

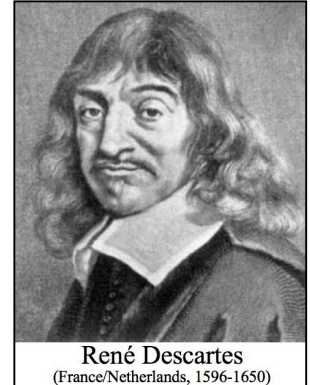
DESCARTES AND MODERN EPISTEMOLOGY

“THE BOOK OF NATURE IS WRITTEN
IN THE LANGUAGE OF MATHEMATICS.”

— Galileo Galilei (1564-1642)

[13] THE RISE OF MODERNISM

René Descartes (1596-1650; pronounced “day-cart”) was born on March 31, 1596, to a family of modest wealth in Le Haye, France (the town was later named “Descartes”). Generally considered to be the father of modern philosophy and the leading figure in the intellectual revolution of the seventeenth century, his writings also mark the beginnings of modern science. Descartes suppressed his early work, *Le Monde* (ready for press in 1633, but published only posthumously) — which offers a mechanical and non-geocentric model of the world — after hearing of Galileo’s trial before the Inquisition at Rome. He eventually published some of his scientific work in 1637, namely, three essays (on optics, meteorology, and geometry) introduced with a short *Discourse on Method*. Criticism of the *Discourse* led Descartes to develop his much longer *Meditations on First Philosophy* (1641). Given his steadily growing reputation throughout Europe, Descartes eventually attracted the attention of Queen Christina of Sweden (1626-89), an intellect in her own right, who invited Descartes to Stockholm to serve as her private tutor. After much hesitation, he agreed to the position, but the early hours and cold weather soon brought on a case of pneumonia, from which he died on February 11, just short of his fifty-fourth birthday.



Modernism refers to the cultural and intellectual climate that developed in Europe in the seventeenth century and continued into the early twentieth century. Modernism is marked by a number of features, some of which were not fully fleshed out until the European Enlightenment of the eighteenth century, but many are discernible even in Descartes’ day, and indeed in his writings. These include the replacing of Aristotelian science with a newer science based on mathematics and experimentation, an emphasis on the individual and personal autonomy, and a belief in progress as guided by human reason.

REJECTION OF ARISTOTELIAN SCIENCE

A major shift in the way science was pursued occurred in the 17th century. Prior to this time, science was “Aristotelian,” in that nature was viewed as teleological and essentialistic. To see the natural world as *teleological* is to see all motion or change as goal-oriented,¹ whether this motion was the growth of a plant, the rolling of a stone down a hill, the burning of a piece of wood, or any other change. Things fall not because of gravitational attraction, but because they are striving toward their proper place. An object pushed across a surface — say, a ball across a

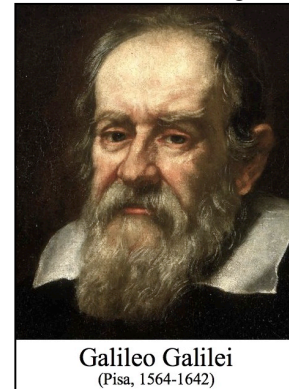
¹ In Aristotle’s world, there were three kinds of motion: (1) the circular motion of the heavens (the world beyond the clouds), (2) the up/down motion of the sublunar realm (of the four elements comprising the sublunar world, earth and water go down, while air and fire go up), and (3) the projectile motion of thrown objects. The first two motions are “natural”; the last is “violent” or “unnatural.”

table — would slow down not because of friction, but because such motion is not natural to it. To view the world as *essentialistic* is to view each kind of thing (for instance, dogs, human beings, oak trees, stones) as possessing a certain nature or essence that determines its behavior (including, of course, the kind of motion natural to it).

Aristotle's essentialism focused on objects that are readily observable, and in this sense his science was highly *empirical*: if you couldn't see it, taste it, feel it, then it didn't exist. This might seem like a good approach for science to take but, as anyone who has explored the natural sciences will know, the world is rarely as it first appears. The building blocks of nature — whether they are atoms, electrons, waves, quarks, or superstrings — generally are not empirically observable. So while Aristotle's naive empiricism, along with his essentialistic and teleological view of nature, served the natural sciences quite well for a millennium or so, it eventually got muddled down with problems — and this was the state in which Descartes, Galileo, and a few other clear minds found the sciences of their own day in the 17th century.

THE NEW SCIENCE

Galileo Galilei (1564-1642) embodied as well as anyone the spirit of the age. His *Dialogue Concerning the Two Chief World Systems* (1632) defended Copernicus's heliocentrism by arguing against the dominant Aristotelian geocentric cosmology. For this he was summoned before the Papal Inquisition at Rome, and on June 22, 1633, was forced to recant his belief that the earth moves (after which he is said to have muttered under his breath: "*Eppur si muove*" — "But it does move"), and was placed for the remainder of his years under house arrest.² He is sometimes credited with having invented the telescope, but in fact crude versions were already being manufactured in Holland before Galileo. His achievement, rather, was to improve this instrument (his first telescope — Galileo used the word *perpicillum* — magnified only about 3x, but within a few months he had managed to create a 20x scope) and to use it to study the heavens, whereupon he discovered that the moon has mountains and craters, that the sun has spots, and that Jupiter has moons (none of which is consistent with Aristotelian cosmology). But Galileo's most important contribution wasn't his telescopic observation so much as his emphasis on a mathematical understanding of the world, and his claim that initial observations rarely reveal to us the true nature of things.



Two characteristics of modern science as it was being developed in the 17th century set it apart from the way science had been done in the past: it was based on *experimentation* and it was *mathematical*. The external world of tables and chairs is now something whose true description consists of mathematical formulas. If it can't be captured with numbers, then it doesn't really exist, or at least cannot be the object of science. Descartes expressed this sentiment at the end of his *Second Meditation*, where he claims that our knowledge of bodies comes through the intellect (using mathematics) rather than through the senses:

I know that bodies are not, properly speaking,
perceived by the senses or by the faculty of

[Poem (selection)]

FROM AN ANATOMIE OF THE WORLD

And new Philosophy calls all in doubt,
The Element of fire is quite put out;
The Sun is lost, and th' earth, and no man's wit
Can well direct him where to looke for it.
And freely men confesse that this world's spent,
When in the Planets and the Firmament
They seeke so many new; then see that this
Is crumbled out againe to his Atomies.
'Tis all in peeces, all cohaerence gone;
All just supply, and all Relation: ...

— John Donne, 1611 (1572-1631), ll. 205-14.

² Recent scholarship of the Vatican records suggests that the church was primarily concerned *not* with Galileo's heliocentrism, but rather with his *atomism*, which contradicted church doctrine regarding the Eucharist (specifically, the transubstantiation of the bread and wine into the body and blood of Christ). Because expounding such beliefs was a capital offense, however, the church silenced him with the lesser charge, not wanting to send a sixty-nine year old celebrity to the stake; cf. Petro Redondi, *Galileo: Heretic* (1983).

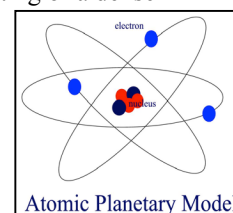
imagination, but only by the intellect, and ... I know that they are not perceived by being touched or seen, but only insofar as they are expressly understood.

This amounted to an explicit rejection of Aristotelian teleology and essentialism: the essence of a thing cannot be described mathematically, nor can its purpose or end. What *can* be reduced to numbers is the size and shape of a thing, and whether it is in motion or at rest. This motion, furthermore, was to be explained in terms of mechanical forces, all of which are quantifiable, and thus amenable to the language of mathematics. Descartes believed that all of Aristotle's talk of formal qualities (being a dog, being furry, being brown) is reducible to these so-called "primary qualities" of size, shape, and motion/rest. Even the four basic qualities of the Ancients (hot, cold, dry, wet) "can be explained without the need of supposing for that purpose anything in their matter other than the motion, size, shape, and arrangement of its parts" (*The World*, ch. 5). Descartes was fully aware of the revolution he was pulling off in his *Meditations on First Philosophy*; in a letter to his friend Marin Mersenne (January 18, 1641) he wrote:

I may tell you, between ourselves, that these six meditations contain all the foundations of my physics. But please do not tell people, for that might make it harder for supporters of Aristotle to approve of them. I hope that readers will gradually get used to my principles, and recognize their truth, before they notice that they destroy Aristotle's principles.

If only to make the world seem even stranger, the basic stuff of this world no longer consists of dogs, human beings, or oak trees, but rather of *atoms* (or *corpuscles*, as they were called by Descartes) — tiny solid objects (invisible to the unaided eye because of their small size), with a definite size and shape. It is the size and shape of these atoms that give them their other properties — for instance, vinegar tastes sour because the "vinegar atoms" have little hooks that prick the tongue. The unobservable features and behavior of the atoms explained the observable characteristics of the larger objects they composed.

The early 20th century saw the rise of a new model³ of atoms that understand them as consisting of a dense nucleus orbited by electrons, somewhat like the planets of our solar system orbit the sun. The implications of this model are rather startling. For instance, the chair we are sitting on and the floor on which we stand, while they appear to be quite solid, are in fact mostly empty space, the distance lying between the nuclei and their electrons being quite immense. The chair and floor do not appear to be 99% emptiness, but that is what they indeed are, according to the new science. (This account of physical objects is already out-dated; a more up-to-date scientific account is even more difficult to associate with our normal, non-mathematical experience of "the world.")

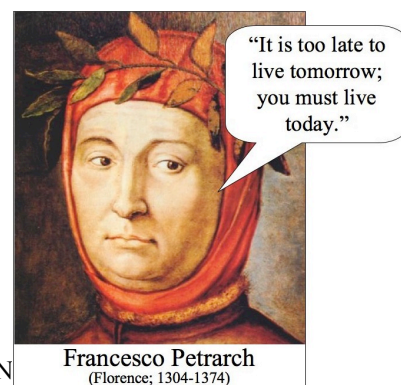


The new scientists also came to appreciate the importance of *experimentation*, of testing their hypotheses against the sense-data of experience. The natural world was the object of study, and so it was similarly the final judge as to the truth of scientific claims. If hypotheses are routinely checked against the data of the senses, foolish assertions such as we occasionally find in Aristotle (for example, that men have more teeth than women, or that bees emerge spontaneously from manure) will always be short-lived and quickly disproved. Aristotle was an acute observer of nature, but he often relied on written authority and hearsay, and failed to check this hearsay against nature itself.

PETRARCH AND THE RISE OF HUMANISM

The Italian Renaissance — a rebirth of humanity's sense of itself — had its roots in the work of two Florentines, **Dante Alighieri** (1265-1321) and **Francesco Petrarch** (1304-1374). This was the 14th century, well before Galileo and Descartes, and setting the stage they would later enter.

Petrarch is often referred to as "the father of humanism," a movement of amazing artistic and scholarly energy aimed at recovering, understanding, and assimilating the

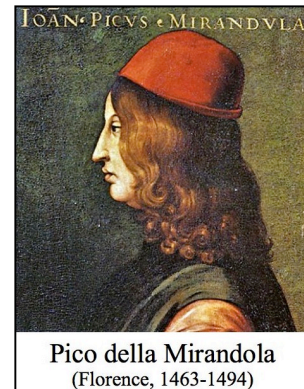


³ The Rutherford Model, articulated in 1911 by **Ernest Rutherford** (1871-1937), a New Zealand physicist, and considered the father of nuclear physics.

literature and values of ancient Greece and Rome. His two greatest influences were the great Roman orator and philosopher **Marcus Cicero** (106-43 BCE) and the early Christian church father **Augustine of Hippo** (354-430). From Cicero, he learned Latin composition and philosophy; from Augustine, he developed his understanding of how human beings should relate to the divine — in particular, that one’s proper study is oneself. His study of the ancients encouraged a focus on the human (rather than on God or nature), and his study of Augustine led to a heightened focus on the *individual* human, as a self-sufficient, autonomous being. Unlike the Greeks, Petrarch did not believe in a natural end for humans, nor that humans were essentially social. Our greatest work was to be ourselves: each of us can become whatever we choose to be, unconfined by any natural or pre-ordained end or fate.

Petrarch’s faith in humanity found its full development a century later in the work of his fellow Florentine, **Giovanni Pico della Mirandola** (1463-1494). In his “Oration on the Dignity of Man” (1486), Pico imagines God addressing Adam at his creation with these words:

“Adam, we give you no fixed place to live, no form that is peculiar to you, nor any function that is yours alone. According to your desires and judgment, you will have and possess whatever place to live, whatever form, and whatever functions you yourself choose. All other things have a limited and fixed nature prescribed and bounded by our laws. You, with no limit or no bound, may choose for yourself the limits and bounds of your nature. We have placed you at the world’s center so that you may survey everything else in the world. We have made you neither of heavenly nor of earthly stuff, neither mortal nor immortal, so that with free choice and dignity, you may fashion yourself into whatever form you choose. To you is granted the power of degrading yourself into the lower forms of life, the beasts, and to you is granted the power, contained in your intellect and judgment, to be reborn into the higher forms, the divine.”



