

WHAT IS PHILOSOPHY?

“NON SCHOLAE SED VITAE DISCIMUS”

(“We learn for life, not for school”)

—based on a saying by Seneca (4 BCE-65 CE)

[1] PHILOSOPHY: WHAT’S IN IT FOR YOU?



What does philosophy have to offer you? What is it good for? Why would anyone do it in the first place? This last question is the easiest to answer: You do philosophy because you’re human. Cows don’t philosophize (usually); plants and rocks don’t philosophize; but to be human is to be, at least occasionally, philosophical. Human beings are curiosity-filled animals: they wonder and worry and try to figure things out. Once their bellies are full and their other material needs are momentarily met, the same mental skills and dispositions that earlier had helped them find dinner now turn them to higher matters, namely, to an understanding of themselves and the world — not merely to improve these (although that is often *one* end of philosophy), but also to understand for its own sake. Human beings are “knowing animals”; sometimes they want to know in order to act, but quite often they simply want to know. So why should you bother with philosophy? You should bother because it’s in your very

nature to do so.

Who are you? What are you? Will the death of your body be the end of *you*? Are there any good reasons for believing in a loving God? Are there any good reasons *not* to? Is there such a thing as a right and a wrong that are true for everyone? What can we know for sure, and what *can’t* we know, but simply have to believe on faith (if we believe at all)? Should we believe *anything* on faith? What does it mean to be *free*? Can I be free if the beliefs in my head were put there by someone else (my parents, my schoolteachers, cable television, ...)? What does it mean for a belief *to be my own*? How do I take ownership of my mind? Why do I believe what I do? Am I *justified* in believing as I do, or in anything at all? (How do I justify my beliefs?) How might we best get along with one another?

These are just some of the questions that philosophy can help you answer. And if you haven’t worried about any of these questions yet, maybe it’s time that you, like Whitman’s spider, began seeking the spheres to connect them.

[Poem]

A NOISELESS PATIENT SPIDER

A noiseless patient spider,
I mark’d where on a little promontory it stood isolated,
Mark’d how to explore the vacant vast surrounding,
It launch’d forth filament, filament, filament, out of itself,
Ever unreeling them, ever tirelessly speeding them.

And you O my soul where you stand,
Surrounded, detached, in measureless oceans of space,
Ceaselessly musing, venturing, throwing, seeking the spheres to
connect them,
Till the bridge you will need be form’d, till the ductile anchor hold,
Till the gossamer thread you fling catch somewhere, O my soul.

— Walt Whitman (1819-92)

[2] DEFINING PHILOSOPHY

PRELIMINARY ANSWERS

Unlike any other academic discipline, the question of the nature of philosophy is itself a philosophical question. Discussing the nature of biology is not part of doing biology, but discussing the nature of philosophy is definitely part of doing philosophy.

Philosophy, in the popular sense, is a kind of private wisdom, or a certain way of approaching life (such as is found in Stoicism) — and in fact the word comes from the Greek words *'philein'* (to love) and *'sophia'* (wisdom), so etymologically 'philosophy' means "love of wisdom." Philosophy is commonly thought of as a repository of this wisdom (namely, as a certain set of beliefs), but the word's literal meaning is a better guide: Philosophy is the science of *pursuing* wisdom.

Historically, philosophy was thought of as the "rational explanation of anything" — and thus it was viewed as a general kind of science, indeed, even as "the first science" or "the science of science." The first person said to have called himself a philosopher was **Pythagoras**, a Greek living some 500 years "before the common era" (BCE) and who is best remembered by the Pythagorean Theorem in geometry. When asked if he was a wise man, he answered, "No, I am not wise, but I am a *lover* of wisdom." Pythagoras explained his meaning with an analogy: Philosophers are like spectators at the Olympic games, and at these games we find three kinds of people: *athletes*, who desire fame and prizes; *merchants*, who wish to make money; and *spectators*, who want merely to observe and to understand. The philosopher hopes for neither fame nor money, but desires rather to contemplate the spectacle. Human life as a whole and the world all around is our object of contemplation, and the philosopher strives to understand those matters concerning "the whole of life."

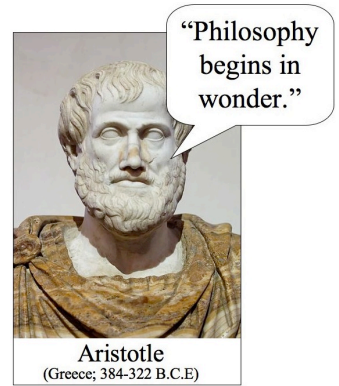
Aristotle wrote that "philosophy begins in wonder," but perhaps such a claim is overly broad, since *every* act of thinking begins with wonder, that is, with some question or puzzle or doubt. In the 19th century, the American philosopher Charles Sanders Peirce pointed out that thinking occurs only in response to doubt or a question, since thinking just is the activity of dispelling doubt.

FINDING A STRATEGY

A discipline is partly defined by the sorts of questions it addresses, and some typically philosophical questions are listed to the right. You might take a few minutes here to answer them.

Everyone, sometime during their life, will wonder about these kinds of questions (at least if they are well-fed and have the necessary leisure), but few people ever go beyond this initial stage of wondering. The reason for this is simple: They don't know *how* to go any further; the mind stumbles, they get confused, eventually they tire out — and the moment of wondering passes. But despite this frustration, a feeling often remains that these questions are nevertheless *important*, with important answers, if only we knew how to find them. Philosophy is useful in developing strategies (or methods, or skills) for studying and answering these questions. Just as mathematics has strategies for working-through certain mathematical problems (such as dividing numbers, or finding square roots), there are strategies in philosophy for tackling *its* problems.

A practicing philosopher is one who tries to find the answers to these questions, and who develops strategies and techniques for thinking about them. As such, philosophy is a discipline just like any other human discipline— such as physics, accounting, psychology, or nursing — and one characteristic of philosophy is the sort of questions that it tries to answer.



A FEW QUESTIONS...

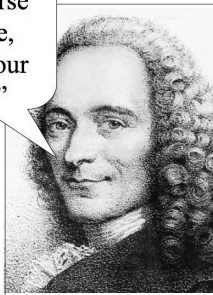
Where did the world come from?
 Is my mind just my brain?
 Does God exist?
 Could a computer have a mind?
 Am I genuinely free?
 Is the death of my body the end of *me*?
 Is anything ever *really* right or wrong?
 Can I know anything with certainty?
 What if God *doesn't* exist?
 What is the good life and how do I get it?
 What is truth?
 Is good art just a matter of taste?
 Is reality understandable? Or is it inherently irrational?
 Where does value come from?
 What is the meaning of life?

THEORY AND PRACTICE

Philosophy is both theoretical and practical. Aristotle distinguished between theoretical reason and practical reason, and philosophy is our reason working each of these two angles. Theoretical reason aims at truth, while practical reason aims at action. Our theoretical side wants and needs to understand the world, while our practical side wants and needs to live in the world, and to live in the world as well as possible.

On the theoretical side, philosophical inquiry has three features. First, it is concerned with **the justification of fundamental beliefs**. Common sense tells us that there is a difference between right and wrong, that a world exists outside our minds, that other people exist, and so on. Philosophy aims to *justify* these common sense beliefs, or to show which beliefs are justified and which, if any, cannot be justified in that they are beyond justification. Occasionally, it may show that a common sense belief is not only unjustified, but very likely false.

“If you wish to converse with me, define your terms.”



Voltaire
(France; 1694-1778)

In general, philosophy aims to uncover our common sense beliefs — our assumptions — and then discover to what extent these beliefs are well-grounded. It is not enough merely to have a belief or an opinion; to be well-educated, to be intellectually mature, is to understand *why* you believe as you do. Similarly, philosophy also investigates the assumptions of other disciplines — for example, the assumption behind the natural sciences that there is a physical world, or the assumption of theology that there is a God.

Second, philosophy is concerned with **conceptual analysis**. When I ask whether I’m free, I first need to ask what it means to be free; similarly with questions regarding the existence of God or the nature of truth, and so on. Notice that most of these questions cannot be answered simply by investigating the world (that is, they aren’t empirical questions). Further, these concepts are tools for thinking, and so they are basic assumptions underlying our thought. In analyzing our concepts, we often clarify our various assumptions.

Finally, philosophy is concerned with **second-order questions**. Philosophy studies other disciplines. As part of its own inquiry into the nature of the world and human existence, philosophy has always turned its eye to our other intellectual pursuits as well; and so there are fields within philosophy such as philosophy of art, of religion, of law, of science, and so on. We might call these other disciplines, such as physics or theology, “*first-order*” disciplines, and call philosophy, because it studies them, a “*second-order*” discipline.

PHILOSOPHY AS PRACTICAL

A danger in the above view of philosophy is that it tends to *over-intellectualize* philosophy, making it appear to avoid life in order to merely contemplate it. But this Pythagorean view of philosophy describes only the theoretical side. We don’t want merely to understand the world and our place in it; we also want to change it. And we want to change ourselves as well — we want to become better people. Philosophy can help us achieve both of these goals in several ways. First, it can save us from the effects of false beliefs. For instance, people are always trying to sell us a lifestyle — in books, in television shows and commercials, in movies, from the church pulpit, in the news media. Many of these exhortations are foolish, and philosophy can help uncover this foolishness.

ON INTELLECTUAL MATURITY

The slow transition from a head full of unfounded beliefs to one of founded beliefs — *that* is growth towards intellectual maturity. We want to believe what is true, and we want the *cause* of our believing it to be its truth. We don’t want to believe merely from some accident or prejudice, since accidents and prejudices are not very reliable guides to the truth. We want to come to our beliefs in the right way; only then do we fully take control of our lives.

A SIDE BENEFIT OF PHILOSOPHY

“Between 1974 and 1982, philosophy students scored at least five percentage points above average in admissions tests for professional and graduate schools in America. No other subject matches that... Philosophy PhDs earn more than the average humanities PhD, too. They are less likely to be unemployed even than chemists or biologists, disciplines more usually thought of as vocational. And, because philosophers are fanatically argumentative, law firms find that they make good lawyers.” [*The Economist*, April 26, 1986]

Consider this: The single basic message of most advertising is that human fulfillment depends upon goods and services that are for sale. If we just buy the right stuff, we will be happy. This message is pressed upon our conscious and subconscious minds virtually without cease, and yet it serves us rather badly, since the least reflection shows it to be utterly untrue.

Philosophy can also help us discover principles for guiding our lives. It helps us order our values, and fit them into a meaningful life. This was essentially Socrates' self-assigned task, and it will be one of the first to be addressed in the following pages.

Finally, philosophy is practical by demonstrating the unimportance of final answers. The mere contemplation and awareness of certain basic problems of human existence is itself rewarding and helpful. Philosophy helps us plumb the contours of human knowledge and ignorance, and thus helps us to better appreciate our place in the order of things.

AREAS OF PHILOSOPHY

As with any other discipline, there are sub-disciplines within philosophy. What follows is a common scheme.

Metaphysics (What is?)

This is the study of being or reality. Topics include ...

... the difference (if any) between reality and appearance:

- How do I know what really exists?
- How can I know what is real in a world of change?

... the nature of the self:

- Who am I, and what is to become of me?
- In what sense am I the same person as I was at birth?
- When did I come into existence?
- Will I stop existing?

... and the nature of God or the divine:

- Is there a God?
- What is God's nature?
- Is there some purpose to the universe?

Axiology (What has value?)

'Axiology' comes from the Greek words *axios* (= worth) and *logos* (= science, account), and means the study of the nature of value. Since there are different kinds of value, and different kinds of value-questions, there are a number of different areas of axiology, including normative ethics (or ethics proper), metaethics, aesthetics, political philosophy, and social philosophy.

Normative ethics is the study of what constitutes morally correct conduct (as opposed to the meaning of particular moral terms), and this requires the articulation and justification of moral principles. Here we find the following sorts of questions:

- How should I act?
- What makes an action right?
- Why should I help others?
- What kind of person do I want to be?

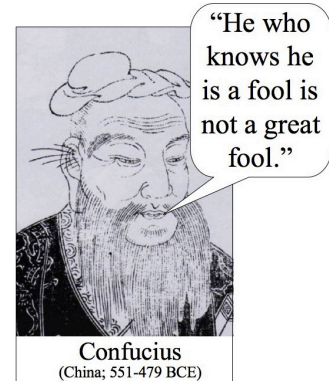
Metaethics is the study of the meaning of moral claims, and the nature of moral principles. It began as a discipline only in the last century, with the publication of G. E. Moore's *Principia Ethica* in 1903. Here we ask questions like:

- What does it mean to say that an action is right or that a state of affairs is good?

WHAT GOOD IS IT?

"Philosophy is to be studied not for the sake of any definite answers to its questions, since no definite answers can, as a rule, be known to be true, but rather for the sake of the questions themselves; because these questions enlarge our conception of what is possible, enrich our intellectual imagination and diminish the dogmatic assurance which closes the mind against speculation; but above all because, through the greatness of the universe which philosophy contemplates, the mind is also rendered great, and becomes capable of that union with the universe which constitutes its highest good."

— Bertrand Russell, *The Problems of Philosophy* (1912)



- Do moral statements like “Torture is wrong” have a truth-value (that is, are they either true or false)?
- If a moral statement is true, is it true for everyone in all cultures, or does the truth of the statement depend upon the culture in which it is made?
- How are moral beliefs justified?
- Why should I be moral?

Aesthetics is the philosophical study of art and of the nature of the beautiful. Here we find such questions as:

- What is the difference between judgments of taste and judgments of beauty?
- Do such judgments have a truth-value (and thus allow for being “scientific”)?
- What is “representation” in art?

Political philosophy is the study of the justification and use of force in the context of a state. Here we ask questions concerning government authority and my relation to it:

- Why should I obey the state?
- Where did the state obtain its authority?
- When, if ever, should I disobey the state?

Finally, *social philosophy* is the study of the ideal society or social organization. As such, this focuses less on the legitimacy of political authority and more on determining the best social arrangements for human flourishing.

Epistemology (What is the relation between subject and object?)

This is the study of the **nature** of truth, belief, and knowledge:

- What is it to “know” something?
- What is the difference between knowing and believing?

Knowing a statement involves believing that statement, but also in being **justified** in one’s belief.

- How is a belief justified?

Another epistemological topic is the **source** of our knowledge:

- Where does knowledge come from?

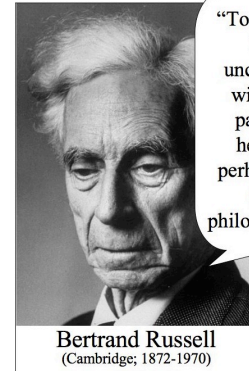
Two traditional views regarding the source of our knowledge are empiricism and rationalism: empiricism claims that our knowledge comes primarily, or even exclusively, through our senses. Rationalism claims that it is instead the product of our reason, either operating on sense-experiences, or working alone. Knowledge always involves statements like “Rabbits can run faster than tortoises” or “The sky above is a deep blue,” and these statements always consist of concepts (rabbit, run, faster than, tortoises, sky, above, deep blue), so the question regarding the source of knowledge is at least two-fold:

- Where do these concepts come from?
- Where do the statements (that link together those concepts) come from?

Finally, what are the **limits** of knowledge? Presumably there are things that I can think or believe, but cannot know; can I discover this boundary-line between knowledge and mere belief?

Logic (What is good reasoning?)

This is the study of the principles of sound argument or reasoning, as opposed to mere rhetorical persuasion (which focuses on *ethos* and *pathos*, as well as *logos*). There are a number of different kinds of logic, the most familiar being *deductive* (arguments or reasoning based on mathematics, or from a definition, or in some syllogistic form), and *inductive* (these include arguments based on analogy, appeals to authority, generalizations from past experiences, and inferences to the best explanation). In general, deductive reasoning is *certain* (if the premises are true and the form of the argument is valid, then the conclusion being argued for is necessarily true) whereas inductive reasoning (like most of life) is simply *probable*.



“To teach how to live with uncertainty, yet without being paralyzed by hesitation, is perhaps the chief thing that philosophy can do”

[3] PREPARING TO DO PHILOSOPHY

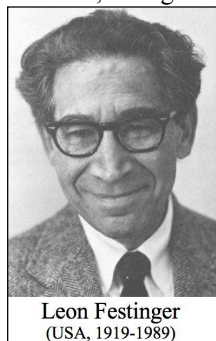
ON CHANGING OUR MINDS

In any philosophy discussion, *what* you believe is not nearly as important as *why* you believe it. Being able to give reasons for believing as you do is the first step in any civil conversation. Offering reasons that are acceptable to those with whom you initially disagree is how rational people are supposed to try to change each other's minds.

Sadly, the crooked timber of our souls often derails this process.

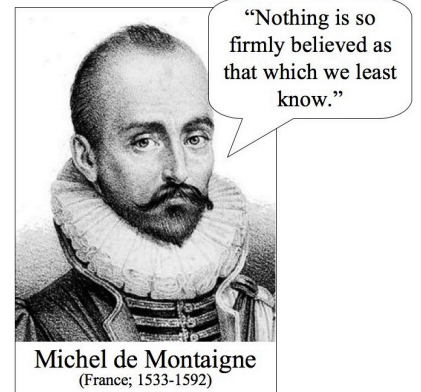
It isn't clear that we ever change our minds *merely* because we come across a good reason to do so. The mechanism underlying the alteration of belief is often a mystery — and a problem for teachers, insofar as they are interested in more than simply reinforcing a student's prior beliefs.

Adding new beliefs that are either unrelated to, or else consistent with, one's old beliefs is not difficult, since it requires only that one trust the teacher as a source of information. The most important part of anyone's college career, however, is not in this mindless accumulation of new information, but rather in the *re-evaluation* of previous beliefs. If it hasn't happened already, college is the time to take charge of your intellectual life — to make it your own, and to come to some understanding of who you are and what you are about. At least for the most successful students, college includes a spring-cleaning of the mind where windows are thrown open and everything is picked-up, dusted and, after a careful examination, either kept and made one's own or else discarded.



Unfortunately, how we actually carry out this mental housekeeping is a puzzle. Critically examining one's own beliefs, and changing them when this examination finds them wanting, is both difficult and unnatural — perhaps one of the most challenging tasks that humans face. Reason itself, as a mental capacity, appears to have evolved not to impartially discover the truth, but rather to convince others of your own beliefs.¹ Worse yet, once we have committed ourselves to some belief, we tend to maintain that belief despite significant evidence to the contrary. A famous early case study of this phenomenon was conducted in 1954 by the American psychologist **Leon Festinger**, who introduced the concept of **cognitive dissonance** — that uneasy feeling we experience when confronting new information that conflicts with a held belief. Festinger and his team studied a small group in Chicago who believed that aliens from the planet Clarion (not an actual planet) were going to visit Earth on December 21st of that year and rescue the true believers before a cataclysm would destroy the earth. The space ship failed to show up, of course, and the earth-destroying cataclysm failed to transpire, and you might think that such failures would have caused these people to give up their belief in the aliens from Clarion. Instead, Festinger found them remarkably ready to retain their belief at all costs, simply revising things to accommodate what should have been disconfirming evidence. In this case, it was revealed to the leader of the group that God had decided to spare the earth from destruction because of the group's incredible faith.²

In a more recent study of how new evidence is evaluated, subjects were divided into those who believed that capital punishment deterred future criminals, and those who believed the opposite. Half of the subjects from each group were then presented with evidence supporting the claim that capital punishment is a deterrent, while the other half was presented with evidence supporting the opposite. The researchers found that whenever the evidence supported the subjects' previous beliefs, those beliefs were considerably strengthened, whereas evidence opposed to the



¹ See Hugo Mercer and Dan Sperber, "Why Do Humans Reason? Arguments for an Argumentative Theory" in *Behavioral and Brain Sciences* 34 (2011): 57-74.

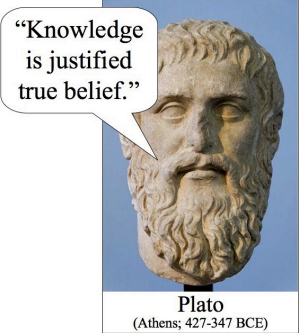
² One might compare this with the more recent followers of Christian radio host Harold Camping, who predicted that the Rapture (and thus the beginning of the "End Times") would occur on May 21, 2011. When that date came and went without incident, Camping revised his beliefs, claiming now that May 21 was simply a "spiritual" day of Judgment, and that the "physical rapture" would occur a few months later, on October 21, at which time God would also destroy the universe. On the Chicago group, see Leon Festinger, *et al.*, *When Prophecy Fails* (Harper, 1956).

subjects' previous belief hardly affected their belief at all. This tendency, called "**belief perseverance**," shows that we place a disproportionate degree of credibility on evidence that supports a *held* belief while discrediting evidence that opposes that belief.³ One strategy to help correct this bias is simply to imagine holding the opposite opinion, and then to reconsider the evidence.

