After Certainty

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PREFACE

My earliest ambition as a philosopher, which goes back to my undergraduate days, was to write about epistemology. Since the topic in its more recent manifestations looked (at that time, to my youthful eyes) as if it had been quite exhaustingly studied already, it seemed a sensible career move (at that time, to those youthful eyes) to go back to an era where there was evidently much room for new research: the middle ages. When I arrived there via upstate New York, I found, however, that I did not know how to talk about medieval epistemology and could not even find much epistemology from that era to talk about. Hence I settled for the theory of cognition.

Some years later I found myself aspiring to write a book on how metaphysics and epistemology changed in the four centuries between Aquinas and Locke. It eventually became clear, however, that metaphysics alone would put quite enough strain on whatever readership there might be for such a book (to say nothing of the strain it eventually put on the art of bookbinding). The research on epistemology never left my spiral notebooks.

Still more recently I was invited to spend a term at Oxford delivering the Isaiah Berlin Lectures on the History of Ideas. Thinking of those notebooks, I decided that I ought to try, one more time, to write about the history of epistemology. This book is the result.

Since delivering those lectures in the spring of 2014, I have rewritten the main text quite extensively, but I have endeavored, so as to preserve a sense of the occasion, to retain the prose style I had adopted then for a public audience. I have also steadfastly adhered both to the original number of lectures and to something like their original length, so that the sprawling material of the notebooks might be distilled into a concentrated argument of manageable size.

Yet, if brevity is the soul of wit, then either soulless or witless I must be, because I found myself unable to resist cheating on these self-imposed constraints in that most shameful and dreaded of ways: by adding endnotes. Very long endnotes. But, though lacking in soul, I am not lacking in heart; hence I have written the main text so that it can be read without the notes. Moreover, I have tried to write the notes so that they, too, can be read continuously, without any need to refer back to the corresponding lecture. Accordingly, readers should on no account attempt the maddening exercise of paging back and forth between lecture and notes. Each lecture should be read without interruption, and the notes for a given lecture should be consulted only after that lecture has been read to the end, and only by readers who want to see more of the dense and scraggly roots from which these lectures grew.

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Lecture One

The Epistemic Ideal

Introduction

Over the weeks ahead I will sketch a series of chapters in the history of our thinking about knowledge. Any serious attempt at such a history should confront, from the start, the surprising fact that, of all the main branches of philosophy today, epistemology is the most alienated from its history. In ethics, politics, metaphysics, and mind, even in logic and language, philosophers pursue themes that go back to antiquity and that run almost continuously over the subsequent centuries. Yet historical precedents are few and far between for the sorts of discussions that have largely animated epistemology over the last fifty years. Today the study of knowledge is one of the foundational subjects of philosophy. But this has not always been so—indeed, for long periods of time, epistemology can appear not to have been an important philosophical subject at all, let alone a foundational one.

It is symptomatic of these discontinuities that the very term 'epistemology' goes back only to the middle of the nineteenth century, before which time philosophers evidently felt no need for a special label to talk about the study of knowledge. Moreover, the ways in which philosophy has been divided over previous centuries have left no space for epistemology as a distinct field of inquiry. For Aristotelians as well as for Stoics, philosophy broke down into logic, physics, and ethics. (Aristotle's *meta*physics was seen as furnishing a kind of appendix to the physical sciences.) Among Arabic philosophers, following the traditions of late antiquity, theoretical philosophy standardly divided into physics, mathematics, and metaphysics, logic being a further subject on the side. In the seventeenth century things were much the same. Thomas Hobbes divided the sciences that study natural bodies from those that study political bodies, including among the former physics, ethics, poetry, and logic, but not the study of knowledge itself.[a] John Locke distinguished "three great provinces of the intellectual world": the nature of things, moral philosophy, and the doctrine of signs.[b] He and his contemporaries conceived of his great *Essay* as falling into that last category—a treatise of logic. In none of these divisions is there any hint of epistemology—under any name—as a special subject, let alone as a foundational philosophical subject.[1]

[a] *Leviathan* 9; see also *De corpore* 1.9. [b] *Essay* IV.21.5.

Still, it is by no means the case that premodern philosophy neglected epistemology. There were debates over skepticism, of course, and over the relationship between sense perception and knowledge; and there were extensive investigations into the cognitive mechanisms that gave rise to sensation and belief. What was very unusual, however, was to address at any length the problem that lies at the heart of modern epistemology: how knowledge is to be defined. To be sure, there was Plato in the *Meno* and the *Theaetetus*, and the casual follower of philosophy's history might be forgiven for supposing that his example carried forward more or less continuously until the present day. In fact, however, Plato has always been more honored than imitated, and this is particularly the case with respect to his interest in definitions. The Platonic dialogues, especially the early ones, are interested in defining all sorts of things: knowledge, piety, friendship, courage, justice, statesmanship, and so on. Most of these definitional projects no longer interest us. Although philosophers still think sometimes about friendship and courage and regularly about justice, it is rare to find attempts at definition. Knowledge is the exception. It is only recently, however, that the quest to define the term has been perceived as a central philosophical question. From Aristotle through the Middle Ages and well beyond, philosophers took an interest in carefully circumscribing one or another particular kind of cognitive grasp of reality—perception, imagination, assent, deduction, and so on—but showed little interest in defining the broad category of knowledge. That English contains this very general word of positive cognitive appraisal did not strike philosophers, even those who worked in English, as calling for any special definitional inquiry.

My aim over the course of these lectures is to consider the sorts of questions about knowledge that philosophy *has* asked for most of its history and to examine how the answers to those questions have changed. I will be particularly interested in what I take to be one of the pivotal moments in the history of philosophy—the seventeenth-century rejection of scholastic Aristotelianism—which I will explore by looking at both sides of that divide. Lying behind the more famous innovations of that revolutionary century are, I shall argue, a series of decisive transformations in the sorts of epistemic demands we make on ourselves.[2]

I have been invited to give these lectures in the name of Isaiah Berlin, the great Oxford historian of ideas. As fortune would have it, the theme that will run through the course of these six weeks—of the ideals and illusions that beset our cognitive enterprise—is one that permeates Berlin's own thought. Over and over, Berlin warns against a certain sort of idealizing tendency, the folly of supposing that "all the ideals of mankind" are compatible. Within both politics and metaphysics, this tendency looms, with respect to ideals like *justice*, *truth*, *liberty*, and *progress*. This faith—that we can achieve, all together, all the various ideals that we aspire to—"is perhaps one of the least plausible beliefs ever entertained by profound and influential thinkers."[a] Even so, this "one belief, more than any other, is responsible for the slaughter of individuals on the altars of the great historical ideals."[b] In these lectures I wish to trace the rise and fall of such ideals in the domain of epistemology. Over the weeks to come we will look at how certain

[a] *Concepts and Categories*, p. 198. [b] "Two Concepts of Liberty," in *Four Essays*, p. 167.

ancient epistemic expectations coalesced in the Middle Ages around a comprehensive theoretical framework, and how those ideals gradually dissolved, piece by piece, in the seventeenth century. I will begin, this week and next, by characterizing these epistemic ideals in a general way. In weeks three and four I will focus on perception and illusion; and then, in the last two weeks, I will take up reason and its frailties, coming around finally, inevitably, to talk about skepticism.