Pico concludes:

Let us disdain earthly things, and despise the things of heaven, and, judging little of what is in the world, fly to the court beyond the world and next to God. In that court, as the mystic writings tell us, are the Seraphim, Cherubim, and Ophanim in the foremost places; let us not even yield place to them, the highest of the angelic orders, and not be content with a lower place, imitate them in all their glory and dignity. If we choose to, we will not be second to them in anything.

MARTIN LUTHER AND THE EMERGENCE OF THE INDIVIDUAL

In 1517, on either Halloween (October 31st) or All Saint’s Day (November 1st), a 34-year-old Martin Luther nailed his Ninety-Five Theses to the castle door at Wittenberg protesting the sale of indulgences by the Catholic Church.⁴ This quickly led to his break with the church and the beginning of the so-called Reformation. The Protestant theology that Luther and his followers came to develop emphasized belief over works (works that included, of course, the buying of indulgences) as a means to salvation, and it rejected the role of the church and the priests as intermediaries between the individual and God. Consequently, the individual human being began to acquire a new prominence, a new value or importance, which would culminate in the 18th century with various documents of the Enlightenment discussing the inherent “Rights of Man” (these are always rights of individuals over against the state and everyone else), and the importance of personal autonomy.



⁴ **Martin Luther** (1483-1546) lived in Wittenberg at the time, teaching theology at the university there. It was common practice to post notices of debates on the door of the castle, and Luther’s document was an invitation to such a debate. There was nothing unusual or ostentatious in his publicizing the theses in this fashion.

THE READING PUBLIC AND PRIVATE READING

Associated with this individualism was the rise in literacy levels and the development of a “reading public” — many newspapers, magazines, and learned journals were begun at this time — causing a shift in the way information was disseminated from oral communication (typically one person addressing a public group) to written communication (one person addressing others in the privacy of their own newspapers).⁵

Not only were literacy rates increasing, people were developing a new skill, that of reading silently. The French historian Roger Chartier (b. 1945) wrote that this “privatization of reading is undeniably one of the major cultural developments of the early modern era,” and it certainly intensified our sense of the self and expanded the realm of the private. Chartier explains what was necessary for this to happen:



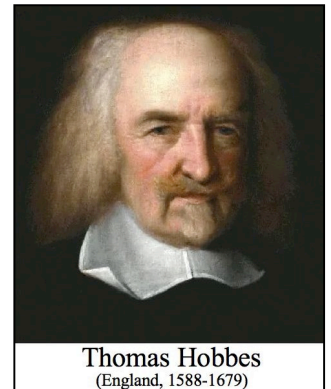
Johannes Vermeer,
“Girl Reading a Letter”
(1657; detail)

First of all, people needed to acquire a new skill: the ability to read without pronouncing the words as they were read. Otherwise the reader remained subject to communal constraints while reading in a library, say, or a room where others were present. Silent reading also made possible the immediate internalization of what the reader read. Reading aloud was slow, laborious, and externalized; silent reading was faster, easier, and more immediate in its impact on the inner self. Apparently, during the Middle Ages, one group of readers after another mastered the technique of silent reading. The first were the copyists working in the monastic *scriptoria*. Then, around the middle of the twelfth century, scholars in the universities acquired the ability. Two centuries later the lay aristocracy learned to read silently. By the fifteenth century silent reading was the norm, at least for readers who also knew how to write and who belonged to segments of society that had long been literate. For others, who belonged to groups that slowly learned to read and for whom books remained strange, rare objects, the old way of reading no doubt remained a necessity.

As late as the nineteenth century, neophytes and maladroit readers could be identified by their inability to read silently. In Labiche’s play *La Cagnotte* (1864), the farmer Colladan replies to a person who loses patience when he reads a very private letter out loud: ‘If I read out loud, it’s not for you, it’s for me... Whenever I don’t read out loud... I don’t understand what I’m reading.’ [Roger Chartier, “The Practical Impact of Writing” in *History of Private Life*, vol. 3: *Passions of the Renaissance* (Harvard University Press, 1993)]

THE SELF AS ATOM

Thomas Hobbes (1588-1679), a contemporary of Descartes and one of the fathers of modern philosophy in England, viewed human beings on the “mechanistic model,” with the larger society as the forum in which these atoms bounce against and around each other. Human society, for Hobbes, is a set of individuals who come and stay together purely out of self-interest, whereby they agree to limit certain of their freedoms in order to increase their security, and thus their overall well-being. In Hobbes’s world, human beings possess no natural sympathies for one another: we are radically selfish by nature, concerned only with our own preservation, and thus naturally at constant war with one another until we agree to leave that rough state and enter a set of contractual arrangements, forfeiting certain of our liberties (say, of stealing a neighbor’s ox). In this world, individuals are primary, and society exists only insofar as the individuals decide to band together. The human being existing outside of society — an oxymoron for the Greeks — became for these moderns the paradigm.



Thomas Hobbes
(England, 1588-1679)

⁵ See Neil Postman’s discussion in *The Disappearance of Childhood* (Vintage, 1982). Houses were also being redesigned in the 16th century to provide for private rooms; prior to this it was typical for everyone to share a single large sleeping and living hall; see Witold Rybczynski, *Home* (Penguin, 1986), especially ch. 2 (“Intimacy and Privacy”) and ch. 3 (“Domesticity”).

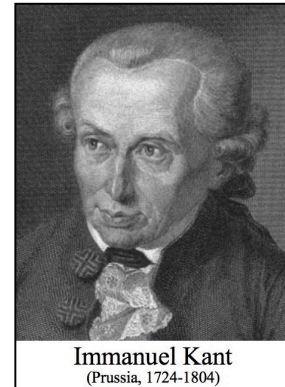
“QUESTION AUTHORITY!”

This modern emphasis on the individual further strengthened the rejection of tradition as a source of truth. It was common for pre-modern scientists to support their arguments by appealing to Aristotle or some Church Father or earlier writer. Descartes and his 17th century contemporaries rejected all this, claiming that much of this past work was deeply flawed. From now on, the only true authority in matters of science was to be one’s own reason and nature itself. By the next century, this attitude had spread to the moral and political realms as well:

Enlightenment is man’s exit from his self-incurred immaturity. Immaturity is the inability to make use of one’s own understanding without the guidance of another. This inability is self-incurred if its cause lies not in the lack of understanding, but rather in the lack of resolution and courage to use it without the guidance of another. Sapere aude! Have the courage to use your own understanding! is the motto of the enlightenment.

So began **Immanuel Kant’s** (1724-1804) famous essay on enlightenment published in 1784.⁶ It continues:

Laziness and cowardice are the causes why such a great part of mankind, long after nature has set them free from the guidance of others, still gladly remain immature for life and why it is so easy for others to set themselves up as guardians. It is so comfortable to be immature. If I have a book that understands for me, a pastor who has a conscience for me, a doctor who decides my diet for me, etc., I do not need to trouble myself at all. I have no need to think, if only I can pay; others will take over the tedious business for me.



For Descartes, the immediate task of the natural sciences was clear: we must rebuild everything from the ground up. What is more, he felt that he could do this single-handedly, indeed, that any “man of good sense” could rebuild the sciences by himself, without recourse to tradition and past authorities like Aristotle. Descartes tells us of his realization that what science needed was a **new method**:

I was in Germany then, where the wars — which are still continuing there⁷ — called me; and while I was returning to the army from the coronation of the emperor, the onset of winter held me up in quarters where, finding no conversation with which to be diverted and, fortunately, otherwise having no worries or passions which troubled me, I remained for a whole day by myself in a small stove-heated room, where I had complete leisure for communing with my thoughts. Among them, one of the first that I thought of considering was that often there is less perfection in works made of several pieces and in works made by the hands of several masters than in those works on which but one master has worked. Thus one sees that buildings undertaken and completed by a single architect are commonly more beautiful and better ordered than those that several architects have tried to patch up, using old walls that had been built for other purposes. Thus these ancient cities that were once merely straggling villages and have become in the course of time great cities are commonly quite poorly laid out, compared to those well-ordered towns that an engineer lays out on a vacant plain as it suits his fancy.

In this metaphor of a town, Descartes is describing the shabby state of the natural sciences as he found them in the early 17th century. Aristotle had argued that each discipline — biology, meteorology, astronomy, etc. — should have its own distinct method or approach of pursuing its science. This resulted, Descartes felt, in a hodge-podge of science, lacking in both certainty and in order, and that the whole mess should be torn down and started anew:

And thus I thought that book learning, at least the kind whose arguments are merely probable and have no demonstrations — having been built up from and enlarged gradually by the opinions of many different people — does not draw as near to the truth as the simple reasonings that can be made naturally

⁶ Immanuel Kant, “An Answer to the Question: ‘What is Enlightenment?’” in *Berlinische Monatsschrift* 4 (1784): 481-94.

⁷ Descartes is referring here to the Thirty Years War (1618-1648), a Europe-wide religious war between Protestant and Catholic rulers that devastated the lands comprising modern-day Germany.

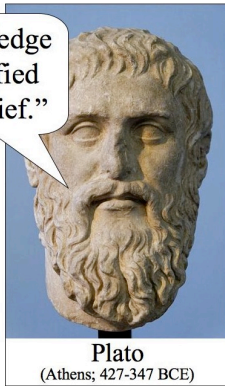
by a man of good sense concerning what he encounters. [Descartes, *Discourse on Method* (1637), translated from the French by Donald Cress]

CENTRALITY OF SELF KNOWLEDGE

There are two basic aspects to the modern conception of the self: the socio-political self as the autonomous and basic unit of society (the foundations of which were laid in the writings of Hobbes and Locke) and the metaphysical-epistemological self, understood as primary in both being and knowledge. This latter aspect is particularly indebted to Descartes' writings that claim our self-knowledge is more certain than any other knowledge we have, even knowledge of the physical objects around us. If I know nothing else, I at least know that I exist; and my knowledge of other things comes from my *ideas* of those things (that is, the images in my mind of rocks, trees, and other people). For Descartes, knowledge begins with the self, both as *knower* and as the *thing known*. The implications of this viewpoint are far reaching.

[14] KNOWLEDGE AND BELIEF

“Knowledge is justified true belief.”



Ever since Plato, knowledge has been understood to be “justified true belief.” To say that I *know* P is to say that: (a) I *believe* P, (b) I am *justified* in believing P, and (c) P is *true*. Let’s consider each of these necessary conditions in turn. To *believe* a proposition means to nod my head approvingly when the statement is uttered, to behave in the world as though it were true, and so on. If a proposition is *true*, we normally view this as a quality that is intersubjective (if it is true for one person, then it is true for all people), objective (if P is true, then it is true regardless of whether anyone believes P or not), and eternal (if P is ever true, then P is always true). Finally, to say that I am *justified* in believing a proposition is to say that I have good reasons or good evidence for believing P. A *reason* to believe, here, is different than a *cause* of that belief. To describe the **cause** of a belief is simply to say how you came to hold such a belief, and this might have been some “non-rational” cause, which as such says

nothing about the truth of the belief. Giving the **reason** for a belief, on the other hand, will justify the belief (“support its truth”), and thus will provide anyone else with a reason for holding the belief as well.

This characterization of knowledge fits well with how we discuss knowledge claims, as the following examples highlight.

KNOWLEDGE REQUIRES TRUTH

If “S knows P” then P has to be true. Someone might believe with all their heart that “Mars is inhabited by intelligent life” but, if it isn’t true, then they can’t be said to know this. Not many centuries ago, even educated people believed that the earth was motionless and at the center of the universe. If challenged on this point, I’m sure they would have insisted that they knew this was so; but we realize now that they were mistaken. They couldn’t have known that “the earth is motionless and at the center of the universe” because this statement is false.

Consider uttering the following statement about a person called Smith and some statement, P:

- (1) P is not true, but Smith knows P.

A moment’s reflection shows that this is absurd, because it violates the very meaning of ‘knows’.

KNOWLEDGE REQUIRES BELIEF

Knowledge also requires belief: if I don’t believe P, I can’t be said to know P.

- (2) Smith knows P, but he doesn’t believe P.

We sometimes speak about knowing something without believing it, but this is an unusual instance, and what we mean here is that we know that something is true, but we can't yet (emotionally) accept it. Perhaps you just won the lottery: you are beside yourself, you know you won (everyone says you did, you have the winning ticket in your hand, etc.), but you can't quite yet believe that it's true. At the other end of the spectrum, suppose you have just learned that your family has all been killed in an airplane crash: you know that it's true (the representative from the airline says it's true, the newspaper says it's true, etc.), but you can't yet adjust your inner life such that you can believe that it is true. Other than these exceptional instances involving sudden and extreme shifts in one's "cognitive landscape," we can say that **knowing P requires believing P**. On the other hand, the converse is not true: Believing P does not require knowing P:

- (3) I believe P, but I don't know P. (i.e., "... I don't know that P is true.")
- (4) Smith believes P, but he doesn't know P.

