The Cambridge Handbook of Intelligence

This volume provides the most comprehensive and up-to-date compendium of theory and research in the field of human intelligence. The 42 chapters are written by world-renowned experts, each in his or her respective field, and collectively, the chapters cover the full range of topics of contemporary interest in the study of intelligence. The handbook is divided into nine parts: Part I covers intelligence and its measurement; Part II deals with the development of intelligence; Part III discusses intelligence and group differences; Part IV concerns the biology of intelligence; Part V is about intelligence and information processing; Part VI discusses different kinds of intelligence; Part VII covers intelligence and society; Part VIII concerns intelligence in relation to allied constructs; and Part IX is the concluding chapter, which reflects on where the field is currently and where it still needs to go.

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The Cambridge Handbook of Intelligence

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This volume is dedicated to the memory of
John L. Horn, foremost scholar, dedicated
colleague, wonderful friend.
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Suppose there were two identical twins stranded on a desert island. Because they have the same genes and are in the same environment, they adapt equally well to the rigorous demands of survival. Would the concept of intelligence ever arise? This conundrum was first posed by Quinn McNe- 
mar (1964) in his presidential address to the American Psychological Association. The 
conundrum raised the question of whether our concept of intelligence is based exclu-
sively on individual differences. It also showed the extent to which in the earlier part of the 20th century, thinking about intelligence was very closely tied to the psychological study of individual differences, or “differential psychology.” In those days, there were many different theories of intelligence but Edwin Boring’s (1923) view of intelligence as whatever it is that intelligence tests measure seemed to be a starting point for much of this research. The factor-analytic theorists who belonged to the differential-psychology movement generally used such tests as the starting point for generating their theories. They still do.

As we start the second decade of the 21st century, approaches to the study of intelligence are far more varied and diverse than they were then. They still very much include the differentially based factor-analytic approach, but they include other approaches as well. Embracing such a diversity of approaches raises far more questions than were raised before about just what intelligence is. But there has never been much agreement on what intelligence is. Even in the early 20th century, when experts were asked what they believe intelligence to be, every expert gave a different answer (“Intelligence and Its Measurement,” 1921). This situation leaves us with the Humpty Dumpty conundrum:

“I don’t know what you mean by ‘glory,’” Alice said. Humpty Dumpty smiled con-
temptuously. “Of course you don’t – till I tell you. I meant ‘there’s a nice knock-
down argument for you’!” “But ‘glory’ doesn’t mean ‘a nice knock-down argu-
ment,’” Alice objected. “When I use a word,” Humpty Dumpty said, in rather a scornful tone, “it means just what I choose it
to mean – neither more nor less." "The question is," said Alice, "whether you can make words mean so many different things." "The question is," said Humpty Dumpty, "which is to be master – that's all." (Lewis Carroll, Through the Looking-Glass, ch. VI)

Does intelligence have any set meaning at all, or does it end up meaning what we want it to mean? Is it discovered, invented, or some combination of the two?

This handbook addresses the most basic questions about intelligence – such as how we come to conceive of it and what it means – and also addresses questions such as how to measure it, how it develops, and how it can be increased, if at all. The handbook is the culmination of a series of volumes, all published by Cambridge University Press. The first volume was published almost 30 years ago (Sternberg, 1982). That Handbook of Human Intelligence was the first comprehensive volume trying to set down and synthesize the entire field of human intelligence. The handbook was intended to guide research on intelligence for the remainder of the 20th century. The century ended and so the second volume was published 18 years later (Sternberg, 2000). The Handbook of Intelligence was broader than the original handbook and included material on animal intelligence as well – hence, the word "human" was dropped from the title. Four years later, the International Handbook of Intelligence (Sternberg, 2004) was published. The goal of that book was to present intelligence in a global way. How is intelligence conceived of, measured, and developed in countries around the world? The handbook revealed similarities but also great diversity in the ways in which intelligence is viewed around the world.

