of virtue, its status as a mean between two extremes, and the qualification that it is not a mean in the mathematical sense, but a mean “relative to us.” Importantly, virtue (conceived as a mean) is predicated of actions, and actions are the concern of craftspeople and moral agents, not scientists. The “knowers” referred to in this passage, then, must be craftspeople and practically wise people. It is their business to know what actions are virtuous and what that virtue consists in. When Aristotle uses the word “epistēmōn” to describe these knowers (and “epistēmē” to describe their knowledge), he must be using the word broadly to refer to people who have mastery in some domain, whatever ones are susceptible to being mastered. He cannot be using it in its narrow sense of specifically scientific knowledge. Surely, then, in the Posterior Analytics passage Aristotle could be using “epistēmai” broadly in order to cast a wide net around all kinds of mastery, scientific and otherwise. We need not read too much into his use of the word epistēmē there.

156 EN 2.6 1106b5–9.
Second, it is simply clear from the example above that Aristotle does conceive of geometry as explaining at least this one medical fact. And he brings the example in at the tail end of describing the superordination-subordination relation. If he meant the example not to be an instance of one domain being explanatorily prior to another, then he is being especially misleading. A charitable reading will have us interpret him as being sincere with his example.

Lastly, it would be rather absurd to think that a doctor’s knowledge is not quasi-subordinate to some domain of science. Specifically, medicine is undoubtedly quasi-subordinate to biology. The medical domain and the biological domain are so closely situated that it is difficult to locate the line that divides them. As a matter of fact, Aristotle thinks the difference is that biology is concerned with the organisms and parts of organisms as species, i.e. for what is universal and “normal” for those organisms and their parts. But the doctor is interested, as already emphasized, in the actual functioning of this here organism before him, and he gives attention to the universal conception of the species and to the model of “normal” functioning only to the extent that he aims to direct his particular patient toward the normal path and away from injury or disease. It is true to say, then, that both biology and medicine are focused on the normal functioning of an organism. It’s just that biology is interested in the truth for its own sake while the doctor is interested in the truth for the sake of healing.\textsuperscript{157} As such, there are many things for which the biologist knows the reason why, but which the doctor will know only as a fact which guides his practice. In any case, we should take Aristotle’s example of medicine’s being quasi-

\textsuperscript{157} Aristotle’s commitment to this difference in motive between the scientist and the craftsman can be gleaned from \textit{EN} 6.3-4 where he says that “craft is a state concerned with making” (1140a20–21).
subordinate to geometry to be an encouraging development of his epistemology, not a mistake, since it carves out some logical space for the obvious connection between biology and medicine.

Still, even when we grant that the doctor’s knowledge is connected with some one or few domains of scientific knowledge, we cannot say that he arrives at his knowledge through working out geometrical proofs or by running biological experiments. He arrives at it through experience. Just as modern medical students are trained by spending time in clinics and practicing in their chosen field of specialization throughout several years of residency, the doctors of Aristotle’s time who had mastered the healing art are those who have acquired a great amount of experience relevant to their craft. Knowledge of wounds comes from repeated observation of actual wounds. It does not come from geometry textbooks and proofs about circles. (Though, admittedly, biology and chemistry textbooks can teach the medical student a great deal, especially about what is not observable to the naked eye, or even under microscope.)

The origin of the doctor’s knowledge of the way wounds heal does nothing to diminish the connection between geometry and medicine. After all, the optical scientist also comes to know her first principles about angles of vision and appearances through experience and not through geometrical proofs. It is through repeated observation of the way that the angle of vision determines the apparent magnitude of an object that a person comes to know that objects seen in a larger angle appear larger.\(^{158}\) Though geometry explains why this is so, the optical scientist does not learn the fact from geometry. We cannot dispute the connection between geometry and optics,

\(^{158}\) Aristotle describes the way in which a person acquires scientific knowledge in *Metaphysics* A.1 as well as *Posterior Analytics* 2.19. In the latter text he tells us that “we conclude that these states of knowledge are neither innate in a determinate form, nor developed from other higher states of knowledge, but from sense-perception.” This suggests that all scientific knowledge starts from experience, a stronger claim that my modest suggestion that optics is a possible candidate for being known through first principles that are grasped through experience.
though. If an optical scientist acquires her first principles via experience, her knowledge of optical science is nevertheless subordinate to geometrical knowledge. So medical knowledge, too—at least, knowledge about the healing of differently shaped wounds—will count as quasi-subordinate to geometrical knowledge, despite being acquired through experience.

The shape of the quasi-subordination relation as we see it realized between geometry and medicine appears not to be the only shape that the relation can take. Whereas geometry and medicine are connected through the overlap of a geometrical theorem and a medical first principle, Aristotle suggests another way in which craft knowledge might overlap with scientific knowledge. In Book 1 of the *Nicomachean Ethics*, in a passage I have already partially quoted above, pp. 90, just after he has laid out the famous “ergon argument,” Aristotle points to a connection between carpentry and geometry.

We must remember what was said before and not look for the same exactness in everything but, in each case, the one that is in accord with the subject matter and the degree sought by the method of inquiry that properly belongs to it. For a carpenter and a geometer inquire differently about the right angle. A carpenter does so to the degree that is useful for his work, whereas the geometer inquires about what it is or what sort of thing, since he is a contemplator of the truth. We must do things in just the same way, then, in other cases, so that side issues do not overwhelm the works themselves.159

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159 *EN* 1.7 1098a25–33.
The carpenter has a grasp on the way that right angles are instantiated in the angled fittings of table legs and chair seats. In basic outline, he knows what a right angle is and relies on this knowledge because it is useful in his work.

But notice that this entails that the point of contact and overlap between geometry and carpentry is different from what we saw between geometry and medicine. Because the carpenter is familiar with what right angles are, his knowledge overlaps not with a theorem of geometry, but with a principle. The tenth definition of Euclid’s geometry states: “When a straight line standing on a straight line makes the adjacent angles equal to one another, each of the equal angles is right, and the straight line standing on the other is called a perpendicular to that on which it stands.” Aristotle does not precisely state what it is that the carpenter knows about right angles, but we can be sure that he is familiar with the idea captured in this definition, what the relation is between perpendicular lines and right angles. A tool that is commonly used by wood- and stone-workers is a “combination square” which is a measuring tool constructed out of a straight-edge ruler and a sliding head that marks the line perpendicular to the straight-edge. The tool allows carpenters to find right angles (and work to produce right angles in tables and chairs).

Of course, we would never expect carpenters to be interested in the nature of right angles on their own, divorced from the context of their utility. That is the geometer’s business. But the carpenter’s familiarity with what makes right angles what they are—even if the carpenter could not articulate that essence in the way the geometer does or even know it to truly be the essence of right angles—reveals that the craft knowledge of carpentry is quasi-subordinate to geometry not by containing a fact which is explained by a geometrical proof, but by containing a fact which features as a principle of geometry.
There are at least two shapes the quasi-subordination relation might take, then. One is the shape exemplified by medicine’s quasi-subordination to geometry, and another is the shape exemplified by carpentry’s quasi-subordination to geometry. Aristotle appears to be inviting us to construe the quasi-subordination relation very broadly and to focus on what is centrally important to any connection between a scientific domain and a craft domain: the scientist knows about the forms of entities in her domain and she her knowledge is expressed through demonstrative syllogisms, but the craftsperson knows just those facts which are useful for realizing the end of their craft, e.g. the table or health. In some cases, the craftsperson’s useful fact is a theorem of a scientific domain and in other cases it is a principle, but the craftsperson certainly does not know these facts in the way that the scientist does. The quasi-subordination relation, in whatever shape it is manifested, maintains the sharp division between scientific knowledge and craft knowledge.\[^{160}\]

Once we grant medicine and carpentry their proper places in relation to geometry and biology, and whatever other scientific domains might be quasi-superordinate to them, then there is nothing to prevent us from also including still more craft domains. Flute-playing earns a place quasi-subordinate to harmonics, and navigation will be quasi-subordinate to

\[^{160}\] If, by chance, you are deeply skeptical about the reality of the quasi-subordination relation, consider this example which I found in Malcolm Gladwell’s *The Tipping Point*: An anthropologist named Robin Dunbar came up with an equation which determines maximum group size of a species by taking the ratio of the size of the species’ neocortex and its brain size. For human beings, this equation determines that our maximum group size is 147.4, or ~150 (179). Interestingly, there are many groups that order their social lives according to this number. Most striking are the Hutterites: “The Hutterites (who came out of the same tradition as the Amish and the Mennonites) have a strict policy that every time a colony approaches 150, they split it in two and start a new one. […] At 150, the Hutterites believe, something happens—something indefinable but very real—that somehow changes the nature of community overnight” (181). It is absolutely clear that the Hutterites are not relying on the anthropological explanation and Dunbar’s equation. But they know what must be done for their community, and they use the rule of 150 to explain their actions.
astronomy/observational data. Through the superordination-subordination relation and the quasi-subordination relation, a network of domains emerges.