And this suggests the need for our last necessary condition of knowledge:

KNOWLEDGE REQUIRES JUSTIFICATION

- (5) Smith believes P, but he has no reason to believe it.
- (6) Smith knows P, but he has no reason to believe it.

Both of these statements might seem a little jarring, but (5) is something that we occasionally encounter: people who believe something "just for the heck of it" or because they "feel like it"; they choose to believe, even though the evidence of its truth is lacking. Statement (6), however, isn't just strange, it's absurd: it violates the meaning of 'knows'.

Believing something that just *happens* to be true isn't the same as knowing it. Knowledge is more than just a lucky guess. For instance, Willie Mays, who played baseball for the San Francisco Giants, hit 52 home runs during the 1965 season. Now suppose I ask Smith how many home runs Mays hit during that season. If Smith guesses '52', then he'll certainly be pleased with himself, but no one will want to say that Smith knew this baseball statistic; he was just guessing. The only way this could be knowledge is if we interpret this guess as part of some fairly reliable system. Sometimes guesses are "informed guesses," and if they are informed enough, then they would count as justified, and it would seem reasonable to speak here of knowing, and not just believing.

Justifying our beliefs is obviously a matter of degree and of interpretation. And it gets complicated. Beliefs justify other beliefs, and these beliefs form "justification chains." When I discover that the leftover pizza is missing from the kitchen counter, I conclude that my friend Bob ate it, and I justify this belief with several other beliefs that I hold: that Bob really likes pizza, that pizzas don't disappear on their own, and that Bob was the only other person in the house that day. Similarly, each of these justifying beliefs are themselves justified; for instance, my belief about Bob's fondness for pizza is based on repeated past observations of him eating pizza while rolling his eyes with pleasure, etc. etc. Even the simplest beliefs seem to have complex and branching justification chains. Every link in the chain is some belief, and most of these beliefs were not consciously entertained when I assented to the initial belief. For instance, when I believe some statement, I rarely (if ever) am aware of the many logical implications of that statement. (As an example of this, consider a belief you might have that a certain ball has a diameter of about four inches; although this belief immediately implies that the ball also has a volume of about thirty-three and one-half cubic inches, many people wouldn't be able to arrive at even a close guess regarding its volume.)

TWO METAPHORS FOR OUR BELIEFS: THE TREE AND THE WEB

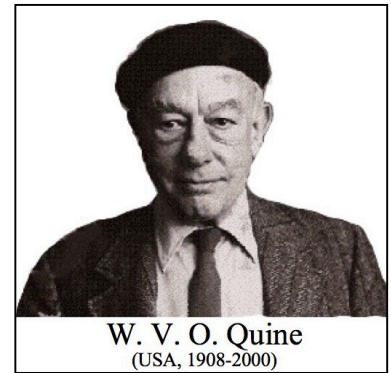
Over the years, two separate traditions have emerged regarding the way our beliefs get justified: foundationalism and coherentism. The foundationalist sees our system of beliefs organized like a tree, where the foundational belief (the trunk) justifies other beliefs (the limbs and branches), which justify still other beliefs (the twigs and leaves). Here the pattern of justification is straightforwardly linear. The coherentist, on the other hand, sees our system of beliefs organized like a spider's web, where each belief is connected to a number of other beliefs, and each belief is justified only insofar as it is "well-connected."

Knowledge, on the foundationalist account, is a formal system, beginning with a set of self-evident axioms (the tree trunk), from which are inferred all the other beliefs. Euclid's geometry is the paradigm of foundational systems, and because Descartes system of knowledge is also foundational, I will say nothing more of it here in order to flesh-out its main contender, coherentism.

COHERENTISM: QUINE'S WEB OF BELIEF

The "web of belief" model was developed by the contemporary Harvard philosopher **W. V. O. Quine** (1908-2000), and embodies his view that justification is a matter of *explanatory coherence*: a belief is justified to the extent that it coheres with other beliefs. The justification chains, in this model, go on indefinitely, constantly branching in such a way that it appears that every belief is eventually connected with every other belief, forming a **web of beliefs**.

Whenever we discover some inconsistency between two beliefs we hold, we will reject whichever belief is least connected to the rest of our beliefs. This is the *conservatism* of coherentism: Make no more changes to the web than necessary. Some beliefs lie at the *periphery* of the web (e.g., what you ate for breakfast this morning), while some beliefs lie closer to the center of the web (e.g., beliefs regarding the existence of God, the existence of an external world, who your parents are, whether you can trust your closest friends).⁸ The more peripheral a belief, the less it is connected to other beliefs, and therefore the more likely that it will be rejected if it is found inconsistent with another belief. In general, the more peripheral of two inconsistent beliefs will be the one given up.



Apart from being peripheral or central (which is a matter of degree), beliefs in the web are also either *particular* (i.e., beliefs about some individual in the world) or *general* (i.e., beliefs about some class of individuals in the world). Particular beliefs serve as *evidence* for general beliefs (e.g., "This swan is white" + "That swan is white" + ... etc., serve as evidence for the general belief that "All swans are white"); and general beliefs help *explain* particular beliefs (e.g., "All swans are white" explains why it is that this particular swan is white).

Except for beliefs on the very periphery of the web, a rejection or addition of any belief can easily lead to changes in many other beliefs. It is fortunately not often that we are forced to change the more central of our beliefs (e.g., that there is a God, or that the historical Jesus was a fake, or that the government can be trusted, or that an external world exists). When we are forced to change a central belief, we often feel as though our whole world were caving in — and, in a sense, the world *is* caving in, except that it is simply the world inside our heads (the way we order our information and beliefs about the world). Are all the beliefs in a web open to revision or rejection? Beliefs along the periphery will be revised or rejected in order to save beliefs closer to the center, but even the central-most beliefs are ultimately revisable, according to Quine.

Of course, all this talk of a web of belief assumes an "ideal believer," a person who keeps his intellectual house in order by revising or rejecting beliefs that do not cohere with the rest. But in fact, most or all of us hold a wide variety of beliefs, many of which are inconsistent with other beliefs that we hold, but that we have not discovered this problem because we have either not reflected enough on our beliefs, or the right opportunity or experience that would illuminate the inconsistency has yet to occur.

⁸ Although we must be careful to distinguish between belief-laden and emotion-laden statements. How many other beliefs would I have to give up if I discovered that a certain close friend had betrayed me?

[15] THE SEARCH FOR A FOUNDATION

HUMAN ERROR

When discussing knowledge, the first thing we must acknowledge is our ignorance. We make mistakes all the time. Socrates spent the better part of his life uncovering such ignorance. Because we believe many things, and because we are often careless, the odds are high that at least some of those beliefs are mistaken — but which ones? How might we best root out the mistakes? (Is it possible that *all* our beliefs are mistaken?) Descartes has a plan:

Suppose a man had a basket full of apples and, being worried that some of the apples were rotten, wanted to take out the rotten ones to prevent the rot spreading. How would he proceed? Would he not begin by tipping the whole lot out of the basket? And would not the next step be to cast his eye over each apple in turn, and pick up and put back in the basket only those he saw to be sound, leaving the others? In just the same way, those who have never philosophized correctly have various opinions in their minds which they have begun to store up since childhood, and which they therefore have reason to believe may in many cases be false. They then attempt to separate the false beliefs from the others, so as to prevent their contaminating the rest and making the whole lot uncertain. Now the best way they can accomplish this is to reject all their beliefs together in one go, as if they were all uncertain and false. They can then go over each belief in turn and re-adopt only those, which they recognize to be true and indubitable. [*Replies to the Seventh Set of Objections*]

EUCLIDEAN GEOMETRY AS THE MODEL OF FOUNDATIONALISM

Descartes would not have found a coherentist account of justification at all plausible. Justification, he felt, was a linear affair: You begin with those beliefs that are most certain and then build from there; and if you build carefully, then the beliefs at the top of the building will enjoy the same degree of certainty as those at the bottom. The coherentist model, on the other hand, provides neither top nor bottom, and the justification appears to be circular. On that account, so long as a group of beliefs support each other, then they are supposedly justified — and yet what prevents the whole group of beliefs from being mistaken?

Descartes wanted a secure foundation for the physical sciences, similar to the foundation that Euclid had won for geometry. For the past two thousand years, Euclidean geometry served as a model for how all human knowledge ultimately should be organized: one begins with axioms (Euclid had five) and deduces theorems from them (for example, that the interior angles of a triangle sum up to two right angles). Once a theorem has been deduced, it can be used for arriving at other theorems, and in this manner the entire edifice of geometry is built. Descartes was a skilled mathematician,⁹ and he admired Euclidean geometry for its simplicity, order, and certainty. His hope was to duplicate in the natural sciences what Euclid had accomplished in geometry.

EUCLID'S AXIOMS

- (1) A straight line is drawn between two points.
- (2) A straight line is extended continuously as a straight line.
- (3) A circle is described by any point and a radius.
- (4) All right angles are equal to one another.
- (5) Two lines at right angles to a third line will not touch.



Euclid
(Alexandria; c.325-c.265 BCE)

⁹ The great 18th century French mathematician d'Alembert (1717-1783) praised Descartes's work with these words: "What has especially immortalized the name of this great man was his application of algebra to geometry, one of the most far-reaching and felicitous ideas which the human mind ever had, and which will always be the key to the most profound research, not only in sublime geometry but also in all the physico-mathematical sciences" (from his Introduction to the first volume of his *Encyclopédie*).

CRITERIA FOR AN ADEQUATE FOUNDATION (FOR THE PHYSICAL SCIENCES)

The axioms, or foundational beliefs, for the physical sciences must be both certain and existentially significant. To be *certain*, a belief has to be self-evident or indubitable. To be *existentially significant*, the belief must imply that something exists *in re* (that is, outside the mind). These two criteria might be viewed as corresponding to the realms of thought and being, respectively. In geometry, axioms need only certainty, for they do not assume the existence of things outside the mind (geometry and arithmetic deal strictly with relationships of ideas in the mind). But the physical sciences deal with objects in the world; consequently, we must be able to prove from axioms in the foundation that something *does* exist independently of the mind. Tautologies like “A = A” are certain, but they tell us nothing about whether something exists. (It will turn out that even the mathematical sciences — not the axioms, but the theorems — are endangered by Descartes’ arguments in the *1st Meditation*, and are secure only once Descartes’ foundation is in place.)

DESCARTES’ METHODOLOGICAL DOUBT [§2]¹⁰

How do we arrive at our foundation? Descartes thought it was best discovered by what is now called “methodological doubt,” which Descartes characterized in his *Discourse on Method* as follows:

Never accept anything as true that I do not know evidently to be so; that is, carefully avoid precipitous judgment and prejudice; and include nothing more in my judgments than what presents itself to my mind with such clarity and distinctness that I have no occasion to put it in doubt.

In other words, “withhold judgment from whatever is dubitable.” This principle is best clarified by noting the three **propositional attitudes** that one might assume.

- (1) *believe* P: affirm that P is true.
- (2) *disbelieve* P: affirm that not-P is true (or: affirm that P is false).
- (3) *withhold judgment regarding* P: affirm neither P nor not-P.

Descartes’ principle tells us to set aside any proposition that can be doubted: don’t believe it, but don’t disbelieve it, either. Think of all the beliefs in your head— there are indefinitely many of them. For instance, you likely entertain the belief that you weigh less than 500 pounds; if so, you also have the belief that you weigh less than 501 pounds, and the belief that you weigh less than 502 pounds, and so on. You can see how these beliefs would start to add up, and so sorting through them one-by-one will be pretty time-consuming. Fortunately, Descartes found a way to examine entire groups of our beliefs at a time, and he was primarily concerned with two such groups: (1) beliefs based on sense-experience (which are important for the sciences, insofar as these sciences are *empirical*), and (2) mathematical beliefs (which are important for the science he hoped to develop, since the external world was to be fully describable in mathematical terms). These groups are defined by the method used in acquiring them. If he can show that a method is unreliable (because it leads, at least occasionally, to false beliefs), then he will set aside any belief acquired in that way.

Descartes’ scheme for re-building the sciences on certain foundations involved the following three steps: First analyze complex ideas into simple ideas (on simple and complex, see *1st Med.*, §7). Second, believe only those simple ideas, which are clear and distinct (ideas whose truth are self-evident; this is his principle of methodological doubt). This will leave us with a set of basic beliefs, all of which are certain. Finally, rebuild the sciences from this purified set of beliefs.

[Poem]

MEDITATION

Animals full of light
walk through the forest
toward someone aiming a gun
loaded with darkness.

