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Author
Feldman, Jerome A

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REVIEW

Language, Stapp, and the Mind/Body/World Problem

Jerome A. Feldman[1]

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Abstract
Sweeney's lament here was that words could not express the full complexity of his feelings and thoughts. The contested usage of technical terms is also endemic in discussions of two of the most profound scientific mysteries: the mind/body problem and the ultimate nature of physical reality. There are still scientific communities that deny the existence/importance of these (and any) scientific mysteries; this will be discussed below. Henry Stapp's research is exceptional in contemporary science in trying to encompass and combine both mysteries.

Keywords "Mind body mystery" · Language · Stapp · "Scientific realism"

> "But I've gotta use words when I talk to you." Sweeney in T.S. Eliot's Sweeney Agonistes.

Historically, Democritus built a theory of perception explicitly based on his idea of atomic structure:

> *Democritus*' theory of *perception* depends on the claim that eidôla or images, thin layers of atoms, are constantly sloughed off from the surfaces of macroscopic bodies and carried through the air … It is the impact of these on our sense organs that enables us to perceive. (https://plato.stanford.edu/entries/democritus/)

This is probably the first enunciation of the *mind/brain/world problem* that examines the relations between the physical world, our bodies (and brains), and the human mind of first-person subjective experience. From a contemporary view, human bodies and minds evolved to be adaptive in the physical and social world, so the two mysteries are entangled.

✉ Jerome A. Feldman
feldman@icsi.berkeley.edu

[1] ICSI and University of California Berkeley, Berkeley, CA, USA

It is fair to say that neither Henry Stapp nor anyone else has solved either problem. His work has been extensively discussed (https://en.wikipedia.org/wiki/Henry_Stapp) and is further reviewed in other articles in this Festschrift. What might not be obvious is that exciting developments in many fields have actually deepened both mysteries and any possible interaction between them. Many suggested possibilities, including the orthodox Copenhagen QM interpretation (partially used by Stapp), have been seriously challenged. Even fairly recently, it was feasible to suggest that unknown circuits in the brain could embody solutions to the ancient mind/body problems. However, the ongoing explosion of knowledge of brain structure and function precludes any reductionist explanation based on current neuroscience or any proposed alternative (Parker and Newsome 1998; Feldman 2016).

The mysteries of the mind and of reality each have large communities actively engaged in theory, experiment, and discussion. There are some efforts to cross-pollinate or combine these efforts, but nothing deep has resulted. The core questions of the mind/body problem are never addressed in the foundations of QM literature. A recent example is the wonderful Adam Becker book "What is Real?" (Becker 2018); the index of the book contains no entry for brain, experience, mind, observer, qualia, etc. The terms consciousness and observable do appear, but only as disembodied aspects of physical theory. Similarly, any invocation of "quantum" in the mind/body literature is just a general claim that the extra computational power of QM could (somehow) provide a basis for

the richness of mind. None of the core questions concerning physical reality are addressed. An informative exception is Henry Stapp's discussion of the binding problem (Feldman 2013), where visual features computed in distant brain regions mysteriously give rise to a unified perception. From his dualist stance, Stapp is able to postulate a *mental* solution to the binding problem without concern for a specific neural substrate (Stapp 2011).

Language and Mystery

It is certainly possible that advances on one of the core mysteries (the mind and physical reality) would shed light on the other one and perhaps additional deep questions. However, this article will focus on more general considerations about how science can deal with phenomena that are currently *mysterious*. Language and the definition and use of concepts and words have a central role to play in all scientific discourse, but especially in the exploration of the unknown. A more extensive discussion of the importance of language for the scientific study of mysteries can be found in (Feldman 2018).

A major linguistic source of confusion is the dichotomy *monism/dualism*. This can lead to the assertion that either our current scientific knowledge is adequate or we must invoke some non-material ontological forces. The following quote from the distinguished clinician and neuroscientist Michal Gazzaniga (Gazzaniga 2018) is typical:

> Instead of an immaterial mind floating around with each of us, modern science has moved the mind into the brain and made it very physical. (Gazzaniga 2018)

This is a symptom of a forced choice between monism and an immaterial dualism.

Science does not work that way; major scientific advances come from novel concepts that are directly connected to existing scientific ideas and experiments. The first step is to clarify the scientific enterprise, which inherently involves *scientific realism*. As is often the case, Rebecca Goldstein puts it best, in her contribution to the book: What Scientific Term or Concept Ought to be More Widely Known? (Goldstein 2017).

Scientific realism is the view that science expands upon—and sometimes radically confutes—the view of the world that we gain by means of our sense organs. Scientific theories, according to this view, extend our grasp of reality beyond what we can see and touch, pulling the curtain of our corporeal limitations aside to reveal the existence of whole orders of unobserved and perhaps unobservable things, hypothesized in order to explain observations and having their reference fixed by the laws governing their behavior. In order for theories to be true (or at any rate, approximations of the truth) these things must actually exist. Scientific theories are ontologically committed.

Scientific realism is not a claim of the *reality* of atoms, etc., but a methodological move to support experiment on postulated entities that are not currently accessible. Of course, scientific realism, like all of science, is approximate and subject to revision. This entails the fact that hypothesized concepts will sometimes be revealed as mistakes. Famous cases include the ether, phlogiston, and vitalism. The contrasting view is usually called *instrumentalism*, the position that science should not postulate unobservable entities and restrict itself to defining formalisms with explanatory and predictive power. This is also known as "shut up and calculate" and is the dominant ethos in physics and increasingly in other fields as part of the "big data" movement.

