feels like this to children: it is a place where they make you go and where they tell you to do things and where they try to make your life unpleasant if you don’t do them or don’t do them right.


19. I simply can’t imagine the world will ever be normal again for us. I do talk about “after the war,” but it’s as if I were talking about a castle in the air, something that can never come true.

I see the eight of us in the Annex as if we were a patch of blue sky surrounded by menacing black clouds. The perfectly round spot on which we’re standing is still safe, but the clouds are moving in on us, and the ring between us and the approaching danger is being pulled tighter and tighter. We’re surrounded by darkness and danger, and in our desperate search for a way out we keep bumping into each other. We look at the fighting down below and the peace and beauty up above. In the meantime, we’ve been cut off by the dark mass of clouds, so that we can go neither up nor down. It looms before us like an impenetrable wall, trying to crush us, but not yet able to. I can only cry out and implore, “Oh, ring, ring, open wide and let us out!”

—Anne Frank, from *The Diary of a Young Girl*, 8 November 1943

20. Unfortunately, the diary [of H. L. Mencken] reveals a man who was shockingly anti-Semitic and racist, to the point where his stature as a giant of American letters may be in danger. . . . I would draw a comparison with Richard Wagner, a virulent anti-Semite. One can still listen to Wagner’s operas and appreciate their artistic beauty. The work is separated from the man. Or is it?


11.3 Appraising Analogical Arguments

Some analogical arguments are much more cogent than others. Although no argument by analogy can be deductively valid, some such arguments yield conclusions that are very probably true, whereas others are very weak indeed. Analogical arguments are evaluated as better or worse depending on the degree of probability with which, relying on the premises they put forward, their conclusions may be affirmed.

Two commonplace examples will help to exhibit the features of analogical arguments that make them better or worse. Suppose you choose to purchase a given pair of shoes because other pairs like it have given you satisfaction in the past; and suppose you select a dog of a given breed because other dogs of
that same breed have exhibited the characteristics that you prize. In both cases, analogical arguments have been relied on. To appraise the strength of these sample arguments, and indeed all analogical arguments, six criteria may be distinguished.

1. **Number of entities.** If my past experience with shoes of a certain kind is limited to only one pair that I wore and liked, I will be disappointed although not surprised by an apparently similar pair that I find flawed in unexpected ways. But if I have repeatedly purchased shoes just like those, I may reasonably suppose that the next pair will be as good as the ones worn earlier. Several experiences of the same kind with an item of just that sort will support the conclusion—that the purchase will be satisfying—much more than will a single instance. Each instance may be thought of as an additional entity, and the number of entities is the first criterion in evaluating an analogical argument.

   In general, the larger the number of entities—that is, cases in our past experience—the stronger the argument. But there is no simple ratio between that number and the probability of the conclusion. Six happy experiences with golden retrievers, intelligent and sweet-tempered dogs, will lead one to conclude that the next golden retriever will also be intelligent and sweet-tempered. However, the conclusion of an analogical argument that has six instances in its premises will not be exactly three times as probable as a similar argument that has two such instances in its premises. Increasing the number of entities is important, but so are other factors.

2. **Variety of the instances in the premises.** If my previous purchases of those good shoes had been from both a department store and a specialty store, and had been made both in New York and in California, by both mail order and direct sale, I may be confident that it is the shoes themselves and not their seller that accounts for my satisfaction. If my previous golden retrievers were both males and females, acquired both as puppies from breeders and as adults from the humane society, I may be more confident that it is their breed—not their sex or age or source—that accounts for my earlier satisfaction.

   We understand this criterion intuitively: The more dissimilar the instances mentioned only in the premises of the analogical argument, the stronger is the argument.

3. **Number of similar respects.** Among the instances in the premises there may have been various similarities: perhaps the shoes were of the same style, had the same price, were made of the same sort of leather; perhaps the dogs were of the same breed, came from the same breeder at the same age, and so on. All the respects in which the instances in the premises are
like one another, and also like the instance in the conclusion, increase the probability that the instance in the conclusion will have that further attribute at which the argument is aimed—giving great satisfaction in the case of the new shoes, being of a sweet disposition in the case of a new dog.

