

METACOGNITION,
STRATEGY USE,
& INSTRUCTION



edited by **Harriet Salatas Waters**
and **Wolfgang Schneider**

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Edited by
HARRIET SALATAS WATERS
WOLFGANG SCHNEIDER

Foreword by John G. Borkowski



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In Memory of Michael Pressley

Throughout his remarkable career in developmental and educational psychology Michael Pressley explored the interplay between metacognition, strategy use, and performance, and applications of that knowledge to the classroom. Michael was convinced of Kurt Lewin's maxim "There is nothing so practical as a good theory"—or, better yet, a good theorist—and his laboratory always encompassed and impacted real children in real schools. His legacy includes a sophisticated developmental framework for understanding metacognition and strategy development. Always alert to new possibilities and applications, his recent chapter for the *Handbook of Child Psychology*, 6th edition (2006) heralded a new generation of research on strategy development. Where many of his colleagues saw a mature field, Michael argued that we are only at the threshold of understanding how strategy discovery, cognitive growth, and metacognition interact and play out in classroom settings. Many in the field now agree with that assessment. The current book brings together leading contributors to the study of metacognition, strategy development, and instruction to celebrate Michael's contributions and frame the key questions in the field for a new generation of researchers.

The chapters address different issues about how metacognition and strategy use relationships are best conceived, always with an emphasis on the implications for instruction. They are organized into three areas of investigation: (1) skilled memory; (2) math and science; and (3) reading, writing, and academic performance. These areas reflect the broadening investigation of metacognition and strategy development over the years into diverse cognitive domains beyond their early roots in memory. The different contributors highlight common threads in their investigations based on their interests in metacognition, strategy development, and

instruction, in spite of the differing skill domains in which they work. This book provides a single source for researchers who want to better understand metacognition and strategy use commonalities across cognitive domains.

Michael had an unbridled enthusiasm for the field of metacognition and strategy development, and we think that he would be particularly pleased with this volume. He always had time to talk to anyone who was interested, whether it was at a conference or in a chance encounter, and was equally open to conversing with students as well as with colleagues. He understood the importance of sharing ideas and maintaining open lines of communication across different cognitive domains. The present volume honors that insight by bringing researchers together to share ideas about metacognition and strategy use, and we hope in doing so to frame future investigations on strategy growth through discovery and instruction.

HARRIET SALATAS WATERS
WOLFGANG SCHNEIDER

Foreword

Hidden in the 2004 version of his vita, Michael Pressley provided a unique and fascinating self-portrait: “Mr. Pressley does not align consistently with the political perspectives of either major political party with respect to literacy (or any other issue for that matter). He is not a registered member of either party, but rather prefers to be fiercely independent in his political affairs, sometimes characterized as moderate, but always advocating for the rights of children and families, especially their educational rights. He is a career supporter of foreign policy initiatives that are more likely to bring lasting peace to the world rather than proliferate conflict.”

“Mr. Pressley” was indeed an iconoclast. Rarely do scholars include such personal reflections in their vita, and generally for good reasons. Yet, I believe Michael penned these comments for a good reason—a reason, in retrospect, related to the themes, scope, and importance of *Metacognition, Strategy Use, and Instruction*.

As in his political life, Michael did not align himself in his professional life to a single methodological perspective. His award-winning work on children’s strategic learning in controlled settings used experimental designs, while his last empirical paper (published in the *Journal of Educational Psychology*) on the reasons for the striking educational successes at Chicago’s Providence St. Mel school used a comprehensive, ethnographic approach. He was not a registered member of any particular theoretical camp, although he found the good information-processing model reasonably comfortable. He accepted this framework so as to focus on the nature of competent teaching to improve children’s literacy and classroom achievements, using knowledge tested in diverse methodological paradigms.

If Michael sometimes saw himself as a political moderate, he was not a moderate in his search for sound answers to complex educational problems. As an editor and critic, he pushed friends and colleagues hard—as well as the field at large—to improve the preciseness of their thinking and the soundness of their methodological approaches. While there was for Michael—as for all of us—a deeply personal factor in his scholarship and its subsequent recognition by many professional organizations, he maintained an overwhelming desire to influence children’s lives through quality education and, thus, to improve the world’s chances for peace by elevating literacy and making “best teaching practice” available to all, rich and poor. Perhaps this is why he put so much time and energy into editorial assignments and tutoring young scholars, knowing full well his own limited time to effect sweeping changes in strategy-based teaching and learning in classrooms here and around the world.

