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Sponsors' Foreword

One of the greatest challenges facing neuroscience is the understanding of human memory. Over the years, studies have repeatedly shown the exquisite precision in how the brain develops, how information is integrated and processed by neurons, and how various functions are organized and distributed in different brain sites. Yet both daily experience and ample observations clearly demonstrate that somehow embedded within this deceptively stable structure is an amazing capacity to adapt and change as a result of experience—allowing the brain to acquire, retain, and later, when needed, retrieve the stored information for subsequent use. What are the brain mechanisms underlying the various facets of declarative memory (our memory for facts and events) and how do these compare with mechanisms giving rise to other kinds of learning and memory? What are the unique properties and what are the common features shared by different types of nondeclarative learning, such as emotional learning, motor learning, and olfactory learning? What factors or mechanisms are associated with age-related memory decline and other undesirable changes, such as pathological forms of fear conditioning, drug and alcohol addiction, and the development of chronic debilitating pain after injury? What can be done to reverse or prevent such maladaptive changes? And how can we prevent the devastating memory loss associated with diseases such as Alzheimer's?

Advances in our understanding of learning and memory have come from studies conducted in a variety of organisms, ranging from invertebrates, such as *Aplysia* and *Drosophila*, to humans. Tremendous gains have been made at many levels of analysis—from molecular, cellular, and systems level approaches to cognitive and behavioral studies. In many brain systems, barriers between different scientific disciplines are dissolving, and our understanding of the genes, proteins, and signaling cascades underpinning learning processes are beginning to converge into an integrated understanding of the neurobiological and cognitive processes underlying memory.

The areas reviewed in the present volume are among those where we have seen some of the most remarkable progress in recent years. The neuroscience institutes at the National Institutes of Health have long recognized the importance of basic research directed at understanding the neural mechanisms underlying learning and memory. In addition to being at the scientific frontier, studies of learning and memory are crucial to our eventual understanding of the processes that go awry in brain illnesses that lead to disorders of cognition, perception, and memory. This research is essential for guiding the development of effective preventions, treatments, and cures for many of the most serious brain-related disorders. We are, therefore, pleased to support this important volume to highlight these advances.

Thomas R. Insel, M.D., Director,
National Institute of Mental Health

Richard Hodes, M.D., Director,
National Institute on Aging

James Battey, M.D., Ph.D., Director,
National Institute on Deafness and Other Communication Disorders

Duane Alexander, M.D., Director,
National Institute of Child Health and Human Development

Story Landis, Ph.D., Director,
National Institute of Neurological Disorders and Stroke

Nora D. Volkow, M.D., Director,
National Institute on Drug Abuse

Ting-Kai Li, M.D., Director,
National Institute on Alcohol Abuse and Alcoholism

For information on the areas of interest for each institute, please visit the websites listed below and contact our staff listed at these websites:
NIMH: http://www.nimh.nih.gov/diva/index.cfm
NINDS: http://www.ninds.nih.gov/funding/index.htm
NIA: http://www.nia.nih.gov/research/
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