

## Chapter 10

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# Don't fool yourself

**H**ow do you know what you know? I have asked that question (or words to that effect) of a good many persons. Asking it about some piece of presumed knowledge a person has offered me, I have got various answers:

- I just *know*, that's all!
- (Somebody) told me so (or I heard it on the radio).
- I read it (someplace).
- I saw it in a movie (or on the TV).
- Well, it stands to reason.
- I saw it myself (or it happened to me once).
- I read a report of a study (or experiment).
- I did a study (or an experiment) on it.

I don't claim that those examples have sharp boundaries among them; I mean merely to say that the answers ranged from a vague faith (even if heartfelt) in a verbal statement to a careful personal inspection of palpable events. There are many ways to come to know something.

### KNOWING SOMETHING

And what is it to “know” something? Everybody (I think) is aware of the distinction between knowing something and knowing *about* something—more precisely, the distinction between having the direct experience of something and having ideas about it or being able to say things about it. Someone might ask, “Do you know the Fiji Islands?” and you might reply, “Well, I've read about them, but I've never been there.” With that reply, you are implying that while you have memories of what you have read *about* Fiji, there are experiences *of* which one can acquire memories only by having been there. Or someone might

ask, “Do you know how to ride a bicycle?” and you might reply, “Well, I've seen a good number of people riding bicycles, so I have a pretty good idea how to go about it.” But no matter how confident you may be of your knowledge, you might not succeed in wobbling down the street on your first try or your second or even your third. Do you know the fragrance of the frangipani flower? Well, you can be told about it, read about it, or smell it yourself.

The kind of knowing to which I give the most attention in this book is the kind that enables you to control a perception of some variable that is affected by the “thing” the knowledge is about—and to control that perception by acting on the world outside your own neural net. If you know the location of the Fiji Islands, you can control your perception of your distance from them. The “thing” your knowledge is about is your distance from Fiji. A couple of perceivable variables (among many possible) that would be perceivable aspects of that distance are (a) the distance you read or calculate from an atlas and (b) an announcement by a flight attendant of the name of the next airport you will be landing at and your translation of that information in your mind into approximate miles yet to go to Fiji. If you know the fragrance of frangipani, you can buy some of that kind, instead of lilac, if what you smell in the bottle matches your olfactory memory.

How can you know where Fiji is? If you have not been there, you can go by what someone tells you or by what you read in a book or see on a map. Those words or maps constitute instructions for getting there. Suppose you live in Chicago. The words or maps tell you, in effect, that one way you can get to Fiji is to buy a ticket that will take you first to San Francisco, then Hawaii, and then Fiji. But how do you know that the words or maps can be trusted?

On current city maps, I have found streets that do not exist and blanks where streets that do exist should have been drawn. In the end, the only way you can be sure that you can get to Fiji by going through San Francisco and Hawaii is by trying it yourself. That kind of knowledge (seeing it yourself) is what is customarily called “scientific.” Also “empirical.”

Science goes further than speculating about where Fiji might be or what it might be like or how you might get there. Science is about getting there. Science offers criteria for knowing when you have arrived at Fiji. It also offers guides for telling other people how to get there. To abide by those criteria, it is not sufficient to answer, “I just *know*, that’s all!” And though it may be interesting for many purposes, it is not scientifically sufficient to say, “My travel agent told me how.”

Sometimes people complain about the scientist’s insistence on wanting to see for himself or herself. “Nobody can always see for himself,” they say. “Most of the time, you have to take somebody’s word for it.” That’s true. You can’t get your daily work done if you are always off to Fiji or Bulgaria or the moon, checking on whether they actually are where people say they are. But if I want knowledge that *can* be verified, then I want instructions on how to verify it. If someone tells me that the moon revolves around the earth, I want the person to tell me how I might check up on that myself, even if I do not intend to do so. If the person cannot tell me how to check for myself, then I must take her assertion as merely one more speculation among others. If someone tells me that the earth is four billion years old, more or less, I want the person to tell me about the procedures through which I can reach such a figure for myself. And if someone tells me the earth is about four thousand years old, I want to know that person’s procedures, too. What the person tells me will be maximally useful if the information is in the form of the functions and organization in a model.

Insisting on verifiable assertions is the first necessity in the procedure we call science, but of course carrying out a verification can be very complex. A lot of this book is about the complexities. My point here is simply that science deals with the external, verifiable world, and therefore a scientific inquiry must begin with an empirically verifiable assertion. Still, scientific procedures are often difficult and subtle, and scientists sometimes honestly think themselves to be on the road to Fiji when they are actually head-

ing elsewhere. Once in a long while, too, a scientist fabricates data. That is sad and dangerous—though I think the proportion of scientists who do that is very much smaller than the fraction of manufacturers who pollute the water supply, and usually, I think, the perfidious scientists do less harm to public health and welfare.

The scientist’s point is that if there is no way to compare an assertion about the external world directly with that external world, then there is no way to resolve competing claims. You can appoint a referee, but that only postpones the difficulty. You can have someone tell you the Revealed Truth, but that too only postpones the difficulty; you may find yourself having to admit, after people have thrust contrary evidence upon you for some 350 years, that you should not have insisted that the sun revolves around the earth.

### TAKING A VOTE

You can take a vote. You may burst out laughing at that suggestion, but it has been made seriously many times. Petr Beckmann (1971) tells us that in 1897, a bill was introduced in the state legislature of Indiana entitled, “A Bill Introducing a New Mathematical Truth.” The bill declared the value of pi (the ratio of the circumference of a circle to its diameter) to be 9.2376. . . , which, Beckmann wrote, “probably represents the biggest overestimate of pi in the history of mathematics” (p. 174). The bill was actually passed by the Indiana House of Representatives, and was about to be voted on by the Senate when the fact came by sheer chance to the attention of a professor of mathematics at Purdue University; he “coached the senators,” Beckmann says, and the Senate voted to postpone further consideration of the bill. It may seem strange that those persons to whose hands the welfare of the state of Indiana was entrusted should believe a geometrical or physical fact to be susceptible to legislation, but I should mention that in recent years, articles have appeared in psychological journals and in journals devoted to the philosophy of science in which physical facts such as the acceleration of gravity have been claimed, if I understand the authors correctly, to be no more than conventions or matters of “social reality”—that is, an agreement among a large number of people that objects approach each other in that way.