Chapter 3:

Belief and Knowledge

The problem of knowledge:

Our beliefs are not held individually. We hold our beliefs as part of a collective whole. There are some key beliefs that guide or constrain the rest. Those deeply held beliefs cannot be abandoned outright without a suspicion that there is something wrong with some of our other, supporting beliefs. The core beliefs in this web of beliefs are the ones that organize the rest. People do not easily give these up. The beliefs on the periphery of our system can be abandoned without a great deal of effort, and we abandon these beliefs when we find out they are incorrect. They are not closely linked to core beliefs. There are beliefs that we will abandon when we recognize that there is some good evidence supporting another conflicting belief, or a sound counterexample to our belief. If one is to learn anything at all, one must be open to evidences. If our core beliefs reject good kinds of evidences, we may be holding false beliefs at our very core.

For example, if our core belief tells us that only one document written by people, no matter what influence they were under or guidance they had, is the sole route to truth, then truths that may be learned by other means, or evidences gathered by the instruments of science may immediately be held suspect. This is often though not uniformly true for religious thinking. People whose core beliefs center around the necessity of trusting a holy book must therefore reject evidence that seems to disagree with that book, whether in fact their interpretation of that book is a good one or not. If the book speaks truth, then one's interpretation must be held suspect.

Likewise, those whose core beliefs are generally skeptical of ancient wisdom, literature, and tradition may fail to take into account the lasting traditions that have proven true over the ages. History has a way of weeding out beliefs that don't stand the test of time. But beliefs that hold true in a long variety of cultures, that stand up to persistent scrutiny and tests, should at least be acknowledged. Principles like the Golden Rule have stood the test of time and have been embedded in a wide variety of cultures even though the various expressions of the Golden Rule have often been derived independently of each other. The likelihood that the Golden Rule is true, or at least must be a functional part of a necessary human worldview, is therefore substantial.

The failure of a variety of worldviews like Marxism,[83] that eliminated moral values from its core principles, is due partly to the abandonment of historically persistent values like the Golden Rule. Often, the reduction of reality to purely material forces leaves the ethical dimension of human behavior to chance and individual preference, again relying on variable and contradictory base instincts to decide how to act. Even though the theoretical disposition of those who reject traditional wisdom may have fair reasons, taking this mode as a universal rule would require civilizations to remake themselves each generation. In the twentieth, and previous centuries, a variety of those experiments failed. Suffice it to say that the best civilizations do not ignore the lessons of the past, and history is a good educator, and provides good data for modern thought. That is true for the individual as well as society in general.

There is something about the nature of truth in human apprehension that leaves space for doubt of things that may not be true. So, an individual who holds a questionable belief, no matter how securely, will always be faced with the possibility that their belief is a misapprehension of

[83] Do not make the mistake of rejecting everything Karl Marx and Friedrich Engels said. Their analysis of nineteenth-century Western civilization is a useful critique of problematic movements, and injustices. What this author calls into question is their recommendation of how to reform our behavior.

reality. For people, who often thrive on the certainty of their beliefs, this room for doubt causes disturbance to their psychological feeling of certainty. Just because we are certain, does not mean that what we believe is true. Certainty is a psychological disposition to believe something. It is not the world of evidences, or the reasoning that ties those evidences together. For that we need a formal theory of knowledge.

The Western theories of knowledge below represent a substantial variety that are also in different language supported in a variety of non-western cultures, especially the sub-continent of India whose language and specific extrapolations of a similar variety, though different, can be mapped closely to Western structures.[84] Mastering both Indian and Western philosophy is not the purpose of this course, and this author is not sufficiently versed in Indian philosophical thinking to use it to illustrate the philosophical problems addressed here. And since Western philosophy has a clear lineage and a structure of logic now adopted by the whole world because of its integration with science and mathematics, this author uses the model of Western philosophy. But this use does not exclude any particular variety of non-Western philosophic stream.

Theories of knowledge:

Here we will discuss a variety of general theories of knowledge, Skepticism, Rationalism, Empiricism, Phenomenology, Foundationalism, A Holistic Movement.

Skepticism

[84] The long view of Vedic philosophies and their critiques, and the varieties of philosophical structures arising independently of the West still fix their views on God, the world, the self, ethics, politics, history, and science. Their solutions vary from those in the West, but their language and philosophy similarly address the same general objects. The mastery of Indian philosophy is perhaps a more arduous task than mastering Western philosophy, but no less sophisticated or comprehensive. Modern Indian philosophers and thinkers in other nations are well-enough versed in Western systems to comprehend the philosophical problems addressed here, and the student will not be at a disadvantage anywhere in the world if they are introduced to these problems through a Western view.

Skepticism may be thought a curious mode of thinking to begin theories of knowledge with. However, being the most spare and cautious theory of belief, the best form of skepticism includes both the tools of criticism for claims of knowledge and a rule for the adoption of belief that has the hallmarks of testability and reliability. This section begins with the most extreme form of skepticism, and moves to a moderate and useful form.

The most extreme form of skepticism comes from a Greek school dated the first century BCE and is named for a thinker of the fourth century BCE, Pyrrho. Pyrrhic skepticism doubts the possibility of knowledge beyond what is immediately available to the senses. Any concatenation of memories (Aristotle, *Metaphysics*) that would form knowledge in a person is rejected. Any statement of universals is rejected. No cautious adoption of theories is admitted. Pyrrho is said to have divided those who practice skepticism into "those who are *ephectic* (a 'suspension of judgment'), *zetetic* ('engaged in seeking'), or *aporetic* ('engaged in refutation')."[85] The attitudes in general admit to no absolutes, no certainties. It is easy to see how one could not build a theory of knowledge on these terms. But the tools are instrumental. Put to the service of a more moderate critique, these tools can be useful for tests of the reliability of knowledge claims.

A modern form of Pyrrhic skepticism from the philosopher Hillary Putnam is a challenge to the very foundations of human belief. Outside of the obvious humor this view elicits, there are serious questions this view brings up. This view can be stated this way: "We don't know that we are not brains in a vat being fed the data of sensation by an evil genius. Our world is a simulation. The people we know are either artificial constructs or other brains in a vat." Other more modern variations imply that we are mere signals in a computer simulation. These themes

[85] Pulleyn, William (1830). *The Etymological Compendium, Or, Portfolio of Origins and Inventions*. T. Tegg. p. 353. Referenced from Wikipedia.org. <https://en.wikipedia.org/wiki/Pyrrho>, accessed 25 June, 2016.

might seem preposterous at first, but a variety of movies have been made that make this account plausible, at least in a science fiction way. We can imagine a scenario where humans are not really in control of their world, where everything we sense and believe is a construct of some external intelligence. What this form of skepticism relies on is that not even our senses are reliable enough to trust. How then can we trust the more subtle and energetic products of the mind like theories of our existence or evaluations of what our reality is like?

This version of skepticism brings up a set of problems that are not really distant from some forms of belief. A belief that our fate is predetermined falls into this category of skepticism. If we think that it is not possible to express true freedom, all our choices are preprogrammed. Our freedom is only an appearance of freedom, and reality takes on a quality of this form of skepticism. It is a common predisposition of some to think that nothing they can do will change their future from what it is programmed to be. This is a form of fatalism.

Another form this skepticism takes is modeled in a variety of theological views. Those views suggest that god[86] has already seen the whole future, and therefore knows those who truly believe and those who don't. In that sense god's knowledge of the future can't be changed, and therefore, no choice people make as believers will change what god knows to be true. In that sense all of our futures have been predetermined. In this case it is god that is the evil genius who holds us in thrall to his absolute and undeniable will.

The non-spiritual or non-theistic skeptical form like this is modeled in a view called determinism. It was precisely this form that was the object of criticism that brought up the brain in a vat illustration in the first place. This view relies on a belief that every effect in the world

[86] The word god here is intentionally lower case, because though this view is a commonly held one, the transcendent God of the Bible in relation to free people is excluded. The god in this case is not the Almighty.

has a cause. Every cause can, in theory be traced back to some prior material cause all the way back to the beginning of the universe. This view assumes that though we don't understand causality, it must be logically true that every event, every occurrence in the world has a prior cause. Each event must be explicable in terms of the rules that brought it into being and each cause contains the effective machinery to bring each effect into being. So, from simplest to most complicated, all organization arises from the rules invested in the original causes and can be derived from them. Therefore no freedom really exists. Like the religious version, if every choice I have is derived from prior causes, then choice is only an illusion. If by genetic inheritance, and training I have been programmed then my choices are the result of those things. There is no independent, libertarian freedom, legitimate choices made by morally responsible individuals.

