

CHAPTER 1 **Consciousness** by WILLIAM P. BANKS AND ILYA FARBER

Consciousness is an inclusive term for a number of central aspects of our personal existence. It is the arena of selfknowledge, the ground of our individual perspective, the realm of our private thoughts and emotions. It could be argued that these aspects of mental life are more direct and immediate than any perception of the physical world; indeed, according to Descartes, the fact of our own thinking is the only empirical thing we know with mathematical certainty. Nevertheless, the study of consciousness within science has proven both challenging and controversial, so much so that some have doubted the appropriateness of addressing it within the tradition of scientific psychology.

In recent years, however, new methods and technologies have yielded striking insights into the nature of consciousness. Neuroscience in particular has begun to reveal detailed connections between brain events, subjective experiences, and cognitive processes. The effect of these advances has been to give consciousness a central role both in integrating the diverse areas of psychology and in relating them to developments in neuroscience. In this chapter we survey what has been discovered about consciousness; but because of the unique challenges that the subject poses, we also devote a fair amount of discussion to methodological and theoretical issues and consider the ways in which prescientific models of consciousness exert a lingering (and potentially harmful) influence.

Two features of consciousness pose special methodological challenges for scientific investigation. First, and best known, is its inaccessibility. A conscious experience is directly accessible only to the one person who has it, and even for that person it is often not possible to express precisely and reliably what has been experienced. As an alternative, psychology has developed indirect measures (such as physiological measurements and reaction time) that permit reliable and quantitative measurement, but at the cost of raising new methodological questions about the relationship between these measures and consciousness itself.

The second challenging feature is that the single word *consciousness* is used to refer to a broad range of related but distinct phenomena (Farber & Churchland, 1995). *Consciousness* can mean not being knocked out or asleep; it can mean awareness of a particular stimulus, as opposed to unawareness or implicit processing; it can mean the basic functional state that is modulated by drugs, depression, schizophrenia, or REM sleep. It is the higher order self-awareness that some species have and others lack; it is the understanding of one's own motivations that is gained only after careful reflection; it is the inner voice that expresses some small fraction of what is actually going on below the surface of the mind. On one very old interpretation, it is a transcendent form of unmediated presence in the world; on another, perhaps just as old, it is the inner stage on which ideas and images present themselves in quick succession.

Where scientists are not careful to focus their inquiry or to be explicit about what aspect of consciousness they are studying, this diversity can lead to confusion and talking at cross-purposes. On the other hand, careful decomposition of the concept can point the way to a variety of solutions to the *first* problem, the problem of access. As it has turned out, the philosophical problems of remoteness and subjectivity need not always intrude in the study of more specific *forms* of consciousness such as those just mentioned; some of the more prosaic senses of consciousness have turned out to be quite amenable to scientific analysis. Indeed, a few of these—such as “awareness of stimuli” and “ability to remember and report experiences”—have become quite central to the domain of psychology and must now by any measure be considered well studied.

In what follows we provide a brief history of the early development of scientific approaches to consciousness, followed by more in-depth examinations of the two major strands in twentieth century research: the cognitive and the neuroscientific. In this latter area especially, the pace of progress has accelerated quite rapidly in the last decade; though no single model has yet won broad acceptance, it has become possible for theorists to advance hypotheses with a degree of empirical support and fine-grained explanatory power that was undreamed-of 20 years ago. In the concluding section we offer some thoughts about the relationship between scientific progress and everyday understanding.

BRIEF HISTORY OF THE STUDY OF CONSCIOUSNESS

Ebbinghaus (1908, p. 3) remarked that psychology has a long past and a short history. The same could be said for the study of consciousness, except that the past is even longer and the scientific history even shorter. The concept that the soul is the organ of experience, and hence of consciousness, is ancient. This is a fundamental idea in the Platonic dialogues, as well as the Upanishads, written about 600 years before Plato wrote and a record of thinking that was already ancient.

We could look at the soul as part of a prescientific explanation of mental events and their place in nature. In the mystical traditions the soul is conceived as a substance different from the body that inhabits the body, survives its death (typically by traveling to a supernatural realm), and is the seat of thought, sensation, awareness, and usually the personal self. This doctrine is also central to Christian belief, and for this reason it has had enormous influence on Western philosophical accounts of mind and consciousness. The doctrine of soul or mind as an immaterial substance separate from body is not universal. Aristotle considered but did not accept the idea that the soul might leave the body and reenter it (*De Anima*, 406; see Aristotle, 1991). His theory of the different aspects of *soul* is rooted in the functioning of the biological organism. The pre-Socratic philosophers for the most part had a materialistic theory of soul, as did Lucretius and the later materialists, and the conception of an immaterial soul is foreign to the Confucian tradition. The alternative prescientific conceptions of consciousness suggest that many problems of consciousness we are facing today are not inevitable consequences of a scientific investigation of awareness. Rather, they may result from the specific assumption that mind and matter are entirely different substances.

The mind-body problem is the legendary and most basic problem posed by consciousness. The question asks how subjective experience can be created by matter, or in more modern terms, by the interaction of neurons in a brain. Descartes (1596–1650; see Descartes, 1951) provided an answer to this question, and his answer formed the modern debate. Descartes's famous solution to the problem is that body and soul are two different substances. Of course, this solution is a version of the religious doctrine that soul is immaterial and has properties entirely different from those of matter. This position is termed *dualism*, and it assumes that consciousness does not arise from matter at all. The question then becomes not how matter gives rise to mind, because these are two entirely different kinds of substance, but how the two different substances can interact. If dualism is correct, a scientific program to understand how consciousness arises from neural processes is clearly a lost cause, and indeed any attempt to reconcile physics with experience is doomed. Even if consciousness is not thought to be an aspect of "soul-stuff," its concept has inherited properties from soul-substance that are not compatible with our concepts of physical causality. These include free will, intentionality, and subjective experience. Further, any theorist who seeks to understand how mind and body "interact" is implicitly assuming dualism. To those who seek a unified view of nature, consciousness under these conceptions creates insoluble problems. The philosopher Schopenhauer called the mind-body problem the "worldknot" because of the seeming impossibility of reconciling the facts of mental life with deterministic physical causality. Writing for a modern audience, Chalmers (1996) termed the problem of explaining subjective experience with physical science the "hard problem."

Gustav Fechner, a physicist and philosopher, attempted to establish (under the assumption of dualism) the relationship between mind and body by measuring mathematical relations between physical magnitudes and subjective experiences of magnitudes. While no one would assert that he solved the mind-body problem, the methodologies he devised to measure sensation helped to establish the science of psychophysics.

The tradition of structuralism in the nineteenth century, in the hands of Wundt and Titchener and many others (see Boring, 1942), led to very productive research programs. The structuralist research program could be characterized as an attempt to devise laws for the psychological world that have the power and generality of physical laws, clearly a dualistic project. Nevertheless, many of the "laws" and effects they discovered are still of interest to researchers.

The publication of John Watson's (1925; see also Watson, 1913, 1994) book *Behaviorism* marked the end of structuralism. Methodological and theoretical concerns about the current approaches to psychology had been brewing, but Watson's critique, essentially a manifesto, was thoroughgoing and seemingly definitive. For some 40 years afterward, it was commonly accepted that psychological research should study only publicly available measures such as accuracy, heart rate, and response time; that subjective or introspective reports were valueless as sources of data; and that consciousness itself could not be studied. Watson's arguments were consistent with views