The field of intelligence has been moving forward at a much greater rate than ever before, and this explosion of knowledge is what has led to the publication of a new and even more comprehensive handbook only slightly more than a decade after the 2000 publication. This handbook is a joint effort between Sternberg and a collaborator and former student at Yale, Scott Barry Kaufman. The Cambridge Handbook of Intelligence, which you are now reading, is by far the most comprehensive single-volume work to present to readers the breadth and depth of work being done in recent years in the field of intelligence. The handbook is divided into nine parts.

Part I, "Intelligence and Its Measurement," contains four chapters that introduce the constructs. Chapter 1, "History of Theories and Measurement of Intelligence," by N. J. Mackintosh, reviews how our current theories and measurements of intelligence have come to be. Chapter 2, "Tests of Intelligence," by Susana Urbina, discusses the current state of intelligence tests and the issues confronting them. Chapter 3, "Factor-Analytic Models of Intelligence," by John O. Willis, Ron Dumont, and Alan S. Kaufman, reviews the differential approach to intelligence and the factor-analytic models that have arisen out of it. Chapter 4, "Contemporary Models of Intelligence," by Janet E. Davidson and Iris A. Kemp, surveys and evaluates some of the major contemporary models.

Part II deals with various aspects of the "Development of Intelligence." Chapter 5, "Intelligence: Genes, Environments, and Their Interactions," by Samuel D. Mandelman and Elena L. Grigorenko, reveals our current knowledge about how genes and environment interact to produce intelligence. Chapter 6, "Developing Intelligence through Instruction," by Raymond S. Nickerson, discusses what we have learned about how intelligence can be developed through instructional techniques. Chapter 7, "Intelligence in Infancy," by Joseph F. Fagan, analyzes what we know about intelligence in the earliest years of life. Chapter 8, "Intelligence in Childhood," by L. Todd Rose and Kurt W. Fischer, reviews the literature on how intelligence develops and manifests itself during the childhood and teenage years. Chapter 9, "Intelligence in Adulthood," by Christopher Hertzog, reviews our knowledge of how intelligence develops throughout the adult life span.

Part III deals with "Intelligence and Group Differences." Chapter 10,

Part IV is on the "Biology of Intelligence." Chapter 16, "Animal Intelligence," by Thomas R. Zentall, summarizes and integrates our knowledge about intelligence in animals other than humans. Chapter 17, "The Evolution of Intelligence," by Liane Gabora and Anne Russon, discusses how intelligence has evolved over time within but primarily across species boundaries. Chapter 18, "Biological Bases of Intelligence," by Richard J. Haier, evaluates our knowledge regarding biological bases, particularly as revealed by neurocognitive imaging.

Part V is about "Intelligence and Information Processing." Chapter 19, "Basic Processes of Intelligence," by Ted Nettelbeck, deals with the more basic attentional and perceptual processes that provide a foundation for intelligence. Chapter 20, "Working Memory and Intelligence," by Andrew R. A. Conway, Sarah J. Getz, Brooke Macnamara, and Pascale M. J. Engel de Abreu, points to interesting research that suggests that working memory and fluid intelligence are extremely closely related. Chapter 21, "Intelligence and Reasoning," by David F. Lohman and Joni M. Lakin, takes a more traditional approach, relating intelligence to reasoning and primarily inductive reasoning. Chapter 22, "Intelligence and the Cognitive Unconscious," by Scott Barry Kaufman, takes a look at interesting literature, some of it quite recent, suggesting that the cognitive unconscious may play more of a role in intelligence than many of us might think. Chapter 23, "Artificial Intelligence," by Ashok K. Goel and Jim Davies, provides a panorama of current views on artificial intelligence and how it relates to natural intelligence.