If people are criminals, it is because they were determined by their genetics and training to be criminals. This view was expressed by Thomas Dewey in the early twentieth century. If people are good, then it is because their genetics and training made them so. Choices to be good or choices to be bad are not morally good or reprehensible, and people should not be rewarded or punished for behaviors from those choices. In this case the evil intelligence behind the brains in vats are and have always been the laws of nature, and the logic that makes up the relationship we have with the natural world.

Pyrrhonism, fatalism, determinism, and theological versions of the same are forms of skepticism that do not deny our ability to make theories of knowledge, but they do preclude legitimate exercise of freedom. I am sure this is not an entirely acceptable result for our efforts. To discover that there is nothing we can do to improve our circumstances, nothing we can do to change what must be our futures, that our inevitable demise or success is preprogrammed into the universe by gods or material causes leaving the meaning of life inaccessible. The intuitions

arising from this result are repugnant to any fair free rationality. A rigid and unfree forced mechanical nature leaves one without either responsibility for their actions or reward for their efforts. But this doesn't seem to be the real world we live in, even though it has foundations in plausible religious, philosophic, and scientific worldviews.

In this view we do have knowledge, and we do have freedom. That seems to be the lesson of reality. It serves no purpose to doubt the very ground of our existence, and anyway would it make any difference if the world were indistinguishable from one that was run by an evil genius? No, it really would not. We have no access either to first causes, or to a God's-eye view, or anything that would give us absolutely secure access to the future state either of ourselves or the universe. The skeptical exercise above doesn't give us a world different from the world we already live in as we continue the movement of human knowledge and human freedom into the future.

What then is skepticism useful for? Given that we really can know some things, what part can skepticism play that will ensure that what we know is reliable? Of all the forms of skepticism, there is only one that serves a useful function. At the start, skepticism is a view about the untrustworthiness of knowledge in general. It is a challenge to claims of any knowledge at all. But this can't possibly be the whole truth about knowledge. Sometimes, and even often our systems of knowledge are reliable. The best form of skepticism becomes a test of the **justifications** for our knowledge. Let's look at a few examples and see how this version of skepticism might work.

Suppose, as has happened in the past, someone came to the police and accused a person of witchcraft. Their justification was that they had a dream where some woman cursed a person and that person died as a result. This is an explanation that served in Europe and Colonial

America to hang people for witchcraft. But is this a good enough reason to deprive a person of their life? In the era called the Age of Reason,[87] Europeans and Americans began a skeptical challenge to justifications like dreams that used to serve as reasons for exacting justice. The thinkers of that age required better evidence, observable evidence to convict a person of a crime. And every punishment should correspond to the severity of a crime. Dreaming, as has been noted by many, is an insufficient justification for prosecution in the absence of more substantial evidence, empirical evidence, forensic evidence.

As has been mentioned before, in the early seventeenth century Galileo Galilei, an expert craftsman and experimentalist, decisively proved that Aristotle's assertion about falling bodies was false. Having the temerity to challenge the prevailing dogma is one of the marks of a skeptical worldview. However, as in the case of those who still insist that the earth is the center of our planetary system, skepticism is often misused. It is not enough to doubt, but one must have good grounds to reject the common wisdom, evidence of other kinds, superior evidence. Rationalism, Empiricism, and Phenomenology as modes of knowing offer a response for irresponsible skepticism.

Rationalism

In Chapter 1 I mentioned Francis Bacon and the four idols. We are going to discuss some modern theories of knowledge, partially by contrast to those idols. Modern theories of knowledge often have a scientific and logical character. And even though there are limitations that prevent any absolute expressions, these theories of knowledge advance our understand of the

[87] The era called the Age of Reason in the West is marked by the European Renaissance from the fourteenth through the seventeenth centuries to the Enlightenment era near the beginning of the nineteenth century. This included Church reforms, and the rise of education, science, and mathematics. It was also marked by civil and world wars, overturning many ancient monarchies and instituting constitutional reforms through Europe.

real world in remarkable ways. First of all we will look at a thinker from the seventeenth century, René Descartes.[88] His theory of knowledge was advanced by a method that can be used today. Though there are limitations to his method, and some of the conclusions he reached have serious problems, it would be a mistake not to understand what he did and why he did it. His theory is today categorized under the heading of **rationalism**.

Rationalism begins with the mind as a starting point. The only certain conclusions to questions about reality are those which the mind itself generates. Observation of the real world are of necessity second-hand information, unreliable in and of themselves. We filter those experiences through our senses and gain ideas in our mind as a result. What is from our mind itself is direct evidence. Logic and mathematics alone carry the weight of truth for any evaluation of the real world.

Descartes' experiment took place something like this. He understood that our observations can be wrong in a variety of ways and he decided, as an experiment, not to trust them. What then are we supposed to base our beliefs on, and how can we tell if our observations are correct or not. Descartes started his exercise with what we would call *instrumental doubt*. This doubt is nothing like doubting that the world or knowledge exists, but rather, anything he could not be certain about should not be counted as a foundation for knowledge. Rather, if something was doubtful, he would reject it as evidence. So, he rejected the evidence of his senses because the senses were not always reliable. Sometimes we feel hot, when it is not really hot in the room. Sometimes people see things that turn out to be something else. Descartes was not able to say with certainty whether he was dreaming or not. This doesn't happen often, but often

[88] Bio and information about René Descartes <https://en.wikipedia.org/wiki/René_Descartes>.

enough to make him question his judgment. So Descartes rejected the senses as a foundation because they were unreliable. He couldn't trust his senses to always tell the truth.

The next thing he did was to call into question the beliefs he took for granted. For instance, though he really did believe in God, and later in his meditations he gave reasons that were compelling for him why that was so, he first called that belief into doubt. He suggested rather, that instead of God, the whole world may be under control of an evil demon[89] of some kind. Nothing would appear different, but the reasons for the appearance of the world would be entirely without purpose. In other words, the demon must be manipulating appearances so that we would not suspect its presence or activity. Descartes asked whether there would be a difference in the world whether there were an almighty God or an evil demon in charge of it. He concluded that it was not possible to tell.

So he didn't trust the world, his senses, his own perceptions, or the existence of God[90] as sufficient foundations for knowledge. What was he left with? He concluded that if none of the usual anchors to knowledge are reliable, there was one left. There was one persistent thing that never seemed to change. That is, even though everything else could be doubted, the fact that he could doubt never could be doubted. He phrased this in a variety of ways in the essays and books he wrote, but basically the idea behind it is that if he as a thinking being could not cease to think, then that must be his essential character. You may have heard the phrase, "I think therefore, I am." Here is the plain language version of Descartes' conclusion: he is certain that he is a thinking being and that certainty is the one thing he cannot doubt.

[89] This is the same evil demon mentioned in the earlier section on skepticism.
[90] It must be remarked here that René Descartes was a devoted Protestant who left for Denmark from France partially because of religious persecution.

So on top of that foundation, the solid rock of the certainty that he was a thinking being, he constructed the rest of his world. Descartes was a world-class mathematician in addition to his philosophical musings.[91] Descartes gave us four rules in order to carry out any rational work where reasoning would lead from true premises to true conclusions.

> **The first** was never to accept anything for true which I did not clearly know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgement than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt.
>
> **The second**, to divide each of the difficulties under examination into as many parts as possible, and as might be necessary for its adequate solution.
>
> **The third**, to conduct my thoughts in such order that, by commencing with objects the simplest and easiest to know, I might ascend by little and little, and, as it were, step by step, to the knowledge of the more complex; assigning in thought a certain order even to those objects which in their own nature do not stand in a relation of antecedence and sequence.
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> And **the last**, in every case to make enumerations so complete, and reviews so general, that I might be assured that nothing was omitted.[92]

[91] He invented the method of analytical geometry that we use today in all our schools, a way of reasoning about mathematics that combined geometry and algebra. We know this today as the Cartesian coordinate system. In modern algebra we often graph the results of an algebraic function in terms of an x and y coordinate system where x stands for the horizontal axis and y for the vertical axis.
[92] Descartes, René, *Discourse on Method: Part II*

The first rule has echoed down through the centuries as a rule of thumb for many seeking to create and retain the best possible justifications for their ideas. It rests on the necessity of finding those things that were presented to our minds so clearly and so distinctly that it is impossible that it could be false. It must be undoubtable. When we look at Descartes' thought experiment of instrumental doubt, where he doubted everything that was doubtful until all he had left was what he found undoubtable, we are looking at the first rule. He concluded that the only thing that was indubitable was his own thinking being.

The second rule we see as a way of reducing each problem to all its constituent parts. That is, make out of a complex problem a comprehensive list of simpler ones. The third follows from this. One must sort the new collection of simple problems into easily solvable ones and more difficult problems and solve all the simple ones first. Then one reassembles all the parts until it makes the object whole again. This is what we have called in Chapter 1 a model.