The solid arrows in this diagram represent the superordination-subordination relation and the dotted arrows represent the quasi-subordination relation, with the direction of the arrow in both cases indicating the direction of explanation, e.g. geometry explains some one or few facts in optical science, optical science explains some one or few facts in rainbow science. This is, of course, not meant to be an exhaustive account of Aristotle’s network of knowledge, but only an illustration of how the superordination-subordination relation and the quasi-subordination relation work together to build points of contact between different domains of knowledge.161

My point here is not to build a comprehensive account of the network of knowledge. Rather, my aim is to build a case for thinking that practical wisdom might also be eligible for holding a place within this network by being quasi-subordinate to some one or few scientific domains. As I have discussed already in Chapter Two, the practical domain and practical wisdom are similar to productive domains and productive knowledge in several salient respects. Both the

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161 Some sciences are related through a “branching” relation—discussed in another of my chapters—so this network of domains connected via (i) the superordination-subordination relation and (ii) the quasi-subordination relation is not meant to exhaustively account for how Aristotle imagines the many scientific, productive, and practical domains to be connected.
practical and the productive are domains of human concern where the subject-matter that comes to be known is the quality of actions (good or bad) with respect to achieving certain aims. The practical domain is concerned with those actions that are good or bad with respect to living happily, and productive domains are concerned with good and bad actions with respect to the production of various products and valuable activities. Because these domains are concerned with action and because actions are particulars, mastery of the domains consists in knowing things that are particular and variable, and so they are states of the calculative part of the soul. On all these points, practical wisdom and productive knowledge have a shared profile. And it just so happens that Aristotle contrasts each of them with science along these dimensions. Thus, insofar as productive knowledge differs from science and yet is still identified as standing in the quasi-subordination relation to some science or another, practical wisdom should be similarly eligible insofar as it differs from science to no greater extent and actually shares all these features with productive knowledge. So it seems that once Aristotle has established that some productive knowledge is quasi-subordinate to science, he has simultaneously established the eligibility of ethics for being quasi-subordinate.

2. The Quasi-Subordination of Ethics to Science

If practical wisdom, conceived as a distinct and separate body of knowledge, is “quasi-subordinate” to any particular domain of scientific knowledge, then two criteria must be met:

(1) There must be some proposition which is known by a practically wise person as a “fact that,” i.e. the practically wise person knows this proposition as a principle or starting point which explains the theorems (or equivalent) in the domain.
(2) There must be some separate body of scientific knowledge which contains a “reason why” that explains the “fact that” known by the practically wise person, i.e. that is a demonstrative syllogism contained within some science which explains the fact that is (as a requirement of criterion (1)) functioning as a principle for practical wisdom.

We are on the look-out for facts in the ethical domain that are explained elsewhere in Aristotle’s corpus by scientific demonstration.\textsuperscript{162} Consider the following example of the kind of facts we are looking for. Good teachers have a special kind of knowledge. It is not knowledge that they have in virtue of having mastery over some given subject matter that they teach such as math, history, or philosophy, but the kind of knowledge that they have \textit{qua} teachers, as specialists in the art of bringing students to a state of understanding. One fact that a good teacher certainly knows is that adolescent or younger students have, on average, an attention span of 20 minutes. In her classroom, the elementary or high school teacher observes that her students are easily distracted when she’s approximately 20 minutes into her lessons, and she observes them becoming reinvigorated when she switches classroom activities every 20 minutes or so, e.g. moving from lecture to group work to in-class writing assignments. She takes the fact into consideration when she plans her lessons, blocking her class-time by 20-minute segments and designing lectures or activities that fit into those blocks of time. And, of course, if you ask a teacher, “Why did you break your lesson down into 20-minute segments?,” she will answer that adolescents and younger students have an attention span of about 20 minutes.

\textsuperscript{162} Or, since we seldom find carefully crafted demonstrative syllogisms anywhere in Aristotle’s writing, we are on the look-out for ethical facts which might be conclusions (or instantiated versions of conclusions) of scientific arguments and discussions found elsewhere in the corpus.
What’s interesting about this fact of the 20-minute attention span is that it looks to be the sort of thing that properly belongs to the knowledge of a psychologist or a neuroscientist, not the knowledge of a teacher. Psychologists and neuroscientists know the fact as a result of studying and testing human subjects through observational studies and interactive experiments that point to the causes of adolescents having attention spans of such and such length.\textsuperscript{163} Some scientists point to the structure of the brain as the cause, others to immediate environmental factors, and still others formulate evolutionary hypotheses that explain the functional role of having an attention span that is limited to 20 minutes. But none of these methods are employed by our knowledgeable teacher. When we make the Platonic-Aristotelian distinction between mere true belief and robust understanding that is secured through knowing explanations, the teacher’s knowledge stands out as a case of mere true belief. The teacher lacks the rigorous scientific proof that firmly establishes the fact.

I want to claim that the \textit{Nicomachean Ethics} features many propositions that are just like the teacher’s fact about the 20-minute attention span. These facts are explanatory in the ethical domain because they “starting points” of practical wisdom, i.e. they explain why certain actions are choice-worthy and good, the very stuff known by a practically wise person. But, at the same time, these facts are not themselves explained within the domain. Instead, the explanation for them is contained within one of the scientific domains, captured in a demonstrative syllogism. I have already described how this connection works. It is the quasi-subordination relation. And I have also emphasized the two criteria which must be met in order for the quasi-subordination

\textsuperscript{163} Burns (1985). Adolescents in classrooms are shown to retain information presented to them decently well up to the 5 minute mark in a lecture, but then retention falls off and remains constant for the next ten minutes, then drops to its lowest level in the 15- to 20-minute interval of instruction.
relation to be realized between two domains of knowledge. What remains is for me to identify specific propositions in Aristotle’s theory of practical wisdom which play the role of principles and are also explained by science.

In Chapter 2, I identified a handful of propositions which meet the first criterion. I described the way in which that explanation works and emphasized that the practically wise person’s knowledge truly consists in appreciating the explanatory power of those propositions and seeing that facts-of-the-matter about the nature of human beings and the definition of happiness have moral force, i.e. they determine, to a significant extent, what actions are choice-worthy and good. Now, in this chapter, I will argue that the second criterion is also satisfied by a subset of those propositions—not all of them, but some. My focus will be on these:

1. The characteristic work (ergon) of human beings is rational activity.\(^{164}\)

2. Human beings are social animals.\(^ {165}\)

3. Virtuous action is fine.\(^ {166}\)

4. This is bread; This is light meat; This is heavy water.\(^ {167}\)

Taking each of these propositions in turn—just as I did in the previous chapter—I will identify how each exemplifies the quasi-subordination relation and, thereby, establishes a formal connection between ethics and science.

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\(^{164}\) *EN* 1.7 1097b24ff.; 10.5 1176a4ff.

\(^{165}\) *Pol.* 1.2 1253a2–3.

\(^{166}\) Cf. “Courage is a fine thing (*kalon*). Indeed the end (*to telos*) is also fine. For each thing is defined by its end. Indeed, the courageous man endures and acts on the basis of courage (*kata tēn andreian*) for the sake of the fine (*kalou heneka*)” (*EN* 3.7 1115b21–24).

