

COMMENTARY

**I Do Not Think That Word Means What You Think It Means:
A Response to Reber and Alcock's
"Searching for the Impossible: Parapsychology's Elusive Quest"**

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Abstract—This paper presents a simple, neutral, unbiased framework for assessing scientific methodologies that serves as both a positive contribution to the literature and an implicit critique of Reber and Alcock's recent paper in the *American Psychologist* (2019). This is followed by an explicit critique of some of their key claims.

How Can We Distinguish Genuine Science from Pseudoscience?

Pretend for a moment that the vast literature on science versus pseudoscience¹ never existed, and ask yourself how we might clarify this distinction. The first step, of course, would be to clarify the meaning of *pseudoscience*.

One possible meaning that we can rule out straight away is that pseudosciences make false claims about the world. They may in fact do so, but so do legitimate sciences. The history of science is the history of discarded hypotheses, so to adopt this interpretation of "pseudoscience" would amount to an assertion that every superseded theory was pseudoscientific, and furthermore prompt the suspicion that much of contemporary science will, in time, likewise be shown to be pseudoscientific.

If there is to be a meaningful distinction between science and pseudoscience, it must focus on *methods* rather than on the conclusions that result from those methods. There is of course a literature that attempts to describe and define the scientific method; it, too, is quite vast and interrelated with the literature on the demarcation problem.

Earlier generations of theorists dreamed of developing a *prescriptive* account of the scientific method. Follow this recipe, and you're doing objective, clear-eyed science. The apogee of such attempts was associated

with the so-called “Vienna Circle” in the early 20th century, with later theorists gradually retreating from the grand verificationist ambitions of the logical positivists (Oldroyd, 1989). Contemporary positive accounts of science tend to be more descriptive rather than prescriptive,² in recognition of the diversity of the sciences and the relative lack of universal methodological features (Laudan, 1983).

So far, so vague. In the absence of a precise universal recipe for conducting science, I propose that we can shed light on the distinction between science and pseudoscience by means of a possible worlds analysis applied to specific instances. Allow me to elaborate.

A “Possible Worlds” Analysis of the Demarcation Problem

Let me propose a couple of working definitions to allow this analysis to proceed.

- *In any possible world, a particular method is “scientific” if it is well suited to establishing the truth or falsehood of a particular empirical claim about that world.*
- *Conversely, in any possible world, a particular method is “pseudoscientific” if it is not well suited to establishing the truth or falsehood of a particular empirical claim about that world.*

Note the neutrality of these definitions. There is no prior judgment about the truth of any empirical matter, just a pragmatic question as to whether the proposed method could plausibly establish the truth or falsity of particular claim.

The classic example in such discussions is astrology, so let’s see how this analysis would treat it. Consider two superficially identical possible worlds, wherein the general tenets of astrology are true in one world (call it A_T) and false in the other (call it A_F) (Table 1).

As is readily apparent from Table 1, the only approach that fares well in this analysis is an objective, unbiased examination of the data. Hardly surprising, and yet it needed to be said. I leave it to the reader as an exercise to analyze other contentious domains in a similar fashion.

Before we move on, it should be acknowledged that I have made little attempt to justify this analysis, hoping that the clarity and non-dogmatic nature of this approach should require little justification. These are, after all, the professed values of both science and philosophy, and yet the contrast between the approach described here and the extant skeptical literature is stark.

TABLE 1
Possible Worlds Analysis of Astrological Methodologies

Proposed Method	Possible World	Fit for Purpose?
Broad acceptance of astrological doctrines, coupled with intuitive exploration of individual application (i.e. typical astrological practice).	A _T	May yield valid insights, depending on the efficacy of intuitive assessments.
	A _F	Prior acceptance of false doctrines hopelessly undermines subsequent intuitive assessments, which are easily confounded by confirmation bias and similar factors.
A priori rejection of astrology based on a disbelief in the possibility of celestial influences on human behavior.	A _T	Prior commitment to the falsehood of astrology curtails examination of valid phenomena.
	A _F	Rejection of false, outmoded superstitions avoids wasting time and energy that could be directed to productive pursuits.
Large-scale studies comparing standardized personality assessments with birth data.	A _T	Independent verification of astrological tenets expands our scope of knowledge and suggests entirely new avenues of research.
	A _F	Authoritative falsification of astrological superstitions confirms the irrationality of such beliefs.

Is Parapsychology Impossible?

