

*Philosophical foundations of neuroscience.*

The problem at issue here is the nature of connection between the features of the experiments described in psychological/mentalistic terms and the features described in spacio-temporally-based physical terms. This question is an aspect of the long-standing problem of the relationship between mind and matter, which has a history dating back to the time of the ancient Greeks. The issue was rekindled by the rise of Newtonian physics during the seventeenth century, and it generated a huge body of speculation and argumentation during the second half of the twentieth century.

It is neither appropriate nor feasible try to review or explain here the complexities of contemporary philosophical opinions on this question, except to say that the reigning view is “materialism,” and that: (1), there is no agreement among its proponents as to how to make rational good sense of this doctrine (Horgan, 1994); and (2), the doctrine, and its supporters, seem, nevertheless, to have strongly influenced the thinking of many neuroscientists.

The central thesis of materialism is that:

“The human body is a causally complete physico-chemical system: although the body is highly susceptible to external causal influences, all physical events in the body, and all bodily movements are fully explainable in physico-chemical terms.” (Horgan, 1994:472)

This thesis is, from a contemporary physics point of view, very obscure: What does “causally complete physico-chemical system” mean? It seems to be referring back to the seventeenth/nineteenth century classical-physics conception of nature, which is now known to fundamentally false. If the doctrine does indeed assume a classical-physics-type

of conception of nature, then every bodily movement would indeed be in principle fully explainable in physico-chemical terms. But no reference to mental states or events occurs in classical physics. Hence one is faced with a question that the proponents of materialism have debated at length: how does one inject causally efficacious mind into this causally complete physical description of nature that make no mention of mind.

The ingenuity of philosophers has provided many possible answers, but every proposal seems flawed to other philosophers, and debate continues.

In addition to the problem of trying to attach causally efficacious mind onto a causally complete mindless theory, there is a still more basic problem: classical physical theory is known to be fundamentally false, and in principle inapplicable to systems, such as brains, that depend sensitively upon, for example, the motions of ions. And there is also the problem that the physico-classical aspect of contemporary physical theory, by itself, does not yield any predictions about empirically accessible data. To obtain even statistical predictions in quantum theory one needs to bring in “The Observer,” who is described, fundamentally, in psychological/mentalistic terms. And this “Observer” plays a *participatory role* in the quantum formulation: he is not the purely passive observer of classical physics. He enters into the dynamics in a causally efficacious way.

In view of these profound, and apparently profoundly relevant, deviations of contemporary physics from what is essentially the seventeenth century materialist creation of Isaac Newton, it is strange that twenty-first century neuroscientists should

adhere so unwaveringly to that seemingly inappropriate and ill-defined doctrine based on a now-known-to-be-fundamentally-false physical theory.

What orthodox quantum theory affirms, and materialism appears to deny, is that psychologically described realities enter *fundamentally* into the scientific description of phenomena, and have, *per se*, causal effects that are *not explained* solely in terms of the physical laws that are the generalization of the physical laws of classical physical theory. These causal effects are, however, explained by using other laws of quantum physics, which have no analog in classical physics.

The big problem with materialism as a basis for neuroscience is that it elevates to primary status, by fiat, the (actually nonexistent) physical entities of classical physics, and relegates to secondary status the experiential realities that are the primary variables of pragmatic empirical science. Classical physics does not explain how functional properties come to be connected to experiential realities, and hence fails to explain the causal efficacy of our thoughts. The power of our thought to influence bodily action seems, therefore, from the standpoint of classical physics, to be some sort of illusion, or at least unexplained mystery. Quantum theory, on the other hand, displays the mechanism of conscious control, and hence dispels the mystery. The details are given in a later section.

[Horgan, Terence E. (1994). Physicalism. In Samuel Guttenplan (Ed.) *A companion to the philosophy of mind* (471-479). Oxford: Blackwell.]