This criterion also is rooted in common sense: *The greater the number of respects in which the entity in the conclusion is similar to the entities in the premises, the more probable is that conclusion.* Again, of course, there is no simple numerical ratio between that conclusion and the number of similar respects identified.

4. **Relevance.** As important as the number of respects shared is the kind of respects in which the instances in the premises are like the instance in the conclusion. If the new pair of shoes, like the previous pairs, is purchased on a Tuesday, that is a likeness that will have no bearing on the satisfaction they give; but if the new pair, like all the previous pairs, had the same manufacturer, that will count heavily. *Respects add to the force of the argument when they are relevant* (as style of shoe, and price, and material surely are)—*and a single highly relevant factor contributes more to the argument than a host of irrelevant similarities.*

There will sometimes be disagreement about which attributes really are relevant in establishing the likelihood of our conclusion, but the meaning of relevance itself is not in dispute. One attribute is relevant to another when it is connected to that other, when there is some kind of *causal relation* between them. That is why identifying causal connections of one kind or another is critical in analogical arguments, and why establishing such connections is often crucial in determining the admissibility of evidence, as relevant or irrelevant, in a court of law.

Analogical arguments can be probable whether they go from cause to effect or from effect to cause. They can even be probable when the attribute in the premise is neither the cause nor the effect of the conclusion’s attribute, provided both are the effect of the same cause. A doctor, noting the presence of a certain symptom in her patient, may predict another symptom accurately not because either symptom is the cause of the other, but because they are jointly caused by the same disorder. The color of a manufactured product is most often irrelevant to function, but it may serve as a relevant respect in an argument when that color is very unusual, and shared by the entities in the premises and the conclusion. The color itself may contribute nothing to the function of the product, but it may serve in argument if it is known to be an attribute of the manufacturing process of a unique producer.

The causal connections that are the key to the evaluation of analogical arguments can be discovered only empirically, by observation and
experiment. The general theory of empirical investigation is the central concern of inductive logic, and will be discussed at length in the chapters that follow.

5. **Disanalogies.** A **disanalogy** is a point of difference, a respect in which the case we are reasoning about in our conclusion is distinguishable from the cases on which the argument is based. Returning to the example of the shoes, if the pair we plan to buy looks like those we had owned earlier, but is in fact much cheaper and made by a different company, those disanalogies will give us reason to doubt the satisfaction they will provide.

What was said earlier about relevance is also important here. Disanalogies undermine analogical arguments when the points of difference identified are relevant—causally connected to the outcome we are seeking. Investors often purchase shares of a stock mutual fund on the basis of its successful “track record,” reasoning that because earlier purchases resulted in capital appreciation, a future purchase will do so as well. However, if we learn that the person who managed the fund during the period of its profitability has just been replaced, we confront a disanalogy that substantially reduces the strength of that analogical argument.

Disanalogies weaken analogical arguments. They are therefore commonly employed in **attacking** an analogical argument. As critics, we may try to show that the case in the conclusion is different in important ways from the earlier cases, and that what was true of them is not likely to be true of the present case. In the law, where the uses of analogy are pervasive, some earlier case or cases are often offered to a court as a precedent for deciding the case at hand. The argument is analogical. Opposing counsel will seek to **distinguish** the case at hand from the earlier cases; that is, counsel will seek to show that because there is some critical difference between the facts in the case at hand and the facts in those earlier cases, they do not serve as good precedents in the present matter. If the differences are great—if the disanalogy is indeed critical—that may demolish the analogical argument that had been put forward.

Because disanalogies are the primary weapon against an analogical argument, whatever can ward off any potential disanalogies will strengthen the argument. This explains why variety among the instances in the premises adds force to an argument. The more the instances in the premises vary from one to another, the less likely it is that a critic will be able to point to some disanalogy between all of them and the conclusion that will weaken the argument. To illustrate, suppose that Kim Kumar comes to a university as a first-year student; ten others from her secondary school have successfully completed studies at the same university.
We may argue analogically that in view of her secondary school preparation, she is likely to succeed as well. If all those other students from her school were similar to one another in some respect that bears on college study but differ from Kim in that respect, that disanalogy will undermine the argument for Kim’s success. However, if we learn that the ten successful predecessors varied among themselves in many ways—in economic background, in family relations, in religious affiliation, and so on—those differences among them ward off such potential disanalogies. The argument for Kim’s success is fortified—as we saw earlier—if the other students from her school serving as premises in the argument do not resemble each other closely, but exhibit substantial variety.