\(^{167}\) *EN* 3.3 1113a1; *EN* 6.7 1141b19; *EN* 6.8 1142a23.
2.1. The Characteristic Work of Human Beings

As discussed in the previous chapter, Aristotle appeals to human nature frequently throughout the *Nicomachean Ethics*, but we only see the statement of man’s nature as a rational animal being relied on as a first principle at the very end of the treatise. In conjunction with the fact that every activity has its own proper pleasure, the fact that the characteristic work of human beings is rational activity ends up explaining why human beings enjoy a unique pleasure among all animals, and why the activity of contemplation delivers the greatest pleasure we are capable of enjoying.

The proposition “the characteristic work of human beings is rational activity” is a principle, or starting point, of practical wisdom, then. It is a fact which the practically wise person knows as a reason why he should choose certain actions and avoid others. Specifically, it explains why the pleasure that supervenes on the activity of contemplation is choice-worthy and good. Of course, there are more reasons to pursue the life of contemplation than just the pleasure that completes it, but the practically wise person is someone who understands why that pleasure is valuable, and his explanation is that it is our nature to engage in rational activity and there is a pleasure that is proper to that activity.

Now, this fact about human nature does not belong distinctively to the practical domain. It is a biologist’s business to isolate the natures of different living organisms and to rely on those facts about natures to explain the behavior of the organisms in question. And it is the nature *as such* which does the explanatory work for the biologist. Thus, insofar as such facts about nature distinctively belong to *any* domain, it will certainly be the domain of biology. And this is precisely what we see in Aristotle’s scientific works. In Book 2 of the *De Anima*, Aristotle gets serious in his
efforts to provide an account of soul. He says that a general definition of soul is analogous to a general definition of figure: one can be provided, but just as there is no figure apart from triangle, square, pentagon, etc., “there is no soul apart from the specific forms of soul.”\textsuperscript{168} The psychologist must study the different forms of soul, then, and determine that definitions of those forms. The various psychic powers turn out to be essential to this scientific inquiry. Aristotle asserts that the nature of a soul is determined by those capacities which constitute it, or, to be more precise, by those capacities which constitute it \textit{distinctively}. A plant’s soul is constituted by the nutritive capacity alone, and so this is the nature of the plant’s soul.\textsuperscript{169} The souls of non-human animals have, in addition to the nutritive capacity, the perceptual and appetitive capacities, and it is these latter which are more definitive of their natures because those capacities distinguish animals from plants.\textsuperscript{170} Not all animals have the five senses, but some have only touch and taste (which is a kind of touching). And, further, some animals have the capacity for locomotion while others do not.\textsuperscript{171} Human beings are the only mortal creatures that have the power of thought.\textsuperscript{172} Of course, this capacity is distinctive of human beings and, therefore, is definitive of the nature of our souls.

Human beings are rational animals, then, and this fact about our nature stands as a \textit{definition} of our souls and as a \textit{first principle} of biology. Further, the characteristic work of any organism is direct expression of the kind of soul it has. As Irwin (1980) puts this, “the function of a living organism is just its form or essence, described in the \textit{De Anima} as its soul.”\textsuperscript{173} So the fact

\textsuperscript{168} \textit{DA} 2.3 414b22.
\textsuperscript{169} \textit{DA} 2.3 414a32.
\textsuperscript{170} Ibid. 2.3 414b1–10.
\textsuperscript{171} Ibid. 2.3 414b9–17.
\textsuperscript{172} Ibid. 2.3 414b17–19 and 415a7–12.
\textsuperscript{173} Irwin (1980), pp. 48. Aristotle insists that each separate capacity of the soul has its own ergon (\textit{DA} 1.1 402b16ff.). Thought and perception together have the ergon of discriminating (tô te \textit{kritikō ho dianoias ergon esti kai aisthēseōs})
about the characteristic work of human beings is itself a first principle of biology because it is a reformulation of the definition of human beings.

When Aristotle relies on this fact as a starting point of practical wisdom, he establishes the ethical domain as quasi-subordinate to biology in just the same way that he has established carpentry as quasi-subordinate to geometry. Recall, the carpenter relies on his cursory conception of what right angles are in order to make tables and chairs. There is a sense in which the carpenter’s knowledge of right angles (what they are) overlaps with the geometry’s knowledge of right angles (what they are), but there is still a dramatic difference between them: the carpenter knows about right angles only to the extent that is useful, but the geometer knows what right angles are in themselves—in their nature—and she knows this as a first principle that explains the behavior of figures which contain right angles. The same is true of the biologist and the practically wise person with respect to the fact about the characteristic work of human beings. The practically wise person knows the fact for its practical utility and in its capacity for explaining the goodness and choice-worthiness of that pleasure that supervenes on rational activity. But the biologist knows the fact as a statement about the definition of human beings and as a first principle that explains the behavior of human beings and their place in the world.

But what makes the practically wise person’s knowledge properly quasi-subordinate to the biologist’s knowledge is not just the fact of this overlap, but the fact of the difference in how each knows the fact. The practically wise person does not grasp the fact as definitive of the nature of human beings, as the biologist does. Instead, he grasps the fact as generically true of the

(Ibid. 3.9 432a16). And it is the ergon of the calculative part of the soul to deliberative about whether to act in this way or that way (praxei tode è tode, logismou édè estin ergon) (Ibid. 3.11 434a8–9).
experience he has had in observing the differences between human beings and other animals and in engaging in rational activity himself. The fact captures what is common among these experiences and in that sense the practically wise person grasps that rational activity is distinctive of human beings. But he does not know the fact as being a universal entailment of the kind of soul that human beings have. Hence, we say of the practically wise person that one of his starting points is that “the characteristic work of human beings is rational activity,” but we do not mean that he knows the fact in a scientific way, i.e. as a statement about the essence of humans. Rather, he knows the fact for its practical utility.  

2.2. Human Beings are Social Animals

In Book 1 of the Politics, Aristotle asserts that “man is by nature a social animal” (ho anthrōs phusei politikon zōon). In the few lines that follow, he briefly explains why we should believe this to be so.

That man is more of a social animal than bees or any other gregarious animals is evident (dēlon). Nature, as we often say, makes nothing in vain, and man is the only animal whom she has endowed with the gift of speech (logon). And whereas mere voice is but an indication of pleasure or pain, and is therefore found in other animals (for their nature attains to the perception of pleasure and pain and the

174 Leunissen (2015) has a reading like this one, according to which the practically wise person knows only as much science as is useful. But Leunissen does not rely on any conception like the quasi-subordination relation for drawing a clear boundary to determine the limits of explanation for practical wisdom. Shields (2015) disagrees with this picture, however, claiming that an individual must have scientific understanding of the human soul (i.e. grasp demonstrative syllogisms, presumably, since that’s what scientific knowledge consists in) if he is to sufficiently well recognize the distinctiveness of human traits against the traits of animals (Shields focuses on the ergon argument of EN 1.7). The editors (Devin Henry and Karen Nielsen) of the volume in which these two positions are defended by their separate authors leap to the defense of Shields: “Here we side with Shields. For it is doubtful that Aristotle would ascribe the ability to distinguish idia from other features of a kind to someone who is merely well educated in a subject. That seems to be the special province of the scientist” (23).

175 Pol. 1.2 1253a2–3.
intimation of them to one another, and no further), the power of speech (*logos*) is intended to set forth the expedient and inexpedient, and therefore likewise the just and the unjust. And it is a characteristic of man that he alone has any sense of good and evil of just and unjust, and the like, and the association of living beings who have this sense makes a family and a state.\(^{176}\)

We might be inclined to think that Aristotle is providing us with the scientific explanation for man’s sociability (just as we might have been so inclined when we encountered the ergon argument).\(^{177}\) But our first clue that this is not the case is that Aristotle explicitly flags this as a discussion of why human beings are “more of political animals” than any other animals. He is not intending to prove definitively that human beings are social animals, but only to urge us toward thinking that since we already attribute sociability to some animals, and human beings have certain properties that are surer signs of sociability than the properties belonging to those animals, we should be perfectly content with thinking that human beings are social creatures. This is not a demonstration. It is a discussion that points to experience we have in observing ourselves and other animals, and it asks us to count that experience as sufficient evidence for accepting that human beings are social.