The fourth rule is what might be called a completeness rule. If one doesn't do a thorough job of accounting for all the elements, all the variables, all the objects within a problem, one can't rightly say that they have solved it.

This way of understanding the world, this sort of knowledge is called rationalism because the world is constructed not of real parts but only of the parts as we have assembled in the model. Our knowledge is not knowledge of the thing in itself, but knowledge of the rational structure of the thing. The strength of this approach is that one may understand the world in terms of these coherent structures, mathematically and logically precise, without having to appeal primarily to observations. It's never true of course that one doesn't observe the world in order to start, but understanding on rationalism's account is something in the mind, not something in the world. Such an aloof, logical, and rational view is weak because once the model is assembled, the

model often has difficulty incorporating new data without collapsing or calling into question the presuppositions under which the model was initially constructed. It is knowledge of a sort, and it works just fine within mathematics and logic, as long as there is no interference from the real world. In fact the results of rationalism are true if the premises and presuppositions are. Calling this narrowness of view to account is a Scottish thinker named David Hume.

Empiricism

Hume comes to us using a purely material form of thinking called **empiricism**. As rationalism takes its initial cues and evidences from the mind, empiricism takes its cues from the world outside. In other words, the world for the empiricist is the source of our knowledge. Our minds follow the cues and evidences of the body and the material world. The senses, though they can be deceived — Hume was never under the impression that the senses gave absolutes — are necessary for every phase of human development including reasoning. Empiricism is fundamentally different from rationalism in that it suggests the structures of the mind can only lead to a deceptive certainty. That is, reason can only give us incomplete, though perhaps logical grasp of reality. For the whole picture, the mind must access the senses. The real world in empiricism remains real while the mind only grasps the world in its outward phenomena.

For example, one cannot know from the mind itself how much energy must be released into a body of water to bring it to a boil without observing and measuring it. There is nothing logic or rationality can say before the observation takes place. One can only invent temperature scales once one knows the physical phenomena that take place in reality.

Hume also introduced to us a method of testing the causes of physical phenomena. This is extremely useful. Following is only a summary of Hume's position.[93]

[93] Taken from Sherry Diestler's *Becoming a Critical Thinker: A User-Friendly Manual*, 4th ed. (Upper Saddle

1. **X**, the cause, *preceded* **y**, the effect, in time.

2. **X** and **y** are *contiguous* (in contact with one another) in time and place.

3. There is a *history* of (1) and (2); that is, there is a history of x preceding y and of x and y being related in time and place.

Now, the explanation of this phenomenon is not simple, and the conclusion is not absolute. In fact, all this gives us is a degree of reliability, what I have called elsewhere, probability. The process used for empiricism is not **deduction** like Descartes uses in rationalism, where he has true premises, uses the rules of logic and comes up with a true conclusion, but rather an **induction** where the conclusion is only arrived at after the observation of multiple events, their probable causes, then reasoning about why that is so. This is not reasoning to certainty, but reasoning to probability.

The first rule tells us that if x is supposed to have caused y then they have to be in the same timeframe. So x cannot follow y and cannot be prior to y in a previous time. They have to be associated in time. The second rule means simply that the objects have to be touching, or that the products of x have to be affecting y. The third rule renders the cause and effect relationship more probable. In other words, if we observe x creating the effect y, over and over, that makes it more likely that y is the result of x.

River, NJ: Pearson, Prentice Hall, 2005), 128-29.

The weaknesses of empiricism show up when one wishes to make predictions about the future. Empiricism tells us about the past, but cannot strictly extend its results into the future, even though an empiricist can tell us with a fair probability what will happen in the future based on what happened in the past. But to make an absolute claim about the future would be stretching the powers of empiricism past their limits. An empiricist on Hume's account cannot tell us with certainty that the sun will rise tomorrow even though we've seen it rise thousands of times before, one day after the next. I understand this example is a caricature of an empirical view but no one is strictly either an empiricist or a rationalist. We all make judgments based on some combination of the two ways of making knowledge whether or not our method follows the strict regimen required of either rationalism or empiricism. So one can reason to the conclusion that the sun will rise tomorrow because it has done so reliably in the past. But this sort of thinking is a combination of both empiricism and rationalism.

It is also true that some forms of knowledge are more suited to rationalism and some more suited to empiricism. If you are going to perform a geological study, you can't do it from behind your desk. You have to go outside and dig around. You will need the skills of an empiricist for geology. But once that examination is done, you need to be a rationalist in order to comprehend all the data you've collected. You have to look at the data, categorize it, then make it tell its secrets by reasoning about it. But later, you need to test your theorizing by doing more digging, see if the data fits the theory, and see if the theory needs to be changed. The problems with rationalism and empiricism led in the eighteenth century to a thinker named Immanuel Kant who proposes that we take the best of both theories and combine them in one that we call phenomenology.

Phenomenology

On many accounts Immanuel Kant's thinking is the capstone to the age of reason. The rationalists on one side with Descartes, Leibniz, and Spinoza and the empiricists on the other with Locke, Berkeley, and Hume leave us with a real tangle. Kant's **phenomenology** gives us a way out of the impasse by including features of both as foundational elements. He manages to release the tangles of rationalism by forcing the acknowledgment that the world is primary to the formation of our consciousness and to the material structure of our minds. There may be nothing like the completely aloof and rationally abstracted mind Descartes favors. And to counter the empiricists, Kant favored a view that the inherent structures of the mind both organized any data we observe and categorize it in terms of presupposed or even natural predispositions of fixed structures of reality.

Kant also realized the limits of our rationality, that it is and will remain incomplete, that the very structure of our minds and of reality itself must remain a matter of faith. For Kant, God, freedom, and immortality are the basic structures that remain beyond rational proof and beyond the most vigorous data collection. These three objects define the limits of our apprehension of the physical universe and the moral law. The moral law is very important for Kant and in later chapters we will explore his version of ethics. But it may be instructive at this point to use Kant's conception of the moral law to illustrate why phenomenology is a useful way of approaching reality.

First, Kant adopted from Aristotle the concept of **categories** that give a rational structure to anything we say about the world. There is, for example, a category called *quantity* used to outline the rational apprehension of how many dates, green beans, or fish people will probably eat for the afternoon meal. "We need to catch five fish for our meal." Counting is an aspect of the category of quantity. *Quantity* is a category that we use to keep track of the number of things.

It is a rational category, something natural to our human capacities, and something that helps us get along in the world.[94] Before the philosophers, it may be that we didn't think of things in this way, but using these tools to explore the world helps us to understand our own nature and helps us to extend our worldview beyond our local associations. Beyond counting fish, quantity can help us decide whether we should keep giving money to the wayward nephew who can't seem to keep a roof over his head. You should see in that illustration how quantity becomes a moral consideration. In point of fact, it is very difficult to separate our lives into strict moral and non-moral categories.

In his moral theory, Kant used something called the **Categorical Imperative**. As a rule, he suggested we must test every proposed action as if it were to become a universal rule for all people. If the consequences of using that action in the whole race were detrimental to the bonds of society or resulted in the diminishment of individuals or groups of persons, then we shouldn't adopt that proposed rule. Think of the categorical imperative as a rule by which we judge right and wrong. It is *categorical* because it is judged on the basis of the results of the test as universal, and it is an *imperative* because it is a way for us to discover what we are obligated to do. For Kant the categories are the most universal way to talk about knowledge. And talking about knowledge is a combination of logical reasoning and grasp of the real world we live in. You can see in that simple description how this is a combination of rationalism and empiricism.

For example, Kant used the illustration of lying. He proposed a rule of action, "I will lie to the banker to get a loan that I do not intend to pay back." Using the categorical imperative I must propose a rule that any person who wants money should lie to the banker without the

[94] For the computer programmer, this may be a class whose purpose is to count, or a variable that stores numbers. For an accountant, it is a ledger.

intention of paying it back. You can almost immediately see through this simple exercise of reason, that the bankers would quickly stop loaning money on the basis of people's promises. Otherwise, banks could no longer loan money, and would go out of business. Banking as an aspect of modern society would be impossible if we all adopted the rule Kant proposed. Kant would say then that the proposed rule of lying to bankers must not be compelling because it would result in losing the conventions and businesses that generated wealth in society. If the results of universalizing this rule were counterproductive, then he concluded that lying is a thing that breaks the bonds of society even in the individual and must therefore not be permitted.