A confusion must be avoided: The principle that disanalogies weaken analogical arguments is to be contrasted with the principle that differences among the premises strengthen such arguments. In the former, the differences are between the instances in the premises and the instance in the conclusion; in the latter, differences are among the instances in the premises only. A disanalogy is a difference between the cases with which we have experience and the case about which a conclusion is being drawn. That conclusion (we may say in presenting the disanalogy as refutation) is not warranted because circumstances in the critical case are not similar to circumstances in earlier cases. The analogy is said to be “strained” or “does not hold.” But when we point to dissimilarities among the premises we are strengthening the argument by saying, in effect, that the analogy has wide force, that it holds in cases like this and in other cases, and that therefore the respects in which the instances in the premises vary are not relevant to the matter with which the conclusion is concerned.

In summary, disanalogies undermine an analogical argument; dissimilarities among the premises reinforce it. And both considerations are tied to the question of relevance: Disanalogies tend to show that there are relevant respects in which the case in the conclusion differs from those in the premises; dissimilarities among the premises tend to show that other factors, which might have been thought causally relevant to the attribute of interest, are not really relevant at all.

Note that the very first criterion identified, pertaining to the number of entities among which the analogy is said to hold, is also linked to relevance. The greater the number of instances appealed to, the greater is the number of dissimilarities likely to obtain among them. Increasing the number of entities is therefore desirable, but as the number of entities increases, the impact of each additional case is reduced. The dissimilarity it may provide is more likely to have been provided by earlier
instances, in which case it will add little or nothing to the protection of
the conclusion from damaging disanalogies.

6. **Claim that the conclusion makes.** Every argument makes the claim that
its premises give reasons to accept its conclusion. It is easy to see that the
more one claims, the greater the burden of sustaining that claim, and that is
obviously true for every analogical argument. The *modesty of the conclusion
relative to the premises* is critical in determining the merit of the inference.

If my friend gets 30 miles to the gallon from his new car, I may infer
that, were I to acquire a car of the same make and model, I would get at
least 20 miles to the gallon; that conclusion is modest and therefore very
probable. Were my conclusion much bolder—say, that I would get at
least 29 miles to the gallon—it would be less well supported by the evi-
dence I have. In general, *the more modest the claim, the less burden is placed
on the premises and the stronger the argument; the bolder the claim, the
greater is the burden on the premises and the weaker the argument.*

An analogical argument is strengthened by reducing the claim made
on the basis of the premises affirmed, or by retaining the claim unchanged
while supporting it with additional or more powerful premises. Likewise,
an analogical argument is weakened if its conclusion is made bolder while
its premises remain unchanged, or if the claim remains unchanged while
the evidence in its support is found to exhibit greater frailty.

**EXERCISES**

A. For each of the following arguments by analogy, six additional premises are
suggested. For each of these alternative premises, decide whether its addition
would make the resulting argument more or less probable. Identify the crite-
rian of appraisal that justifies this judgment, and explain how that criterion
applies to the given case.

**EXAMPLE**

1. An investor has purchased one hundred shares of oil stock every
December for the past five years. In every case the value of the stock
has appreciated by about 15 percent a year, and it has paid regular div-
idends of about 8 percent a year on the price at which she bought it.
This December she decides to buy another hundred shares of oil stock,
reasoning that she will probably receive modest earnings while watch-
ing the value of her new purchase increase over the years.

    a. Suppose that she had always purchased stock in eastern oil compa-
nies before, and plans to purchase stock in an eastern oil company
this year too.
b. Suppose that she had purchased oil stocks every December for the past fifteen years, instead of for only five years.
c. Suppose that the oil stocks previously purchased had gone up by 30 percent a year, instead of only 15 percent.
d. Suppose that her previous purchases of oil stock had been in foreign companies as well as in eastern, southern, and western U.S. oil companies.
e. Suppose she learns that OPEC has decided to meet every month instead of every six months.
f. Suppose she discovers that tobacco stocks have just raised their dividend payments.

