This book presents a new, “triarchic” theory of human intelligence that goes beyond IQ in its conceptualization and implications for assessment. The theory has three parts. The first deals with the relations between intelligence and experience. It describes the role that intelligence plays at various points in our continuum of experience with tasks and situations, from the time we first encounter them to the time they have become thoroughly familiar. The second deals with the relations between intelligence and the external world. It describes the interplay between intelligence and the contexts in which it is exercised and, indeed, defined. The third deals with the relations between intelligence and the internal world of the individual. It describes the mental mechanisms that underlie what we consider to be “intelligent performance.”

Robert J. Sternberg begins by sketching the history of intelligence research. He then outlines the three parts of the theory and adduces supporting evidence, including evidence from studies of “practical” as well as “academic” intelligence. He considers the issues raised by exceptional intelligence and by intelligence testing.

His conclusions will be of interest to all those concerned with intelligence, its development and its measurement.
Beyond IQ

A triarchic theory of human intelligence

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This book is dedicated to that triarchy of mentors and role models who have been most influential in shaping my professional values, standards, and ways of thinking over the years:

GORDON BOWER  WENDELL GARNER  ENDEL TULVING
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Preface

The general goal of this book is to present a new, “triarchic” theory of human intelligence. I believe the theory goes beyond many previous theories in its scope and answers a broader array of questions about intelligence than has been answered in the past by most single theories, including my own former componental theory. Indeed, the theory is to some extent an outgrowth of the componental theory: That theory is now one of three subtheories that comprise the triarchic theory.

The first subtheory, a contextual subtheory, specifies how intelligent behavior is defined in large part by the sociocultural context in which this behavior takes place. Contextually intelligent behavior is specified to involve (a) adaptation to a present environment, (b) selection of a more nearly optimal environment than the one the individual presently inhabits, or (c) shaping of the present environment so as to render it a better fit to one’s skills, interests, or values. The normal course of intelligent functioning in the everyday world entails adaptation to the environment; when the environment does not fit one’s values, aptitudes, or interests, one may attempt to shape the environment so as to achieve a better person–environment fit; when shaping fails, an attempt may be made to select a new environment that provides a better fit. Alternatively, one may attempt to shape the old environment when selection fails. What is involved in adaptation, selection, and shaping can be determined, to some extent, by examining people’s conceptions of intelligence within a given sociocultural milieu. The “implicit” theories of persons thus derived can then serve as a framework for explicit theorizing about intelligence. Contextual theories, in general, and this one, in particular, do not place sufficient constraints upon behavior in order fully to characterize what constitutes intelligent behavior. Hence, a contextual theory can serve only as a subtheory of a full theory of intelligence.

The second subtheory, an experiential subtheory, posits that for a given task or situation, contextually appropriate behavior is not equally “intelli-
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gent” at all points along the continuum of experience with that behavior or class of behaviors. Rather, one’s intelligence is best demonstrated when one is (a) confronted with a relatively (but not totally) novel task or situation or is (b) in the process of automatizing performance on a given task or in a given situation. These two facets interact to some extent: Efficacious automatization of processing allows allocation of additional resources to the processing of novelty in the environment; conversely, efficacious adaptation to novelty allows automatization to occur earlier in one’s experience with new tasks and situations. Thus, one cannot simply classify a task as either requiring intelligence or not requiring intelligence. The extent to which it requires intelligence depends upon the point in an individual’s experiential continuum at which the task is encountered. The same holds true for situations. Although this subtheory constrains the contextual subtheory in stating at what points along the experiential continuum contextually appropriate behavior is more and less intelligent, it does not specify the mental structures or mechanisms involved in intelligent behavior.