Kant explicitly said that he was trying to understand the rules of reasoning for humans just like Sir Isaac Newton understood the rules of gravity for planetary motion. Kant wished to make scientific what had been largely speculative. He was only partially successful. It turns out that Kant himself could not avoid some mistakes even while he was very successful on other accounts. He was, as we are, subject to his contemporary ethos, stuck with a culture that did not challenge some of the most basic rules of society. With most people in the world, he assented to the idea of the natural inferiority of women with respect to strength and reasoning capability. He thought their place was in the home, not involved in politics, because they were not naturally suited to the higher functions of rationality and society that men were.[95] More than a century later, after the time of Immanuel Kant, women in Great Britain, the United States, and other nations legally acquired, against much opposition, the right to vote. The world has become, on that account, in some respects, a better place for all of us because it is more consistent with our theories of truth which assert the equality of all human people.

[95] Kant, Immanuel, *Anthropology from a Pragmatic Point of View*, trans. Robert B. Louden (New York, NY: Cambridge University Press, 2006). Many in the world still think this way, though the West has slowly become acclimated to the equal role of women in society.

Even though Kant and many of those in the eighteenth century and before were incorrect about the role of women in society and their capacities as thinking persons, the system he devised was flexible enough to account for the improvement of their status.

Recap

So rationalism takes as its root the certainties of the mind, and the rest of the world is constructed within the mind on the basis of those certainties. Mathematics and logic are the natural allies of rationalism. Empiricism takes as its root, the world and secondarily our sensible observation and interaction with it as the basis for a probable understanding. Its allies are scientific instruments, and data collection. Phenomenology takes the best of both views. It starts with the world as an experience and places all the sensible data of that world in natural, rational categories. So reason, experience, and some combination of the two have become persistent modes of knowing the world and ourselves. But readers must understand that any and all of these approaches are fairly bleak as total explanations of our experience of the world. These modes of knowing may all be categorized as knowledge by reduction, that is, what we know is only a part of the whole. It may be a good and useful part, but the experience of friendship, beauty, love, redemption, and art are beyond its borders. To think that love is nothing but the chemical interaction of bodies, as some scientific theorizing has done, strips some of the most precious meaning from our lives, and lays bare the grizzly details of ordinary physical interactions. It makes mundane what is transcendent and debases the best of human feeling and accomplishment. Human value is very difficult, and maybe impossible to construct from within these three frameworks. There are versions of knowledge that do not suffer these defects, and we will explore some of those options later.

Foundationalism

I have given as a fourth category of knowledge something we will call **foundationalism**. Its character is different from the preceding three ways of knowing. It happens to be a presupposition of all of those ways, and a constituent of the aims of Enlightenment thinking. On principle, it opposes radical skepticism and assumes there is a ground for knowledge. The word itself should give you a clue about what it means. We don't build houses without some kind of foundation. We look at the land, then devise a method of making sure that when we build that house, it will not blow away in the storms that will inevitably come. For some houses, all we need is a set of stones beneath supports to hold it up. For other houses, we need a good deal of concrete, for others yet again, we drive pillars down into the earth to hit bedrock. What Descartes, Hume, and Kant all wanted to do was provide a foundation for knowledge, so that when a belief was challenged, one could defend that belief by appealing to those foundations. In other words, if the foundations are secure, then what is built on them will also be secure.

This seems reasonable, and even desirable. It would be nice if everything we believed were backed up by some absolutely certain thing. That way, everything we believe that was derived from those foundations would be secure as well. So historically, religious people, philosophers, rulers, and healers, have proposed God or gods, traditions, stories like the early cosmologies we looked at earlier, and other beliefs as foundations. Descartes offered us the certainty of our own thinking selves as a foundation. Hume offered the real world. Kant offered God, freedom, and immortality.

Once we arrive at these foundations we no longer have to prove them. But this is where the worm turns on our feeling of certainty. No two persons' views of God, reason, or the world

are identical. Who is right? My sensibility of the world is not quite the same as anybody else's. No two people reason alike or have the same kind of certainty that Descartes achieved in his meditations using instrumental doubt. The stories told of rabbis and philosophers are true. There may be three of them in a discussion but between them they've got five opinions.

There are foundations in moral evaluations like the Golden Rule, but it turns out that they are all too general to be of specific help. Doing to others what you would wish them to do for you, does not tell you what to do. You must search yourself for the answer by empathizing with the other person. The Golden Rule is more a method or heuristic than a foundation. Saying that your own reasoning is persistently true when all your observations could be mistaken does not help when you are trying to understand your observations. Saying that the world is the foundation doesn't give a person even a clue how to interpret it. And saying God or gods created or brought my thoughts into being doesn't explain god-like beings in the least, or give a logical connection to them. That's disappointing, I know. So, what's the answer? I'll give it to you, but you're not going to like it.[96]

There may be what we call absolutes, truths, existence, reality. But humans are a step away from these things. We are attached to the world, can't get unstuck, and we make a variety of predictable and capricious mistakes on our journeys. We break the very rationality that is supposed to help us along, and misinterpret the observations we so diligently take. It is as if we are on a ship out at sea and there is no port to dock in. We must live on the sea, fix the boat when it is broken, find resources, reproduce, live lives of meaning and purpose, all without the security of a home port. To make that illustration concrete, we have traditions, reason, and experience,

[96] I reference Douglas Adams' *Hitchhiker's Guide to the Galaxy* here. The answer to "life, the universe, and everything," after millions of years of cogitations by Deep Thought a great computer, was 42. My answer is more helpful than that, but not much more so.

even holy books, but making sense out of our world and our obligations in it is not a trivial rule-governed activity. We need to be creative, solve problems, redeem lost time and lost relatives, grow and prosper or suffer debasement and defeat, fix the broken things best we can and be responsible for ourselves and those who cannot be responsible for themselves. Welcome to the real world. There may be foundations, but humans will never see them clearly enough or be able to depend on them without faith, risk, and luck.

As a philosopher, realizing this has been a lifelong process. To a person who has not spent many waking hours troubling this issue, my explanation may be disappointing, and even unbelievable, but acknowledging it will save them a lot of grief and anxiety. In this, philosophy is therapeutic in the best sense. Uncertainty is part of the human condition and it is something that can't be completely eliminated. However, as the reader proceeds in life, learning where to rest, who to have confidence in, what things are true, and what natural limitations are, there will be some acceptance of the view I provide. One measure of being an adult is learning to live with this inevitable uncertainty.

What we believe, what we know, and how we learn are conditioned by our worlds, our reasonings, our cultures, and our traditions. Though everyone of us begins their journey in the middle of the process, we do have some control over how it turns out. As knowers, we are not absolute, but we can choose to improve our grasp of the world, and our place in it. Part of improving our grasp of the world is what humans have developed into science. The results of science are not absolute, but they are the best grasp of material reality we have at the moment. But these results are limited. They don't tell us everything, and we shouldn't expect them to. But, the search for truth within science has given meaning to many people, and provides the most

reliable and persistent grasp of the material reality we are in. Those who refuse its results do so at their own peril. The resulting ignorance forgets the efforts made by our predecessors in the knowledge project, calling into doubt what will remain steadfast.

The Emergence of Science

It is in the Scientific worldview that these three modes of knowing (rationalism, empiricism, and phenomenology) come to their greatest accomplishment and most enduring fruit. Science, as a product of the modern world has captured the lion's share of mind space with respect to modern commerce and technology. Almost every area of life in the civilized world is touched and affected by the scientific process. It is both rational and practical and holds great promise for us as societies and individuals. In this section, we will explore the beginnings of modern science and how it captured our attention so thoroughly.

We begin the exploration of the emergence of science with the ancients. Some early Greek explorations into knowledge can be classified as scientific. These thinkers preceded Socrates and Plato, and because of that are called pre-Socratic. They are not of much interest now but they posed some of the earliest questions that like the current book asking about the basic nature of things. Later, perhaps the greatest practitioner of ancient Greek science is Aristotle, a student of Plato. His explorations and observations in biology have still been considered useful in the modern age. He was a careful observer and took elaborate notes. His conclusions have since been surpassed, but his methods were still, in the nineteenth century, an instructive example.

The Greeks may have been good at logic, language, and speculation but they were poor or perhaps more accurately, limited mathematicians. Though Pythagoras is credited with the

Pythagorean theorem, its origins can be found in the Babylonian, Egyptian, and Indian mathematics he was trained in. Pythagoras' unique contribution was to show how a mathematical description of the cosmos was universal. But the Babylonians had calculated useful tables centuries earlier based on their understanding of what would become the Pythagorean theorem, and the Egyptians used their understanding of it to construct the great pyramids. Even the greatest mathematical work of the ancient Greeks, Euclid's Geometry, was written in logical sentences, not mathematical equations. Part of the reason for this is that there was, as yet in the ancient western world, no universal numbering system. The Greek number system used their alphabet for counting, as did the Hebrew number system. Letters were also used as numbers. Even the Roman number system was difficult to calculate with. Two trends that have become standards in mathematics are first, the decimal numbering system, and the convention of lining up numbers in rows with different values for counting purposes. The decimal system along with the number zero (0-9) can be traced through Arab thinkers of the late first millennium CE to much earlier Roman shopkeepers to the Gwalior number system created in ancient times in the middle of the Indian subcontinent.

