Heuristics and Biases

Is our case strong enough to go to trial? Will interest rates go up? Can I trust this person? Such questions – and the judgments required to answer them – are woven into the fabric of everyday experience. This book examines how people make such judgments. The study of human judgment was transformed in the 1970s, when Kahneman and Tversky introduced their “heuristics and biases” approach and challenged the dominance of strictly rational models. Their work highlighted the reflexive mental operations used to make complex problems manageable, and illuminated how the same processes can lead both to accurate and to dangerously flawed judgments. The heuristics and biases framework generated a torrent of influential research in psychology – research that reverberated widely and affected scholarship in economics, law, medicine, management, and political science. This book compiles the most influential research in the heuristic and biases tradition since the initial collection of 1982 (by Kahneman, Slovic, and Tversky). The various contributions develop and critically analyze the initial work on heuristics and biases, supplement these initial statements with emerging theory and empirical findings, and extend the reach of the framework to new real-world applications.

Thomas Gilovich is Professor of Psychology at Cornell University and a member of the Cornell Center for Behavioral Economics and Decision Research.

Dale Griffin is Associate Professor at the Graduate School of Business, Stanford University.

Daniel Kahneman is Eugene Higgins Professor of Psychology and Professor of Public Affairs at the Woodrow Wilson School of Public Affairs, Princeton University.
HEURISTICS
AND BIASES

The Psychology of Intuitive Judgment

Edited by

THOMAS GILOVICH
Cornell University

DALE GRIFFIN
Stanford University

DANIEL KAHNEMAN
Princeton University
To the memory of Amos Tversky
## Contents

List of Contributors  
Preface  

**Introduction – Heuristics and Biases: Then and Now**  
*Thomas Gilovich and Dale Griffin*  

### PART ONE. THEORETICAL AND EMPIRICAL EXTENSIONS

**A. Representativeness and Availability**

1. **Extensional versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment**  
   *Amos Tversky and Daniel Kahneman*  
   19

2. **Representativeness Revisited: Attribute Substitution in Intuitive Judgment**  
   *Daniel Kahneman and Shane Frederick*  
   49

3. **How Alike Is It? versus How Likely Is It?: A Disjunction Fallacy in Probability Judgments**  
   *Maya Bar-Hillel and Efrat Neter*  
   82

4. **Imagining Can Heighten or Lower the Perceived Likelihood of Contracting a Disease: The Mediating Effect of Ease of Imagery**  
   *Steven J. Sherman, Robert B. Cialdini, Donna F. Schwartzman, and Kim D. Reynolds*  
   98

5. **The Availability Heuristic Revisited: Ease of Recall and Content of Recall as Distinct Sources of Information**  
   *Norbert Schwarz and Leigh Ann Vaughn*  
   103

**B. Anchoring, Contamination, and Compatibility**

6. **Incorporating the Irrelevant: Anchors in Judgments of Belief and Value**  
   *Gretchen B. Chapman and Eric J. Johnson*  
   120
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Putting Adjustment Back in the Anchoring and Adjustment Heuristic</td>
<td>139</td>
</tr>
<tr>
<td></td>
<td>Nicholas Epley and Thomas Gilovich</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Self-Anchoring in Conversation: Why Language Users Do Not Do What They “Should”</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Boaz Keysar and Dale J. Barr</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inferential Correction</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>Daniel T. Gilbert</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mental Contamination and the Debiasing Problem</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>Timothy D. Wilson, David B. Centerbar, and Nancy Brekke</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sympathetic Magical Thinking: The Contagion and Similarity “Heuristics”</td>
<td>201</td>
</tr>
<tr>
<td></td>
<td>Paul Rozin and Carol Nemeroff</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Compatibility Effects in Judgment and Choice</td>
<td>217</td>
</tr>
<tr>
<td></td>
<td>Paul Slovic, Dale Griffin, and Amos Tversky</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Forecasting, Confidence, and Calibration</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>The Weighing of Evidence and the Determinants of Confidence</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td>Dale Griffin and Amos Tversky</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Inside the Planning Fallacy: The Causes and Consequences of Optimistic Time Predictions</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Roger Buehler, Dale Griffin, and Michael Ross</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Probability Judgment across Cultures</td>
<td>271</td>
</tr>
<tr>
<td>16</td>
<td>Durability Bias in Affective Forecasting</td>
<td>292</td>
</tr>
<tr>
<td></td>
<td>Daniel T. Gilbert, Elizabeth C. Pinel, Timothy D. Wilson, Stephen J. Blumberg, and Thalia P. Wheatley</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>Optimism</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Resistance of Personal Risk Perceptions to Debiasing Interventions</td>
<td>313</td>
</tr>
<tr>
<td></td>
<td>Neil D. Weinstein and William M. Klein</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Ambiguity and Self-Evaluation: The Role of Idiosyncratic Trait Definitions in Self-Serving Assessments of Ability</td>
<td>324</td>
</tr>
<tr>
<td></td>
<td>David Dunning, Judith A. Meyerowitz, and Amy D. Holzberg</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>When Predictions Fail: The Dilemma of Unrealistic Optimism</td>
<td>334</td>
</tr>
<tr>
<td></td>
<td>David A. Armor and Shelley E. Taylor</td>
<td></td>
</tr>
</tbody>
</table>
## E. Norms and Counterfactuals

