More Baloney Detection

How to draw boundaries between science and pseudoscience, Part II

By MICHAEL SHERMER

When exploring the borderlands of science, we often face a "boundary problem" of where to draw the line between science and pseudoscience. The boundary is the line of demarcation between geographies of knowledge, the border defining countries of claims. Knowledge sets are fuzzier entities than countries, however, and their edges are blurry. It is not always clear where to draw the line. Last month I suggested five questions to ask about a claim to determine whether it is legitimate or baloney. Continuing with the baloney-detection questions, we see that in the process we are also helping to solve the boundary problem of where to place a claim.

6. Does the preponderance of evidence point to the claimant's conclusion or to a different one?

The theory of evolution, for example, is proved through a convergence of evidence from a number of independent lines of inquiry. No one fossil, no one piece of biological or paleontological evidence has "evolution" written on it; instead tens of thousands of evidentiary bits add up to a story of the evolution of life. Creationists conveniently ignore this confluence, focusing instead on trivial anomalies or currently unexplained phenomena in the history of life.

7. Is the claimant employing the accepted rules of reason and tools of research, or have these been abandoned in favor of others that lead to the desired conclusion?

A clear distinction can be made between SETI (Search for Extraterrestrial Intelligence) scientists and UFOlogists. SETI scientists begin with the null hypothesis that ETIs do not exist and that they must provide concrete evidence before making the extraordinary claim that we are not alone in the universe. UFOlogists begin with the positive hypothesis that ETIs exist and have visited us, then employ questionable research techniques to support that belief, such as hypnotic regression (revelations of abduction experiences), anecdotal reasoning (countless stories of UFO sightings), conspiratorial thinking (governmental cover-ups of alien encounters), low-quality visual evidence (blurry photographs and grainy videos), and anomalistic thinking (atmospheric anomalies and visual misperceptions by eyewitnesses).

8. Is the claimant providing an explanation for the observed phenomena or merely denying the existing explanation?

This is a classic debate strategy—criticize your opponent and never affirm what you believe to avoid criticism. It is next to impossible to get creationists to offer an explanation for life (other than "God did it"). Intelligent Design (ID) creationists have done no better, picking away at weaknesses in scientific explanations for difficult problems and offering in their stead "ID did it." This stratagem is unacceptable in science.

9. If the claimant proffers a new explanation, does it account for as many phenomena as the old explanation did?

Many HIV/AIDS skeptics argue that lifestyle causes AIDS. Yet their alternative theory does not explain nearly as much of the data as the HIV theory does. To make their argument, they must ignore the diverse evidence in support of HIV as the causal vector in AIDS while ignoring the significant correlation between the rise in AIDS among hemophiliacs shortly after HIV was inadvertently introduced into the blood supply.

10. Do the claimant's personal beliefs and biases drive the conclusions, or vice versa?

All scientists hold social, political and ideological beliefs that could potentially slant their interpretations of the data, but how do those biases and beliefs affect their research in practice? Usually during the peer-review system, such biases and beliefs are rooted out, or the paper or book is rejected.

Clearly, there are no foolproof methods of detecting baloney or drawing the boundary between science and pseudoscience. Yet there is a solution: science deals in fuzzy fractions of certainties and uncertainties, where evolution and big bang cosmology may be assigned a 0.9 probability of being true, and creationism and UFOs a 0.1 probability of being true. In between are borderland claims: we might assign superstring theory a 0.7 and cryonics a 0.2. In all cases, we remain open-minded and flexible, willing to reconsider our assessments as new evidence arises. This is, undeniably, what makes science so fleeting and frustrating to many people; it is, at the same time, what makes science the most glorious product of the human mind. SA

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