**SOLUTION**

a. More probable. *Number of similar respects.* The change provides an additional respect in which the instance in the conclusion is the same as those in the premises.
b. More probable. *Number of entities.* With this change the number of entities in the premises is substantially increased.
c. More probable. *Claim made by the conclusion.* With this change in the premises, the conclusion, although unchanged, is now, relatively speaking, substantially more modest.
d. More probable. *Variety among the premises.* With this change, the dissimilarity among the instances in the premises is clearly established.
e. Less probable. *Disanalogy.* With this change in the premises, a significant difference between the instance in the conclusion and the instances in the premises is introduced.
f. Neither. *Relevance.* It is unlikely that the dividends paid by tobacco companies would have any impact on the profitability of oil companies or the price of their shares.

2. A faithful alumnus, heartened by State’s winning its last four football games, decides to bet his money that State will win its next game, too.

a. Suppose that since the last game, State’s outstanding quarterback was injured in practice and hospitalized for the remainder of the season.
b. Suppose that two of the last four games were played away, and that two of them were home games.
c. Suppose that, just before the game, it is announced that a member of State’s Chemistry Department has been awarded a Nobel Prize.
d. Suppose that State had won its last six games rather than only four of them.

e. Suppose that it has rained hard during each of the four preceding games, and that rain is forecast for next Saturday too.

f. Suppose that each of the last four games was won by a margin of at least four touchdowns.

3. Although she was bored by the last few foreign films she saw, Charlene agrees to go to see another one this evening, fully expecting to be bored again.

a. Suppose that Charlene also was bored by the last few American movies she saw.

b. Suppose that the star of this evening’s film has recently been accused of bigamy.

c. Suppose that the last few foreign films that Charlene saw were Italian, and that tonight’s film is Italian as well.

d. Suppose that Charlene was so bored by the other foreign films that she actually fell asleep during the performance.

e. Suppose that the last few foreign films she saw included an Italian, a French, an English, and a Swedish film.

f. Suppose that tonight’s film is a mystery, whereas all of those she saw before were comedies.

4. Bill has taken three history courses and found them very stimulating and valuable, so he signs up for another one, confidently expecting that it too will be worthwhile.

a. Suppose that his previous history courses were in ancient history, modern European history, and U.S. history.

b. Suppose that his previous history courses had all been taught by the same professor scheduled to teach the present one.

c. Suppose that his previous history courses had all been taught by Professor Smith, and the present one is taught by Professor Jones.

d. Suppose that Bill had found his three previous history courses to be the most exciting intellectual experiences of his life.

e. Suppose that his previous history courses had all met at 9 A.M., and that the present one is also scheduled to meet at 9 A.M.

f. Suppose that, in addition to the three history courses he took previously, Bill had also taken and enjoyed courses in anthropology, economics, political science, and sociology.
5. Dr. Brown has stayed at the Queen’s Hotel every fall for the past six years on her annual visit to New York, and she has been quite satisfied with her accommodations there. On her visit to New York this fall, Dr. Brown goes again to the Queen’s Hotel, confidently expecting to enjoy her stay there again.

   a. Suppose that when she stayed at the Queen’s Hotel before, she had occupied a single room twice, shared a double room twice, and twice occupied a suite.

   b. Suppose that last spring a new manager had been put in charge of the Queen’s Hotel.

   c. Suppose that she had occupied a suite on all of her previous trips and is assigned a suite this time as well.

   d. Suppose that on her previous trips she had come to New York by train, but this time she flew.

   e. Suppose that, when she stayed at the Queen’s Hotel before, her quarters had been the most luxurious she had ever known.

   f. Suppose that she had stayed at the Queen’s Hotel three times a year for the past six years.

B. Analyze the structure of the analogical arguments in the following passages, and evaluate them in terms of the six criteria that have been explained.

1. If you cut up a large diamond into little bits, it will entirely lose the value it had as a whole; as an army divided up into small bodies of soldiers loses all its strength. So a great intellect sinks to the level of an ordinary one, as soon as it is interrupted and disturbed, its attention distracted and drawn off from the matter in hand: for its superiority depends upon its power of concentration—of bringing all its strength to bear upon one theme, in the same way as a concave mirror collects into one point all the rays of light that strike upon it.