Most difficult of all are those beliefs that we have already surrounded with justifications. Even should we discover that our initial reason for holding the belief is wrong, once we have woven the belief into a larger explanatory framework, it is remarkably difficult to dislodge.

"I know that most men, including those at ease with problems of the greatest complexity, can seldom accept the simplest and most obvious truth if it be such as would oblige them to admit the falsity of conclusions which they have proudly taught to others, and which they have woven, thread by thread, into the fabrics of their life."
 — Leo Tolstoy (1828-1910)

KNOWLEDGE, JUSTIFIED BELIEF, AND MERE OPINION



Knowing something requires three things: that I **believe** it, that my belief is **justified**, and that the thing believed is actually **true**. For instance, in order for me to *know* that the gestational period of chimpanzees is similar to that of humans, I obviously need to *believe* this claim, and it also has to be more than a guess: I need to be *justified* in believing this claim (e.g., either I've observed the reproductive cycle of chimpanzees, or else I've consulted reliable authorities).

Finally, the claim has to be *true*. Not long ago, most people believed that the earth was immobile, and they certainly would have said this was something that they knew, as well. What is more, they were justified in their belief, since the immediate evidence of their senses (and ours) certainly suggests a stationary earth. *We* know, however, that their belief was false, and therefore that they didn't *know* that the earth is immobile — rather, they merely *believed* it.

The upshot of all this is that we often aren't certain that we know something, and this for the simple reason that we aren't certain that it is true. When the certainty is high, we usually call it 'knowledge', but only out of convenience. For instance, I would say that I know that "2 + 5 = 7," that "the sun will rise in the morning," that "lead is denser than water," and that "Napoleon was defeated at Waterloo in 1815." I have very good reasons for believing each of these claims, although I am completely certain only of the first claim.

We don't believe claims that *we think* are false, even though we often believe claims that are *in fact* false (for instance, a Cubs fan might believe that the Cubs will win the World Series that season; or someone might believe that the earth is flat or motionless). On the other hand, we often hold beliefs that are not justified, or not adequately justified and, among those justified beliefs, not all will be true — although the more a belief is justified, the more reason we have to believe that it is true (this is just what we mean by 'justified'). There is no difference between "believing P" and "believing that P is true," but there *is* a difference between "believing P" and "believing that I am justified in believing P."

Knowledge (= justified true belief)	"The square of the hypotenuse is equal to the sum of the squares of the two sides" (provable as a theorem in Euclidean geometry). "Naragon prefers his spinach raw rather than boiled" (a stated preference). "Lead is denser than water" (empirically testable). "Napoleon was defeated at Waterloo in 1815" (an historical claim, justified through records).
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³ C. G. Lord, L. Ross, and M. Lepper, "Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence" in the *Journal of Personality and social Psychology* 37 (1979): 2098-2109. See also Michael Gazzaniga, *Nature's Mind* (Basic Books, 1992), p. 136, and Ziva Kunda, "The Case for Motivated Reasoning" in the *Psychological Bulletin* 108 (1990): 480-98. A related source of irrational beliefs is **confirmation bias**: this is the common tendency for us to look for evidence that confirms our current beliefs, rather than to seek out evidence that might disconfirm it.

Justified False Belief	“The earth is motionless” (justified by the direct evidence of our senses). “All swans are white” and “The next swan I inspect will be white” (justified by an inspection of a great many white swans, and a failure to locate any non-white swans).
Unjustified False Belief	“Drinking gasoline cures most head colds” (this is <i>not</i> true, folks). “The Cubs will win the World Series this year” (normally a false belief).
Unjustified True Belief (“a lucky guess”)	“The Cubs will win the World Series this year” (if believed in a year when they win). “The square root of 289 is 17” (if believed without the benefit of any calculation).

If the people at Poison Control tell you that drinking gasoline can kill you, then you are probably justified in believing this. There is a wide range of justification possible, however; evidence might place the likelihood of the truth of a claim anywhere from “next to zero” to “almost certain.” For instance, it is possible that “the sun won’t rise in the morning” — in other words, that between now and next morning the sun will go out of existence and/or the earth will stop spinning — but this is highly unlikely. There is a higher likelihood that “California will suffer a devastating earthquake within the next 24 hours,” but even this claim is not well justified. That “snarling dogs tend to bite” is much more justified for you, and the belief that “holding your hand directly over an open flame will cause a burn” even more so. In general, to have evidence for the truth of P is to have some justification to believe P. The hard part is figuring out when there is enough evidence to actually justify your believing P.

We’ve considered the nature of knowledge and of justified belief; what about what we call “mere opinion”? Consider the following two exchanges:

Exchange #1

John: Penicillin is much better than Erythromycin for treating this kind of infection.
Mary: Thanks for the advice; I’ll switch to penicillin.

Exchange #2

John: Chocolate ice cream is much better than vanilla ice cream.
Mary: That’s just your opinion.

John’s two claims have the same outward appearance — they both appear to be making a judgment about things in the world — but they differ in an important way. In the first exchange, Mary accepts John’s claim — she obviously trusts him as an authority here — and were she doubtful, she could ask him for evidence to support his claim (for instance, whether it is supported by any clinical trials).

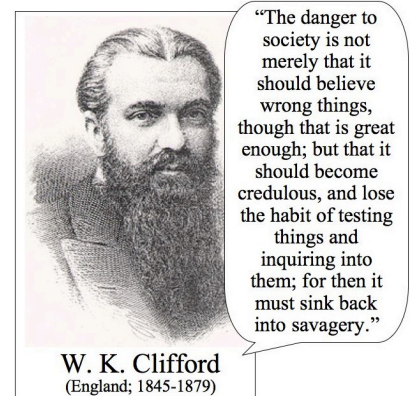
Her reply in the second exchange, however, suggests that John is simply stating a preference of his, and that there is no reason available for anyone else to share that preference. It would be odd for Mary to counter with “What evidence do you have for believing that?” John’s claim about ice cream should actually be understood as a claim about himself (viz., “John prefers chocolate to vanilla ice cream”), and Mary’s response is an acknowledgement of that fact. Consider a similar exchange:

Exchange #3

John: I prefer chocolate ice cream to vanilla.
Mary: That’s just your opinion.

Here we find Mary’s response to be strangely argumentative. “Of course it’s his opinion,” we want to say, “what else could it be?” But more importantly, we view John as the final authority on the truth of his preferences, so what he is stating is rather more than some “unsupported belief” or “mere opinion”. This is something about which he can’t be wrong.

“Why do you believe that?” is a response appropriate for statements like “smoking cigarettes increases your chance of developing lung cancer” or “all objects fall at the same rate, once air resistance is taken into account” or “it’s raining outside” — but not for statements like “I enjoy listening to Bach cantatas.” In the first three, we can meaningfully ask for evidence that supports the truth of the



claim, but there is no additional evidence that could be given to support the last statement: It is true by virtue of someone saying it (so long as they are sincere).

Finally, we sometimes encounter people holding unjustified beliefs:

Exchange #4

John: Intelligent life inhabits the interior of Mars.

Mary: What evidence do you have for believing that?

John: I had a dream last night about those Martians.

Mary: Well, that's hardly a good reason for believing it.

This is different from Exchange #2, where John is really just telling us something about himself, rather than about ice cream (that is, it concerned a matter of taste). Here the claim does appear to involve Mars (a matter of judgment), except that it lacks any proper justification.

MATTERS OF TASTE AND MATTERS OF JUDGMENT

A common belief held by students new to philosophy goes something like this: “Philosophy is just a matter of opinion. None of it can be proved one way or another, so each opinion is just as good as the next.”

This is a belief about other beliefs — so we could call it a *meta-belief*. It is the belief that all beliefs are of equal value or worth, and that each is as likely to be true as the next (or else, that *none* are true or false). This meta-belief goes by the name of *relativism*, and for some it is a view held of nearly all beliefs.

While this meta-belief may be common, a little reflection suggests that it is very likely false. First, it misunderstands the relationship between **proof** and **evidence**. A belief may not be proven, but there may still exist evidence in its favor that warrants our believing it. While there are areas of life where one opinion *does* seem to be just as worthy as the next, philosophy isn't one of them, no more than any other field of academic study, for as soon as we admit that there *is* evidence for or against some belief, then we have left the realm of “mere opinion” and entered the realm of “justified belief.”

If I say I don't like the taste of pickled herring, then there's little point in arguing with me. You might think my opinion of pickled herring unfortunate (perhaps you wanted to take me to eat at your favorite pickled herring deli), but it isn't wrong or misinformed. There's no being wrong in matters of taste: either you like something or you don't, and that's the end of the discussion. The claim that “Pickled herring tastes good” is a *mere opinion*, a matter of taste.

Matters of judgment are quite different in this regard. With these, it is quite appropriate to ask for the evidence, for the “reasons to believe.” Many matters of judgment have been conclusively determined to be true or false; others are still being debated. What is important here is to see that the debate is legitimate and meaningful — that there is a truth waiting to be discovered. You might believe, for instance, that the heavier an object is, the faster it will fall to the ground when dropped. Not only will a physicist disagree with you, she'll prove by experiment that weight and acceleration in free fall are wholly unrelated, and you will have no choice but to change your mind about the matter.⁴ Here there is no room for intelligent

ON READING PHILOSOPHERS

“In studying a philosopher, the right attitude is neither reverence nor contempt, but first a kind of hypothetical sympathy, until it is possible to know what it feels like to believe in his theories, and only then a revival of the critical attitude, which should resemble, as far as possible, the state of mind of a person abandoning opinions which he has hitherto held. Contempt interferes with the first part of this process, and reverence with the second. Two things are to be remembered: that a man whose opinions and theories are worth studying may be presumed to have had some intelligence, but that no man is likely to have arrived at complete and final truth on any subject whatever.”

— Bertrand Russell, *A History of Western Philosophy* (1945)

⁴ In fact, Galileo's thought experiment is fairly decisive. He argued that the speed of objects in free fall is not related to their weight. Imagine two ten-pound bowling balls falling through the air. Now tie a string between them, producing one twenty-pound object: Will it now drop twice as fast? If you like, substitute a rigid steel rod for the string. It is clear, simply from our imagined experiment, that weight and speed of free fall are unrelated.

disagreement, because the truth of the matter has been decided. But unlike matters of taste, which are purely subjective, here the matter is entirely *objective*, and the evidence supporting the belief can be presented and examined.

Philosophical claims do not appear to be matters of taste. But how much objectivity they enjoy is still an open question, as is their decidability. None of the theories used in the natural sciences have been proven in the sense that they are irrefutably true for all time: perhaps all of them will be overturned sometime in the future. But that doesn't mean that one theory is just as good as the next, and that it is all a matter of opinion whether $E = mc^2$. There is good solid reasoning, including much empirical evidence, behind these theories that makes them superior to their competitors. Similarly with theories or claims in philosophy: What makes one theory better than another isn't that we know the one is true and the other false, but rather that we have *better reasons* for believing the one than the other. We will now turn to logic, which is a discipline for helping us think through these reasons to believe.



"It sort of makes you stop and think, doesn't it."

Dropping balls of different weight from the leaning tower of Pisa, as legend claims Galileo did, is quite unnecessary for making this simple point.

READINGS

THE ALLEGORY OF THE CAVE

Plato

Plato (427-347 BCE) wrote his famous masterpiece on justice — The Republic — in mid-career, and somewhat after the period of his so-called "Socratic Dialogues." Although this work is presented in dialogue form, it lacks much of the lively give-and-take of the earlier dialogues, and is much more a didactic string of monologues. While Socrates is the main interlocutor (and the narrator of the story), we should neither assume that any of this was intended as historical record, nor that Socrates held any of these views. This is Plato speaking, loud and clear.

The following selection comes from the very beginning of Book VII (514a-518d). The entire Republic is cast in the form of Socrates recounting a previous conversation (thus his references to his own speech). Socrates is speaking with Glaucon about the nature of philosophy, and the effect of education on the soul.

SOCRATES: And now, I said, compare the effect of education and of the lack of it on our nature to an experience like this: Imagine human beings living in an underground cave, which has a mouth open towards the light and reaching all along the cave; here they have been from their childhood, and have their legs and necks chained so that they cannot move, and can only see before them, being prevented by the chains from turning round their heads. Above and behind them a fire is blazing at a distance, and between the fire and the prisoners there is a raised way; and you will see, if you look, a low wall built along the way, like the screen which marionette players have in front of them, over which they show the puppets.

GLAUCON: I see.

S: And do you see, I said, men passing along the wall carrying all sorts of vessels, and statues and figures of animals made of wood and stone and various materials, which appear over the wall? Some of them are talking, others silent.

G: You have shown me a strange image, and they are strange prisoners.

S: Like ourselves, I replied; and they see only their own shadows, or the shadows of one another, which the fire throws on the opposite wall of the cave?

True, he said; how could they see anything but the shadows if they were never allowed to move their heads?

And of the objects which are being carried in like manner they would only see the shadows?

Yes, he said.

And if they were able to converse with one another, would they not suppose that they were naming what was actually before them?

Very true.

And suppose further that the prison had an echo which came from the other side, would they not be sure to fancy when one of the passers-by spoke that the voice which they heard came from the passing shadow?

No question, he replied.

To them, I said, the truth would be literally nothing but the shadows of the images.

That is certain.

And now look again, and see what being released from their bonds and cured of their ignorance would naturally be like. At first, when any of them is liberated and compelled suddenly to stand up and turn his neck round and walk and look towards the light, he will suffer sharp pains; the glare will distress him, and he will be unable to see the realities of which in his former state he had seen the shadows; and then conceive some one saying to him, that what he saw before was an illusion, but that now, when he is approaching nearer to being and his eye is turned towards more real existence, he has a clearer vision. What will be his reply? And you may further imagine that his instructor is pointing to the objects as they pass and requiring him to name them. Will he not be perplexed? Will he not fancy that the shadows which he formerly saw are truer than the objects which are now shown to him?

Far truer.

And if he is compelled to look straight at the light, will he not have a pain in his eyes which will make him turn away to take in the objects of vision which he can see, and which he will conceive to be in reality clearer than the things which are now being shown to him?

He would.

And suppose once more, that he is reluctantly dragged up a steep and rugged ascent, and held fast until he's forced into the presence of the sun itself, is he not likely to be pained and irritated? When he approaches the light his eyes will be dazzled, and he will not be able to see anything at all of what are now called realities.

At least not at first, he said.

He will require to grow accustomed to the sight of the upper world. And first he will see the shadows best, next the reflections of men and other objects in the water, and then the objects themselves; then he will gaze upon the light of the moon and the stars and the spangled heaven; and he will see the sky and the stars by night better than the sun or the light of the sun by day?

Certainly.

Last he will be able to see the sun, and not mere reflections of it in the water, but he will see it in its own proper place, and not in another; and he will be able to study it as it is.

Certainly.

He will then proceed to argue that this is what gives the season and the years, and is the guardian of all that is in the visible world, and in a certain way the cause of all things which he and his fellows have been accustomed to behold?

Clearly, he said, he would first see the sun and then reason about it.

And when he remembered his old habitation, and the wisdom of the cave and his fellow-prisoners, do you not suppose that he would count himself happy for the change, and pity them?

Certainly, he would.

And if they were in the habit of conferring honors among themselves on those who were quickest to observe the passing shadows and to remark which of them went before, and which followed after, and which were together; and who were therefore best able to draw conclusions as to the future, do you think that he would care for such honors and glories, or envy the possessors

of them? Would he not say with Homer, "Better to be the poor servant of a poor master, and to endure anything, rather than think as they do and live after their manner"?

Yes, he said, I think that he would rather suffer anything than entertain these false notions and live in this miserable manner.

Imagine once more, I said, such a person coming suddenly out of the sun to be replaced in his old situation; would he not be certain to have his eyes full of darkness?

To be sure, he said.

And if there were a contest, and he had to compete in measuring the shadows with the prisoners who had never moved out of the cave, while his sight was still weak, and before his eyes had become steady (and the time which would be needed to acquire this new habit of sight might be considerable) would he not be ridiculous? Men would say of him that he went up and came back down without his eyes; and that it was better not even to think of ascending; and if any one tried to loose another and lead him up to the light, let them only catch the offender, and they would put him to death.

No question, he said.

This entire allegory, I said, you may now append, dear Glaucon, to the previous argument: The prison-house is the world of sight, the light of the fire is the sun, and you will not misapprehend me if you interpret the journey upwards to be the ascent of the soul into the intellectual world according to my poor belief, which, at your desire, I have expressed whether rightly or wrongly God knows. But, whether true or false, my opinion is that in the knowable realm the form of the good is the last to be seen, and then only with difficulty. Once seen, however, it is inferred to be the cause of all things beautiful and right, that it produces both light and its source in the visible world, and that in the intelligible realm it controls and provides truth and understanding, so that anyone who is to act sensibly in private or public must see it.

I agree, he said, as far as I am able to understand you.

Moreover, I said, you must not wonder that those who attain to this beatific vision are unwilling to descend to human affairs; for their souls are ever hastening into the upper world where they desire to dwell;

which desire of theirs is very natural, if our allegory may be trusted.

Yes, very natural.

What about what happens when someone turns from divine study to the evils of human life? Do you think it's surprising, since his sight is still dim, and he hasn't yet become accustomed to the darkness around him, that he behaves awkwardly and appears completely ridiculous if he's compelled, either in the courts or elsewhere, to contend about the shadows of justice or the statues of which they are the shadows and to dispute about the way these things are understood by people who have never seen justice itself?

Anything but surprising, he replied.

Any one who has common sense will remember that the eyes may be confused in two ways and from two causes, either from coming out of the light or from going into the light, which is true of the mind's eye, quite as much as of the bodily eye; and he who remembers this when he sees any one whose vision is perplexed and weak, will not be too ready to laugh. He will first ask whether that soul has come out of the brighter light, and is unable to see because unaccustomed to the dark, or having turned from darkness to the day is dazzled by excess of light. And he will count the one happy in his condition and state of being, and he will pity the other; or, if he has a mind to laugh at the soul which comes from below into the light, there

will be more reason in this than in the laugh which greets him who returns from above out of the light into the cave.

That, he said, is a very just distinction.

But then, if I am right, certain professors of education must be wrong when they say that they can put knowledge into the soul which was not there before, like sight into blind eyes.

They undoubtedly say this, he replied.

Whereas, our argument shows that the power and capacity of learning exists in the soul already; and that just as the eye was unable to turn from darkness to light without the whole body, so too the instrument of knowledge can only by the movement of the whole soul be turned from the world of becoming into that of being, and learn by degrees to endure the sight of being, and of the brightest and best of being, or in other words, of the good.

Very true.

Then education is the craft concerned with doing this very thing, this turning around, and with how the soul can most easily and effectively be made to do it. It isn't the craft of putting sight into the soul. Education takes for granted that sight is there but that it isn't turned the right way or looking where it ought to look, and it tries to redirect it appropriately.

So it seems.

THE DARKNESS AND THE LIGHT

Neil Postman

Neil Postman (1931-2003) is a frequently cited social critic and communications theorist. He chaired the Department of Culture and Communications at New York University, and was the author of numerous articles and books, including The Disappearance of Childhood (1982), Amusing Ourselves to Death (1985), and Technopoly (1992). The following speech was given at a forum sponsored by Utne Reader at the town hall in New York City in 1995. It first appeared in Utne Reader (July-August 1995), p. 35. Having begun with a quote from Edna St. Vincent Millay (1892-1950), he could just as well have quoted a few lines from her contemporary, T. S. Eliot (1888-1965), who asked in his "Choruses from 'The Rock'":

"Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?"

These poets are some of the first responses to what has since become known as the "Information Age".

The darkness of which I am most acutely aware was spoken of in a prophetic poem by Edna St. Vincent Millay. The poem is from her book *Huntsman, What*

Quarry? and in this fragment of it Ms. Millay describes precisely the problem that darkens our horizon:

Upon this gifted age, in its dark hour,
Rains from the sky a meteoric shower
Of facts...
They lie unquestioned, uncombined.
Wisdom enough to leech us of our ill
Is daily spun,
but there exists no loom
To weave it into fabric....