So, we have observation, logical sentence and argument construction, and the decimal number system as groundwork for the advances of science in the modern age. In the modern age many of the political, religious, and social prohibitions against knowledge of a certain kind in the West were being set aside. Charles Taylor describes for us how this transformation took place,[97] how society in the West moved from an enchanted worldview to a secular one. This story is not one of the betrayal of our best instincts, but the movement from evidences of one kind to evidences of another. Through the middle ages, say, the fifth through the fifteenth centuries CE

[97] Taylor, Charles, *A Secular Age* ().

in the West, the boundaries between the material world and the spiritual one were believed to be very thin, if existent at all. In short, the material world was invested with a good deal of spiritual force. Objects had meaning and power beyond their material form.

Today we call that superstition or supernaturalism, and its effects penetrated every aspect of life. C. S. Lewis[98] told us that in the era preceding ours, two children were born, magic and science. Magic, as we all know, has faded away, except in the fringes of popular culture and entertainment. Science, however, has flourished and become the leading cultural trend in the modern world. Its natural child, technology, infuses almost every aspect of modern life. Many cling to a pre-technological past but do not also return to the age of superstition with the social and political powers it wielded. There are, however, vestiges of the enchanted worldview in many cultures around the world where an encounter with power is sought, or remains the assumed foundation of life.

The intent of Lewis' critique is not a value judgment, but rather marks the flaws of a superstitious worldview. Magic and superstition do not access the real world without a residue of issues. The metaphysical foundations of magic remain beyond the acquaintance of humans. And though there is mystery in the world still, it remains unlikely that its resolution lies in the domain of magic. One interesting precursor to science, alchemy, held for some time the fascination of many who were at the forefront of scientific discovery. Alchemy held many of the presuppositions of magic at its core, but as well many of the developing rubrics of science. Sir Isaac Newton, a premiere scientist of the seventeenth century, practiced alchemy alongside of the science that made him famous. Through his alchemical experiments he discovered that the

[98] Lewis, Clive Staples, *The Abolition of Man* ().

human body was an electrical system, something we take for granted today but was otherwise unknown in his era.

Science emerged from within a culture that only had a few of the clues that would lead Western society to *enframe*[99] itself within the scientific apparatus as it is today, and there were many forces that found any challenge to their current worldview a challenge to the current authorities, those of the Church and the Monarchy. But the Renaissance through the Enlightenment era (1400-1900 CE) was a time not only of great learning and discovery, but revolution. This is the era of the formation of the modern state, the decline of the rights of royalty and priestcraft, the rise of capitalism in the middle or merchant class, and the decline of the Church as the gatekeeper of righteousness in society.

A History of Science

The history of science is the history of scientists and the discoveries they made that changed our way of thinking about the cosmos. Often the greatest drive for science is the need to solve some practical problem. The answers to what the future holds moved from the reading of animal entrails to observations of the heavens. When observation of the heavens became fine enough, people puzzled over possible theories of why heavenly bodies moved as they do.

Our exploration of the history of science will be a short review of some of the great scientific advancements leading to the modern age, the twentieth century and beyond, where

[99] There are a variety of expressions that state the same or similar thing. Michel Foucault used the term *epistéme* while Charles Taylor used the term *social imaginaries*. To enframe is a Heideggerian term that he used to talk about the unrecognized but persistent milieu of an era. He used this term with reference to the twentieth-century enframing of society through the lens of technological accomplishment. So what we are and what we do in the West is bound in a system of technology, whether that be educational, or industrial. People become no more than resource to feed the machine of capitalism. I use enframe here because it is its own description.

many of the basic beliefs of the ancients were finally abandoned in favor of a more consistent, mathematically coherent, observationally careful description of the world. The modern narrative holds great promise, not as an answer, but as a framework for understanding that has stood the tests of time and the exertions of experimenters. Modern technology, beginning with harnessing the forces of nature in the industrial revolution, to the use of steam and electricity, the table of elements, to radiation, radio waves, quantum physics and all its cousins, The search for a Theory of Everything, evolutionary theory, genetics, discovery of DNA and the structures of life, harnessing the logic of sentences to the logic of computers, digital technology, and all the rest that follows today and will be extrapolated into the future, is a child of the belief that the universe is intelligible, that its order is discernable through observation and describable through mathematics, that it could be harnessed for our own uses. This narrative is exceptionally deep, so deep in fact, that no individual has very much more than a small part of it mastered, and most barely scratch its surface. Our machines today are more complex than any one individual may understand in detail, and it is sustained and explored further only by the cooperative effort of millions of hours of labor and research by people all over the globe. The very presupposition that the universe is intelligible is the child of the belief that God created the universe with immutable laws, something we explored in Chapter 1.

Let me start this short exploration with one of the last and arguably the greatest metaphysician, Saint Thomas Aquinas of the thirteenth century who believed that the world was intelligible in terms of a scientific worldview, and that the resulting knowledge was not in any way in conflict with the teachings of the Church or, indeed God himself. In some respects St. Thomas set the stage for an integration of science and the structure of the university following the structure of Aristotle's writings, to engage in an exploration of the real world unencumbered

by problematic notions of a superstitious sort. The world existed on its own terms and could be explored on those terms. Though the age of superstition lasted well into the seventeenth century, the seeds of its demise can be found in St. Thomas, but not him alone.

From the scholarly community of the Scholastics of whom St. Thomas was perhaps the greatest, emerged the beginnings of modern scholarly discussion about the nature of the universe. But when some of those explorations began to impinge on the teachings of the Church, it became more difficult to move forward, and some thinkers were forced into silence while others were killed. The printing press developed by Johannes Gutenberg in the fifteenth century became a tool for disseminating knowledge more readily, though heresy was spread with equal rapidity. State and Church efforts to censor books was slowly eroded in the sixteenth century as alternate means of distributing literature arose. The printing press is an invention that made it possible for those left in the dark by the state and church to gain knowledge. Also the swift spread of pamphlets and newspapers made it possible to sidestep the censors entirely. With the rapid dissemination of knowledge, the records of researchers could be preserved publicly for all time. Now, though war could burn a library, the likelihood that all copies of a work would be lost diminished and generations could collect prior works of knowledge with some ease.

Nicolaus Copernicus, in the sixteenth century, released a book named *On the Revolutions of the Celestial Spheres* and dedicated it to the current pope in Rome, Paul III. He advanced a theory that placed the Sun at the center of our planetary system based on the mathematics that he developed and partially derived from his predecessors in the Arabic world. He explained that the idea was not new and referenced the ancient Greek thinker Aristarchus of Samos who proposed the same view. This must be seen as not only a revolution in observation, but a revolution in mathematics. Copernicus argued that because the mathematics of the heliocentric model he

developed were simpler than those of the geocentric model, the geocentric model should be abandoned. But it was not simply because of its overall simplicity that the heliocentric view was adopted, rather Copernicus' theory made prediction of heavenly movement more accurate. Predictive success is one of the hallmarks of good science.

Though Copernicus did not argue against church dogma, he did give good reasons to abandon Ptolemy's overly complex and troubled geocentric system with the heliocentric one. The dogma of the Roman Church at the time specified that the earth was the center of our planetary system, but since Copernicus was a friend of the church, his work was not contested at the time.

Enter Galileo Galilei, a less patient man, into the conversation. An engineer who through experiment abandoned Aristotle's supposition that lighter objects fall to the earth more slowly than heavier ones, and invented one of the first telescopes with which he observed Jupiter and its moons. Around the turn of the seventeenth century when Galileo made some of his early discoveries, the Roman Church had become less patient with disagreement by the scientifically minded, though the authority of the Church had become increasingly diminished because of the Protestant reformation in the sixteenth century. When Galileo contended with the Church about their geocentric dogma, their reliance on Aristotle, and pointed out some of the foibles of the current pope, the Roman Church was less forgiving of his disagreement than they had been of Copernicus. In addition, he wrote in Italian the common language, and his book *Dialogue Concerning the Two Chief World Systems*[100] once published could not be recalled. This book, and subsequently all Galileo's books were banned by the Catholic church. In addition, the Copernicus' work was also banned in response. But Protestant northern Europe and politically

[100] <https://en.wikipedia.org/wiki/Dialogue_Concerning_the_Two_Chief_World_Systems>

independent northern Italy did not have the dogmatic scruples arising from aging Catholic dogma, and adopted Galileo's work. Soon it became the standard text among Western universities.

