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Progress in Cognitive
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For Mabel Gertrude Le Bas (nee Glover),
1892-1986 (MLH)

Series Preface

For some time now, the study of cognitive development has been far and away the most active discipline within developmental psychology. Although there would be much disagreement as to the exact proportion of papers published in developmental journals that could be considered cognitive, 50% seems like a conservative estimate. Hence, a series of scholarly books devoted to work in cognitive development is especially appropriate at this time.

The Springer Series in Cognitive Development contains two basic types of books, namely, edited collections of original chapters by several authors, and original volumes written by one author or a small group of authors. The flagship for the Springer Series is a serial publication of the “advances” type, carrying the subtitle *Progress in Cognitive Development Research*. Each volume in the *Progress* sequence is strongly thematic, in that it is limited to some well-defined domain of cognitive-developmental research (e.g., logical and mathematical development, development of learning). All *Progress* volumes will be edited collections. Editors of such collections, upon consultation with the Series Editor, may elect to have their books published either as contributions to the *Progress* sequence or as separate volumes. All books written by one author or a small group of authors are being published as separate volumes within the series.

A fairly broad definition of cognitive development is being used in the selection of books for this series. The classic topics of concept development, children’s thinking and reasoning, the development of learning, language development, and memory development will, of course, be included. So,

however, will newer areas such as social-cognitive development, educational applications, formal modeling, and philosophical implications of cognitive-developmental theory. Although it is anticipated that most books in the series will be empirical in orientation, theoretical and philosophical works are also welcome. With books of the latter sort, heterogeneity of theoretical perspective is encouraged, and no attempt will be made to foster some specific theoretical perspective at the expense of others (e.g., Piagetian versus behavioral or behavioral versus information processing).

C. J. Brainerd

Preface

When we speak of cognitive development, we normally mean the changes in functioning that occur between birth and physical maturity. This general tendency is reflected in many of the preceding volumes in the Springer Series in Cognitive Development, where the primary focus has been upon the advancement of knowledge in areas such as learning, memory, and cognition throughout childhood and early adolescence. As we are all aware, however, cognitive development does not end with adolescence, but, rather, continues over the life course. Although the study of development in adulthood has a rich history, the past few years have witnessed a dramatic increase in research activity, particularly in the area of changes in cognitive functioning that occur during late adulthood. This intensification of interest has led to an extensive literature, one that has even warranted the establishment of a new journal, *Psychology and Aging*, devoted to issues involved in understanding the nature of developmental changes that occur in adulthood.

In surveying this expanding literature, it became clear to us that an advances volume was needed, one that captured the diversity of both the content and the methodological/analytical procedures that typify the study of cognitive development in adulthood. Although a number of “handbooks” exist, some of which are excellent, the motivation for the present volume was to present chapters that not only review and discuss topics that are central to cognitive development in adulthood, but also integrate theory, analytical techniques, and new empirical findings, thereby providing a state-of-the-art snapshot of the study of cognitive aging. In soliciting chapters, we asked authors to prepare their contributions so as to weave their theoretical

positions together with discussions of methodological considerations and the presentation of new empirical findings. It is this blend of theory, data, and methodology, as well as the willingness of the authors to include original data and analyses, that should help make this volume a useful resource.

This volume is divided into two sections. The first section contains chapters that are concerned with the contributions of memory factors to cognitive aging. The second section contains chapters that are concerned with cognitive and performance factors. The first section begins with two chapters that focus on problems associated with the measurement of age changes in memory. In Chapter 1, Darlene Howard examines the use of explicit and implicit measures to assess memory changes in adulthood. The research reviewed in this chapter clearly shows that implicit memory measures yield different patterns of age variation than do explicit measures. It is argued that the reliance on explicit measures in most previous research has led to an overly pessimistic view of memory in the aged, and that a complete picture must incorporate both implicit and explicit aspects of memory. A second, classical problem in studies of memory and memory development concerns how we can obtain independent ratio-scale measures of basic processes such as storage and retrieval. In Chapter 2, Mark Howe discusses measurement problems arising from attempts to dissever storage and retrieval processes in developmental studies of long-term memory, and describes one resolution, namely, the use of Markov models. A recent identifiable implementation of a two-stage Markov model is then applied to a series of eight experiments. Here, it is shown that although the magnitude of age differences at retrieval exceed those at storage, both age invariances and age differences occur in these factors. In line with the arguments presented by Howard, Howe concludes that theories positing a unitary decline in memory functioning with age are at odds with the data and that a complete theory of memory aging must consider age changes as well as age invariances.

In Chapter 3, David Hultsch, Christopher Hertzog, Roger Dixon, and Heather Davidson describe their research on metamemory in adulthood. Using metamemory questionnaires, these authors have not only established the reliability and factorial validity of these measures, but have also shown consistent age differences in metamemory, particularly in relationship to measures of self-efficacy. In Chapter 4, Donald Kausler and Wemara Lichty discuss a program of research on memory for activities and the implications of this research for the study of both rehearsal-independent and rehearsal-dependent memory. They describe a two-stage model of activity/action memory in which age deficits in recall are attributed to differences in encoding contextual information. In the last chapter in this section, Chapter 5, Elizabeth Zelinski and Michael Gilewski present a meta-analysis of studies of the aging of prose memory. The results of this analysis, like those of other chapters, argue for both age differences and age invariances in memory for discourse.

The second section begins with an analysis of problem solving in adulthood. In Chapter 6, David Arenberg discusses two components of problem

solving, namely, analysis, and synthesis. Although individual differences are evident, both longitudinal and cross-sectional analyses reveal that older adults have more difficulty than younger adults at identifying the relevant information needed for the problem solution (analysis) and at putting the information together (synthesis). In Chapter 7, Timothy Salthouse provides a critical analysis of the concept of processing resources. Following a more formal articulation of this construct, he proceeds to examine the role of processing resources in a programmatic series of studies. He concludes that although the notion of processing resources should not be abandoned, neither should it be considered a true explanation of cognitive aging until it has been properly operationalized.

In Chapter 8, K. Warner Schaie outlines some further methodological problems in the study of cognitive aging that fall under the general heading of internal validity. After reviewing the nature of these problems and proposing relevant solutions, he provides a new analysis of some recent data from the Seattle Longitudinal Study. Schaie concludes that when the appropriate correction procedures for internal validity threats are in place, longitudinal parameter estimates are a preferred source of information in the study of cognitive aging. Finally, in the last chapter in this section, Chapter 9, Michael Stones and Albert Kozma provide a unique look at the relationship between activity levels and the aging of cognitive/motor performance. Following a review of both the empirical and theoretical literature, they propose a functional age model that is subsequently investigated in a series of studies. They conclude that (chronically) increased activity levels do indeed appear to influence cognitive performance, perhaps through a reduction in hypoxia. Importantly, these results suggest that physiological measures play a critical role in our understanding of cognitive aging.

Despite the diversity of topics and research methods contained in this book, when taken together the chapters paint an optimistic picture of the aging of memory and cognition. The different contributions in both sections illustrate an important point about the study of cognitive development in adulthood: While there are clear circumstances in which older adults do not perform as well as younger adults (instances that tell us much about the decline of functioning with age), there are many other circumstances in which age differences are absent (or favor older adults). It is only when both age differences and age invariances are considered in concert that a satisfactory theory of the aging of memory and cognition will emerge.

Acknowledgment. Preparation of this volume was facilitated by a research grant from the Natural Sciences and Engineering Research Council of Canada (No. A3334) to Mark L. Howe.

M.L. Howe
C.J. Brainerd

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