What the poet speaks of here is a great paradox. Beginning in the 19th century, humanity creatively addressed the problem of how to eliminate information scarcity, how to overcome the limitations of space, time, and form. And we did so in spectacular fashion, especially in the 19th century.

For those of you unfamiliar with the 19th century, here are some of the inventions that contributed to the solution: telegraphy, photography, the rotary press, the transatlantic cable, the electric light, radio, movies, the computer, the X-ray, the penny press, the modern magazine, and the advertising agency.

Of course, in the first half of the 20th century, we added some important inventions so that the burdens of information scarcity were removed once and for all. But in doing so, we created a new problem never experienced before: information glut, information incoherence, information meaninglessness. To put it far

less eloquently than Ms. Millay did, we have transformed information into a form of garbage, and ourselves into garbage collectors.

Like the sorcerer's apprentice, we are awash in information without even a broom to help us get rid of it. Information comes indiscriminately, directed at no one in particular, in enormous volume, at high speeds, severed from import and meaning. And there is no loom to weave it all into fabric. No transcendent narratives to provide us with moral guidance, social purpose, intellectual economy. No stories to tell us what we need to know, and what we do not need to know.

This, then, is the problem we have to confront with as much intelligence and imagination as we can muster. How to begin? We will have to stop consulting our engineers, our computer gurus, and our corporate visionaries, who, though they claim to speak for the future, are strangely occupied in solving a 19th-century problem that has already been solved. Instead, we will need to consult our poets, playwrights, artists, humorists, theologians, and philosophers, who alone are capable of creating or restoring those metaphors and stories that give point to our labors, give meaning to our history, elucidate the present, and give direction to our future. They are our weavers, and I have no doubt that there are men and women among us who have the looms to weave us a pattern for our lives. The prospect of their doing so is, for me, the gleam of light on the horizon.

THE VALUE OF PHILOSOPHY

Bertrand Russell

Bertrand Russell (1872-1970) was born into a line of progressive British politicians, and so from an early age felt that he too must be engaged in the betterment of society. Thus, far from being an ivory tower intellectual, Russell followed much in the steps of John Stuart Mill (who was his godfather) in working for social reform.

Russell's most important philosophical work was in the philosophy of logic and mathematics, but he also published many popular works on the philosophy of education, love, sex, and morality. He was a devoted pacifist, and spent two stints in jail: once for six months in 1918 during the first world war for crit-

icizing the United States (during which time he wrote his Introduction to Mathematical Philosophy), and once for a week in 1961 (at the age of 89) for protesting the production of nuclear weapons. Russell was awarded the Nobel Prize for Literature in 1950.

The following selection is the final chapter (ch. 15) of Russell's slender introduction to The Problems of Philosophy (1912; re-issued 1972).

Having now come to the end of our brief and very incomplete review of the problems of philosophy, it will be well to consider, in conclusion, what is the

value of philosophy and why it ought to be studied. It is the more necessary to consider this question, in view of the fact that many men, under the influence of science or of practical affairs, are inclined to doubt whether philosophy is anything better than innocent but useless trifling, hair-splitting distinctions, and controversies on matters concerning which knowledge is impossible.

This view of philosophy appears to result, partly from a wrong conception of the ends of life, partly from a wrong conception of the kind of goods which philosophy strives to achieve. Physical science, through the medium of inventions, is useful to innumerable people who are wholly ignorant of it; thus the study of physical science is to be recommended, not only, or primarily, because of the effect on the student, but rather because of the effect on mankind in general. Thus utility does not belong to philosophy. If the study of philosophy has any value at all for others than students of philosophy, it must be only indirectly, through its effects upon the lives of those who study it. It is in these effects, therefore, if anywhere, that the value of philosophy must be primarily sought.

But further, if we are not to fail in our endeavour to determine the value of philosophy, we must first free our minds from the prejudices of what are wrongly called 'practical' men. The 'practical' man, as this word is often used, is one who recognizes only material needs, who realizes that men must have food for the body, but is oblivious of the necessity of providing food for the mind. If all men were well off, if poverty and disease had been reduced to their lowest possible point, there would still remain much to be done to produce a valuable society; and even in the existing world the goods of the mind are at least as important as the goods of the body. It is exclusively among the goods of the mind that the value of philosophy is to be found; and only those who are not indifferent to these goods can be persuaded that the study of philosophy is not a waste of time.

Philosophy, like all other studies, aims primarily at knowledge. The knowledge it aims at is the kind of knowledge which gives unity and system to the body of the sciences, and the kind which results from a critical examination of the grounds of our convictions, prejudices, and beliefs. But it cannot be maintained that philosophy has had any very great measure of

success in its attempts to provide definite answers to its questions. If you ask a mathematician, a mineralogist, a historian, or any other man of learning, what definite body of truths has been ascertained by his science, his answer will last as long as you are willing to listen. But if you put the same question to a philosopher, he will, if he is candid, have to confess that his study has not achieved positive results such as have been achieved by other sciences. It is true that this is partly accounted for by the fact that, as soon as definite knowledge concerning any subject becomes possible, this subject ceases to be called philosophy, and becomes a separate science. The whole study of the heavens, which now belongs to astronomy, was once included in philosophy; Newton's great work was called 'the mathematical principles of natural philosophy'. Similarly, the study of the human mind, which was a part of philosophy, has now been separated from philosophy and has become the science of psychology. Thus, to a great extent, the uncertainty of philosophy is more apparent than real: those questions which are already capable of definite answers are placed in the sciences, while those only to which, at present, no definite answer can be given, remain to form the residue which is called philosophy.

This is, however, only a part of the truth concerning the uncertainty of philosophy. There are many questions — and among them those that are of the profoundest interest to our spiritual life — which, so far as we can see, must remain insoluble to the human intellect unless its powers become of quite a different order from what they are now. Has the universe any unity of plan or purpose, or is it a fortuitous concourse of atoms? Is consciousness a permanent part of the universe, giving hope of indefinite growth in wisdom, or is it a transitory accident on a small planet on which life must ultimately become impossible? Are good and evil of importance to the universe or only to man? Such questions are asked by philosophy, and variously answered by various philosophers. But it would seem that, whether answers be otherwise discoverable or not, the answers suggested by philosophy are none of them demonstrably true. Yet, however slight may be the hope of discovering an answer, it is part of the business of philosophy to continue the consideration of such questions, to make us aware of their importance, to examine all the approaches to them, and to

keep alive that speculative interest in the universe which is apt to be killed by confining ourselves to definitely ascertainable knowledge.

Many philosophers, it is true, have held that philosophy could establish the truth of certain answers to such fundamental questions. They have supposed that what is of most importance in religious beliefs could be proved by strict demonstration to be true. In order to judge of such attempts, it is necessary to take a survey of human knowledge, and to form an opinion as to its methods and its limitations. On such a subject it would be unwise to pronounce dogmatically; but if the investigations of our previous chapters have not led us astray, we shall be compelled to renounce the hope of finding philosophical proofs of religious beliefs. We cannot, therefore, include as part of the value of philosophy any definite set of answers to such questions. Hence, once more, the value of philosophy must not depend upon any supposed body of definitely ascertainable knowledge to be acquired by those who study it.

The value of philosophy is, in fact, to be sought largely in its very uncertainty. The man who has no tincture of philosophy goes through life imprisoned in the prejudices derived from common sense, from the habitual beliefs of his age or his nation, and from convictions which have grown up in his mind without the co-operation or consent of his deliberate reason. To such a man the world tends to become definite, finite, obvious; common objects rouse no questions, and unfamiliar possibilities are contemptuously rejected. As soon as we begin to philosophize, on the contrary, we find, as we saw in our opening chapters, that even the most everyday things lead to problems to which only very incomplete answers can be given. Philosophy, though unable to tell us with certainty what is the true answer to the doubts which it raises, is able to suggest many possibilities which enlarge our thoughts and free them from the tyranny of custom. Thus, while diminishing our feeling of certainty as to what things are, it greatly increases our knowledge as to what they may be; it removes the somewhat arrogant dogmatism of those who have never traveled into the region of liberating doubt, and it keeps alive our sense of wonder by showing familiar things in an unfamiliar aspect.

Apart from its utility in showing unsuspected possibilities, philosophy has a value — perhaps its

chief value — through the greatness of the objects which it contemplates, and the freedom from narrow and personal aims resulting from this contemplation. The life of the instinctive man is shut up within the circle of his private interests: family and friends may be included, but the outer world is not regarded except as it may help or hinder what comes within the circle of instinctive wishes. In such a life there is something feverish and confined, in comparison with which the philosophic life is calm and free. The private world of instinctive interests is a small one, set in the midst of a great and powerful world which must, sooner or later, lay our private world in ruins. Unless we can so enlarge our interests as to include the whole outer world, we remain like a garrison in a beleaguered fortress, knowing that the enemy prevents escape and that ultimate surrender is inevitable. In such a life there is no peace, but a constant strife between the insistence of desire and the powerlessness of will. In one way or another, if our life is to be great and free, we must escape this prison and this strife.

One way of escape is by philosophic contemplation. Philosophic contemplation does not, in its widest survey, divide the universe into two hostile camps — friends and foes, helpful and hostile, good and bad — it views the whole impartially. Philosophic contemplation, when it is unalloyed, does not aim at proving that the rest of the universe is akin to man. All acquisition of knowledge is an enlargement of the Self, but this enlargement is best attained when it is not directly sought. It is obtained when the desire for knowledge is alone operative, by a study which does not wish in advance that its objects should have this or that character, but adapts the Self to the characters which it finds in its objects. This enlargement of Self is not obtained when, taking the Self as it is, we try to show that the world is so similar to this Self that knowledge of it is possible without any admission of what seems alien. The desire to prove this is a form of self-assertion and, like all self-assertion, it is an obstacle to the growth of Self which it desires, and of which the Self knows that it is capable. Self-assertion, in philosophic speculation as elsewhere, views the world as a means to its own ends; thus it makes the world of less account than Self, and the Self sets bounds to the greatness of its goods. In contemplation, on the contrary, we start from the not-Self, and through its great-

ness the boundaries of Self are enlarged; through the infinity of the universe the mind which contemplates it achieves some share in infinity.

For this reason greatness of soul is not fostered by those philosophies which assimilate the universe to Man. Knowledge is a form of union of Self and not-Self; like all union, it is impaired by dominion, and therefore by any attempt to force the universe into conformity with what we find in ourselves. There is a widespread philosophical tendency towards the view which tells us that Man is the measure of all things, that truth is man-made, that space and time and the world of universals are properties of the mind, and that, if there be anything not created by the mind, it is unknowable and of no account for us. This view, if our previous discussions were correct, is untrue; but in addition to being untrue, it has the effect of robbing philosophic contemplation of all that gives it value, since it fetters contemplation to Self. What it calls knowledge is not a union with the not-Self, but a set of prejudices, habits, and desires, making an impenetrable veil between us and the world beyond. The man who finds pleasure in such a theory of knowledge is like the man who never leaves the domestic circle for fear his word might not be law.

The true philosophic contemplation, on the contrary, finds its satisfaction in every enlargement of the not-Self, in everything that magnifies the objects contemplated, and thereby the subject contemplating. Everything, in contemplation, that is personal or private, everything that depends upon habit, self-interest, or desire, distorts the object, and hence impairs the union which the intellect seeks. By thus making a barrier between subject and object, such personal and private things become a prison to the intellect. The free intellect will see as God might see, without a *here* and *now*, without hopes and fears, without the trammels of customary beliefs and traditional prejudices, calmly, dispassionately, in the sole and exclusive desire of knowledge — knowledge as impersonal, as purely contemplative, as it is possible for man to

attain. Hence also the free intellect will value more the abstract and universal knowledge into which the accidents of private history do not enter, than the knowledge brought by the senses, and dependent, as such knowledge must be, upon an exclusive and personal point of view and a body whose sense-organs distort as much as they reveal.

The mind which has become accustomed to the freedom and impartiality of philosophic contemplation will preserve something of the same freedom and impartiality in the world of action and emotion. It will view its purposes and desires as parts of the whole, with the absence of insistence that results from seeing them as infinitesimal fragments in a world of which all the rest is unaffected by any one man's deeds. The impartiality which, in contemplation, is the unalloyed desire for truth, is the very same quality of mind which, in action, is justice, and in emotion is that universal love which can be given to all, and not only to those who are judged useful or admirable. Thus contemplation enlarges not only the objects of our thoughts, but also the objects of our actions and our affections: it makes us citizens of the universe, not only of one walled city at war with all the rest. In this citizenship of the universe consists man's true freedom, and his liberation from the thralldom of narrow hopes and fears.

Thus, to sum up our discussion of the value of philosophy: Philosophy is to be studied, not for the sake of any definite answers to its questions since no definite answers can, as a rule, be known to be true, but rather for the sake of the questions themselves; because these questions enlarge our conception of what is possible, enrich our intellectual imagination and diminish the dogmatic assurance which closes the mind against speculation; but above all because, through the greatness of the universe which philosophy contemplates, the mind also is rendered great, and becomes capable of that union with the universe which constitutes its highest good.

LOGIC FOR BEGINNERS

**“MEN ARE APT TO MISTAKE THE STRENGTH OF THEIR FEELING
FOR THE STRENGTH OF THEIR ARGUMENT.
THE HEATED MIND RESENTS THE CHILL TOUCH
AND RELENTLESS SCRUTINY OF LOGIC.”**

—William E. Gladstone (1809-1898)

[4] ARGUMENT ANALYSIS

When most people hear the word ‘argument’, they think of disagreements or conflicts of some sort, as in:

1. “Bob and Alice are having a big argument about that new couch he bought yesterday.”

Logic gives the word a rather different meaning: **An argument is a set of reasons that suggests the truth of some claim.** An argument is the laying out of the reasons (or evidence) for believing some claim. To analyze an argument is to attempt to understand those reasons to believe, and then to evaluate them as good or bad reasons.

It is in this latter sense of ‘argument’ that we say that **logic** is the study of good arguments or good reasoning, that is, logic is a study of how we *ought* to argue or reason, rather than of how we do in fact argue or reason. (In this regard, logic resembles ethics, which is a study of how we ought to behave, not how we in fact do behave.) Arguments are the primary objects of study in logic. A good argument will give reasons or support for believing some disputed or questioned claim. Bad arguments *seem* to give support when in fact they do not; these we call **fallacies**.

PREMISES AND CONCLUSION

An **argument** is an attempt to support the truth of some statement (the **conclusion**), based on the alleged truth of one or more other statements (the **premises**). The premises, if they are to serve as premises, must be statements that everyone accepts. These premises then serve as reasons for accepting some additional claim — the **conclusion** — which is the statement in doubt, and thus in need of support. The most basic logical skill is being able to distinguish the premises from the conclusion. Consider the following passage:

When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had. Therefore, a warrantless search or seizure of abandoned property is not unreasonable under the Fourth Amendment. [Judge Stephanie Kulp Seymour, *United States v. Jones*]

The claim being argued for here is what follows the word ‘therefore’:

2. A warrantless search or seizure of abandoned property is not unreasonable under the Fourth Amendment.

That’s the conclusion. And why should we believe this conclusion? The reason to believe the conclusion is provided in a single premise:

[Poem]

FIRE AND ICE

Some say the world will end in fire,
Some say in ice.
From what I’ve tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice.

Robert Frost, 1920 (1874-1963)

3. When individuals voluntarily abandon property, they forfeit any expectation of privacy in it that they might have had.

Normally you can discover the conclusion and premise(s) by a careful reading of the passage. What does the author want you to believe? (That will be the conclusion.) And what reasons does she give you to believe it? (Those will be the premises.) We often use certain indicator words to help highlight the reasoning involved (see the box listing common indicator words for premises and conclusions).

Here's another argument:

Because both the world and a watch have multiple parts that seem to interact with one another for some purpose, and since watches were created by a designing intelligence, it follows that the world was probably also created by a designing intelligence.

It is generally helpful to mark up a passage, enclosing the various claims in parentheses and highlighting the indicator words:

Because (both the world and a watch have multiple parts that seem to interact with one another for some purpose), and **since** (watches were created by a designing intelligence), **it follows that** (the world was probably also created by a designing intelligence).

Here, the first two claims are premises, and the conclusion that is presumably supported by these two premises is the last claim. Whether this conclusion actually follows from these premises will be considered more closely in a later chapter.

<p style="text-align: center;">Conclusion-indicators include: therefore, wherefore, thus, consequently, hence, accordingly, entails that, for this reason, so, it follows that, as a result, suggests that, proves that, indicates that, is likely that.</p> <p style="text-align: center;">Premise-indicators include: since, because, given that, in that, as indicated by, for, owing to, inasmuch as, may be inferred from, in view of the fact that.</p>

SENTENCES AND THEIR USES

An argument consists of one or more premises and a conclusion; premises and conclusions are all statements; and a statement is a kind of sentence. So first we need to make sure we know what we mean by 'sentence' and 'statement', after which we can take a closer look at arguments.

A **sentence** is a series of words strung together following the rules of grammar. This is a sentence. Here's another one. And if we collect together all the sentences, from all the different languages, into one group, a sub-group of these sentences will be statements. A **statement** is a sentence with a **truth-value** (i.e., a sentence that is either true or false).

Sentences can be used to do various things, and in general they can perform any of three separate roles or *functions*:

- informative (e.g., "The world will end in two minutes.")
- expressive (e.g., "You can't be serious!")
- directive (e.g., "Please lift this piano off my nose.")

Only sentences meant informatively can be said to express statements, and so have a truth-value ("Ow!" or "Get out of here!" or "Where's my other sock?" do not have truth-values). In logic, we are normally concerned only with those sentences that have truth-values.

Apart from these functions, sentences come in various *forms* (this is the sentence's outward appearance), such as:

- *questions*: "Are you sitting on my hat?"
- *proposals*: "Let's buy the green one."
- *commands*: "Go to bed!"
- *exclamations*: "Nuts!"
- *assertions*: "There's coffee in the pot."

One might think that all assertions are informative, all exclamations expressive, and all commands and questions directive, but such a correspondence does not always hold. The following four sentences presumably all serve the same directive function of getting someone to bring more coffee, yet they all have different forms:

- Is there any coffee left? (question)
- Let's have another cup. (proposal)
- Bring me some coffee! (command)
- O cruel fate, that my cup is empty! (exclamation)
- I would like some more coffee. (assertion)

Finally, a sentence doesn't have to be true to be a statement. "The earth has five moons" is just as much a statement as "The earth has one moon" — although the first is false and the second true — and either might show up in an argument.

STATEMENTS AND PROPOSITIONS

Sentences with truth-values are statements. To be able to determine the truth-value of a statement, however, we need to understand its **meaning**, and we then need to check that meaning against reality, to see if the meaning corresponds with reality. If it does, then the sentence is true.

The meaning of a statement — when this meaning is unambiguous — is what we call the **proposition** (or **propositional-content**). Propositions are the **meaning** expressed unambiguously by statements, and (often ambiguously) by sentences. For instance, the sentence

1. His shirt is red.

has a truth value, and so is a statement, but we have no sense of the truth-value without first knowing which shirt is intended. Anyone who understands English will know that this statement is claiming that some male-gendered being has a shirt that is red; this is one level of meaning. Until we know who owns the shirt, however, and which shirt is being discussed, we won't be able to determine whether the statement corresponds with the way things really are, namely, that his shirt is in fact red.

In the following, I will use 'statement' in this fuller sense, as that set of words that unambiguously captures the propositional-content of a sentence, and which also has a truth-value. So, for instance, when I utter the sentence "I am sitting," this sentence — as a statement — would need to have the pronoun replaced with my name, and the time of the utterance would also have to be indicated, since sometimes I sit and sometimes I don't. In the following examples, we see the same statement expressed in three different sentences (1, 2, 3), and the same sentence expressing two different statements (1, 4)

	Sentence	Statement
1	I am sitting. [spoken by Steve Naragon at noon on June 3, 2016]	Steve Naragon is sitting at noon on June 3, 2016.
2	He is sitting. [spoken by another of Steve Naragon at noon on June 3, 2016]	Steve Naragon is sitting at noon on June 3, 2016.
3	I was sitting at noon. [spoken by Steve Naragon at 4pm on June 3, 2016]	Steve Naragon is sitting at noon on June 3, 2016.
4	I am sitting. [spoken by Alice Miller at noon on June 3, 2016]	Alice Miller is sitting at noon on June 3, 2016.

