# David Hume and the Problem of Induction

David Hume (1711-1776) was a Scottish philosopher and historian whose skeptical arguments have to come to influence almost every area of modern philosophy. They’ve also left their imprint on economics (Adam Smith was a close friend), physics (Einstein cited him as an influence), statistics, and psychology. In this lecture, we’ll be looking at one of Hume’s best known puzzles: **The Problem of Induction.** According to this problem, we aren’t justified in nearly all of our most important beliefs about the world around us. That is, we have *no reason at all* to think these things are more likely to be true than false. These include any and all beliefs about what might happen the future, about causes and effects, about anything we aren’t currently observing, and many other things. This importantly includes all of science, history, religion, psychology, as well as what might be called “common sense.” In fact, just about the only areas of knowledge that *aren’t* affected by Hume’s argument are things like pure mathematics or “conceptual analysis” (of the type done by some philosophers). However, even mathematicians and philosophers will run into his problem if and when they try to *use* their work to describe anything in the real world.

## A Starting Point: Deductive and Inductive Reasoning

“In our reasonings concerning matter of fact, there are all imaginable degrees of assurance, from the highest certainty to the lowest species of moral evidence. A wise man, therefore, proportions his belief to the evidence.” (D. Hume, EHU)

Hume’s argument begins by noting that we reason in two different ways. In current terminology, we can call these **deductive reasoning** and **inductive reasoning.** In deductive reasoning, *if* the premises we start from are true, then the conclusion is guaranteed to be true as well:

1. Since all chickens are birds, and all birds lay eggs, chickens must lay eggs.
2. Since all chickens speak French and Foghorn Leghorn is a chicken, Foghorn Leghorn can speak French.

As the second example shows, deductive arguments can have false conclusions, but they do so *only* if we start from false premises. On the other hand, if they have true premises (as in the first case), we are *guaranteed* to reach a true conclusion. The process of deductive argument doesn’t introduce any “new” risk of our getting things wrong. Deductive reasoning has always played an important role in many areas of mathematics (and related areas, like computer science). However, we don’t actually use it that much in day-to-day life (for example, when was the last time you actually *proved* something, in the way you would in a high school geometry class?).

Deductive reasoning can be contrasted with **inductive reasoning,** which plays a much bigger role in most of life. In inductive arguments, it is possible for our conclusion to be false, even if our premises are true. So, for example:

1. The first 1,000 chickens observed all had feathers. So, I can conclude that all chickens have feathers.
2. The first 1,000 swans observed were all white. So, I can conclude that all swans are white.

Both arguments look similar: we start from everything we’ve observed, and we make a conclusion about things we haven’t observed (the chickens and the swans we haven’t yet seen). So far, so good. Unfortunately, we now know the conclusion of the second argument is false (there are black swans!). This is the fundamental feature that differentiates inductive from deductive reasoning: *we might get the conclusion wrong, even if we start from true premises.*

## Inductive reasoning as the foundation of our lives

“Custom, then, is the great guide of human life. It is that principle alone which renders our experience useful to us, and makes us expect, for the future, a similar train of events with those which have appeared in the past. Without the influence of custom, we should be entirely ignorant of every matter of fact beyond what is immediately present to the memory and senses. We should never know how to adjust means to ends, or to employ our natural powers in the production of any effect. There would be an end at once of all action, as well as of the chief part of speculation.” (D. Hume, EHU)

While the “certainty” of deductive reasoning has always been attractive to some people, Hume was among the first to notice that inductive reasoning plays a much more significant role in our lives. Some examples:

* **Every time we draw conclusions based on what we’ve read or been told, we reason inductively.** “I’ve thoroughly researched chickens, and all the textbooks agree that chickens can’t speak human languages like parrots. So, I can be certain the chicken I just bought will never learn to speak.
* **Every time we make predictions or generalize, we reason inductively.** “Mary is a human, and she is pregnant. Since every human woman up to now has given birth to a baby human, it’s unlikely Mary will lay an egg.
* **Every time we draw conclusions about causes or effects, we reason inductively.** “It’s forty below 0, and my car won’t start. It’s likely this was caused by the weather. By contrast, it would be ridiculous to conclude that my alternator has been sabotaged by group of Martians who are currently disguised as rogue chickens.”
* **Both science and common sense are based on induction.** Both science and common sense require that we be able to use evidence about things we *have* observed to things we haven’t observed. While we may sometimes use deductive reasoning to help us out along the way, we wouldn’t survive long without the ability to make reasonably accurate predictions about the future (“Jumping off the building would hurt,” “Smoking causes cancer,” “I shouldn’t drink motor oil.”)

