The visual world in memory edited by J R Brockmole; Psychology Press, New York 2008, 292 pages, $64.76 cloth (£35.96) ISBN 978 1 84169 684 3

Memory for visual information is a fascinating topic. We effortlessly remember thousands of faces, or pictures presented only briefly, and retain such information for months, if not years. *The Visual World in Memory* deals with this intriguing area of cognitive psychology. The eight-chapter volume aims to cover a huge field, spanning from very short-term iconic memory to long-term memory, and from memory for basic object features to memory for complex visual scenes. It covers issues that are of interest primarily to the memory theorist, such as dissociations between and within memory systems, but also issues that are directly relevant to real-world application, such as spatial navigation and eyewitness testimony. In the following, I will briefly review each chapter, before I evaluate the book and note some points of critique.

The first chapter, by Logie and van der Meulen, deals with the components of visuospatial working memory (WM). They present an extension of the well-known Baddeley and Hitch WM model, and review behavioural and neuropsychological evidence for dissociations between WM systems. These include a dissociation between modality-specific verbal and visuospatial WM (VWM) systems, and—within VWM—between WM for static patterns and movement sequences, and also between visual imagery and VWM. In discussing the capacity of VWM and the types of codes that can be used to retain visual information the authors also point out the 'Humpty-Dumpty problem': How are separate systems 'put together again' to allow for integrated and flexible performance? For example, they conclude that phonological and visual codes can be used independently but in conjunction to retain visual information. Finally, they briefly touch on feature binding and WM capacity issues.

These are taken up by Jiang, Makovski, and Shim in chapter 2, focusing on WM for feature conjunctions. The authors discuss how the separation of object and location processing (ventral versus dorsal stream) in perception does not seem to transfer clearly to VWM. Behavioural studies, in contrast, have revealed more subtle dissociations, suggesting, for instance, that spatial but not nonspatial features of items are obligatorily encoded into VWM. They go on to review central discussions in the literature: (1) whether VWM is object-based (with a capacity of about four objects irrespective of the number of constituent features, but varying with complexity and/or similarity of to-be-remembered objects) or feature-based (with separate capacities for different features), or (2) if the capacity limit of WM is best described as a storage limit (defined by a limited number of WM slots or a limited resolution that decreases with increasing memory load) or an executive-control limit (meaning that low-capacity individuals may not have lower WM capacity per se, but may be less able to filter out irrelevant information).

The third chapter, by Bruce, is concerned with memory for faces and how this may be a 'special' type of memory. Evidence is reviewed (including disproportionate effects of inversion and negation) that face identification unlike 'standard' object recognition is strongly based on holistic analysis of feature configurations. Findings suggesting that face memory is *not* special are also reviewed. For instance, similar effects of inversion etc are also observed in experts' object identification (eg when a farmer identifies his sheep). Nonetheless, neuroimaging research suggests that, brain-wise, faces are special, with the fusiform face area specifically devoted to face processing, independently of expertise. Finally, Bruce discusses how the reproduction of faces by witnesses is extremely poor, and how this could be improved by novel techniques (eg morphing of several independent reproductions).

In chapter 4, Hollingworth highlights the fact that, unlike objects studied in the lab, objects in the real-world are typically embedded in complex scenes. Hence this chapter deals with how the coordination of component operations in memory supports real-world perception of (objects in) scenes. The functions of visual memory in scene perception are fundamental: iconic memory allows for the integration of information across very short intervals. VWM bridges gaps in perception created, inter alia, by movement (of the eye and objects in the world) and hence allows for scene continuity (based, in particular, on the mapping of pre- and post-saccadic object representations). Visual long-term memory allows for the accumulation and stable representation of object information in complex scenes (which easily exceeds the capacity of VWM), and integrates objects with their scene context. Finally, schematic scene knowledge can help guide attention to task-relevant objects.

Chapters 5 (Hayhoe) and 6 (Shelton and Yamamoto) discuss the importance of visual memory for action and navigation. Visuospatial memory makes the planning of eye-, hand-, and body-movements more efficient. For example, a spatial—not retinal—representation of the environment is essential in the planning of complex tasks with many eye movements and high demands on hand–eye coordination. In moving environments (traffic, sports), internal models of the dynamics of moving objects allow for anticipatory saccades, which in turn allow for higher speed and precision of action. In navigation, while spatial representations are fundamentally based on vision, there is some evidence for a supramodal navigation system. For example, spatial information can also be extracted from nonvisual modalities, and such representations will be modality-specific to a certain degree (eg a verbal description of object positions can be superior to visual encoding in some tasks). Also, while there is a clear role of visual memory in cue-guided landmark navigation, people can also rely on more supramodal, allocentric cognitive 'maps' that are not primarily visual.

In chapter 7, Davis and Loftus focus on how expectations, emotions, and beliefs lead to systematic distortions of visual memory. At encoding, expectations and activated schemas partly determine what is encoded (eg the false perception of a man holding a weapon is more likely when the man is dark-skinned). Likewise, storage and retrieval are strongly influenced by the belief of "what must be true": labelling (eg of a suspect as 'black') will lead to memory for the suspect's appearance being shifted towards prototypicality; suggestive post-event information will distort both what is remembered and the confidence it is remembered with. Expectations (eg that the culprit 'must be' in the line-up) and misattributions (eg that an innocent suspect is familiar from the crime scene when he is in fact familiar from a photo in the file) will increase the probability of false identifications. Finally, the review points out that the popular 'tunnel-memory' theory of the effects of emotion on memory—central aspects of emotional events are better remembered at the expense of peripheral detail—is far too simplistic; for example, emotions can generally impair memory by promoting automatic retrieval processes at the expense of more accurate controlled processes.

The final chapter, by Ganis, Thompson, and Kosslyn, discusses the overlap of brain regions associated with vision and imagery. While perception seems to engage more brain regions than imagery (presumably owing to functions needed in perception but not imagery, such as visual grouping), the overlap is striking, going down to the single-neuron level. Neuropsychological impairments affecting both imagery and perceptual identification can be object-specific, providing some evidence for reinstatement theory (ie similar brain regions support perception and long-term storage of specific object classes). Finally, the finding that the motor system is actively involved in mental rotation has paved the way for an exciting application, namely the successful use of mental practice to improve actual motor performance, not only in sports, but also in stroke recovery.

Overall, the book finds a nice balance between data and theory (although some chapters are a bit light on the theory side). A very positive aspect is that central topics of visual memory research—how the system deals with the severe capacity limitations imposed by VWM, how long-term representations influence perception and interpretation of visual information—are taken up in different chapters and are discussed from different angles. The book therefore has a nice flow to it, and there is appropriate cross-referencing. Hence, the book offers an integrated overview of research into human visual memory that in its breadth and depth will appeal to interested undergraduate students as well as memory researchers.

Given the book's broad scope, it is obvious that not all potentially relevant data and theories could be discussed, and that some topics of visual memory had to be omitted altogether. In most chapters, literature reviews are encompassing and the main theoretical controversies are sufficiently discussed. I found that some authors, however, focused too much on their own work (to give one arbitrary example, I was surprised to find the work of Bar [eg Bar 2004] unmentioned). Also, readers with an interest in episodic recognition memory or implicit forms of memory should turn to other sources of information, as should readers primarily interested in computational modelling or the neuroscience of visual memory (the reviewed data are mainly behavioural, augmented by neuroscientific evidence, contrary to what is suggested by the cover). Yet, this should not necessarily be seen as a weakness of the book, which offers a focused collection of first-class reviews and will be a valued repository for scientists fascinated with the visual world in memory.

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Reference

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