Part VI deals with "Kinds of Intelligence." Chapter 24, "The Theory of Multiple Intelligences," by Katie Davis, Joanna Christodoulou, Scott Seider, and Howard Gardner, presents the widely known and utilized theory of multiple intelligences originally presented by Howard Gardner. Chapter 25, "The Theory of Successful Intelligence," by Robert J. Sternberg, summarizes the (triarchic) theory of successful intelligence and the empirical evidence supporting it. Chapter 26, "Emotional Intelligence," by John D. Mayer, Peter Salovey, David R. Caruso, and Lillia Cherkasskiy, reviews a literature that has shown explosive growth during the last two decades or so, that on emotional intelligence. Chapter 27, "Practical Intelligence," by Richard K. Wagner, highlights our understanding of practical intelligence, or how people use their intelligence in their everyday lives. Chapter 28, "Social Intelligence," by John F. Kihlstrom and Nancy Cantor, discusses how social intelligence, or intelligence as exhibited in our interactions with people, can make a difference to people's lives. Chapter 29, "Cultural Intelligence," by Soon Ang, Linn Van Dyne, and Mei Ling Tan, discusses cultural intelligence, or how we can adapt to different cultural contexts. Finally, Chapter 30,
“Mating Intelligence,” by Glenn Geher and Scott Barry Kaufman, presents the intriguing notion that intelligence may be in large part an evolutionary adaptation to increase our ability to attract the mates we want.

Part VII covers “Intelligence and Society.” Chapter 31, “Intelligence in Worldwide Perspective,” by Weihua Niu and Jillian Brass, provides an overview of intelligence as it exists in a wide variety of cultures. Chapter 32, “Secular Changes in Intelligence,” by James R. Flynn, discusses the astonishing finding, by Flynn himself, that levels of intelligence as measured by intelligence tests increased by about three points per decade during the 20th century. Chapter 33, “Society and Intelligence,” by Susan M. Barnett, Heiner Rindermann, Wendy M. Williams, and Stephen J. Ceci, deals with the relationship between IQ test scores and outcomes in society that are viewed as more or less successful in the contexts of various societies. Chapter 34, “Intelligence as a Predictor of Health, Illness, and Death,” by Ian J. Deary and G. David Batty, reviews results analyzed by Deary and others, especially of the Scottish Mental Surveys, linking intelligence to issues of longevity and health during one’s life span.

Part VIII is entitled “Intelligence in Relation to Allied Constructs.” Chapter 35, “Intelligence and Personality,” by Colin G. DeYoung, surveys the ever-growing literature on how intelligence relates to personality as captured by different theories, especially five-factor theory. Chapter 36, “Intelligence and Achievement,” by Richard E. Mayer, summarizes what we know about how measured levels of intelligence predict school and other types of achievement. Chapter 37, “Intelligence and Motivation,” by Priyanka B. Carr and Carol S. Dweck, shows that people’s attitudes toward their intelligence, and especially its modifiability, may be key in their ability to acquire new knowledge and to succeed in learning, both in school and elsewhere. Chapter 38, “Intelligence and Creativity,” by James C. Kaufman and Jonathan A. Plucker, reviews the widely dispersed literature on the relationship of intelligence to creativity, a relationship whose nature has been in dispute for many years and continues to be. Chapter 39, “Intelligence and Rationality,” by Keith E. Stanovich, Richard F. West, and Maggie E. Toplak, reviews the literature on intelligence and rationality, suggesting that although they may be related, they are by no means the same. Chapter 40, “Intelligence and Wisdom,” by Ursula M. Staudinger and Judith Glück, shows that understanding wisdom can help us better understand how intelligence can play either a positive or a negative role in society. Chapter 41, “Intelligence and Expertise,” by Phillip L. Ackerman, discusses how intelligence matters in the acquisition and manifestation of expertise in its various phases.

Finally, Part IX is called “Moving Forward.” In the final chapter of the book, Chapter 42, “Where Are We? Where Are We Going? Reflections on the Current and Future States of Research on Intelligence,” Earl Hunt, one of the pioneers of the cognitive approach to intelligence, discusses both where the field is and where it is going and should be going.

We hope you enjoy the book and find it profitable. The book has been a labor of love for both of us. But most of all, it has been a labor for all the authors involved and we are grateful to them for taking the time and putting in the effort to make this volume possible. We wish to thank our editors at Cambridge University Press, Simina Calin and Jeanie Lee, for their support of this project, as well as our copy editor Patterson Lamb for her patience and hard work and Ken Karpinski for his help with production. We also want to thank Cambridge University Press for its support of the entire endeavor in its publication of all the successive handbooks of which this one is a culmination.

RJS and SBK
February 2011

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