20 Norm Theory: Comparing Reality to Its Alternatives  
*Daniel Kahneman and Dale T. Miller*  
348

21 Counterfactual Thought, Regret, and Superstition: How to Avoid Kicking Yourself  
*Dale T. Miller and Brian R. Taylor*  
367

## PART TWO. NEW THEORETICAL DIRECTIONS

### A. Two Systems of Reasoning

22 Two Systems of Reasoning  
*Steven A. Sloman*  
379

23 The Affect Heuristic  
*Paul Slovic, Melissa Finucane, Ellen Peters, and Donald G. MacGregor*  
397

24 Individual Differences in Reasoning: Implications for the Rationality Debate?  
*Keith E. Stanovich and Richard F. West*  
421

### B. Support Theory

25 Support Theory: A Nonextensional Representation of Subjective Probability  
*Amos Tversky and Derek J. Koehler*  
441

26 Unpacking, Repacking, and Anchoring: Advances in Support Theory  
*Yuval Rottenstreich and Amos Tversky*  
474

27 Remarks on Support Theory: Recent Advances and Future Directions  
*Lyle A. Brenner, Derek J. Koehler, and Yuval Rottenstreich*  
489

### C. Alternative Perspectives on Heuristics

28 The Use of Statistical Heuristics in Everyday Inductive Reasoning  
*Richard E. Nisbett, David H. Krantz, Christopher Jepson, and Ziva Kunda*  
510

29 Feelings as Information: Moods Influence Judgments and Processing Strategies  
*Norbert Schwarz*  
534

30 Automated Choice Heuristics  
*Shane Frederick*  
548

31 How Good Are Fast and Frugal Heuristics?  
*Gerd Gigerenzer, Jean Czerlinski, and Laura Martignon*  
559
Contents

32 Intuitive Politicians, Theologians, and Prosecutors: Exploring the Empirical Implications of Deviant Functionalist Metaphors
Philip E. Tetlock 582

PART THREE. REAL-WORLD APPLICATIONS

A. Everyday Judgment and Behavior

33 The Hot Hand in Basketball: On the Misperception of Random Sequences
Thomas Gilovich, Robert Vallone, and Amos Tversky 601

34 Like Goes with Like: The Role of Representativeness in Erroneous and Pseudo-Scientific Beliefs
Thomas Gilovich and Kenneth Savitsky 617

35 When Less Is More: Counterfactual Thinking and Satisfaction among Olympic Medalists
Victoria Husted Medvec, Scott F. Madey, and Thomas Gilovich 625

36 Understanding Misunderstanding: Social Psychological Perspectives
Emily Pronin, Carolyn Puccio, and Lee Ross 636

B. Expert Judgment

37 Assessing Uncertainty in Physical Constants
Max Henrion and Baruch Fischhoff 666

38 Do Analysts Overreact?
Werner F. M. De Bondt and Richard H. Thaler 678

39 The Calibration of Expert Judgment: Heuristics and Biases Beyond the Laboratory
Derek J. Koehler, Lyle Brenner, and Dale Griffin 686