Further, the evidence he provides does not have the form which constitutes scientific knowledge. That is, it is in not in the form of a demonstrative syllogism. So whatever we might think about the practically wise legislator’s command of scientific proofs relating to the sociability

\(^{176}\) Ibid. 1.2 1253a7–18.

\(^{177}\) In Chapter Two, I explain why the ergon argument falls very far short of being a scientific explanation, in no small part because scientific explanations are not possible in the practical domain and not exercises of the calculative part of the soul (which is the part of the soul that studies the practical domain and is capable of being practically wise).
of human beings, we cannot think that what is supplied in Pol 1.2 in relation to that sociability is itself a scientific proof. It simply falls short of scientific form. But I want to make a case for the stronger thesis that the practically wise legislator does not have a grasp on scientific proofs anyway, at least not in his capacity as a practically wise legislator.

The scientist who is in possession of an explanation for this fact about human sociability is the one who is concerned to answer the question “why do human beings live together in groups that are organized and regulated by constitutions?” We might identify this scientist as a biological anthropologist—someone who studies human beings in comparison with other species, relying on unique features of human beings to identify and explain even the most subtle of differences between human behavior and other species behavior. Importantly, the biological anthropologist understands that the “power of reason (logos)” is distinctive of human beings, just as Aristotle says here in the Politics, but also as he says in his scientific treatises. It is because of our nature as rational animals, i.e. our possession of souls that are capable of thought, that we have this power of reason. The biological anthropologist accounts for the distinctive way that human beings live by pointing to our nature as the reason why.

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178 I refer to a “practically wise legislator” here instead of a “practically wise person” only because the Politics is set out as a treatise about the kinds of things that must be known by a person who is going to act well in political contexts as a statesman. And Aristotle has already told us in EN 6.8 that “political knowledge (politikē) and practical wisdom (phronēsis) are the same state (hexis) but not the same with respect to being (to mentoi einai ou tauton autais)” (1141b23–24). I take this to mean that the practical wisdom that belongs to an excellent moral agent is the same as the wisdom that belongs to an excellent legislator, but they exercise their wisdom in different contexts and with respect to different things. So “practically wise legislator” is only a slight shift from “practically wise person.” I am still talking about the same body of knowledge.

179 The answer to this “why” question should take the form of a demonstrative syllogism. This is to illustrate the distinctively scientific character of this discussion, as opposed to the practical discussion carried out in the Politics 1.2 passage.

180 DA 2.3 414b18–19.
In *History of Animals*, Aristotle tells us that there are a few species of animals which live together in groups and have their shared life organized according to their ergon. “Such social creatures are man, the bee, the wasp, the ant, and the crane.” The ergon of each of these species is different, so the mode of shared life that we find for each differs accordingly, and explains why human beings live in communities organized as they are. The explanation is something like this. Human beings are rational animals and the function of a rational animal is to engage in rational activity. Rational activity involves formulating and communicating ideas, which in turn involves having contact with other human beings. Such activity of sharing ideas is perfected (brought to its fullest form) through organized, regular, communal life. Hence, human beings, by nature, are animals which live together in groups that are organized and regulated by constitutions. Of course, this is only a sketch of what a scientific explanation might look like on Aristotle’s conception. He does not supply any such demonstration in the *History of Animals*, or anywhere else, but we can imagine that it would proceed from a claim about the nature of human beings, and their ergon, to a conclusion about the specific kind of social living that is peculiar to humans.

The *Politics*, especially Book 1, is famous for its references to nature as a means for building a naturalistic or scientific foundation for Aristotle’s political theory. But if my ideas here might contribute anything to that discussion, it is to show that Aristotle’s appeal to nature in establishing political (i.e. practical) principles is not a rigorous and methodical enterprise. Practical wisdom is depicted in the *Politics* as being quasi-subordinate to biological anthropology in just the way that medicine is quasi-subordinate to geometry, by having as a starting point some

181 *HA* 488a7ff.
fact which is explained by the quasi-superordinate science. We should conclude that Aristotle has maintained his attitude from the *Nicomachean Ethics* regarding the division between the scientific and practical domains as well as the necessity of pursuing an investigation in the fashion appropriate to it. Neither the student of political theory nor the mature legislator needs to have scientific understanding (i.e. demonstrative knowledge) of why man is a social animal. It is enough for him to see the fact expressed in the behavior of human beings. The abstract principles do not have any practical importance for him.

### 2.3. Virtuous Action is Fine

In the *Metaphysics*, Aristotle indicates that what he calls “mathematical science” involves some demonstrations about properties which are important in the practical domain. Fineness and goodness, he says, are explained by demonstrative syllogisms in mathematics.

Now since the good and the fine are different (for the former always implies action as its subject, while the fine is found also in motionless things), those who assert that the mathematical sciences say nothing of the beautiful or the good are in error. For these sciences say and prove a great deal about them; if they do not expressly mention them, but prove attributes which are their results or their definitions, it is not true to say that they tell us nothing about them. The chief forms of fineness are order (*taxis*) and symmetry (*summetria*) and definiteness (*hōrismenon*), which the mathematical sciences demonstrate in a special degree (*malista deiknuousin*).\(^{182}\)

Even if the demonstrative syllogisms of mathematics do not expressly name “fineness” or “goodness” as terms, it is still the case that mathematics “has a great deal to say” about them.

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\(^{182}\) *Met. M* 1078a31-b2
because mathematics has proofs about the properties in which fineness and goodness consist. Just as geometry does not include “appearance” or “angle of vision” as terms in its demonstrations while nevertheless explaining the behavior of appearances and angles of vision through those demonstrations (as we saw in Chapter One), mathematics can explain what fineness consists in and what it means for a thing to be fine without needing to explicitly employ the term “fineness.” This is because, as the passage above indicates, the concept “fineness” has as its chief forms various mathematical concepts. Basically, what it means for a thing to be fine—to have fineness predicated of it as a subject—is for it to embody one or more of those mathematical concepts.

We might call to mind the blueprint of the Parthenon to illustrate this point. The Parthenon—a jewel that stood intact atop the Athenian Acropolis during Aristotle’s day—

\[\frac{\alpha}{\beta} = \frac{\alpha + \beta}{\alpha}\]

is famously regarded as a near perfect illustration of the Golden Ratio. When two quantities stand in proportion to one another such that the ratio of the larger quantity to the smaller is the same as the ratio of the sum of the two quantities to the larger, then the quantities are said to instantiate the Golden Ratio.

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\textsuperscript{183} Construction began in 447BC and continued through 438BC, a century before Aristotle’s flourishing years. For a lively examination of the wonders of the Parthenon, cf. Connelly (2014).

\textsuperscript{184} Whether or not the Greeks consciously incorporated the Golden Ratio into the design of the temple is a hotly debated subject. For a strong dissenting opinion, cf. Markowsky (1992). We do know that Euclid was familiar with the ratio—in Elements Book 6, Proposition 30, he refers to “dividing a line in the extreme and mean ratio” which turns out to be a matter of finding the ratio of larger to smaller that is the same as the ratio of the larger segment to sum total—but we do not have any evidence of earlier mathematicians being aware of it. Still, Euclid’s work undoubtedly did not emerge in a vacuum, but was preceded by decades, if not centuries, of mathematical investigation. It is not absurd—to my mind—to think that Euclid’s predecessors discovered the Golden Ratio, in which case it might have been consciously employed by architects and familiar also to Aristotle.
This is a geometric representation of the ratio. Here also is the algebraic formula:

\[ \varphi \equiv \frac{\alpha + \beta}{\alpha} = \frac{\alpha}{\beta} \]

The Parthenon’s design holds these proportions in a repeating pattern along its vertical and horizontal dimensions.

The effect that this proportion has on the eye is extremely pleasing. Not only does the Parthenon have the general reputation of being the grandest example of what was the Golden Age of Greek architecture (5th century BC), but psychological studies have confirmed that the Golden Ratio has a real, positive effect on observers.\(^{185}\) We find objects aesthetically pleasing which are constructed with Golden proportions. They are, as the Greeks would say, “fine” (\textit{kalon}).

