CHAPTER 12

COGNITIVE SCIENCE AND THE FUTURE OF RATIONAL CRITICISM

1. COGNITIVE SCIENCE AT THE EXTREMES

Throughout most of the Western intellectual tradition, the evaluation of reasoning has focused on the relations among statements or sentences. To oversimplify only slightly, the strand of the evaluative tradition associated with formal logic has focused on the syntactic relations between premisses and conclusion (and the semantic relation between premisses and the world) as the key to deciding whether a piece of reasoning is sound. Informal logic, as well, though not limiting its purview to the "logical form" exemplified in the relation of premisses to conclusion, has for the most part attended to reasoning insofar as it is linguistically encoded in arguments. Those who’ve adopted a dialectical approach (from Rescher to van Eemeren and Grootendorst) have remained within the mainstream tradition in this respect: their subject matter is a kind of argumentation that focuses on the standpoints taken toward the propositional content of claims put forward in natural languages.

Indeed, the most prominent philosopher of mind/philosopher of psychology in the English-speaking world is probably still Jerry Fodor, who maintains (even to this very day) that thinking takes place in a language of thought whose components resemble the components of natural languages in important ways. To simplify Fodor’s version of functionalism only slightly: mental states are computational states (beliefs and desires—or a sophisticated counterpart thereof—being the chief varieties); to have a belief, for example, is to stand in certain kind of relationship to a sentence in the language of thought; reasoning or drawing inferences is a computational transformation on mental states, and such computational transformations depend only on the syntax of the sentential content of the mental states transformed. If such an account of the nature of thought is essentially on the

1In using the phrase informal logic, I have in mind the way that phrase is used by Johnson and Blair, Govier, Doug Walton, and others. For a bibliography of informal logic in this sense, see Hansen 1990. It's worth noting another use of the phrase: Alvin Goldman (1986, pp. 83-84) argues that formal logic does not supply principles of good reasoning and that there is a need for an "informal logic" which would be a "branch of epistemology" (p. 82); Goldman is adapting an argument from Gilbert Harman 1973: discovering that a conclusion c follows from something p we already believe does not always justify us in accepting c; sometimes it ought to lead us to reject p. In this other use of informal logic, its subject matter still seems to be beliefs insofar as they are linguistically encodable.

2For a fairly recent version of the story, see Fodor 1990, p. 22: "...within certain famous limits, the semantic relation that holds between two symbols when the proposition expressed by the one is entailed by the proposition expressed by the other can be mimicked by syntactic relations in virtue of

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right track, the evaluative tradition as we know it—a tradition which equates the evaluation of reasoning with the evaluation of arguments in formal or in natural languages, and which stresses the formal or syntactic features of the premisses and conclusions of such inferences—is also essentially on the right track as well.

But over the last 20 years a number of writers in both psychology and philosophy have, in a variety of different ways, been suggesting that accounts of the dynamics of human reasoning should not focus on the manipulation of linguistic material. A mild version of this idea can, I think, be found in Philip Johnson-Laird's insistence that it is mental models, rather than "logic", which is crucial to that processing of information which we associate with reasoning. A more radical version can be found in the eliminative materialism of the Churchlands: a view according to which explanations in terms of belief and desire carry with them a commitment to a theoretical framework which they dub "folk psychology" and which, in their view, is a clumsy and inadequate framework for explaining human behavior that will be replaced by a framework drawing its fundamental constructs from neurophysiology. Jerry Fodor's version of functionalism draws much of its empirical inspiration and underpinning from mainstream work in cognitive science of the 60's and 70's. Eliminative materialism is today claiming PDP and connectionist AI as a model for understanding and explaining human learning and representation—and even, according to Paul Churchland, for a more adequate understanding of scientific explanation than has been available heretofore.

Paul Churchland describes one of the implications of eliminative materialism and the rejection of folk psychology as follows:

According to the new theory, any declarative sentence to which a speaker would give confident assent is merely a one-dimensional projection—through the compound lens of Wernicke's and Broca's areas onto the idiosyncratic surface of the speaker's language—a one dimensional projection of a four-or five-dimensional solid that is an

which one of the symbols is derivable from the other. We can therefore build machines which have, again within famous limits, the following property: the operations of such a machine consist entirely of transformations of symbols; in the course of performing these operations, the machine is sensitive solely to syntactic properties of the symbols. Such machines—computers, of course—just are environments in which the causal role of a symbol token is made to parallel the inferential role of the proposition that it expresses."

But see Fodor's criticism of cognitive science in Fodor 1990 (quoted on p. 121 below). There Fodor is criticizing, among other things, expert-system or rule-based AI, which attempts to reconstruct reasoning in terms of the rules appropriate to a subject area. The rules which do the work there are not rules for purely syntactic transformations. See Nisbett 1993 for a discussion of the relationship between this kind of approach to the explanation of reasoning and an approach which highlights purely syntactic rules (Nisbett's example of the latter being Piaget).

"PDP" stands for parallel distributive processing.

There is a compelling argument that the architecture of the brain must be a PDP or parallel distributed processing architecture. That argument has to do with the maximum number of times a neuron can fire in a second—the order of magnitude is in the hundreds, not in the millions (probably something like 300 times per second): unless the brain has a PDP architecture, it simply could not process the amount of information it processes in the time that it does. From this argument, however, it can be concluded that the brain has a connectist or neural network architecture, not that eliminative materialism is correct. Connectionist models simply provide eliminate materialism with a possible way of fleshing out the idea that reasoning and representation can be understood in ways that don't require folk psychology to be true.