Different instances of the same sentence can have quite different meanings. For instance, the sentence "I am sitting" contains exactly three words, and it's the same sentence whether *I* say it or *you* say it. But the *meaning* of this sentence will change with the speaker, since the 'I' means Steve Naragon when I say it, but not when you say it. So here we have one sentence, but two statements, each expressing a different proposition. Finally, this sentence will sometimes be true, and sometimes false, depending on who says it and when they say it (namely, whether or not they are actually sitting when they say it). Until we know the full meaning, we won't be able to decide what statement is being expressed, and thus whether what is being said is true.

One important role of language is to convey some propositional meaning from one person (the sender) to another (the receiver). Depending on the beliefs and backgrounds of these two parties, the intended meaning of the sender

can differ considerably from the meaning understood by the receiver. This is true in any number of senses, but also in one very direct sense: When someone says, for instance, that “Heather’s dog has rabies,” any competent English-speaker will understand what is meant, since they will know the meaning of each word of the sentence; but they won’t have the fullest understanding of this sentence — and thus the proposition being expressed — until they know exactly which dog is claimed to have rabies. The sender and receiver might have in mind quite different Heather’s, or perhaps the same Heather but different dogs (should more than one dog live with Heather).

SIMPLE AND COMPLEX STATEMENTS

The statements comprising the premises and conclusion of an argument can be either simple or complex. A **simple statement** cannot be analyzed into simpler statements, while a **complex statement** can. This is not as clear-cut as you might imagine, but for our purposes we shall assume that it *is* clear-cut. So, for instance,

1. A hedgehog is climbing up the back of your trousers.

will, for our purposes, count as a simple statement, even though a pickier person might conceivably analyze it into something like this:

2. There is at least one hedgehog.
3. There is at least one person (namely, you).
4. There is at least one pair of trousers.
5. You are standing in a certain relationship to those trousers (namely, you are wearing them).
6. The hedgehog is standing in a certain relationship to the trousers as described in statement 5 (namely, it is climbing up the back of them).

I will not expect such a high level of pickiness here.

A **complex statement** is any statement that *can* be analyzed into simpler statements. Three common types of complex statements are disjunctive (p or q), conjunctive (p and q), and conditional statements (if p , then q). Let’s first consider a **disjunctive statement**, which is marked by the terms “either ... or ...”:

1. Either that’s a hedgehog climbing up your trousers or it’s a porcupine.

can be analyzed into the two simple statements:

2. A hedgehog is climbing up your trousers.
3. A porcupine is climbing up your trousers.

and we could re-write the original sentence in the following form, which is more straight-forward but less elegant, enclosing each simple statement in parentheses:

4. (A hedgehog is climbing up your trousers) **or** (A porcupine is climbing up your trousers.).

Sometimes complex statements will appear to be simple statements, like the following **conjunctive statement**:

5. Ed and Bob are Republicans.

On closer inspection, it is found to be analyzable into two simple statements:

6. Ed is a Republican.
7. Bob is a Republican.

... and can be more perspicuously written as:

8. (Ed is a Republican) **and** (Bob is a Republican).

Liberal Education

“Liberal education in our colleges and universities is and should be Socratic, committed to the activation of each student’s independent mind and to the production of a community that can genuinely reason together about a problem, not simply trade claims and counterclaims.”

— Martha Nussbaum, *Cultivating Humanity* (1997), p. 19.

Conjunctive statements usually include a conjunction like ‘and’ or ‘but’.

Finally, some of the most common arguments that we encounter include inferences drawn from a **conditional** statement, like the following:

9. If you mow my lawn this afternoon, then I’ll pay you \$20.

This can be re-written with the simple statements enclosed in parentheses, in order to make the form more apparent:

10. **If** (you mow my lawn this afternoon), **then** (I’ll pay you \$20).

In general, every conditional statement has the form “If p, then q” — where ‘p’ and ‘q’ are statements. Similarly, every disjunctive statement has the form “p or q” and every conjunctive statement has the form “p and q.”

[extra]

TRUTH FUNCTIONALITY

One important feature of these complex statements is that their truth-value is dependent upon the truth-values of the simple statements that comprise them. So for any disjunctive statement, ‘p or q’, the statement will be true so long as one or both of the simple statements is true; if both p and q are false, then ‘p or q’ is false. Any conjunctive statement, ‘p and q’, is true so long as both p and q are true; otherwise it is false. And any conditional statement will be true except for one situation: if p is true and q is false, then the conditional statement ‘if p, then q’ is false; otherwise it is true. It is for this reason that we call these complex statements **truth functional**: their truth-value is a function of the truth-values of their parts.

NECESSARY AND SUFFICIENT CONDITIONS

Necessary and sufficient conditions are often explained in terms of conditional statements, and so it is useful to discuss them here, even though the fit is not as tidy as is sometimes presumed. On the surface at least — and I plan to go no deeper than that here — these conditions are fairly straight-forward, and can be captured with a simple conditional statement, ‘**if p, then q**’: p is a **sufficient condition** of q, and q is a **necessary condition** of p. This suggests a symmetry between the two conditions, viewing them as essentially the same relationship, but moving in opposite directions. So, for instance,

1. If something is a square, then it has four sides.

Being a square is a sufficient condition for having four sides, and having four sides is a necessary condition for being a square. Having four sides is also a necessary condition for being a rectangle (or any other quadrilateral), and being a square is also a sufficient condition for being a two-dimensional figure. Having a daughter is a *sufficient condition* for being a parent, but not a necessary condition (since you might instead have a son).

For any given object or event, we can speak of its various necessary and sufficient conditions. A necessary condition (NC) of some object or event is whatever *has* to happen, given the object or event, while a sufficient condition (SC) of some object or event is adequate, all by itself, to bring about that object or event.⁵

X	... is a of ...	Y
Having four sides	NC (but not SC)		Being a square
Being a square	SC (but not NC)		Having four sides
Having a daughter	SC (but not NC)		Being a parent
Being a parent	NC (but not SC)		Having a daughter
Being an unmarried man	NC and SC		Being a bachelor
Wearing blue suede shoes	neither NC nor SC		Being a college professor.

This all seems fairly straight-forward, at least until I show up at the cinema wanting to watch a movie, and the person at the ticket counter informs me that:

2. If you want to see this movie, then you need to buy a ticket.

⁵ To put this in terms of statements: A is a sufficient condition of B if A’s truth guarantees B’s truth, and B is a necessary condition of A if B must be true whenever A is true.

This seems to mean that buying a ticket is a necessary condition for seeing the movie (assuming that I remain legal, and don't somehow sneak into the theater without one); but can we plausibly say that either is a condition of the other? I can want to see a movie and still not buy a ticket, and my wanting to see a movie is not sufficient for buying the ticket (I also need the money). The standard English used here does not match the logical nature of the 'if...then...' construction, and would need to be written as:

3. If you see this movie, then you will buy (or 'will have bought') a ticket,

which doesn't quite capture the sense of (2).

Or suppose I decide that ...

4. If Tom gets an A in Calculus, then we'll celebrate.

Here it seems clear that Tom's A is a sufficient condition for our celebration; but it sounds odd, if not downright false, to claim as well that our celebration is a necessary condition for Tom's A in the class.

I leave these as unresolved puzzles, hanging from the deep complexity of the English word 'if' (and the concept of cause that often lurks beneath).

ARGUMENTS VS EXPLANATIONS

Arguments and explanations typically share the same structure, but they differ in the direction of the reasoning. With **arguments**, the conclusion is always the statement that is known less well, and it is supported by appealing to statements that are better known (the premises). With **explanations**, the thing or event being explained (the *explanandum*) is best known, and the explanation of that thing or event — why or how it happened (the *explanans*) is less known. Consider the following sentences:

1. Mary broke the window because she wasn't paying attention while pitching the ball.
2. Mary broke the window because she forgot her key and needed to get in.
3. Mary broke the window because she was the only person nearby at the time.

The first two sentences are explanations, while the last is an argument (statements in bold-face are what we appear to know better):

Mary wasn't paying attention.	Mary forgot her key.	Mary was the only person nearby.
Mary broke the window.	Mary broke the window.	Mary broke the window.

In all three of these columns, the first sentence could be introduced with a 'because' or a 'since,' etc. But in the first two columns, it is the second sentence that is known best, while the first sentence is offered as a conjecture. In the first two sentences, the "because"-phrase explains why Mary broke the window; in the third sentence, the "because"-phrase gives us a reason to believe that Mary broke the window.

When the *explanans* is controversial or uncertain, then it is arrived at through a kind of reasoning called hypothetical induction, which will be discussed below.

ARGUMENTS VS EXPOSITORY PASSAGES

Passages containing arguments and explanations are also to be distinguished from merely **expository passages**: these will describe, develop, or illustrate some point, rather than offer reasons to believe it. Consider the following two paragraphs:

Musical composition is one of the most mysterious of all art forms. People who can easily come to terms with a work of literature or a painting are still often baffled by the process by which a piece of music — appearing in material form as notation — must then be translated back into sound through the medium of a third party — the performer. Unlike a painting, a musical composition cannot be owned (except by its creator); and although a score may be published, like a book, it may remain incomprehensible to the general public until it is performed. Although a piece may be played thousands of

times, each repetition is entirely individual, and interpretations by different players may vary widely. [Wade-Matthews and Thompson, *The Encyclopedia of Music*]

There are three familiar states of matter: solid, liquid, and gas. Solid objects ordinarily maintain their shape and volume regardless of their location. A liquid occupies a definite volume, but assumes the shape of the occupied portion of its container. A gas maintains neither shape nor volume. It expands to fill completely whatever container it is in. [Hill and Kolb, *Chemistry for Changing Times*, 7th ed.]

Both of these paragraphs have a topic sentence (viz., the first sentence of each paragraph) that introduces the topic for the paragraph. In the first, the sentences following the topic sentence give the reader reasons to believe that “musical composition is one of the most mysterious of all art forms.” Because of this, the first paragraph is readily understood as containing an argument. In the second paragraph, the topic sentence is not supported by the remainder of the paragraph (none of the sentences give a reason to believe that “there are three familiar states of matter”). Instead, they are merely developing the topic sentence by describing these three states.

ENTHYMEMES

An enthymeme is an argument that is missing either a premise or a conclusion, or both. In everyday life, most arguments are presented as enthymemes, because one or more of the premises is so obvious that explicitly mentioning it would seem redundant, or else because the inference from the stated premises to the conclusion is so obvious that stating it would insult the intelligence of the reader. For example ...

1. We cannot trust this man, for he has lied in the past.

Here we find an argument with a conclusion [C] and one premise [Pr] ...

2. [C] (We cannot trust this man), for [Pr1] (he has lied in the past).

... but it seems to be missing a second premise necessary for the conclusion to follow, namely,

3. [Pr2] Whoever has lied in the past cannot be trusted.

When filling out these enthymemes, we need always to follow the **principle of charity**, which advises us to assume that the person making the argument is rational and not arguing invalidly; thus, if at all possible, the missing statements need to be inserted in such a way that the resulting argument is as good as possible.

Enthymemes are generally a good thing. Spelling out every premise, or always explicitly stating the conclusion, can solidify an otherwise fluid prose into a nearly immovable slab of text. In a witty poke at the operatic composer Richard Wagner (1813-1883), Mark Twain wrote:

There is no law against composing music when one has no ideas whatsoever. The music of Wagner, therefore, is perfectly legal.

Twain could have expressed himself more perspicuously with the following ...

- | | |
|---|---------------------|
| (1) It is not illegal to compose music barren of any ideas. | [stated premise] |
| (2) Richard Wagner has composed music barren of any ideas. | [assumed premise] |
| (3) Therefore, Richard Wagner has done nothing illegal in composing this music. | [stated conclusion] |

... but it is to our better fortune that he did not, nor would it have been as humorous.

The above is an honorable form of enthymeme, but some are dishonorable, for they are sometimes used to cloak dubious premises. This is common in advertising, where loose associations are often made between, say, using a certain mouthwash and enjoying a happy life filled with beautiful and adoring friends. The implied premise necessary to get to the desired conclusion would look something like this: “If you use our mouthwash, then your life will soon be filled with beautiful and adoring friends.” When stated so openly, however, the argument loses all ability to persuade.

[5] EXTENDED ARGUMENTS

The deductive and inductive arguments discussed below will all be simple arguments — a set of statements, one of which is the conclusion, whose truth is supported by the remaining statements that are the premises, or reasons supporting the truth of the conclusion. Most arguments that we encounter in everyday life, however, are rather more complicated than this, typically involving arguments nested inside other arguments, and with multiple lines of support. These more complex arguments we call **extended arguments**.

Our basic task, with these **extended arguments**, is the same as with simple arguments: (1) identify the conclusion (the statement that the arguer is wanting us to believe, and towards which all the other statements are trying to point) and (2) evaluate the extent to which the premises support the truth of the conclusion. The new problem here is deciding how to map out the more complicated structure of logical support. For this we need a few more terms. There are four basic patterns to be found in any extended argument, and these can themselves be mixed and matched: horizontal, vertical, conjoint premises, and multiple conclusions. The last pattern (multiple conclusions) is less common.

The **horizontal pattern** is where two or more premises give independent support to a conclusion (that is, each premise, all by itself, supports the conclusion). The **vertical pattern** is where one statement supports a second statement, the second statement supports a third, and so on. The **conjoint premises pattern** is where two or more premises support the conclusion, but only when grouped together. Every deductive and inductive argument mentioned below will have this pattern. Finally, the **multiple conclusions pattern** is where, at the end of the argument, one finds more than one final conclusion being supported. (Note that most extended arguments will have many conclusions, where a conclusion is then used as a premise for another conclusion; but only some will have multiple *final* conclusions.)

When tracing out the support structure of an extended argument, keep asking the question: “Why should I believe this?” Number the statements in the passage, then look at each statement and ask: “What other statement in the passage gives me reason to believe **this** statement?” If any of the other statements speak to this question, then start a diagram on a scrap of paper and, using numbers and arrows, draw an arrow from the supporting premise to the conclusion. It may take several run-throughs, but eventually the support structure will become clear, and in the end you will have a much better understanding of the argument and whether it really does offer adequate grounds for believing the final conclusion. What follows are extremely abbreviated arguments to serve as examples of these four patterns.

Horizontal

(1) We should not build more nuclear power plants in the United States. (2) Nuclear power is a dangerous technology to those presently living, (3) it places an unfair burden on future generations, and (4) we don’t really need the additional power such plants would generate.

In this passage, (1) is supported separately by (2), (3), and (4).

Vertical

(1) Nuclear power is a dangerous technology. (2) Accidents at these power plants are inevitable, since (3) human error will sooner or later lead to a mistake. (4) We should not build more nuclear power plants in the United States.

In this passage, (4) is supported by (1), which is supported by (2), which is supported by (3).

Conjoint

(1) Nuclear power is an unacceptably dangerous technology. (2) Accidents at these power plants are inevitable and (3) accidents of this sort generally involve catastrophic consequences.

In this passage, (1) is supported conjointly by (2) and (3). In other words, neither (2) nor (3) offer any support to (1) except when they are combined together — for if the accidents are inevitable but trivial, then that does not suggest that nuclear power is a dangerous technology. Similarly, if the accidents are catastrophic, but avoidable, then nuclear technology need not be considered dangerous. But when these are combined, then the conclusion is supported.

Multiple Conclusions

(1) Nuclear power is a dangerous way to generate electricity. Therefore, we should (2) stop building such plants, (3) support the development of solar technologies, and (4) do a better job conserving energy use.

In this passage, statements (2), (3), and (4) are all supported by (1).

[6] DEDUCTIVE LOGIC

All arguments that we come across in our day-to-day lives are either **deductive** or **inductive**. Good *deductive* arguments guarantee the truth of the conclusion, so long as the premises are true. Good *inductive* arguments, on the other hand, suggest that the conclusion is more likely true than false (and therefore more reasonable to believe than to disbelieve) if the premises are true. In what follows, we will first consider some deductive arguments, and then look at four kinds of inductive argument.

SOUNDNESS, VALIDITY, AND TRUTH

A good deductive argument is called a sound argument, and a **sound argument** is defined as one that (a) is *valid*, and (b) has only *true premises*.

A deductive argument is **valid** if the conclusion necessarily follows from the premises, in other words, if it is impossible for the premises to be true and the conclusion false. (This is a technical definition that you need to both memorize and understand!) Validity (or its opposite: invalidity) is a property of arguments, *not* of individual statements. Validity concerns the form or structure of the argument, rather than its content; specifically, validity concerns the inference-relation between the premises and the conclusion. We can learn whether an argument is valid or invalid simply by looking at the form — the way the parts are connected together — without knowing what the actual parts are at all. A good structure is valid and a bad structure is invalid. Validity is that property of an argument's structure that guarantees the truth of the conclusion given the truth of the premises. Another way of thinking about validity is as a *truth-preserving* property: if an argument is valid, then any truth contained in the premises will be preserved in the conclusion.

Soundness and unsoundness are also properties of arguments (and only of arguments), because they include validity as one of their components. Truth and falsity, on the other hand, are properties of individual statements (for instance, properties of the premises and the conclusion). Each statement has a *truth-value*, being either true or false.

EVALUATING ARGUMENTS

As we've seen above, a good deductive argument has two components: validity and true premises. Consequently, in evaluating a deductive argument, you need to ask two things: "Is the argument valid?" and "Are all of the premises true?" If the argument fails with either of these, then it fails completely. This should be your strategy whenever you are confronted by an argument: check its validity and check the truth of each premise.

How do you know when a premise is true or false? Sometimes this is obvious: "The earth consists entirely of discarded chewing gum" is false based on simple perceptual evidence (namely, the earth doesn't *appear* to consist of discarded chewing gum). Sometimes, however, we need to argue for the truth or falsity of a premise; in other words, deciding the truth of some premise might require you to evaluate a prior argument that has this premise as its

conclusion. (From this you can see now how evaluating arguments can quickly grow quite complicated.) Often you won't be able to determine whether a premise is *certainly* true or *certainly* false; at best you will be able to say whether there are better reasons for believing a premise than for disbelieving it. All of this affects the strength of the argument as a whole.

Evaluating the validity of an argument can be a bit trickier, although people routinely do this informally (although they are often unaware of what exactly they are criticizing). The informal method for checking validity is called “**the method of counterexample**,” whereby you imagine some scenario in which an argument with the *same form* as the argument in question has *obviously true premises* but an *obviously false conclusion*. Since validity guarantees a *true* conclusion from true premises, such an argument form is immediately shown to be invalid.⁶

Examples of evaluating the validity of arguments

Consider the following argument: “If it were raining, then you would need your umbrella; but it’s not raining, so you don’t need your umbrella.” This is a simple argument with two premises and a conclusion. We could re-write it as follows:

- (1) If it’s raining, then you need your umbrella.
- (2) It’s not raining.
- (3) ∴ You don’t need your umbrella.

[‘∴’ is a sign used to introduce a conclusion; read it as ‘therefore’]

In evaluating this argument’s soundness, we need to investigate its validity and the truth of the two premises. Here the truth is relatively easy to determine, but what about the validity? There are two kinds of counterexample that you might offer. First, try to imagine some **alternate scenario** in which the premises of the argument will be true, but the conclusion false. A little reflection shows that we can do this with the above argument. For instance, it could well be true that you need your umbrella when it’s raining (assuming that you don’t want to get wet), and it could well be true that it isn’t raining; but you might nonetheless need your umbrella, for perhaps it is snowing and you want to keep the snow off your head, or you need an umbrella to fend off a vicious dog or a mugger. Merely that it’s *possible* for the premises to be true and the conclusion false proves the invalidity of the argument.

An improved form of the method of counterexample is where we strip away the content of the premises and conclusion, leaving only the form of the argument, and then find **substitution instances** that will make all the premises true but the conclusion false. Recall that validity concerns only the form of the argument, and not its content, so stripping away the content actually makes the evaluation of validity more straightforward. The form of the above argument is found in the recurring phrases. If we let ‘p’ stand for ‘It’s raining’ and ‘q’ stand for ‘You need your umbrella’, then we can write the form of this argument as follows:

- (1) If p, then q
- (2) not-p
- (3) ∴ not-q

Key:
p = ‘it’s raining’
q = ‘you need your umbrella’

[denying the antecedent / **invalid**]

Let’s now see if we can find substitution instances for ‘p’ and ‘q’ that will make the premises obviously true and conclusion obviously false. Substitute “That’s a dog” for ‘p’ and “That’s a mammal” for ‘q’, and now choose some cow as the subject of the argument: It’s clearly true that if something is a dog, then it will be a mammal; and it’s clearly true that the cow being discussed is not a dog; but it’s also clearly false that the cow is not a mammal. The fact that we are able to find substitutions for ‘p’ and ‘q’ making the premises clearly true and the conclusion clearly false proves that the argument is invalid (indeed, any argument with that form will be invalid).