By the end of today I hope to have explained how epistemology came to stand as a foundational topic in philosophy. To tell that story, I need to describe the rise of a distinction between knowledge and science, a development that has its origins in the breakdown of scholastic Aristotelian metaphysics. But before arriving at these famous episodes at the dawn of modern science, we need to consider the framework in which epistemology was pursued for most of its history. The story I wish to tell today and in the weeks ahead turns on reconceptualizing what a theory of knowledge might look like. If the history of epistemology looks strange to us, this is because we have lost sight of the subject's most prominent aim. Once that aim comes into clearer focus, we will be able to make much better sense of a great many episodes from the history of this subject. And, once we understand these episodes better, we will be in a position to ask whether this alternative epistemic framework might be an improvement on more recent ways of pursuing epistemology.

The framework I have in mind, and which I will argue dominated the history of our theorizing about knowledge, is what I call an *idealized epistemology*. Rather than take as its goal the analysis of our concept of knowledge, an idealized epistemology aspires, first, to describe the epistemic ideal that human beings might hope to achieve and then, second, to chart the various ways in which we commonly fall off from that ideal. As one might expect, it turns out to be fairly easy to characterize what we would ideally like to achieve in principle and quite hard to come to grips with what we might actually be able to achieve in practice.

Aristotle's Ideal Theory

To see an idealized epistemology in action, we should start by looking back to Aristotle, the ancient inspiration for so much of what gets said about knowledge during the first two millennia of philosophy in the Middle East and Europe. Like Plato, Aristotle devotes an entire treatise to investigating the character of something they both call *epistēmē*. But the results Aristotle arrives at, in his *Posterior Analytics*, are utterly different from what Plato had suggested in his *Theaetetus*. Whereas it might plausibly be thought that the *Theaetetus* has the same goal as that of many modern epistemologists—considering our ordinary way of talking about knowledge and of pursuing necessary and sufficient conditions for its satisfaction—it is clear from the very start of the *Posterior Analytics* that this is not Aristotle's aim. No conversation with an ordinary Athenian, no matter how one-sided, could plausibly have elicited the result that knowledge concerns a proposition that is necessary and universal, known on the basis of an affirmative demonstration in the first syllogistic figure, the premises of which are necessary and explanatory of the conclusion. This is not what even the most erudite Athenian could have meant by *epistēmē* before Aristotle came along, and if this is what *epistēmē* is, then

we would have to conclude that it is something that hardly anyone has ever had, in any domain.

But if the *Posterior Analytics* is not analyzing the meaning of 'knowledge', then what is it doing? In what sense is this an epistemology at all? One line of answer to these questions has been to find some other English word that better fits Aristotle's project, the most prominent such suggestion being that this is a theory of *understanding*. Clearly this is a promising idea about how to translate *epistēmē* in the context of the *Posterior Analytics*. The agent who comes to understand a proposition in the way Aristotle describes goes well beyond simply *knowing* that proposition. One can come to know quite well that vines shed their leaves, for example, simply by observation.[a] But someone who grasps the general truth in the way Aristotle describes—on the basis of necessary principles grounded in the vine's essence—might plausibly be said to have a better *understanding* of that truth. Even so, as helpful as this may be as a translation, it does not go very far toward explaining what Aristotle is after. Is he simply engaged in his own linguistic project, trying to understand a Greek word for which 'understanding' is the closest English counterpart? Presumably there is something special about *epistēmē* as the *Posterior Analytics* conceives of it, something that makes it worthy of being singled out for special treatment. And understanding, to be sure, is eminently worthy of study. But why study this, rather than knowledge? And why develop the details in the way Aristotle does? Are the arcane requirements of his demonstrative method really intended as necessary and sufficient conditions for understanding a thing?

The traditional reading of the *Posterior Analytics* takes it to be a theory of scientific knowledge. This is another way in which *epistēmē* has been translated, and the treatise itself is almost always described in these terms, as offering a theory of knowledge or understanding *in the domain of science*. It is odd that this should be so, however, because it is apparent even on a casual inspection that the treatise's scope is much broader than science as we now conceive of it. Although scientific examples figure prominently, they are not its exclusive focus. The method is evidently meant to apply to mathematics too; there are, indeed, as many mathematical examples as there are scientific ones. There is also no reason to describe the method as scientific rather than philosophical, since it is completely unclear how we would mark the divide between science and philosophy at this early date. To be sure, various ancient authors use the plural form *epistēmai* to refer more or less to what we now think of as 'the sciences.' But it is highly misleading to describe the *Posterior Analytics* as a treatise on science, given how much more broadly the theory is meant to apply. A theory that does not discriminate between science and mathematics on one hand and between science and philosophy on the other is surely not a theory of science in our sense at all. Scholars will perhaps defend themselves on this point by insisting that, of course, they are using the term 'science' in the broad sense of the Greek *epistēmē*. But, once that is said, it becomes clear that characterizing the treatise as scientific in its concerns in fact explains nothing at all.[3]

To describe the *Posterior Analytics* as a theory of science is perhaps most charitably regarded as shorthand for the more complex idea that it aims at an account of *systematic theoretical knowledge*—the sort of thing one does in mathematics and philosophy just as

[a] *Post. An.* II.16.

much as in the sciences. One may speak of the project synecdochically as *scientific*, but that is just because, as in many other prominent cases, we do not have in English the right term for conveying what Aristotle is after. There is, however, more to be said here than this. Commentators have almost unanimously latched onto the notion that the *Posterior Analytics* offers a theory of science because they have not seen any other sort of enterprise in the vicinity that the treatise could be concerned with. It is not just that we lack a word for systematic theoretical knowledge, but that we lack any place in our conceptual scheme for the study of such a thing. However, philosophers do of course study the nature of science. Hence it has become an *idée fixe* in the recent literature that this is what the *Posterior Analytics* does.

Regardless of how the topic of the *Posterior Analytics* is to be characterized, there is a further puzzle concerning its methodological prescriptions: that the method described seems both impractical and in fact unpracticed by Aristotle. If possessing *epistēmē* requires grasping first principles and essences, then it seems unlikely that we have achieved this condition in more than a few domains. (Mathematics would be the most likely place to find such a methodology in place. But it is unclear whether mathematical proofs satisfy the requirement that one know a proposition through principles that explain the reason why it is so.) Perhaps unsurprisingly, Aristotle's own writings, including the *Posterior Analytics* themselves, contain no examples that satisfy all the necessary requirements. To be sure, his many examples serve individually to illustrate one or another dimension of the theory, but each seems incomplete in one regard or another. The prescribed method, then, seems to be one that he himself is incapable of fully putting into practice.[4]

All of these puzzles dissolve when one reads the *Posterior Analytics* as describing an epistemic ideal. Aristotle characterizes his subject matter as *epistēmē haplōs*, unconditionally or unqualifiedly knowledge, in contrast to various lesser forms of knowledge, which he is willing to count as *epistēmai* but which are in one way or another deficient.[a] According to this distinction, these lesser kinds are simply the ordinary sorts of knowledge that human beings regularly do possess, and unqualified knowledge is the ideal state that we should aspire to, even if its attainment is extremely difficult. This explains why Aristotle elsewhere seems not to practice what he preaches—not because it is not his goal, but because it is an idealized goal. For this reason, too, the *Posterior Analytics* itself gives us little more than fragments of what an *epistēmē* taken *haplōs* is supposed to be. This is not the perverse failing that it might seem, because Aristotle is describing the ideal aim of inquiry rather than something that he himself is in a position to achieve.