Michael would be pleased with *Metacognition, Strategy Use, and Instruction*. His friends Harriet Salatas Waters and Wolfgang Schneider have assembled a group of colleagues who represent methodological diversity, theoretical richness, and innovative insights in their scholarly work. Their collective scholarship summarizes much of what we know about the meaning of skilled memory, how mathematical and scientific reasoning can be advanced through strategic learning, and how to improve academic performance in a variety of domains and settings. What is unique about this book is the integration of laboratory and classroom research. Michael Pressley was equally passionate about studying cognition in the classroom and in the laboratory and was convinced that research on cognitive development was of profound relevance for understanding children’s progress in school.

The individual threads of Michael’s scholarship over nearly four decades can be woven into a set of five interrelated themes: (1) understanding children’s development of cognitive and metacognitive strategies; (2) designing interventions that promote complex strategy use, especially in early reading readiness; (3) classifying how motivation affects strategy use and self-regulated learning; (4) searching for strategy use in classrooms led by expert teachers; and (5) translating all of this knowledge—derived from controlled and naturalistic research settings—so as to improve teacher training. This is how Michael hoped to shape the lives of children and, in turn, to prod the world toward peace and prosperity.

This book reflects the major themes of Michael’s research agenda. The first set of chapters—Waters and Kunnmann on strategy discovery in early childhood (Chapter 1); Ornstein, Grammer, and Coffman on teacher’s mnemonic styles and children’s development of skilled memory (Chapter 2); and Schneider on metacognition and memory development (Chapter 3)—emphasize the complexity involved in the development of

skilled memory. In contrast to the first phase of memory research (around 1975 to 1995), the new wave explores the precise conditions under which goal-directed strategy use develops in young children, the role of strategic teachers in prompting children's enduring use of strategies in classroom contexts, and the process through which a child's knowledge of mental verbs (e.g., knowing or forgetting) and acquisition of a "theory of mind" become precursors to metamemory, and, subsequently, to enhanced recall performance. These three chapters reflect more complex theory, more intense data gathering, and greater respect for individual differences in background, talent, and motivation than the first wave of memory research.

The second set of chapters analyze the role of cognitive and metacognitive processing for success in math and science as well as the importance of contextual supports sometimes provided by peers. Siegler and Lin begin by focusing on how self-explanations promote children's learning (Chapter 4); Waters and Waters study how children and adult bird experts differ in knowledge utilization and self-monitoring (Chapter 5); Kuhn and Pease analyze how production and inhibition are key components in developing an effective use of strategies (Chapter 6); Mayer shows how multimedia instruction fosters scientific reasoning (Chapter 7); and Carr reports on how metacognition influences conceptual changes underlying children's math strategies (Chapter 8). These five chapters are noteworthy for their emphases on microgenetic designs in which variability among children—measured intensively over time—becomes the venue for observing stability and instability in strategy use. The field is indebted to Siegler, Kuhn, and other researchers for developing this methodological approach, whose impact is seen in many of the chapters in this section. Parenthetically, Michael's own use of the ethnographic method in classrooms at Providence St. Mel and at Benchmark School in Media, Pennsylvania, bears similarities to the microgenetic approach. Given the typical variability observed in individual behavior, even over short time spans, "single-shot, one-look" approaches to studying complex cognitive processing yields confusion and chaos rather than reliable, profound insights.

The third and final set of chapters—on reading, writing, and academic performance—mirror Michael's main concerns during the final phase of his illustrious career. Afflerbach and Cho demonstrate the potential role of the Internet in fostering reading strategies (Chapter 9); Harris, Santangelo, and Graham show the power of strategy instruction on skilled writing (Chapter 10); and Cornoldi develops an integrative model of metacognition, working memory, and intelligence as they conjointly influence academic performance (Chapter 11). These final chapters reflect specific interventions and a working theoretical framework that together point

the way to improving classroom performance through the enhanced use of novel strategies in the essential skills of reading and writing. Waters and Schneider provide a summary and analysis of the book and highlight its major themes in the conclusion (Chapter 12).

