



منابع و یادداشت‌های کتاب تفکر سریع و کند

نوشتهٔ دنیل کانمن - نشر نوین

مقدمه

- i. We had read a book that criticized psychologists for using small samples, but did not explain their choices: Jacob Cohen, *Statistical Power Analysis for the Behavioral Sciences* (Hillsdale, NJ: Erlbaum, 1969).
- ii. I have slightly altered the original wording, which referred to letters in the first and third position of words.
- iii. A prominent German psychologist has been our most persistent critic. Gerd Gigerenzer, "How to Make Cognitive Illusions Disappear," *European Review of Social Psychology* 2 (1991): 83–115. Gerd Gigerenzer, "Personal Reflections on Theory and Psychology," *Theory & Psychology* 20 (2010): 733–43. Daniel

- Kahneman and Amos Tversky, "On the Reality of Cognitive Illusions," *Psychological Review* 103 (1996): 582–91.
- iv. Some examples from many are Valerie F. Reyna and Farrell J. Lloyd, "Physician Decision-Making and Cardiac Risk: Effects of Knowledge, Risk Perception, Risk Tolerance and Fuzzy-Processing," *Journal of Experimental Psychology: Applied* 12 (2006): 179–95. Nicholas Epley and Thomas Gilovich, "The Anchoring-and-Adjustment Heuristic," *Psychological Science* 17 (2006): 311–18. Norbert Schwarz et al., "Ease of Retrieval of Information: Another Look at the Availability Heuristic," *Journal of Personality and Social Psychology* 61 (1991): 195–202. Elke U. Weber et al., "Asymmetric Discounting in Intertemporal Choice," *Psychological Science* 18 (2007): 516–23. George F. Loewenstein et al., "Risk as Feelings," *Psychological Bulletin* 127 (2001): 267–86.
- v. The prize awarded in economics is named Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel. It was first given in 1969. Some physical scientists were not pleased with the addition of a Nobel Prize in social science, and the distinctive label of the economics prize was a compromise.
- vi. Herbert Simon and his students at Carnegie Mellon in the 1980s set the foundations for our understanding of expertise. For an excellent popular introduction to the subject, see Joshua Foer, *Moonwalking with Einstein: The Art and Science of Remembering* (New York: Penguin Press, 2011). He presents work that is reviewed in more technical detail in K. Anders Ericsson et al., eds., *The Cambridge Handbook of Expertise and Expert Performance* (New York: Cambridge University Press, 2006.)
- vii. Gary A. Klein, *Sources of Power* (Cambridge, MA: MIT Press, 1999).
- viii. Herbert Simon was one of the great scholars of the twentieth century, whose discoveries and inventions ranged from political science (where he began his career) to economics (in which he won a Nobel Prize) to computer science (in which he was a pioneer) and to psychology.

- ix. Herbert A. Simon, "What Is an Explanation of Behavior?" *Psychological Science* 3 (1992): 150–61.
- x. The concept of the affect heuristic was developed by Paul Slovic, a classmate of Amos's at Michigan and a lifelong friend.
- xi. See chapter 9

فصل اول

- i. For reviews of the field, see Jonathan St. B. T. Evans and Keith Frankish, eds., *In Two Minds: Dual Processes and Beyond* (New York: Oxford University Press, 2009); Jonathan St. B. T. Evans, "Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition," *Annual Review of Psychology* 59 (2008): 255–78. Among the pioneers are Seymour Epstein, Jonathan Evans, Steven Sloman, Keith Stanovich, and Richard West. I borrow the terms System 1 and System 2 from early writings of Stanovich and West that greatly influenced my thinking: Keith E. Stanovich and Richard F. West, "Individual Differences in Reasoning: Implications for the Rationality Debate," *Behavioral and Brain Sciences* 23 (2000): 645–65.
- ii. This sense of free will is sometimes illusory, as shown in Daniel M. Wegner, *The Illusion of Conscious Will* (Cambridge, MA: Bradford Books, 2003).
- iii. Nilli Lavie, "Attention, Distraction and Cognitive Control Under Load," *Current Directions in Psychological Science* 19 (2010): 143–48.
- iv. In the classic Stroop task, you are shown a display of patches of different colors, or of words printed in various colors. Your task is to call out the names of the colors, ignoring the words. The task is extremely difficult when the colored words are themselves names of color (e.g., GREEN printed in red, followed by YELLOW printed in green, etc.).
- v. Professor Hare wrote me to say, "Your teacher was right," March 16, 2011. Robert D. Hare, *Without Conscience: The*

Disturbing World of the Psychopaths Among Us (New York: Guilford Press, 1999). Paul Babiak and Robert D. Hare, *Snakes in Suits: When Psychopaths Go to Work* (New York: Harper, 2007).

- vi. Agents within the mind are called homunculi and are (quite properly) objects of professional derision.
- vii. Alan D. Baddeley, "Working Memory: Looking Back and Looking Forward," *Nature Reviews: Neuroscience* 4 (2003): 829–38. Alan D. Baddeley, *Your Memory: A User's Guide* (New York: Firefly Books, 2004).