2. It would be the height of hypocrisy if Pete Rose, one of baseball’s star players, were allowed back into baseball and elected to the Hall of Fame after finally admitting that he placed bets on his team and other teams and lied about it. In coming to a decision about Rose, the Baseball Commissioner should remember that Olympic athletes who have been caught using performance-enhancing drugs are stripped permanently of their titles and medals.

3. Look round the world: contemplate the whole and every part of it: you will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions, to a degree beyond what human senses and faculties can trace and explain. All these various machines, and even their most minute parts, are adjusted to each other with an accuracy which ravishes into admiration all men who have ever contemplated them. The curious adapting of means to ends, throughout all nature, resembles exactly, though it much exceeds, the production of human contrivance, of human design, thought, wisdom, and intelligence. Since therefore the effects resemble each other, we are led to infer, by all the rules of analogy, that the causes also resemble; and that the Author of Nature is somewhat similar to the mind of men; though possessed of much larger faculties, proportioned to the grandeur of the work, which he has executed. By this argument a posteriori, and by this argument alone, do we prove at once the existence of a Deity, and his similarity to human mind and intelligence.

—David Hume, *Dialogues Concerning Natural Religion*, 1779

4. The philosopher Metrodorus of Chios, who lived in the fourth century B.C., was greatly interested in the heavenly bodies. He wrote: “To consider the Earth as the only populated world in infinite space is as absurd as to assert that in an entire field of millet, only one grain will grow.”

5. To the casual observer porpoises and sharks are kinds of fish. They are streamlined, good swimmers, and live in the sea. To the zoologist who examines these animals more closely, the shark has gills, cold blood, and scales; the porpoise has lungs, warm blood, and hair. The porpoise is fundamentally more like man than like the shark and belongs, with man, to the mammals—a group that nurses its young with milk. Having decided that the porpoise is a mammal, the zoologist can, without further examination, predict that the animal will have a four-chambered heart, bones of a particular type, and a certain general pattern of nerves and blood vessels. Without using a microscope the zoologist can say with reasonable confidence that the red blood cells in the blood of the porpoise will lack nuclei. This ability to generalize about animal structure depends upon a system for organizing the vast amount of knowledge about animals.


6. The body is the substance of the soul; the soul is the functioning of the body. . . . The relationship of the soul to its substance is like that
of sharpness to a knife, while the relationship of the body to its functioning is like that of a knife to sharpness. What is called sharpness is not the same as the knife, and what is called the knife is not the same as sharpness. Nevertheless, there can be no knife if the sharpness is discarded, nor sharpness if the knife is discarded. I have never heard of sharpness surviving if the knife is destroyed, so how can it be admitted that the soul can remain if the body is annihilated?


7. If a single cell, under appropriate conditions, becomes a person in the space of a few years, there can surely be no difficulty in understanding how, under appropriate conditions, a cell may, in the course of untold millions of years, give origin to the human race.

—Herbert Spencer, *Principles of Biology*, 1864

8. An electron is no more (and no less) hypothetical than a star. Nowadays we count electrons one by one in a Geiger counter, as we count the stars one by one on a photographic plate. In what sense can an electron be called more unobservable than a star? I am not sure whether I ought to say that I have seen an electron; but I have just the same doubt whether I have seen a star. If I have seen one, I have seen the other. I have seen a small disc of light surrounded by diffraction rings which has not the least resemblance to what a star is supposed to be; but the name “star” is given to the object in the physical world which some hundreds of years ago started a chain of causation which has resulted in this particular light-pattern. Similarly in a Wilson expansion chamber I have seen a trail not in the least resembling what an electron is supposed to be; but the name “electron” is given to the object in the physical world which has caused this trail to appear. How can it possibly be maintained that a hypothesis is introduced in one case and not in the other?


9. Just as the bottom of a bucket containing water is pressed more heavily by the weight of the water when it is full than when it is half empty, and the more heavily the deeper the water is, similarly the high places of the earth, such as the summits of mountains, are less heavily pressed than the lowlands are by the weight of the mass of the air. This is because there is more air above the lowlands than above the mountain tops; for all the air along a mountain side presses upon the lowlands but not upon the summit, being above the one but below the other.