The last decade of Michael's research career focused on the nature of classroom instruction, with a keen eye toward how expert and novice (or poor) teachers employ a variety of strategies useful to students in carrying out reading and reasoning assignments and how they motivate students to persist in the face of challenging work. In many respects, *Metacognition, Strategy Use, and Instruction* fulfills Michael's dream of using research in controlled and naturalistic settings to influence a new generation of teachers who will inspire their students to become lifelong learners, morally conscious about the world around them, and dedicated to peace and justice. Michael would be happy to read about the diverse, high-quality scholarship that has been assembled in this book—a book that sets the stage for the next generation of research on metacognition and strategy use.

JOHN G. BORKOWSKI, PHD
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Contents

PART I. SKILLED MEMORY

- | | | |
|----------|--|-----------|
| 1 | Metacognition and Strategy Discovery
in Early Childhood | 3 |
| | <i>Harriet Salatas Waters and Thomas W. Kummann</i> | |
| 2 | Teachers' "Mnemonic Style" and the Development
of Skilled Memory | 23 |
| | <i>Peter A. Ornstein, Jennie K. Grammer, and Jennifer L. Coffman</i> | |
| 3 | Metacognition and Memory Development
in Childhood and Adolescence | 54 |
| | <i>Wolfgang Schneider</i> | |

PART II. MATH AND SCIENCE

- | | | |
|----------|--|------------|
| 4 | Self-Explanations Promote Children's Learning | 85 |
| | <i>Robert S. Siegler and Xiaodong Lin</i> | |
| 5 | Bird Experts: A Study of Child and Adult
Knowledge Utilization | 113 |
| | <i>Harriet Salatas Waters and Theodore E. A. Waters</i> | |
| 6 | The Dual Components of Developing
Strategy Use: Production and Inhibition | 135 |
| | <i>Deanna Kuhn and Maria Pease</i> | |

7	Fostering Scientific Reasoning with Multimedia Instruction	160
	<i>Richard E. Mayer</i>	

8	The Importance of Metacognition for Conceptual Change and Strategy Use in Mathematics	176
	<i>Martha Carr</i>	

**PART III. READING, WRITING,
AND ACADEMIC PERFORMANCE**

9	Determining and Describing Reading Strategies: Internet and Traditional Forms of Reading	201
	<i>Peter Afflerbach and Byeong-Young Cho</i>	

10	Metacognition and Strategies Instruction in Writing	226
	<i>Karen R. Harris, Tanya Santangelo, and Steve Graham</i>	

11	Metacognition, Intelligence, and Academic Performance	257
	<i>Cesare Cornoldi</i>	

PART IV. CONCLUSION

12	Common Themes and Future Challenges	281
	<i>Harriet Salatas Waters and Wolfgang Schneider</i>	

	Author Index	289
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	Subject Index	295
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Part I

SKILLED MEMORY

Metacognition and Strategy Discovery in Early Childhood

Harriet Salatas Waters
Thomas W. Kunnmann

Since the field of the memory development began several decades ago, evidence has accumulated on important age differences in strategy use, metacognition, and the impact of both on memory performance (Schneider & Pressley, 1997; Schneider & Bjorklund, 1998; Pressley & Hilden, 2006). Young children are capable of using strategies, but only if the materials are just right, the processing conditions are right, and instructions are set up to prompt strategy use. It is only as children mature that they broaden their strategy use across different materials and processing conditions. Hand-in-hand with strategy development, there are comparable changes in metacognition, with an increasing awareness of strategy use and its impact on performance (Pressley, Borkowski, & Schneider, 1987; McCormick, 2003).

Thus, we have a general picture of the developmental pattern leading toward more skilled memory, but have learned very little about how individual children make the transition from the more passive, less deliberate strategy use of early childhood toward the more active, goal-directed strategy use typical of older children. Part of the problem has been that early work on memory strategy development relied on adult experimental paradigms adapted for children. These paradigms were primarily used in cross-sectional designs and did not provide information about intra-individual patterns of development. Not surprisingly, researchers continue to bemoan how little we know about factors that propel children toward skilled remembering (e.g., Ornstein & Haden, 2001).