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Review of *EXPERIMENTAL COGNITIVE PSYCHOLOGY AND ITS
APPLICATIONS*, A. F. Healy (Ed.).**

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Book review

Applying cognitive psychology to education, training and testing

EXPERIMENTAL COGNITIVE PSYCHOLOGY AND ITS APPLICATIONS. A. F. Healy (Ed.). American Psychological Association, Washington, DC, 2005. 263 pages. ISBN 1-59147-183-4. Price \$69.95 (US) (hardcover).

This book, which is part of the American Psychological Association's Decade of Behavior series, is both less and more than it seems. Its title sounds like it would be suitable for a cognitive psychology laboratory course, but its scope is too narrow for that. It focuses largely on a relatively small subset of applied cognitive psychological topics—education, training, and testing—and the research traditions of three (albeit three distinguished and influential) researchers: Lyle Bourne, Walter Kintsch, and Thomas Landauer. In that sense, then, the book is less than it seems. In another sense, though, it is more than it seems. In using these research domains for exemplary purposes, it attempts, as few others have done, to bridge the gap (some might say “gulf”) between basic and applied cognitive psychology (see Neisser, 1978). And at this task it succeeds admirably.

To be fair, the volume never purports to be a comprehensive overview of applied cognitive psychology; rather, it serves two purposes. First, it brings together “contributions by some of the most significant contemporary experimental psychologists working in cognition ... so that [their] ideas and results can be integrated for use by practitioners in the field” (p. xiii). Second, it serves as a triple festschrift in honour of Bourne, Kintsch, and Landauer, who recently retired from the University of Colorado after many years of service. The chapters were originally presented at a conference in their honour.

The chapters are of two types. Three chapters are taken from symposia at the conference focusing on the careers and contributions of the three honourees. Although each of these chapters combines what were apparently several separate presentations, the authors—former students or collaborators of each honouree—do a nice job of making each chapter read more like a coherent whole than a pastiche of individual talks. The remaining chapters are by other conference participants, who are an impressive group of researchers. This portion of the book is divided into sections on Learning (with contributions by Anderson, Healy, and McDaniel), Memory (Bahrick, Loftus, and Nairne), Information Processing (Logan and Proctor), Discourse (Gernsbacher, Goldman, and Graesser), and Knowledge Representation (Nickerson, Schvaneveldt, Sternberg, and Steyvers). Most of these contributions are not linked directly to the honourees, but they are clearly inspired by their efforts, and the work is very much in the same tradition. Graesser *et al.* provide a nice metaphor for the task undertaken by all of the contributors and the honourees: They are attempting “to solve a three-body problem ... to productively coordinate science, computation, and application” (p. 183). The book provides a number of fine examples of this approach.

For example, the chapter by Kellogg *et al.* in honour of Bourne is not so much a summary of his research, as an extension of his work on intellectual skills' dependency on domain-specific knowledge. It provides a nice review of evidence from different labs, tasks, and domains (e.g. learning algebra, geography, writing skills). Streeter *et al.*'s chapter in honour of Landauer sets the tone for the whole volume, by invoking Stokes' (1997) model for good science, which seeks both knowledge and the solution to a practical problem. The three honourees clearly adhered to this model, as do all of the other contributors to the book, albeit to varying degrees.

The remaining chapters make this clear, as some emphasize basic psychological research, with merely a passing nod at applications, whereas others focus on the research's applications from the get-go. Fortunately, there are many more of the latter variety than the former. Several chapters—especially those by Bahrick, Nairne, and Schvaneveldt—take a broad approach to the field of cognitive psychology as a whole, rather than describing a narrow set of research findings. For example, Bahrick begins by noting that “One hundred and twenty years of psychological memory research have had scarcely any impact on education” (p. 89). From this starting point, he speculates on why memory researchers have neglected the long-term retention of educational content (i.e. semantic knowledge). He concludes that the reasons are largely historical, and goes on to summarize some of his own pioneering research on long-term retention. Although this group of chapters is more conceptual than empirical, it is nonetheless interesting to learn the view of the field held by these distinguished researchers.

Most (though not all) of the chapters focus on applying cognitive psychology to the classroom. For example, there are chapters on helping students learn mathematics (Anderson *et al.*) and foreign languages (Bahrick), improve reading comprehension (Goldman & Bloome; McDaniel & Einstein), understand narratives (Gernsbacher & Robertson), and solve physics problems (Graesser *et al.*). These chapters illustrate several important points.

First, experimental cognitive psychology can be successfully applied to the classroom context; and of course, these research programmes are just a few of the many success stories of applied cognitive psychology. Second, technology is, in many cases, helping to win the war. The efforts of Anderson *et al.* and Graesser *et al.* are especially nice exemplars of how computer technologies can enhance learning. Third, methodologically sound applied cognitive research is time-consuming, labour-intensive, and difficult. This theme comes through loud and clear in virtually all of the chapters. For example, Goldman and Bloome describe a project that involved daily videotaping, for 6–8 weeks, of seventh- and ninth-grade classrooms, as well as collecting written work. The logistical issues and amount of coding involved in such a project—which the authors modestly spare the reader—must be mind-boggling.

In keeping with the direction that the field is going, some contributions describe cognitive neuropsychological research programmes, such as Anderson *et al.*'s work on tracking eye movements and imaging the brain while students learn algebra, and Gernsbacher and Robertson's functional magnetic resonance imaging studies of the brain's activity while processing discourse. This research is very interesting, for two reasons: first, the methodologies themselves are very cool (there's really no better way to say it); and second, they have clear applications to educational settings. Understanding which regions of the brain are involved in performing an educational task, such as learning mathematics or processing discourse, can be used to improve instruction using tutors.

With the exception of the chapter by Sternberg and Grigorenko—which sounds an important note of caution about generalizing research results across cultures, especially in educational settings—all of the contributions deal with American participants in American learning contexts. To be sure, many of the findings, which concern fundamental cognitive processes, are likely to be universal, but this cautionary point is well taken. One can hope that the present volume will inspire more research on applied cognitive psychology, both in the US and abroad. It already provides a fine overview of selected research findings in cognitive psychology applied to education, training, and testing. If it also manages—as seems likely—to fuel interest in this crucial interdisciplinary domain, then it will truly become more than it seems.

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