The third subtheory, a componential subtheory, specifies the structures and mechanisms that underlie intelligent behavior. Contextually appropriate behavior emitted at the relevant points in the experiential continuum is intelligent as a function of the extent to which it involves certain kinds of mental processes: Metacomponents control one’s information processing and enable one to monitor and later evaluate it; performance components execute the plans constructed by the metacomponents; knowledge-acquisition components selectively encode and combine new information and selectively compare new information to old information, so as to allow learning of new information to take place. This subtheory thus specifies the cognitive processes involved in adaptation to, selection of, and shaping of environments. The componential subtheory completes the triarchy of specifications that defines the extent to which a given behavior is intelligent.

In sum, the contextual subtheory relates intelligence to the external world of the individual; it addresses the questions of what behaviors are intelligent for whom and of where these behaviors are intelligent. The subtheory specifies the potential set of contents for behaviors that can be characterized as intelligent. The experiential subtheory relates intelligence to both the internal and external worlds of the individual; it answers the question of when behavior is intelligent. This subtheory specifies the relation between intelligence as exhibited on a task or in a situation, on the one hand, and amount of experience with the task or situation, on the other. The componential subtheory relates intelligence to the internal world of the individual; it answers the question of how intelligent behavior is generated. In particular, the subtheory specifies the potential set of mental mechanisms that underlie intelligent behavior, regardless of the particular behavioral contents. The
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three subtheories, taken together, can be used to understand individual differences, or who is intelligent. I hope that I will provide in the course of the explication of the subtheories sufficient evidence to establish why it is that certain behavior can be considered, on a theoretical basis, to be more intelligent than other behavior.

The first, contextual subtheory, is “relativistic” with respect to both individuals and the sociocultural settings in which they live. What constitutes an intelligent act may differ from one person to another. The second, experiential subtheory, is relativistic only with respect to the points at which novelty and automatization are relevant for a given individual. But the relevance of the two facets to intelligence is claimed to be universal. The third subtheory is universal: Although individuals may differ in what mental mechanisms they apply to a given task or situation, the potential set of mental mechanisms underlying intelligence is viewed to be the same across all individuals and sociocultural settings. Thus, the vehicles by which one might wish to measure intelligence (test contents, modes of presentation, formats for test items, etc.) will probably need to differ across sociocultural groups and possibly even within such groups; but the underlying mechanisms to be measured and their functions in dealing with novelty and in becoming automatized do not differ across individuals or groups.

The book has three specific goals as well as the general goal noted at the beginning.

First, it presents the first full statement of the triarchic theory. Prior to this book, the componential subtheory was all I had to offer by way of a theory of human intelligence. But as the years have gone by, I have become increasingly aware of the incompleteness of this subtheory as an account of human intelligence. The present theory remedies some (I hope, many) of the incompletenesses of the componential account.

Second, the book serves to update the presentation of my theorizing since the publication of my 1977 book, Intelligence, Information Processing, and Analogical Reasoning: The Componential Analysis of Human Abilities. This earlier book is now out of date: My subsequent theory and empirical research have been presented in a series of articles and book contributions that have followed the earlier book. The present book pulls together and integrates under the rubric of the triarchic theory the material that until now has been presented only in scattered fashion.

Third, the book is intended to serve as a metatheoretical statement of the form theories of intelligence might take in the future, as well as an initial statement of a theory that takes this form. I believe that previous theories, such as the componential one, have tended to address only very limited aspects of human intelligence. For whatever value they may have had as theories of cognition, they have been of lesser value, because of their incom-
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pleteness, as full-scale theories of intelligence. I believe the present theory goes beyond many past theories in both the breadth of questions addressed and the depth of the answers proposed.

The book is divided into five parts comprising twelve chapters, which in combination give a thorough presentation of the triarchic theory and existing tests of it.

Part I consists of just Chapter 1, “Conceptions of intelligence.” This introductory chapter discusses the history of theory and research on intelligence and places the triarchic theory in a historical context of theories of human intelligence.