Now, a mathematician is not in a position, \textit{qua} mathematician, to know that the Parthenon and other objects which illustrate the Golden Ratio are fine. What the mathematician knows is the story about the Ratio itself, the reason why the Ratio is 1.618, and why certain figures can hold

\(^{185}\) For an overview of the studies that have been conducted, a good source is Green (1995).
golden proportions while others cannot. It is for the architect and for people with aesthetically trained perception to know *that* the Parthenon is a thing of beauty, but they certainly need not know *why* this is the case in order to be justified.\(^{186}\)

For Aristotle, this aesthetic fineness translates perfectly into the ethical domain, where actions, instead of art and architecture, earn the name “fine” according to how well-proportioned they are. In one respect, an action is made fine by being a “mean” between excess and deficiency—sometimes called a “Golden Mean”. This mean is not a mathematical property, but a “mean relative to us,” Aristotle says.

If ten is many and two is few, six is the intermediate, taken in terms of the object; for it exceeds and is exceeded by an equal amount. This is the intermediate according to arithmetical proportion. But the intermediate relative to us is not to be taken so. If ten pounds are too much for a particular person to eat and two too little, it does not follow that the trainer will order six pounds; for this also is perhaps too much for the person who is to eat it, or too little—too little for Milo, too much for a beginner in athletics. (*EN* 2.6)

Striking the “mean” is a matter of choosing the action which is appropriate in proportion to one’s self. Where the “mean” action just is the “fine” action, it is clear that an agent is seeking a certain balance of proportions in determining how to act. The good moral agent—the *phronimos*—will be

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\(^{186}\) This is why we need not mire ourselves in the debate about whether or not the architects designed the temple with the ratio in mind. From an Aristotelian perspective, we can rest content that experience in designing buildings and with observing what features of buildings are pleasing to the eye are sufficient for enabling the architects to design an aesthetically pleasing structure. Indeed, other features of the temple’s design reveal a striving for aesthetic, rather than pure utilitarian, effect (e.g., *entasis*, a convex narrowing of the columns that gives the illusion of straightness to correct for what would otherwise appear as concavity in the columns). And these are features for which we cannot expect the architects to know an explanation, but we can be assured that they knew *that* the design would have the effect it does.
one who knows what actions are fine, knows that certain actions are fine, and he will use this knowledge in order to live well.

The mathematician, then, knows the reason why an action is good or fine, even if he does not know that an action is good or fine. He understands the abstract, universal explanation for what properties confer fineness, and he has the understanding without necessarily being able to point to any particular fine things in the world. But the moral agent, on the other hand, knows the fact without knowing the explanation. He knows that some action or another is good or fine, and he uses his understanding of this fact in the course of deliberating about how to act in certain ethical situations, but he could not tell you the reason why. At least, he could not do so qua moral agent. If he provides you an explanation, he will be doing so qua mathematician. As a moral agent, he does not know about fineness per se; he only knows facts about fine actions.

2.4. This is Bread; This is Light Meat; This is Heavy Water
These propositions capture the content of individual perceptions that people have when they pay attention to their environment. Aristotle tells us that an adept deliberator will be keen to take in such content from their environment because deliberation is usefully guided by the particular facts of our situations and practical decisions may be better or worse depending on how sensitive a deliberator has been to such facts. Further, when a practical agent makes a decision—such as “I should eat light meat for dinner”—putting that decision into action crucially involves recognizing particular opportunities to do so.\(^{187}\) In this case, the practical agent can put into action her decision to eat light meat for dinner only when she perceives light meat in her environment. It is clear,

\(^{187}\) As Lorenz (2009) puts this, “A person may decide to eat some bread, when they take bread to be readily available, or to cook some stew to the right degree” (186).
then, what explanatory role these propositions have in the practical domain. A practically wise person certainly has command over such facts and knows them as reasons why he should choose certain actions, and it is clear also that his command over them is only at the level of perception. He is not in possession of any explanation for why the propositions are true.

But these propositions are susceptible to explanation. The properties that are borne by the objects identified through the perception—the properties which establish those objects as being what they are—are properties understood through science. In fact, science affords understanding not only of the properties (e.g., what “lightness” or “heaviness” consists in), but also of the way in which those properties belong to the subject which bears them (e.g., what it means for meat to be light or water to be heavy, or even what it means for bread to be bread). Of course, scientists (according to Aristotle’s account of science) do not deal in particular propositions. The whole scientific enterprise, including scientific knowledge itself, is concerned with universal propositions, not particular. So whatever the scientist knows about the objects we perceive and the properties that belong to those objects, there will not be any proposition in the scientist’s body of knowledge which has the form “This is...” What the scientist knows is the nature of those objects, and the nature is something universal. Insofar as the nature or essence of these things is knowable at all—and certainly where there is an essence, it is knowable, at least on Aristotle’s theory\textsuperscript{188}—it will be some scientist who does the knowing since scientists are concerned with natures.

\textsuperscript{188} An exception to this might be artefacts, such as houses and shoes and even bread. These entities have essences, but they might not be sufficiently natural for be the objects of scientific knowledge. This is because scientific explanation is grounded by first principles that capture the unchanging natures of things, but the natures of artefacts might not be unchangeable. In one respect, those natures are certainly changeable since they came into being with the first instance of being made. But the concept of the artefact might change overtime as well if human innovation
Precisely what those scientific explanations are, i.e. what the demonstrative syllogisms look like, is difficult to say, and there will be dramatic variation across different contents of perceptions, both in what kind of scientific causes are appealed to and which body of scientific knowledge contains the demonstration. But even in doubt about what the science amounts to, we can be sure that there are scientific reasons why for these practical propositions—despite the fact that the scientist does not know the practical proposition itself, just as the geometer does not know the fact about circular wounds. Thus, we find practical wisdom in a quasi-subordinate relation to science even at the level of the most particular-focused propositions. The relation pervades Aristotle’s theory.

Other ethical propositions, in addition to these, will also fulfill the quasi-subordination relation. For example, that humans feel pain, that animals feel pain, that people develop habits very early in life, that human children can develop psychological disorders if they are not held as infants, that interaction with nature can restore cognitive abilities and emotional well-being, that this is a child has special needs, that this is my father, that this is the last available seat on the bus, etc. Each of these propositions has potential to play an explanatory role in a moral agent’s life. Whether or not they will actually play that role depends on what kind of life the agent lives, what kinds of situations they find themselves in, and what decisions are best in those situations. Where they do feature, the moral agent need not fully substantiate the facts. It is enough for the fact to be “well-established,” as we saw in Chapter Two with the way that Aristotle establishes the fact introduces such modifications to the artefact as to fundamentally alter it. Whether or not artefacts have natures like natural objects or are counted as substances by Aristotle are controversial questions. The answer to these questions might make a difference to how we think about whether or not the proposition “this is bread” can be explained by science, but it does not make a difference to the other propositions I discuss here, nor myriad others we could identify as the contents of our perceptions.
of what happiness consists in. A rigorous proof will do nothing to make the agent better in choosing actions. But, nevertheless, proofs are available, and scientists are in possession of them. It is the scientist’s business—but not the practically wise person’s business—to know the explanation that firmly proves the truth of these propositions or else to know the nature of human beings as the nature of human beings, and so we see that science and ethics are connected through the quasi-subordination relation but held apart by their separate concerns.

### 3. Becoming Familiar with these Starting Points

For any proposition that is known by a practically wise person as an explanation for the choice-worthiness and goodness of certain ethical actions, we must expect that the proposition is prior and primitive and better known than that which it explains. That is, just as scientific first principles must be more firmly grasped than scientific theorems if they are to be the foundation upon which scientific knowledge is built, then the starting points of ethics must be grasped in a similarly firm way, at least in relation to the “theorems” of ethics. If such propositions are properly explanatory and function as the foundation of practical wisdom, then the practically wise person must be closely familiar with them. How is such familiarity achieved?

