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Mental Time Travel. Book review of '*Episodic memory, new directions in research*', edited by A. Baddeley, M.A. Conway, and J.P. Aggleton (Oxford University Press, 2002)

'*Episodic memory, new directions in research*' contains 15 chapters, many by leading researchers in the field. The book originates from a discussion meeting of the Royal Society that was called to review recent developments in episodic memory research. An introductory chapter is provided by Allan Baddeley and the book concludes with a discussion by Endel Tulving. The remaining 13 chapters cover a wide range of topics and approaches. These include, amongst others, the distinction between 'remembering' and 'knowing', false memories and memory for spatial context. The various chapters discuss not only behavioral data obtained with healthy humans but also data from humans with brain damage, animal studies and neuroimaging studies. In fact, only four chapters are primarily concerned with behavioral research using 'normal' human subjects. A complete listing of the chapters and contributors can be found at the website of Oxford University Press (http://www.oup-usa.org/toc/tc_0198508808.html).

An important topic of the book is our ability to mentally travel back in time and relive past experiences. In drawing the distinction between episodic and semantic memory, Tulving (1972) originally focused on the different types of information stored in episodic and semantic memory. Episodic memory is involved in the storage and retrieval of temporally dated events or episodes. Semantic memory on the other hand is involved in the storage and retrieval of general knowledge such as the meaning of words, knowledge of the metric system and the fact that Amsterdam is the capitol of the Netherlands. In later publications, Tulving (1983) emphasized phenomenological aspects of episodic and semantic memory. An important distinction made by Tulving is that between autonoetic (self-knowing) and noetic (knowing) consciousness. Autonoetic consciousness is a defining property of episodic memory and is expressed as conscious recollection of past experiences (reliving the past). Noetic consciousness on the other hand is associated with semantic memory and is expressed as a feeling of familiarity or knowing.

The distinction between autonoetic and noetic consciousness is a recurrent topic that is discussed in several of the book's chapters and plays a central role in a chapter by Gardiner. In his chapter, Gardiner discusses the remember-know paradigm which has become increasingly popular over the last 15 or so years. In this paradigm, subjects are given a recognition task and for items classified as old (i.e., for items that subjects think were presented on the study list) subjects are asked to give a 'remember' or 'know' judgment. A remember judgment must be given if subjects recollect specific details of the

earlier presentation of the word. A know judgment must be given if subjects recognize the word but do not recollect specific details about its earlier presentation. Gardiner discusses a variety of studies showing that remember and know judgments are differentially affected by a number of variables. Not surprisingly, for those familiar with Gardiner's work, he argues that the remember-know distinction does not correspond with differences in confidence or memory strength, bur rather reflects different forms of awareness that arise from the operation of different memory systems. Although this conclusion would probably not be shared by the entire community the chapter gives a nice overview of the work that has been done in this area.

One of the chapters I particularly liked is that by Clayton, Griffiths, Emery and Dickinson on episodic-like memory in animals. According to Tulving's (1972) original formulation of the distinction between semantic and episodic memory, spatio-temporal experiences are encoded in episodic memory. Because, according to Tulving, animals do not have episodic memories they should not be able to store and retrieve unique experiences containing information about *what*, *when* and *where*. Contrary to this idea, the authors describe a series of carefully designed experiments that convincingly show that scrub jays can recall what kind of food they stored where and when. In one of the discussed experiments jays cached three kinds of food (fresh mealworms, fresh crickets and peanuts) in different locations. After varying retention intervals (4, 28 or 100 hours) the jays were allowed to 'recover' the cached food (in fact the food had been removed during this interval to eliminate any perceptual cues about which food was stored where). Jays normally prefer mealworms and fresh crickets over peanuts which was evident in the search preferences after a short interval. Mealworms and crickets are, however, perishable and jays that had been trained to learn this showed a change in search preference for the longer intervals (i.e., at longer intervals they preferentially searched locations with peanuts). Additional experiments showed that jays also remembered what foods they had recovered on previous occasions. In his concluding chapter, Tulving agrees that these experiments show episodic memory by the 1972 standards but argues that they do not demonstrate autonoetic consciousness. Hence, these results do not show true episodic memory as defined by his later 1983 theory. One can wonder of course how such consciousness could be demonstrated in animals (to be fair it should be mentioned, though, that some possible approaches to this problem are briefly discussed in Tulving's chapter). However, regardless of whether or not the scrub jay data are problematic for Tulving's theory, the data are interesting in and of itself as they demonstrate that animals have rich memories for single events and can use such memories in a flexible way.

Although the book covers a variety of topics and approaches to episodic memory, I missed two things in the book. First, I found that formal approaches to memory where somewhat underrepresented. Influential models such as SAM, TODAM or the more recently developed REM model (Shiffrin & Steyvers, 1997) are not discussed. Formal modeling is interesting for several reasons, one of the most important being that it forces one to make underlying assumptions explicit. It is often hard to derive testable predictions when assumptions about processes and representations remain unspecified and I fear that some of the theories proposed in the book are hard to test. Second, I would have liked a chapter discussing the recent research investigating the role of inhibitory processes in memory retrieval. I my opinion, the research by Michael Anderson and colleagues (e.g., Anderson & Spellman, 1995) on this topic is one of the most interesting developments in episodic memory research in the last 10 years because their results challenge virtually all theories of memory.

Overall, however, I found the book informative and I would certainly recommend it to someone interested in episodic memory. The book could be used in an advanced memory course, but is certainly also of interest to researchers in the field. As so many papers are being published on a wide variety of topics within the field of memory it is virtually impossible to keep track of all new developments. The present book is of interest to anyone who wants to be up-to-date on some of the new developments in the field of episodic memory.

## References


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