That’s the world: God
holding still
letting it happen again,
and again and again.

— William Stafford
from *Animals Full of Light*

¹⁰ This and the following section-numbers (§) refer to paragraphs in Descartes’ *Meditations*.

CAN I KNOW ANYTHING WITH CERTAINTY?

In Meditation One, Descartes examines reasons for doubting the *in re* existence of things as well as the truth of mathematical propositions. Why doubt any of our beliefs about the sensory world or of mathematics? He first considers how sometimes our senses deceive us — for example, when a straight stick appears bent when half submerged in water, or when the moon appears to become smaller as it rises in the sky, or when we misidentify a distant object. But these are not good reasons for doubting, for instance, that you right now are reading this book. We are often deceived by sensations of distant objects, but not by those immediately before us and, as Descartes points out, we would have to be insane to think otherwise.

“Oh God! I could be bounded in a nutshell and count myself a king of infinite space, were it not that I have bad dreams.”

— Shakespeare, *Hamlet*

The dream argument [§5]

Descartes recalls, however, that he is a human being, and that human beings are given to sleeping; and when he sleeps he often dreams. And since “there are no certain indications by which we may clearly distinguish wakefulness from sleep,” I can never be absolutely certain that I am not now dreaming. Probably everyone has had dreams that are so lifelike, so “realistic,” that they are fooled in the dream into thinking that they are awake; you might even ask yourself during such a dream whether indeed it *is* only a dream, and upon reflection you may decide that you’re *not* dreaming (and you’ll continue to believe this until you wake up).

“Once upon a time, I dreamt I was a butterfly, fluttering hither and thither, to all intents and purposes a butterfly. I was conscious only of following my fancies as a butterfly, and was unconscious of my individuality as a man. Suddenly I waked, and there I lay, myself again. Now I do not know whether I was then a man dreaming I was a butterfly, or whether I am now a butterfly dreaming I am a man.”

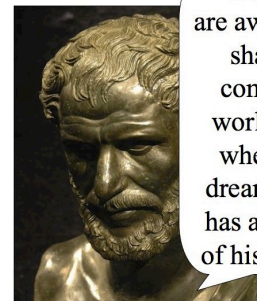
— Chuang-Tzu (c. 369-286 BCE)

This is the heart of Descartes’ dream argument. If I can’t be certain that I’m dreaming or awake, then I can’t be certain of any of my beliefs based on the experiences that I’m having (since much of what I experience in my dreams is false).

- (1) All my beliefs about the external world are based on sense-experience.
- (2) It is possible to have the same sense-experience while dreaming as while awake.
- (3) ∴ For any belief about the external world, I cannot be certain it’s based on a waking sense-experience. [1, 2]
- (4) Beliefs based on dreaming sense-experiences are often false.
- (5) ∴ I cannot be certain that any of my beliefs about the external world are true. [3, 4]

We can actually expand Descartes’ argument somewhat. My beliefs are in jeopardy not only if I am asleep right now, but also if I have some belief that is (unbeknownst to me) based on an experience I had while I was dreaming — either of these will infect my beliefs with doubt. For instance, most people have had realistic “dreams of betrayal” where a close friend mistreats you in some way. Upon waking, you realize that it was “all just a dream,” and yet your feelings towards that person are somewhat altered — you mistrust the person, or feel hurt, and your next encounter with the person is stilted or unnatural. Consciously you know that the friend didn’t betray you, but somewhere deep in your subconscious is still that feeling of hurt and mistrust. Eventually these bad (and mistaken) feelings get worked out; but what is striking here is how tenacious such dreamt experiences can be. Now consider all the dreams we have that lack the practical or immediate implications for us that the betrayal of a friend would have; with these dreams we don’t wake up confronting their truth with the reality of our waking experiences. How many trivial (but false) beliefs have we acquired while asleep which are never weeded out while awake? To what extent might some of our other beliefs be based on these false beliefs?

Given this dream argument, all my beliefs about the external world — that is, my beliefs about *the true causes of my sensory ideas* — can be doubted. But even if there are no tables and chairs, humans, etc., there may still be components of these items. While unicorns do not exist, for instance, horns and horses do; and so similarly, while we may be dreaming of



Heraclitus
(Ephesus; c.535-470 BCE)

“When we are awake we share a common world, but when we dream each has a world of his own.”

non-existent things, the parts of which they consist might still exist (e.g., colors and shapes). Descartes considers the most basic components to include the following: colors, sounds, tastes, and also the subjects of the mathematical sciences such as extension, shape, quantity, and spatial and temporal location. All of these clearly exist in the understanding as ideas. But they may not have any reality outside the understanding (i.e., in the external world), which is their cause — for *I* might be the cause of all these ideas. Also, since mathematical truths are normally considered to be merely relations among my ideas, and not relations among objects outside the understanding, these truths are not rendered dubious by the dream argument.

The evil demon argument [§§8-11]

Descartes presents next an even more devastating argument against the certainty of our beliefs. He notes that he is already given to believing in an all-powerful god, so it would not be so unusual to imagine some powerful god who is bent on deceiving us. Indeed, we often *are* deceived (insofar as we often make mistakes), and so there might indeed exist such an “evil demon.” Descartes does not believe that this is probable or likely, but he does believe that it is obviously *possible*, and with the possibility of this evil demon comes some serious epistemic challenges.

If an evil demon is constantly distorting and changing my memory, then any certainty of my past and of historical knowledge has been undermined, as well as any knowledge that requires a continuous process of some sort, such as counting; and so my certainty even of mathematical truths is undermined. A trivial example: in counting the sides of a square, I might arrive at a different number each time, or the same wrong number each time, due to either misremembering which number-sound I last uttered or thought, or in misremembering to which side of the square I last pointed (or “counted”). I could misremember with either series — young children do this all the time — making mistakes at either or both levels.

Descartes is not claiming that there *is* an evil demon, only that such a demon is *possible* — and that is all that is needed to make such beliefs dubitable.

You might think that such deception is perfectly harmless so long as it is consistent and systematic. For instance, whenever I count the sides of a square, I come up with four, instead of the five that are really there, etc. Why should we worry about this, so long as we always count four sides? But even such systematic error is undesirable for two reasons. First, if there really are five sides, then we are not getting nature right, and such an error will eventually cause us problems in our dealings with nature. Second, the demon could change these “truths” at will, such that tomorrow we might count five sides — that is, there is no guarantee that our “truths” will still be true tomorrow.

CONCLUSION OF 1ST MEDITATION: RADICAL SKEPTICISM [§9]

To be a skeptic is to doubt the knowability of something and therefore to withhold judgment about it. One might be a skeptic regarding the claim that God exists (and thus be an agnostic), or a skeptic about moral truths (and thus be a moral skeptic). To be a radical skeptic is to doubt our ability to know *anything*. “I am forced to admit that nothing that I used to believe is beyond legitimate doubt.”

[16] ON THE EXISTENCE AND NATURE OF THE SELF

COULD I BE NOTHING MORE THAN A PART OF A DREAM?

Is it possible that I might simply be part of someone else’s dream or imagination, and nothing more? Consider the following passage from Lewis Carroll’s *Through the Looking Glass* (1872). Here we find Alice speaking with Tweedledum and Tweedledee:

After a pause, Alice began, “Well — *both* were very unpleasant characters—” Here she checked herself in some alarm, at hearing something that sounded to her like the puffing of a large steam-engine in the wood near them, though she feared it was more likely to be a wild beast. “Are there any lions or tigers about here?” she asked timidly.

“It’s only the Red King snoring,” said Tweedledee.
 “Come and look at him!” the brothers cried, and they each took one of Alice’s hands, and led her up to where the King was sleeping.

“Isn’t he a *lovely* sight?” said Tweedledum.
 Alice couldn’t say honestly that he was. He had a tall red night-cap on, with a tassel, and he was lying crumpled up into a sort of untidy heap, and snoring loud — “fit to snore his head off!” as Tweedledum remarked.

“I’m afraid he’ll catch cold with lying on the damp grass,” said Alice, who was a very thoughtful little girl.

“He’s dreaming now,” said Tweedledee: “and what do you think he’s dreaming about?”

Alice said “Nobody can guess that.”

“Why, about *you!*” Tweedledee exclaimed, clapping his hands triumphantly. “And if he left off dreaming about you, where do you suppose you’d be?”

“Where I am now, of course,” said Alice.

“Not you!” Tweedledee retorted contemptuously. “You’d be nowhere. Why, you’re only a sort of thing in his dream!”

“If that there King was to wake,” added Tweedledum, “you’d go out — bang! — just like a candle!”

“I shouldn’t!” Alice exclaimed indignantly. “Besides, if *I’m* only a sort of thing in his dream, what are *you*, I should like to know?”

“Ditto,” said Tweedledum.

“Ditto, ditto!” cried Tweedledee.

He shouted this so loud that Alice couldn’t help saying “Hush! You’ll be waking him, I’m afraid, if you make so much noise.”

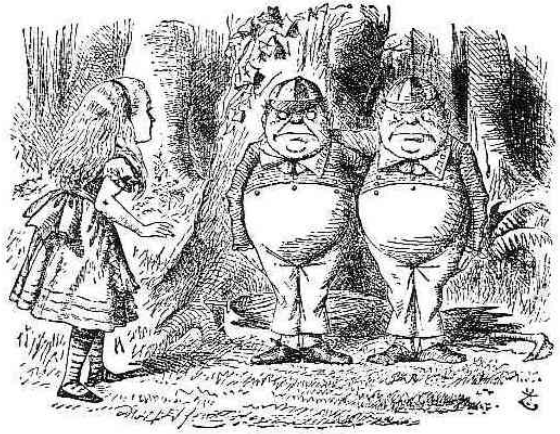
“Well, it’s no use *your* talking about waking him,” said Tweedledum, “when you’re only one of the things in his dream. You know very well you’re not real.”

“I *am* real!” said Alice, and began to cry.

“You won’t make yourself a bit realer by crying,” Tweedledee remarked: “there’s nothing to cry about.”

“If I wasn’t real,” Alice said — half-laughing through her tears, it all seemed so ridiculous — “I shouldn’t be able to cry.”

“I hope you don’t suppose those are *real* tears?” Tweedledum interrupted in a tone of great contempt.



Stories like this tend to leave us feeling dizzy, as though the author has made some logical joke, and is now waiting to see if we notice it. Is the above story absurd? Although I can imagine that everyone else is simply a part of my own dream or imagination, and that I alone exist, can I imagine that *I* am part of someone else’s dream?

If I weren’t *substantial* — that is, the center or source of power or activity — then I wouldn’t be able to have a point of view or to have experiences. But I *do* have a “point of view,” I *am* a “locus of experience,” and as such my existence seems to enjoy some independence — and thus not within the control of any other mind (this is my *volitional* or willing self).

DESCARTES’ FOUNDATION [MEDITATION TWO, §§1-3]

Descartes discusses the existence and nature of the self in his Second Meditation. First, he speaks of needing an “Archimedean point,” some foundation upon which to stand. He finds this with the proposition: “I think, therefore I am” (Latin: *cogito ergo sum*). This proposition is indubitable, for in the very act of doubting it, its truth is established, since there must be *something* doing the doubting, and that something is the existing self. As he wrote in the *Discourse*,

I resolved to pretend that everything that had ever entered my mind was no more true than the illusions of my dreams. But immediately afterward I noticed that, during the time I wanted thus to think that

everything was false, it was necessary that I, who thought thus, be something. And noticing that this truth — *I think, therefore I am* — was so firm and so certain that the most extravagant suppositions of the skeptics were unable to shake it, I judged that I could accept it without further scruple as the first principle of the philosophy I was seeking. [*Discourse on Method*, pt. 4, transl. from the French by Donald Cress]

This *cogito ergo sum* will be true despite all of the skeptical worries raised earlier. I am certain that I exist even if I am *dreaming* (since there must be something doing the dreaming). I am certain that I exist even if I am *being deceived by an evil demon* (since there must be something being deceived). I am certain that I exist even if I am *a mere brain in a vat* (since I am still thinking and experiencing, even if I am unsure of the form or whereabouts or even existence of the bodily support of this thinking).

DOES THE COGITO MEET DESCARTES' CRITERIA?

Recall that Descartes wanted a foundation for the natural sciences, that is, a foundation upon which he could build all his beliefs about the world. Such a foundation would have to meet two criteria. It would have to be *certain* (i.e., self-evidently true) and it would have to be *existentially significant* (i.e., it must imply the existence of something *in re*). The *cogito* meets the criterion of certainty for the reasons given above: there is no circumstance where- in I can imagine that it is false. I *must* exist, since even *doubting* its truth *proves* its truth.

Whether it passes the criterion of existential significance is perhaps less obvious. Does it prove that something exists outside the mind or intellect? Ideas exist in the mind; does the *cogito* prove the existence of more than just ideas? Well, yes, it proves the existence of something having those ideas, namely, the existence of a mind. This mind exists as a real thing, *in re*, and not as a mere idea in someone else's mind. I am a substance, a thing with

SUPPOSE YOU WERE A YOUNG GIRL ...

