

Just What is Cognitive Science Anyway?

Author(s): Jay L. Garfield

Source: *Philosophy and Phenomenological Research*, Vol. 59, No. 4 (Dec., 1999), pp. 1075-1082

Published by: International Phenomenological Society

Stable URL: <http://www.jstor.org/stable/2653574>

Accessed: 28-03-2017 03:49 UTC

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://about.jstor.org/terms>



International Phenomenological Society is collaborating with JSTOR to digitize, preserve and extend access to *Philosophy and Phenomenological Research*

Just What *Is* Cognitive Science Anyway?*

JAY L. GARFIELD
University of Tasmania

We have here a book that presents itself as an introductory textbook that can also be read as a monograph on the structure of cognitive science (Thagard) and another that presents itself as a monograph on cognitive science suitable for use as a textbook (Von Eckardt). These are two instances of what can be seen as a genre (Hardcastle 1996, Haugeland 1985 and Flanagan 1984 are other notable examples) whose existence is perhaps symptomatic both of the flux in this interdisciplinary field and of the explosion in interdisciplinary cognitive science pedagogy. As a consequence cognitive scientists are struggling at the same time to articulate a metatheoretic self-understanding and a set of pedagogical materials. Accomplishing these two tasks in a single volume is not impossible, but the attempt can lead to expository tensions, particularly at points where the desiderata of accessibility, comprehensiveness and evenhandedness attaching to the textbook writing enterprise compete with those of depth, focus and partisan argument attaching to the monograph project. These tensions are resolved in opposite directions by the present volumes, and in each case in the direction indicated by the author's avowed primary intention: Von Eckardt opts for a sophisticated and detailed metatheoretic exposition that will prove challenging for any but the most talented undergraduate classes; Thagard's treatment will be accessible to any first year college audience, but is extremely thin in its treatment of each issue on which it touches.

Despite these opposite expository strategies, these two books share two glaring and troubling lacunae: Neither author takes the role of either of two central strands of theory and research in cognitive science—linguistics or neuroscience—at all seriously as an element of the interdisciplinary fusion s/he aims to characterise. Linguistics and neuroscience are each featured prominently on the cover illustration of Thagard's book, but neither receives

* P. Thagard, *Mind: Introduction to Cognitive Science* (Cambridge: MIT Press/Bradford Books, 1996), pp. xi, 213, hardcover and B. Von Eckardt, *What is Cognitive Science?* (Cambridge: MIT Press/Bradford Books, 1993), pp. x, 466, paperback.

more than passing comment in the text. Von Eckardt also ignores linguistics almost completely as an element of cognitive science, and devotes only a brief afterthought section to asking whether neuroscience is part of cognitive science or not. The fact that this question is even posed—let alone the equivocal answer the question receives—is already reason to suspect the empirical adequacy of the metatheory of cognitive science the book develops. It is somewhat surprising, however, that the pressure that is in part responsible for the elision of neuroscience in both volumes—the focus on abstract computational theory of cognitive processes and on the structure of mental representation—does not lead to some attention to classical linguistic theory. In any case, both brain and language are curiously absent as objects of study from both accounts of the domain and method of cognitive science.

These omissions are unfortunate whether one views these volumes as textbooks or as monographs. To introduce students to cognitive science without introducing the binding theory, the rudiments of semantic theory, any of the entire field of psycholinguistics, without any explanation of how the brain and nervous system work, of the state of our understanding of the neural bases of cognition and perception and of the role of neural evidence in psychological research is to present a limited and distorted introduction. (See Stillings et al. 1995 for a textbook providing a far more comprehensive and balanced treatment of the field for undergraduates than either of these.)¹

If, on the other hand, we read these as metascientific monographs arguing against the centrality of these fields to the discipline, we must find them wanting as well: As a simple observation in the history and sociology of the discipline, both linguistic and neuroscientific theory loom large in self-conscious cognitive science literature and research. Linguists and neuroscientists are prominent in the field, in its academic programs, its journals and presses, and in its societies. Moreover, some of the most sophisticated recent discussions of the structure of the discipline (Hardcastle 1996 is a fine example) emphasise the multi-level character of explanation, theory and research, comprising both abstract rules as objects of knowledge such as those appealed to in linguistics, and accounts of neural realisation, as one of the important defining characteristics of cognitive science as a discipline. It is therefore a very serious defect in both pedagogical presentation and in their respective theories of the field that Von Eckardt and Thagard present cognitive science as comprising neither of these enterprises.

