Lack of general information and of specific details of protocol, environment, and controls has allowed critics to attack the experiments regardless of their outcome. Chapter 7 of ***Guidelines*** addresses the issue of experimental reporting by stressing the need to record all conversations, protocols, environments and results in as many ways as possible. Verbatim transcripts should also be included in the final report. The reliability of the evidence is tantamount to the strength of the experiment and can be preserved by use of video and audio recordings as well as photographic inventory of the environment.

This book is well written and offers to experimenters advice of quality about designing and carrying out investigations of psychic claimants. However, the reader may very well walk away from this book with a hunger for more detailed information regarding previous experiments and issues alluded to in most chapters. The authors state in the conclusion (Chapter 9), "It is hoped that future versions of the manual will include these and many other interesting issues." That would bolster the information already addressed and provide the reader with a full meal of details to replace the tantalizing snack the authors provide. In the present edition, Appendix A lists some general reading in parapsychology, on experimental design in psychology, other specific texts on testing psychic claimants, consideration of some past investigations, and books on conjuring and psychic fraud. There are also addresses where relevant literature is available and for relevant periodicals. Appendix B gives some more useful addresses, of organizations for parapsychology and for conjuring.

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The Astonishing Hypothesis: The Scientific Search for the Soul by Francis Crick. London: Simon & Schuster, 1994, 318 pp. $16.99 ISBN 0-671-71295-0.

Francis Crick is one of the preeminent scientists of this century who, in 1962, was awarded, with James Watson, the Nobel Prize for his contribution to the decipherment of the genetic code. Now, at the age of 79, working in La Jolla, California, he has turned his attention to that most complex of all objects in the universe, the human brain. The problem he has set himself is to ascertain what specifically goes on in the brain when we are said to be conscious. Or, rather, since he admits that would be too vast a problem, what specifically goes on when we are aware of some object in our field of vision. This book, which is dedicated to Christof Koch, his younger colleague at Caltech, offers a tentative solution.

The book is divided into three parts followed by an epilogue in which he discusses the philosophical implications of what he is trying to do. Part I, which deals with the experimental psychology of vision, presents no special difficulties and is well and amply illustrated with appropriate figures and illusions.

Part II, which deals with the human brain, makes for harder going though the author does what he can to reach the lay reader. For ethical reasons, many of the critical experiments have had to be done on the primate brain but some conclusions can be drawn from studying brain damage in humans. Some progress can also be made, these days, by constructing so-called 'neural networks' and a chapter is devoted to this method of simulating brain functions. Part III develops what I shall call Crick's 'special hypothesis' regarding the underlying brain activity associated with visual awareness and the two final chapters, which I shall treat as an epilogue, introduces the 'astonishing hypothesis' of the title and here the author discusses the wider philosophical implications of his approach. The volume concludes with an extensive glossary and an annotated list of further readings.

The 'special hypothesis' is introduced piecemeal and tentatively. Consciousness, he points out, almost certainly involves the thalamus, that central relay station of the cortex, and a modicum of short-term memory. It also seems to demand the presence of reverberatory circuits in certain specific layers of the cortex. Not being a neuro-scientist, this reviewer is in no position to evaluate the Crick hypothesis and readers who are looking for a more technical discussion may be referred to the review in ***Brain*** (Smythies, 1994). However, the author makes it clear that the details are less important than the enterprise that they represent. "While writing it down" he confesses "I would unhesitatingly condemn it as a house of cards. Touch it and it collapses. This is because it has been carpentered together with not enough crucial experimental evidence to support its various parts. Its only virtue is that it may prod scientists and philosophers to think about these problems in neural terms, and so accelerate the experimental attack on consciousness."

Such modesty disarms criticism. One can but applaud those who have the capacity and the tenacity to engage in such an exacting field of science. But, in seeking to promote the neural approach to consciousness, Crick may be exaggerating its novelty. Surely, ever since the use of electro-encephalography revealed differences between the waking brain and the sleeping brain or the fact that rapid-eye-movement sleep is associated with vivid dreams, we were on course to discover more and more about the cerebral underpinning of consciousness? It is by now no more than a truism to say that something specific is going on in the brain whatever we do or feel or think. Why should we be jolted, therefore, to be told that visual awareness depends on a certain set of cortical events?