“And if he left off dreaming about you,
where do you suppose you'd be?”

— Lewis Carroll, *Through the Looking Glass*

Suppose you were a young girl named Alice, and you and your pet cat have lived normal, happy, everyday lives for as long as either of you can remember. You go to school, you have dinners with your family, you spend time with your friends, and so on. And then one day your teacher hands you a book entitled *This is Your Life*.

“Could you write a book report on this, and present it to class next week?” he asks.

“Of course,” you reply, and you start reading as soon as you get home that afternoon.

It's not an especially interesting book, but better than some you've had to read, and there's also something vaguely familiar about it. “Perhaps I've read so many books, they're starting to repeat themselves...,” you muse. Towards evening, after an early dinner with your family, you lie down on the living room sofa with your book. The lowering sun is a deep red, filling the room with its warm glow; your cat lies curled in the hollow of one knee. Chapter Four begins:

“Could you write a book report on this, and present it to class next week?” Mr. Ascot asked Alice. He was always giving her interesting books, hoping to stretch her mind.

“Of course,” she replied, “What's it about?” He hesitated, admitted he wasn't quite sure and that he hadn't read it himself, but that it came highly recommended. “Whatever,” thought Alice, “More work, and I'll never have time to go boating this weekend.”

Alice found the book not especially interesting, but better than many she'd suffered through. Later that evening, after an early dinner with her family, she arranged herself on the living room sofa, her cat jumped from the floor and nestled itself in the hollow of Alice's knee. The deep red sun filled the room with its warm glow. She began to read chapter four.

Alice looked up from her book, wary and somewhat confused. Was she reading or was she living? Was she alive or was she just a character in a book? Wondering what she might do next, she turned back to the book in her lap:

But before she could turn the page, her eyes grew heavy, and she rested her head against a pillow, stroking her cat and murmuring, “Life is at times too strange... Who can really make sense of it?...” — and fell asleep.

causal powers, a thing that can *have* and *produce* ideas. Mere ideas cannot have or produce other ideas, because ideas are only properties of minds (they can exist only in or with a mind, never by themselves — just as the property of “weighing 6 pounds” can exist only as embodied in some thing, and never by itself independently of any physical object).

WHAT AM I? [§§4-8]

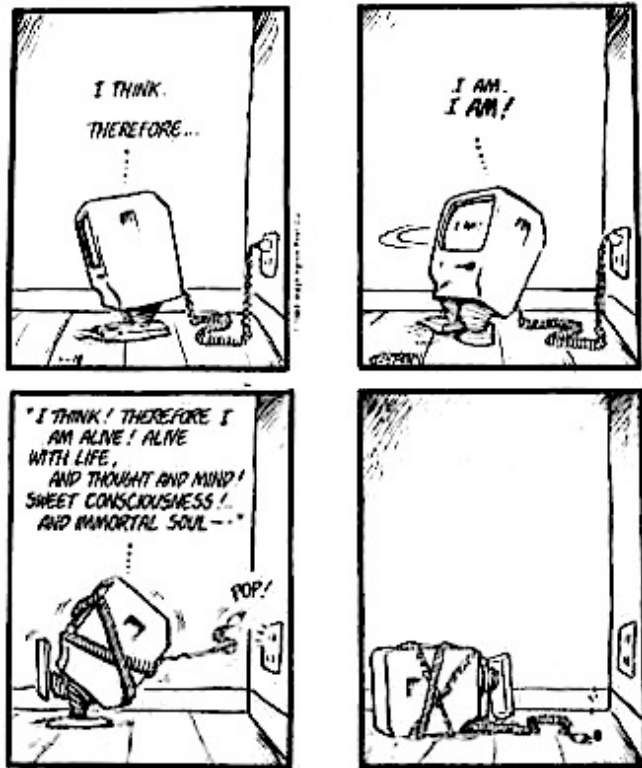
Although I now know *that* I am, I still don't know *what* I am. Descartes first suggests that I am a body and a soul; that is, after all, how we traditionally think of the self. But then I stop to think: I know I have a body, but what's this talk of soul? Everyone agrees that we have bodies, but there seems to be vast disagreement as to the existence of souls, which seem to be a matter of religious belief, and thus open to a great deal of disagreement [§5]. But as we noted in the *First Meditation*, the existence of bodies is highly dubitable: it might be all a dream, or some kind of deception. Therefore, it isn't clear that I am a body.

The certainty that I have about my existence is *not* certainty about my being a body, since I might be wrong about having or being a body; but I can't be wrong about my existence. So it seems that all that is left is that I am a thinking thing (*res cogitans*) — which, after all, is something rather like a soul, so we may as well call it that. Given the demon hypothesis, I can doubt that I have a body, but I can't doubt that I am a thinking thing, a mind or soul. Likewise, certain attributes of the soul (*viz.*, nutrition, walking, sensation) are useless without a body. *Thinking* alone is an attribute, which cannot be separated from me. (At this point, we need to leave aside all religious connotations of the word ‘soul’; all that Descartes has proven is that the essential self is that which thinks, remembers, desires, etc. — and, to be exact, he hasn't yet proved that this thinking thing is *not* a body.)

By the Sixth Meditation, Descartes will conclude that he, as a human being, is a composite of a mind (an immaterial “thinking thing”) and a human body (a material, divinely-crafted machine). He is able to arrive at this conclusion only once he has established the trustworthiness of certain kinds of belief, however, so at this position, in the Second Meditation, Descartes is certain only of one thing: that he exists as a mind.

CONCLUSION OF THE SECOND MEDITATION: SOLIPSISM

Descartes has escaped from the radical skepticism of the *First Meditation*, but not by very far. He now knows that he exists, as a mind or thinking thing, but that is all he knows. That leaves him in a state of **solipsism**. ‘Solipsism’ comes from the Latin *solus* [= alone] and *ipse* [= self]. This is the view that only the self exists, that it is all alone in the universe — that the physical universe is nothing more than the ideas in his mind.



[17] REBUILDING THE WORLD

FIRST PROOF OF GOD'S EXISTENCE (3RD MEDITATION, §§16-27)

In the *Third Meditation*, Descartes takes stock of all that he finds in himself as a thinking thing. These thoughts fall into three groups: *ideas* (or “images of things”; he also uses the word ‘idea’ in a more general way, as “whatever is immediately perceived by the mind”), *emotions*, and *judgments* (such as when I judge that two ideas — red and sour — are caused by the same thing, namely, a cherry). When he considers the many ideas in his mind, he notes that they might have any of three origins: they might be *innate* (coming from within the mind, but not as an act of choosing or volition — for example, my sense of what “thing” is in general, or what “truth” is), they might be *fictitious* (coming from within the mind as an act of will, and thus clearly “produced by me,” as when I imagine a unicorn, or a three-legged pink elephant), or they might be *adventitious* (which seem to come from without me, such as when I hear a noise or see the sun).

Descartes considers his ideas of human beings, of animals, of angels, of various physical objects, and of God, and he notes that, while he could himself be the cause of most of these ideas (thus, they could be fictitious in some fashion), he could not be the cause of his idea of God. The idea of God is of a perfect, infinite substance, and as such this idea has more “presentational reality” than the self has “formal reality” (to use the technical terms Descartes employs here).

How does this argument work? First, Descartes notes that an effect can't have more “reality” in it than its cause (to claim otherwise is to claim that something can come from nothing). For example, imagine a billiard ball rolling across the table and striking another ball. The second ball is not going to roll away at a faster rate than the first ball, nor with greater force: the effect can't exceed the cause. Or again, consider a construction worker carrying under his arm a roll of blueprints for the Empire State Building. It would be incredible to think that this worker actually was the cause of that set of blueprints; his “formal reality” is not as great as the presentational reality of those blueprints. Descartes argues that we are similarly situated with respect to our idea of a perfect God: we could never be the cause of such an idea. Only God has enough formal reality to cause my idea of God. Since the idea of God exists, I know that God exists. The idea of *infinite substance* cannot be caused by a finite substance, for the idea of infinity is not simply “the absence of limits.” I understand the finite only by first understanding the infinite; consequently, my understanding of God must be prior to my understanding of myself.

Descartes now believes that he has proven the existence of God, and thus has escaped from the solipsism of the *Second Meditation*. He now knows that at least two substances exist: himself and God. Descartes now extends this proof of God's existence with what many scholars consider to be a second distinct proof.

SECOND PROOF OF GOD'S EXISTENCE (3RD MEDITATION, §§29-36)

From where do I derive my existence? Where did I come from? Descartes notes that he couldn't have been self-created (that is, be the source of his own existence), for a self-caused being would be perfect, and he is clearly not perfect, therefore he is not self-caused.

Even if, as a self-created being, I was unable to *perfect* myself, I still would not have deprived myself of so many easily acquired sciences, that I lack. For instance, I know about geometry, but I lack knowledge and the memory of most of its content. But even if I assume that I have *always* existed as I now am and so was never created, I *still* need something to *conserve* me. The nature of time shows that conservation requires as much power as actual creation: “the distinction between creation and conservation is solely a distinction of the reason” [§31]. And so I need only ask if I am *now* in possession of such a power: if I were, I would be conscious of it, but I am conscious of no such power, therefore, I do not have the power to conserve myself, nor do I have the power to create myself [§32]. And we likewise cannot allow an infinite regress of causes, as we have to account for my *conservation*, and not just

some original creation [§34].¹¹ Nor could I have been caused by something less perfect than God, since I have in myself the idea of God, so whatever causes me must be able to cause the idea of God as well, and only God can cause that. So God is the only possible cause left. Thus, from the fact that *I* exist, I can prove that God also exists.

PROBLEM OF INTELLECTUAL ERROR (4TH MEDITATION)

Now it would seem that if God created me, then I should never fall into error, since God would not have created something imperfect (for this would suggest that God is either impotent or malicious, which he is not). Consequently, the mental faculties that I use to form beliefs about my surroundings must indeed be reliable, and so I ought to be able to trust my beliefs that there is indeed an external world, etc.

This strategy implies that I never err; for if everything in me comes from God, then it doesn't seem possible for me ever to err. But this is surely false, for I *do* err. I often make mistakes, and so it seems either that I was wrong in believing that God is my creator, or else God is perhaps imperfect in some way, despite the reasons given above to the contrary. This raises the general question of how it is possible that I can ever have false beliefs, if indeed I am created and conserved by a perfect God. In the Fourth Meditation, Descartes sets out to explain how human error is consistent with the existence of a perfect God (note how this is a special kind of theodicy).

Because I am not infinitely perfect (which only God is), there is some "privation" or "negation" to my being, and this privation (rather than the positive part of me, which God created) is the cause of my error. The human is like a computer lacking a chip; what chips it has are faultlessly made, and so are not themselves the source of any error. But occasionally the computer will make errors because of the missing chip.

What is the nature of this privation? It's a lack of knowledge, although God is not to be blamed here, for he gave me all I need to avoid falsehood and error. *Understanding* is "the thing by which I grasp the ideas about which I form judgments" [§9]. I am limited in the number of ideas I have, and the understanding itself is "very small and restricted" [§10]. But by itself, the understanding will never lead me into error. *Will* is the ability "either to do or not to do, to affirm or deny, to seek or avoid. Or better: having a will amounts to being inclined to do or not to do... what the understanding offers." The will does not seem to be restricted in any way; it is equal to God's. As such, each faculty is faultless; the fault lies rather in the combination. The will is a perfect thing of its kind, and the understanding does not introduce error: when I understand something, I understand it correctly and without deception. Error is a result of the limitless will going beyond the limits of the understanding [§11]. "In these misuses of freedom of choice lies the deprivation which accounts for error" [§14].

Having shown that his faculties are without fault if used correctly, Descartes concludes that he can avoid error simply by believing only those ideas that are clear and distinct. He mentions this in the "Synopsis" to the *Meditations*:

Moreover, it is required that we know that everything that we clearly and distinctly understand is true, in precisely the manner in which we understand them. This could not have been proven before the Fourth Meditation.

THE NATURE AND EXISTENCE OF MATTER (5TH & 6TH MEDITATIONS)

Descartes argues for three points in the *Fifth Meditation*: (1) that our ideas of mathematics are innate; (2) that these mathematical ideas constitute the essence or nature of body (the material world); and (3) that our knowledge of

CLEAR AND DISTINCT IDEAS

"I term that idea *clear* which is present and apparent to an attentive mind... but the *distinct* idea is that which is so precise and different from all other objects that it contains within itself nothing but what is clear."

Descartes, *Principles of Philosophy*, #45.

¹¹ Consider Aquinas's distinction between accidental and essential causal series (discussed below). The original creation could be part of an accidental (and infinitely long) series, but conservation involves an essential (and finite) series.