Thagard's *Mind* is distinctive for its extreme brevity and shallowness of analysis. Thagard asserts that the central commitment of cognitive science is to the "computational-representational understanding of the mind," which he

¹ I must give notice of a conflict of interest here, inasmuch as I am a co-author of Stillings, et al. (1995).

defines as the view that the explanans of cognitive science is human intelligent behaviour, and that the explanans always adverts to the claim that humans have mental representations, algorithmic operations over which produce the intelligent behaviour in question. [18] Just as Thagard ignores a lot of what is paradigmatic of this view of the field (such as linguistic behaviour), he ignores all of the work in cognitive science that does not fit this pattern (e.g., non-classical connectionist modelling, the neuroscience of perception and motor control, syntactic or semantic theory, cognitive development, etc.). Indeed, it emerges in the book that by “cognitive science” what Thagard really means is the cognitive psychology of adult knowledge representation, reasoning and problem solving (not coincidentally the domain in which Thagard has made his own important empirical and theoretical contributions). The problem, of course, is that if anyone took this account seriously as a characterisation of cognitive science as a whole, s/he would be forced to reject Thagard’s own (in fact true, but unsubstantiated by his analysis) pious proclamations of the interdisciplinarity of the field.

The shallowness of the book derives from its curious eschewal of the discussion and analysis of any actual empirical or philosophical work in cognitive science. (Contrast Von Eckardt, Stillings et al. 1995 or Hardcastle 1996, for instance, all of whom take the time to present, discuss and contextualise coalface work in the field as evidence or illustration of their claims about the field.) Thagard passes over important and complex examples of research in brief sentences or pairs of sentences. This is especially egregious in a textbook. There is no way that a student could hope to understand the relationships between the research Thagard mentions and the claims Thagard makes without some description of the research itself. As a consequence, any student who learns from this book will have to take quite a bit on faith; will learn exactly the wrong lessons about the relation between evidence and conclusions in arguments; and will end up with at best the illusion of understanding what is going on in the field. We owe our first year students much more rigour and a better example of intellectual responsibility than this. The genuine clarity of Thagard’s prose hence hides the real unclarity in the story he tells—an unclarity that issues from the fact that all of the evidence is held back.

This shallowness is compounded by the procrustean framework into which Thagard forces all of his specific discussions. Each topic is queried for its relation to learning, language, psychological plausibility, neurological plausibility and practical applicability, in that order. There is no defence of these criteria as constituting the unique set against which any segment of the theory of cognition should be measured, nor any defence of the idiosyncratic partitioning of the domain (logic, rules, concepts, analogies, images, connections) as the way to cut up the field of cognitive science. The entire analytic strategy hence appears curiously arbitrary in outline and in detail. The intel-

lectual poverty of the text perhaps comes out most clearly in the discussion questions included at the end of each chapter. Consider this randomly chosen example at the end of chapter 2 (logic) and hence 41 pages into a student's study of cognitive science: "Are people logical? Should they be?" Is a student supposed to be able to answer this? What would we think of a student who thought that s/he had learned enough even to understand this question at this point? Far too much of what might appear to be successful about this book hinges upon its likely success in giving students the illusion of understanding a complex field in virtue of the deceptive simplicity and brevity of the prose.

Von Eckardt's treatment of the field is far more satisfying. She provides much greater detail in her development of the philosophy of science underpinning her characterisation and in her discussion of examples of cognitive science research and philosophical investigation in the field. Her treatment is in every respect far more sophisticated than that of Thagard. While one might quarrel with her characterisation of the field, it is ably defended. Her comparison of philosophical views is judicious and incisive; her treatment of empirical research is knowledgeable. The reader always has enough information to assess the argument and to have a good picture of the relevant intellectual or empirical terrain. A student who masters this book will have in hand a sophisticated entrée into cognitive science.

On the other hand, *What is Cognitive Science?* shares with *Mind* a problematic narrowness in its view of the field. The book focuses excessively on cognitive psychology, though in Von Eckardt's case this narrowness is mitigated by a good deal of excellent philosophy of mind and philosophy of science that lends the book a metatheoretical depth entirely lacking from Thagard's.