When it comes to those propositions that are starting points of practical wisdom but also explained by scientific demonstrations, we might be inclined to think that the most intimate familiarity with those propositions would be achieved by learning the science which explains them. But this cannot be right. First of all, if we honor Aristotle’s insistence that it is the doctor’s business, and not the geometer’s business, to know *that* circular wounds heal more slowly, and that it is the geometer’s business, and not the doctor’s business, to know *why* they do so, then we cannot think that the only way to acquire such propositions is by learning the science to which
they are connected. In fact, we cannot think that learning the science is even appropriate to the task of acquiring such propositions. It is not the practically wise person’s business to know the biological and psychological demonstrations that explain his starting points. If those demonstrations are not his business, then such learning cannot be what Aristotle imagines to be the practically wise person’s means of acquiring principles. There will be some other means of acquisitions which really is his business.

But, secondly, it is also unclear how the practically wise person could be said to be closely familiar with these propositions and to “know them better” than the other ethical facts that are explained by them if he accesses them only through the abstract terms of a science. In the Prior Analytics, Aristotle emphasizes the importance of coming to know the principles of a science through experience.

Most of the starting points are special to each science. That is why experience must provide us with the starting points where each is concerned—I mean, for example, that experience in astronomy must do so in the case of astronomical science. For when the appearances had been adequately grasped, the demonstrations in astronomy were found in the way we described. And it is the same way where any other craft or science whatsoever is concerned. Hence if what belongs to each thing has been grasped, at that point we can readily exhibit the demonstrations.189

As discussed in Chapter One, experience is a semi-technical notion for Aristotle. It is the grasp we have on what is common among many perceptions or observations of sufficiently similar

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189 APr 1.30 46a13–23. Cf. also EN 1.7 1098b3ff. where Aristotle says that different principles are acquired in different ways and we ought to “follow the method of inquiry suited to each.”
phenomena. In astronomy—to stick with the example Aristotle uses in this passage—a person observes the earth obstructing the path of the sun’s light to the moon’s surface. Details of this observation include: the darkening of the otherwise lit moon, the phenomenon occurs at night, the darkness appears to move across the moon’s surface from left to right. When a person observes these features together many times, storing them as memories and comparing those memories with new occurrences, she will at some point make the requisite connections for determining that what she is observing is a lunar eclipse. And this generalized characterization of the phenomena is what Aristotle calls “experience” (empeiria). This is the kind of familiarity with principles that Aristotle expects of all scientists and all experts in any domain of knowledge. The practically wise person, then, must have experience of his starting points, and this means observing, having memories of, and inducing what is common to, ethical phenomena. It will not be sufficient for him to pick up his principles from the science which happens to explain them.

We can be sure, then, that at least part of the account of how the practically wise person becomes familiar with his principles is through experience. Thus, when Aristotle lists the means by which principles are acquired—

We grasp (theōrountai) some starting points (tōn archōn) through induction (epagoge), some through perception (aisthēsei), some through a kind of habituation (ethismō tini), and others in other ways—

—we can confidently say that “experience” is on the list of “other ways” of acquiring principles. I want to argue, though, that experience is much more important to the acquisition of ethical

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190 EN 1.7 1098b3–4.
starting points than it is to the acquisition of scientific principles. Experience in astronomy or biology is the means by which the astronomer or biologist, respectively, is first exposed to the entities and phenomena she is studying. It is the first meeting between the scientist and the objects studied. But once the general proposition—e.g. a lunar eclipse is the obstruction of the path of light from the sun to the moon by the earth—is firmly settled in the soul of the scientist, it is only that general proposition that is employed in scientific activities. The particular perceptions, which were the origin points of that proposition, are shoved aside.\footnote{191}

In ethics, the particular from which the unified experience arose, is not pushed aside. The practically wise person needs to know and appreciate these propositions not for how they fare as universal expressions of the natures studied by science, but for how they capture generalizable truths about the particulars relevant to the ethical domain. To put this another way, the practically wise person must know the propositions in their \textit{practical} capacity, and that means he must know the particulars from which they are abstracted. For example, the practically wise person knows

\footnote{191 We might be inclined to think that observation of particulars retains importance for some sciences like biology (perhaps all the “natural” sciences) because those sciences are concerned with entities that are necessarily enmattered (\textit{Met} 6.1 1025b30ff.). The \textit{matter} of enmattered entities necessitates a kind of particularity in them. \textit{There is variability in their behavior and in their expression of their forms and this means that what we observe in one instance might be at variance with what we observe in another instance. (This is all in contrast with sciences like geometry in which the entities studied are abstract, i.e. not enmattered, and therefore behave in precise accordance with their natures, invariably.) However, the \textit{principles} of these sciences will not be variable. They are the definitions of the entities studied by the science (as well as whatever common notions are employed in the science’s proofs), and these definitions capture the invariable nature or essence to the entities, a fact about the entities which does not vary. Even if matter interferes with the full expression of a tree’s nature, the nature of the tree is what it is regardless. We must be careful, though, not to diminish the role of particulars in natural science too much, though. Aristotle is clear in saying the best scientists are those who are closely intimate with a \textit{lot} of particular observations: “Those who dwell in more intimate association with the facts of nature are better able to lay down first principles which can bring together a good many of these, whereas those whom many arguments have made unobservant of the facts come too readily to their conclusions after looking at only a few facts” (\textit{GC} 1.2 316a6–10).}
that “human beings are social animals.” In order for this proposition to be known in a practically useful way, a person must be able to recognize the particular features of human life that reflect the fact. The practically wise person does not merely grasp the abstract fact about sociability. Instead, he has many experiences of human beings behaving sociably (e.g. observing human beings living closely together, human beings cooperating in complex projects, human beings suffering when made to live solitary lives, human beings thriving in relationships, etc.) and he sees that what is common to all these experiences is the theme of sociability. It is only by knowing the particulars which gives expression to the abstract proposition that the practically wise person can know the proposition in the way appropriate to his special practical knowledge.

The practically wise person does not set his particular observations aside, then. This is partly what Aristotle has in mind when he says the following:

Practical wisdom is not of universals only. On the contrary, it must also know particulars. For it is practical, and action is concerned with particulars. That is why, in other areas too, some people who lack knowledge—most of all, those with experience—are more effective doers of action than are others who have knowledge without experience. For if someone knows that light meats are digestible and healthy but is ignorant about which sorts of meat are light, he will not produce health; but someone who knows that poultry is healthy will produce

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192 Pol. 1.2 1253a2ff. Aristotle does not insist that human beings are the only social animals (bees and “other gregarious animals” are also social), but he does say that we are more social than the others, and this is on account of our capacity for speech and, thereby, expressing attitudes about rightness and wrongness.
health more. But practical wisdom is practical, so one must possess both sorts of knowledge—or this one [the particular] more.  

Although we can imagine a person who has knowledge of the universal fact but lacks experience with particulars, we cannot imagine the *practically wise person* to have such incomplete understanding. His grasp of the universal is founded on his familiarity with the particulars. He sees the universal in the particular, and he sees the particulars in the universal.

Earlier we said that practical wisdom consists, at least in part, in understanding the moral force or practical value of those propositions which are starting points of his knowledge. Like the teacher who understands the fact about the 20 minute attention span to be a reason for her to organize her lessons around 20 minute segments, the practically wise person understands facts about the characteristic work of human beings and their sociability to be reasons for choosing certain actions. But in order to be able to appreciate these propositions for their moral force in particular situations that call for action, we must know the propositions for how they are instantiated in particular situations. Without such understanding, we would scarcely be able to appreciate the explanatory connection between these propositions and the choice-worthiness of actions. In this sense, practical wisdom depends on experience in a much more profound way than do any of the domains of scientific knowledge.

Aristotle frequently reminds us of the importance of experience in the practical domain. In the first book of the *Nicomachean Ethics*, he says that young people (*neos*) are not suitable students of politics because they are “inexperienced in the actions of life” (*apeiros* *gar* *tôn* *kata* *ton*  

\[193\] *EN* 6.7 1141b14–21.
In Book 2, when he identifies two species of virtue (the moral and the intellectual), he says of intellectual virtue that it comes through teaching and therefore “requires experience and time” (empeirias deitai kai chronou). In Book 6, he says again that young men are not experienced (empeiros ouk estin) because they have not spent enough time in life (plēthos gar chronou poiei tēn empeirian), and this is why a young person cannot be practically wise (phronimos ou dokei ginesthai).