Johannes Kepler, the assistant to the last great naked-eye astronomer Tycho Brahe, eventually worked out that the planets revolved in an elliptical orbit around the sun, not as Copernicus and his predecessors asserted that the planets revolved in circles, a conceit that persisted because of its elegance and the notion that the heavens were perfect.

With Galileo's observations, Kepler's theory, Descartes' mathematics and a variety of other influences, Isaac Newton worked out the theory of gravity, the scientific laws governing the movement of the planets as well as the explanation for bodies staying attached to the earth. Newton's work, *Philosophiæ Naturalis Principia Mathematica*, published in 1687 overturned with elegance and precision all the previous theories of planetary motion, leaving those who thought the earth was positioned at the center of our planetary system without enough fair evidence to persist in their belief. But as with all traditions, it took generations to move the whole society from the geocentric system. Newton also designed a new form of telescope that advanced the observations of the heavens.[101] But it was not until later centuries that telescopes could greatly exceed the power of the early ones, and not until the twentieth century could the fundamental properties of the universe be known with any precision. However, the increase and precision of telescopes built on the foundations of Newton's theories, provided a collection of substantial data and theories without which the twentieth century discoveries could not have been made.

[101] Modern versions of Galileo's and Newton's telescopes are available today.

Let this short history of one narrow aspect of the scientific enterprise be used as a point of focus where the struggle with observational data and theory eventually finds resolution in history in a form of truth that need not be in contention any longer. This is a point where the reader can confidently say that those who hold to some other view are mistaken. Science does give us truth, and yet consolidates meaning around stable and understandable models. We do acquire certainty of a kind in this. But the reader shouldn't think that just because we have material certainty, that is, confidence that it is highly unlikely the belief in question is wrong, that other claims a scientist makes about beliefs that are outside their domain of expertise are reliable.[102] Being able to detect the difference between results developed in a practitioners area of expertise and unreliable beliefs is part of what it means to be philosophically adept, and the tools one gains reading the material of this book should enable a reader to gain some tools for that discernment.

On the one hand scientific truth is stable and reliable. On the other hand political circumstances may oppose or even prevent the movement of scientific exploration. Certainly funding is a concern, but ideologies of many kinds hinder the search for truth and even stop it for a time. For example in the Soviet Union during the 1930s, many scientists were forced to come to conclusions in their work that agreed with the contemporary political version of Marxist ideology or else suffer imprisonment. It should be obvious that political force is not a good means of securing the truth. But every advance in science has had to contend with political force in one way or another. Knowledge does not just emerge freely in the environment. It comes into

[102] For those interested in natural language problems, this is called the *fallacy of the expert*. Many in our era who are experts in their fields, hold beliefs and make claims about subjects that are not in their field of study. They use their scientific, theoretical, or theological credibility to promote ideas outside of their expertise, without that same credibility. Though they may be a reliable witness about some truths, they are not automatically a reliable witness about others.

being with struggle and often against opposition. Sometimes, as in the case of the heliocentric theory of planetary movement, it may take decades or even centuries for the truth to find a secure expression in a social environment. Now, no serious student of reality can take the geocentric system as anything more than a historic stage in the development of human knowledge. It was at one time the best approximation of reality given the tools, observations, and theories available. Better instruments and theories, better observations and predictions made possible a revolution in the way humans saw the reality of our planetary system.

This is true in many other branches of science, and even today science struggles with political and social forces that oppose it, or wish to use it to obtain advantage for themselves. That doesn't mean that all the goals of science are in keeping with humanity's best interests, and so struggle it must until the ethical and moral issues are resolved. Scientists also have to struggle with the temptations of capitalism even though capitalist concerns are the bread and butter of its continued existence.[103]

Let us move now to an exploration of the method, information, and ethos of science to discover why it has become the force it is in our modern society. There are many philosophical issues involved in the production of scientific truth and its justifications.

Scientific Reality

Scientific reality works under a variety of presuppositions, notions about the way the world works and the way that people interact with it. Though science cannot declare the existence or the non-existence of God, it can reliably grant to its users access to the structure and

[103] An instructive example of this is the search to codify the human genome undertaken by two teams in parallel, one publicly funded, the other corporately funded. <https://en.wikipedia.org/wiki/Human_Genome_Project>

secrets of the universe itself. Though for ages people have attempted, using metaphysical speculation, to comprehend realities like God through the observation of the universe, that task is too large for science itself. At best, with the best tools, instruments, and theory at our disposal, we can recognize regularities in the universe that point to some intelligence, some design. But whether the universe is structured in such a way as to appear designed in terms of the laws of nature, or whether the Almighty God fashioned it to be so structured, or whether both are true can't be known from the scientific worldview alone. One must have insights of a level beyond what science provides, say, those that theology might supply. The fact that the universe is ordered in a recognizable way is a feature that permits examination and theorizing about that order which closely resembles the universe itself.

Many have wondered that mathematicians are able to so closely model the universe using tools that are logical, simple to understand in their basic components, and can be extended by the best theoreticians to explain even some of the most complex observable phenomena. Why is it that our mathematics are so able to model the universe? The answer to that question has been struggled over by a variety of scientists, mathematicians, and philosophers for many generations. The answer is not simple, but we might approach the problem by looking for the best possible solution by means of an abductive method. Seeing as how human knowledge is at best incomplete, no one can argue from the point of an absolute, that is, from the point of irrefutable basic beliefs what are called axioms. There are other methods which we will explore in an attempt to retrieve human knowledge through science. Each of these methods begins with plausible beliefs and ends with a conclusion that is logical based on those beliefs, but that may not be enough to guarantee those beliefs are true. It may be that what we are looking for is, as

Immanuel Kant and others suppose, the best combination of methods that grants us access to the real world and ourselves in it as participants.

The first method, a rational method, is one that supposes we have constructed our mathematics as an artifact of human reasoning. Let's call this the constructivist view. It is logical because we have made it in that way. It gives us conclusions that we *know* are true because they are derived from other things that we *know*. In this view our mathematics are set off from the real world because of their mode of construction. It is only trial and the elimination of error, on this view that our mathematics model the real world successfully.

The second view that we will call intuitionist, suggests that human intuition, because it is part of the real world models the real world successfully in mathematics. So, even though mathematics are a human construction, they are true because they are part of the world that they model.

The last view, a realist view, ventures to declare that there is a real world both in our imagination, mathematics, and reality itself. Mathematics models the real world because it is itself real. Not only have we constructed it logically from true premises,[104] and as humans we are part of the world that we model, but that world, its mathematics, and our selves are all of one piece. That is, there is no objective high ground from which to make our observations, but within that limitation, we have learned to manipulate the world, ourselves, and our mathematics to a very large degree with very fine control. The measure of successfulness of realism is the technology that emerges from it. That technology is organic, natural, and extensible to the finest instruments and manipulations of nature. Mathematical truths are as real as stars and planets, and it is no surprise that they so closely model the universe and our own behavior. But the realist

[104] That is, the true premises have been constructed and modified by trial and the elimination of error.

doesn't take the next rational step and declare that our mathematics have wrapped up all of reality. They are a work in progress. We are exploring mathematics even as we explore other aspects of reality.

So order in the universe is comprehensible by beings such as ourselves who have the capacity to reflect on their existence in the universe, to ask questions, and have the confidence to trust their own answers. And it is at this point that science becomes useful. Using the best form of skepticism, science continually forces the reexamination of the principles under which it does its work. It calls them to account and requires an answer. It asks whether a particular project is scientific or not. Does that project fall within the boundaries of what we have come to know as science? One way to know whether a project has gotten off track is to ask whether it is open to new data. If it is, then it will remain on the path toward discovery. If it does not, then it has fallen to the point where its dogma is ruling the path instead of discovery.

This problem has come to be known as the boundary or demarcation problem. The question of what science is and what it is not is a fair problem because of the authority granted by the method itself. If one uses the authority of science without also exercising the method of science then their work should be called into question. But before we examine the boundary problem let us look at a sociological and historical perspective of science.

A historian of science Thomas Kuhn,[105] writing in the 1960s, challenged the view that science could be characterized by the slow accumulation of knowledge in a linear progress toward enlightenment or indeed toward the mastery of the universe. The idea of inevitable

[105] Kuhn, Thomas S., *The Structure of Scientific Revolutions*, Second ed. (Chicago, IL: University of Chicago Press, 1970). Wikipedia article, <https://en.wikipedia.org/wiki/Thomas_Kuhn>, accessed August 17, 2016. Kuhn took the exploration of science in a new direction. He asked whether science was indeed the slow accumulation of knowledge, but rather following sociology discovered that disruptions, revolutions, and accidents played as large a part in the progress of knowledge as the normal science that was so productive.

progress has had a long history in the west. Trying to say that history was going somewhere specific led to the idea of an inevitable completion of human civilization and knowledge.[106] There is something of theology in that idea. The suggestion is that God had a plan and was guiding people to fulfill the plan and bring the millennial kingdom into being. So historians tried to understand history in terms of that millennial ending and interpreted events in history in those terms. Michel Foucault argued strenuously that a history developed in terms of some divine goal for humanity blinded the historian from seeing the disruptions, accidents, and revolutions that inevitably took place.[107] He suggested that if one wished to do history, it must be built on a collection of artifacts from the real world, instead of a fiction based on some supposed millennial ending toward which humans were inevitably moving.