Von Eckardt understands cognitive science as especially concerned with the nature of representation and its role in cognition, and devotes a great deal of her book to exploring the concept of mental representation. This is both a strength and a weakness of the volume. It is a strength in that Von Eckardt explores the concept of mental representation, the relation between representations and their contents, and the role of representation in cognitive science in great detail. Her discussion is lucid, fine-grained and highly informative. She develops a persuasive Peircean account of intentionality, and presents an informed, closely argued discussion of the enterprise of psychosemantics and of the many complex debates surrounding the notion of content, including the externalism-internalism debate, and the debates between proponents of the many varieties of functionalism. Indeed one of the best things about this book is that it can function as a very high-level handbook on this important terrain in the foundations of cognitive science. But this strength is also the Achilles heel of the book. For nearly half of the book is taken up with this topic, and while the nature of mental representation is indeed a central topic

in the philosophical foundations of cognitive science, it by no means comes even close to exhausting the field. The focus on representation comes at the expense of adequate treatments of such topics as motor control, perception, language acquisition, non-representational models of cognition, etc. The result is a somewhat distorted view of the field.

A closely related distortion is introduced by Von Eckardt's problematic, unargued, and unmotivated assertion that the domain of cognitive science is what she calls "adult normal, typical cognition (ANTCOG)." [57 ff.] As an empirical claim about the field as it is practiced, this is, of course, patently false. Cognitive development, developmental psycholinguistics and cognitive pathology are all important fields of cognitive research, as is infrahuman cognitive ethology. Things get even more distorted when it emerges that cognition is, for Von Eckardt, always representational, thus ruling out the study of primitive perceptual processes and a lot of motor control research from the domain. Practitioners of these fields would be surprised. Since it would be bizarre for Von Eckardt to be offering to reconfigure the discipline from the armchair (and she never pretends to do any such thing) this empirical inadequacy is quite odd. It certainly undermines any claim to provide a general metatheory of cognitive science and presents a misleading view to a student coming to the discipline for the first time. The best that one can say is that Von Eckardt provides a searching and compelling account of the philosophical foundations of the cognitive psychology of adult human mental representation. No mean feat, but not what she promises or claims.

Von Eckardt's approach to the philosophy of science is innovative and promising, characterising the structure of a research program in terms of several distinct kinds of methodological, metatheoretic and ontological assumptions and a set of basic questions. While as a general approach to understanding research programs this strategy seems excellent, the specific characterisation of cognitive science in terms of this framework reflects the overly narrow view of the discipline Von Eckardt shares with Thagard. She argues [57] that cognitive science identifies its explanatory domain as the set of adult human cognitive capacities. We have seen that this is too narrow a specification. As a consequence, Von Eckardt argues that any question posed within the cognitive science research framework is of the form "For the normal, typical adult, what precisely is the human capacity to ___?" [92]. Again, this simply omits many of the most important questions asked in the field.

Finally, she argues [138–41] that the central ontological assumption of cognitive science is that "the human mind/brain is either a general-purpose, stored-program, conventional computer or a special-purpose, wired-program, conventional computer or a connectionist computer, or some combination of these." [141] Now there is no doubt that assumptions that computational models of various kinds would prove adequate to cognitive explanation have

played and continue to play central roles in cognitive science, and indeed the very assumption Von Eckardt identifies would be endorsed by many cognitive scientists. But—unless the assumption is given a trivial interpretation according to which anything counts as a computer—it must be said that much neuroscientific work within cognitive science does not operate under this assumption. And if we take the more trivial reading seriously, Von Eckardt's disjunction trivialises it further: Under this interpretation it could serve, *mutatis mutandis*, as the fundamental assumption of *any* science formulated in mathematical form.

Neuroscience does not enter Von Eckardt's story until late—in her chapter 9, where she discusses the methodological assumptions of cognitive science. Significantly, she poses the question of the place of neuroscience this way: "So what is the relation of neuroscience to cognitive science? Are they engaged in competing research programs...or are they partners in a common enterprise?" [319] When the options are reduced to these two by the second question, the most obvious answer to the first, viz., that neuroscience (or at least some neuroscience) is *part* of cognitive science, is precluded. And so Von Eckardt never considers this option. This however ignores the facts regarding how cognitive science is actually prosecuted, the self-understanding of most practicing cognitive scientists and the arguments of other meta-theorists of cognitive science such as the Churchlands (P. Churchland 1995, P. S. Churchland 1986), Hardcastle 1996 and Stillings et al. 1995 who have argued explicitly for a central role of neuroscience in cognitive science.