And at the end of the treatise, he says,

While people experienced in any subject matter judge rightly the works produced in it, and understand by what means or how they are achieved, and what harmonizes with what, the inexperienced must be content if they do not fail to see whether the work has been well or ill made—as in the case of painting. […] Even medical men do not seem to be made by study of text-books. Yet people try, at any rate, to state not only the treatments, but also how particular classes of people can be cured and should be treated, distinguishing the various habits of the body. But while this seems useful to experienced people, to the inexperienced it is valueless.

The importance of being intimately familiar with particulars is constantly at the forefront of Aristotle’s thought as he explains his ethical theory. We should not suppose that there is any way of coming to know the principles of practical wisdom other than through experience. Even where

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194 EN 1.3 1095a2–4.
195 Ibid. 2.1 1103a14–17. Practical wisdom is one of the intellectual virtues. As indicated later, at EN 6.2 1138b35ff., the intellectual virtues are the best states of the rational part of the soul. These are practical wisdom, craft knowledge, scientific knowledge, nous, and philosophical wisdom (sophia).
196 Ibid. 6.8 1142a13–16.
197 Ibid. 10.9 1181a19–1181b6.
some of those principles are explained by a scientific proof, as are the principles I have focused on in this chapter, to acquire them from a text-book is not to acquire them adequately.
Conclusion

At the beginning of this work I proposed that there is a tension at root of Aristotle’s distinction between philosophical wisdom and practical wisdom. That tension is borne from the fact that the way Aristotle illustrates the distinction is by casting our philosophical heroes (Thales, for example) as being inept in their practical lives and, by implication, by casting our moral heroes as philosophically underdeveloped. Thales does not know how to navigate moral situations in the excellent—perhaps perfect—way that the practically wise person does, and the practically wise person, we are repeatedly told, does not have any firm understanding of biology or mathematics or psychology.

What my dissertation offers by way of loosening this tension is the suggestion that Aristotle’s theory only specifies that the practically wise person as such is not philosophical and the philosopher as such is not practically wise. Wisdom in one domain does not entail wisdom in the other. This is not to say that we will never find practically wise philosophers, but that it is not by being philosophically wise that a person has practical wisdom. It is not in virtue of having practical wisdom that a philosopher is capable of contemplating the best objects. What a wonder Thales would be if it were knowledge of what is good and bad for human beings that somehow
grounded his theories about the cosmos. And, likewise, philosophical knowledge does not ground the practically wise person’s knowledge of right action and how to live a happy life. This is the point Aristotle is really aiming to make when he says that Anaxagoras and Thales and other philosophers are “wise, but not practically wise.”

Philosophical wisdom does not present an obstacle to being practically wise, either. This is probably the source of our unrest when Aristotle casts them apart. We are inclined to draw the inference that, since Aristotle says the philosophers are “wise, but not practically wise,” he must mean that the wise cannot be practically wise. But this surely is not his view. When he elevates the philosophical, i.e. contemplative life above all others, he is explicitly saying that philosophers live the happiest lives possible for human beings. To predicate happiness of the philosophical life is, for Aristotle, to evaluate that life for its practical value. Happiness is unquestionably among the “human goods” which are objects of concern in the practical domain. Insofar as the philosophical life is counted among those goods—and is counted as the best of them!—we can certainly say that the philosophers engage in an activity that has practical utility.

We need not worry that Aristotle values philosophy too little, then, nor that he has cast philosophical wisdom and practical wisdom so far apart that they cannot both be found in a single individual. But what he does think is that a capacity for acting and choosing well with respect to human goods is not developed through scientific training. It is by experiencing life and engaging in human activities and by coming to appreciate the way that various actions contribute to or constitute happiness that we develop that capacity. Scientific knowledge is not about those values, so it cannot aid us in becoming or being good people with happy lives. Even the status of philosophical activity itself as a human good is a fact unavailable to the philosopher qua
philosopher. It is through the acquisition of practical wisdom that one learns that contemplation features prominently in happiness. The practically wise person is in a position to know this, not the philosopher, because the practically wise person’s distinctive knowledge is concerned with what is good and bad for human beings.¹⁹⁸

We might think, though, that having practical wisdom is only a sufficient condition for living a happy life—since it enables a person to deliberate well and follow through on good decisions—but that it is not necessary for happy living. After all, if the contemplative life is happiest, then should philosophers live the happiest lives just by exercising their philosophical wisdom, and can they not do this without having practical wisdom? Cannot a philosopher be happy without having the knowledge afforded by practical wisdom that his distinctive activity (contemplation) is constitutive of the happiest human life?

Surely the answer is No. We saw that knowledge is one of the criteria which must be met if we are to perform virtuous actions in the way requisite for those actions to contribute to good living. And this knowledge is not just mere awareness of what one is doing, but a rich understanding of why the action is choice-worthy, why it is good. In order for our activities to actually make our lives happy, we must be reflectively aware of their value. Of course, Aristotle made that point in relation to the activities which proceed from character virtue, but the same analysis surely goes through for the activity of contemplation too. The philosopher’s life is not fully happy if he fails to choose the activity of contemplation with full knowledge of how it fits into a good life. And such understanding is not built into philosophical wisdom—it is part of

¹⁹⁸ EN 6.5 1140b19–20.
practical wisdom instead—so the philosopher must learn about and master the practical domain separately and in addition to his philosophical wisdom if he is live *happily* by engaging in contemplation.

My account of the relationship between philosophical (or scientific) knowledge and practical wisdom in Aristotle’s epistemology stands somewhere on a wide spectrum of interpretations that have been offered over recent decades. The three views which I am particularly keen to distance myself from are these: One camp offers a reading of Aristotle according to which practical wisdom is a kind of science, but there is variation among scholars in this camp with respect to what kind of science it is. Reeve (2014) says that it is an “applied science,” and Irwin (2000) says it is an “inexact science.” Reeve says, “Once we register the fact that politics must include both a scientific knowledge of universals and an experience of particulars that enables us to apply those universals correctly to them, we can see that it is something like an applied science as opposed to a pure one.”

The strategy here is to draw a thick line between what is known in a “universal” way by the practically wise person, and what is known in a “particular” way. But, as I hope my discussion in this dissertation has shown, this construal does violence to the careful distinction that Aristotle makes between scientific knowledge and practical wisdom, including his insistence that the separate kinds of knowledge belong to separate parts of the soul. And it also underappreciates the place of particulars in practical wisdom. In thinking that particulars are tacked onto the practical wise person’s

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200 Does Reeve think that practical wisdom is a single state that straddles the divide between the two soul parts? The universal part of practical wisdom belonging to the scientific part of the soul, the particular part belonging to the calculative part?
knowledge as a kind of know-how or applied aspect of the knowledge, Reeve misses out on the robust explanatory power of particulars. He fails to appreciate the way in which they are starting points of practical wisdom.

The second camp is the group of scholars who think that ethical facts are grounded in scientific explanation. Irwin (1980) is also in this camp, as well as Lennox (1999) and Shields (2015). Perhaps motivated by slightly different reasons, each of these scholars has claimed that the scientific explanations of biological and psychological phenomena (particularly, human phenomena) provide the naturalist foundation of Aristotle’s ethical theory. Lennox argues that Aristotle’s conception of “natural virtue” in the ethics is crucially filled out by his discussion of voluntary action, animal psychology, and the psychology of children. As such, “its fit with his account of animal character and behavior in the Historia Animalium suggests that there is a general theoretical account of the differences in animal behaviors that underwrites the concept of natural virtue.”201 “Underwrites” here is a notion of dependence. The practically wise person’s understanding of what natural virtue consists in depends on a scientific account of differences in animal behaviors. But, for all the reasons I have laid out in this dissertation, we should not expect the practically wise person’s knowledge to depend on an scientific knowledge—no more than we expect an optical scientist’s knowledge to depend on geometrical knowledge. The relation of quasi-subordination (or superordination-subordination) marks a link between bodies of knowledge, but it does not establish a relation of dependence. The autonomy of different domains would be threatened by such dependence.

