



massimo.pigliucci@gmail.com

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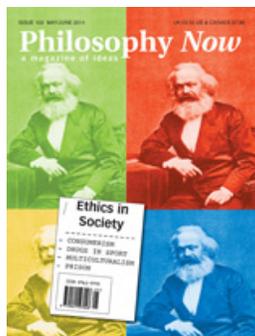
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Science

Are There 'Other' Ways of Knowing?

Our philosophical science correspondent **Massimo Pigliucci** asks.

I recently participated in a conversation at Ghent University with Dan Dennett and physicist Lawrence Krauss on the limits of science (available on YouTube at tinyurl.com/DKP-Ghent). At one point, perhaps predictably, the issue of other ways of knowing – besides the scientific one – came up. All three of us, despite the otherwise significant differences we had about science and its relationship with philosophy, quickly dismissed the notion as nonsense.

But a moment's reflection should show that *of course* there are other ways of knowing – depending on what exactly one means by 'ways' and 'knowing' (no, this isn't a Bill Clinton joke). For instance, I'm sure you know that the earth orbits around the sun and not *vice versa* (okay, technically they both rotate around a common center of gravity that's located inside the sun but not at its center; still, you get the drift). You also know that the square root of 9 is 3. Yet, what you mean by 'know' in these two instances surely isn't the same thing. The first is an empirical discovery, derived from observations of the world; the second a deductively known property of a certain way of relating the concepts '3', '9', and 'square root'. So, to a first approximation, mathematical knowledge isn't the same as empirical knowledge, and consequently mathematics is, indeed, a different way of knowing from science.

A similar point can be made if we consider logic instead of mathematics. (Yes, the two are deeply related, but it is far from clear whether one is a form of the other, or whether the two are members of a broader form of non-empirical knowledge. My bet is on the latter.) For instance, if you have taken an introductory course in logic you will know – and perhaps can even demonstrate – that *modus tollens* is a valid form of reasoning. You may also know that 'affirming the consequent' is a logical fallacy. All of this knowledge, again, has no roots in empiricism, and even less in the special kind of empirical knowledge that we call science. (In full disclosure, I should point out that both Dennett and I quickly disabused Krauss of the notion that mathematical knowledge is a kind of empirical, and thus scientific, knowledge, as he stubbornly contended.)

Things get a little vaguer when we more decidedly enter the realm of empiricism. Is all empirical knowledge *equivalent* to science, thereby justifying a more restricted interpretation of the Dennett-Krauss-Pigliucci consensus I mentioned above? What about, for instance, intuition? I don't mean the quasi-mystical sixth sense some people think they have; I mean intuition as the kind of subconscious fast processing of information that psychologists like Daniel Kahneman have studied for a long while now. That sort of intuition amounts to a storage of ready-to-use, domain specific knowledge that most of us aren't aware of having, at least much of the time. When a footballer knows the best way to impart a dangerous curve to a ball to fool the goalkeeper, or a chess master knows that a certain move will get him out of a particular pickle he got himself into, they may be able to logically explain *afterwards* why they did what they did, but doing it on the spur of the moment wasn't the result of systematic observations and experiments, or framed within the sort of theoretical thinking we expect from a scientist. It was the result of a different way of knowing, all right. There is also what I would call 'everyday empirical knowledge', like the fact that I know how to navigate the New York subway system (but not London's), simply because I live in New York and have acquired the necessary information via decidedly mundane means (maps, asking people). That knowledge really ought not to be described by the lofty adjective of 'scientific' – even though of course it is empirical knowledge, and eminently useful, if you live in or visit New York City.

And there's even more. Phenomenological experience (the infamous 'what is it like' of which some philosophers of mind are so enamored) could count as knowledge as well: I know what it is like to feel pain, or quenching thirst, or a number of other sensations, and I'm sure you do too. But this knowledge, if we really want to call it that, is not the result of scientific studies. It is a result of the basic biological machinery with which we are all equipped from birth (save for mutations or developmental defects, of course). It certainly ain't math, but it ain't science either, and yet it still is a type of generally reliable information we have about the world, which moreover is absolutely crucial to successfully navigate our way in it.

So as it turns out, a little reflection shows that there are several other ways of knowledge besides the one provided by science. None of these are in any meaningful sense 'better' or 'going beyond' science, thereby

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not yielding any comfort to the purveyors of woo. Each has its proper domain of application, and of course there are plenty of areas of overlap and interaction. Dennett, Krauss and yours truly were just a bit too quick that night in Ghent.

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Massimo Pigliucci is Professor of Philosophy at the City University of New York. He is the co-editor, with Maarten Boudry, of Philosophy of Pseudoscience: Reconsidering the Demarcation Problem (University of Chicago Press). His philosophical musings can be found at www.rationallyspeaking.org.

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