In many cases, we simply do these sorts of things without thinking. After all, even if we can’t *prove* (using deductive argumentation from self-evident premises) that Mary won’t give birth to a chicken, this is hardly a good reason for her to spend her time worrying about this. Instead, we generally, she should spend her time trying to (inductively) reason about things about which the evidence isn’t quite so clear: the birth plan, the way to arrange maternity leave, or whatever. Similarly, when my car won’t start, the best bet is to get a jump, call a mechanic, and so on.

## OK, So explain why It’s Ok to use Induction

Hume’s Problem of Induction presents an argument that we are *never* justified in using induction and thus, have no good reason to believe any of things we believe. The argument can be thought of as a sort of challenge to our common sense. It begins by Hume asking us to defend something that (should) seem obviously true to us: that the sun will come up tomorrow. Here’s a paraphrase:

1. Person: The sun will almost certainly come up tomorrow. You’d be crazy to think otherwise.
2. Hume: I’m not convinced. I can perfectly well imagine what it would be like for the sun not to come up (in fact, there are plenty of science fiction books about stuff like this). Why are you so certain that this won’t happen tomorrow?
3. Person: OK, I’ll grant you that it *could* happen, in the sense of it being imaginable. But that doesn’t mean it’s not crazy. After all, the sun been coming up for millions of years. And there’s no special reason to think anything has changed.
4. Hume: I know the sun has always come up in the past. But I want to know why you think that the sun’s behavior will be the same tomorrow as it was in the past.
5. Person (scratching head): While, in my past experience, the past has always been a good guide to predicting the future.
6. Hume: But this is just what I’m asking you to defend! I know that, in the past, the future has always resembled the past. But I want you to explain to me why I should think this will be the case in the future! I’m willing to grant that, if we had *independent* reason for believing that the future will resemble the past (or that unobserved cases will resemble observed ones), induction might make sense. The problem is that this principle is itself only supported by induction. It’s like your saying “The reason that inductive arguments are OK to use is that I can give an inductive argument that they are OK.” This is cheating.
7. Person (convinced Hume has misunderstood something…) OK, I get it. You are some sort of skeptic. I grant that’s possible I’m wrong. I just don’t think it’s very likely, based on my past experience.
8. Hume: No, you’ve misunderstood. I’m not just saying that inductive reasoning might not work (we already knew that!). I’m saying that, all things considered, there’s no absolutely reason to think the sun will come up tomorrow.
9. Person (perplexed, but sensing a possible advantage): Hmm. So, if the sun’s not going to come up tomorrow, the world’s to end, right? Would you be willing to sell me your car for $1.00?
10. Hume (smiling): Absolutely not! While I don’t think there is any satisfactory *justification* for using induction, I think it is something we humans do by habit. And I’m perfectly human, and I feel just as convinced as you do that the world won’t end tomorrow. And if it doesn’t end, I’ll still need my car!

There are a few important points to note here. First, in point (3-4), we discover that we can’t deductive *prove* that the sun is going to come up: it’s not as if the sun not coming up is like the appearance of a 4-sided triangle, or anything like that (this really would be impossible, we could deploy deductive logic to prove it). But this means we’ll have to use inductive reasoning, which sets up the rest of the argument. In point (6), Hume refers to the so-called **Principle of Induction,** which might serve to justify our use of inductive reasoning about the sun, if we could find some way of explaining why it was OK for us to believe in the principle itself. Hume’s big problem here is that the only way he can think of to defend the principle is to use inductive reasoning, which itself relies on this very same principle! An analogy: if asked why they think their holy texts are true, a religious fundamentalist might say “because the texts themselves say so!” For obvious reasons, this won’t serve to convince a skeptic.

Finally, in point (10), we see Hume’s **Skeptical Solution:** he claims that he can give a good psychological explanation of the reason humans behave and think as they do, even when they aren’t necessarily justified in doing so*.* n the years since Hume wrote, the problem he identifies has become one of immense practical importance, as statisticians, computer scientists, economists, and others have struggled to develop mathematical models that predict future events or various types. As Hume might have predicted, developing an “inductive logic” of this type has proved remarkably difficult.

## Review Questions

1. A number of studies have found that “experts” in many areas are often not nearly as good at inductive reasoning as we might expect. For example, when political pundits (of the sort on TV/radio/internet) make predictions about political events, they are only right around half the time (which is no better than a coin flip). Given this, why do you think so many people believe them? How might Hume’s “Skeptical Solution” relate to this? (A sidenote: Statisticians do somewhat better than pundits ☺).
2. Briefly explain the difference between inductive and deductive reasoning, and why science necessarily involves induction. Then, consider what it might mean to have *better* or *worse* inductive arguments in science. For example, both defenders of Darwin’s theory of evolution (or any other scientific theory) and its critics rely inductive evidence. That is, they both use arguments like generalizations, causal inferences, predictions, and so on. However, most scientists argue that the Darwin’s theory *better supported* by the evidence than any other.