This particular argument form (if p then q; not-p; therefore, not-q) is such a common fallacy that it has even been given a name: *Denying the Antecedent*. This refers to the conditional (‘if...then’) statement: the ‘p’ is the antecedent

⁶ This method can only prove invalidity. It cannot prove that an argument is valid, since the failure to discover a counterexample might be the result of your poor imagination rather than of the argument’s structure.

and the ‘q’ is the consequent of the statement. In this fallacy the antecedent is denied, from which is illicitly inferred the denial of the consequent.

Now consider this argument: “If God exists, then there is no evil in the world, and God *does* exist; therefore, there is no evil in the world.” Written in standard form, the argument will look like this:

- | | |
|--|--------------|
| (1) If God exists, then there is no evil in the world. | If p, then q |
| (2) God exists. | p |
| (3) ∴ There is no evil in the world. | ∴ q |

[modus ponens / **valid**]

This is a valid argument, and goes by the name of ‘modus ponens’. Because the method of counterexample cannot prove validity, you’ll have to trust me on this; but if you want to idle away an afternoon, try to find a counterexample or substitution instance that will prove this form to be invalid. (Good luck.) Whether this argument is sound, however, is another matter, since neither of the premises is obviously true (at least not true without further argumentation). Many theists will reject (1), all atheists will reject (2), and most people reject the conclusion.

Now consider the following argument and its form:

- | | |
|--|--------------|
| (1) If the medicine doesn’t work, then the patient will die. | If p, then q |
| (2) The patient died. | q |
| (3) ∴ The medicine did not work. | ∴ p |

[affirming the consequent / **invalid**]

Let ‘p’ and ‘q’ stand for the same substitutions as above (“That animal is a dog” and “That animal is a mammal”), and once more consider a cow. As with denying the antecedent, both premises turn out to be true and the conclusion false, and so the argument is invalid. This fallacy is called *affirming the consequent*.

The French philosopher and scientist **René Descartes** (1596-1650) once wrote that “I cannot be identical with my body, since if I were, both my existence and my body’s existence would be equally dubitable, and they are not” — for he can doubt whether his body exists, but not that he (as a thinking thing) exists. Re-written, the argument looks like this:

- (1) If I am identical with my body, then my existence and my body’s existence are equally dubitable.
- (2) My existence and my body’s existence are not equally dubitable.
- (3) ∴ I am not identical with my body.

This argument has a common — and valid — form called *modus tollens*:

- (1) If p, then q
- (2) not-q
- (3) ∴ not-p

[modus tollens / **valid**]

Is it a good, or sound, argument? That depends on whether the premises are true. Descartes does a good job of demonstrating the truth of (2) in the first and second meditations of his *Meditations on First Philosophy* (1641), but the first premise is very likely false. After all, I might feel quite certain that Mark Twain wrote *The Adventures of Huckleberry Finn*, but feel less certain that Samuel Clemens did (this would be true for anyone who didn’t know that Mark Twain is the same man as Samuel Clemens). My *belief states* being different doesn’t require that *the objects of belief* differ. So Descartes’ argument is unsound; and it is unsound even if the conclusion turns out to be true. Remember: soundness is strictly a property of arguments, and while sound arguments always have true conclusions, unsound arguments can have either true or false conclusions.

Take a moment to study the following three arguments, all of which are valid (the first two have the form *modus ponens* and the third *modus tollens*). The first argument is unsound because its first premise is false.

VALID (modus ponens), but UNSOUND

- | | |
|--|--------------|
| (1) If you have dark hair, then you are Italian. | If p, then q |
|--|--------------|

- (2) You have dark hair. p
- (3) ∴ You are Italian. ∴ q

VALID (modus ponens), and SOUND

- (1) If you are human, then you are mammalian. If p, then q
- (2) You are human. p
- (3) ∴ You are mammalian. ∴ q

VALID (modus tollens), and SOUND

- (1) If the medicine doesn't work, then the patient will die. If p, then q
- (2) The patient did not die. not-q
- (3) ∴ The medicine worked. ∴ not-p

As noted above, validity is a property of arguments that preserves the *truth* of premises when moving from premises to conclusion but, surprisingly, it does not preserve any of the *falseness*. If an argument is valid *and* if all the premises are true, then the conclusion is guaranteed to be true; but if one or more (or all) of the premises are false, the conclusion could be either true or false. Validity preserves only truth.

PROVING VALIDITY WITH TRUTH TABLES

The proof of the validity of argument forms in propositional logic had to wait nearly 2000 years for the independent work of Emil Post (1897-1954) and Ludwig Wittgenstein (1889-1951). Wittgenstein developed, in his classic early work, the *Tractatus Logico-Philosophicus* (1921), an account of truth that is still in use today. A truth table, in effect, makes a complete list of every possible combination of truth-values of the component statements, and from that allows us to determine whether an argument is valid (or “truth-preserving”) by seeing whether there is any possible combination in which all the premises are true but the conclusion false.

This might sound complicated, but it is actually quite simple and intuitive once you reflect on an example or two. Consider the argument: “I told you that if I won the lottery, I'd buy you dinner, and I did win the lottery; so I'm going to buy you dinner.” Because this is such a straightforward argument, we can *see* that it's valid; but it's nice to be able to *demonstrate* its validity as well, especially since there are plenty of more complicated arguments where the validity is anything but straightforward, and where some mechanical method for demonstrating validity is crucial. This argument is an example of modus ponens:

- (1) If I win the lottery, then I'll buy you dinner. If p, then q
- (2) I won the lottery. p
- (3) ∴ I'll buy you dinner. ∴ q

In this argument, there are two statements, p and q, and each of these might be either true or false. That means there are four possibilities — or possible worlds (ways the world might have turned out) — that we need to consider:

- (1) I win the lottery and buy you dinner
- (2) I win the lottery and don't buy you dinner.
- (3) I don't win the lottery but still buy you dinner.
- (4) I don't win the lottery and I don't buy you dinner.

We can summarize these possibilities in the first truth table (see “Truth Table - MP”), with each line of the truth table representing one of the four possible worlds.

This truth table shows the four possible combinations of the truth-values for p and q (the first two columns), and then lists the premises and the conclusion of the argument given above (the last three columns). When constructing a truth table to check the validity of an argument, you first fill in the possible combinations for the variables ‘p’ and ‘q’, and then you assign the truth-values for the premises and the conclusion for each of the four possible worlds. With modus ponens arguments, the second premise is just ‘p’, and so the truth-values will be the same as column one;

	p	q	p ⊃ q	p	q
(1)	T	T	T	T	T
(2)	T	F	F	T	F
(3)	F	T	T	F	T
(4)	F	F	T	F	F
			P1	P2	C

likewise with the conclusion, which is identical to the ‘q’ column. The only column that might be puzzling is how to decide when a conditional statement is true. As it turns out, conditional statements (‘if p, then q’) are **false** only when the p-statement is true and the q-statement is false (this is the situation we find on row 2 of *Truth Table - MP*); otherwise they are true. For instance, the conditional statement “If I win the lottery, then I’ll buy you dinner” is clearly false if I do in fact win the lottery and then refuse to buy you dinner. And it’s clearly **true** if I both win the lottery **and** I buy you dinner; but it might seem a little odd that the statement is true even in those situations where I don’t win the lottery. But think about it: if I buy you dinner even when I don’t win the lottery, does that make the conditional statement false? Not at all! It just means I’m a really nice guy, and that I have money to spare, even without winning the lottery.

Truth Table - AC

	p	q	p ⊃ q	q	p
(1)	T	T	T	T	T
(2)	T	F	F	F	T
(3)	F	T	T	T	F
(4)	F	F	T	F	F
			P1	P2	C

After we have filled in the truth-values for the premises and conclusions, we are then ready to use the completed truth table to decide whether the argument is valid. Remember that an argument is valid only if it’s impossible for the premises to all be true and the conclusion to be false. So to check validity, we need to examine each row in which all the premises are true; if any of these rows have a false conclusion, then we know that the argument is invalid, otherwise it’s valid. If the conclusion is always true on those rows in which all the premises are true, then the argument is valid. With modus ponens, we see that the conclusion is true on every row where all of the premises are true (there is only one row where this is the case, namely row 1)

This is not the case with the argument form known as “affirming the consequent” (see *Truth Table - AC*). Here we see that both premises are true on rows 1 and 3, and that while the conclusion is true on row 1, it is false on row 3, proving that it is possible for the premises to all be true, yet the conclusion be false. This proves that any argument with the form of affirming the consequent is invalid.

A FEW STANDARD FORMS FOR DEDUCTIVE ARGUMENTS

Examples of a few of the more common argument forms are given below. Use the following list of forms to parse these arguments into their component p’s and q’s, and then check your work with the answers in the footnotes below.

Modus Ponens (valid)

- (1) $p \supset q$
- (2) p
- (3) $\therefore q$

Disjunctive Syllogism (valid)

- (1) $p \vee q$
- (2) $\sim p$
- (3) $\therefore q$

Modus Tollens (valid)

- (1) $p \supset q$
- (2) $\sim q$
- (3) $\therefore \sim p$

Denying the Antecedent (invalid)

- (1) $p \supset q$
- (2) $\sim p$
- (3) $\therefore \sim q$

Hypothetical Syllogism (valid)

- (1) $p \supset q$
- (2) $q \supset r$
- (3) $\therefore p \supset r$

Affirming the Consequent (invalid)

- (1) $p \supset q$
- (2) q
- (3) $\therefore p$

$p \supset q$ reads ‘if p, then q’
 $p \vee q$ reads ‘p or q’ (inclusive)
 $p \cdot q$ reads ‘p and q’
 $\sim p$ reads ‘not p’
 \therefore reads ‘therefore’

Modus Ponens (MP)

“If you have dark hair, then you are Italian. John has dark hair. Therefore, John is Italian.”
 [If p, then q; p; therefore, q.]

Modus Tollens (MT)

“If God exists, then there is no evil in the world. But there *is* evil. So God does not exist.”
 [If p, then q; not q; therefore, not-p.]

Hypothetical Syllogism (HS)

“If human beings consist entirely of matter, then all of their actions are determined. If all of their actions are determined, then none of their actions are free. Therefore, if human beings consists entirely of matter, then none of their actions are free.”

[If p, then q; if q, then r; therefore, if p, then r.]

Compare with the following invalid argument:

“If you’re a brain surgeon, then you’re wealthy. And if you’re a brain surgeon, then you’ve also spent years and years in school. Therefore, if you’re wealthy, then you’ve spent years and years in school.”

[If p, then q; if p, then r; therefore, if q, then r.]

Disjunctive Syllogism (DS)

“The mind is either identical to the brain or else it is an immaterial substance. It is not identical to the brain. Therefore, it is an immaterial substance.”

[p or q; not-p; therefore, q.]

This is a valid argument, although it may not be sound, since the first premise is probably false — there is probably some third alternative — and of course the second premise would need to be supported with an additional argument.

Compare with the following *invalid* argument:

“This Intro class is going to be either really difficult or really interesting. It’s turning out to be really interesting, so I guess it won’t be very difficult.”

[p or q; q; therefore, not-p.]

What is happening in the second argument is that one of the alternatives is believed to be true, and from that it is wrongly inferred that the other alternative must be false — but the first premise claims only that one alternative is true, not that only one is true (for they might *both* be true).

Denying the Antecedent (DA; *invalid*)

“If this is not the best of all possible worlds, then God does not exist. But this *is* the best of all possible worlds. So God *does* exist.”

[If p, then q; not-p; therefore, not-q.]

Affirming the Consequent (AC; *invalid*)

“If the medicine doesn’t work, then the patient will die. The patient died. So the medicine did not work.”

[If p, then q; q; therefore, not-p.]

Mixed (DS, MT, HS)

“The world is either finite or infinite in space. If it’s finite, then we would be able to arrive at its edge. But we cannot even conceive of doing this (much less doing it), so it is not finite. Therefore, it must be infinite.”

[p or not-p; if p, then q; not-q; therefore, not-p.]

“The world is either finite or infinite in age. If it’s infinite, then it had no beginning in time; and if the world has no beginning in time, then an infinite series has been completed. But an infinite series cannot be completed (by definition). Therefore, the world is not infinite; and so therefore the world’s age is finite (i.e., it has a beginning).”

[p or not-p; if not-p, then q; if q, then r; not-r; therefore, not-not-p; therefore, p.]

“The world is either finite or infinite in age. If it’s finite, then it had a beginning in time; and if the world had a beginning in time, then it was preceded by some empty time. But nothing can begin from an empty time. Therefore, the world is not finite; and so therefore the world’s age is infinite (i.e., it has no beginning).”

[p or not-p; if p, then q; if q, then r; not-r; therefore, not-p.]

Dilemma

Dilemmas can be analyzed into simpler argument forms (they make use of a combination of disjunctive syllogism and modus ponens or modus tollens), but they are such a common and effective rhetorical move that they are

commonly treated as a distinct form of logical argument. Dilemmas are traditionally thought to have two “horns” (the two conditional statements), such that the opponent can be “impaled on the horns of a dilemma.” Think of the dilemma as though it were a charging and angry bull. Being impaled on the horns of the dilemma is something to be avoided, whenever possible, and this is done either by “grasping one of the horns” or by “going between the horns.” The first strategy is to question the truth of one of the conditional statements; the second is to contest the truth of the disjunctive claim (normally by identifying some third possibility that is more plausible than either of the given alternatives). Finally, dilemmas are sometimes counteracted by posing a counter-dilemma. This last maneuver is rhetorically effective, primarily because it tends to dazzle the opponents, although there’s little reason to believe that doing this moves one any closer to the truth. Consider this dilemma:

“If God cannot prevent evil, then he is not omnipotent. If God does not want to prevent evil, then he is not perfectly good. God either cannot or does not want to prevent evil (since evil exists). Therefore, God is either not omnipotent or not perfectly good.”

[If p, then q; if r, then s; p or r; therefore, q or s.]

A common response to this argument is to attack the right horn, and argue that there could well be reasons why God might allow a creature to suffer that are compatible with God’s goodness. One might also attempt to go between the horns, by arguing that evil does not exist (both of these strategies will be explored in a later chapter).

In the next dilemma, going between the horns is not possible:

“If test animals are similar enough to humans to make the research relevant, then experimenting on them is morally similar to experimenting on humans, and thus wrong. If test animals are too dissimilar, then the research is irrelevant. Either test animals are similar enough to humans or not. So experimenting on animals is either morally wrong or irrelevant.”

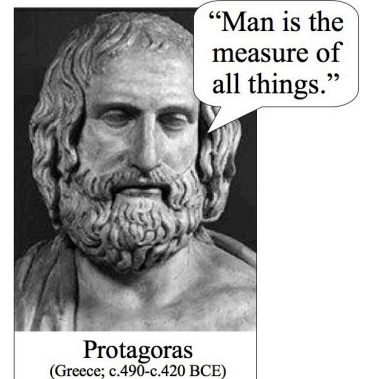
[If p, then q; if r, then s; p or not-p; therefore, q or s.]

Going between the horns is not possible, because the disjunctive claim is a necessary truth (p or not-p). The best approach is probably to contest the left horn, focusing on the different ways of being *similar* — *morally similar* and *physiologically similar* might not be as closely connected as this premise suggests (in any event, it needs further discussion).

One of the most famous instances of a dilemma and counter-dilemma is attributed to the sophist **Protagoras** (c.490-420 BCE) and his former student Euathlus. Protagoras had agreed to teach his student at a reduced fee, with the understanding that Euathlus would pay the remainder after winning his first court case. Some time passed, however, with Euathlus never taking on any cases, so Protagoras took him to court to sue for unpaid fees. Protagoras argued before the court — the Areopagus in Athens, where Socrates would later be tried — that Euathlus must pay him no matter what, offering the following dilemma: If Euathlus wins this court case, then (by the terms of his agreement with Protagoras), he will have to pay. And if he loses the case, then (by order of the court) he will have to pay. Since he will either win the court case or he won’t, he will have to pay:

- (1) **If p** (the student *loses* the court case), **then q** (he has to pay [by order of the court])
- (2) **If not-p** (the student *wins* the court case), **then q** (he has to pay [by the terms of his agreement with Protagoras])
- (3) **Either p or not p**
- (4) Therefore, **q**

Euathlus had clearly learned his lessons well from Protagoras, however, and offered up a counter-dilemma: He will not have to pay Protagoras any fees, for if he wins the court case, then (by order of the court) he does not have to pay, and if he loses the court case, then (by the terms of his agreement with Protagoras) he will not have to pay. Since he will either win the court case or he won’t, he will not have to pay:



- (1) **If p** (the student wins the court case), **then q** (he doesn't have to pay [by order of the court])
- (2) **If not-p** (the student loses the court case), **then q** (he doesn't have to pay [by the terms of his agreement with Protagoras])
- (3) **Either p or not p**
- (4) Therefore, **q**

We know of this court case from several ancient sources; these differ on various details, but they all agree that the court was unable to decide the case, given its paradoxical nature.

[7] INDUCTIVE LOGIC

All of the arguments discussed so far are *deductive*; the kind of inference used in those arguments guarantees the truth of the conclusion, so long as the premises are true. *Inductive* arguments, even good ones, do not provide conclusions that are certainly true; but good inductive arguments do provide conclusions that are more likely true than false, and therefore more reasonable to believe than not to believe. Because true premises do not guarantee a true conclusion in inductive arguments, we speak of good inductive arguments as being *cogent* (rather than sound), and the argument's form as being either *strong* or *weak* (rather than valid or invalid). A **strong argument** is one such that it is unlikely that its conclusion is false so long as its premises are true. A **cogent argument** is an inductive argument that is strong, and all of whose premises are true. There are many different kinds of inductive arguments; four of the more common are generalization from the past, argument from authority, argument from analogy, and hypothetical induction.

GENERALIZATION FROM THE PAST

Perhaps the most common form of inductive reasoning involves generalizing from past experiences; this is also called *enumerative induction*. In abstraction, it looks like this:

- (1) Token 1 of type A has property X.
- (2) Token 2 of type A has property X. [... and so on ...]
- (3) ∴ All tokens of type A have property X.

(where a *token* is an individual, and a *type* is a kind of individual, for instance, Socrates is a token of the type human). Here we draw a conclusion about some **target population** (all the tokens of type A) based on our observation of some **sample population** of that group (tokens 1, 2, ... of type A).

Now let's consider this kind of induction more concretely.

Fred is a beginning philosophy student cramming for his first exam of the semester. In preparation for an all-night study marathon, he heads to the local grocery store for supplies — carrot sticks, apples, and a large 24-count box of Twinkie snack cakes. “With such a combination of power food,” Fred reasons, “I can't help but do well on tomorrow's exam.” So now Fred is back in his room, trying to remember the difference between deductive and inductive logic while biting into his first Twinkie of the night — but something tastes odd and the Twinkie is crunchier than usual. He spits it out onto the pages of his opened philosophy text, and you can imagine his considerable surprise and disgust when he sees little brown objects mixed in with the white marshmallow filling. His roommate wanders by, considers the half-chewed mess on Fred's textbook, and offers helpfully: “Looks like you've got some mouse droppings in that Twinkie, Fred” — which is confirmed by a closer inspection with a magnifying glass. Fred can't bring himself to finish the half-eaten Twinkie, so he throws it away and opens another, but this second Twinkie tastes no better than the first, and it too ends up half-chewed on his textbook. Things continue in this manner until finally Fred reasons:

- (1) The first Twinkie I ate from this box of 24 Twinkies had its crème filling riddled with mouse droppings.
- (2) The second Twinkie I ate from the box was similarly contaminated.
- (3) Likewise with the third Twinkie.
- (4) ∴ All the Twinkies in this box have mouse droppings in their crème filling.

Now it's perfectly possible that the remainder of the Twinkies in the box are entirely free of mouse droppings — there's no guarantee that the next Twinkie will be like the previous Twinkie, nor that, more generally, the future will be like the past — but there is a strong presumption for it, and most people would reasonably throw out the remaining Twinkies (or better still, return them to the store for a refund). So the above argument is cogent.