40 Clinical versus Actuarial Judgment
Robyn M. Dawes, David Faust, and Paul E. Meehl 716

41 Heuristics and Biases in Application
Baruch Fischhoff 730

42 Theory-Driven Reasoning about Plausible Pasts and Probable Futures in World Politics
Philip E. Tetlock 749

References 763

Index 855
List of Contributors

David A. Armor
Department of Psychology
Yale University

Maya Bar-Hillel
Department of Psychology
Hebrew University

Dale J. Barr
Department of Psychology
University of Chicago

Stephen J. Blumberg
National Institutes of Health

Nancy Brekke
Department of Psychology
Lake Forest College

Lyle Brenner
School of Management
University of Florida

Roger Buehler
Psychology Department
Wilfrid Laurier University

David B. Centerbar
Department of Psychology
University of Virginia

Gretchen Chapman
Psychology Department
Rutgers University

Incheol Choi
Department of Psychology
Seoul National University

Robert B. Cialdini
Department of Psychology
Arizona State University

Jean Czerlinski
Max Planck Institute for Human Development

Robyn Dawes
Department of Social & Decision Sciences
Carnegie Mellon University

Werner De Bondt
Department of Finance, Investment & Banking
University of Wisconsin – Madison

David Dunning
Department of Psychology
Cornell University

Nicholas Epley
Department of Psychology
Harvard University

David Faust
Department of Psychology
University Rhode Island

Melissa Finucane
Decision Research

Baruch Fischhoff
Department of Social & Decision Sciences
Carnegie Mellon University

Shane Frederick
Sloan School of Management
Massachusetts Institute of Technology

Gerd Gigerenzer
Max Planck Institute for Human Development
List of Contributors

Daniel Gilbert
Department of Psychology
Harvard University

Thomas Gilovich
Psychology Department
Cornell University

Dale Griffin
Department of Commerce
University of British Columbia

Max Henrion
Decision Laboratory
Ask Jeeves!

Amy D. Holzberg
Department of Psychology
Cornell University

Christopher Jepson
Department of Psychology
University of Michigan

Eric Johnson
Graduate School of Business
Columbia University

Daniel Kahneman
Department of Psychology and
Woodrow Wilson School
of Public Policy
Princeton University

Boaz Keysar
Department of Psychology
University of Chicago

William M. Klein
Department of Psychology
Colby College

Derek J. Koehler
Department of Psychology
University of Waterloo

David H. Krantz
Department of Psychology
Columbia University

Ziva Kunda
Department of Psychology
University of Waterloo

Ju-Whei Lee
Department of Psychology
Chung Yuan University

Donald G. MacGregor
Decision Research

Scott Madey
Psychology Department
Shippensburg University

Laura F. Martignon
Max Planck Institute for Human
Development

V. H. Medvec
Kellogg Graduate School
of Management
Northwestern University

Paul E. Meehl
Psychology Department
University of Minnesota

Judith A. Meyerowitz
Department of Psychology
Cornell University

Dale T. Miller
Department of Psychology
Princeton University

Efrat Neter
Department of Psychology
Hebrew University

Richard E. Nisbett
Department of Psychology
University of Michigan

Ellen Peters
Decision Research

Elizabeth C. Pinel
Department of Psychology
Penn State University

Paul C. Price
Department of Psychology
California State University – Fresno
Emily Pronin
Department of Psychology
Stanford University

Carolyn Puccio
Department of Psychology
Stanford University

Kim D. Reynolds
Department of Psychology
Arizona State University

Lee Ross
Department of Psychology
Stanford University

Michael Ross
Department of Psychology
University of Waterloo

Yuval Rottenstreich
Graduate School of Business
University of Chicago

Paul Rozin
Department of Psychology
University of Pennsylvania

Kenneth Savitsky
Department of Psychology
Williams College

Norbert Schwarz
Institute for Social Research
University of Michigan

Donna F. Schwartzman
Department of Psychology
Arizona State University

Stephen J. Sherman
Department of Psychology
Indiana University

Winston R. Sieck
Department of Psychology
University of Michigan

Steven A. Sloman
Department of Cognitive and Linguistic Sciences
Brown University

Paul Slovic
Decision Research

Keith E. Stanovich
Department of Human Development and Applied Psychology
University of Toronto

