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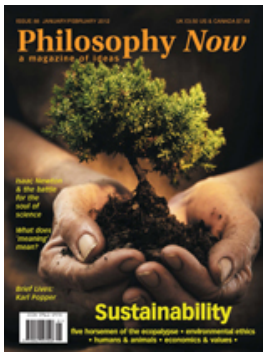

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Science

Reflective Equilibrium

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Our philosophical science correspondent **Massimo Pigliucci** finds himself deep in it.

Suppose you believe in the inerrancy of the Bible. Suppose you also think morality comes from God. Further, suppose you maintain that it is immoral to deliberately kill children. Then you read the following in *Exodus* 21:17: "He that curseth his father or his mother, shall surely be put to death." (Something similar also appears in the New Testament: "For God commanded, saying, Honour thy father and mother: and, He that curseth father or mother, let him die the death" – *Matthew* 15:4.) If you are concerned about the coherence of your beliefs, you now have several moves at your disposal. You could admit that the Bible is not infallible, and that God may not have said what *Exodus* and *Matthew* attribute to Him. Or, you coul abandon the idea that morality comes from God, and instead turn to the tricky proposition that hu beings may decide on their own even whether gods behave immorally. Lastly, you could come to a that it is alright to kill children who disrespect their elders. In considering any of these options, an adjusting your set of beliefs about morality, divinity and children's behavior, you have engaged in adjusting what philosophers call your 'reflective equilibrium'.

The concept (but not the term) was introduced by Nelson Goodman in a classic book published in 1 *Fact, Fiction, and Forecast*. Goodman was not concerned with morality, but rather with the validity reasoning, both inductive and deductive. Goodman's suggestion was that we justify our rules of inf based on how those rules fare when compared with a range of instances of what we believe are c conclusions. In other words, sometimes, if an inferential rule yields unacceptable results, we may to discard that rule, no matter how it may have seemed like a good idea beforehand.

The most famous application of the principle of reflective equilibrium (and use of the term) is four John Rawls' highly influential *A Theory of Justice* (1971). Rawls proposed to apply Goodman's 'cohe approach to adjusting our sometimes conflicting moral beliefs, just as in the case of the Bible and disrespectful children mentioned above. Whether or not one agrees with the outcome of Rawls' ana justice as fairness, the reflective equilibrium approach should be compelling to anyone seriously in in, well, reflecting on their own beliefs.

It turns out that a similar approach had already been used in the philosophy of science by Pierre D as a way to debunk the common idea that science is about the direct empirical testing of theories. book published in 1908, *La Théorie Physique*, Duhem pointed out that if there is a disagreement be theory and the empirical evidence, one cannot automatically reject the theory, because scientific t are complex statements which include many ancillary conditions and sub-theories. The existence c disagreement between theory and evidence tells us that *something* is wrong, but not what. It coul be that the core theory – say, the Copernican idea of a Sun-centered solar system – ought to be re But it could also be that some adjustment to the theory would resolve the discrepancy, for exampl Kepler modified Copernicus' theory to say that the planets go around the Sun following elliptical (o not circular, orbits. Indeed, it may even be the case that the data is wrong, because of a malfunct the instrumentation (which was one of the reasonable objections raised by critics of Galileo, since telescope was largely untested). There could also be an error in the interpretation of data.

Duhem's thesis was largely unknown in the literature until it was mentioned by W.V.O. Quine in his landmark 1953 paper, 'Two Dogmas of Empiricism'. In this paper, Quine extended Duhem's thesis, that whenever there is a discrepancy in our understanding of the world, to account for the discrepa could potentially change any of the interconnected statements that constitute that understanding. Famously, Quine held that even logic itself may have to be altered if it turned out that there were problems caused by its application. (Don't laugh: there is a whole field of 'paraconsistent logic' tha exactly that, to account for classical paradoxes like Bertrand Russell's famous problem concerning which are not members of themselves.)

The Stanford Encyclopedia of Philosophy summarizes the Duhem-Quine thesis in this fashion: "(i) s empirical statements are interconnected, they cannot be singly disconfirmed; and (ii), if we wish t particular statement true, we can always adjust another statement." The entry goes on to say that ironically, Duhem would probably agree with sub-thesis (i) but reject sub-thesis (ii). Be that as it r both theses together form yet another application of reflective equilibrium – only an equilibrium th constrained not just by our beliefs, but also by our methods (both scientific and logically-inferentia and further, by the way the world happens to be.

The idea of reflective equilibrium is one of the most powerful in philosophy, and indeed embodies quintessentially philosophical approach to problems of all kinds. The on-going adjustment of one's also applicable in everyday life, of course, and so can be used to introduce non-philosophers to wh means to think philosophically. The crucial thing to remember is that the equilibrium is not meant static: new evidence and new ideas constantly enter the system, and a wise person keeps adjustin beliefs accordingly. Try it, it's a refreshingly liberating exercise.

Massimo Pigliucci is Professor of Philosophy at the Graduate Center of the City University of New Y is the author of Nonsense on Stilts: How to Tell Science from Bunk *(University of Chicago Press, 2 His philosophical musings can be found at: www.rationallyspeaking.org*.