Part II, on subtheories of the triarchic theory, consists of three chapters. Chapter 2, “The context of intelligence,” presents my contextual subtheory and describes why intelligence should be understood in part in terms of the individual’s attempt to adapt to, select, and shape real-world environments. Chapter 3, “Experience and intelligence,” presents an experiential subtheory that places certain constraints upon the contextual subtheory. The subtheory holds that two facets of contextually appropriate behavior, response to novelty and automatization of information processing, are part of what makes such behavior “intelligent.” Chapter 4, “Components of intelligence,” presents my componential subtheory, which specifies the mental structures and mechanisms involved in intelligent behavior. It thus completes the set of constraints that needs to be applied to the contextual subtheory, as well as to the experiential subtheory, in order to have a reasonably complete theory of intelligence.

Part III, presenting tests of the triarchic theory, describes the theories of cognitive functioning nested under the triarchic theory, especially the componential subtheory, and presents the results of numerous tests of these theories of cognitive functioning. This part of the book is divided into five chapters. The organization of these chapters into sets of chapters dealing with fluid, crystallized, and practical aspects of intelligence derives from the contextually derived implicit theory of intelligence presented in the preceding part of the book. Chapters 5 and 6 deal with “fluid” aspects of intelligent functioning. Chapter 5, “Fluid abilities: inductive reasoning,” presents a componential theory of inductive reasoning and tests of this theory. Chapter 6, “Fluid abilities: deductive reasoning,” presents a componential theory of deductive reasoning and tests of this theory. Chapters 7 and 8 deal with “crystallized” aspects of intelligent functioning, but also with the question of how fluid abilities give rise to crystallized ones. Chapter 7, “Crystallized intelligence: acquisition of verbal comprehension,” describes a theory of acquisition of verbal information (and particularly vocabulary) from context and relates acquisition processes to present levels of knowledge. Chapter 8, “Crystallized intelligence: theory of information processing in real-time
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verbal comprehension,” describes a theory of how verbal information, and especially vocabulary, is processed in real time. Chapter 9, “Social and practical intelligence,” extends the triarchic theory to more worldly domains. It presents limited theories of adaptive functioning and tests of the theories as they apply to social and practical adaptation in the world.

Part IV, discussing some implications of the triarchic theory, contains two chapters. Chapter 10, “Exceptional intelligence,” deals with the implications of the theory for understanding intellectual giftedness and retardation. Chapter 11, “Implications of the triarchic theory for intelligence testing,” views current intelligence tests from the perspective of the triarchic theory, and suggests how such tests might be changed.

Part V, the concluding remarks, consists just of Chapter 12, “Integration and implications,” which discusses some general issues regarding intelligence that arise out of the theory and the tests of the theory that have been conducted.

In sum, I present in this book a new triarchic theory of human intelligence and the evidence that supports the theory. Although this theory, like every other theory of intelligence or any other psychological construct, will have only a limited half-life, I hope that the theory helps us better understand the nature of intelligence and is useful in guiding research on intelligence in productive directions.

Many people have contributed immeasurably to the development of the ideas presented in this book. In particular, I must thank the present and past members of my research group at Yale both for their valuable collaborations in the research described here and for their continuous influence on, contributions to, and critiques of my thinking. Because of their tremendous contributions, over the eight years I have been at Yale, to the work presented in this book, I would be doing them a great disservice not to mention them individually by name: Cindy Berg, Liz Charles, Barbara Conway, Janet Davidson, Cathryn Downing, Mike Gardner, Bob Greene, Marty Guyote, Danny Kaye, Jerry Ketron, Maria Lasaga, Diana Marr, Tim McNamara, Georgia Nigro, Jan Powell, Bathsheva Rifkin, Brian Ross, Bill Salter, Miriam Schustack, Louise Spear, Judi Suben, Sheldon Tetewsky, Roger Tourangeau, Meg Turner, Rick Wagner, Evelyn Weil. Janet Davidson and Bob Greene had the kindness and patience to read through and comment upon the entire book manuscript, for which I am especially grateful. My students and staff have in no way been “junior componenial analysts” or “junior triarchic theorists.” To the contrary, they have worked highly independently, bear major responsibility for many of the ideas in our joint research, and have disagreed with me at least as often as they have agreed. I owe them a tremendous debt.
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R. J. S.