We often engage in this kind of enumerative induction, but sometimes we do it badly. Faulty induction of this sort (commonly referred to as the *fallacy of hasty generalization*) results from either of two errors: (1) the sample size is too small for the group, or (2) the sample is not representative of the group. Consider the following two accounts of inductive reasoning:

- (1) John held his hand directly over the flame of an acetylene torch for 5 seconds, and was badly burned. He concluded that such a flame would always burn human skin when placed in such close proximity.
- (2) John wished to know what the professors at his university thought about Jack Kerouac as a novelist, so he asked his economics professor, who exclaimed that Kerouac was the greatest novelist of all time. From this John concluded that the professors at his university think that Jack Kerouac was the greatest novelist of all time.

In both of these cases, John is reasoning from a sample of one to a much larger target population. In the first, the target population is quite large (namely, the skin of any human being anywhere); in the second, the target population consists of the 100 or so professors at his university. It would seem that his reasoning would be more reliable in the second example — since the sample size constitutes a larger proportion of the target population — but in fact the second example is less reliable, because the sample is much less representative of the group. With the first example, the target population is **homogenous** regarding the property being generalized (viz., sensitivity to a flame), and so a small sample size is adequate;⁷ with the second example, however, there is likely considerable diversity regarding the property, and consequently a larger sample size would be needed to get a sense of how that property is related to the target population.

In this second example, because the property (viz., the degree to which Kerouac is admired as a novelist) is not homogenous across the general population, we must increase the sample size, so that

[Extra]

CALCULATING THE MARGIN OF ERROR

Suppose I want to know how many white marbles are in a large box of five-million marbles, but I don't feel like counting all five-million marbles. Instead, I randomly draw 400 marbles from the box, and discover that 25% of this sample are white. How likely will it be that the entire population of five-million will have this proportion of white marbles?

The **margin of error** is a measure of this accuracy, and can be mathematically calculated and presented in tables like the one to the right (which is based on a 95% **level of significance**). The margin of error is found by dividing 1 by the square root of the number of individuals in the sample. So, for instance, the margin of error for a sample of 400 is exactly +/- 5%. The 95% level of significance means that if I were to take, say, 100 samples just like the one I took (returning the samples to the box each time), then at least 95 of the samples will contain white marbles in proportions ranging from 20% to 30%. This 10% gap is the **confidence interval**. If my sample size was only 100, then the confidence interval would be 20%.

Margin of Error	
Sample Size	Margin of Error
1600	2.5%
1000	3.2%
900	3.3%
800	3.5%
700	3.8%
600	4.1%
500	4.5%
400	5.0%
300	5.7%
200	7.1%
100	10.0%
50	14.1%

⁷ This is a vexing issue. Inductive generalization is normally applied to groups of individuals where some property is arbitrarily distributed among them; we can then save time by looking at a sample of the group to arrive at a good estimate of how the property is related to that entire group. If this property is a necessary condition of being a member of that group, however — like having skin that is easily burned by an acetylene torch — then looking at a single individual is quite adequate for determining how the property applies to all the other individuals. Deciding whether a property is truly arbitrary in this sense, or is instead somehow connected with the nature of the individuals, is itself a complicated question. Do we discover this inductively?

In general, how do we know if a sample is representative of the target group? If I taste a single Twinkie from a box of 24, do I have any reason *not* to believe that all the Twinkies in that box will taste roughly the same? So having tasted one, can I appropriately infer that all the other Twinkies will taste the same? And if I taste mouse droppings in one, should I make this same inference?

our sample will more accurately reflect the general population regarding this property. For the same reason, we need to make sure that the sample is **random** (i.e., find some method by which it is just as likely that he choose one of them as any other). For instance, if we decided to increase the sample to 25 professors, but we drew them all from the campus Kerouac fan club, then the sample will still probably not be representative of the whole population.

Similarly, if we used a procedure that ensured randomness, but where the sample size was still too small, the sample would likely not reflect the larger population. Suppose there are the 100 professors at the university. John needs to devise some method for arriving at a **random sample**. Let John take 100 slips of papers, put the name of a different professor on each of these, place them all in a bag, give it a good shake, close his eyes, and then draw out a slip of paper. That should make the procedure random. John now reads the name of his economics professor, and discovers that this professor “greatly admires” Kerouac. From this random sampling, in which 100% of the sample population “greatly admires” Kerouac, John concludes that 100% of the target population also “greatly admires” Kerouac. This would be a mistaken inference, of course, because the sample size is too small to accurately represent the group. The sample was arrived at randomly, but it is too small to provide a workable margin of error (see below).

ARGUMENT FROM AUTHORITY

The vast majority of what we believe is based on hearsay. Someone whom we trust tells us that S is true, and so now we believe S. Very few of us have good independent reasons for believing in the existence of atoms, viruses, Pluto, the year of Napoleon’s defeat at Waterloo, or even the true identity of our biological parents — save for the various authorities in whom we’ve placed our trust. There’s clearly nothing wrong in any of this, either, so long as we’re aware of what we’re doing, and we take care in choosing our authorities.

All arguments from authority have the following structure:

- (1) A (some person) is an authority regarding S (some statement).
- (2) A believes S.
- (3) ∴ S is true.

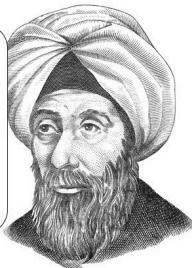
In general, we would do well to listen to the experts. Plato, for instance, depicts Socrates as committed to the testimony of experts, those with genuine knowledge (*Crito*, 47a-e):

Socrates: Consider then, do you not think it a good statement that one must not value all the opinions of men, but some and not others, nor the opinions of all men, but those of some and not of others? What do you say? Is this not well said?

Bertrand Russell, the 20th century British logician and philosopher, suggested that following just three basic rules would vastly improve our epistemic situation:

- (1) that when the experts are agreed, the opposite opinion cannot be held to be certain; (2) that when they are not agreed, no opinion can be regarded as certain by a non-expert; and (3) that when they all hold that no sufficient grounds for a positive opinion exist, the ordinary man would do well to suspend his judgment.⁸

“Finding the truth is difficult, and the road to it is rough.”



Ibn al-Haytham
(Basra/Cairo; 965-1039 C.E.)

The basic problem facing this kind of argument is determining who is an authority. A common mistake is to accept as “an authority regarding P” someone whose authority lies in some area other than that of P. When individuals speak outside their area of expertise, their words should carry no more weight than the next person’s. Authorities need not have higher degrees or any formal education at all; they simply need to be reliable sources of information of the relevant kind — they need to be honest and in a position to know. If the statement in question concerns the winner of the 1982 World Series, for instance, then any avid baseball fan will likely serve as a reliable authority.

⁸ Bertrand Russell, *Let the People Think* (London: William Clowes, 1941), p. 2.

The matter gets more complicated as the statements become more contested or controversial, and individuals might harbor motives to lie or otherwise distort the truth. Here we typically find ourselves involved in a new inductive argument based on the person's past performance: Have they been reliable in the past? Have we ever discovered their claims to be false? This additional inductive step involves a "generalization from the past," for we are assuming that a person's past performance (as a reliable source of information) is indicative of their future performance. Finally, we must be sensitive to any special motivations that an otherwise reliable source might have to lie in the present case — for instance, if a lie would spare the person or those he cares about much harm or make possible some significant good.

ARGUMENT FROM ANALOGY

The first thing to note about arguments from analogy is how badly they can go. The second thing to note is how often we use them. First the bad, then the ubiquitous:

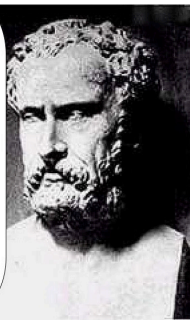
- (1) Soccer and hockey share many similarities (e.g., they are both team sports that involve getting an object into a net).
- (2) Hockey is played on ice.
- (3) \therefore Soccer is probably played on ice as well.

Almost everything has something in common with everything else, so it would seem to be a rather sorry kind of reasoning to infer that two things, because they share *one* property, will also share some second property that we know the first thing to have. Nonetheless, and quite remarkably, we routinely make good use of this kind of argument.

Arguments from analogy all have the following form:

- (1) Items A and B have characteristic X.
- (2) Item A also has characteristic Y.
- (3) \therefore B probably has characteristic Y as well.

"We cannot be certain of the truth of anything, but with care we can arrive at opinions that more closely resemble the truth."



Xenophanes
(Colophon; 6th century B.C.E)

The thing or things we know best we call the **primary analogate(s)**. The thing about which we are, by way of analogy, drawing an inference, we call the **secondary analogate**. There might be only one primary analogate or there might be dozens; there might be only two characteristics being considered between the primary and secondary analogates, or there might be twenty or more. But all arguments from analogy compare at least two things sharing at least one characteristic, and from which we infer an additional characteristic in the secondary analogate that we *know* is possessed by the primary analogate.

In the U.S. legal system, judges routinely use analogy when deciding court cases based on precedent. Consider the case of *Adams v. New Jersey Steamboat Co.* (151 NY 163 [1896]): On June 17th, 1889, the plaintiff (Adams) boarded an overnight steamboat from New York City to Albany, and during the night money was stolen from his room. Adams sued the steamboat company for damages, noting that under the normal contract of hospitality, hotel proprietors are responsible for the safety of the guest's belongings. Because the steamboat was essentially operating like a "floating hotel," it should be bound by this well-established contract. The steamboat company, for its part, appealed to the decision given in *Carpenter v. Railroad Co.* (124 NY 53, 26 N. E. 277), in which the court found the railroad company *not* liable for luggage stolen from a sleeper berth, since the contract between the plaintiff and the defendant was primarily for travel and not for lodging. So, how should the judge decide the *Adams* case? Is the steamboat more like a "floating hotel" or like a "seagoing train"? Which similarities are more relevant? What are the disanalogies?

Consider the following analogical argument:

- (1) Bill, Ted, and Al are all Manchester alumni.
- (2) Bill and Ted both drive BMWs.
- (3) ∴ Al probably also drives a BMW.

This is not a particularly strong argument as it stands, but there might be additional information that would strengthen the analogy. For instance, if Bill and Ted were picked at random from all Manchester alumni, then both of them driving BMWs might indicate a characteristic true of all or most of that population. If we increased the number of samples (by looking at the cars driven by other alumni), and found that all or most alumni sampled did in fact drive BMWs, then that would increase the likelihood that Al also drives a BMW. We also might increase the number of characteristics observed: suppose that Bill, Ted, and Al all majored in philosophy, graduated the same year, took similar jobs, etc. The more similarities we can find between the samples, the more likely the analogy will hold. But these similarities have to be *relevant*: noting that Bill, Ted, and Al all have first names with fewer than five letters does *not* make the analogy any stronger. And if we find that Bill and Ted were both pre-med majors and went on to become neurosurgeons, but Al majored in English and now writes poetry for a living, or that Bill and Ted graduated in 1955 and Al graduated just last year, then these are *disanalogies* which can weaken the analogy considerably (depending upon their relevance). In all, there are six different factors that determine the strength or weakness of an argument from analogy:

- (1) **Relevance of similarities**: Relevance of the known shared property (x) to the inferred shared property (y). [The more relevant, the stronger the analogy.]
- (2) **Disanalogy**: These are relevant differences between the primary and secondary analogates. [Usually, the more disanalogies, the weaker the analogy.]
- (3) **Number of Similarities**: Number of similarities between primary and secondary analogates. [The more similarities, the stronger the analogy.]
- (4) **Sample size**: Number and kind of primary analogates. [The more samples, the stronger the analogy.]
- (5) **Sample diversity**: Diversity among the primary analogates; randomized sampling strengthens the likelihood of the secondary analogate sharing the contested property. [Usually, the greater the diversity, the stronger the analogy.]
- (6) **Specificity**: Specificity of the conclusion relative to the premises. [The more specific the conclusion, the weaker the analogy.]

An argument from analogy with somewhat more historical importance was offered by **William Paley** (1743-1805), who argued that the universe and pocket watches share one important characteristic: They have many parts that seem to interact with one another towards some purpose. But since watches have the additional property of having been created by some “designing intelligence,” we might conclude by analogy that the universe shares this property as well, and so was created by a designing intelligence, namely, a God as envisioned in the Judeo-Christian-Islamic tradition. The strength of this particular analogy will be discussed later.

As for *Adams v. New Jersey Steamboat Co.*, Judge O’Brien ruled in favor of Adams, writing that ...

The relations that exist between a steamboat company and its passengers, who have procured state-rooms for their comfort during the journey, differ in no essential respect from those that exist between the innkeeper and his guests. The passenger procures and pays for his room for the same reasons that a guest at an inn does. There are the same opportunities for fraud and plunder on the part of the carrier that was originally supposed to furnish a temptation to the landlord to violate his duty to the guest. A steamer carrying passengers upon the water, and furnishing them with rooms and entertainment is, for

FINDING NEPTUNE

The planet Neptune was discovered in 1846. Here’s how it happened. In 1845, a year before the discovery, the mathematician John Couch Adams (1819-1892) noticed perturbations in the orbit of Uranus that the current theory of celestial mechanics (viz., Newton’s laws) did not allow. This was the surprising phenomenon in need of an explanation. Through abductive reasoning, Couch arrived at an hypothesis (H): *There is some undiscovered planet beyond Uranus causing the perturbations.* If H is correct, then we should be able to observe a new planet (i.e., a bright spot in the night sky) at a certain place in the sky at a certain time. On September 23, 1846, Johann Galle observed a bright spot at the predicted time and place; later observations showed it following the predicted path, thus confirming H (and further confirming Newtonian mechanics).

all practical purposes, a floating inn, and hence the duties which the proprietors owe to their charge ought to be the same. [...] The two relations, if not identical, bear such close analogy to each other that the same rule of responsibility should govern.⁹

HYPOTHETICAL INDUCTION

All arguments from hypothetical induction look something like the following:

- (1) P [some phenomenon]
- (2) If T, then P [T explains the existence/ occurrence of P]
- (3) ... [Additional premises that speak against rival explanations of P]
- (4) ∴ T is the best explanation we have of P.
- (5) ∴ T

Formally, this kind of reasoning resembles the deductively fallacious *affirming the consequence*.

The father of American pragmatism, **Charles Sanders Peirce** (1839-1914), was the first to write explicitly about hypothetical induction, or what is often called “inference to the best explanation.” Peirce called it “abductive logic,” contrasting it with both deductive logic and enumerative forms of inductive logic:

The great difference between induction [generalization] and hypothesis [abduction] is, that the former infers the existence of phenomena such as we have observed in cases which are similar, while hypothesis supposes something of a different kind from what we have directly observed, and frequently something which it would be impossible for us to observe directly.¹⁰

Peirce noted that we are remarkably successful with abduction; given the infinite number of possible hypotheses from which to choose, it is amazing how quickly we normally hit upon the right one:

Think of what trillions of trillions of hypotheses might be made of which one only is true; and yet after two or three or at the very most a dozen guesses, the physicist hits pretty nearly on the correct hypothesis. By chance he would not have been likely to do so in the whole time that has elapsed since the earth was solidified.

Peirce understood the **scientific method** as a blending of abductive, deductive, and inductive reasoning. First, we begin with (1) a **surprising phenomenon**, which is in need of an explanation. This initiates the inquiry. We then use (2) **abductive reasoning** to develop an hypothesis [H] that explains the phenomenon. Next we use (3) **deductive reasoning** to determine one or more necessary conditions of H (that is, observable phenomena that will obtain under a certain condition [C], if H is true). Finally, we use (4) **inductive reasoning** to decide if the new observations offer adequate support for H (here, we are looking for the deduced necessary conditions of H, given C).¹¹ This is such an important, and common, kind of reasoning, it is worth looking at these steps in more detail.

The Case of Childbed Fever

Childbed fever (puerperal sepsis) has been a concern for women in childbirth since ancient times. Immediately after giving birth, the uterine wall where the placenta was attached is a large open wound and highly susceptible to infection. With childbed fever, the septic woman develops a high fever shortly after giving birth, and dies (at least without the intervention of antibiotic treatment — a 20th century development). As unfortunate as this was, it

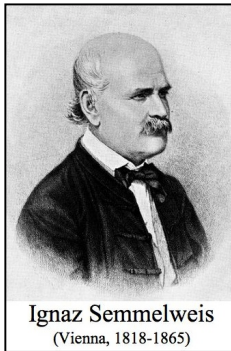
⁹ Quoted in Martin P. Golding, *Legal Reasoning* (Broadview Press, 2001), pp. 46-47.

¹⁰ This and the next quoted passage come from Peirce’s “Three Types of Reasoning” (1903). With enumerative induction, we infer from one individual to another, but it’s always the same kind of individual. With abduction, on the other hand, the inference is normally to a completely different kind of thing, since it is what explains the observed individual. The inferred entity might even be impossible to observe directly (such as an electron, or the earth’s core, or a black hole) — but it’s existence and nature help explain phenomena that *are* directly observable.

¹¹ In “Three Types of Reasoning” (1903), Peirce wrote: “Induction consists in starting from a theory, deducing from it predictions of phenomena, and observing those phenomena in order to see *how nearly* they agree with the theory.”

remained relatively rare and isolated until the 17th century advent of “laying-in” hospitals, where women would go to deliver their babies. The first recorded epidemic of childbed fever occurred in 1646 at the *Hôtel Dieu* in Paris, and reports of sporadic epidemics continued over the next two centuries on both sides of the Atlantic; an understanding of the disease, however, was slow in coming. Thomas Watson, a professor of medicine at King’s College Hospital, London, suggested in 1842 that the fever was promoted by the attending physician having unwashed hands — in other words, that the fever was a matter of contagion, passed from woman to woman on the physician’s hands — but his idea was ignored. The following year in Boston, Dr. Oliver Wendell Holmes also argued that childbed fever was caused by contagion. Apart from urging physicians to wash their hands with chlorinated water when moving from one woman to the next, Holmes also suggested that these physicians forego performing autopsies at the same time that they are attending women on the birthing ward. Holmes’ ideas were met with ridicule; most physicians couldn’t imagine that they were the actual cause of the problem.¹²

Unaware of the writings of Watson and Holmes, the Hungarian physician Ignaz Semmelweis was puzzling over a disturbing fact at the Vienna General Hospital where he worked. There were two delivery wards at the hospital — on the first ward, wealthier women were attended by physicians and their medical students, while on the second



Ignaz Semmelweis
(Vienna, 1818–1865)

ward, poorer women were attended by midwives. The incidence of childbed fever was about 16% among the women in the first ward, but only 2% on the second ward. In hindsight, knowing what we know, this fact is not surprising, for the physicians and medical students were performing autopsies downstairs in the morgue while waiting for the babies to be born, and they weren’t washing their hands carefully — so the same hand that had been probing the cavities of a dead body would the next minute be checking for cervical dilation.

A sad epiphany came to Semmelweis when his friend Jakob Kolletschka, the professor of forensic pathology, accidentally cut himself while performing an autopsy, grew septic, and died; his symptoms were remarkably like that of a woman suffering from childbed fever. Semmelweis wrote:

Suddenly a thought crossed my mind: childbed fever and the death of Professor Kolletschka were one and the same. His sepsis and childbed fever must originate from the same source ... the fingers and hands of students and doctors, soiled by recent dissections, carry those death dealing cadavers’ poisons into the genital organs of women in childbirth

Working with this hunch, Semmelweis had all his physicians and students wash their hands in chlorinated water before attending the laboring women, and with this simple practice the incidence of childbed fever dropped to less than 3%. Despite these dramatic results, his ideas were dismissed, and many more women died unnecessarily before the medical community accepted the idea that childbed fever was the direct result of physician-caused contagion.

We can reconstruct Semmelweis’ reasoning by patterning it after Peirce’s model of the scientific method: (1) a **surprising phenomenon** [P] in need of an explanation, (2) **abductive reasoning** to develop an hypothesis [H] that explains the phenomenon, (3) **deductive reasoning** to determine one or more necessary conditions [NC] of H (if H is true, then necessary conditions of H will also have to be true), and (4) **inductive reasoning** to test for these necessary conditions.

(1) Phenomenon (P): We observe some phenomenon that is surprising or otherwise inexplicable, given the current laws and theories. This is the *explanandum*, in need of an *explanans*. In the above case:

P = Five times more women contract childbed fever if they are on the ward attended by the physicians rather than by midwives.

(2) Hypothesis (H): There are always many ways of explaining why P might happen; the goal is to find the explanation that is most likely correct. Just like P, this explanatory hypothesis (H) should be stated as clearly as possible. Semmelweis’ hypothesis was something like this:

¹² If you find such obtuseness among physicians inconceivable, remember that the germ theory of disease (viz., the theory that many diseases are caused by microscopically small organisms — what we today call bacteria and viruses) wasn’t well established until 1875, with the work of Robert Koch in Germany.