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201 Lennox (1999), pp. 16.
Shields champions much the same view, but perhaps takes the thesis to an extreme. He focuses on the relationship between practical wisdom and knowledge of the human soul. He tells us that the question he aims to answer is “to what extent, if any, does the science of soul structure Aristotelian ethical theory?” He answers this question by saying that Aristotle’s theory places “significant scientific demands” on the practically wise person—especially in the context of the ergon argument—with the result that he has “at least some active scientific knowledge of the soul.” Interestingly, Lennox and Shields both acknowledge Aristotle’s insistence that knowledge of scientific explanations is not a necessary component of practical wisdom, but they nevertheless think that the body of knowledge that is grasped by the practically wise person is either dependent upon or includes various scientific proofs. They have not observed Aristotle’s careful maintenance of the line that divides practical wisdom from scientific knowledge.

Lastly, there are the particularists, a group that includes most prominently McDowell (2009) and Nussbaum. This interpretation goes in the direction of the opposite extreme. He certainly avoids identifying practical wisdom as a body of scientific knowledge, but at the cost of failing to acknowledge a place for universals at all.

Practical wisdom is the intellectual excellence that is operative in the behavior of a fully-fledged possessor of virtue of character. [...] Aristotle does not believe that such a conception can be spelled out in general rules of conduct. We cannot encapsulate the content of practical wisdom in a general formula that could be abstracted away from the concrete details of life. A correct conception of the end

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203 Ibid., pp. 170.
is accordingly inseparable from a kind of perception, which Wiggins helpfully
glosses as “situational appreciation.”

Things get off to a good start here when McDowell alludes to Aristotle’s idea that practical
wisdom and character virtue are mutually complementary. That is certainly Aristotle’s view. But
then McDowell seems to go astray in his conception of the place of anything “general” in practical
wisdom. Specifically, he banishes all “general rules of conduct” and “general formula” in favor
of reducing practical wisdom to mere skill in perception. Granted, he wants that skill to be quite
refined, but as we have seen from my discussion of starting points in the practical domain, it is a
mistake to think that practical wisdom is only a kind of perception, i.e. only a matter of interacting
with particulars. In the case of craft knowledge and practical wisdom alike, the person with
knowledge is distinguished from the person with mere experience precisely on this point: they
grasp a universal and they grasp it as explanatory. In overlooking this central feature of Aristotle’s
epistemology, McDowell has failed to reconstruct practical wisdom in a true Aristotelian spirit.

So my reading is situated somewhere in the logical space between the interpretations of
Lennox, et al., and McDowell, et al.. I deny that ethical knowledge is continuous with scientific
knowledge (I maintain the division between those domains), but I also recognize the place of

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204 McDowell (2009), pp. 66.
205 I do think McDowell is correct in his assertion that there are no “general rules of conduct.” This claim forms the
basis of McDowell’s version of particularism—the idea that moral situations differ from one another to such an
extent that we cannot codify rules of behavior. The action that is suitable in situation A will not also be suitable in
situation B if those situations differ in any salient way. The moral agent must be on guard to recognize these salient
differences, and so practical wisdom consists—on McDowell’s view—in appreciating the salient features of one’s
situation. It seems right, to me, to say that Aristotle’s theory is intolerant of general rules of conduct. The discussion
in EN 2 where he emphasizes that the virtue is a mean relative to us, and not just to “us” as a species but to us as
individuals, makes this point crystal clear. But McDowell slides between “no general rules of conduct” and “no
general formulas” too quickly. There is a general formula of happiness that is foremost in Aristotle’s mind as he
works through the Ethics, as well as general conceptions of what kinds of creatures we are and what kinds of
activities are good for us. These “general” propositions explain why certain actions are choice-worthy and that is the
sense in which they are most certainly part of practical wisdom.
universal propositions in the body of knowledge that is practical wisdom. Thus, we can see that my interpretation does mark out new territory in the debate about what kind of knowledge is practical wisdom.\textsuperscript{206}

A final, significant upshot of my view is that we might be pushed to reconsider the status of the \textit{Nicomachean Ethics} as a philosophical treatise. We reflected earlier on how surprising it is to find Aristotle casting philosophical wisdom and practical wisdom so widely apart when he seems to be a prime example of someone who gives philosophical treatment to ethical questions. But if he truly is committed to the distinction between scientific and practical knowledge and the \textit{Nicomachean Ethics} is a practical investigation and contains much of the content that fills out practical wisdom, then that text is \textit{practical}, not \textit{philosophical}.

But this is so only if we understand philosophy strictly as being an activity of investigating and contemplating those “divine things” which Aristotle says are the objects of \textit{sophia}.\textsuperscript{207} Certainly the objects of practical wisdom are not the objects of \textit{sophia}.

Philosophical wisdom (\textit{sophia}) will contemplate none of the things that will make a man happy, for it is not concerned with any coming into being, and though practical wisdom has this merit, for what purpose do we need it? Practical wisdom is the quality of mind concerned with things just and noble and good for human beings.\textsuperscript{208}

\textsuperscript{206} Leunissen (2015) seems to be situated quite close to me on this spectrum of interpretations since she says that the practically wise person must have extensive familiarity with biology (because she reads the ergon argument as relying on a deep understanding of biology), but she draws a line in saying that practical expertise does not require scientific expertise. So full blown scientific knowledge is not part of practical wisdom, on her account. But my reading still differs from her in that I recognize the quasi-subordination relation as marking out the boundary between domains and, in that conception, I think that even a deep understanding of biology is ruled out.

\textsuperscript{207} Met. E.1 1026a18–21 and EN 10.8 1179a22–32.

\textsuperscript{208} EN 6.12 1143b19–21.
Aristotle’s conception of *sophia* is clear, and it certainly restricts us from saying that we can have *sophia* of practical matters. But to translate “*sophia*” as “philosophy” is our convention, and it may very well be that Aristotle conceived of philosophy more broadly—as being a reflective and rationally engaged approach to a domain of study. On such a construal of philosophy, he would think of his *Nicomachean Ethics* as being every bit as philosophical as his *Metaphysics*.209

But however we land on the issue of the status of the *Nicomachean Ethics* as a philosophical text, we must be on guard not to allow Aristotle’s distinction between philosophical wisdom (*sophia*) and practical wisdom (*phronēsis*) to collapse. And, further, we must appreciate that it is practical wisdom that is described in that text. Above all else, the surest sign—at least to my mind—that Aristotle conceives of the *EN* as a discussion of practical, not philosophical, wisdom is that he says the aim of all ethical inquiry is not knowledge, but action. The treatise is most certainly an ethical inquiry. It is an investigation into what things are good and bad for human beings, how to acquire the right attitudes toward those things, how to organize one’s life so as to make it the happiest life possible, and it is a celebration of those who have managed to do all these things.

Anybody can become angry—that is easy, and so it is to give and spend money;

but to be angry with or give money to the right person, and to the right amount,

and at the right time, and for the right purpose, and in the right way—this is not

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209 Cooper (2012) has argued extensively for the idea that Aristotle conceives of there being two philosophical paths and, correspondingly, two philosophical lives—the life of contemplation and the life of politics. “For Aristotle, this second philosopher, or kind of philosopher, lives a second philosophical life, not the life of the contemplative but the life either of the political leader or of the ordinary private citizens. Both of these make their practical virtues, conceived as a communal good, the organizing focus of their lives. Philosophy does not just, so to speak, lie behind this way of life, supporting it from the outside. It is actually in this life, as (theoretical) philosophy also is for contemplatives, who devote major portions of their time to theoretically philosophical work” (142).
within everybody’s power and is not easy; so that to do these things properly is rare, praiseworthy, and noble.  

What we hope for in reading the *Nicomachean Ethics* is exactly what those lucky students of Aristotle’s were invited to learn: to know what is good and why it is good and (most importantly) how to put that knowledge into action.

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210 *EN* 2.6 1109a26–30.
Works Cited

Primary Texts


Secondary Texts