Aristotle nowhere says explicitly that *epistēmē haplōs* is an ideal that he has not yet realized. But he comes close in the *Metaphysics*, where he remarks:

> The study of truth is difficult in one way, in another easy. A sign of this is that no one is able to attain it completely, nor entirely misses it. But each individual says something concerning the nature of things, so that while he may individually contribute little or nothing, from the collaboration of all there comes a great amount. It is like the proverbial door: who can fail to hit it? In this respect it is easy; but being able to grasp the whole and not only a part makes the difficulty clear.[b]

[a] E.g. *Post. An.* $71^{b}10$, $72^{b}30$, $73^{b}17$, $74^{a}33$. [b] *Meta.* II.1, $993^{a}30$–$^{b}7$.

Aristotle does not use the term *epistēmē* here, but it seems clear enough that the study (*theōria*) he has in mind is just what he had described in rigorous detail in the *Posterior Analytics*. For what is most distinctive about Aristotle's conception of *epistēmē* is his insistence that it involve a grasp not just of a single isolated proposition, but of the whole causal and inferential network of propositions that lie behind it. Aristotle's ideal theory therefore requires a grasp of the whole door, not just a part, and what he tells us here is that it is easy to make a contribution to *epistēmē*, but very hard to achieve the complete ideal. Indeed, "no one" is able to do that.

As soon as one considers the possibility that Aristotle is offering not a theory of 'knowledge'—even for a special refined domain of inquiry—but an account of the ideal limit of human inquiry, it becomes easy to see why Aristotle would insist on the various details of his account. According to the canonical definition of *Posterior Analytics* I.2, *epistēmē* in the ideal, unqualified sense arises "when we think we know of the explanation [*aitia*] because of which the object holds that it is its explanation, and also that it is not possible for it to be otherwise."[a] This imposes two requirements on *epistēmē*: that it be grounded in an explanation; and that it concern what is necessary. Although, as we will see today and next week, both of these conditions become controversial in the seventeenth century, it is nevertheless easy to see why Aristotle would have taken each one to be an element of the cognitive ideal. And, when subsequent chapters introduce further conditions on *epistēmē*, these conditions are defended precisely as features of the cognitive ideal. In I.24, for instance, he offers a lengthy series of arguments as to why *epistēmē* should be of the universal rather than the particular. How do we choose between these options? By determining which achievement is superior. Thus, "if you know something universally, you know it *better* as it holds than if you know it particularly. Hence universal demonstrations are *better* than particular demonstrations."[b] The next chapter argues in similar fashion about the reason why *epistēmē* should be based on affirmative rather than negative premises: not because the latter fail to yield knowledge or understanding or science, but because "the affirmative, being prior and more familiar and more convincing, will be better."[c] And so I.26 continues by showing that positive arguments "are better" than arguments cast in the form of a *reductio*. Obviously, arguments that are deficient in these respects can significantly increase our understanding. Indeed, in other places Aristotle happily recognizes a wide variety of cognitive states that fall short of the ideal described here, such as grasping particulars and retaining them in memory, reaching conclusions in a nonexplanatory way (by way of the fact 'that', *hoti*, rather than by way of the reason 'why', *dia ti*), and achieving practical wisdom in action. We might reasonably describe all of these as kinds of knowledge. The point of the *Posterior Analytics* is simply that they are not ideal.[5]

Normative Ideals

Among authors writing in Latin, from antiquity to the seventeenth century, *epistēmē* becomes *scientia*, and *scientia* continues to be understood in terms of the cognitive ideal. Jumping ahead to the high Middle Ages, we can find Albert the Great, in the prologue to

[a] *Post. An.* I.2, $71^{b}9$–12. [b] I.24, $85^{b}13$–15. [c] I.25, $86^{b}29$.

his *Posterior Analytics* commentary (1261), remarking of *scientia* that "this is the end and the most perfect and the sole unconditionally desirable thing among the logical sciences."[a] Thomas Aquinas, in his commentary, remarks that "to have *scientia* of something is to cognize it perfectly." From this principle he derives the twin features of the canonical definition: that what is known in this way must be necessary, and that it must be grasped through a grasp of its cause.[b] Describing Adam's condition in the Garden of Eden, he writes that "just as the first man was endowed in a perfect state with respect to his body . . . so too he was endowed in a perfect state with respect to his soul . . . And thus the first man was endowed by God so as to have *scientia* of all the things about which a man is naturally suited to be instructed."[c] Even after Aristotle's influence began to wane, authors continued to take for granted that *scientia* should be understood as the cognitive ideal. Francisco Sanches, for instance, a late sixteenth-century critic of Aristotelianism, puts in capital letters his definition of *scientia* as "the perfect cognition of a thing."[d] And René Descartes, in his early *Rules for the Direction of the Mind*, conceives of these rules as a guide for the achievement of *scientia*, and writes that they "will help us ascend to the peak of human cognition."[e] Descartes's case will be considered in some detail next week.[6]

Once we begin to think of *scientia* (née *epistēmē*) as the ideal, the peak of perfection, it becomes natural to worry that, however it is to be characterized, it will remain only an ideal, unattainable to us. We noticed already how, in Aristotle, it is hard to find a single conclusion that meets all the criteria of his ideal theory. And indeed, historically, it is very common to worry about how close human beings might be able to come to the cognitive ideal. Back in the second century, Ptolemy had remarked that, of the various theoretical disciplines, "only mathematics can provide sure and unshakable knowledge [*eidēsis*] to its devotees." As for physics and metaphysics, "they should be called conjecture rather than knowledge [*katalēpsis epistēmonikē*] . . . There is no hope that philosophers will ever be agreed about them."[f] Pietro Pomponazzi, in the Renaissance, similarly remarked that "philosophy would be beautiful, if it were as certain as mathematics. For metaphysics and philosophy are conjectural, and on almost any subject one may find different opinions, so that it is like playing with toys."[g] (This is one of two obstacles Pomponazzi describes as plaguing philosophy. The other, naturally, is that it does not pay.)

Although Ptolemy and Pomponazzi put their complaints in strong terms, their concern is one that nearly everyone has always shared about almost every area of human inquiry. So, if epistemology is to be conceived in ideal terms, it might seem that skepticism lies just around the corner. In fact, however, the strategy of idealization does not require identifying some sort of *absolute* ideal and then holding it fixed regardless of whether it can be obtained. The objective is not to identify standards that only a god could achieve. The point instead is to define what sort of knowledge *we* might be able to achieve, given the world we live in. Accordingly, if the highest cognitive ideal turns out to be one that can be achieved only in certain limited contexts, then an idealized epistemology had better be ready to make various retrenchments to the theory, as

[a] *Comm. Post. an.* I.1.1 (ed. Jammy, I: 514a). [b] *In Post. an.* I.4.
[c] *Summa theol.* 1a 94.3c. [d] *Quod nihil scitur*, p. 200. [e] *Rules* 2 (X: 364).
[f] *Almagest* I.1, p. 36 trans.; see also Lecture Two, p. 27. [g] See Perfetti, "Pietro Pomponazzi," §5.