We can define a *scientific mystery* as a phenomenon for which there is no plausible explanation. A related source of mystery is an *inconsistency* between two or more conflicting theories of the same phenomena. Much of the historical success of science can be traced to concerted effort on mysteries. Einstein believed a rather stronger statement.

> The most beautiful and profound experience is the feeling of mystery. It underlies religion as well as all deeper aspirations in art and science. (Einstein)

It seems obvious that any effort on a scientific mystery presupposes a commitment to scientific realism. One needs to postulate unobservable entities in order to help explain the mysterious phenomena. This simple linguistic observation goes far to clear up many (but not all) debates about both mind and physical realism. Another linguistic problem arises from the ubiquitous human tendency to extend (by analogy, metaphor, etc.) the meaning of words (Feldman 2005). Any attempt to define a technical meaning for a word like "reality" or "consciousness" encounters semantic drift. This is the original sin of academic philosophy. Scientific realism suggests great care in choosing which unobservables to postulate and how to name them.

A related problem is how to describe a general scientific attitude when dealing with scientific mysteries—materialism, etc., will certainly not do. We have seen that a required choice between dualism and a forced monism choice of mind or matter is also problematic. Henry Stapp has pursued the path of explicit dualism, with limited success. There is a standard philosophical stance named mysterianism (https://en.

wikipedia.org/wiki/New_mysterianism), but this is usually taken to suggest eternal mysteries. Given the great historical success of scientific inquiry, we should assume that some, but not necessarily all, of the current scientific mysteries can and will be explained in this century. The stance that best summarizes these constraints is *agnostic mysterianism* (Feldman 2016; McGinn 2018).

Science as Demystification

One can view a core mission of science as attempting to explain the mysteries of nature. The history of science is largely a saga of increasingly sound theories of the mental, physical, and social world. There is broad agreement that the nature of the mind and of physical reality are two of the deepest current mysteries, and one might hope that science will help demystify either or both.

In fact, several ancient mysteries of the mind have been largely reduced to routine science within our lifetime. One interesting case is *synesthesia,* a perceptual experience in which stimuli presented through one modality spontaneously evoke sensations in an unrelated modality. The most common form, seeing/hearing numbers or letters as having specific colors, was well known to the Greeks. Many eminent scientists studied this phenomenon including Goethe, Locke, and Newton.

Synesthesia was considered a deep mystery well into the twentieth century, and its demystification is not well known, even today. Ongoing research from several perspectives now forms the basis for a mature scientific discipline with a literature (Ward 2013), professional societies, conferences (Simner and Hubbard 2013), etc. One research branch started from the observation of family correlations of specific kinds of synesthesia and has evolved into a rich genome-based effort. An originally separate thread suggested a universal "neonatal synesthesia" that is usually pruned away through natural development. Brain imaging (mostly fMRI) confirms appropriate synesthetic activity in, e.g., color sensitive, brain regions of synesthetes. Current work also includes studies of correlations between synesthesia and clinical conditions like autism and schizophrenia.

Conclusion

So far, this article has focused on issues involved in the pursuit of scientific mysteries, but *avoidance* is at least as common. In physics, this avoidance often manifests as instrumentalism, as discussed earlier. The mind/body problem is much older and strikes much closer to our personal sense of self. Many reductionist materialists (not only physicists) manage to totally ignore the mind, first-person subjective experience, and the other aspects of consciousness and claim that QM explains everything (Carroll 2016).

In recent years, this faith-based reductionism has become a mantra that defines seriousness in the cognitive and brain sciences as "the mind is what the brain does"—no details suggested. There is also a renewed interest in exploiting QM as a key to understanding the mind. One recent book (Gazzaniga 2018) follows Howard Pattee (Pattee 1982) in assuming that the cut between quantum and classical reality is exactly between living and non-living and that enzymes act on both sides of the cut. A second new book (Georgiev 2017) is a much more technical presentation with postulated QM axioms of mind and many detailed calculations and examples. It also bottoms out in a form of panpsychism.

This brings me to a story of my favorite interaction with Henry Stapp. After decades trying to build neural models of subjective visual experience, I concluded that standard theories of neural computation were *inconsistent* with some famous mental mysteries, especially the binding problem (Feldman 2013) and the experience of a rich stable visual world (Feldman 1985). A proof of this inconsistency was published as "Mysteries of Visual Experience" (Feldman 2016). That article starts with an experiential demonstration of stable world "illusion". It then proves that the basic facts about the structure and behavior of the visual system according to the standard neural theory of computation (Parker and Newsome 1998) are *inconsistent* with the experience. It also shows that no known alternative theory of brain computation can explain such mysteries. Finally, it points out that such inconsistencies have often led to major advances in physics, notably quantum mechanics.

The agnostic mysterianism formulation neither postulates nor precludes Stapp's ontologically distinct "idea-like aspects of nature." It does suggest that any proposed mind-brain theory must confront the classical mind/body mysteries.

The response to these results has ranged from denial, to avoidance, to "true, but not useful to my career"—except for Edward Frenkel (www.edwardfrenkel.com/) and Henry Stapp. When I presented these results in a UC Berkeley seminar, Henry came up afterwards and expressed approval and interest in the result, but that was not what impressed me the most. He also suggested that perhaps we could work on combining our ideas. My response was my usual one—we need to start with how your theories would deal with the standard mysteries discussed in my talk. His answer was remarkably honest and humble—"Oh, my

theories can't do that." Clearly, Henry is a gentleman of the old school of serious scientists and it is a privilege to know him.

Compliance with Ethical Standards

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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