God's existence is as certain as our mathematical knowledge (this is Descartes' "ontological" argument for God's existence).

In the *Sixth Meditation*, Descartes reviews what we now know and why we know it. I know that my essence is a thinking thing (for that is the one characteristic that I cannot separate from the conception of myself), and that this thinking thing is distinct from any bodies that might exist. But just as my "mental abilities" suggest that I am a thinking substance, my "physical abilities" (e.g., the seeming ability to move about) suggest that there might be some body to which my mind is closely attached. What is more, my sensory ability to passively receive ideas (that is, sensations) strongly suggests that there are physical bodies in the world causing these sensations. Why? Because they are not under the control of my will, and therefore arise from something outside of my will (that is, from outside of me); and they can't come from God since God isn't a deceiver (I am so strongly disposed to believe in the physical objects, that God would in fact be deceiving me if he were the sensations' source).

But apart from this, I have found that all of my clear and distinct ideas are reliable; and it turns out that I do in fact have such ideas of physical objects, namely, all my ideas of objects that are expressible mathematically. So I do in fact know that there are material objects outside me, although I am aware that these objects are not always as they first appear to me (for instance, properties like color are not really in the objects). Finally, I know that one of these material objects stands in a special relationship to me as *my* body, for I have a clear notion of it standing under my will in a way that no other bodies do; indeed, "I am very closely united to it, and so to speak so intermingled with it that I seem to compose with it one whole."

SUBSTANCE AND ATTRIBUTE

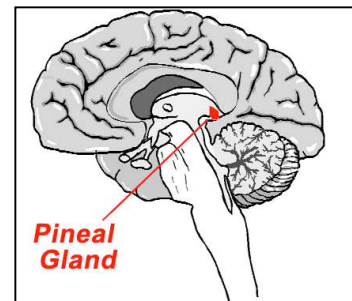
'Substance' and 'attribute' have had many different meanings throughout the history of philosophy, but they typically mean something like this: Whatever is a **substance** is that which is most real, something which can exist by itself, independently of anything else. So, for instance, in the Cartesian tradition, God was considered to be the "primary substance" (since God is most real, and requires nothing else for its existence), and matter and mind are "secondary substances" (since they require only God for their existence). Substances are thought of as being "causally efficacious" (they can *do* things), they are "centers of activity." An **attribute**, on the other hand, is simply a quality or property of a substance. Attributes exist only insofar as their underlying substance exists. For Descartes, *mind* is a substance that thinks, and its attributes include *sensations, ideas, memories, and feelings*.

Cartesian Dualism

Thus for Descartes there are two kinds of substances in the world: **thinking substance** (where each mind is a distinct mental substance) and **extended substance** (where all physical objects are made of this matter). The essences or core natures of these two substances are that of thinking and of being extended in space (having some size, shape, and being in motion or at rest).

Human beings are a complex whole composed of a mind associated with a complicated material machine. These two substances interact, according to Descartes, by way of the pineal gland, and all material bodies move according to the Galilean laws of motion. He explains this in his last writing, *The Passions of the Soul* (1649):

We need to recognize also that although the soul is joined to the whole body, nevertheless there is a certain part of the body where it exercises its functions more particularly than in all the others.... a certain small gland situated in the middle of the brain's substance and suspended above the passage through which the spirits in the brain's anterior cavities communicate with those in its posterior cavities. The slightest movements on the part of this gland may alter very greatly the course of these spirits, and conversely change, however slight, taking place in the course of the spirits may do much to change the movements of the gland (Pt. 1, sect. 31).



Descartes goes on to note that the pineal gland is the best candidate to play this role of mind/body intermediary because...

all the other parts of our brain are double, as also are all the organs of our external senses — eyes, hands, ears, and so on. But in so far as we have only one simple thought about a given object at any one time, there must necessarily be some place where the two images coming through the two eyes, or the two impressions coming from a single object through the double organs of any other sense, can come together in a single image or impression before reaching our soul, so that they do not present to it two objects instead of one (sect. 32).

[18] AFTER DESCARTES

Skepticism existed long before Descartes was born, and it has continued long after his death. The principle target of skeptics has always been **dogmatism**, a kind of “epistemic rashness” where beliefs are held to be true on the basis of inadequate evidence. Skeptics have appeared in many shapes, just as there are many brands of dogmatists. Much skepticism is aimed at the metaphysical dogmatism of various philosophical schools; other skeptics were concerned primarily with religious dogma, although these were just as likely to be working in the defense of religion (the so-called fideists, like Bayle, Hamann, and Kierkegaard) as in defense of atheism (such as Diderot, d’Alembert, Hume, or Voltaire).

While the historical evidence suggests that his claims of religious belief were sincere, Descartes’ writings routinely swayed readers toward atheism and a deep religious skepticism. Most were convinced by the arguments of the *First Meditation*, and by the *Cogito* argument of the *Second Meditation*, but Descartes arguments for God’s existence and his subsequent rebuilding of the physical world found fewer supporters. So Descartes ultimately left many of his readers in a state of solipsism. Without the guarantee of a benevolent God who has given us reliable faculties for perceiving and having knowledge of the world, we cannot be sure of the world’s nature, or even if it exists. Consequently, skepticism of the external world became a pervasive problem for philosophy in the centuries following Descartes. This, in concert with certain other events of the day, led to that vertiginous lack of center and focus that Yeats described so well in his poem, “The Second Coming.” That rough beast slouching toward Bethlehem might well have been called Cartesianism.

Several issues were raised in this examination of Descartes, the first being the nature of knowledge and the problem of skepticism (What is knowledge? Can we know anything with certainty?). Two others are the nature of human beings (Are we minds? Are we minds plus bodies? What is a mind?) and the nature of the external world (What is it, and how do we obtain knowledge of it?). We will now set aside the problem of skepticism as such and consider in more detail the nature of this external world and our knowledge of it. In particular, we will consider the theoretical underpinnings of *perception*, or the experiencing of sensations (“simple ideas”) of physical objects, first by examining John Locke’s views on perception (which, for our purposes, are equivalent to Descartes’), and then considering George Berkeley’s criticisms of the

[Poem]

THE SECOND COMING

Turning and turning in the widening gyre
The falcon cannot hear the falconer;
Things fall apart; the center cannot hold;
Mere anarchy is loosed upon the world,
The blood-dimmed tide is loosed, and everywhere
The ceremony of innocence is drowned;
The best lack all conviction, while the worst
Are full of passionate intensity.

Surely some revelation is at hand;
Surely the Second Coming is at hand;
The Second Coming! Hardly are those words out
When a vast image out of *Spiritus Mundi*
Troubles my sight: somewhere in sands of the desert
A shape with lion body and the head of a man,
A gaze blank and pitiless as the sun,
Is moving its slow thighs, while all about it
Reel shadows of the indignant desert birds.
The darkness drops again; but now I know
That twenty centuries of stony sleep
Were vexed to nightmare by a rocking cradle,
And what rough beast, its hour come round at last,
Slouches towards Bethlehem to be born?

— William Butler Yeats, 1921 (1865-1939)

Cartesian/Lockean account of perception. Looking ahead a bit further, we will then return to examine Descartes' conception of the mind and compare it with current work in the philosophy of mind (including work on artificial intelligence).

READINGS

THE CIRCULAR RUINS

Jorge Luis Borges

Jorge Luis Borges (1899-1986) was born in Buenos Aires to Argentinean parents, but his father taught at an English school and the young Borges learned English before he learned Spanish. He grew up to be one of the leaders of the modernist Ultraist movement in South American letters. In 1914, near the outbreak of World War I, his family took him to Geneva, where he learned French and German, and eventually received his B.A. After returning to Buenos Aires in 1921, he began his writing career, although not until 1938 did he develop the style for which he is best known; in that year, the year his father died, Borges suffered a severe head wound and subsequent blood poisoning, which left him near death, temporarily bereft of speech, and fearing for his sanity. This traumatic experience appears to have freed in him his most distinctive creative forces, and the next eight years saw the writing of his best short stories, those later collected in the series of Ficciones ("Fictions") and the volume of English translations entitled The Aleph and Other Stories, 1933-69. A congenital disorder that had blinded his father also blinded him by the mid-1950s, forcing him to dictate his writing, thus joining the ranks of such literary geniuses as Homer and Milton. He died in Geneva.

The following story was originally published as "Las ruinas circulares" in the journal Sur in December 1940, and in the following year in a collection of Borges' short stories, The Garden of Forking Paths (Spanish title: El jardín de senderos que se bifurcan).

"And if he left off dreaming about you..."
Through the Looking Glass, VI

No one saw him disembark in the unanimous night, no one saw the bamboo canoe sinking into the sacred mud, but in a few days no one did not know that the taciturn

man came from the South and that his home had been one of those numberless villages upstream in the deeply cleft side of the mountain, where the Zend language has not been contaminated by Greek and where leprosy is infrequent. What is certain is that the grey man kissed the mud, climbed up the bank without pushing aside (probably without feeling) the blades which were lacerating his flesh, and crawled, nauseated and bloodstained, up to the circular enclosure crowned with a stone tiger or horse, which sometimes was the color of flame and now was that of ashes. This circle was a temple, long ago devoured by ancient fires, profaned by the miasmal jungle, and whose god no longer received the homage of men. The stranger stretched himself out beneath the pedestal. He was awakened by the sun high overhead. He was not astonished to find that his wounds had healed; he closed his pallid eyes and slept, not through weakness of flesh but through determination of will. He knew that this temple was the place required for his invincible purpose; he knew that the incessant trees had not succeeded in strangling the ruins of another propitious temple downstream which had once belonged to gods now burned and dead; he knew that his immediate obligation was to sleep. Toward midnight he was awakened by the disconsolate shriek of a bird. Tracks of bare feet, some figs and a jug warned him that the men of the region had been spying respectfully on his sleep, soliciting his protection or afraid of his magic. He felt a chill of fear, and sought out a sepulchral niche in the dilapidated wall where he concealed himself among unfamiliar leaves.

IDEAS AND THEIR CAUSES

“WHEN I SEE A BIRD THAT WALKS LIKE A DUCK
AND SWIMS LIKE A DUCK AND QUACKS LIKE A DUCK,
I CALL THAT BIRD A DUCK.”

— Richard Cardinal Cushing

[19] THE PHYSIOLOGY OF PERCEPTION

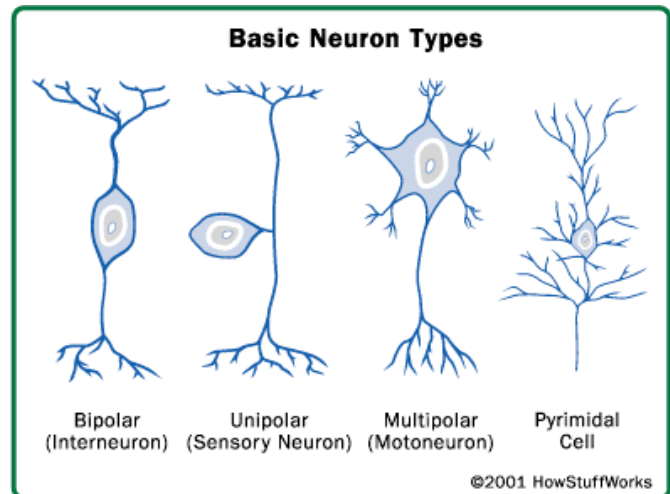
Perception is our window on the external world. Or to be more precise: Perception is our point of contact with the external world. To follow this thought a step further, we might say that perception *is* the external world — it is that point where the self rubs up against something else.

Physical stimuli — such as light rays striking the retina in our eyes, air vibrations striking the tympana in our ears, pressure against our skin, etc. — are changed into a series of chemical reactions that cascade down our nerves as “nerve impulses,” eventually reaching our brain where they are “interpreted” and we “have an experience” — such as seeing something green, hearing a dog bark, feeling someone sneeze on the back of our neck, etc. These nerve impulses move at roughly the speed of sound along your nervous system, with a frequency anywhere between 5 and 800 impulses per second (the stronger the physical impulse, the higher the frequency of nerve impulses).

Each sense organ involves some kind of **transducer**, that is, an organ that can convert one kind of physical energy into, ultimately, the chain of chemical events that makes up a nerve impulse. For instance, the retina of the eye has transducers that are sensitive to light, insofar as they can convert light-energy into a nerve impulse.

We commonly think of perception as involving our five senses — sight, sound, taste, smell, and touch — but in fact there are three separate sensory systems — the proprioceptive, the interoceptive, and the exteroceptive — which are defined by the source of the physical stimulus.¹

The **proprioceptive** sensory system receives physical impulses from the action of the body and provides information on its status. This includes *vestibular information* (that is, the static position of the head with respect to gravity, and linear or rotational movements of the head) and *kinesthetic information* (stimuli arising from muscles, tendons, joints — in general, information on the position of limbs); these tend to be mechanical transducers. Much of the proprioceptive input is processed in a part of the brain that does not result in conscious awareness. The **interoceptive** sensory system receives physical impulses from internal organs and viscera, and here there are sensitivities to pain, pressure, and temperature.



