Hall of Mirrors
or What is True?
by Richard Dawkins

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A little learning is a dangerous thing. This has never struck me as a particularly profound or wise remark, but it comes into its own in the special case where the little learning is in philosophy (as it often is). A scientist who has the temerity to utter the t-word ('true') is likely to encounter a form of philosophical heckling which goes something like this.

There is no absolute truth. You are committing an act of personal faith when you claim that the scientific method, including mathematics and logic, is the privileged road to truth. Other cultures might believe that truth is to be found in a rabbit's entrails, or the ravings of a prophet up a pole. It is only your personal faith in science that leads you to favor your brand of truth.

That strand of half-baked philosophy goes by the name of cultural relativism. It is one aspect of the Fashionable Nonsense detected by Alan Sokal and Jean Bricmont, or the Higher Superstition of Paul Gross and Norman Levitt. The feminist version is ably exposed by Noretta Koertge, author of Professing Feminism: Cautionary Tales from the Strange World of Women's Studies:

Women's Studies students are now being taught that logic is a tool of domination. . . the standard norms and methods of scientific inquiry are sexist because they are incompatible with 'women's ways of knowing' . . . These 'subjectivist' women see the methods of logic, analysis and abstraction as 'alien territory belonging to men' and 'value intuition as a safer and more fruitful approach to truth'.

How should scientists respond to the allegation that our 'faith' in logic and scientific truth is just that – faith – not 'privileged' (favorite in-word) over alternative truths? A minimal response is that science gets results. As I put it in River Out of Eden,

Show me a cultural relativist at 30,000 feet and I'll show you a hypocrite. . . If you are flying to an international congress of anthropologists or literary critics, the reason you will probably get there – the reason you don't plummet into a ploughed field – is that a lot of Western scientifically trained engineers have got their sums right.

Science boosts its claim to truth by its spectacular ability to make matter and energy jump through hoops on command, and to predict what will happen and when.

But is it still just our Western scientific bias to be impressed by accurate prediction; impressed by the power to slingshot rockets around Jupiter to reach Saturn, or intercept and repair the Hubble telescope; impressed by logic itself? Well, let's concede the point and think sociologically, even democratically. Suppose we agree, temporarily, to treat scientific truth as just one truth among many, and lay it alongside all the rival contenders: Trobriand truth,

Kikuyu truth, Maori truth, Inuit truth, Navajo truth, Yanomamo truth, !Kung San truth, feminist truth, Islamic truth, Hindu truth: the list is endless – and thereby hangs a revealing observation.

In theory, people could switch allegiance from any one 'truth' to any other if they decide it has greater merit. On what basis might they do so? Why would one change from, say, Kikuyu truth to Navajo truth? Such merit-driven switches are rare. With one crucially important exception: switches to scientific truth, from any other member of the list. Scientific truth is the only member of the endless list which evidentially convinces converts of its superiority. People are loyal to other belief systems for one reason only: they were brought up that way, and they have never known anything better. When people are lucky enough to be offered the opportunity to vote with their feet, doctors and their kind prosper, while witch doctors decline. Even those who do not, or cannot, avail themselves of a scientific education, choose to benefit from the technology that is made possible by the scientific education of others. Admittedly, religious missionaries have successfully claimed converts in great numbers all over the underdeveloped world. But they succeed not because of the merits of their religion but because of the science-based technology for which it is pardonably, but wrongly, given credit.

Surely the Christian God must be superior to our Juju, because Christ's representatives come bearing rifles, telescopes, chainsaws, radios, almanacs that predict eclipses to the minute, and medicines that work.

So much for cultural relativism. A different type of truth-heckler prefers to drop the name of Karl Popper or (more fashionably) Thomas Kuhn:

There is no absolute truth. Your scientific truths are merely hypotheses that have so far failed to be falsified, destined to be superseded. At worst, after the next scientific revolution, today's 'truths' will seem quaint and absurd, if not actually false. The best you scientists can hope for is a series of approximations which progressively reduce errors but never eliminate them.

The Popperian heckle partly stems from the accidental fact that philosophers of science are obsessed with one piece of scientific history: the comparison between Newton's and Einstein's theories of gravitation. It is true that Newton's simple inverse square law has turned out to be an approximation, a special case of Einstein's more general formula. If this is the only piece of scientific history you know, you might indeed conclude that all apparent truths are mere approximations, fated to be superseded. There is even a quite interesting sense in which all our sensory perceptions – the 'real' things that we 'see with our own eyes', may be regarded as unfalsified 'hypotheses' about the world, vulnerable to change. This provides a good way to think about illusions, such as the Necker Cube.