One unfortunate stylistic feature of *What is Cognitive Science* must be mentioned: Von Eckardt's otherwise pleasing and perspicuous prose is seriously marred by an annoying alphabet soup of non-mnemonic acronyms. By the end of the book we have encountered ANTCOG (Adult, normal, typical cognition), TCD (theory of content determination), and MRS-SEMPROP (a mental representation system's semantic properties) among others, not to mention a host of numbered conditions, definitions, methodological theses, questions, etc. (C_n 's, D_n 's M_n 's and Q_n 's). A cheat-sheet would be needed to keep track of them, and the abbreviations add no clarity or concision to the text. Indeed, Von Eckardt is often forced to include the translation parenthetically along with the supposedly space-saving abbreviation. Better to dispense with them altogether.

Cognitive science is a complex, multidisciplinary and interdisciplinary venture. To used a tired metaphor, its problems, projects and programs are related to one another more by relations of family resemblance than through sharing some common essence. An attempt to squeeze the entire discipline into a single mould will inevitably either issue in a trivial account (cognitive science is the science of cognition, or something like that) or leave a lot out. Neither Thagard nor Von Eckardt can be indicted on the former grounds, but each is guilty of the latter, and in exactly the same way. A fully satisfying

account must reflect the diversity and scope of the field and in doing so must eschew the project of seeking an artificial uniformity. This requires both tolerance for a messy disunity even within a single science and an eye on actual practice and signal examples of cognitive science in action, as opposed to a commitment to abstract rational reconstruction. Von Eckardt provides a great deal of good philosophy of science and insightful philosophy of mind and psychology. For all of its problems, it is a substantial and original contribution to the literature in the foundations of cognitive science. None of this can be said of Thagard's volume.

Teaching cognitive science and writing textbooks to support that teaching is doubly complex. Not only is the field vast and heterogeneous, but it is not clear where one can pick the tangle up: Understanding any portion seems to require understanding a good deal else. How does one present an interdisciplinary field to a student who may well have studied none of the disciplines whose convergence that field represents? One can imagine a number of approaches to this problem, none of them without difficulties: One could introduce the disciplines first, each with a focus on their convergence in cognitive science, and then choose specific problems for case study focus (Stillings et al. 1995). Or one could choose a single core problem and examine how cognitive science approaches it interdisciplinarily (Hardcastle 1996). Alternatively, one could take the bull by horns and discuss the interdisciplinary science methodologically, with case studies along the way as each of these texts does. But any successful textbook must be sufficiently broad to encompass at least most of the field, and sufficiently attentive to ground level work to teach science and not just chat about it.

On both grounds it would be hard to recommend *Mind* to any teacher of an introduction to cognitive science course. Von Eckardt's book on the other hand would be useful as a textbook as it provides sufficient analysis and detail, though would need supplementation and stringent methodological critique in order for a course to be sufficiently comprehensive. Combining it in a course with Hardcastle's *How to Build a Theory in Cognitive Science* would be interesting, as the strengths and problems with these two books are exactly complementary, and their metatheory is interestingly contrastive.

References

- Churchland, P. (1995). *The Engine of Reason; The Seat of the Soul*. Cambridge: MIT Press/Bradford Books.
- Churchland, P.S. (1986). *Neurophilosophy*. Cambridge: MIT Press/Bradford Books.
- Flanagan, O. (1984). *The Science of the Mind*. Cambridge: MIT Press/Bradford Books.
- Haugeland, J. (1985). *Artificial Intelligence: The Very Idea*. Cambridge: MIT Press/Bradford Books.

- Hardcastle, V. (1996). *How to Build a Theory in Cognitive Science*. Philadelphia: John Benjamin.
- Stillings, N., S. Weisler, C. Chase, M. Feinstein, J. Garfield and E. Rissland. (1995). *Cognitive Science: An Introduction*. Cambridge: MIT Press/Bradford Books.