

The Problem of Induction

Now we're going to, in Hume's words, raise some doubts about things that only a fool or a madman would question. But, as philosophers we will raise these doubts in the interest of intellectual curiosity...

1. Two Categories of Knowledge: The sorts of things that we claim to KNOW can be divided into two categories:

- (1) Relations of Ideas (i.e., a priori, deductive knowledge): Some things can be known merely by considering ideas in the mind and discovering the relations between them. For instance, merely by considering the definition of the term 'triangle', we can know that <triangles have 3 sides> is true. This knowledge does **not** require any experience of the world (it's **a priori**), and <triangles have 3 sides> would still be true regardless of whether or not any actual triangles existed in reality. Other examples include <2 + 2 = 4> and <All bachelors are unmarried>, which merely express relations between the concepts or ideas involved in those statements. These sorts of truths can be known with CERTAINTY; i.e., there is NO WAY that these statements could be false. To deny them would result in a contradiction. For instance, if you claimed that <Some bachelors are married> what you would really be claiming is that <Some unmarried males are married>, which contradicts itself.
- (2) Matters of Fact (i.e., a posteriori, inductive knowledge): But most of what we claim to know is not true *by definition*. For instance, imagine that you knew the DEFINITIONS of 'water' and 'fire', but had never seen either before. Without experiencing first-hand or witnessing water suffocating a person, you would not be able to know that <Water will suffocate a person> is true. Similarly, with <Fire will consume a person>, or <The Sun will rise tomorrow>. These sorts of truths can only be known by EXPERIENCE (**a posteriori**). Denying them does NOT result in a contradiction. For instance, if you claimed, <The Sun will NOT rise tomorrow>, this would not be false *by definition*, since the claim does not contradict itself. Since matters of fact are not true by definition, we cannot know them with absolute, 100% CERTAINTY.

[*Question: Are type (1) truths just the necessary truths, and type (2) the contingent truths?*]

2. How Do We Know Matters of Fact?: Relations of ideas can be known with certainty merely by understanding the concepts involved, and how those concepts can consistently be related to one another. But, how are matters of fact known?

As stated, matters of fact are known by **experience**. Typically, we have an experience of one thing, and then another, and then we **infer** that there is a connection between

them. For example, in the dark, you claim: <There is a person in this room>. Why do you think this? Perhaps you heard a voice, or your hand felt something. You then INFERRED that there is some kind of **connection** between the sound or touch and the existence of a person. But, what is this connection? Hume claims that it is one of **cause and effect**. The person CAUSED the voice or the image, and you infer their existence from these effects. (*Note that the experience needn't be direct. For instance, I might come to believe that <My friend is in Hawaii>. I come to believe this because I have an experience of a post card, and infer that my friend is the cause of it being written and sent to me.*)

3. On Cause and Effect: So, we come to know matters of fact based on experiences plus an assumed relation of cause and effect. But, then, how is that RELATION known? In other words, **How can we know that something is the cause of something else?**

Causation is known only by experience: Since effects are entirely different things than their supposed causes, effects cannot be discovered merely by examining their causes (as if effects were somehow contained within them). Cause and effect cannot be known by reason. We only learn what the effects of certain things are by EXPERIENCE. Imagine:

- You just popped into existence a moment ago. I roll one billiard ball toward another. What do you think will happen? YOU HAVE NO IDEA! Will it come to a halt? Will it travel straight THROUGH the second ball? You'll probably be quite surprised when the first ball hits the second and comes to a stop while at that same moment the second ball starts moving!

Now imagine that I pick up a billiard ball and hold it in the air and then let go. What do you think will happen? YOU HAVE NO IDEA! Your best guess is probably that it will continue to hang right there. Imagine your surprise when it immediately begins moving downward! Why not upward? Or sideways?

In other words, prior to experience, we have no reason to expect that an object will behave a certain way or produce a certain effect.

Causation is known by REPEATED experience: Seeing one billiard ball strike another once, or seeing me drop one of the balls once, does not seem to be enough to justify any knowledge of cause and effect though. For instance, imagine that you had never seen bread before. Maybe you eat a bit of it, and find that it nourishes you. You don't die, and your hunger is satiated. Now, the next time you see a brown, loaf-shaped object with a certain smell, consistency, etc.—what reason can you possibly have for thinking that THIS object will ALSO nourish you?

If the ball went downward the first time I dropped it, what reason do you have for believing that it will go downward the *second* time that I drop it? And so on...

There must be something more than a SINGLE experience, then.

Hume observes that we infer cause and effect when we observe a **constant conjunction** of things. When I am hungry and I have some bread, I do not hesitate to eat it. I do not stop to think, "Well maybe this time, this sort of object will kill me." Why? Because every time that I have seen something that looked and smelled like bread in the past, it nourished me when I ate it. Therefore, **bread + nourishment** have always been '**constantly conjoined**' together in my past experiences. So, when I see bread, I expect that it will AGAIN be conjoined with nourishment.

The Assumption: So, we start from the fact <Bread has always nourished me in the past> and conclude that <This bread will nourish me now>. But, the inference from the former to the latter requires that we make the following assumption:

The Assumption: Things that have been constantly joined together in the past will CONTINUE to be joined together in the future.

Or, put simply: **The future will conform to the past.**

Hume writes, "From causes which appear *similar*, we expect similar effects. This is the sum of all our experimental conclusions."

But, Hume says, this assumption is not obvious. It is surely not known prior to experience—for, its denial, <Things that have been joined together in the past will NOT continue to be joined together in the future>, does not result in a contradiction.