Brian R. Taylor
Albert Einstein College of Medicine

Shelley E. Taylor
Department of Psychology
UCLA

Philip E. Tetlock
Department of Psychology
The Ohio State University

Richard H. Thaler
Graduate School of Business
University of Chicago

Amos Tversky
1937–1996
Late of Department of Psychology
Stanford University

Leigh A. Vaughn
Institute for Social Research
University of Michigan

Neil D. Weinstein
Department of Psychology
Rutgers University

Richard F. West
School of Psychology
James Madison University

Thalia P. Wheatley
Department of Psychology
University of Virginia

Timothy D. Wilson
Department of Psychology
University of Virginia

J. Frank Yates
Department of Psychology
University of Michigan
Preface

Judgment pervades human experience. “Is it worth it?” “Would he be a good father to my children?” “Is our case strong enough to go to court?” “Is our left flank adequately protected?” How – and how well – do people make such judgments? It is to these questions that this book is devoted.

This book addresses these questions by presenting a number of contributions – some preexisting, some new – to the understanding of everyday judgment. Each of these contributions is connected to what has been called the heuristics and biases approach to the study of judgment under uncertainty. Indeed, this book is intended as an update or successor to the influential 1982 book on the subject by Kahneman, Slovic, and Tversky, Judgment under Uncertainty: Heuristics and Biases. Much has happened in the field of judgment since that book appeared, and in this work we attempt to capture many of the most important contributions and developments.

The core idea of the heuristics and biases program is that judgment under uncertainty is often based on a limited number of simplifying heuristics rather than more formal and extensive algorithmic processing. These heuristics typically yield accurate judgments but can give rise to systematic error. Kahneman and Tversky originally identified three such general purpose heuristics – availability, representativeness, and anchoring and adjustment. This book accordingly begins with twelve chapters dealing with more recent research on these heuristics. It continues with an examination of empirical and conceptual extensions of the ideas present in the 1982 book, with seven chapters on forecasting, overconfidence, and optimism, and two chapters on norms and counterfactual thinking.

We then turn to an examination of complementary views on everyday judgment that were put forward after 1982. Since that time, for example, a great deal of effort has gone into the development and investigation of various dual processing accounts of human judgment. Among these are accounts of how judgments are made through the interaction of one mental system akin to “intuition” and another akin to “reason.” We thus begin our coverage of complementary perspectives with three chapters that examine such a “two-systems” perspective on human judgment. We then present three chapters on Support Theory, Amos Tversky’s last comprehensive theoretical contribution to the understanding of judgment under uncertainty. These three chapters illustrate the broad
ramifications of Support Theory’s insight that judgments are not based on events themselves, but on descriptions of events. The examination of complementary perspectives on heuristics ends with four chapters on specific heuristics beyond those originally proposed by Kahneman and Tversky, and one chapter that examines the implications of considering alternative metaphors of the human judge.

The book concludes with ten chapters on various applications of the heuristics and biases approach to judgment. Four of these deal with judgments made by “the average person” in various aspects of everyday life and six are concerned with the judgments rendered by experts in a number of applied domains. These chapters are significant because they illustrate that the processes of judgment revealed by psychological research are not restricted to the psychological laboratory or to unfamiliar and unimportant tasks. These heuristics – and the biases that are associated with them – have implications for some of the most consequential judgments that life requires people to make.

On a procedural front, we should note that the source of each preexisting piece is indicated by a footnote on the opening page. All preexisting pieces have been edited to some degree. Deletions from the original are indicated by elipses (...). In nearly all cases, such deletions (and the concomitant renumbering of tables, figures, etc.) constitute the only changes from the original. Exceptions are noted in the opening footnote of the pertinent chapters. Readers interested in the full statement of any author are encouraged to consult the original work. Note also that all references are contained in an overall reference list at the back of the book, and that references to other chapters in the book are indicated by chapter number.

Our work in preparing this book was supported by NSF grants 9809262 and 0091416 to Cornell University, a Social Sciences and Humanities Research Council of Canada research grant to the University of British Columbia, and NSF grant 2556558 to Princeton University.

We wish to thank Zachary Dorsey, Richard Gonzalez, Michael Griffin, and Phil Laughlin for their help in the preparation of this book.

Thomas Gilovich
Dale Griffin
Daniel Kahneman