H = The physicians are transmitting the cause of this fever (what Semmelweis called “cadaveric matter”) on their hands, which they pick up during their autopsies in the morgue.

- (3) **Necessary Condition (NC) of H:** Explanations can be thought of as the antecedent clause of a conditional statement, where the thing to be explained is the consequent clause. So: **If H, then P.** H is the sufficient condition of P, and P the necessary condition of H.¹³ We know that P is true (it’s the surprising phenomenon that we want to explain), but we don’t know if H is true. So we need to test if H is true, and one way to do this is to find some *second* necessary condition of H, that is, some new conditional statement: **if H, then NC.** Once we do that, we can check to see if NC is true; if NC is false, then by *modus tollens* we know that H is also false. If NC is true, then H has not been falsified, and so might still be true. This process “confirms” the truth of H, but never can prove it.¹⁴

This step is more abstract than the others, so let me repeat the above, with examples.

If the hypothesis (H) is to count as an explanation of P, then P has to be a necessary condition of H (if H, then P). An explanation is always a sufficient condition of the thing being explained. Our problem is that, for any particular phenomenon, there might be many possible explanations, and we want to discover the correct one. For instance, you hear a dog yelp in pain. One explanation of the yelping is that someone kicked the dog, but there are other possible explanations: it was stung by a bee, it was chewing on an electrical cord and received a shock, it has gas pains, and so on. Given the many possible explanations, we need to (abductively) arrive at what we think is the most plausible explanation, and then we need to (deductively) devise a test for it. In other words, we need to arrive at some *other* necessary condition of H, for which we can then (inductively) test. If it passes this test, then the presence or truth of H is confirmed — although not proven — making it available as a possible cause or proper explanation of P. For Semmelweis, the additional necessary condition was:

NC = If transmission of this cadaveric matter to the pregnant women is stopped, then the additional illnesses should disappear.

- (4) **Testing for the NC:** We now need to devise a test to see if the new NC is present.

Test = Have all attending physicians and medical students wash their hands with chlorinated water, which should destroy the cadaveric matter.

Observed phenomenon (OP) under the test condition: This is the observation of the presence or absence (or the truth/falsity) of NC.

OP = Incidence of childbed fever drops dramatically.

Conclusion: The explanatory hypothesis (H) is confirmed or falsified. If confirmed, we generally refer to the hypothesis as a theory.

Criteria for Deciding between Theories

Hypotheses are supported, but never proven as true, by the inductive reasoning in stage four. Galle’s astronomical observations confirmed the existence of a new planet and served as a remarkable confirmation of Newtonian mechanics, but it certainly didn’t prove that Newton was right — and we have since learned that Newton was, in fact, wrong (his mechanics have been replaced by Einstein’s theories of relativity as a more adequate account of the universe). Theories are kept until they are replaced by something more adequate. The criteria for adequacy, or for preferring one theory over another, are something like the following:¹⁵

- (1) **Internally consistent:** The theory involves no self-contradiction.
- (2) **Testable/Predictive:** The theory must be something that we can test by observation; more specifically, it must be falsifiable (we must be able to indicate the conditions that would falsify the theory: for this to be possible, the theory must make some new prediction that can be checked).
- (3) **Externally consistent:** The theory is consistent with well-established facts and other theories.

¹³ For any conditional statement — if p, then q — p is a sufficient condition of q, and q is a necessary condition of p. If this isn’t clear, see the discussion of necessary and sufficient conditions, above.

¹⁴ If we could prove H in this deductive fashion, then natural science would be a matter of deductive reasoning, and would enjoy the same kind of certainty as mathematics; but natural science is about the physical world — see the quoted passage from Stephen Jay Gould, below — and so will always remain open-ended and uncertain.

¹⁵ See Thomas Kuhn, *The Essential Tension* (1977), pp. 321-22.

- (4) **Simple:** The theory introduces no unnecessary mysteries (Ockham's Razor).
- (5) **Scope:** The more that the hypothesis can explain, the more it is to be preferred. Newton's account of motion had greater scope than Galileo's. Einstein's account had greater scope than Newton's.
- (6) **Fruitful:** The theory suggests various other lines of inquiry.

Facts, Laws, and Theories

This is a good place to briefly consider a common confusion among non-scientists regarding the relationship between facts and theories. The paleontologist Stephen Jay Gould (1941-2002) offers a helpful clarification in the context of his own field, evolutionary biology:

In the American vernacular, "theory" often means "imperfect fact" — part of a hierarchy of confidence running downhill from *fact* to *theory* to *hypothesis* to *guess*. Thus the power of the creationist argument: evolution is "only" a theory and intense debate now rages about many aspects of the theory. If evolution is worse than a fact, and scientists can't even make up their minds about the theory, then what confidence can we have in it? Indeed, President Reagan echoed this argument before an evangelical group in Dallas when he said (in what I devoutly hope was campaign rhetoric): "Well, it is a theory. It is a scientific theory only, and it has in recent years been challenged in the world of science — that is, not believed in the scientific community to be as infallible as it once was."

"By doubting, we come to inquiry; and through inquiry, we perceive truth."
— Peter Abelard (1079-1142)

Well evolution *is* a theory. It is also a fact. And facts and theories are different things, not rungs in a hierarchy of increasing certainty. Facts are the world's data. Theories are structures of ideas that explain and interpret facts. Facts don't go away when scientists debate rival theories to explain them. Einstein's theory of gravitation replaced Newton's in this century, but apples didn't suspend themselves in midair, pending the outcome. And humans evolved from ape-like ancestors whether they did so by Darwin's proposed mechanism or by some other yet to be discovered.

Moreover, "fact" doesn't mean "absolute certainty"; there ain't no such animal in an exciting and complex world. The final proofs of logic and mathematics flow deductively from stated premises and achieve certainty only because they are *not* about the empirical world. Evolutionists make no claim for perpetual truth, though creationists often do (and then attack us falsely for a style of argument that they themselves favor). In science "fact" can only mean "confirmed to such a degree that it would be perverse to withhold provisional consent." I suppose that apples might start to rise tomorrow, but the possibility does not merit equal time in physics classrooms.

Evolutionists have been very clear about this distinction of fact and theory from the very beginning, if only because we have always acknowledged how far we are from completely understanding the mechanisms (theory) by which evolution (fact) occurred. Darwin continually emphasized the difference between his two great and separate accomplishments: establishing the fact of evolution, and proposing a theory — natural selection — to explain the mechanism of evolution.¹⁶

Facts are observations, while **theories** are explanations of what is observed. An especially useful kind of fact is a **law**, which is a description of a regularity found among the phenomena. The claim that "all swans are white" is a law (and, as we now know, a false law), for it describes how certain phenomena (being a swan, being white) combine in our experience. Boyle's Law (formulated in 1662 by the Irish chemist Robert Boyle) describes how the pressure and volume of a gas are related (*viz.*, they vary inversely), while Charles' Law describes the relationship between the volume and temperature of gases, and Gay-Lussac's Law describes the relationship between temperature and pressure. These laws all describe the way the gases behave, and as such are quite different from the *kinetic theory of gases* — namely, that a volume of gas consists of individual gas molecules colliding with each other and with the sides of the container holding the gas, and that it is the collection of these collisions that accounts for the observed temperature, pressure, and volume of the gas. This kinetic theory (first postulated by Daniel Bernoulli in 1740, and in opposition to the Newtonians) explains why these law-like regularities obtain. Similarly, Newton's inverse-square law of gravity is an excellent example of a law: it describes a regularity in the observed motions of bodies, but leaves wholly unexplained the mechanism behind this regularity (*i.e.*, what gravity is).

¹⁶ Stephen J. Gould, "Evolution as Fact and Theory," *Discover* (May 1981).

Another example: We can make various astronomical observations of the position of the sun, moon, planets, and stars. Each observation of the sun, for example, would count as a **fact**: “The sun is at position, *p*, and time, *t*.” We accumulate these many facts and notice clear regularities, which can eventually be distilled into **laws**, such as: “The sun returns to the same place in the sky every 23 hours and 56 minutes” or “The observed location of the sun follows the same path — which we call the ecliptic — each day.” These laws are nothing more than summaries of the many observations (although they go beyond the observations, of course; they predict what we will observe in the future, and since our set of past observations is always incomplete, it claims what we would have observed, had we looked at that time and place.) A **theory** will explain why these facts and laws are as they are, and here we have two well known and competing theories. The first theory (geocentrism) is that the earth is motionless while the sun moves around the earth approximately every 24 hours; that the sun literally rises in the morning, moves westward across the sky, and then sets in the evening. The second theory (heliocentrism) is that the earth spins on its north-south axis once approximately every 24 hours, and that it is this spinning that causes the apparent motion of the sun each day. These two theories offer quite different explanations for our many astronomical observations (facts).

Laws often act like theories, because we often use them as a kind of explanation: “He’s flatulent because of all that chili he ate for dinner” — this is an explanation based on the law-like correlation between eating chili and suffering flatulence. There is a deeper explanation, however, based on the chemistry of beans and digestive tracts, and here we are at the level of theoretical explanation. The difference between these two levels of explanation, and between laws and theories, is complicated and contested, but one useful way of thinking about it is this: With a law, one explains that a particular *S* is *P* by pointing to the law that “All *S* are *P*” (or that, e.g., 89% of all *S*’s are *P*) ; with a theory, one explains *why* all *S* are *P* (based on the presumed natures of *S* and *P*).

INDUCTION, DEDUCTION, AND UNCERTAINTY

Inductive arguments have conclusions that are uncertain, but so do many deductive arguments. The difference is that, with deductive arguments, the uncertainty stems from one or more uncertain premises, while with inductive arguments the uncertainty is (at least in part) a result of the inference from the premises to the conclusion. For instance, all conclusions about the future are uncertain, because the future is itself uncertain. Inductive generalizations typically involve some claim about a future event, e.g., about the next swan that you examine (or more ambitiously, about all future swans). This conclusion was probably inferred from premises that were themselves wholly certain (e.g., I look at one swan and see that it is white, I look at a second swan and see that it is white, and so forth):

This swan is white.
That swan is white. [...]
∴ All swans are white.

But consider the following deductive argument:

All swans are white.
Alice has a swan.
∴ Alice’s swan is white.

The conclusion is guaranteed to be true if the premises are both true, yet we could imagine the conclusion being false (since Alice might be in possession of a black swan). This uncertainty in the conclusion is not a result of the inference, but rather of an uncertainty found in the first premise.

READINGS

THE FIXATION OF BELIEF

Charles Sanders Peirce

Charles Sanders Peirce (1839-1914), born in Cambridge, Massachusetts, was the second son of Benjamin Peirce, a professor of mathematics and astronomy at Harvard and one of America's leading mathematicians. Charles studied at Harvard, receiving a degree in chemistry in 1863. By this time he had already been working with the U.S. Coast and Geodetic Survey, a position he kept for thirty years. Alongside his work in the sciences, Peirce wrote works on philosophy and logic, making a number of important innovations. He has been called "the American Leibniz" because he knew so much about so many things.

At the same time, Peirce had a cranky personality that stood in the way of his social and academic success. He was unable to maintain a teaching position for any length of time, lecturing only briefly at Harvard and Johns Hopkins (a newly established school of higher research). In the latter part of his life, what little money he made was from occasional public lectures and published articles, and he eventually died in extreme poverty near Milford, Pennsylvania, at a farm to which he had retired in 1887.

The essay from which the following is selected, "The Fixation of Belief," first appeared in Popular Science Monthly, 12: 1-15 (November 1877). The first two sections have been omitted.

III

We generally know when we wish to ask a question and when we wish to pronounce a judgment, for there is a dissimilarity between the sensation of doubting and that of believing.

But this is not all which distinguishes doubt from belief. There is a practical difference. Our beliefs guide our desires and shape our actions. The Assassins, or followers of the Old Man of the Mountain, used to rush into death at his least command, because they believed that obedience to him would insure everlasting felicity. Had they doubted this, they would not have acted as they did. So it is with every belief, according to its degree. The feeling of believing is a more or less sure indication of there being established in our nature

some habit which will determine our actions. Doubt never has such an effect.

Nor must we overlook a third point of difference. Doubt is an uneasy and dissatisfied state from which we struggle to free ourselves and pass into the state of belief; while the latter is a calm and satisfactory state which we do not wish to avoid, or to change to a belief in anything else. On the contrary, we cling tenaciously, not merely to believing, but to believing just what we do believe.

Thus, both doubt and belief have positive effects upon us, though very different ones. Belief does not make us act at once, but puts us into such a condition that we shall behave in some certain way, when the occasion arises. Doubt has not the least such active effect, but stimulates us to inquiry until it is destroyed. This reminds us of the irritation of a nerve and the reflex action produced thereby; while for the analogue of belief, in the nervous system, we must look to what are called nervous associations — for example, to that habit of the nerves in consequence of which the smell of a peach will make the mouth water.

IV

The irritation of doubt causes a struggle to attain a state of belief. I shall term this struggle inquiry, though it must be admitted that this is sometimes not a very apt designation.

The irritation of doubt is the only immediate motive for the struggle to attain belief. It is certainly best for us that our beliefs should be such as may truly guide our actions so as to satisfy our desires; and this reflection will make us reject every belief which does not seem to have been so formed as to insure this result. But it will only do so by creating a doubt in the place of that belief. With the doubt, therefore, the struggle begins, and with the cessation of doubt it ends. Hence, the sole object of inquiry is the settlement of opinion. We may fancy that this is not enough for us, and that

we seek, not merely an opinion, but a true opinion. But put this fancy to the test, and it proves groundless; for as soon as a firm belief is reached we are entirely satisfied, whether the belief be true or false. And it is clear that nothing out of the sphere of our knowledge can be our object, for nothing which does not affect the mind can be the motive for mental effort. The most that can be maintained is, that we seek for a belief that we shall think to be true. But we think each one of our beliefs to be true, and, indeed, it is mere tautology to say so.

That the settlement of opinion is the sole end of inquiry is a very important proposition. It sweeps away, at once, various vague and erroneous conceptions of proof. A few of these may be noticed here.

1. Some philosophers have imagined that to start an inquiry it was only necessary to utter a question whether orally or by setting it down upon paper, and have even recommended us to begin our studies with questioning everything! But the mere putting of a proposition into the interrogative form does not stimulate the mind to any struggle after belief. There must be a real and living doubt, and without this all discussion is idle.

2. It is a very common idea that a demonstration must rest on some ultimate and absolutely indubitable propositions. These, according to one school, are first principles of a general nature; according to another, are first sensations. But, in point of fact, an inquiry, to have that completely satisfactory result called demonstration, has only to start with propositions perfectly free from all actual doubt. If the premises are not in fact doubted at all, they cannot be more satisfactory than they are.

3. Some people seem to love to argue a point after all the world is fully convinced of it. But no further advance can be made. When doubt ceases, mental action on the subject comes to an end; and, if it did go on, it would be without a purpose.

V

If the settlement of opinion is the sole object of inquiry, and if belief is of the nature of a habit, why should we not attain the desired end, by taking as answer to a question any we may fancy, and constantly reiterating it to ourselves, dwelling on all which may conduce to that belief, and learning to turn with contempt and hatred from anything that might disturb it?

This simple and direct method is really pursued by many men. I remember once being entreated not to read a certain newspaper lest it might change my opinion upon free-trade. "Lest I might be entrapped by its fallacies and misstatements," was the form of expression. "You are not," my friend said, "a special student of political economy. You might, therefore, easily be deceived by fallacious arguments upon the subject. You might, then, if you read this paper, be led to believe in protection. But you admit that free-trade is the true doctrine; and you do not wish to believe what is not true." I have often known this system to be deliberately adopted. Still oftener, the instinctive dislike of an undecided state of mind, exaggerated into a vague dread of doubt, makes men cling spasmodically to the views they already take. The man feels that, if he only holds to his belief without wavering, it will be entirely satisfactory. Nor can it be denied that a steady and immovable faith yields great peace of mind. It may, indeed, give rise to inconveniences, as if a man should resolutely continue to believe that fire would not burn him, or that he would be eternally damned if he received his ingesta otherwise than through a stomach-pump. But then the man who adopts this method will not allow that its inconveniences are greater than its advantages. He will say, "I hold steadfastly to the truth, and the truth is always wholesome." And in many cases it may very well be that the pleasure he derives from his calm faith overbalances any inconveniences resulting from its deceptive character. Thus, if it be true that death is annihilation, then the man who believes that he will certainly go straight to heaven when he dies, provided he have fulfilled certain simple observances in this life, has a cheap pleasure which will not be followed by the least disappointment. A similar consideration seems to have weight with many persons in religious topics, for we frequently hear it said, "Oh, I could not believe so-and-so, because I should be wretched if I did." When an ostrich buries its head in the sand as danger approaches, it very likely takes the happiest course. It hides the danger, and then calmly says there is no danger; and, if it feels perfectly sure there is none, why should it raise its head to see? A man may go through life, systematically keeping out of view all that might cause a change in his opinions, and if he only succeeds — basing his method, as he does, on two fundamental psychological laws — I do not see

what can be said against his doing so. It would be an egotistical impertinence to object that his procedure is irrational, for that only amounts to saying that his method of settling belief is not ours. He does not propose to himself to be rational, and, indeed, will often talk with scorn of man's weak and illusive reason. So let him think as he pleases.

But this method of fixing belief, which may be called the method of tenacity, will be unable to hold its ground in practice. The social impulse is against it. The man who adopts it will find that other men think differently from him, and it will be apt to occur to him, in some saner moment, that their opinions are quite as good as his own, and this will shake his confidence in his belief. This conception, that another man's thought or sentiment may be equivalent to one's own, is a distinctly new step, and a highly important one. It arises from an impulse too strong in man to be suppressed, without danger of destroying the human species. Unless we make ourselves hermits, we shall necessarily influence each other's opinions; so that the problem becomes how to fix belief, not in the individual merely, but in the community.

Let the will of the state act, then, instead of that of the individual. Let an institution be created which shall have for its object to keep correct doctrines before the attention of the people, to reiterate them perpetually, and to teach them to the young; having at the same time power to prevent contrary doctrines from being taught, advocated, or expressed. Let all possible causes of a change of mind be removed from men's apprehensions. Let them be kept ignorant, lest they should learn of some reason to think otherwise than they do. Let their passions be enlisted, so that they may regard private and unusual opinions with hatred and horror. Then, let all men who reject the established belief be terrified into silence. Let the people turn out and tar-and-feather such men, or let inquisitions be made into the manner of thinking of suspected persons, and when they are found guilty of forbidden beliefs, let them be subjected to some signal punishment. When complete agreement could not otherwise be reached, a general massacre of all who have not thought in a certain way has proved a very effective means of settling opinion in a country. If the power to do this be wanting, let a list of opinions be drawn up, to which no man of the least independence of thought can assent, and let the faithful be required to

accept all these propositions, in order to segregate them as radically as possible from the influence of the rest of the world.

This method has, from the earliest times, been one of the chief means of upholding correct theological and political doctrines, and of preserving their universal or catholic character. In Rome, especially, it has been practiced from the days of Numa Pompilius to those of Pius Nonus. This is the most perfect example in history; but wherever there is a priesthood — and no religion has been without one — this method has been more or less made use of. Wherever there is an aristocracy, or a guild, or any association of a class of men whose interests depend, or are supposed to depend, on certain propositions, there will be inevitably found some traces of this natural product of social feeling. Cruelties always accompany this system; and when it is consistently carried out, they become atrocities of the most horrible kind in the eyes of any rational man. Nor should this occasion surprise, for the officer of a society does not feel justified in surrendering the interests of that society for the sake of mercy, as he might his own private interests. It is natural, therefore, that sympathy and fellowship should thus produce a most ruthless power.

In judging this method of fixing belief, which may be called the method of authority, we must, in the first place, allow its immeasurable mental and moral superiority to the method of tenacity. Its success is proportionately greater; and, in fact, it has over and over again worked the most majestic results. The mere structures of stone which it has caused to be put together — in Siam, for example, in Egypt, and in Europe — have many of them a sublimity hardly more than rivaled by the greatest works of Nature. And, except the geological epochs, there are no periods of time so vast as those which are measured by some of these organized faiths. If we scrutinize the matter closely, we shall find that there has not been one of their creeds which has remained always the same; yet the change is so slow as to be imperceptible during one person's life, so that individual belief remains sensibly fixed. For the mass of mankind, then, there is perhaps no better method than this. If it is their highest impulse to be intellectual slaves, then slaves they ought to remain.