فصل دوم

- i. Much of the material of this chapter draws on my *Attention and Effort* (1973). It is available for free download on my website (www.princeton.edu/~kahneman/docs/attention_and_effort/Attention_hi_quality.pdf). The main theme of that book is the idea of a limited ability to pay attention and exert mental effort. Attention and effort were considered general resources that could be used to support many mental tasks. The idea of general capacity is controversial, but it has been extended by other psychologists and neuroscientists, who found support for it in brain research. See Marcel A. Just and Patricia A. Carpenter, "A Capacity Theory of Comprehension: Individual Differences in Working Memory," *Psychological Review* 99 (1992): 122–49; Marcel A. Just et al., "Neuroindices of Cognitive Workload: Neuroimaging, Pupillometric and Event-Related Potential Studies of Brain Work," *Theoretical Issues in Ergonomics Science* 4 (2003): 56–88. There is also growing experimental evidence for general-purpose resources of attention, as in Evie Vergauwe et al., "Do Mental Processes Share a Domain-General Resource?" *Psychological Science* 21 (2010): 384–90. There is imaging evidence that the mere anticipation of a high-effort task mobilizes activity in many areas of the brain, relative to a low-effort task of the same kind. Carsten N. Boehler et al., "Task-Load-Dependent Activation of Dopaminergic Midbrain Areas in

- the Absence of Reward,” *Journal of Neuroscience* 31 (2011): 4955–61.
- ii. Eckhard H. Hess, “Attitude and Pupil Size,” *Scientific American* 212 (1965): 46–54.
 - iii. The word *subject* reminds some people of subjugation and slavery, and the American Psychological Association enjoins us to use the more democratic *participant*. Unfortunately, the politically correct label is a mouthful, which occupies memory space and slows thinking. I will do my best to use *participant* whenever possible but will switch to *subject* when necessary.
 - iv. Daniel Kahneman et al., “Pupillary, Heart Rate, and Skin Resistance Changes During a Mental Task,” *Journal of Experimental Psychology* 79 (1969): 164–67.
 - v. Daniel Kahneman, Jackson Beatty, and Irwin Pollack, “Perceptual Deficit During a Mental Task,” *Science* 15 (1967): 218–19. We used a halfway mirror so that the observers saw the letters directly in front of them while facing the camera. In a control condition, the participants looked at the letter through a narrow aperture, to prevent any effect of the changing pupil size on their visual acuity. Their detection results showed the inverted-V pattern observed with other subjects.
 - vi. Attempting to perform several tasks at once may run into difficulties of several kinds. For example, it is physically impossible to say two different things at exactly the same time, and it may be easier to combine an auditory and a visual task than to combine two visual or two auditory tasks. Prominent psychological theories have attempted to attribute all mutual interference between tasks to competition for separate mechanisms. See Alan D. Baddeley, *Working Memory* (New York: Oxford University Press, 1986). With practice, people’s ability to multitask in specific ways may improve. However, the wide variety of very different tasks that interfere with each other supports the existence of a general resource of attention or effort that is necessary in many tasks.

- vii. Michael E. Smith, Linda K. McEvoy, and Alan Gevins, "Neurophysiological Indices of Strategy Development and Skill Acquisition," *Cognitive Brain Research* 7 (1999): 389–404. Alan Gevins et al., "High-Resolution EEG Mapping of Cortical Activation Related to Working Memory: Effects of Task Difficulty, Type of Processing and Practice," *Cerebral Cortex* 7 (1997): 374–85.
- viii. For example, Sylvia K. Ahern and Jackson Beatty showed that individuals who scored higher on the SAT showed smaller pupillary dilations than low scorers in responding to the same task. "Physiological Signs of Information Processing Vary with Intelligence," *Science* 205 (1979): 1289–92.
- ix. Wouter Kool et al., "Decision Making and the Avoidance of Cognitive Demand," *Journal of Experimental Psychology—General* 139 (2010): 665–82. Joseph T. McGuire and Matthew M. Botvinick, "The Impact of Anticipated Demand on Attention and Behavioral Choice," in *Effortless Attention*, ed. Brian Bruya (Cambridge, MA: Bradford Books, 2010), 103–20.
- x. Neuroscientists have identified a region of the brain that assesses the overall value of an action when it is completed. The effort that was invested counts as a cost in this neural computation. Joseph T. McGuire and Matthew M. Botvinick, "Prefrontal Cortex, Cognitive Control, and the Registration of Decision Costs," *PNAS* 107 (2010): 7922–26.
- xi. Bruno Laeng et al., "Pupillary Stroop Effects," *Cognitive Processing* 12 (2011): 13–21.
- xii. Michael I. Posner and Mary K. Rothbart, "Research on Attention Networks as a Model for the Integration of Psychological Science," *Annual Review of Psychology* 58 (2007): 1–23. John Duncan et al., "A Neural Basis for General Intelligence," *Science* 289 (2000): 457–60.
- xiii. Stephen Monsell, "Task Switching," *Trends in Cognitive Sciences* 7 (2003): 134–40.
- xiv. *Baddeley, Working Memory.*

- xv. Andrew A. Conway, Michael J. Kane, and Randall W. Engle, "Working Memory Capacity and Its Relation to General Intelligence," *Trends in Cognitive Sciences* 7 (2003): 547–52.
- xvi. Daniel Kahneman, Rachel Ben-Ishai, and Michael Lotan, "Relation of a Test of Attention to Road Accidents," *Journal of Applied Psychology* 58 (1973): 113–15. Daniel Gopher, "A Selective Attention Test as a Predictor of Success in Flight Training," *Human Factors* 24 (1982): 173–83.