required to identify a level of cognitive excellence that ordinary people can meet in ordinary circumstances. And this is in fact what we find happening, beginning with Aristotle. Although the *Posterior Analytics*' theory of demonstration sets a formidable standard for *epistēmē*, Aristotle elsewhere describes in considerable detail an epistemology of nonideal conditions, which he labels *dialectic*. The *Topics*, his treatise devoted to this subject, explains what one should do in cases where one or another component of demonstrative reasoning is not available, and considers what merit there is to arguments that fall short of the rigor of *epistēmē*. Although dialectic does not rise to the level of the ideal, it is appropriately deployed by certain kinds of people in certain kinds of situations and is a worthy subject of philosophical investigation.[7]

For the next two millennia, epistemology largely wrapped itself around these two frameworks, demonstrative and dialectical, and subsequent Aristotelians devoted considerable effort to investigating the conditions under which one or another method was most appropriately deployed. Accordingly, it became standard to register the different senses in which one might speak of *epistēmē* or *scientia*. In Themistius's fourth-century commentary on the *Posterior Analytics*, for instance, we are told that '*epistēmē*' is said in two ways, broadly and strictly. The strict sense is that of the *Posterior Analytics*. Broadly, in contrast, "we say that every apprehension [*gnōsis*] is knowledge [*epistēmē*], however it comes about, whether it be of accidental things, through whatever method [*tropos*]."[a] The first Latin commentary, that of Robert Grosseteste in the 1220s, distinguishes four ways of speaking of *scientia*: he begins with Themistius's very broad sense but arrives at the strictest sense only after registering two intermediary levels, one for natural science (where conclusions hold only for the most part) and one for mathematics (where Grosseteste thinks we lack a grasp of the reason why).[b] In one form or another, this four-fold division runs all through subsequent scholastic thought.[8]

If its goals are adjusted to fit the capacities of real agents and real circumstances, an idealized epistemology might seem to embrace a purely descriptive account of human cognitive activities. But in fact the theory is normative in its ambitions. In seeking to establish the cognitive ideal, the theory aims at a question that lies at the heart of epistemology: the question of when ordinary agents, in ordinary circumstances, should believe the things they believe. This way of proceeding insists that a normative account of our epistemic position, nonideal as it is, presupposes some conception of the ideal. Such a methodology—ideal theory as foundational for real-world applications—is familiar enough in other normative domains. In political philosophy, for instance, it is common to frame a theory of justice around an account of what an ideally just state would look like. The project is not, of course, to describe a form of government suitable only for the gods. Nor is it supposed that the only just state would be one that perfectly satisfies the ideal theory. The goal is an understanding of what a just state would be for beings such as we are, in a world like this one. With some such picture of the ideal, calibrated against what is actually possible, we are able to think about what sort of political structures we might reasonably demand. This is precisely what we find in an idealized epistemology: it begins with a conception of the human cognitive ideal, then applies it to the question of what we ought to believe.[9]

[a] *Paraphrasis Post. an.* I.2 (ed. Wallies, p. 5; ed. O'Donnell, p. 247).

[b] *Comm. Post. an.* I.2, p. 99.

In many ways, this is a more promising approach than what one finds in epistemology today. Rather than describe an ideal and then consider how close we might come to achieving it, the modern epistemologist has tended to begin with questions of threshold: exactly what divides knowledge from mere true belief? It would be as if political philosophers spent most of their time trying to define exactly where the borderline falls between the just and the unjust state, or as if ethicists focused on just precisely how good an act must be in order to count as praiseworthy. To be sure, there will be cases in the moral or political domain where such questions of threshold have practical relevance. But it would be odd to expect clear lines of demarcation, and odd to think that the principal task of normative theory is to discover those lines. In epistemology, too, boundary conditions clearly matter. We care about the theory of knowledge largely because we care about what we ought to believe and what we ought to do, and we think such questions of belief and agency are tied up with questions about what we know. Next week we will see why, beginning in the seventeenth century, epistemology becomes increasingly focused on whether our beliefs are *justified*. Once the issues are so starkly normative it becomes natural, as we will see, to look for the boundaries that demarcate knowledge. Even so, it is strange to embrace the widespread current assumption that the way to investigate such questions runs through language—as if finding necessary and sufficient conditions for the word 'knowledge' would show us what the proper standards are for belief and action.[a] A more meaningful way to proceed is to begin with an account of the epistemic ideals toward which we ought to aspire and then to reflect on how much progress toward those ideals we should demand of ourselves in one or another domain.

Like other normative disciplines, an idealized epistemology holds out the hope not only of clarifying our actual practices, but of putting us in a position to critique those practices. Mill's utilitarianism describes an ethical ideal, maximizing happiness, which does not immediately tell us exactly how much happiness an action must produce to count as morally good. All the same, even if Mill's theory does not mark the precise boundaries of right action, it has tremendous potential to influence society's conceptions of where those boundaries should be drawn, simply by winning people over to a new conception of the moral ideal. Something similar might happen in epistemology. A pessimistic conception of our epistemic prospects—of the sort we will encounter in Lecture Six—might encourage a more tolerant attitude toward belief. Instead of scorning those who hold various religious, ethical, and political views upon insubstantial evidence, we might indulgently regard such naïfs as being on more or less the same footing as everyone else. In contrast, optimism regarding the attainability of some epistemic ideal might lead us toward higher expectations in everyday life. Indeed, this may already have happened. William Whewell, in his nineteenth-century paean to the progress of science, argues for the larger social consequences of the scientific revolution: "an advance from the obscure to the clear, and from error to truth, may be traced in the world at large."[b] Whewell contends that rising standards of certainty and precision in science caused society to elevate its cognitive expectations more generally—a clear case of how an epistemic ideal, once seen to be realizable, might bring about a broader shift

[a] Lecture Two discusses the linguistic tendencies of much recent epistemology.
[b] *History of Scientific Ideas* I: 279.

in normative expectations. Even if Whewell's enthusiasm is misplaced, the phenomenon is not implausible. An idealized epistemology might be more than descriptive—it might also have normative force. So, even if recent theorists of knowledge have only interpreted the word in various ways, the point might instead be to change it.[10]

The Breakdown of Aristotelian Essentialism

It is relatively easy to describe the *absolute* epistemic ideal—the sort of knowledge that a god might have. The ideal would be to grasp, in a single glance, all of reality, with complete certainty, and to understand all the explanatory connections between things. Eventually, in my final lecture, I will consider whether there might be limits to this sort of absolute ideal, even for a god. The more pressing questions of an idealized epistemology, however, concern its application to this world. It is only here that the normative dimension of the theory comes into play, since one can reasonably insist that human beings *ought* to achieve a certain epistemic standing only if it is *possible* for us to do so. This is what I mean by the *normative* epistemic ideal.

To see what sort of epistemic ideal is possible for us requires taking into account two kinds of constraints: those imposed by our human limitations and those imposed by the character of the world in which we live. This is perhaps part of the reason why the theory of knowledge has not traditionally been conceived of as a distinct subject of inquiry. Epistemology, once idealized, can be developed only as part of a much broader theory. On one side, an account of the normative ideal must be embedded in a theory of our cognitive capacities. Such constraints will take center stage in later lectures. Today, however, I am concerned with those constraints that arise from the other side, from our conception of the world around us. Such metaphysical questions have, traditionally, gone hand in hand with epistemology. When Plato, for instance, discusses his theory of knowledge in the *Theaetetus* and the *Republic*, he does so in the context of his theory of Forms, which he regards as ideal objects of inquiry. Conceived of apart from the Forms, Plato's epistemology is unintelligible. Aristotle's epistemology, as set out in the *Posterior Analytics*, expressly sets itself against that Platonic conception of reality. In its place Aristotle offers a more down-to-earth but still ideal object: the inner essences of things. The details of Aristotle's theory of knowledge depend on his essentialism just as much as those of Plato's depends upon his Forms.

