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Current neuropsychological understanding of consciousness as influenced by antecedent arguments in the philosophy of mind

Jeff Kerr

The purpose of this paper is to describe antecedent influences of philosophy on modern neuropsychological conceptions of consciousness. I will first describe a brief philosophical history of consciousness in the form of several famous arguments, which underlie modern understanding of the phenomenon. As a result, I will illustrate how modern neuroscientific theories of consciousness are very much a melody of multi-disciplinary historical ideas, which play notable roles in directing neuroscience investigation.

The very early theories of consciousness were almost exclusively philosophical in nature. The most explicit of these early philosophies are those that viewed the mind from a dualistic perspective, which considered mind and body as separate entities that were not necessarily physically connected. The most famous of these philosophies is found within Descartes' 2nd meditation written in the 15th century, entitled "Cartesian Dualism" (1). Specifically, his argument stated that the only aspect of humanness one can be certain of is that of his or her own mind. In essence, because I know that I think (I can hear my consciousness), this is the only aspect of myself I can be certain exists. As a result, I cannot be so certain about the existence of my body. Thus, they must be fundamentally different in some way (1). Later, he elaborates on this premise, stating that the mind exists in some nonphysical realm, outside of reality, due to the private nature of our thoughts. The body, however, exists in physical space, because my material essence is necessarily public (1).

It was not until the early 20th century until philosophers began conceiving of mental properties as physical events with respect to fundamental laws of physics. Philosophers David Armstrong and W.T. Stace directed the philosophy of mind towards this goal. Both are considered naturalists; a school of thought which claims that "nonphysical events" (those supposedly incapable of being explained by epistemological methods) have no place in scientific investigation (4). In the 1950's, Stace and Armstrong proposed the mind-brain identity theory, proposing that mental properties are identical to physical properties. For example, mental events such as pain must have some corresponding physical cause, such as neural activity or cell physiology (2). Therefore, for every mental state, there is a physical state of the brain. Moreover, rather than pain causing neurons to fire or neurons causing the sensation of pain, pain is both those neurons and the sensation responsible for pain. To exemplify this, tissue damage occurs (input), causing "pain neurons" to fire, which subsequently causes the physical expression of pain, like crying (output). Because functionalists view mental processing as result of qualitative cause-and-effect, with mental states defined by their respective causal role, many philosophers and computer scientists view this processing analogous to the methods of computers (1). With series and series of algorithms resembling complex neural networks, this led to debate over the possibility of artificial intelligence.

As a whole, each of these philosophies discussed above can be interpreted in terms of modern problems in neuroscience. Even the dualist perspective of Descartes

can be used to analyze the qualitative effects of phantom limb. For example, phantom limb pain is experienced at a location that does not exist (where the limb used to be) (2). In effect, it is convenient to assume that such pain exists in some nonphysical space. Of course, the dualistic perspective is widely dismissed in the scientific community due to its emphasis on nonphysical entities, and advances in modern neurobiology. Nevertheless, functions of consciousness can be defined psychologically as well, in which researchers search for the neurophysiological functions that define them (5). However, the capabilities of modern neuroscience has also allowed for the analysis of consciousness in reverse fashion – the ability to stimulate neurons in a variety of ways to analyze their behavioral result.

Nevertheless, currently, there still exists great philosophical debate over how to describe consciousness in both the scientific and philosophical realm. However, philosophers are beginning to incorporate neuroscientific advances into the formation of philosophies of science and mind. For instance, the modern theory of emergence explains that higher level functioning must be a result of the processes of its makeup. In other words, consciousness is a “higher level” or systemic brain function that only emerges through the complex interaction of “lower level” parts, like neurons, atoms and molecules (5). In effect, consciousness *emerges* from these lower level processes, which, themselves, do not possess consciousness. Under this perspective, thought formation should be able to be studied both from a bottom-up and top-down analysis.

Furthermore, only recently has science considered consciousness as suitable for scientific investigation. Due to its subjective nature and first-person “ontology”, it has been difficult to designate it as a function analogous to digestion or metabolism (6). To consider the investigation of consciousness via scientific methods, we must allow that consciousness to be defined by brain functioning, and is, in a sense, an “organ of the brain” (3). Moreover, consciousness can be defined as, at a minimum, the awareness of certain sensory processes, motor initiation and control, control over some physiological states, and cognition (7). One of the most important developments in explaining consciousness are split-brain studies, in which the corpus callosum, the structure separating the left and right hemispheres, was lesioned as a treatment for epilepsy. This effectively separated the communication between hemispheres, revealing startling results. The effects of these studies revealed the presence of “double consciousnesses”, with the right hemisphere possessing a different consciousness than the left (3). Moreover, different hemispheres seemed to contribute different aspects to consciousness; the non-dominant hemisphere dealt more with synthesizing information and controlling appropriate social behavior whereas the dominant hemisphere controlled discrimination and general awareness (3).

Furthermore, possibly the most famous of split-brain studies was conducted by H.W. Sperry in 1961. He concluded that each hemisphere seemed to behave independently of one another, with each possessing its own perceptions, learning, and memory experiences (8,9). For instance, a split-brain patient may be going about their daily business when their left hand spontaneously rises to pick an article of clothing from the closet while attention was focused on an unrelated piece of clothing. This suggests that a full awareness or consciousness is necessitated by the interconnection of hemispheres. In other words, when a patient’s corpus callosum is severed, the two hemispheres communicate imperfectly, resulting in an imperfect consciousness (6).

Moreover, the integration of innumerable neural pathways in consciousness is analogous to the visual system. For instance, in vision, anatomically different neurons are responsible for different functions, such as angle, color, length, etc. Each of these is integrated through a systematic network to produce perceptual experience (6)

In effect, the field of philosophy has for centuries attempted to tackle the issue of consciousness, due to its puzzling nature and first-person subjectivity. However, problems arose when trying to describe it through the use of scientific methodologies. Because conscious states only exist when they are personally experienced, it is awfully difficult to investigate its processes in an objective manner. However, as philosophical accounts of consciousness progressed in time, they began to incorporate and remain open to neuroscientific explanation, like modeling neural networks through supercomputers and neuropsychological explanations of split-brain studies. As a result, modern neuroscience appears ready to tackle consciousness as a biological occurrence, with a make-up of electrical, cellular, and physical processes. Yet the lens through which we view consciousness, theoretically, as an entity, has been crafted by centuries of philosophical debate. In effect, despite advances in neuroscientific instrumentation, like fMRI imaging that popularly will “read your thoughts”, scientists and philosophers alike have not quite settled on an explanation of consciousness. Only until this is settled, that we may realize the biological basis, psychological function, and evolutionary importance of consciousness itself.

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