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- ii. Baba Shiv and Alexander Fedorikhin, "Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making," *Journal of Consumer Research* 26 (1999): 278–92. Malte Friese, Wilhelm Hofmann, and Michaela Wänke, "When Impulses Take Over: Moderated Predictive Validity of Implicit and Explicit Attitude Measures in Predicting Food Choice and Consumption Behaviour," *British Journal of Social Psychology* 47 (2008): 397–419.
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- iv. Sian L. Beilock and Thomas H. Carr, "When High-Powered People Fail: Working Memory and Choking Under Pressure in Math," *Psychological Science* 16 (2005): 101–105.
- v. Martin S. Hagger et al., "Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis," *Psychological Bulletin* 136 (2010): 495–525.
- vi. Mark Muraven and Elisaveta Slessareva, "Mechanisms of Self-Control Failure: Motivation and Limited Resources," *Personality and Social Psychology Bulletin* 29 (2003): 894–906. Mark

- Muraven, Dianne M. Tice, and Roy F. Baumeister, "Self-Control as a Limited Resource: Regulatory Depletion Patterns," *Journal of Personality and Social Psychology* 74 (1998): 774–89.
- vii. Matthew T. Gailliot et al., "Self-Control Relies on Glucose as a Limited Energy Source: Willpower Is More Than a Metaphor," *Journal of Personality and Social Psychology* 92 (2007): 325–36. Matthew T. Gailliot and Roy F. Baumeister, "The Physiology of Willpower: Linking Blood Glucose to Self-Control," *Personality and Social Psychology Review* 11 (2007): 303–27.
- viii. Gailliot, "Self-Control Relies on Glucose as a Limited Energy Source."
- ix. Shai Danziger, Jonathan Levav, and Liora Avnaim-Pesso, "Extraneous Factors in Judicial Decisions," *PNAS* 108 (2011): 6889–92.
- x. Shane Frederick, "Cognitive Reflection and Decision Making," *Journal of Economic Perspectives* 19 (2005): 25–42.
- xi. This systematic error is known as the belief bias. Evans, "Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition."
- xii. Keith E. Stanovich, *Rationality and the Reflective Mind* (New York: Oxford University Press, 2011).
- xiii. Walter Mischel and Ebbe B. Ebbesen, "Attention in Delay of Gratification," *Journal of Personality and Social Psychology* 16 (1970): 329–37.
- xiv. Inge-Marie Eigsti et al., "Predicting Cognitive Control from Preschool to Late Adolescence and Young Adulthood," *Psychological Science* 17 (2006): 478–84.
- xv. Mischel and Ebbesen, "Attention in Delay of Gratification." Walter Mischel, "Processes in Delay of Gratification," in *Advances in Experimental Social Psychology*, Vol. 7, ed. Leonard Berkowitz (San Diego, CA: Academic Press, 1974), 249–92. Walter Mischel, Yuichi Shoda, and Monica L. Rodriguez, "Delay of Gratification in Children," *Science* 244 (1989): 933–38. Eigsti,

“Predicting Cognitive Control from Preschool to Late Adolescence.”

- xvi. M. Rosario Rueda et al., “Training, Maturation, and Genetic Influences on the Development of Executive Attention,” *PNAS* 102 (2005): 14931–36.
- xvii. Maggie E. Toplak, Richard F. West, and Keith E. Stanovich, “The Cognitive Reflection Test as a Predictor of Performance on Heuristics-and-Biases Tasks,” *Memory & Cognition* (in press).

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- i. Carey K. Morewedge and Daniel Kahneman, “Associative Processes in Intuitive Judgment,” *Trends in Cognitive Sciences* 14 (2010): 435–40.
- ii. To avoid confusion, I did not mention in the text that the pupil also dilated. The pupil dilates both during emotional arousal and when arousal accompanies intellectual effort.
- iii. Paula M. Niedenthal, “Embodying Emotion,” *Science* 316 (2007): 1002–1005.
- iv. The image is drawn from the working of a pump. The first few draws on a pump do not bring up any liquid, but they enable subsequent draws to be effective.
- v. John A. Bargh, Mark Chen, and Lara Burrows, “Automaticity of Social Behavior: Direct Effects of Trait Construct and Stereotype Activation on Action,” *Journal of Personality and Social Psychology* 71 (1996): 230–44.
- vi. Thomas Mussweiler, “Doing Is for Thinking! Stereotype Activation by Stereotypic Movements,” *Psychological Science* 17 (2006): 17–21.
- vii. Fritz Strack, Leonard L. Martin, and Sabine Stepper, “Inhibiting and Facilitating Conditions of the Human Smile: A Nonobtrusive Test of the Facial Feedback Hypothesis,” *Journal of Personality and Social Psychology* 54 (1988): 768–77.

- viii. Ulf Dimberg, Monika Thunberg, and Sara Grunedal, "Facial Reactions to Emotional Stimuli: Automatically Controlled Emotional Responses," *Cognition and Emotion* 16 (2002): 449–71.
- ix. Gary L. Wells and Richard E. Petty, "The Effects of Overt Head Movements on Persuasion: Compatibility and Incompatibility of Responses," *Basic and Applied Social Psychology* 1 (1980): 219–30.
- x. Jonah Berger, Marc Meredith, and S. Christian Wheeler, "Contextual Priming: Where People Vote Affects How They Vote," *PNAS* 105 (2008): 8846–49.
- xi. Kathleen D. Vohs, "The Psychological Consequences of Money," *Science* 314 (2006): 1154–56.
- xii. Jeff Greenberg et al., "Evidence for Terror Management Theory II: The Effect of Mortality Salience on Reactions to Those Who Threaten or Bolster the Cultural Worldview," *Journal of Personality and Social Psychology* 58 (1990): 308–18.
- xiii. Chen-Bo Zhong and Katie Liljenquist, "Washing Away Your Sins: Threatened Morality and Physical Cleansing," *Science* 313 (2006): 1451–52.
- xiv. Spike Lee and Norbert Schwarz, "Dirty Hands and Dirty Mouths: Embodiment of the Moral-Purity Metaphor Is Specific to the Motor Modality Involved in Moral Transgression," *Psychological Science* 21 (2010): 1423–25.
- xv. Melissa Bateson, Daniel Nettle, and Gilbert Roberts, "Cues of Being Watched Enhance Cooperation in a Real-World Setting," *Biology Letters* 2 (2006): 412–14.
- xvi. Timothy Wilson's *Strangers to Ourselves* (Cambridge, MA: Belknap Press, 2002) presents a concept of an "adaptive unconscious" that is similar to System 1.