The flat pattern of ink on paper is compatible with two alternative 'hypotheses' of solidity. So we see a solid cube which, after a few seconds, 'flips' to a different cube, then flips back to the first cube, and so on. Perhaps sense data only ever confirm or reject mental 'hypotheses' about what is out there.

Well, that is an interesting theory; so is the philosopher's notion that science proceeds by conjecture and refutation; and so is the analogy between the two. This line of thought – all our percepts are hypothetical models in the brain – might lead us to fear some future blurring of the distinction between reality and illusion in our descendants, whose lives will be even more dominated by computers capable of generating vivid models of their own. Without venturing into the high-tech worlds of virtual reality, we already know that our senses are easily deceived. Conjurors – professional illusionists – can persuade us, if we lack a skeptical foothold in reality, that something supernatural is going on. Indeed some notorious erstwhile conjurors make a fat living doing exactly that: a living much fatter than they ever enjoyed when they frankly admitted that they were conjurors. Scientists, alas, are not best equipped to unmask telepathists, mediums and spoonbending charlatans. This is a job which is best handed over to the professionals, and that means other conjurors. The lesson that conjurors, the honest variety and the impostors, teach us is that an uncritical faith in our own sense organs is not an infallible guide to truth.

But none of this seems to undermine our ordinary concept of what it means for something to be true. If I am in the witness box, and prosecuting counsel wags his stern finger and demands, "Is it or is it not true that you were in Chicago on the night of the murder," I should get pretty short shrift if I said,

What do you mean by true? The hypothesis that I was in Chicago has not so far been falsified, but it is only a matter of time before we see that it is a mere approximation.

Or, reverting to the first heckle, I would not expect a jury, even a Bongolese jury, to give a sympathetic hearing to my plea that,

It is only in your western scientific sense of the word 'in' that I was in Chicago. The Bongolese have a completely different concept of 'in', according to which you are only truly 'in' a place if you are an anointed elder entitled to take snuff from the dried scrotum of a goat.

It is simply true that the Sun is hotter than Earth, true that the desk on which I am writing is made of wood. These are not hypotheses awaiting falsification; not temporary approximations to an ever-elusive truth; not local truths that might be denied in another culture. They are just plain true. And the same can safely be said of most scientific truths. It is forever true that DNA is a double helix, true that if you and a chimpanzee (or an octopus or a kangaroo) trace your ancestors back far enough you will eventually hit a shared ancestor. To a pedant, these are still hypotheses which might be falsified tomorrow. But they never will be. Strictly, the truth that there were no human beings in the Jurassic era is still a conjecture, which could be refuted at any time by the discovery of a single fossil, authentically dated by a battery of radiometric methods. It could happen. Want a bet? These are just truths, even if they are nominally hypotheses on probation. They are true in exactly the same sense as the ordinary truths of everyday life; true in the same sense as it is true that you have a head, and that my desk is wooden. If scientific truth is open to philosophic doubt, it is no more so than common sense truth. Let's at least be even-handed in our philosophical heckling.

A more profound difficulty now arises for our scientific concept of truth. Science is very much not synonymous with common sense. Admittedly, that doughty scientific hero T H Huxley said:

Science is nothing but trained and organized common sense, differing from the latter only as a veteran may differ from a raw recruit: and its methods differ from those of common sense only as far as the guardsman's cut and thrust differ from the manner in which a savage wields his club.

But Huxley was talking about the methods of science, not its conclusions. As Lewis Wolpert emphasised in The Unnatural Nature of Science, the conclusions can be disturbingly counter-intuitive. Quantum theory is counter-intuitive to the point where the physicist sometimes seems to be battling insanity. We are asked to believe that a single quantum behaves like a particle in going through one hole instead of another, but simultaneously behaves like a wave in interfering with a non-existent copy of itself, if another hole is opened through which that non-existent copy could have traveled (if it had existed). It gets worse, to the point where some physicists resort to a vast number of parallel but mutually unreachable worlds, which proliferate to accommodate every alternative quantum event; while other physicists, equally desperate, suggest that quantum events are determined retrospectively by our decision to examine their consequences. Quantum theory strikes us as so weird, so defiant of common sense, that even the great physicist Richard Feynman was moved to remark, "I think I can safely say that nobody understands quantum mechanics." Yet the many predictions by which quantum theory has been tested stand up, with an accuracy so stupendous that Feynman compared it to measuring the distance between New York and Los Angeles accurately to the width of one human hair. On the basis of these stunningly successful predictions, quantum theory, or some version of it, seems to be as true as anything we know.

Modern physics teaches us that there is more to truth than meets the eye; or than meets the all too limited human mind, evolved as it was to cope with medium sized objects moving at medium speeds through medium distances in Africa. In the face of these profound and sublime mysteries, the low-grade intellectual poodling of pseudo-philosophical poseurs seems unworthy of adult attention.

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