—Blaise Pascal, *Treatise on the Weight of the Mass of the Air*, 1653
10. Suppose that someone tells me that he has had a tooth extracted without an anaesthetic, and I express my sympathy, and suppose that I am then asked, “How do you know that it hurt him?” I might reasonably reply, “Well, I know that it would hurt me. I have been to the dentist and know how painful it is to have a tooth stopped [filled] without an anaesthetic, let alone taken out. And he has the same sort of nervous system as I have. I infer, therefore, that in these conditions he felt considerable pain, just as I should myself.”


11. Now if we survey the universe, so far as it falls under our knowledge, it bears a great resemblance to an animal or organized body and seems actuated with a like principle of life and motion. A continual circulation of matter in it produces no disorder: a continual waste in every part is incessantly repaired; the closest sympathy is perceived throughout the entire system: and each part or member, in performing its proper offices, operates both to its own preservation and to that of the whole. The world, therefore, I infer, is an animal, and the Deity is the soul of the world, actuating it, and actuated by it.

—David Hume, Dialogues Concerning Natural Religion, 1779

12. One cannot require that everything shall be defined, any more than one can require that a chemist shall decompose every substance. What is simple cannot be decomposed, and what is logically simple cannot have a proper definition.

—Gottlob Frege, “On Concept and Object,” 1892

13. Most endangered or threatened species in the United States find suitable habitat on private land, and the destruction of habitat is widely recognized as the leading cause of extinctions. For these reasons, protecting wildlife without regulating the use of private land has been compared by biologists to playing the piano with just the black keys.


14. Opposing legislation that would restrict handgun ownership in the United Kingdom, the husband of Queen Elizabeth II reasoned as follows:

Look, if a cricketer, for instance, suddenly decided to go into a school and batter a lot of people to death with a cricket bat, which he could do very easily, are you going to ban cricket bats?

—Prince Philip, the Duke of Edinburgh, in an interview on the BBC, 19 December 1996
15. . . . The simplest form of the theological argument from design [was] once well known under the name “Paley’s watch.” Paley’s form of it was just this: “If we found by chance a watch or other piece of intricate mechanism we should infer that it had been made by someone. But all around us we do find intricate pieces of natural mechanism, and the processes of the universe are seen to move together in complex relations; we should therefore infer that these too have a Maker.”


11.4 Refutation by Logical Analogy

“You should say what you mean,” [said the March Hare, reproving Alice sharply.]

“I do,” Alice hastily replied; “at least—at least I mean what I say—that’s the same thing, you know.”

“Not the same thing a bit!” said the Hatter. “Why, you might just as well say that ‘I see what I eat’ is the same thing as ‘I eat what I see’!”

“You might just as well say,” added the March Hare, “that ‘I like what I get’ is the same thing as ‘I get what I like’!”

“You might just as well say,” added the Dormouse, which seemed to be talking in its sleep, “that ‘I breathe when I sleep’ is the same thing as ‘I sleep when I breathe’!”

“It is the same thing with you,” said the Hatter, and here the conversation dropped.

—Lewis Carroll, Alice’s Adventures in Wonderland

The Hare, the Hatter, and the Dormouse all seek to refute Alice’s claim—that meaning what you say is the same as saying what you mean—by using a logical analogy. The form of an argument, as distinct from its particular content, is the most important aspect of that argument from a logical point of view. Therefore, we often seek to demonstrate the weakness of a given argument by stating another argument, known to be erroneous, that has the same logical form.

In the realm of deduction, a refuting analogy for a given argument is an argument that has the same form as the given argument but whose premises are known to be true and whose conclusion is known to be false. The refuting analogy is therefore known to be invalid, and the argument under attack, because it has the same form, is thus shown to be invalid as well. This is the same principle that underlies the testing of categorical syllogisms explained in Section 6.2, and it also underlies the repeated emphasis on the centrality of logical form, as explained in Section 8.4.

In the realm of inductive argument, our present concern, the technique of refutation by logical analogy can also be used to great effect. Scientific, political,