It was, of course, the Aristotelian framework that became dominant after antiquity. When this framework collapsed in the seventeenth century, it did so not mainly because of doubts specific to Aristotelian epistemology, but because of doubts over its metaphysical foundations. Specifically, seventeenth-century authors began to challenge the Aristotelian doctrine of essences. As long as that metaphysical doctrine had thrived, so had the *Posterior Analytics* framework, along with its conception of the cognitive ideal. But with the rise of the mechanical philosophy came a new metaphysics, and with it a new conception of knowledge. Or, to be more precise, as we will see, the seventeenth century gives rise to several distinct conceptions of the epistemic ideal, engendering new meanings for both 'knowledge' and 'science' and paving the way ultimately to our modern conception of epistemology as the foundational subject of philosophy.

For early chapters in this transformation, we can turn to Hobbes and Locke, authors of the first two great philosophical treatises of the English language. To understand their backstory, however, something should be said briefly about the history of English epistemic vocabulary. A theory of knowledge ought not to be a theory of 'knowledge.' But we can perhaps disrupt epistemology's preoccupation with language, at least for a short while, by reflecting on the historical contingencies that led to our current patterns of usage. When English began to take shape in its modern form, in the later Middle Ages, various options were available for talking about our epistemic achievements. There was our verb 'to know,' which is attested in Old English and is very common throughout all periods, along with the noun 'knowledge,' which begins in Middle English. Then, also going back to Old English, there is the verb 'witen' (from the same root as the German *wissen*). Finally, beginning in the fourteenth century, English starts to use the Latinate word 'science.' Each of these words might have come into prominence as our principal way of talking about epistemic achievements. Indeed, it is interesting to see that each of the three—'knowledge,' 'witen,' 'science'—predominates in one or another early translation of Boethius's *Consolation of Philosophy*, which was the first philosophical work to be rendered in English. By the early seventeenth century, 'witen' largely falls out of usage as a verb, whereas 'knowledge' and 'science' often seem quite interchangeable. In some texts, we find 'knowledge' where we would expect to find 'science.' Francis Bacon, for instance, in 1605, describes mathematics as "the most abstracted of knowledges."[a] Others use 'science' where now we would use knowledge, and still others switch back and forth even within the same sentence. Joseph Glanvill, for instance, in 1661, writes that "he is the greatest ignorant, that knows not that he is so: for 'tis a good degree of science, to be sensible that we want it."[b] [11]

Confronted with unsettled terminology and complex theoretical questions, philosophers naturally set about constructing systematic accounts. But by the time this started to happen in English, Aristotle's philosophy lay under a dark cloud, disreputable even if still enormously influential. Consider Hobbes's *Leviathan* (1651). Writing in English, Hobbes proposes that we think of "knowledge" as coming in two kinds: knowledge of fact and knowledge of the connection between propositions. The first "is nothing else but sense and memory." The second is "the knowledge required in a philosopher," and this is what Hobbes says should be called *science*.[c] On its face, this looks entirely un-Aristotelian, as one might expect, given that Hobbes has absolutely no sympathy for the broader metaphysical framework of Aristotle's epistemology. Moreover, quite unlike Aristotle's, Hobbes's account seems to make science rather easy to acquire; we need grasp only that one proposition entails another. But this turns out to be misleading, because Hobbes goes on to express considerable doubt about whether we often manage to achieve science. He remarks that geometry is the only science we have successfully attained[d]—ironically enough, coming from a man who would later spend years trying to persuade the leading geometers of his day that the circle can be squared. As for the natural sciences, they "cannot teach us our own nature, nor the nature of the smallest creature living."[e] The grounds for such pessimism are unclear from the *Leviathan* itself, but can be grasped from the earlier *De corpore*. There, writing in Latin, Hobbes lays out a

[a] *Advancement of Learning* Bk. II (*Major Works*, p. 235). [b] *Vanity of Dogmatizing* ch. 23, p. 225.
[c] *Lev.* 9.1. [d] 4.12. [e] 21.33.

conception of *scientia* that turns out to be much more Aristotelian than one might have guessed, inasmuch as science arises out of a series of demonstrations grounded in initial definitions that establish "the causes and generation of things."[a] Chains of inference that do not bottom out in an understanding of ultimate causes do not count as science.[12]

Locke, the other great seventeenth-century fount of philosophical English, offers a similar picture of the epistemic landscape. On the one hand, he has a very demanding sense of 'knowledge,' which he associates with science and contrasts with a looser notion of assent based on probabilities. (But, as we will see next week,[b] Locke is unlike Hobbes in that he refuses to speak of such assent as knowledge.) Although Locke does not expressly define 'science' as a distinct kind of knowledge, it seems clear that, like Hobbes, he understands it in broadly Aristotelian terms, as requiring a grasp of the necessary connection from causes to effects. Also like Hobbes, Locke despairs of our being able to achieve any such thing, writing: "As to a perfect science of natural bodies (not to mention spiritual beings) we are, I think, so far from being capable of any such thing, that I conclude it lost labour to seek after it."[c] Locke's discussion of these matters goes one step further, however, inasmuch as his skepticism about the prospects for science results from a sophisticated refashioning of the Aristotelian doctrine of essences. Whereas Hobbes had retained the causal requirement without an Aristotelian metaphysics of essence, Locke maintains at least a vestige of that metaphysics, taking for granted throughout his writings that there are some such "real essences" or "real constitutions" that both define what a substance is and explain its various accidental features. Thus, he says, "'tis past doubt, there must be some real constitution on which any collection of simple ideas co-existing must depend."[d] To have scientific knowledge of the natural world, then, would be to grasp these ultimate causal principles. But Locke completely rejects our ability to do any such thing: "we in vain pretend to range things into sorts, and dispose them into certain classes, under names, by their real essences, that are so far from our discovery or comprehension."[e] Our conventional groupings of things into kinds—what he calls their *nominal essences*—have little connection to the actual distribution of real essences.

If Locke's view of real essences had been merely skeptical, then not much would have followed for the Aristotelian idea of *scientia*. After all, even for the Aristotelians, the essences of things are merely an ideal goal of inquiry. But Locke's account implies that essences are a false ideal—that we do not live in a world that clusters so neatly into kinds, and that what clusters there are may not reflect any deep metaphysical structure. At this point Locke might have articulated some other epistemic ideal, which is in effect what both Descartes and Newton did, albeit in very different ways, as we will see later today and next week. Instead Locke despairs of our achieving anything that would count as an epistemic ideal. Science, for him, is the epistemic ideal, and to possess it would be to grasp the real essences of things and to understand why those essences give rise to the various qualities and operations that we observe in the world around us. Yet, because of the "darkness we are involved in," such "connections and dependencies [are] not discoverable in our ideas." Accordingly, "we are so far from being able to comprehend the whole nature of the universe, and all the things contained in it, that we are not

[a] *De corpore* 6.13. [b] Chapter Two, p. 41. [c] *Essay* IV.3.29.
[d] III.3.15. [e] III.6.9.

