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Book reviews

The rediscovery of the mind by John R. Searle, MIT Press, USA, 1992, pp 270, £9.95 (p/back), ISBN 0-262-69154-X.

This is a book on the philosophy of mind and it is primarily addressed to professional philosophers. It does, however, contain a chapter attacking the foundations of cognitive science, namely Chapter 9 entitled "The Critique of Cognitive Reason". It is impossible in a short review to discuss all the issues raised in this book, so I have decided to discuss the content of this chapter.

The specific thesis that Searle criticizes is the view—which he calls *cognitivism* (202) and *computationalism* (207)—that the brain is a digital computer (200). He regards this as being equivalent to the claim that brain processes are computational (201). To be even more specific, he argues that syntax is not intrinsic to physics (208, 210, 225). It is, rather, essentially an observer-relative notion (209, 225).

The main difficulty that I have in evaluating the cogency of Searle's arguments is that they are couched in terms of an idiosyncratic and poorly thought-out terminology. In particular, the fundamental distinction that he makes between *intrinsic* and *observer-relative* properties is inadequately explained. This distinction is crucial to Searle's arguments and—if he is to be believed—to the whole of philosophy, since he claims that one of the most important philosophical tasks is that of classifying the various features of the world into those that are intrinsic and those that are observer-relative (xii–xiii). Apart from Searle, however, I know of no one else who thinks that the production of a lexicon listing the many features of the world—annotated with the information that they are either intrinsic or observer-relative—will be one of the most significant philosophical achievements of the twentieth century. Moreover, no reasons are given, no arguments produced and no references cited to persuade the reader that this really is such an important task. Searle simply makes the assertion and neither tries to justify it nor tries to inform us what beneficial consequences would flow if ever it were successfully accomplished.

Be that as it may, the distinction is radically flawed. One would have thought that if this distinction really is as important as Searle thinks it is, then he would have carefully and thoughtfully analysed it and explained it cogently and unambiguously. But he does not do this. The main criterion that he uses for distinguishing between intrinsic and observer-relative properties comes in two forms:

(1) A property is intrinsic to the world if the world would still have it if all observers and users *ceased to exist*.
(2) A property is intrinsic to the world if the world would still have it if there *had never been* any observers or users.

These appear within a few sentences of each other on the same page (211), yet a property that is intrinsic by (1) does not have to be intrinsic by (2). For example, if there had never been any human beings, then Stonehenge would not have been constructed. But it has been constructed and if all human beings ceased to exist tomorrow, Stonehenge would still continue to be a feature of the world.

Furthermore, Searle would have us believe that 'gravitational attraction', for example, names an intrinsic feature of the world: "If there had never been any users or observers, there would still be . . . gravitational attraction" (211). He seems to be unaware of the work of Popper, Quine and others, who have carefully argued that notions like *gravitational attraction* only have significance when they are part of a physical theory, and that such a theory is largely the product of one or more

human minds; that such a theory goes way beyond the evidence available, and can never be known with certainty to correspond exactly to the world. In a very real sense, had there never been any human beings, there would be no such thing as gravitational attraction. To emphasize this point, one could simply ask the question "The gravitational attraction that is supposed to be an intrinsic feature of the world—is this gravitational attraction as understood in Newtonian theory or is this gravitational attraction as understood in Einsteinian theory?" Of course, one feels that there is some force out there in the universe that attracts bits of matter to one another—and obviously there is—but the point I am making is that the nature of human cognition is such that there is no way of getting at an understanding of physical reality—in fact, there is no way of even talking about the world—that is independent of our theories. We can strive to improve our theories, but we cannot—in principle—achieve a theory-free account of the world.

Towards the end of Chapter 9, Searle claims to have shown that one of the main tenets of cognitivism—expressed by means of the sentence "The brain is a digital computer"—is not false but rather lacks a clear sense (225). Unfortunately for Searle exactly the same charge can be made—and for very similar reasons as I have shown—against his position: 'Syntax is not intrinsic to physics.' Although this sentence aspires to falsehood, it does not quite achieve it because Searle has failed to give it a clear sense. To reiterate: We can only single out features of the world by means of theories expressed in a language. Those features would not exist *for us* without a language and, thus, necessarily are observer-relative.

To conclude: I looked forward to reading the book because I agree with Popper that critical discussion and argumentation—especially between people with radically different outlooks—is crucial to the growth of knowledge, but I was disappointed because of Searle's slovenly and careless treatment of his own conceptual apparatus. Searle may well have important things to say about cognitive science, but I for one was so distracted and irritated by his discussion of the distinction between intrinsic and observer-relative properties that I have no reason to believe that the effort required to unearth them will be worthwhile.

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Artificial intelligence applications in manufacturing by A. F. Famili, D. S. Nau and S. H. Kim (Eds.), AAAI Press/MIT Press, 1992, pp 455, £35.95, ISBN 0-262-5606606.

The term "manufacturing" encompasses the broad range of activities involved in bringing a product to market. These range from marketing through design and development, planning of individual part manufacture, organization and control of manufacturing systems, and operation of production machines. In each of these fields there are well established computer applications involving modelling, simulation, analysis and control which come under the general headings of Computer-Aided Engineering (CAE), Computer-Aided Design and Manufacture (CADCAM) and Computer-Integrated Manufacture (CIM). In the past decade or so, the development of these applications has been constrained by limitations in traditional numerical approaches. The progress of automation has been restricted by the semantic weakness of representations used in modelling. Planning and scheduling problems have proved to be computationally complex, and susceptible to variations in the performance of real engineering systems. Incomplete and imprecise information have complicated decision making and analysis. In each of these areas solutions have been sought through the application of artificial intelligence.

The extent to which AI has penetrated manufacturing research is shown by the number of journals, conferences and workshops which have emerged in the field. The book under review is an outgrowth of such workshops organized by members of the special interest group Artificial Intelligence in Manufacturing, in particular at meetings convened at the International Joint Conference on Artificial intelligence (IJCAI-89), and the American Association for Artificial Intelligence (AAAI-90). The book is an edited collection of articles based on papers presented at, or motivated by, these workshops.