Foreword

Consciousness and Cautiousness

There was a time, not so long ago, when the word "consciousness" was not welcome in scientific papers. This attitude, often based on a laudable sense of cautiousness but sometimes bordering on 'taboo', was nicely captured by George Miller:

> "consciousness is a word worn smooth by a million tongues.... Maybe we should ban the word for a decade or two until we can develop more precise terms for the several uses which "consciousness" now obscures." (in *Psychology*, *The Science of Mental Life*, 1962).

Fortunately, neither Miller himself nor many other great scientists including Michael Posner, Larry Weiskrantz, Tim Shallice, or Dan Schacter heeded this advice. In the 1970s and 1980s, consciousness research saw a slow but persistent progress, owing to the development of many paradigms as diverse as the split-brain, neglect and blindsight conditions, sleep and anesthesia, the implicit–explicit dissociation, the attention-orienting "Posner task", or subliminal priming experiments. A steady flow of papers on consciousness kept irrigating the field, but the C word itself was rarely used — only the attentive reader could see that quite a lot of the research bore directly on problems related to consciousness.

Not until the late 1980s did we see an explosion of work directly aimed at exploring the nature of consciousness. I will not attempt to identify all of the causes for this major change, as this is a task for historians of science. In my opinion, however, the movement started under the impulse of highly visible publications by several neuroscientists and psychologists. Jean-Pierre Changeux's *Neuronal Man* (1983), Gerald Edelman's *Remembered Present* (1989), Bernard Baars's *Cognitive Theory of Consciousness* (1989), and Crick and Koch's *Towards a Neurobiological Theory of Consciousness* (1990) all paved the way toward the present state of affairs. Consciousness has now become an amazingly dynamical and almost dizzying field of research, ripe with many interesting discoveries, and a constant buzzing, blooming confusion of articles and books at the rate of hundreds per year.

This situation is justified, to some extent, by the breadth of the scientific database that suddenly appears as relevant to consciousness research. Contributions in the field exhibit an extreme diversity that cuts across the traditional boundaries of scientific disciplines. Whoever aims at understanding this domain must be ready to jump from philosophy of mind to studies of coma, from minute psychological designs in artificial sequence learning to mathematical definitions of information integration, from anatomical studies of anterior cingulate to the complex methods of primate electrophysiology.

It is in this context that the present volume may be particularly valuable. The distinguished panel of philosophers, modelers, psychologists, physicians, and neuroscientists assembled here provides an accessible, yet in-depth perspective on many of those fields of research. Rarely has such a diversity of points of view been made available in a single volume. Browsing through them provides an exciting window into the forefront of consciousness research, as well as the associated philosophical, ethical, and clinical issues.

Yet has the pendulum swung too far? Shouldn't we be a little bit more cautious in our broad use of the word "consciousness"? Many scientists — who also tend to be referees — still think that we would be better off using only the technical terms of our trade (implicit/explicit, overt/covert, awake/asleep,

masked/unmasked), and that appealing to the over-encompassing concept of consciousness does not add much. In many circles, it is still considered as the wisest and most cautious approach to carefully avoid any mention of the term "consciousness". In the field of subliminal priming, for instance, it remains customary to read papers in which awareness of the primes was not even measured.

I personally believe that black-outing consciousness is a major error. If some of our theories are even partly correct, the absence or presence of consciousness corresponds to a major change in the activity of the nervous system (Dehaene and Changeux, 2004; Dehaene and Naccache, 2001). Indeed, radical metabolic changes occur in a highly distributed thalamo-cortical system when normal subjects or comatose patients fall in and out of awareness (Laureys, Owen and Schiff, 2004). Such changes in state also imply changes in access to consciousness: the brain activations evoked by the same stimulus can differ importantly as a function of the state during which they occur (Portas et al., 2000). To take another example, recent experiments using masked priming suggest that the results can change dramatically when one sorts the subjects into two groups, those that perceived some of the primes and those that did not (Kouider and Dupoux, 2001). This is hardly surprising, because conscious access makes available a diversity of processes of immediate interest to any psychologist: access to episodic memory, verbal report, consumption of attentional resources. Indeed, consciousness may permeate almost all fields of human research: the "strategic biases" that have been the curse of psychological experimentation for decades in fact reflect the operation of a conscious brain that has its autonomy and cannot be enslaved by the experimenter's instructions.

I am therefore persuaded that, with the hindsight of time, our past neglect of consciousness will be considered as a major error, one that delayed for decades the progress of our discipline. Still, we have to sort the wheat from the chaff. Cautiousness remains deeply needed as we begin to converge on a set of methodologies for studying consciousness, and of theories with which to assess the results. The present volume, by confronting many points of view in the field, is likely to serve as an important landmark on the way to this ultimate goal.

Suggested Readings:

Dehaene, S. and Changeux, J. P. (2004). Neural mechanisms for access to consciousness. In: M. Gazzaniga (Ed.), The Cognitive Neurosciences (3rd ed.) vol. 82, Norton, New York, pp. 1145–1157.

Dehaene, S. and Naccache, L. (2001) Towards a cognitive neuroscience of consciousness: Basic evidence and a workspace framework. Cognition, 79: 1–37.

Kouider, S. and Dupoux, E. (2001) A functional disconnection between spoken and visual word recognition: Evidence from unconscious priming. Cognition, 82(1): B35–B49.

Laureys, S., Owen, A.M. and Schiff, N.D. (2004) Brain function in coma, vegetative state, and related disorders. Lancet Neurol., 3(9): 537–546.

Portas, C.M., Krakow, K., Allen, P., Josephs, O., Armony, J.L. and Frith, C.D. (2000) Auditory processing across the sleep-wake cycle: Simultaneous EEG and fMRI monitoring in humans. Neuron, 28(3): 991–999.

Stanislas Dehaene
President-elect ASSC
Onsay, France