There is, however, an ambiguity in Crick's use of the words 'consciousness' or 'awareness' which undermines the reductionism inherent in his approach. One could use these terms in a purely objective, behavioral sense, where it would be perfectly proper to say of a robot that had been programmed to avoid obstacles in its path that it was aware of the objects in question. On the other hand, in the conventional sense of the word 'awareness' which implies having certain subjective sensations or experiences, it would be silly to attribute

awareness to an inanimate artifact. Crick recognizes that something here has been omitted from his account when, in the final chapter, he says: "I have said almost nothing about qualia - the redness of red - except to brush it to one side and hope for the best." On the next page he even concedes that: "It is certainly possible that there may be aspects of consciousness, such as qualia, that science will not be able to explain. We have learned to live with such limitations in the past (e.g. limitations of quantum mechanics) and we may have to live with them again."

The comparison he invokes, however, could hardly be less appropriate. Quantum mechanics is a highly abstract theory and any such incompleteness at the fringes of science should not surprise us. Conscious experiences, on the other hand, are the most concrete or immediate data of our worlds; nothing, after all, could be more unassailable than the red patch that I am staring at in the center of my visual field. Whatever set of neural events may be activated as I continue to stare, they cannot in themselves constitute my consciousness.

This is really two books. The first is an unexceptionable, indeed helpful, introduction to the state of the art in the search for the neural underpinning of consciousness, or at least, of visual awareness. The second is a highly tendentious attempt to promote a materialist-reductionist theory of mind. This first book comprises the first seventeen chapters; this second book comprises the title, the subtitle and the final chapter plus the postscript. Needless to say, it is this second book that has given the complete volume its wide currency not to say notoriety.

This brings me finally to the 'astonishing hypothesis' as such. In the glossary, the author defines it thus: "The hypothesis that a person's mental activities are entirely due to the behavior of nerve cells, glial cells, and the atoms, ions, and molecules that make up and influence them. The theme of this book." Now, if I were to entertain this hypothesis, my first impulse (if I were true to my Popperian self) would be to scour the literature for possible evidence that might falsify it. If I did that, then, even after discarding everything that could be dismissed as too dubious, I would still be left with the huge amount of evidence for the various paranormal phenomena reported during the past century and a half which, by definition, defy explanation in terms of "the behavior of nerve cells, glial cells etc." To me the most astonishing fact about The Astonishing Hypothesis is that the author nowhere even hints at the existence of such evidence. As a Fellow of CSICOP, he can hardly be unaware of such a challenge yet he writes as if the only kind of opposition he has to contend with is the religious one based on faith rather than evidence. Now I am not saying that he is duty bound to accept the parapsychological evidence; in the absence of any experiment that can be readily repeated on demand there is bound to be continuing controversy, but at least he should acknowledge that a vast amount of human testimony must be set at nought in order to sustain the assumptions he is here embracing.

If there is no self, if the brain alone determines everything we do, it follows

that the notion of free will must also go by the board. In his brief "A Postscript on Free Will" with which the book concludes, the author recognizes this implication but is not unduly worried by it. As he puts it: "While lawyers and theologians may have to confront it, philosophers by and large, have ceased to take much interest in the topic. And it is almost never referred to by psychologists and neuroscientists." That the assumption of free will underlies all social intercourse does not seem to bother him. The problem, as he sees it, is to explain what it is that makes us think we are acting freely. He mentions certain pathological cases where, as a result of brain damage, individuals lose their normal capacity to act as if they could exercise choice. Eventually he comes to the conclusion that "Free Will is located in or near the anterior cingulate sulcus. In practice, things are likely to be more complicated. Other areas of the brain may also be involved." One is left asking oneself what area of Crick's superb brain was involved when he set out to prove, by writing this treatise, that he was not a free agent in doing so and that we, his readers, are not free agents in accepting or rejecting his thesis.

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Daniel Dennett is a philosopher and the Director for Cognitive Studies at Tufts University who has become well known as the exponent of the artificial intelligence approach to the understanding of mind. Like Crick, Dennett rejects the dualism of mind and matter but is less concerned with what actually happens in the brain when we are said to be conscious. His lengthy book is divided into three parts: Problems and Methods, An Empirical Theory of Mind, and The Philosophical Problems of Consciousness. The position he defends is even more radical than that of Crick. Whereas Crick grudgingly acknowledges the existence of qualia as a kind of unexplained emergent property of certain brain processes, Dennett, taking the bull by the horns, boldly denies their existence! One might say that ***Consciousness Explained*** might, more accurately, be called 'Consciousness Denied' !

There is much in this volume that is instructive, entertaining and stimulating