That is not to say that there might not be a millennial ending for the human race, but its structure cannot be known or used as a guide to interpreting history. People have speculated about some inevitable end of humanity whether in paradise or in a post-apocalyptic residue of civilization, but those possible ends force a blindness on the real history of the world.

Thomas Kuhn theorized that there are three phases of the scientific project. The first, where there is no central idea and prior to theory the scientists explore the world and notice regularities. This is the point to science prior to Aristotle. Following this stage, people are observing the heavens and wondering whether the things they have been told, the common beliefs of their world, are true or not. They develop tools and explore the world thoroughly during this phase that Kuhn calls normal science. Then when the old cosmology seems to have

[106] This idea led many to formulate what have come to be called utopias that characterized the highest point of human existence in a completely just society. The drive for a perfectly complete society under just leadership has fascinated many people over the entire history of people.
[107] Foucault, Michel, *The Archaeology of Knowledge and The Discourse on Language* (New York, NY: Pantheon Books, 1972). Wikipedia article, <https://en.wikipedia.org/wiki/Michel_Foucault>, accessed August 17, 2016.

more problems than answers, say, the ancient cosmology of most civilizations, a new theory emerges in the third phase of Kuhn's view. That is, a revolution takes place where an experiment, a theory, a technology, or a new view which explains not only the old and resolved observations, but also resolves many or most of the problems of the old view. But in a revolution, sometimes the interpretations of old resolved observations turn out to be problematic, and are rejected. The new view is more subtle and can predict future reality better. In the second century CE, Ptolemy proposed a theory of the heavens,[108] a better cosmology than the ancient one, by placing the earth at the center of the observed planetary system, with the planets revolving in impenetrable shells circling the earth. And for almost 1400 years this view held the central place of cosmology. With the assistance of Arab mathematics, Islamic study of the heavens, and Greek theorizing, Ptolemy's view is extended in Kuhn's normal science, until Copernicus, borrowing heavily from his predecessors, proposes the heliocentric view, reviving a view of the ancient Greek thinker Aristarchus. Copernicus is perhaps the most noteworthy individual in the early phase of a revolution that was finally resolved in Newton's theory of gravity over a 130 years later.

Copernicus stood the observation of the heavens on its head, and eventually the heliocentric theory upset the political and religious ideas that had governed western society at the time. That certainly wasn't the end of scientific revolutions. Though Newton's view held sway for 230 years its very foundations were called into question by Einstein and his contemporaries with the general and special theories of relativity. Einstein's revolution accounted for reality better than Newton's view, even though Newton's view was a tremendous advance. So, various

[108] Wikipedia article, <https://en.wikipedia.org/wiki/Ptolemy>, accessed August 17, 2016.

elements of cosmology, on the account I have given here, are scientific because they permit and even encourage the adoption of new data, even if it means the complete disruption of the theories that have preceded it.

At this stage, in the early twenty-first century, Einstein's theories are beginning to age and show weaknesses, even though some predictions of his theories have been confirmed very recently.[109] It is clear that relativity on its own can't account for everything in the universe, even though much about the universe is understandable by it. So, the project that Einstein failed at, the search for a theory of quantum gravity that merges what we know about the macro universe and the quantum universe of the standard model is being vigorously explored at this time.

So science must be **realist** both in observation and theory in order to account for events in the universe. That realism permits better observations with advanced technology to help adjust theories and allow for revolutions in thought. Without the supposition that there is a real world our theories describe, theorists will not have a substantial reference against which to test their theories. In a world where science is not realist, competing theories vie with each other in terms of their internal logic and theoretical symmetry, not their correspondence with the real world. They can't be tested against better data, because data is not their starting point, but a rationalism and a logic like that of Descartes. Science must be realist for another reason. That is, if there is a persistent real world behind all our observations, then observations and theories can be tested. We can know when we have succeeded and when we have failed.

[109] LIGO or Laser Interferometer Gravitational-Wave Observatory has confirmed a prediction of Einstein by showing that gravitational waves proceed from stellar events. <https://en.wikipedia.org/wiki/LIGO> accessed 8/17/2019.

Being *testable* means that any result achieved can be compared to results achieved by other observers. It also means that differing methods examining the same phenomenon may converge on a single hypothesis that becomes testable in terms of a single theory. No single observation will count as the deciding factor in adopting an explanation for some phenomenon. The student may look at objectivity this way: When one individual makes an observation, their resulting theory about it is not likely to be a fully-formed one. When two people observe the same phenomenon from different perspectives, it is likely that they achieve a fuller picture of that reality than any single observer. When a large variety of people make observations, all from different perspectives, then it becomes more likely that any resulting theory will be more complete. Testability then, is the feature of scientific practice that gives access for people to adjust theories so that they more closely resemble reality. Testability is part of what has come to be known as the *scientific method*.

First, there is a distinction between the scientific method in general and all the individual methods scientists use to observe, theorize, and experiment that together comprise the scientific method. At the core, in realist terms, observation is the key, "All facts in science are provisional and subject to challenge and change, therefore science is . . . a *method* of discovery that leads to *provisional* conclusions."[110] There are three characteristic parts of method in the human knowledge project. In science they are explicit. "Presuppositions, evidence, and logic"[111] comprise our belief systems. **Presuppositions** are often but not always unexamined parts of our worldview what I have called earlier enframing. We may understand perfectly well what the

[110] Shermer, Michael, *The Moral Arc: How Science and Reason Lead Humanity Toward Truth Justice, and Freedom* (New York, NY: Henry Holt and Company, 2015), 15, author's emphasis.
[111] Gerald Rau. *Mapping the Origins Debate: Six Models of the Beginning of Everything* (Downers Grove, IL: IVP Academic, 2012), Kindle location 166.

ground of our belief system is. Everyone's presuppositions are generated by culture, training, and experience.

Evidence for a person of faith is often connected to holy books like the Bible for Christians, Jews, Buddhists, Taoists. Experience of God and the world also counts as evidence. But observational evidence in science is collected in a variety of ways for different types of science.

> There is a difference in the way empirical evidence is collected in different types of science. *Experimental science* examines phenomena that are repeatable, regular occurrences, by manipulating a variable to determine its effect. This is the type of science most people currently think of as prototypical science. Although typically associated with laboratory science, experiments can also be conducted in agriculture or ecology by applying treatments to different plots of land. Phenomena that are too large, time consuming or where there are ethical constraints on experimentation must be studied observationally. Examples of *observational science* include investigation of stars, earthquakes or disease spread. *Historical science* is the study of nonrepeatable physical events, including the ice ages or origins. *Theoretical science* makes predictions, often based on mathematical calculations, that can be tested by one of the three empirical approaches. A famous example is the prediction made by the theory of relativity, and later confirmed, that gravity could bend light.[112]

The **logic** that holds our belief system together determines the relative consistency of that belief system. When we speak of consistency in morals, we require a moral person to keep their

[112] Ibid, Kindle location 170-176, editor's emphasis.

promises, and live what they profess. When we speak of consistency in a belief system, we require that beliefs correspond with reality. When our beliefs do not correspond with reality, there is a break from truth, and when our efforts to prove our beliefs require that we ignore or explain away reality, our beliefs are not consistent.

There are two kinds of consistency. The first, which has already been mentioned, is correspondence with the real world. That means that our observations and our explanation must be consistent. The second kind of consistency is where our logic holds together. If we are consistent in that sense, then our theoretical explanation will not be flawed. This feature of good theory is often associated with another measure of scientific truth, coherence. Coherence is a broader feature, that measures the value of a theory by how well the whole theory hangs together even in the face of fair critique, skepticism, and observations that seem to contradict the theory.