Reber and Alcock (2019) allege that parapsychological claims are impossible, remarking:

Paranormal effects violate basic scientific principles in a host of nontrivial ways, ways that paranormalists either do not consider or, when they do, seemingly fail to grasp the magnitude of the problems. Four of the most egregious are violations of *causality, time–causality reversal, thermodynamics, and the inverse square law.*

At the outset, it is unclear whether they understand the logical meaning of impossibility, or are merely indulging in hyperbole, because “impossibility” and “violations of basic scientific principles” are two very different things. Genuine impossibility means direct contradiction, not merely something that is weird or hard to explain.

More tellingly, historically speaking, *every major paradigm shift in science was literally a violation of the basic scientific principles of the time.*

Heliocentric theory violated the basic scientific principle of geocentrism. Evolution by natural selection violated the basic scientific principle of the immutability of species. And so on.

But perhaps this is just an unfortunate turn of phrase on their part, so let us examine these claims in a little more detail, starting with the last two. Are there possible worlds with different laws of thermodynamics, or none at all? Undoubtedly. Are there possible worlds that violate the inverse square law? Certainly. For all we know, our actual world might be among these worlds. It is entirely possible that future scientists will discover violations of thermodynamics and the inverse square law, either here on Earth, or perhaps in a strange world orbiting a distant star.

Now let's turn to the first two alleged problems, the lack of a causal mechanism and time reversal/flipping of cause and effect. The lack of a causal mechanism in contemporary parapsychological theories could simply be attributed to the immaturity of our current understanding, and does not even fall within the category of violating scientific principles, let alone genuine impossibility. Moreover, time reversal/flipping of cause and effect are not just logically possible, but actively discussed in contemporary physics (for example, Brukner, 2018).

Of course, if Reber and Alcock have the courage of their convictions, we can look forward to a blistering attack on modern theoretical physics on these grounds, not to mention violations of a laundry list of "basic scientific principles," defined as principles that domains other than modern theoretical physics have in common at present. That would really be something to see!

Moreover, and somewhat astonishingly, Reber and Alcock go on to insist that parapsychological claims should not be held to the same standards as those of other sciences:

Statistician Joel Greenhouse (1991) maintained that "parapsychologists should not be held to a different standard of evidence to support their findings than other scientists" (p. 388). We dispute this proposition in the strongest of terms. When confronted with "miraculous" claims, standard procedure is precisely the opposite. Claims that contradict, dispute, or even gently call into question accepted and empirically established findings and models are, and must be, held to a higher standard.³

Findings and models⁴ are very different things, so let's treat them separately. In the first place, evidence is evidence: It is either reliable in the sense of accurately representing reality or it is not. The standards of gathering evidence have absolutely nothing to do with any associated theories or models. And different instances of evidence do not contradict each other: The experience of having seen black swans does not contradict the experience of having seen white swans.

Moreover, it is well understood by philosophers of science that theories are underdetermined by data.⁵ Logically, any finite collection of data can be explained by an indefinite number of theories. And this is no mere technicality: The evidence that supported Newton's mechanics also supported Special and General Relativity.

A Final, and Somewhat Personal, Word

I have consciously borrowed this heading from Reber and Alcock's paper to conclude on a more inclusive and conciliatory note. We live in strange times, in which the concept of truth itself has come under attack in the political sphere, and the open, unbiased discussion of some sciences has become all but impossible thanks to the propaganda and political lobbying of certain business and religious groups.

It is tempting in such trying circumstances to retreat into tribalism, to perceive unfamiliar voices as threats, to close our minds to different perspectives and new ideas. But this is not how science and society can progress and evolve.

I like to think that the neutral, possible worlds–driven approach that I outlined earlier in this paper may, with suitable adaptations, be of value not just in addressing alleged instances of pseudoscience, but any set of rival claims. Through adopting a neutral framework for assessing and resolving rival claims, open dialogue becomes possible, with mutual understanding following in its wake.

Notes

- ¹ Frequently referred to as the “demarcation problem”. My purpose in putting aside this literature is to avoid being drawn into familiar frameworks and disputes, and to undertake this discussion with as few encumbrances as possible.
- ² See, for example: <https://undsci.berkeley.edu/article/scienceflowchart>
- ³ In other words, Reber and Alcock would have us believe that extraordinary claims require extraordinary evidence. For a commentary on this notion, see Deming, D. (2016). Do Extraordinary Claims Require Extraordinary Evidence?, *Philosophia*, 44, 1319–1331.
- ⁴ I prefer the language of “evidence and theories” to connect more directly with the philosophical literature.
- ⁵ The *Stanford Encyclopedia of Philosophy*, as usual, provides a capable overview: <https://plato.stanford.edu/entries/scientific-underdetermination/>

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