But no institution can undertake to regulate opinions upon every subject. Only the most important ones can

be attended to, and on the rest men's minds must be left to the action of natural causes. This imperfection will be no source of weakness so long as men are in such a state of culture that one opinion does not influence another — that is, so long as they cannot put two and two together. But in the most priest-ridden states some individuals will be found who are raised above that condition. These men possess a wider sort of social feeling; they see that men in other countries and in other ages have held to very different doctrines from those which they themselves have been brought up to believe; and they cannot help seeing that it is the mere accident of their having been taught as they have, and of their having been surrounded with the manners and associations they have, that has caused them to believe as they do and not far differently. Nor can their candor resist the reflection that there is no reason to rate their own views at a higher value than those of other nations and other centuries; thus giving rise to doubts in their minds.

They will further perceive that such doubts as these must exist in their minds with reference to every belief which seems to be determined by the caprice either of themselves or of those who originated the popular opinions. The willful adherence to a belief, and the arbitrary forcing of it upon others, must, therefore, both be given up. A different new method of settling opinions must be adopted, that shall not only produce an impulse to believe, but shall also decide what proposition it is which is to be believed. Let the action of natural preferences be unimpeded, then, and under their influence let men, conversing together and regarding matters in different lights, gradually develop beliefs in harmony with natural causes. This method resembles that by which conceptions of art have been brought to maturity. The most perfect example of it is to be found in the history of metaphysical philosophy. Systems of this sort have not usually rested upon any observed facts, at least not in any great degree. They have been chiefly adopted because their fundamental propositions seemed "agreeable to reason." This is an apt expression; it does not mean that which agrees with experience, but that which we find ourselves inclined to believe. Plato, for example, finds it agreeable to reason that the distances of the celestial spheres from one another should be proportional to the different lengths of strings which produce harmonious chords. Many philosophers have been led to

their main conclusions by considerations like this; but this is the lowest and least developed form which the method takes, for it is clear that another man might find Kepler's theory, that the celestial spheres are proportional to the inscribed and circumscribed spheres of the different regular solids, more agreeable to his reason. But the shock of opinions will soon lead men to rest on preferences of a far more universal nature. Take, for example, the doctrine that man only acts selfishly — that is, from the consideration that acting in one way will afford him more pleasure than acting in another. This rests on no fact in the world, but it has had a wide acceptance as being the only reasonable theory.

This method is far more intellectual and respectable from the point of view of reason than either of the others which we have noticed. But its failure has been the most manifest. It makes of inquiry something similar to the development of taste; but taste, unfortunately, is always more or less a matter of fashion, and accordingly metaphysicians have never come to any fixed agreement, but the pendulum has swung backward and forward between a more material and a more spiritual philosophy, from the earliest times to the latest. And so from this, which has been called the *a priori* method, we are driven, in Lord Bacon's phrase, to a true induction. We have examined into this *a priori* method as something which promised to deliver our opinions from their accidental and capricious element. But development, while it is a process which eliminates the effect of some casual circumstances, only magnifies that of others. This method, therefore, does not differ in a very essential way from that of authority. The government may not have lifted its finger to influence my convictions; I may have been left outwardly quite free to choose, we will say, between monogamy and polygamy, and, appealing to my conscience only, I may have concluded that the latter practice is in itself licentious. But when I come to see that the chief obstacle to the spread of Christianity among a people of as high culture as the Hindoos has been a conviction of the immorality of our way of treating women, I cannot help seeing that, though governments do not interfere, sentiments in their development will be very greatly determined by accidental causes. Now, there are some people, among whom I must suppose that my reader is to be found, who, when they see that any belief of theirs is determined by any circumstance

extraneous to the facts, will from that moment not merely admit in words that that belief is doubtful, but will experience a real doubt of it, so that it ceases to be a belief.

To satisfy our doubts, therefore, it is necessary that a method should be found by which our beliefs may be determined by nothing human, but by some external permanency — by something upon which our thinking has no effect. Some mystics imagine that they have such a method in a private inspiration from on high. But that is only a form of the method of tenacity, in which the conception of truth as something public is not yet developed. Our external permanency would not be external, in our sense, if it was restricted in its influence to one individual. It must be something which affects, or might affect, every man. And, though these affections are necessarily as various as are individual conditions, yet the method must be such that the ultimate conclusion of every man shall be the same. Such is the method of science. Its fundamental hypothesis, restated in more familiar language, is this: There are Real things, whose characters are entirely independent of our opinions about them; those Reals affect our senses according to regular laws, and, though our sensations are as different as are our relations to the objects, yet, by taking advantage of the laws of perception, we can ascertain by reasoning how things really and truly are; and any man, if he have sufficient experience and he reason enough about it, will be led to the one True conclusion. The new conception here involved is that of Reality. It may be asked how I know that there are any Reals. If this hypothesis is the sole support of my method of inquiry, my method of inquiry must not be used to support my hypothesis. The reply is this: 1. If investigation cannot be regarded as proving that there are Real things, it at least does not lead to a contrary conclusion; but the method and the conception on which it is based remain ever in harmony. No doubts of the method, therefore, necessarily arise from its practice, as is the case with all the others. 2. The feeling which gives rise to any method of fixing belief is a dissatisfaction at two repugnant propositions. But here already is a vague concession that there is some one thing which a proposition should represent. Nobody, therefore, can really doubt that there are Reals, for, if he did, doubt would not be a source of dissatisfaction. The hypothesis, therefore, is one which every mind admits,

so that the social impulse does not cause men to doubt it. 3. Everybody uses the scientific method about a great many things, and only ceases to use it when he does not know how to apply it. 4. Experience of the method has not led us to doubt it, but, on the contrary, scientific investigation has had the most wonderful triumphs in the way of settling opinion. These afford the explanation of my not doubting the method or the hypothesis which it supposes; and not having any doubt, nor believing that anybody else whom I could influence has, it would be the merest babble for me to say more about it. If there be anybody with a living doubt upon the subject, let him consider it.

To describe the method of scientific investigation is the object of this series of papers.¹⁷ At present I have only room to notice some points of contrast between it and other methods of fixing belief.

This is the only one of the four methods which presents any distinction of a right and a wrong way. If I adopt the method of tenacity, and shut myself out from all influences, whatever I think necessary to doing this, is necessary according to that method. So with the method of authority: the state may try to put down heresy by means which, from a scientific point of view, seem very ill-calculated to accomplish its purposes; but the only test on that method is what the state thinks; so that it cannot pursue the method wrongly. So with the a priori method. The very essence of it is to think as one is inclined to think. All metaphysicians will be sure to do that, however they may be inclined to judge each other to be perversely wrong. [...] But with the scientific method the case is different. I may start with known and observed facts to proceed to the unknown; and yet the rules which I follow in doing so may not be such as investigation would approve. The test of whether I am truly following the method is not an immediate appeal to my feelings and purposes, but, on the contrary, itself involves the application of the method. Hence it is that bad reasoning as well as good reasoning is possible; and this fact is the foundation of the practical side of logic.

It is not to be supposed that the first three methods of settling opinion present no advantage whatever over

¹⁷ [This essay was the first of six written by Peirce for the *Popular Science Monthly* (1877-78) to serve as "Illustrations of the Logic of Science."]

the scientific method. On the contrary, each has some peculiar convenience of its own. The a priori method is distinguished for its comfortable conclusions. It is the nature of the process to adopt whatever belief we are inclined to, and there are certain flatteries to the vanity of man which we all believe by nature, until we are awakened from our pleasing dream by rough facts. The method of authority will always govern the mass of mankind; and those who wield the various forms of organized force in the state will never be convinced that dangerous reasoning ought not to be suppressed in some way. If liberty of speech is to be untrammelled from the grosser forms of constraint, then uniformity of opinion will be secured by a moral terrorism to which the respectability of society will give its thorough approval. Following the method of authority is the path of peace. Certain non-conformities are permitted; certain others (considered unsafe) are forbidden. These are different in different countries and in different ages; but, wherever you are, let it be known that you seriously hold a tabooed belief, and you may be perfectly sure of being treated with a cruelty less brutal but more refined than hunting you like a wolf. Thus, the greatest intellectual benefactors of mankind have never dared, and dare not now, to utter the whole of their thought; and thus a shade of *prima facie* doubt is cast upon every proposition which is considered essential to the security of society. Singularly enough, the persecution does not all come from without; but a man torments himself and is oftentimes most distressed at finding himself believing propositions which he has been brought up to regard with aversion. The peaceful and sympathetic

man will, therefore, find it hard to resist the temptation to submit his opinions to authority. But most of all I admire the method of tenacity for its strength, simplicity, and directness. Men who pursue it are distinguished for their decision of character, which becomes very easy with such a mental rule. They do not waste time in trying to make up their minds what they want, but, fastening like lightning upon whatever alternative comes first, they hold to it to the end, whatever happens, without an instant's irresolution. This is one of the splendid qualities which generally accompany brilliant, unlasting success. It is impossible not to envy the man who can dismiss reason, although we know how it must turn out at last.

Such are the advantages which the other methods of settling opinion have over scientific investigation. A man should consider well of them; and then he should consider that, after all, he wishes his opinions to coincide with the fact, and that there is no reason why the results of those three first methods should do so. To bring about this effect is the prerogative of the method of science. [...] But, above all, let it be considered that what is more wholesome than any particular belief is integrity of belief, and that to avoid looking into the support of any belief from a fear that it may turn out rotten is quite as immoral as it is disadvantageous. The person who confesses that there is such a thing as truth, which is distinguished from falsehood simply by this, that if acted on it should, on full consideration, carry us to the point we aim at and not astray, and then, though convinced of this, dares not know the truth and seeks to avoid it, is in a sorry state of mind indeed.

THE ETHICS OF BELIEF

W. K. Clifford

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A ship owner was about to send to sea an emigrant-ship. He knew that she was old, and not over well built at the first; that she had seen many seas and climes, and

often had needed repairs. Doubts had been suggested to him that possibly she was not seaworthy. These doubts preyed upon his mind, and made him unhappy; he thought that perhaps he ought to have her thoroughly overhauled and refitted, even though this should put him at great expense. Before the ship sailed, however, he succeeded in overcoming these melancholy reflections. He said to himself that she had gone safely through so many voyages and weathered so many

storms that it was idle to suppose she would not come safely home from this trip also. He would put his trust in Providence, which could hardly fail to protect all these unhappy families that were leaving their fatherland to seek for better times elsewhere. He would dismiss from his mind all ungenerous suspicions about the honesty of builders and contractors. In such ways he acquired a sincere and comfortable conviction that his vessel was thoroughly safe and seaworthy; he watched her departure with a light heart, and benevolent wishes for the success of the exiles in their strange new home that was to be; and he got his insurance-money when she went down in mid-ocean and told no tales.

What shall we say of him? Surely this, that he was verily guilty of the death of those men. It is admitted that he did sincerely believe in the soundness of his ship; but the sincerity of his conviction can in no wise help him, because *he had no right to believe on such evidence as was before him*. He had acquired his belief not by honestly earning it in patient investigation, but by stifling his doubts. And although in the end he may have felt so sure about it that he could not think otherwise, yet inasmuch as he had knowingly and willingly worked himself into that frame of mind, he must be held responsible for it.

Let us alter the case a little, and suppose that the ship was not unsound after all; that she made her voyage safely, and many others after it. Will that diminish the guilt of her owner? Not one jot. When an action is once done, it is right or wrong forever; no accidental failure of its good or evil fruits can possibly alter that. The man would not have been innocent, he would only have been not found out. The question of right or wrong has to do with the origin of his belief, not the matter of it; not what it was, but how he got it; not whether it turned out to be true or false, but whether he had a right to believe on such evidence as was before him. [...]

It may be said, however, that [...] it is not the belief which is judged to be wrong, but the action following upon it. The ship-owner might say, "I am perfectly certain that my ship is sound, but still I feel it my duty to have her examined, before trusting the lives of so many people to her." [...]

In the first place, let us admit that, so far as it goes, this view of the case is right and necessary; right, because even when a man's belief is so fixed that he can-

not think otherwise, he still has a choice in the action suggested by it, and so cannot escape the duty of investigating on the ground of the strength of his convictions; and necessary, because those who are not yet capable of controlling their feelings and thoughts must have a plain rule dealing with overt acts.

But this being premised as necessary, it becomes clear that it is not sufficient, and that our previous judgment is required to supplement it. For it is not possible so to sever the belief from the action it suggests as to condemn the one without condemning the other. No man holding a strong belief on one side of a question, or even wishing to hold a belief on one side, can investigate it with such fairness and completeness as if he were really in doubt and unbiased; so that the existence of a belief not founded on fair inquiry unfits a man for the performance of this necessary duty.

Nor is it that truly a belief at all which has not some influence upon the actions of him who holds it. He who truly believes that which prompts him to an action has looked upon the action to lust after it, he has committed it already in his heart. If a belief is not realized immediately in open deeds, it is stored up for the guidance of the future. It goes to make a part of that aggregate of beliefs which is the link between sensation and action at every moment of all our lives, and which is so organized and compacted together that no part of it can be isolated from the rest, but every new addition modifies the structure of the whole. No real belief, however trifling and fragmentary it may seem, is ever truly insignificant; it prepares us to receive more of its like, confirms those which resembled it before, and weakens others; and so gradually it lays a stealthy train in our inmost thoughts, which may someday explode into overt action, and leave its stamp upon our character for ever.

And no one man's belief is in any case a private matter which concerns himself alone. Our lives are guided by that general conception of the course of things which has been created by society for social purposes. Our words, our phrases, our forms and processes and modes of thought, are common property, fashioned and perfected from age to age; an heirloom which every succeeding generation inherits as a precious deposit and a sacred trust to be handed on to the next one, not unchanged but enlarged and purified, with some clear marks of its proper handiwork. Into this, for good or ill, is woven every belief of every man who has speech of

his fellows. An awful privilege, and an awful responsibility, that we should help to create the world in which posterity will live.

In the two supposed cases which have been considered, it has been judged wrong to believe on insufficient evidence, or to nourish belief by suppressing doubts and avoiding investigation. The reason of this judgment is not far to seek: it is that in both these cases the belief held by one man was of great importance to other men. But forasmuch as no belief held by one man, however seemingly trivial the belief, and however obscure the believer, is ever actually insignificant or without its effect on the fate of mankind, we have no choice but to extend our judgment to all cases of belief whatever. Belief, that sacred faculty which prompts the decisions of our will, and knits into harmonious working all the compacted energies of our being, is ours not for ourselves but for humanity. It is rightly used on truths which have been established by long experience and waiting toil, and which have stood in the fierce light of free and fearless questioning. Then it helps to bind men together, and to strengthen and direct their common action. It is desecrated when given to unproved and unquestioned statements, for the solace and private pleasure of the believer; to add a tinsel splendor to the plain straight road of our life and display a bright mirage beyond it; or even to drown the common sorrows of our kind by a self-deception which allows them not only to cast down, but also to degrade us. Who so would deserve well of his fellows in this matter will guard the purity of his beliefs with a very fanaticism of jealous care, lest at any time it should rest on an unworthy object, and catch a stain which can never be wiped away.

It is not only the leader of men, statesmen, philosopher, or poet, that owes this bounden duty to mankind. Every rustic who delivers in the village alehouse his slow, infrequent sentences, may help to kill or keep alive the fatal superstitions which clog his race. Every hard-worked wife of an artisan may transmit to her children beliefs which shall knit society together, or rend it in pieces. No simplicity of mind, no obscurity of station, can escape the universal duty of questioning all that we believe.

It is true that this duty is a hard one, and the doubt which comes out of it is often a very bitter thing. It leaves us bare and powerless where we thought that we

were safe and strong. To know all about anything is to know how to deal with it under all circumstances. We feel much happier and more secure when we think we know precisely what to do, no matter what happens, than when we have lost our way and do not know where to turn. And if we have supposed ourselves to know all about anything, and to be capable of doing what is fit in regard to it, we naturally do not like to find that we are really ignorant and powerless, that we have to begin again at the beginning, and try to learn what the thing is and how it is to be dealt with — if indeed anything can be learnt about it. It is the sense of power attached to a sense of knowledge that makes men desirous of believing, and afraid of doubting.

This sense of power is the highest and best of pleasures when the belief on which it is founded is a true belief, and has been fairly earned by investigation. For then we may justly feel that it is common property, and hold good for others as well as for ourselves. Then we may be glad, not that *I* have learned secrets by which I am safer and stronger, but that *we men* have got mastery over more of the world; and we shall be strong, not for ourselves but in the name of Man and his strength. But if the belief has been accepted on insufficient evidence, the pleasure is a stolen one. Not only does it deceive ourselves by giving us a sense of power which we do not really possess, but it is sinful, because it is stolen in defiance of our duty to mankind. That duty is to guard ourselves from such beliefs as from pestilence, which may shortly master our own body and then spread to the rest of the town. What would be thought of one who, for the sake of a sweet fruit, should deliberately run the risk of delivering a plague upon his family and his neighbors?

And, as in other such cases, it is not the risk only which has to be considered; for a bad action is always bad at the time when it is done, no matter what happens afterwards. Every time we let ourselves believe for unworthy reasons, we weaken our powers of self-control, of doubting, of judicially and fairly weighing evidence. We all suffer severely enough from the maintenance and support of false beliefs and the fatally wrong actions which they lead to, and the evil born when one such belief is entertained is great and wide. But a greater and wider evil arises when the credulous character is maintained and supported, when a habit of believing for unworthy reasons is fostered and made

permanent. If I steal money from any person, there may be no harm done from the mere transfer of possession; he may not feel the loss, or it may prevent him from using the money badly. But I cannot help doing this great wrong towards Man, that I make myself dishonest. What hurts society is not that it should lose its property, but that it should become a den of thieves, for then it must cease to be society. This is why we ought not to do evil, that good may come; for at any rate this great evil has come, that we have done evil and are made wicked thereby. In like manner, if I let myself believe anything on insufficient evidence, there may be no great harm done by the mere belief; it may be true after all, or I may never have occasion to exhibit it in outward acts. But I cannot help doing this great wrong towards Man, that I make myself credulous. The danger to society is not merely that it should believe wrong things, though that is great enough; but that it should become credulous, and lose the habit of testing things and inquiring into them; for then it must sink back into savagery.

The harm which is done by credulity in a man is not confined to the fostering of a credulous character in others, and consequent support of false beliefs. Habitual want of care about what I believe leads to habitual want of care in others about the truth of what is told to me. Men speak the truth of one another when each reveres the truth in his own mind and in the other's mind; but how shall my friend revere the truth in my mind when I myself am careless about it, when I believe things because I want to believe them, and because they are comforting and pleasant? Will he not learn to cry, "Peace," to me, when there is no peace? By such a course I shall surround myself with a thick atmosphere of falsehood and fraud, and in that I must live. It may matter little to me, in my cloud-castle of sweet illusions and darling lies; but it matters much to Man that I have made my neighbors ready to deceive. The credulous man is father to the liar and the cheat; he lives in the bosom of this his family, and it is no marvel if he should become even as they are. So closely are our duties knit together, that who so shall keep the

whole law, and yet offend in one point, he is guilty of all.

To sum up: it is wrong always, everywhere, and for anyone, to believe anything upon insufficient evidence.

If a man, holding a belief which he was taught in childhood or persuaded of afterwards, keeps down and pushes away any doubts which arise about it in his mind, purposely avoids the reading of books and the company of men that call into question or discuss it, and regards as impious those questions which cannot easily be asked without disturbing it — the life of that man is one long sin against mankind.

If this judgment seems harsh when applied to those simple souls who have never known better, who have been brought up from the cradle with a horror of doubt, and taught that their eternal welfare depends on *what* they believe, then it leads to the very serious question, *Who hath made Israel to sin?*

It may be permitted me to fortify this judgment with the sentence of Milton —

A man may be a heretic in the truth; and if he believe things only because his pastor says so, or the assembly so determine, without knowing other reason, though his belief be true, yet the very truth he holds becomes his heresy. [*Areopagitica*]

And with this famous aphorism of Coleridge —

He who begins by loving Christianity better than Truth, will proceed by loving his own sect or Church better than Christianity, and end loving himself better than all.

Inquiry into the evidence of a doctrine is not to be made once for all, and then taken as finally settled. It is never lawful to stifle a doubt; for either it can be honestly answered by means of the inquiry already made, or else it proves that the inquiry was not complete.

"But," says one, "I am a busy man; I have no time for the long course of study which would be necessary to make me in any degree a competent judge of certain questions, or even able to understand the nature of the arguments."

Then he should have no time to believe.