capable of a philosophical knowledge of the bodies that are about us, and make a part of us."[a] In part he blames the world for not having a structure that is readily discernible, and in part he blames our cognitive faculties: "the weakness of our faculties in this state of mediocrity . . . makes me suspect that natural philosophy is not capable of being made a science."[b] Locke is enthusiastic about the achievements of a few contemporaries: he describes himself as living "in an age that produces such masters as the great Huygenius, and the incomparable Mr. Newton."[c] But, by Locke's standards, even work such as this falls short of the ideal. We can see what that epistemic ideal is, Locke thinks, and we can see its unattainability.[13]

Hobbes and Locke stand at the brink of post-scholastic epistemology. Having rejecting Aristotelian metaphysics, they are unable to engage in the epistemic program that Aristotle had described. Yet, even so, they continue to accept that program as an ideal, insofar as they accept that genuine knowledge or science would require a grasp of the ultimate causes of things. That they hold such a view is really no surprise, because they thus follow the virtually unanimous verdict of the philosophical tradition. We have seen how the causal requirement appears in Aristotle's canonical definition of *epistēmē*. Indeed, Aristotle remarks that "study of the reason why is what reigns supreme in knowledge."[d] From antiquity through the Middle Ages and well into the seventeenth century, this requirement gets taken for granted. Plato had spoken of the need to grasp the "legitimate cause and reason" of natural phenomena.[e] From Peter Abelard to Pierre Gassendi, authors invoke Vergil: "Happy is he who has been able to grasp the causes of things."[f] When Aquinas comments on Aristotle's definition, he first insists that *scientia* is perfect cognition, then adds that "one who has *scientia*, if he is cognizing perfectly, must cognize the cause of the thing of which he has *scientia*."[g] Throughout the sixteenth century, and even among many of the most anti-Aristotelian seventeenth-century authors, this ideal remained firmly in place. Francis Bacon offers the epigram that "to know [*scire*] truly is to know through causes."[h] On these grounds Descartes criticizes Galileo's crowning masterpiece, the *Two New Sciences*: "without having considered the first causes of nature, he [Galileo] has searched only for the reasons beyond various particular effects, and so has built without any foundation."[i] [14]

Hobbes and Locke both follow this traditional conception of the epistemic ideal, but with the crucial difference that neither thinks that we can satisfy this ideal, not even in principle. What drove them to this conclusion was not some sort of generalized skeptical crisis or broad scruples over causality. Rather they came to have doubts of a much more specific kind, regarding Aristotelian essentialism. That doubts over essence should lead to despair over causal understanding may be surprising, but in fact it is a characteristic feature of late scholastic Aristotelianism to think of *causal* explanation almost exclusively in terms of grasping the *essences* of things. Strictly speaking, to be sure, the causal demand applies to all four Aristotelian causes: not just to the "internal" causes, material and formal, but also to the "external" causes, efficient and final. But scholastic philosophy put little weight on efficient causes as explanatorily significant and treated matter as

[a] IV.3.29. [b] IV.12.10. [c] *Essay* epistle.
[d] *Post. An.* I.14, 79[a]24. [e] *Timaeus* 28a.
[f] Abelard, *Logica "Nostrorum,"* pp. 505–6; Gassendi, *Syntagma* II.I.4.1 (I: 283a)—both quoting Vergil, *Georgics* ii.490.
[g] *Comm. Post. an.* I.4, n. 5. [h] *Novum organum* II.2. [i] To Mersenne, 1638 (II: 380).

simply the enduring background frame over which change occurred. Moreover, despite the famous controversy that surrounds final causes, in truth these too were rarely given much weight in scholastic natural philosophy. The governing program, instead, was to understand a thing's inner nature—its essential qualities and, above all, the substantial form that gave a substance its coherence and enduring character. Thus Henry Oldenburg, first secretary of the Royal Society, blamed substantial forms for having single-handedly "stopped the progress of true philosophy."[a] Even if formal causes were just one of the four scholastic types of causes, they still dominated theoretical inquiry, quite overshadowing material, efficient, and final explanations. Such an attitude endures even in Pierre Gassendi, who betrays his basically scholastic outlook on explanation when he remarks that "not much work needs to be expended on grasping the external causes, which experience itself and the senses reveal at once. The difficulty lies with the internal causes. Those who investigate these are rightly said to be searching deep into the secrets of nature."[b] For Gassendi, this characteristically scholastic program could still be carried forward within the atomistic Epicurean framework, shorn of Aristotelian forms. But when later seventeenth-century authors came to have fundamental doubts about essential explanations, the whole program came to seem a false ideal.[15]

And here is where things get really interesting. Hobbes and Locke have a traditional conception of the epistemic ideal and propose reserving the Latinate English word 'science' to pick this ideal out. If this usage had stood, it would have condemned "science" to a marginal existence, as the sort of knowledge we might imagine in our dreams of the life to come. We could praise the efforts of Newton and others for their practical benefits, but not for having attained the level of science. As Locke puts it, "how far soever humane industry may advance useful and experimental philosophy in physical things, scientifical will still be out of our reach."[c] What in fact happened, however, is that the great seventeenth-century figures whom we now think of as scientists, rather than despairing of success or reconciling themselves to mere practical benefit, articulated a new, post-Aristotelian conception of the epistemic ideal, one that relinquished the goal of causal understanding grounded in a grasp of essences. This is the next stage in our story.

Trading Depth for Precision

The history of modern science's turn away from causal explanation has been told many times and been much disputed, but it can be understood somewhat more clearly in light of the historical background we have been surveying. A key transitional figure is Galileo. In his third letter on sunspots (1612), he writes that "in our speculating we either seek to penetrate the true and internal essence of natural substances, or content ourselves with a knowledge of some of their properties [*affezioni*]." He goes on to set aside the ideal of grasping essences, judging it impossible for us to have such knowledge, and in its place he extols inquiry into the mere properties of both earthly and celestial phenomena: "location, motion, shape, size, opacity, mutability, generation, and dissolution."[d] On its face, this is not so far from what we have seen Hobbes and Locke later say, but what is

[a] *Correspondence* III: 67. [b] *Syntagma* II.1.4.1 (I: 284a).
[c] *Essay* IV.3.26. [d] *Discoveries*, p. 123 (*Opere* V: 187–8).

new here is Galileo's enthusiasm for a method that simply lets go of the old ideal. It is not that Galileo denies the desirability of understanding the causes of the phenomena under investigation. Indeed, one can sometimes find him speaking of such knowledge as his goal, and even boldly claiming to have achieved it. What motivates his new attitude, then, is neither metaphysical scruples over causation nor any principled methodological hostility toward causal explanation. Instead, his complaint is that philosophy has pitched its ideal at the wrong level, not because causal explanation is not desirable but because, in many domains, such explanations are not to be reasonably expected. As he remarks of his theory of comets in *The Assayer*:

> I should not be condemned for being unable to determine precisely the way in which comets are produced, especially in view of the fact that I have never boasted that I could do this, knowing that they may originate in some manner that is far beyond our power of imagination.[a]

Philosophy is damaged, Galileo thinks, by demanding a goal that, often, cannot be achieved. Instead of pushing ourselves into speculation over causes we cannot understand, we should celebrate our ability to grasp the "properties" of bodies and the rules that govern them.[16]

In effect, Galileo is urging a recalibration of our epistemic ideal. This approach would go on to find its most illustrious proponent in Isaac Newton. In a famous query from the *Opticks* (Latin edition of 1706), he writes:

> To tell us that every species of things is endowed with an occult specific quality by which it acts and produces manifest effects is to tell us nothing. But to derive two or three general principles of motion from phenomena, and afterwards to tell us how the properties and actions of all corporeal things follow from those manifest principles, would be a very great step in philosophy, though the causes of those principles were not yet discovered; and therefore I scruple not to propose the principles of motion above mentioned, they being of very general extent, and leave their causes to be found out.[b]

It would be hard to overstate the dramatic shift that this method represents, when contrasted with the prevailing approach of the Aristotelians. Aristotle had begun his *Physics* with the injunction to seek causes:

> When the objects of an inquiry, in any department, have principles, causes, or elements, it is through acquaintance with these that knowledge [*eidenai*] and understanding [*epistasthai*] is attained. For we do not think that we know [*gignōskein*] a thing until we are acquainted with its primary causes or first principles, and have carried our analysis as far as its elements.[c]

The contrast is striking. The expectation Aristotle had announced with the very first words of his treatise would set the agenda in natural philosophy for two millennia. With Newton, that agenda collapses. The "two or three general principles" that he offers make no claim to take us all the way to Aristotle's "primary causes or first principles"; instead they merely describe "the phenomena."