Therefore, The Assumption (itself a 'matter of fact') must be known BY EXPERIENCE. But, experience of what!? Well, in the past, whenever we observed regularities and patterns in the world, those regularities CONTINUED to occur! For instance, in the past we've noticed that bread and nourishment were constantly connected. Then, when we arrived at later times, we discovered that those two things were STILL connected. In short, every time we expect the future to conform to the past, when we get there, we discover that it DOES still conform to the past. So, The Assumption is known via constant conjunction.

But, notice that now our chain of justification is circular. For example:

1. I've observed that the Sun has risen every morning so far.
2. Patterns I've observed in the past will continue into the future.
3. Therefore, the Sun will rise again tomorrow morning.

But premise (2) is justified as follows:

1. Every time I've observed two things to be repeatedly connected, when I arrived at later times I CONTINUED to see those two things connected. (In other words, in the past, patterns I've recognized in the past have continued into the future.)
2. Patterns I've observed in the past will continue into the future.
3. Therefore, patterns I've observed in the past will continue into the future.

This argument is problematic. It reasons in a circle. Premise (ii) and the conclusion are the same! You can't support a conclusion by repeating the conclusion. That's like saying:

"I believe that you never lie. Why? Because you told me you never lie. Why did I believe you? Because I believe you never lie. Therefore, I believe you never lie."

You can't cite your belief that someone never lies as your evidence for why they never lie! That's circular. Similarly, all induction is based on the following circular reasoning:

- (a) Knowledge about matters of fact rests on knowledge about cause and effect.
- (b) Knowledge about cause and effect rests on (i) **our experience of constant conjunction**, and (ii) The assumption that **the future will conform to the past**.
- (c) The assumption (ii) that the future will conform to the past is justified by (iii) our experience of constant conjunction, and (ii) the assumption that the future will conform to the past. **XXX - Illegal Move! Game Over.** Hume writes,

"We have said that all arguments concerning existence are founded on the relation of cause and effect; that our knowledge of that relation is derived entirely from experience; and that all our experimental conclusions proceed upon the supposition that the future will be conformable to the past. To endeavor, therefore, the proof of this last supposition by probable arguments, or arguments regarding existence, must be evidently going in a circle and taking for granted that which is the very point in question. ... When a man says, *I have found, in all past instances, such sensible qualities conjoined with such secret powers*, and when he says, *Similar sensible qualities will always be conjoined with similar secret powers*, he is not guilty of a tautology, nor are these propositions in any respect the same. You say that the one proposition is an inference from the other. But you must confess that the inference is not intuitive; neither is it demonstrative. Of what nature is it, then? To say it is experimental is begging the question. For all inferences from experience suppose, as their foundation, that the future will resemble the past, and that similar powers will be conjoined with similar sensible qualities. If there be any suspicion that the course of nature may change, and that the past may be no rule for the future, all experience becomes useless and can give rise to no inference or conclusion. It is impossible, therefore, that any arguments from experience can prove this resemblance of the past to the future, since all these arguments are founded on the supposition of that resemblance." (IV.2)

Justified By Habit: So, how is The Assumption justified at all? We seem to assume that, if a thing that looks a certain way (e.g., bread) has always produced a certain effect (e.g., nourishment), then it will ALWAYS do so. But, why? There is no reason for us to think that such a connection is a necessary one. All we ever observe are single instances. With bread, for instance, I never observe the necessary connection between bread and nourishment, per se. All I ever observe is the eating of bread, and then my own nourishment. But, no matter how many times I eat bread, I never see MORE than this. The 1000th time, I still merely observe the eating and then the nourishment. The necessary connection—the causation—between the two is never observed.

Hume concludes that there is ultimately no explanation for The Assumption except **custom**, or habit. Due to the experience of constant conjunction of two things, our minds are naturally led to the conclusion that there must be some connection between those two things, with no reason that justifies this.

But, notice that this is a PSYCHOLOGICAL explanation of The Assumption, not a rational JUSTIFICATION of it.

The Problem of Induction as Undermining All of Science: This worry is a problem for scientists, who conduct all of their investigations based on induction. Induction is the inference that, through repeated observation, future observations will conform to past ones. If all 1000 of my test subjects have recovered from their illness after I administered my **vaccine**, I expect OTHER instances of this illness to be cured by this vaccine as well. If all of the light I've tested so far has **refracted** through a prism into the visible spectrum, I expect ALL light to do so. If all of the massive bodies I've studied so far attract one another (**gravity**), I expect ALL bodies to do so. If all of the paper I've observed to reach 451 degrees Fahrenheit has **combusted**, I expect ALL paper to combust at 451^o F. Etc...

This is how all scientific inquiry is conducted. But, if The Assumption that the future will conform to the past is unjustified, then all of science is ultimately unjustified—because all hypotheses in science rely on it. [*In fact, nearly ALL knowledge turns out to be unjustified (e.g., my belief that this bread will nourish me, or that this chair will support my weight, or even—if we think, as Hume did, that we only ever directly perceive the sensations inside our heads rather than the things themselves—that hearing a voice entails that there is someone nearby, etc.).*]

According to Hume, whether I've observed bread to nourish me one time, one thousand times, or one MILLION times, this never strengthens my reason for believing that it will nourish me NEXT time. This is total skepticism about all scientific inquiry.

So, how do we answer Hume? (For more, check out these videos: [part 1](#) & [part 2](#))