فصل پنجم

- i. The technical term for cognitive ease is *fluency*.
- ii. Adam L. Alter and Daniel M. Oppenheimer, "Uniting the Tribes of Fluency to Form a Metacognitive Nation," *Personality and Social Psychology Review* 13 (2009): 219–35.
- iii. Larry L. Jacoby, Colleen Kelley, Judith Brown, and Jennifer Jasechko, "Becoming Famous Overnight: Limits on the Ability to Avoid Unconscious Influences of the Past," *Journal of Personality and Social Psychology* 56 (1989): 326–38.
- iv. Bruce W. A. Whittlesea, Larry L. Jacoby, and Krista Girard, "Illusions of Immediate Memory: Evidence of an Attributional Basis for Feelings of Familiarity and Perceptual Quality," *Journal of Memory and Language* 29 (1990): 716–32.
- v. Normally, when you meet a friend you can immediately place and name him; you often know where you met him last, what he was wearing, and what you said to each other. The feeling of familiarity becomes relevant only when such specific memories are not available. It is a fallback. Although its reliability is imperfect, the fallback is much better than nothing. It is the sense of familiarity that protects you from the embarrassment of being (and acting) astonished when you are greeted as an old friend by someone who only looks vaguely familiar.
- vi. Ian Begg, Victoria Armour, and Thérèse Kerr, "On Believing What We Remember," *Canadian Journal of Behavioural Science* 17 (1985): 199–214.
- vii. Daniel M. Oppenheimer, "Consequences of Erudite Vernacular Utilized Irrespective of Necessity: Problems with Using Long Words Needlessly," *Applied Cognitive Psychology* 20 (2006): 139–56.
- viii. Matthew S. McGlone and Jessica Tofighbakhsh, "Birds of a Feather Flock Conjointly (?): Rhyme as Reason in Aphorisms," *Psychological Science* 11 (2000): 424–28.

- ix. Anuj K. Shah and Daniel M. Oppenheimer, "Easy Does It: The Role of Fluency in Cue Weighting," *Judgment and Decision Making Journal* 2 (2007): 371–79.
- x.
- xi. Adam L. Alter, Daniel M. Oppenheimer, Nicholas Epley, and Rebecca Eyre, "Overcoming Intuition: Metacognitive Difficulty Activates Analytic Reasoning," *Journal of Experimental Psychology—General* 136 (2007): 569–76.
- xii. Piotr Winkielman and John T. Cacioppo, "Mind at Ease Puts a Smile on the Face: Psychophysiological Evidence That Processing Facilitation Increases Positive Affect," *Journal of Personality and Social Psychology* 81 (2001): 989–1000.
- xiii. Adam L. Alter and Daniel M. Oppenheimer, "Predicting Short-Term Stock Fluctuations by Using Processing Fluency," *PNAS* 103 (2006). Michael J. Cooper, Orlin Dimitrov, and P. Raghavendra Rau, "A Rose.com by Any Other Name," *Journal of Finance* 56 (2001): 2371–88.
- xiv. Pascal Pensa, "Nomen Est Omen: How Company Names Influence Short- and Long-Run Stock Market Performance," *Social Science Research Network Working Paper*, September 2006.
- xv. Robert B. Zajonc, "Attitudinal Effects of Mere Exposure," *Journal of Personality and Social Psychology* 9 (1968): 1–27.
- xvi. Robert B. Zajonc and D. W. Rajecki, "Exposure and Affect: A Field Experiment," *Psychonomic Science* 17 (1969): 216–17.
- xvii. Jennifer L. Monahan, Sheila T. Murphy, and Robert B. Zajonc, "Subliminal Mere Exposure: Specific, General, and Diffuse Effects," *Psychological Science* 11 (2000): 462–66.
- xviii. D. W. Rajecki, "Effects of Prenatal Exposure to Auditory or Visual Stimulation on Postnatal Distress Vocalizations in Chicks," *Behavioral Biology* 11 (1974): 525–36.

- xix. Robert B. Zajonc, "Mere Exposure: A Gateway to the Subliminal," *Current Directions in Psychological Science* 10 (2001): 227.
- xx. Annette Bolte, Thomas Goschke, and Julius Kuhl, "Emotion and Intuition: Effects of Positive and Negative Mood on Implicit Judgments of Semantic Coherence," *Psychological Science* 14 (2003): 416–21.
- xxi. The analysis excludes all cases in which the subject actually found the correct solution. It shows that even subjects who will ultimately fail to find a common association have some idea of whether there is one to be found.
- xxii. Sascha Topolinski and Fritz Strack, "The Architecture of Intuition: Fluency and Affect Determine Intuitive Judgments of Semantic and Visual Coherence and Judgments of Grammaticality in Artificial Grammar Learning," *Journal of Experimental Psychology—General* 138 (2009): 39–63.
- xxiii. Bolte, Goschke, and Kuhl, "Emotion and Intuition."
- xxiv. Barbara Fredrickson, *Positivity: Groundbreaking Research Reveals How to Embrace the Hidden Strength of Positive Emotions, Overcome Negativity, and Thrive* (New York: Random House, 2009). Joseph P. Forgas and Rebekah East, "On Being Happy and Gullible: Mood Effects on Skepticism and the Detection of Deception," *Journal of Experimental Social Psychology* 44 (2008): 1362–67.
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- xxvi. Sascha Topolinski and Fritz Strack, "The Analysis of Intuition: Processing Fluency and Affect in Judgments of Semantic Coherence," *Cognition and Emotion* 23 (2009): 1465–1503.