¹ These three systems were first distinguished and described by C. S. Sherrington in *The Integrative Action of the Nervous System* (1906), which earned him the Nobel Prize for Physiology/Medicine in 1932.

Finally, the **exteroceptive** sensory system — which includes our traditional five senses — receives physical impulses from outside the body, providing information of external events. The transducers in the retina of the eyes are *rods* and *cones* that are sensitive to light (electromagnetic radiation within a certain band of frequencies). The tongue, palate, and nose have transducers sensitive to certain kinds of chemicals. There are fungiform papillae on the front of the tongue, foliate papillae on the sides, and circumvallate papillae on the back. Each of these responds to the five “qualities of taste” (viz., sweet, salty, sour, bitter, and *umami*), but their respective sensitivities differ. There are also chemical transducers in the olfactory mucosa of the posterior nasal cavity.

Ears have mechanical transducers: they convert mechanical energy into nerve impulses. The human ear can hear sounds from about 20 Hz up to 20,000 Hz,² and is most sensitive to sounds at 2000 Hz (for comparison, middle C on the piano is 256 Hz, each wave being about four-feet long at room temperature). At this pitch, the ear reaches the practical limitations of sensitivity to air vibrations: a movement of the eardrum of less than 1/10 the diameter of a hydrogen atom can result in an auditory sensation. Were the ear any more sensitive, we would hear a constant roaring sound from the random Brownian motion of air molecules bouncing against the eardrum.³

The “sense of touch” is actually a collection of different senses, each with their own kind of transducer sensitive to a different kind of physical impulse. For instance, the organs of Ruffini are sensitive to heat greater than 45° C, the bulbs of Krause are sensitive to cold, Meissner’s corpuscles are sensitive to pressure, and a neuron specific to itch was finally located in the early 1990s.⁴

Other Animals

Of course, not all animals have the same sort of sensory organs. Bees, for instance, are able to see certain frequencies of ultraviolet radiation, as well as the normal visible spectrum of light energy (we call the extra color that they can see “bee purple”). Many animals have transducers for converting barometric pressure into nerve impulses (pigeons, various diving birds, sharks, etc., have a small vesicle in the ear for this purpose). Many fish (including sharks) have organs sensitive to electrical currents (called “ampullae Lorenzini”), distributed over their body surface and often concentrated in the region of the head. Orientation to magnetic north has been found in bacteria, flatworms, and snails, and various birds and bees use this sensitivity to magnetic north in their navigation (this sensitivity may also be present in human beings). And unlike many humans, mice can’t stand the taste of Diet Coke. So the “external world” can appear quite differently to different kinds of animals, if only because their sense organs are different.

[Poem (haiku)]

In this world
we walk on the roof of Hell
gazing at the flowers.

— Issa (1763-1827)

All nerve impulses “look the same”

The nerves that carry information throughout our bodies consist of linked chains of individual neurons. A neuron is a nerve cell, and the information gets passed from neuron to neuron: that’s how your brain gets your toes to wiggle, and how the pain in your finger gets experienced “by the brain.” One thing to keep in mind, however, is that all nerve impulses “look the same.” They are just electrical charges carried on ions (generally potassium or sodium) passing across the neuron’s membrane, thereby changing the electrical potential. You can think of neurons as copper wires carrying electrical signals down the line, with a switch at the end of each nerve that determines whether the electrical signal will be passed to the next. But whether you are seeing a red, red rose, or smelling some rotting compost, or listening to a string quartet, or feeling your way down a dark alley — all that information streaming to your brain is coming in the form of electrical impulses, and these impulses do not smell, they have no color, they make no

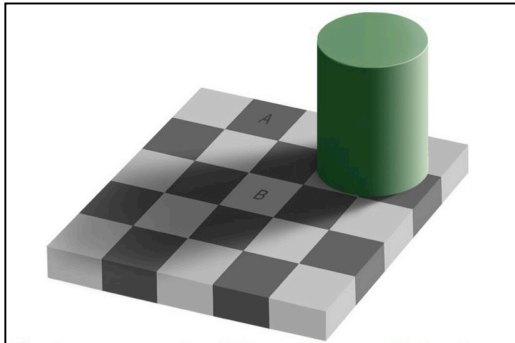
² A hertz (Hz), named after the German physicist Heinrich Hertz (1857-1894), is a unit of frequency equal to one cycle per second.

³ Richard F. Thompson, *Introduction to Physiological Psychology* (New York: Harper and Row, 1975), p. 217.

⁴ On the last, see Martin Schmelz, “A Neural Pathway for Itch” in *Nature Neuroscience*, 4 (2001): 9-10.

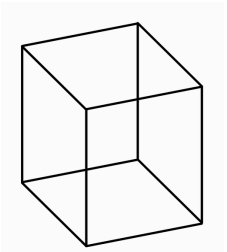
sound, they have no texture. The brain is constantly receiving countless nerve impulses, all of which are the same sort of thing, and yet it is able to interpret them — presumably based on which nerve is carrying the impulse, and the frequency of the impulses — into an experienced world of colors, sounds, tastes, cows, the whole nine yards. How this gets done is not obvious, and has been the subject of much discussion and investigation among philosophers, psychologists, neurologists, biochemists, and others in the cognitive sciences.

THERE'S MORE TO PERCEPTION THAN SENSATION



The two squares, A and B, are the same shade of grey

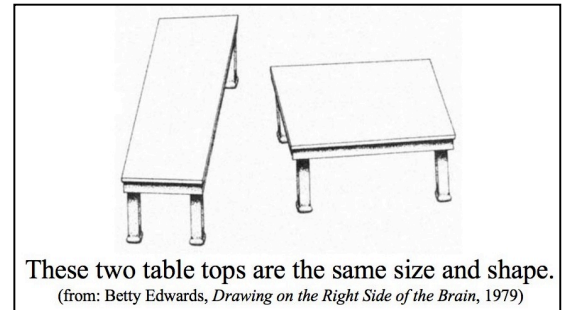
Research in the neurosciences has made it clear that our perception of the world involves rather more than just sensations streaming in from “out there” (in the form of nerve impulses coming from the various sense-organs), and some of this can be readily understood without knowing any neurophysiology. For instance, look at the Necker Cube to the right.⁵ Sometimes the front side of the cube is facing up and to the left, sometimes it's facing down and to the right —



that's what we *see*. And yet the actual and unchanging image of twelve black line-segments striking our retina (and presumably the neural firings passing down our optic nerves) is always the same. Similarly with the image of the checkerboard: the square marked with an 'A' appears much darker than the square marked with a 'B', but the same amount of light is reflecting off both squares, as they are the same shade of grey. Finally, the two tables appear to have quite different shapes, but in fact the table tops are the very same size and shape. There are many such optical illusions, and the message they give us is clear: there's much more to seeing than what meets the eye.

If the eyes were just like cameras streaming visual images into the brain — which is how they are commonly characterized — then you would expect that the optic nerves coming from our retinas would constitute the vast majority of the nerves entering the optic lobe of the brain (where visual imagery is processed).

As it turns out, however, only about 20% of the nerve fibers come from the retinas; the remaining 80% originate from the cortex, and some research suggests that roughly 90% of perception is constituted by memory.⁶ Much of what we see (and hear, feel, taste, smell) is based more on what we remember than on what is actually present before us.



These two table tops are the same size and shape.
(from: Betty Edwards, *Drawing on the Right Side of the Brain*, 1979)

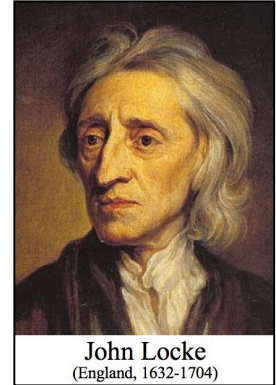
[20] LOCKE'S EMPIRICISM

John Locke (1632-1704) was born in Wrington, Somerset (England), into the minor gentry. He attended Oxford, where **Robert Boyle** (1627-92) had his famous chemistry laboratory, and soon Locke found himself dabbling in chemistry and medical studies. Locke's medical training later won him a position as the personal physician to

⁵ This wire cube is named after the Swiss crystallographer Louis Albert Necker (1786-1861), who was the first to publish this image for its ambivalent optical properties: “Observations on some remarkable optical phenomena seen in Switzerland; and on an optical phenomenon which occurs on viewing a figure of a crystal or geometrical solid” in *London and Edinburgh Philosophical Magazine and Journal of Science* 1 (1832): 329–37.

⁶ Richard Gregory, “Brainy Mind” in *British Medical Journal*, 317 (1998): 1693-5.

Lord Ashley, who later became the first Earl of Shaftesbury, and whose political activities and eventual political disfavor caused Locke to flee England for Holland in 1683. Eventually, King Charles II died, James II ascended the throne, and William of Orange (whom Locke had been advising in Holland) then contrived to assume the throne in the “Glorious Revolution” of 1688 (“glorious” because no blood was shed in the change of political power). Locke returned to England a few months later in the entourage of the princess of Orange, who later became Queen Mary. Locke had been busy writing during these years, and once back in England published his two best known works: the *Two Treatises of Government* (1690) and the *Essay Concerning Human Understanding* (1689). The former helped shape, a century later, much of what would later become the U.S. Constitution, while the latter served as the foundation of British Empiricism. We will be concerning ourselves here with Locke’s empiricism, and much of the following is a discussion of parts of Book Two of the *Essay*.



EMPIRICISM AND RATIONALISM

Locke is often called the father of **British Empiricism** — the school of thought that believes all knowledge comes from our sense experience and therefore that none of it is innate. As such, he is contrasted with the so-called **Continental Rationalists**, whose founder is said to be René Descartes, and whose basic principle is that knowledge is based on reason, rather than on sense experience. These labels (British Empiricism, Continental Rationalism) came from the 19th century; Locke and Descartes clearly were not thinking in terms of them, and placing Locke and Descartes in opposing camps might suggest that they have little in common. From our vantage point, at this introductory level, they are more alike than different, since they both are interested in the problem of knowledge, they both assume that the world consists of subjects (knowers, minds) and objects (things to be known), they both accept Descartes’ *cogito* argument, they both take *ideas* (whatever that ill-defined word means) as the things we know immediately, and they both are interested in analyzing complex ideas into simple ideas, which are then to serve as the foundational building blocks for the sciences.

There is one point of difference, however, that is worth exploring: the question of **innate ideas**, that is, ideas that are already in the mind at birth. Locke’s major work in epistemology, his *Essay Concerning Human Understanding* (1690), was written in four books, and the entire first book is devoted to arguing against the existence of innate ideas, which was a key difference between empiricists and rationalists. Plato was a rationalist in this regard; he argued in his *Meno* that our souls, before entering our bodies, were in contact with the Forms — those unchanging realities that make things what they are, and through which we can recognize and have knowledge of those things. His Theory of Recollection explained that learning about circles or sheep was nothing more than these memories of the Forms being awakened in our souls by the sight of physical circles and physical sheep. The order of learning is important here: Plato argued that the Form (or concept or abstract idea) of sheep was already in my mind before I ever laid eyes on a single sheep; seeing my first sheep merely brought to my awareness this latent idea. This is the rationalist doctrine of innate ideas. Other rationalists will offer different stories of how these ideas make their way into my mind, but they all agree that it is *not* through my sensory experience.

Locke offers three main arguments *opposing* the doctrine of innate ideas. First, Locke argues that the primary support of the doctrine of innate ideas is that there is a “universal consent” regarding some ideas or beliefs, and the only way that we can explain this universal consent is that all humans are born with them already in their minds. Locke then spends considerable time (in Book One of his *Essay*) offering examples that suggest this universality is lacking.

That first argument was empirical; his second is more conceptual, and also more serious, namely: How are we to understand what these innate ideas are during that time when they are merely lying dormant in the mind — for instance, my idea of goats before ever seeing my first goat? As Locke writes,

To say a notion is imprinted on the mind, and yet at the same time to say that the mind is ignorant of it, and never yet took notice of it, is to make this impression nothing. No proposition can be said to be in the mind which it never yet knew, which it was never yet conscious of.

An idea that is “in the mind” and yet is hidden from the mind, and hasn’t even ever been noticed by the mind, is to talk nonsense. To have an idea, for Locke, is to know it, to be aware of it. This point of Locke’s is of considerable interest, and we will come back to it shortly.

