chapters on learning in rats with considerable emphasis on hippocampal lesions, on several neurophysiological contributions and on neurochemical aspects of memory formation. It is doubtful whether any neuropsychologist would find any of this material useful—it might have been better as another book.

It is difficult to see any strong reason for buying this very expensive book. There are some interesting chapters in Sections 1 and 2 and (I suspect) in Section 3. However, there is little attempt to organize the material and no critical evaluation of the multitude of data and theories put forward. Anyone approaching the neuropsychology of memory for the first time should steer well clear of this book.

Alan Parkin

Mandler, J. M. (1984). *Stories, scripts, and scenes: Aspects of schema theory.* Hillsdale, N.J.: Lawrence Erlbaum Associates Inc. Pp. xii + 132, ISBN 0–89859–446–4. £19.15.

Long-term memory is a highly organized store of knowledge, as is shown by its use in story comprehension and other high-level cognitive tasks. However, an adequate theory of memory organization has yet to be formulated, let alone one that meshes with accounts of other cognitive processes. This fact does not reflect a lacuna in the cognitive science literature. Work on memory organization has flourished under such heads as frame-system theory, scripts, and *schemata* (or *schemas* as Jean Mandler asks us to call them).

There are two sides to this work. On the one hand particular knowledge structures in long-term memory have been investigated. For a variety of domains, what we know (often only implicitly) about regularities in the world has been explicitly codified. On the other hand general principles for describing the organization of knowledge in memory have been put forward. However, these general principles have little empirical content, and have received only mild confirmation from the description of particular knowledge structures in the frameworks that they suggest. Furthermore, as Mandler says at the beginning of *Stories, Scripts, and Scenes,* "it is not clear that any specific schema theory has yet reached that pinnacle of science" (i.e., "testability and especially falsifiability"). To put my own doubts more forcefully: In formulating principles about memory organization have we progressed beyond the general dictum that memory is organized in some way?

Given this worry, what of the detailed research on stories, scripts, and scenes, much of it from Mandler's own laboratory, reported in this

book? On Mandler's own admission, these studies do not test her general ideas about memory organization, though they do provide information about specific expectations that people have. Of her three main topics, Mandler argues that these expectations have been detailed most thoroughly for folk tales from the oral tradition—we are, she claims, quite well-informed about the "structure of story schemas". However, I am still unable to see how the evidence that Mandler cites tells us anything about the processing of stories *qua stories*. Of course we have expectations about what will happen in folk tales, but these expectations parallel the ones we have about how people will act in real life. They are based on our knowledge of the world, which includes familiarity with the hierarchical structuring of the goals and subgoals that guide people's actions. Much of the structure in folk tales derives from these goals and the characters' attempts to fulfil them. Mandler dismisses the suggestion that her findings can be explained in terms of plausibility, but only because she adopts an impoverished account of this notion—one which ignores the fact that the plausibility of a story depends partly on the goals of its protagonists. Goal hierarchies are not specific to stories, let alone stories from the oral tradition, yet Mandler seems to suggest that we understand the same sequence of actions differently in a folk tale, in a novel, and when actually witnessed.

We *do* have expectations specific to certain types of story. Fairy tales often end: "... and they all lived happily ever after.' More seriously, genre stories, such as detective novels, conform to relatively well-defined patterns. We even have expectations about the *structure* of texts, particularly poetical forms such as sonnets. However, the kinds of expectation that Mandler describes are not specific to stories, and should not be described as deriving from a *story* schema. Such schemata need to be dissected in the way scripts have been. Originally conceived as unitary memory structures, scripts are now regarded as assemblies of smaller, more fundamental units called Memory Organization Packets.

Obviously I am out of sympathy with the theoretical stance taken in this book. However, it does contain some useful material. Most obviously, it provides a summary of empirical work on memory for stories, events and scenes. I also like Mandler's critique of the "levels effect" in memory for text—the tendency for items higher in the structure to be remembered better than those in lower positions. Mandler notes that there are different, sometimes incompatible, ways of specifying "levels" in a text. She also worries about what it means to remember to a high-level node, given that the sentences it subsumes are not remembered verbatim. However, the distinction between different meanings of *proposition* provides no answer to my previous doubts about how the categories of story constituents can be determined (Garnham, 1983).

Stories, Scripts, and Scenes, although of some interest to those working on text processing and memory organization, is a slim volume with a comparatively high price tag. It will probably find its way into more public than private libraries.

Alan Garnham

REFERENCE

Garnham, A. (1983). What's wrong with story grammars? *Cognition,* 15, 145–154.

Smyth, M. M. and Wing, A. M. (Eds.). *The psychology of human movement.* London: Academic Press. 1984. Pp. xiv + 339. ISBN 0–12–653022–X. £16.00.

Descartes thought human movement was an automatic consequence of the flow of animal spirits from the mind to the body, which view seems to have left a legacy of a profound imbalance of interest, among psychologists, between perception and cognition on the one hand and action on the other. Descartes was nearly right: the body is a biological automaton, and we know that it can play a Chopin waltz only if the muscles receive a continuous and detailed flow of information from the nervous system. The central problem in the modern study of motor skill, then, is to determine the form of this information and the control of its flow, a problem that springs into focus when we try to get robots to perform some of the human skills. Ryle laid the philosophical foundation for this study with his discussion of tacit knowledge, but psychologists have been slow to recognize that it points to a deep symmetry between the epistemic problems of how meaning is perceived in the world and how it is conveyed through movement.

Smyth and Wing provide a useful introductory text on human action, its kinematics, its physiology, its disorders and its development in young infants. It overlaps considerably with recent books by Holding, by Kelso and by Schmidt. On balance, I prefer it to those books, but each has its special merits, and, conversely, none of them comes to satisfactory grips with the problem of motor skills: none of the authors in these books offers a coherent account of an information processing system that can, with practice, develop its control structure and refine perception and movement to achieve the degree of skill common in everyday activities. As a result, the accounts given in these books are reminiscent of primitive counting systems that go "one, two, many": having carefully