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- iii. *Ibid.*
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- iii. Alexander Todorov, Manish Pakrashi, and Nikolaas N. Oosterhof, "Evaluating Faces on Trustworthiness After Minimal Time Exposure," *Social Cognition* 27 (2009): 813–33.
- iv. Alexander Todorov et al., "Inference of Competence from Faces Predict Election Outcomes," *Science* 308 (2005): 1623–26. Charles C. Ballew and Alexander Todorov, "Predicting Political Elections from Rapid and Unreflective Face Judgments," *PNAS* 104 (2007): 17948–53. Christopher Y. Olivola and Alexander Todorov, "Elected in 100 Milliseconds: Appearance-Based Trait Inferences and Voting," *Journal of Nonverbal Behavior* 34 (2010): 83–110.
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- Reliability,” in *Contingent Valuation: A Critical Assessment*, ed. Jerry A. Hausman (Amsterdam: North-Holland, 1993), 91–159.
- viii. *Stanley S. Stevens*, *Psychophysics: Introduction to Its Perceptual, Neural, and Social Prospect* (New York: Wiley, 1975).
- ix. Mark S. Seidenberg and Michael K. Tanenhaus, “Orthographic Effects on Rhyme Monitoring,” *Journal of Experimental Psychology—Human Learning and Memory* 5 (1979): 546–54.
- x. Sam Glucksberg, Patricia Gildea, and Howard G. Bookin, “On Understanding Nonliteral Speech: Can People Ignore Metaphors?” *Journal of Verbal Learning and Verbal Behavior* 21 (1982): 85–98.

فصل نهم

- i. An alternative approach to judgment heuristics has been proposed by Gerd Gigerenzer, Peter M. Todd, and the ABC Research Group, in *Simple Heuristics That Make Us Smart* (New York: Oxford University Press, 1999). They describe “fast and frugal” formal procedures such as “Take the best [cue],” which under some circumstances generate quite accurate judgments on the basis of little information. As Gigerenzer has emphasized, his heuristics are different from those that Amos and I studied, and he has stressed their accuracy rather than the biases to which they inevitably lead. Much of the research that supports fast and frugal heuristic uses statistical simulations to show that they *could* work in some real-life situations, but the evidence for the psychological reality of these heuristics remains thin and contested. The most memorable discovery associated with this approach is the recognition heuristic, illustrated by an example that has become well-known: a subject who is asked which of two cities is larger and recognizes one of them should guess that the one she recognizes is larger. The recognition heuristic works fairly well if the subject knows that the city she recognizes is large; if she knows it to be small, however, she will quite reasonably guess

that the unknown city is larger. Contrary to the theory, the subjects use more than the recognition cue: Daniel M. Oppenheimer, "Not So Fast! (and Not So Frugal!): Rethinking the Recognition Heuristic," *Cognition* 90 (2003): B1–B9. A weakness of the theory is that, from what we know of the mind, there is no need for heuristics to be frugal. The brain processes vast amounts of information in parallel, and the mind can be fast and accurate without ignoring information. Furthermore, it has been known since the early days of research on chess masters that skill need not consist of learning to use less information. On the contrary, skill is more often an ability to deal with large amounts of information quickly and efficiently.

- ii. Fritz Strack, Leonard L. Martin, and Norbert Schwarz, "Priming and Communication: Social Determinants of Information Use in Judgments of Life Satisfaction," *European Journal of Social Psychology* 18 (1988): 429–42.
- iii. *The correlation was .66.*
- iv. Other substitution topics include marital satisfaction, job satisfaction, and leisure time satisfaction: Norbert Schwarz, Fritz Strack, and Hans-Peter Mai, "Assimilation and Contrast Effects in Part-Whole Question Sequences: A Conversational Logic Analysis," *Public Opinion Quarterly* 55 (1991): 3–23.
- v. A telephone survey conducted in Germany included a question about general happiness. When the self-reports of happiness were correlated with the local weather at the time of the interview, a pronounced correlation was found. Mood is known to vary with the weather, and substitution explains the effect on reported happiness. However, another version of the telephone survey yielded a somewhat different result. These respondents were asked about the current weather before they were asked the happiness question. For them, weather had no effect at all on reported happiness! The explicit priming of weather provided them with an explanation of their mood, undermining the connection that would normally be made between current mood and overall happiness.

- vi. Melissa L. Finucane et al., “The Affect Heuristic in Judgments of Risks and Benefits,” *Journal of Behavioral Decision Making* 13 (2000): 1–17.