What the scientist acquires through the use of this method is predictive success and fruitfulness. Predictive success of a good theory allows that theory to be extended in a variety of ways. Isaac Newton's theory of gravity allowed observers to predict the movements of heavenly bodies with extremely good accuracy. His methods have allowed modern spacefarers in many nations to travel to earth's moon and send probes to many of the known bodies in our solar system.[113] Our ability to use Newtonian science for our own purposes shows how fruitful Newton's theory is. That is, because the scientist can predict the future states of physical systems, they can also manipulate those same systems. The fruitfulness of any science has been the basis of the construction of technologies that have transformed our world. The information

[113] The student must realize that modern space exploration is not so simple. The trajectories of spaceships must be adjusted using the theory of relativity. But the adjustment is much finer than anything that can be done by the naked eye. Newton's methods are not enough for interplanetary travel.

collected and produced by science has permitted human extension into many areas that before the modern era were forbidden. But the question arises, just because humans can extend their reach over the material world through science, should they? This is a conflict that has come to the front of modern ethical discussion. Is our science advancing more quickly that our ability to govern its uses ethically? Does just because we can do something mean that we should? Robert Oppenheimer, one of the original creators of the atomic bomb during World War II, expressed concerns that human ingenuity had outstripped human ethical reach. But suffice it to say that the scientific enterprise has had a long relationship with ethical questions.

So we have a methodology that is very productive, and information as a product of the efforts of science that gives us great technological reach. But science operates on another axis. That is, in order for science to have the best possible reach and effect it must operate in ethical terms. If the scientist is dishonest, then the information produced will turn out to be unreliable. The results of their work will not be repeatable if they experiment or report falsely.

> Science has succeeded because scientists comprise a community that is defined and maintained by adherence to a shared ethic. It is adherence to an ethic, not adherence to any particular fact or theory, that I believe serves as the fundamental corrective within the scientific community.[114]

The key word here is *corrective*. If science is to stay on course, then it must of necessity be self-correcting. If the members of the scientific community do not monitor their own and their colleagues' behavior, then it is likely that the entire project will get off track. Science must self-correct, and the way it does it is by adherence to fundamental principles of honesty and integrity.

[114] Lee Smolin, *The Trouble With Physics: The Rise of String Theory, the Fall of Science, and What Comes Next* (Boston: Houghton Mifflin Company, 2006), p. 301.

So science is not only the production of information through a tried and true method, but an ethical community whose implicit agreement draws its members toward honesty and integrity. Historically there are many examples of scientists who have gone far afield by failing to adhere to these ethical norms. As a result, around the turn of the twenty-first century, many have rejected the authority of science. It is not that they have an alternative mode of discovery for the knowledge project, but that they would rather trust their own commonsense intuitions than the conclusions of those they suspect of dishonesty. If scientists are not working from an ethical high ground, then their declarations reveal themselves as suspect.

In a famous example during the twentieth century, doctors associated with the tobacco industry declared that the dangers of tobacco were unknown, or at least not important enough to study further. Doctors researching independently from the tobacco industry did their own tests and concluded that the tobacco industry had influenced the results of their own internal research. The independent doctors collected significant statistical evidence that showed clearly that the industry research was dishonest. As a result, the tobacco industry was forced to pay large fines and pay for educational efforts to convince people not to smoke. The incidence of cancer from smoking has declined since that time. In this case the scientific ethos of the independent doctors provided a necessary critique and challenge to the tobacco industry studies.

But industry is not the only factor that has skewed the results of scientific investigation. Political, ideological, and religious forces also often require that their science come to conclusions that contradict evidence and observation. That doesn't necessarily have to happen. In fact many industrial, political, ideological, and religious groups adhere to the same ethos good science does because they believe that the truth is more important than any temporary advantage that might be gained by cutting corners, skewing results, or outright deception. There are a

variety of human, personal, social, and cultural reasons why people do not adhere to the required ethos.

Conclusion

So first, the theories of knowledge historically tested and used only get us part of the way to the modern world. They are helpful in sorting our categories and giving a start to our explorations. But none of the theories are capable in themselves of advancing to the modern age. The requirements have changed even, may I say it, as humans have evolved. What we do is no longer just in our heads or in our hands. The whole of the problem must be explored with all the tools at our disposal. Theory and observation, testing and industry must all have a hand in discovery. The real world, including the reality of being human in the world has to be taken into account, and any theory or practice that doesn't manage the merging of both our strengths and limitations is bound to produce flawed theory and practice. The insistence in the modern age of practitioners in the Young Earth Creationist or Flat Earth Theorist categories that some particular belief or observation has priority over the ordinary practices of science breaks both the ethos and realism that science requires to succeed.

Looking for scientific clues within an ancient text that has no relation to the modern interests or modern capabilities seriously hamstrings any search for truth. If truth *must* reflect a certain interpretation of an ancient text, then there is no possibility that truth may speak for itself. The hypocrisy of the Young Earth Creationists is that they have abandoned persistently, though quietly, bits of the text that can no longer be squared with reality. Even within the self-imposed limits of Creation Science, it is no longer possible to square observational or physics-based

reality with any sort of dome of water or ice over the earth as the text of Genesis plainly states.[115] Any attempt to justify this absurdity again as we find in Kent Hovind's efforts, is plainly thought foolish by the Creationists themselves, even though the entire structure of Creation Science hangs in the balance with any rejection of literalism.[116] Yet they persist.

The absurdity of the simpletons who take naked-eye observations of the world as enough evidence to support a flat earth theory is just beyond the scope of modern science entirely. But what these folks and the Young Earth Creationists do is both fail to read history and enter into the conversation science offers. Yes, approaching a scientific grasp of reality is complicated, and yes it is hard work, but both groups will not engage because of the privilege they give to primitive modes of knowledge: authority and self certification. Bacon warned us of both of these errors and any attention to the Enlightenment theorists at all would disabuse these groups from following their chosen courses. For the YEC, we have already gone through a series of discoveries in the eighteenth through twentieth centuries that make their work entirely redundant. For the Flat Earthers, the task remains to get beyond their explanations why settled science is inferior to their primitive observations. Both groups are all but entirely unaware of their embeddedness in a scientific social imaginary. Which one of the theorists would abandon their cell phones, air conditioning, flush toilets, cars, etc. in order to rejoin the ancient worlds they profess to be members of. No, instead they use all the advantages that modern science has provided to push their agenda.

I can't think of any reason outside stubbornness for the Flat Earthers to persist. But the YEC has a reason, that though not well considered, at least professes loyalty to a document that

[115] Genesis 1:7, "So God made the expanse and separated the waters beneath it from the waters above."
[116] Hovind's theory, at least in 2005 suggested that the ice or water encircling the planet (he doesn't believe that the earth is flat which all ancient cosmologies, including the Genesis record supports) fell to the earth during the flood. <http://wiseoldgoat.com/papers-creation/hovind-seminar_part2a_2007.html>

in many other respects deserves their adherence. Closer examination reveals that their adherence is not to the document itself, the Bible, but to a very poor interpretation of it that doesn't consider their own circumstances. They believe they have a God's-eye view of things and therefore, need no other proof. They are deluded. No one but God has a God's-eye view. Most pitiable are the serious scientists who also adhere to the YEC view. They have to have abandoned any serious exploration of established science to do what they do. But they will keep working at it until they realize, even with all their powers, that reality is just not so. If they persist after that, well, they and their followers will be blindsided by reality. I am sorry for them.

But does science offer a panacea, a cure for all rational and knowledge problems? No, there is a hollowness in the theoretical and technological offerings of science, or at least in the confidence that science will answer all their longings. And when science becomes its own -ism instead of a tool to explore reality, it fails because it can't naturally include, as I have said before, love, justice, kindness, truth, and a variety of other values that are not the within its domain, except when sociology and psychology seek to address them. But I suggest that psychology and sociology are more pointing to reality than satisfying our need for those values. However, when research, as much of it does, points out that certain human values are compellingly ignored, things go wrong.

What is lacking, that has been assumed in the conversation, is an anthropology that functions like reality functions. That is, before the modern era, every version of what it means to be human has at best contained only part of a comprehensive model. Haltingly, but surely the modern scientific ethos has begun to take on the task of producing a comprehensive anthropology, or at least one that allows data into the equation to modify our theories, one that is not closed off by the inclusion of an absolute, privileging some idea or centering on some logos.

Historical models of humanity have always failed in that they have totalized being and erased differences and the complexity of human reality. Is it true that humans are just sinners, or just economic beings, or essentially sexual beings, or only political instruments? Of course they aren't, but that doesn't stop the mountebanks from characterizing us those ways for their own profit. What modern research is doing is setting the groundwork at reality, instead of a theoretical absolutism, a much humbler but more easily attainable goal. Whether humans will start at reality or not is another question. Humans are complex and difficult to unwrap, difficult to predict, and difficult to manage. Freedom will be preferred over all the resolutions given, over all descriptions, and over all religious and political environments, because meaning isn't available where freedom is unavailable. Characterizations of persons will be skirted, even if it means one must transgress some expected belief or behavior. Those transgressions may or may not include what have been considered sins.

In order to proceed with this conversation further we need to have a theory of knowledge that encompasses our freedom and our experience. Chapter 4 provides something of a resolution to the quandary that a bad anthropology and an incomplete mode of knowing have left us.