Do Galileo and Newton truly renounce the search for causes? Sometimes they talk in this way, but elsewhere they seem to be still searching. Their attitudes become clearer when we think in terms of epistemic ideals. Neither author believes that a grasp of

[a] *Discoveries*, p. 258 (*Opere* VI: 281).
[b] *Opticks*, query 31, pp. 401–2.
[c] *Physics* I.1, 184[a]10–14.

causes is to be despised. *Everyone* would ideally wish to have such knowledge, if it were available. Nor is their point merely that such knowledge is not forthcoming any time soon. *Everyone*, even the most doctrinaire scholastics, acknowledges that much. Instead, what is new here is an enthusiasm for a new research project, one that neither resorts to fanciful causal speculation nor wallows in skeptical resignation. In part, what is new is the insight that there is quite a lot of work to be done in framing general principles to account for the phenomena. But of equal importance is the further thought that such work is a worthy end of inquiry. Galileo's *Two New Sciences* (1638), from the end of his career, remarks:

> The present does not seem to me to be an opportune time to enter into the investigation of the causes of the acceleration of natural motion, concerning which various philosophers have produced various opinions . . . Such fantasies, and others like them, would have to be examined and resolved, with little gain. For the present it suffices our Author that we understand him to want us to investigate and demonstrate some attributes [*passioni*] of a motion so accelerated (whatever be the cause of its acceleration).[a]

What Galileo is accomplishing "suffices," as he puts it, for present purposes. This is a normative claim about what human beings ought to be doing—indeed, what their "Author," God, wants them to be doing—by way of understanding the world around them. In the next life our aspirations can be higher. But, for now, in many domains, this is the appropriate normative ideal. Newton speaks in strikingly similar ways in the second edition of the *Principia* (1713). Famously abjuring the temptation to "feign hypotheses," he writes that "it is enough that gravity really exists and acts according to the laws that we have set forth and is sufficient to explain all the motions of the heavenly bodies and of our sea."[b] "It is enough," Newton says, not because there would be no value in learning more, but because in this life, with respect to much of the world around us, this is what we are capable of.[17]

For Newton in particular, an important part of what leads him to regard his approach as worthy of the appellation 'science' is that he sets for himself an alternative epistemic ideal, that of *precision*. In effect, what Newton gives up in speculative depth he compensates for through the precise accuracy of his mathematical methods. His brief preface to the *Principia* gives pride of place to this quest for accuracy: "Anyone who works with less accuracy is a less perfect mechanic, and anyone who could work with perfect accuracy would be the most perfect mechanic of all."[c] As an ideal, this is not wholly new. Plato had put considerable weight on the need for an *epistēmē* to be precise, and Aristotle, too, had spoken of this desideratum in various places. But Aristotle had expected full precision to be possible only in mathematics: "the precise reasoning of mathematics is not to be demanded in all cases, but only in the case of things that have no matter. Therefore its method is not that of natural science."[d] For Newton, in contrast, the ideal is one that can be insisted on across the sciences. If the natural sciences fail to be precise, "the errors belong not to the art, but to its practitioners."[e] Even in the formerly second-rate mechanical sciences, Newton thinks, the highest ideal can be achieved. In place of philosophical depth, he offers the precision of mathematics.

[a] Third Day, pp. 158–9 trans. (*Opere* VIII: 202). [b] *Principia*, General Scholium, p. 943 trans.
[c] *Principia*, Preface, p. 381 trans. [d] *Metaph.* II.3, 995[a]15–16. [e] *Principia*, Preface, p. 381 trans.

This transposition of ideals is not coincidental. Scholastic philosophers went deep into identifying the substantial forms and elemental qualities that ground the natural world, but in so doing they made precision impossible, because they had postulated the existence of entities they were unable to characterize in any sort of accurate detail. In this respect one might say that their method in natural philosophy recapitulated their theology, where they likewise postulated ultimate entities (God and angels) about which very little could be said with any precision. For Newton, as a natural philosopher, to postulate such hidden principles is (as above) "to tell us nothing" (though famously, when it came to theology, Newton took a much more indulgent view). Inevitably, there is a trade-off here. We can seek precision about what lies close to the surface; or we can aspire, inchoately, to the murky depths. For us, just as much as for Newton and his scholastic predecessors, the goal of a fully precise account that goes all the way down remains a distant, merely absolute ideal. When it comes to the sort of ideal that might have normative force for our epistemic practices, we have to make a choice between the competing ideals of depth and precision.[18]

By the early eighteenth century it was clear that Galileo and Newton would carry the day, and the term 'science' would eventually come to be associated with the modes of inquiry they pursued rather than with the remote absolute ideal to which Hobbes and Locke had attached it. So, as the story goes, modern science is born. We rightly celebrate this development for the way it saved science from the limitations of speculative metaphysics, and we rightly see Galileo and Newton as its founding figures. If, in comparison, one reads William Gilbert's *De magnete* (1600), it is clear that *something* importantly new is happening. In place of armchair speculation, there is a striking emphasis on observation grounded in experiment. But Gilbert's conclusions in the end still strike a modern reader as something of an embarrassment, because he persists in taking as his ideal an account of the underlying causal explanation for magnetism; and, to satisfy that desideratum, he can do no better than to propose that magnets possess a soul. Similar complaints might be made—and were constantly made—about many stretches of Descartes's scientific writing: even if his explanations are wholly mechanical, still those explanations serve as the vehicle for speculative causal explanation. No wonder that (as we have seen) Descartes found Galileo's method so alien.

Yet, though we may admire the modern renunciation of causal depth and the precision that such a renunciation makes possible, it must be said that it exacts a price. For every Gilbert and Descartes whose work might have been improved as a result of less metaphysical speculation and more attention to precise data, we can cite in contrast a figure whose abjuration of explanation leads to absurdity. Consider Joseph Glanvill. In his *Vanity of Dogmatizing* (1661), he takes up the great question of why anointing a weapon helps cure the wound that the weapon had previously inflicted. Having learned from his peers at the Royal Society how science is to be done, Glanvill magisterially declines to frame hypotheses. "It is enough for me that *de facto* there is such an intercourse between the magnetic unguent and the vulnerated body, and I need not be solicitous of the cause."[a] Here, one may protest, we have neither explanatory depth nor precision. Sometimes the new method was clearly not "enough."[19]

[a] *Vanity of Dogmatizing* ch. 21, p. 208.