فصل دهم

- i. Howard Wainer and Harris L. Zwerling, “Evidence That Smaller Schools Do Not Improve Student Achievement,” *Phi Delta Kappan* 88 (2006): 300–303. The example was discussed by Andrew Gelman and Deborah Nolan, *Teaching Statistics: A Bag of Tricks* (New York: Oxford University Press, 2002).
- ii. Jacob Cohen, “The Statistical Power of Abnormal-Social Psychological Research: A Review,” *Journal of Abnormal and Social Psychology* 65 (1962): 145–53.
- iii. Amos Tversky and Daniel Kahneman, “Belief in the Law of Small Numbers,” *Psychological Bulletin* 76 (1971): 105–10.
- iv. The contrast that we drew between intuition and computation seems to foreshadow the distinction between Systems 1 and 2, but we were a long way from the perspective of this book. We used *intuition* to cover anything but a computation, any informal way to reach a conclusion.
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- vi. Thomas Gilovich, Robert Vallone, and Amos Tversky, “The Hot Hand in Basketball: On the Misperception of Random Sequences,” *Cognitive Psychology* 17 (1985): 295–314.

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- ii. Nicholas Epley and Thomas Gilovich, "Putting Adjustment Back in the Anchoring and Adjustment Heuristic: Differential Processing of Self-Generated and Experimenter-Provided Anchors," *Psychological Science* 12 (2001): 391–96.
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- v. Karen E. Jacowitz and Daniel Kahneman, "Measures of Anchoring in Estimation Tasks," *Personality and Social Psychology Bulletin* 21 (1995): 1161–66.
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- ix. Adam D. Galinsky and Thomas Mussweiler, "First Offers as Anchors: The Role of Perspective-Taking and Negotiator Focus," *Journal of Personality and Social Psychology* 81 (2001): 657–69.
- x. Greg Pogarsky and Linda Babcock, "Damage Caps, Motivated Anchoring, and Bargaining Impasse," *Journal of Legal Studies* 30 (2001): 143–59.
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- iii. Schwarz et al., "Ease of Retrieval as Information."
- iv. Sabine Stepper and Fritz Strack, "Proprioceptive Determinants of Emotional and Nonemotional Feelings," *Journal of Personality and Social Psychology* 64 (1993): 211–20.
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where competitive solutions are considered, the correlation between costs and benefits must be negative; the solutions that have the largest benefits are also the most costly. Whether laypeople and even experts might fail to recognize the correct relationship even in those cases is an interesting question.

- iv. Jonathan Haidt, "The Emotional Dog and Its Rational Tail: A Social Institutionist Approach to Moral Judgment," *Psychological Review* 108 (2001): 814–34.
- v. Paul Slovic, *The Perception of Risk* (Sterling, VA: EarthScan, 2000).
- vi. Timur Kuran and Cass R. Sunstein, "Availability Cascades and Risk Regulation," *Stanford Law Review* 51 (1999): 683–768. CERCLA, the Comprehensive Environmental Response, Compensation, and Liability Act, passed in 1980.
- vii. Paul Slovic, who testified for the apple growers in the Alar case, has a rather different view: "The scare was triggered by the CBS *60 Minutes* broadcast that said 4, 000 children will die of cancer (no probabilities there) along with frightening pictures of bald children in a cancer ward—and many more incorrect statements. Also the story exposed EPA's lack of competence in attending to and evaluating the safety of Alar, destroying trust in regulatory control. Given this, I think the public's response was rational." (Personal communication, May 11, 2011.)

فصل چهاردهم

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- ii. Jonathan St. B. T. Evans, "Heuristic and Analytic Processes in Reasoning," *British Journal of Psychology* 75 (1984): 451–68.
- iii. Norbert Schwarz et al., "Base Rates, Representativeness, and the Logic of Conversation: The Contextual Relevance of 'Irrelevant' Information," *Social Cognition* 9 (1991): 67–84.

- iv. Alter, Oppenheimer, Epley, and Eyre, "Overcoming Intuition."
- v. The simplest form of Bayes's rule is in odds form, posterior odds = prior odds \times likelihood ratio, where the posterior odds are the odds (the ratio of probabilities) for two competing hypotheses. Consider a problem of diagnosis. Your friend has tested positive for a serious disease. The disease is rare: only 1 in 600 of the cases sent in for testing actually has the disease. The test is fairly accurate. Its likelihood ratio is 25:1, which means that the probability that a person who has the disease will test positive is 25 times higher than the probability of a false positive. Testing positive is frightening news, but the odds that your friend has the disease have risen only from 1/600 to 25/600, and the probability is 4%.
- vi. For the hypothesis that Tom W is a computer scientist, the prior odds that correspond to a base rate of 3% are $(.03/.97 = .031)$. Assuming a likelihood ratio of 4 (the description is 4 times as likely if Tom W is a computer scientist than if he is not), the posterior odds are $4 \times .031 = 12.4$. From these odds you can compute that the posterior probability of Tom W being a computer scientist is now 11% (because $12.4/112.4 = .11$).

فصل پانزدهم

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- iii. See, among others, Ralph Hertwig and Gerd Gigerenzer, "The 'Conjunction Fallacy' Revisited: How Intelligent Inferences Look Like Reasoning Errors," *Journal of Behavioral Decision Making* 12 (1999): 275-305; Ralph Hertwig, Bjoern Benz, and Stefan Krauss, "The Conjunction Fallacy and the Many Meanings of And," *Cognition* 108 (2008): 740-53.

- iv. Barbara Mellers, Ralph Hertwig, and Daniel Kahneman, "Do Frequency Representations Eliminate Conjunction Effects? An Exercise in Adversarial Collaboration," *Psychological Science* 12 (2001): 269–75.

