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# BOOK REVIEW

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## Memory for Odors

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Schab, F.R. and Crowder, R.G. (eds) (1995) Lawrence Erlbaum Associates, Mahwah, NJ. pp. 187.  
ISBN 0-8058-0728-4. Price \$39.95.

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How are odors internally represented? What happens between the perception of an odor and an animal's response on a memory test? Schab, Crowder and 10 other authors (de Wijk, Cain, Mair, Harris, Flint, Murphy, Davis, Ludvigson, Herz and Eich) address these and other enigmatic issues as they assess the current state of research in the area of olfactory memory. This long awaited text begins with the goal of convincing 'cognitive psychologists that there was something genuinely olfactory to be considered in this literature for odor, rather than just another level of processing.' Before it is finished, *Memory for Odors* introduces the reader to new research, a variety of theoretical ideas and a number of good suggestions for continuing exploration.

The mental process that is commonly called 'memory' is composed of at least three elements: encoding, storage and retrieval. Encoding refers to the process by which the animal develops an internal representation of an external stimulus. Storage refers to the persistence of the internal representation over time. It is important to note that this internal representation may be altered by interference from other information or from decay over time. Retrieval refers to the utilization of this stored information; certain representations may be available (stored) not retrievable (accessible). These three elements of memory are themselves mere components of an animal's mental life, which includes attention and emotion, among other aspects.

Throughout the text, each author pursues the theme of understanding the intricate mechanisms involved in olfactory memory. Key concepts, important to any discussion of memory, are raised and examined in turn: recognition, identification, neuropsychological issues, implicit testing, imagery, age and memory in non-human organisms. As

pointed out repeatedly in *Memory for Odors*, the issue of psychological coding, the extent to which verbal-semantic (or other sensory) encoding enhances or replaces a perceptual olfactory code, is important to each of these aspects of memory. Answering this riddle, on some level, is crucial for understanding past experiments, and for planning future experiments. Unless the nature of the psychological code is better delineated, the independent variable of the experiment is always in question. Is verbal memory being tested, when the intent was olfactory memory? Furthermore, the nature of the internal representation of odors will allow for better integration between theories of olfactory memory and general models of memory, as gradually the relationships between sensory systems are uncovered.

Many places in *Memory for Odors*, as in a good deal of the literature concerning cognitive psychology, the tendency is to develop theories which account for only the data at hand, rather than the entire spectrum of findings. For example, Chapter 3 discusses a new integrated model for odorant identification, the pairing of an odorant with a stored representation of its name. This model's recognition that poor odor identification may be the result of limitations in sensory-perceptual discrimination among odors as well as weak odor-name associations is original. However, it fails to connect the idea of identification to over-all odor memory, apart from drawing in the concepts of top-down (stored information) and bottom-up (perception) processing.

Chapter 9 utilizes the concept of a multiple memory systems framework, the idea that 'odors are encoded, processed, and stored differently than stimuli mediated by other sensory modalities', to account for the data from odor memory experimentation. The authors go on to point out

that olfaction may be unique in this way because it serves as the primary sense responsible for conveying information pertinent to survival of a species (e.g. food, reproduction, kin recognition). The concept of memory systems specialized to deal with particular types of information may prove useful in relating olfaction to a more general memory scheme.

*Memory for Odors* is an extremely thorough assessment of the state of current understanding of olfactory memory. As a slight downside, the book is almost too thorough, including many unpublished and 'in press' articles as references, as well as a fair number of presentations from meetings, all of which are inaccessible to the average reader. Also, unfortunately, a more comprehensive model of memory is not drawn out of the olfactory literature presented. A stronger view of olfactory memory as a component of a whole memory system would have been helpful to the reader, although perhaps this was not possible due to the scarcity of previous research of this nature. Still, this book provides a plethora of new research ideas, some of which are spelled out, others suggested simply by the accumulation, explanation and association of data into a cogent format. These suggestions raise many more questions than they answer, inviting new explorers into the realm of encoding, storage, retrieval, and olfaction.

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