Even so, carried along by its successes, post-scholastic science made a virtue out of resignation. Locke had thought that the lesson of post-scholastic philosophy was that natural science is impossible, which is to say that, in the domain of nature, human beings simply cannot achieve their epistemic ideal. Events would develop otherwise, however, not by showing Locke to be wrong about what we are capable of, and not by reframing science as a nonideal discipline, but instead by reconceiving the ideal. Inspired by the brilliant examples of Galileo and Newton, natural philosophers by and large embraced a diminution of ambitions. They did so, in general, without any sense of having succumbed to skepticism, or even without any sense of having dethroned science from its traditional status as the ultimate goal of inquiry. By the time of David Hume's *Treatise of Human Nature* (1739), 'science' and 'knowledge' had so parted ways that, even while Hume judges knowledge to be largely unattainable, he takes science as the governing ambition of the whole project: "In pretending therefore to explain the principles of human nature, we in effect propose a complete system of the sciences, built on a foundation almost entirely new, and the only one upon which they can stand with any security."[a] Within this new framework science could carry on, radically transformed from the *epistēmē* of Aristotle or the *scientia* of the scholastics but still heir to those notions, inasmuch as science remained the normative goal of inquiry, the epistemic ideal to which human beings might aspire. So the scientific revolution begins from a revolution in our cognitive expectations.[20]

Epistemology in the Ascendant

If this was to be the fate of science, then where does it leave philosophy? Next week we will consider how, by the end of the seventeenth century, philosophers began to reconceptualize knowledge in response to a rising interest in probability. But even before looking into the changing fortunes of that concept, we are in a position here to consider the fate of epistemology in the modern era. The rise of modern science stripped philosophy of a large part of its traditional core, those fields once known as *natural philosophy* but now rechristened as *science*. Shorn of the new sciences, philosophy faced a choice. On the one hand, it could turn its back on the new scientific ideals, or at least insist on its autonomy in relation to science. In that case philosophy might continue its pursuit of deep causal explanations, not as a chapter of science but as metaphysics. Leibniz is the shining early example of this sort of approach, and his efforts at a metaphysics that could transcend natural philosophy would shape German philosophy through Kant and beyond. On the other hand, philosophy might embrace the new scientific conception of the epistemic ideal, and hence begin to assume a similar modesty regarding conjectural causal explanations. The early champion of this approach, which sets itself against the speculative metaphysics of the scholastics, was Locke. In one of his most familiar passages, he pronounced it "ambition enough to be employed as an under-labourer in clearing ground a little, and removing some of the rubbish that lies in the way to knowledge." Again, it is "enough" to do this, not because more would not be better, but because this is the most we should suppose possible. The ambition to do

[a] *Treatise*, Introduction, p. xvi. On Hume's skepticism, see Lecture Six.

more has made philosophy hitherto, in Locke's biting words, "the sanctuary of vanity and ignorance."[a]

With this dilemma in mind, we can return to the question with which I began this lecture. Why is it that epistemology—after so many centuries of not being a discrete subject at all—has now become a foundational subject within philosophy? The answer is that we have followed Locke's path through the dilemma, inasmuch as philosophers in the Anglo-American tradition have largely deferred to science on questions of what the world is like and why. Thus the dominant philosophical tendency for three hundred years, at least in the English language, has been to concentrate on those subjects that once comprised logic in its broad traditional sense: the study of knowledge, language, and patterns of inference. In place of explanatory depth, philosophy has come to prize, above all else, precision. As the young Wittgenstein wrote, "[t]he aim of philosophy is the logical clarification of thoughts . . . Philosophy should take the thoughts that are otherwise cloudy and blurred, as it were, and make them clear, giving them sharp boundaries."[b] Once subservient to theology—the reigning medieval project of understanding the ultimate reasons why—modern philosophy has made itself handmaid, underlaborer, actuarial clerk to the scientist. As Voltaire, under the sway of the new English method, succinctly put it, "[p]hilosophy consists in stopping when the torch of science fails us."[c] So it has been, more or less, through Hume and Whewell, Mill and Moore, Davidson, Dummett, and Quine.

Except that, in recent years, there have been signs of change. Although long accustomed to the diminished Newtonian ideal of precision over explanatory force, philosophers of the past several decades have been increasingly unwilling to embrace their supporting role in that enterprise. Wittgenstein himself exemplifies one path of resistance, when in his later works he calls into question his youthful aspirations to logical precision: "we eliminate misunderstandings by making our expressions more exact; but now it can look as if we are moving towards a particular state, a state of complete exactness; and as if this were the real goal of our investigation."[d] The main line of Anglo-American development, however, has been not to challenge the ambition of scientific precision, but rather to disavow the metaphysical resignation of earlier generations. And so in recent years there has been a recrudescence of speculative metaphysics, which has again become the central philosophical topic of our day. In keeping with this trend, historians of philosophy have increasingly found themselves drawn not to Locke and Hume, but to the metaphysically more adventuresome work of Spinoza and Leibniz, and even to the medieval metaphysics that Hume had long ago consigned to the flames.

Predictably, as philosophers have returned to their speculative enthusiasms of old, scientists have begun to complain in an increasingly acerbic voice. Stephen Hawking declares that "philosophy is dead."[e] Freeman Dyson, reviewing a book on that most ambitiously philosophical question of all—*Why is there something rather than nothing?*—calls philosophy today "a toothless relic of past glories."[f] Why such belligerence? For as long as philosophy played its subsidiary role, content to serve as handmaid to the

[a] *Essay* epistle, p. 10. [b] *Tractatus* 4.112.
[c] *Philosophical Dictionary*, "Soul," VI: 168. [d] *Philosophical Investigations* I.91.
[e] Hawking and Mlodinow, *Grand Design*, p. 5. [f] "What Can You Really Know?"

restrained ideals of modern science, the scientists have been willing to tolerate the philosopher's ancient pretensions to wisdom. But if the philosophers are not going to abide by the old Newtonian code of resignation—if they are going to frame hypotheses about reality in all its depths—then it becomes necessary for the real lovers of wisdom, with their laboratories and government grants, to speak out against these pretenders. The philosopher, having given birth to and fostered the various sciences, is now sent off into the woods to die, yielding her lectureship and office space to worthier academic enterprises.

But perhaps we need not rush quite yet to throw up barricades between the arts quad and the science towers. The history of philosophy has its consolations, one of which is a vivid awareness of the way in which, in one form or another, this power struggle between science and philosophy is nothing new. Going back to antiquity, champions of an austerely empirical conception of inquiry have battled against proponents of a speculative rationalism. So it was between Plato and his unspeakable rivals, the Presocratic atomists; so it was between Newton and Leibniz. At issue, I have been arguing, is the nature of our epistemic ideals. What sorts of demands do we make of ourselves as we investigate the world around us? An answer to this question depends in turn on still deeper puzzles about what this world is like. If we suppose that all there is is particles in motion, subject to forces of various sorts, then the great task of speculative inquiry must be to measure those forces as accurately as possible. But what if there is more to the world than this? What if we live in a world with beings whose agency runs beyond anything hitherto imagined by science? What if these beings are sensitive to values that cannot be weighed in any laboratory? Who, then, will measure these things, and how much precision may we demand? Of course, these glimmers of transcendence are perhaps just illusions, destined to be assimilated to the ever-growing reductive empire of science. Yet who will decide when that reduction has succeeded? How will we know?[21]