فصل شانزدهم

- i. Applying Bayes's rule in odds form, the prior odds are the odds for the Blue cab from the base rate, and the likelihood ratio is the ratio of the probability of the witness saying the cab is Blue if it is Blue, divided by the probability of the witness saying the cab is Blue if it is Green: posterior odds = $(.15/.85) \times (.80/.20) = .706$. The odds are the ratio of the probability that the cab is Blue, divided by the probability that the cab is Green. To obtain the probability that the cab is Blue, we compute: Probability(Blue) = $.706/1.706 = .41$. The probability that the cab is Blue is 41%.
- ii. Amos Tversky and Daniel Kahneman, "Causal Schemas in Judgments Under Uncertainty," in *Progress in Social Psychology*, ed. Morris Fishbein (Hillsdale, NJ: Erlbaum, 1980), 49–72.
- iii. Richard E. Nisbett and Eugene Borgida, "Attribution and the Psychology of Prediction," *Journal of Personality and Social Psychology* 32 (1975): 932–43.
- iv. John M. Darley and Bibb Latane, "Bystander Intervention in Emergencies: Diffusion of Responsibility," *Journal of Personality and Social Psychology* 8 (1968): 377–83.

فصل هفدهم

- i. Michael Bulmer, *Francis Galton: Pioneer of Heredity and Biometry* (Baltimore: Johns Hopkins University Press, 2003).
- ii. Researchers transform each original score into a standard score by subtracting the mean and dividing the result by the standard deviation. Standard scores have a mean of zero and a standard

deviation of 1, can be compared across variables (especially when the statistical distributions of the original scores are similar), and have many desirable mathematical properties, which Galton had to work out to understand the nature of correlation and regression.

- iii. This will not be true in an environment in which some children are malnourished. Differences in nutrition will become important, the proportion of shared factors will diminish, and with it the correlation between the height of parents and the height of children (unless the parents of malnourished children were also stunted by hunger in childhood).
- iv. The correlation was computed for a very large sample of the population of the United States (the Gallup-Healthways Well-Being Index).
- v. The correlation appears impressive, but I was surprised to learn many years ago from the sociologist Christopher Jencks that if everyone had the same education, the inequality of income (measured by standard deviation) would be reduced only by about 9%. The relevant formula is $\sqrt{1-r^2}$, where r is the correlation.
- vi. This is true when both variables are measured in standard scores—that is, where each score is transformed by removing the mean and dividing the result by the standard deviation.
- vii. Howard Wainer, “The Most Dangerous Equation,” *American Scientist* 95 (2007): 249–56.

فصل هجدهم

- i. The proof of the standard regression as the optimal solution to the prediction problem assumes that errors are weighted by the squared deviation from the correct value. This is the least-squares criterion, which is commonly accepted. Other loss functions lead to different solutions.

فصل نوزدهم

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- ii. *See chapter 7.*
- iii. Michael Lewis, *Moneyball: The Art of Winning an Unfair Game* (New York: Norton, 2003).
- iv. Seth Weintraub, "Excite Passed Up Buying Google for \$750,000 in 1999," *Fortune*, September 29, 2011.
- v. Richard E. Nisbett and Timothy D. Wilson, "Telling More Than We Can Know: Verbal Reports on Mental Processes," *Psychological Review* 84 (1977): 231–59.
- vi. Baruch Fischhoff and Ruth Beyth, "I Knew It Would Happen: Remembered Probabilities of Once Future Things," *Organizational Behavior and Human Performance* 13 (1975): 1–16.
- vii. Jonathan Baron and John C. Hershey, "Outcome Bias in Decision Evaluation," *Journal of Personality and Social Psychology* 54 (1988): 569–79.
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- ix. Jeffrey Goldberg, "Letter from Washington: Woodward vs. Tenet," *New Yorker*, May 21, 2007, 35–38. Also Tim Weiner, *Legacy of Ashes: The History of the CIA* (New York: Doubleday, 2007); "Espionage: Inventing the Dots," *Economist*, November 3, 2007, 100.
- x. Philip E. Tetlock, "Accountability: The Neglected Social Context of Judgment and Choice," *Research in Organizational Behavior* 7 (1985): 297–332.
- xi. Marianne Bertrand and Antoinette Schoar, "Managing with Style: The Effect of Managers on Firm Policies," *Quarterly*

- Journal of Economics* 118 (2003): 1169–1208. Nick Bloom and John Van Reenen, “Measuring and Explaining Management Practices Across Firms and Countries,” *Quarterly Journal of Economics* 122 (2007): 1351–1408.
- xii. I am indebted to Professor James H. Steiger of Vanderbilt University, who developed an algorithm that answers this question, under plausible assumptions. Steiger’s analysis shows that correlations of .20 and .40 are associated, respectively, with inversion rates of 43% and 37%.
- xiii. *The Halo Effect* was praised as one of the best business books of the year by both the *Financial Times* and *The Wall Street Journal*: Phil Rosenzweig, *The Halo Effect: ... and the Eight Other Business Delusions That Deceive Managers* (New York: Simon & Schuster, 2007). See also Paul Olk and Phil Rosenzweig, “The Halo Effect and the Challenge of Management Inquiry: A Dialog Between Phil Rosenzweig and Paul Olk,” *Journal of Management Inquiry* 19 (2010): 48–54.
- xiv. James C. Collins and Jerry I. Porras, *Built to Last: Successful Habits of Visionary Companies* (New York: Harper, 2002).
- xv. In fact, even if you were the CEO yourself, your forecasts would not be impressively reliable; the extensive research on insider trading shows that executives do beat the market when they trade their own stock, but the margin of their outperformance is barely enough to cover the costs of trading. See H. Nejat Seyhun, “The Information Content of Aggregate Insider Trading,” *Journal of Business* 61 (1988): 1–24; Josef Lakonishok and Inmoo Lee, “Are Insider Trades Informative?” *Review of Financial Studies* 14 (2001): 79–111; Zahid Iqbal and Shekar Shetty, “An Investigation of Causality Between Insider Transactions and Stock Returns,” *Quarterly Review of Economics and Finance* 42 (2002): 41–57.
- xvi. Rosenzweig, *The Halo Effect*.
- xvii. Deniz Anginer, Kenneth L. Fisher, and Meir Statman, “Stocks of Admired Companies and Despised Ones,” working paper, 2007.

