

Book review

Rapp, B. (Ed.). (2001). *The handbook of cognitive neuropsychology: What deficits reveal about the human mind*. New York: Psychology Press. Pp. 528. ISBN 0-86377-592-6. Price £54.95 (hardback).

With the onslaught of new imaging techniques Cognitive Neuroscience is increasingly becoming a major tool for the understanding of how cognition takes place in the brain. However, these imaging techniques might be considered the “Nouveau Riche” in understanding mind–brain relationships. The old wealth would be the use of brain damaged patients to understand how the mind works. It is this field that the current work covers in an elegant, sophisticated, and extensive manner. Furthermore, it presents a diversity of perspectives, ranging from those who represent a more modular-symbolic perspective to those who argue for distributed representations. In short, no other work covers the field so widely and does such a good job.

The book begins with a nuts and bolts approach. What are the basic assumptions in the field and how do experts gather their data? The very first chapter ends with a series of questions (which are commonly asked). These questions are then answered one by one. This section was particularly interesting. As an informed consumer of Cognitive Neuropsychology I found it helpful to read common critiques and how these critiques were addressed. Of course, for those in the field it helps to at least address some of the basic criticisms they may have of the field. The book proceeds with a historical overview of the field. This section progresses quite nicely through the different phases of the field. From heart and brain debates, through the phrenological approach and up to more modern studies looking at different types of aphasia. The review ends by addressing two compelling issues: the introduction of sophisticated new methods for localising brain activity and the importance of distributed representations of cognitive functions.

On objects, space, and consciousness

The second section of the book continues by considering the nature of object and space representation. The section begins by considering how object recognition proceeds. It provides a compelling review of the current state of the object recognition literature. This chapter covers a number of well-known deficits in visual object processing including loss of motion perception (akinetopsia),

colour perception (achromatopsia), depth perception, and apperceptive agnosia. The authors make interesting claims about the latter deficit, arguing that it could be due to minute scotoma that result in a "peppery" mask effect on vision. This chapter continues with a review of studies of object recognition. The review of object recognition also fits in nicely with the review of face recognition. Although the nature of face recognition impairments has been documented before, the fractionation of this process is not. For example, evidence that recognition of familiar and unfamiliar faces is dissociable is presented. In addition, further fractionation occurs for expression analysis, gender decision, age estimation, and lipreading.

The topic of consciousness is so important as to garner the attention of three different chapters. The chapters on both object recognition and face recognition review differences between covert and overt processing. For example, there are achromatopsics who can use colour to distinguish between figure and ground but cannot consciously report a colour. Similar types of phenomena occur for alexics, who may not be able to report what a word is under certain circumstances but are better than chance at making word decisions. Similarly, some prosopagnosics can make same/different judgements of faces without being able to consciously identify faces. These findings are integrated very nicely in the chapter on consciousness. Particularly fascinating is the review of three different chapters on how conscious awareness occurs in the brain. The first possibility supposes that there is a distinct centre that is responsible for consciousness. In this view a phenomenon like blindsight in which a patient can point to an object without being able to see it could be the product of a disconnection between visual systems and "consciousness" systems. Consciousness could also be the result of an integration of distinct brain systems. In this view, modality-specific perceptions, current actions, and plans coalesce in order to provide the experience of consciousness. Finally, Farah proposes that consciousness may be a graded property of the brain. That is, information may be partially represented due to a degradation of either the input or the representation itself. In the end, it is concluded that all three views account for some aspect of the data.

From words to sentences

Any work on cognitive neuropsychology would be incomplete without considering the nature of language breakdown. This field is covered in incredible depth in this work. The first section on language considers the most basic unit: the word. This section begins by considering how the lexical system is organised. This topic is covered with great elegance, from considering the possibility of multiple semantic systems, separate phonological and orthographic output lexicons, and how far we can fractionate each of these. For each fractionation, evidence is presented that either supports or refutes their stance. Particularly interesting was the section that considered how factors such as frequency,

familiarity, semantic category, concreteness, and grammatical word class play a role on different levels of processing. Interestingly, all these factors play a role in verbal production. The role of grammatical word class is also important when considering morphology. Separate chapters are devoted to more common topics such as morphology, word reading, and spoken word production. The authors of these chapters do an excellent job of covering their respective fields and pointing out things that still need to be addressed. For example, in the section on reading the authors indicate points of dispute between connectionist and symbolic models of reading. Furthermore, they point out that work remains to be done in order to fully resolve these issues.

The *Handbook of Cognitive Neuropsychology* also goes beyond traditional issues. The chapter on bilingual lexical access is such an example. In this chapter, the authors discuss the neural bases of bilingualism, take us through a tour of current models of bilingual lexical representation, and end with a case study of a bilingual aphasic patient. The authors do admirable work in the confines of a single chapter. The final two chapters on language cover sentence comprehension and production in a thoughtful and cogent manner.

Here today gone tomorrow

Another topic of considerable importance and precedence in neuropsychology is memory. Again, the work covers a number of important topics. These include a review of work which documents the neural structures involved in memory and a review of how patient work has informed the structure of memory. The authors also make interesting connections between disordered and normal processing. For example, a series of studies indicate that those with frontal lobe damage have particular difficulty with conditions in which the features of items are overlapping. This suggests that these patients have particular difficulty with integrating sets of features into wholes. The authors point out that this has also been observed in older adults and is consistent with the view that frontal lobe dysfunction leads to stronger data-driven processing. The intercorrelations of features is also an important topic in semantic memory, a topic covered in a separate chapter. Category-specific deficits have been studied for many years. The authors present data which disputes that these deficits are due to the severity of damage. An intriguing account of memory distortion is presented in a separate chapter. The section on memory, like others in the book, is reviewed in a thorough manner. It also sums up current research extremely well and suggests places where further research is needed.

Two sections are devoted to less common topics in neuropsychology. These include music perception, processing of numbers, time, and planning and execution of actions. The authors of these chapters make the work accessible while not skimping on the details. For example, in the chapter on planning and execution of actions, the authors spend a great deal of time considering the

neuroanatomical basis of the supervisory attentional system and its breakdown during action disorganisation syndrome. Like all of the other chapters, the writing is detailed and concise while keeping the larger issues in the field in mind.

Last but not least the book ends by considering the future of cognitive neuropsychology. This is split into three goals. Goal one involves using cognitive neuropsychology as an experiment of nature. McCloskey notes that more work needs to be done in order to integrate cognitive psychology and cognitive neuropsychology. Goal two involves functional localisation. Here the author makes some interesting points of advantage for the lesion deficit approach relative to the new methods of functional imaging. Specifically, the lesion-deficit approach leads to causal statements more easily because it is difficult to ascertain if neural activity observed in neuroimaging is due to the process itself or is simply the by product of that process. Finally, the third goal is to understand deficits.

In summary, this book was a true delight to read both because of its breadth and depth. Furthermore, I am sure that I will use it as a reference when I need information on patient studies. If you are interested in the neural bases of cognition you must read this book.

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