Locke’s third argument is spread throughout the remainder of his *Essay*, namely, his empiricist account of the origin of various ideas traditionally claimed to be innate by the rationalists. If Locke can offer a plausible account of how these ideas are all drawn from our sensory experience, then we will have little reason to believe the rationalists’ stories of innate ideas. As Locke explains in the opening paragraph of Book Two:

I know it is a received doctrine, that men have native [i.e., innate] ideas and original characters, stamped upon their minds in their very first being. This opinion I have at large examined already; and, I suppose what I have said in the foregoing Book will be much more easily admitted, when I have shown whence the understanding may get all the ideas it has; and by what ways and degrees they may come into the mind; — for which I shall appeal to every one’s own observation and experience.

In the very next paragraph, Locke quickly describes his empirical orientation:

Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas: — How comes it to be furnished? Whence comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer, in one word, from EXPERIENCE. In that all our knowledge is founded; and from that it ultimately derives itself

Locke’s empiricism will strike many modern readers as wholly commonsensical and right. What motivation could one have to believe in Platonic Forms and other such rationalist conjectures?

The other side is not without some reasonable arguments, however, and before we continue our account of Locke’s empiricism, we should let a rationalist offer his reply. The German philosopher and mathematician **Gottfried Wilhelm von Leibniz** (1646-1716) never met Locke, but he had studied Locke’s *Essay* quite closely, and was about to publish a lengthy reply when he heard of Locke’s death in 1704. Out of courtesy to Locke, Leibniz withheld publication of his work.⁷ From a 20th century vantage point, it turns out that much of Leibniz’s epistemology is remarkably prescient. He was the first to theorize at length about subconscious thoughts, for instance — roughly three centuries before Sigmund Freud — and his understanding of innate ideas were likewise ahead of his time. Leibniz believed that the mind was born not with explicit beliefs or ideas, but rather with capacities and dispositions that then shaped our beliefs and ideas when confronted by experience. Leibniz admired Locke’s writing, but understood that he and Locke belonged to entirely different schools: “although the author of the *Essay* says a thousand beautiful things which I commend, our systems are very different. His has more relation to Aristotle, mine to Plato,” after which Leibniz notes that ...



Gottfried Leibniz
(Hannover, 1646-1716)

Our differences are upon subjects of some importance. The question is to know whether the soul in itself is entirely empty as the tablets upon which as yet nothing has been written (*tabula rasa*) according to Aristotle, and the author [Locke] of the *Essay*, and whether all that is traced thereon comes solely from the senses and from experience, or whether the soul contains originally the principles of many ideas and doctrines which external objects merely call up on occasion, as I believe with Plato, and even

⁷ Leibniz’s book was published only many years after his own death, as *New Essays Concerning Human Understanding* (1765). One recent study arguing with Leibniz against this “blank slate” view of the mind from the perspective of evolutionary psychology, is Steven Pinker’s *The Blank Slate* (Harvard, 2002).

with the schoolmen,⁸ and with all those who interpret in this way the passage of St. Paul (Rom. 2:15) where he states that the law of God is written in the heart. [...] Whence another question arises, whether all truths depend upon experience, i.e., upon induction and examples, or whether there are some which have still another foundation. For if some events can be foreseen prior to any trial which may have been made of them, it is clear that we must here contribute something of our own. The senses, although necessary for all our actual knowledge, are not sufficient to give us the whole of it, since the senses never give anything except examples, that is, particular or individual truths. All examples which confirm a general truth, however many they may be, are not enough to establish the universal necessity of this same truth; for it does not follow that what has happened will happen again in the same way.

Experience (inductive generalization) can never guarantee a general or universal law (for instance, Boyle's gas law); this is an important point. So either these universal laws don't really exist, or else they receive some other kind of justification. The same holds for mathematical truths:

It would seem that necessary truths, such as are found in pure mathematics, and especially in arithmetic and in geometry, must have principles the proof of which does not depend on examples, nor, consequently, on the testimony of the senses, although without the senses it would never have occurred to us to think of them. This ought to be well recognized; Euclid has so well understood it that he often demonstrates by reason what is obvious enough through experience and by sensible images.

Finally, Leibniz points to the real possibility of a subconscious side of the mind:

Why is it necessary that everything should be acquired by us through the perceptions of external things, and that nothing can be unearthed in ourselves? Is our soul, then, such a blank that, besides the images borrowed from without, it is nothing? [...] There are a thousand indications that lead us to think that there are at every moment numberless perceptions in us, but without apperception [= awareness] and without reflections; that is to say, changes in the soul itself of which we are not conscious, because the impressions are either too slight and too numerous, or too even, so that they have nothing sufficient to distinguish them one from the other; but, joined to others, they do not fail to produce their effect and to make themselves felt at least confusedly in the mass.

There is more that can be said on behalf of rationalism, but the above is a good start. And which of these positions is correct? It is perhaps likely that some third position, that combines important insights of each, is closer to the truth — Kant's critical idealism, discussed later in this chapter, was the "next best idea" — but for the present we will examine more carefully the empiricist account of perception and knowledge.

ATOMISM AND PERCEPTION

Locke was an atomist (or "corpuscularian") in the tradition of Boyle. According to atomism, the world consists of tiny bits of matter ("atoms") that are distinguished from one another by their different sizes and shapes.⁹ These atoms are too small to be seen individually, and they can be wholly described in terms of their size, their shape, their motion (or rest), and their solidity. In other words, they can be wholly described in terms of pri-

PRIMARY & SECONDARY QUALITIES

The distinction between primary and secondary qualities goes back to the atomists of 4th century BCE Greece. Traditionally, the primary qualities (PQ) cause in us the ideas of size, shape, motion or rest, quantity, and (Locke would add) solidity.

Secondary qualities (SQ) are the cause of our ideas of colors, tastes, sounds and smells. The distinction is based on the belief that primary qualities are actually in the physical objects of the world, while secondary qualities exist only in our minds as ideas, caused by the micro-configurations of various primary qualities. The difference also marks those qualities reducible to mathematical terms (the PQ) and those that were not (the SQ).

⁸ Late medieval scholars, often following in the path of Thomas Aquinas and Duns Scotus.

⁹ As **Isaac Newton** (1642-1727) noted in his *Opticks*, atoms are "solid, massy, hard, impenetrable movable Particles... so very hard, as never to wear or break in pieces." The word comes from the Greek 'atomos' (= indivis-

QUALITIES AND IDEAS

Certain qualities in bodies (“modifications of matter”) cause the ideas in our minds. As noted already, there need be no resemblance between the ideas and their causes. An **idea** is the immediate object of perception, while a **quality** is the power to produce an idea in our mind; it is that in the object that is the *cause* of the idea. **Primary qualities** are the qualities of solidity (impenetrability), extension (size), figure (shape), mobility (motion/rest), and number. These primary qualities are wholly inseparable from matter; dividing a body will not destroy these properties (although it might destroy secondary qualities). **Secondary qualities** include such qualities as colors, sounds, and tastes. These qualities are actually nothing in the objects themselves other than mere powers to produce various ideas in us, these powers being based on the arrangement of various primary qualities. Finally, **tertiary qualities** are those powers in one body to affect another body (e.g., the power in a flame to melt wax).

THE PRODUCTION OF IDEAS

Ideas are produced in us by the *impulse* of bodies striking against our various sense organs, such as the retinas in our eyes. In seeing an object, for instance, light is reflected off of the surface of the object in a way determined by features of that surface (ultimately, by the size, shape, and motion of the atoms at the surface). This light strikes our retina, causing certain changes in the retina, then the optic nerve, ultimately causing various simple ideas in our mind (the “mental substance”). These ideas, as they first enter the mind, are simple, and of either primary or secondary qualities, and all are caused “by the operation of insensible particles on our senses.” In other words, the impulse of various small bodies, which differ in their size, shape, and velocity, strike our sense organs (and thereby effect our brains) causing in us the various ideas of size, shape, and motion as well as of colors, sounds, scents, etc.

ONLY PRIMARY QUALITIES EXIST IN BODIES

Our ideas of primary qualities resemble their causes; our ideas of secondary qualities do not. There is no similarity or resemblance between a microscopic particle (of a certain size, shape, and velocity) and the scent of a rose, just as there is no similarity between the pain that we experience when a knife pierces our flesh, and the motion, size, and shape of the knife. Ideas of primary qualities resemble the primary qualities that cause them, whereas ideas of secondary qualities do not resemble their causes.

Primary qualities are *real* qualities, actually existing in bodies; but secondary qualities are not in bodies at all — they are best conceived of as a fiction. The causes of our *ideas of secondary qualities* exist in the bodies, but these are just the primary qualities. Take away the mind and secondary qualities disappear, leaving only the size, shape, and motion of bodies.

REAL OBJECTS AND SENSIBLE OBJECTS

It seems clear that things cannot be exactly as they appear, and it is not a bad guess that the difference between how things are and how they appear is somehow a result of the workings of the mind. This distinction between *real objects* and *sensible objects* is forced upon us by the most trivial and commonplace of observations. For instance, take a penny and rotate it end for end: as it rotates, its apparent shape changes from circular through various degrees of ellipticity. Take the same penny and move it towards your eye: the apparent size increases dramatically. But through both of these changes (of size and shape) we want to say the penny’s size and shape (the *real* size and shape) have not changed at all. Only the *apparent* or *sensible* size and shape have changed. The real object does not change, while the sensible object does; the real object exists independently of the mind, while the sensible object exists in the mind, as a collection of ideas.

Once the distinction has been made between real and sensible objects, it is not difficult to show that certain “qualities” are *only* found in sensible objects (as ideas), that is, that they don’t really exist in real objects at all. As noted above, primary qualities comprise the real object, while our ideas of primary and secondary qualities comprise the sensible object, and “secondary qualities” is just a kind of short-hand way of referring to those powers in the real object to cause ideas of secondary qualities in the sensible object. The qualities in the real object *cause* the ideas

that comprise the sensible object in the mind, but only our ideas of primary qualities bear any resemblance to their cause.

Consider the ideas of hot and cold. If you move your hand close enough to a fire, it will feel warm, and if you move it closer still it will feel hot, and eventually these feelings will merge into feelings of pain. These ideas of cold, warm, hot, and pain all seem to belong together. But because no one would want to claim that pain is actually in the fire (it is *in me*, not out there), then the same should apply to the other ideas. The cause of these ideas is in the fire, but not the idea itself. If heat is actually in the fire, then that heat must somehow make its way through your nerves and into your brain, whereupon it then miraculously pops into your mind. But the nerves themselves do not get hot as the nervous impulses move up towards the brain, nor does that receiving part of the brain grow any warmer upon receiving the impulses. The cause of this sensation of heat, that comes from the fire, stops at the skin in the organs of Ruffini.

Consider also the “three basin” experiment: take three basins of water, where the water in the left basin is boiling hot, the water in the right basin is ice cold, and the water in the tepid water of the middle basin is room temperature. Place your left hand in the hot water and your right hand in the cold water, and then place both hands in the middle basin. This same water will feel cold to your left hand and hot to your right hand. Yet this makes no sense if hot and cold are actual qualities in the water. For instance, we don't find this relativity with respect to shape (where an object would feel like a sphere to one hand, but like a cube to the other).

We think of the immediate cause of our sensations of sound being the waves of motion in the air touching our eardrum; more specifically, we hear sounds because air molecules pound against our eardrums. Thought of rather simply (but I hope not misleadingly), these air molecules are like bits of matter, with a certain size and shape, and a certain speed as they strike the eardrum. A certain pattern of these molecules striking the eardrum will cause me to hear middle-C; a more complex pattern will result in my hearing Beethoven's violin concerto. It would be quite odd to say of these molecules that they are loud or delicate or shrill or melodious. They don't have these sorts of qualities. Rather, they seem to have only primary qualities, and these primary qualities cause within the mind the various sensations (ideas) that we associate with a concerto.

And so the argument goes for all our ideas of secondary qualities, according to Locke. They are unlike anything in the object that causes them. Our next philosopher — George Berkeley — will extend this same observation to our ideas of primary qualities as well.

IF A TREE FALLS IN THE FOREST...

... and no one is there to hear it, does it make a sound?

Before you start to argue about this, you'll want to define your terms. If by “sound” you mean the compression waves in the air that typically result in us (or other properly equipped animals) hearing something, then the answer is ‘yes’. If you mean by “sound” the subjective experience that a normal “hearing” animal experiences when confronted with such compression waves, then the answer is ‘no’.

As for tape recorders and other such instruments, keep in mind that they are simply storing the effects of the compression waves in some sort of medium — analog patterns of ferrous oxide on tape, or patterns of 0's and 1's on a floppy disk, etc. — and that these machines don't “hear” anything. They merely store these patterns of physical impulses. If they come with a playback mechanism, then they are able to reconvert this stored information into compression waves roughly similar to those that affected the instruments originally and, if this is done in the presence of a suitably-equipped hearing animal, something will be heard.

[21] BERKELEY'S IMMATERIALISM

A QUESTION OF SIZE

These words that you are presently reading are printed on a standard 8 1/2 x 11 inch sheet of paper. Take a good look at this paper. How big is it? You will likely want to reply that it is 8 1/2 inches wide and 11 inches long, give