- xviii. Jason Zweig observes that the lack of appreciation for regression has detrimental implications for the recruitment of CEOs. Struggling firms tend to turn to outsiders, recruiting CEOs from companies with high recent returns. The incoming CEO then gets credit, at least temporarily, for his new firm's subsequent improvement. (Meanwhile, his replacement at his former firm is now struggling, leading the new bosses to believe that they definitely hired "the right guy.") Anytime a CEO jumps ship, the new company must buy out his stake (in stock and options) at his old firm, setting a baseline for future compensation that has nothing to do with performance at the new firm. Tens of millions of dollars in compensation get awarded for "personal" achievements that are driven mainly by regression and halo effects (personal communication, December 29, 2009).

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- vii. Mark Grinblatt and Sheridan Titman, "The Persistence of Mutual Fund Performance," *Journal of Finance* 42 (1992): 1977–84. Edwin J. Elton et al., "The Persistence of Risk-Adjusted Mutual Fund Performance," *Journal of Business* 52 (1979): 1–33. Edwin Elton et al., "Efficiency With Costly Information: A Re-interpretation of Evidence from Managed Portfolios," *Review of Financial Studies* 6 (1993): 1–21.
- viii. Philip E. Tetlock, *Expert Political Judgment: How Good is It? How Can We Know?* (Princeton: Princeton University Press, 2005), 233.

فصل بیست و یکم

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- ii. During the 1990–1991 auction season, for example, the price in London of a case of 1960 Château Latour averaged \$464; a case of the 1961 vintage (one of the best ever) fetched an average of \$5,432.
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- v. James Shanteau, "Psychological Characteristics and Strategies of Expert Decision Makers," *Acta Psychologica* 68 (1988): 203–15.

- vi. Danziger, Levav, and Avnaim-Pesso, "Extraneous Factors in Judicial Decisions."
- vii. Richard A. DeVaul et al., "Medical-School Performance of Initially Rejected Students," *JAMA* 257 (1987): 47–51. Jason Dana and Robyn M. Dawes, "Belief in the Unstructured Interview: The Persistence of an Illusion," working paper, Department of Psychology, University of Pennsylvania, 2011. William M. Grove et al., "Clinical Versus Mechanical Prediction: A Meta-Analysis," *Psychological Assessment* 12 (2000): 19–30.
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فصل بیست و دوم

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- ii. *Klein, Sources of Power.*
- iii. The Getty Museum in Los Angeles brings in the world's leading experts on Greek sculpture to view a kouros—a marble statue

of a striding boy—that it is about to buy. One after another, the experts react with what one calls “intuitive repulsion”—a powerful hunch that the kouros is not 2,500 years old but a modern fake. None of the experts can immediately say why they think the sculpture is a forgery. The closest any of them could come to a rationale is an Italian art historian’s complaint that something—he does not know exactly what—“seemed wrong” with the statue’s fingernails. A famous American expert said that the first thought that came to his mind was the word *fresh*, and a Greek expert flatly stated, “Anyone who has ever seen a sculpture coming out of the ground could tell that that thing has never been in the ground.” The lack of agreement on the reasons for the shared conclusion is striking, and rather suspect.

- iv. Simon was one of the towering intellectual figures of the twentieth century. He wrote a classic on decision making in organizations while still in his twenties, and among many other achievements he went on to be one of the founders of the field of artificial intelligence, a leader in cognitive science, an influential student of the process of scientific discovery, a forerunner of behavioral economics and, almost incidentally, a Nobel laureate in economics.
- v. Simon, “What Is an Explanation of Behavior?” David G. Myers, *Intuition: Its Powers and Perils* (New Haven: Yale University Press, 2002), 56.
- vi. Seymour Epstein, “Demystifying Intuition: What It Is, What It Does, How It Does It,” *Psychological Inquiry* 21 (2010): 295–312.
- vii. *Foer*, *Moonwalking with Einstein*.

فصل بیست و سوم

- i. The labels are often misunderstood. Numerous authors believed that the correct terms were “insider view” and

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 - iii. Richard E. Nisbett and Lee D. Ross, *Human Inference: Strategies and Shortcomings of Social Judgment* (Englewood Cliffs, NJ: Prentice-Hall, 1980).
 - iv. For an example of the doubts about evidence-based medicine, see Jerome Groopman, *How Doctors Think* (New York: Mariner Books, 2008), 6.
 - v. Daniel Kahneman and Amos Tversky, “Intuitive Prediction: Biases and Corrective Procedures,” *Management Science* 12 (1979): 313–27.
 - vi. Rt. Hon. The Lord Fraser of Carmyllie, “The Holyrood Inquiry, Final Report,” September 8, 2004, www.holyroodinquiry.org/FINAL_report/report.htm.
 - vii. Brent Flyvbjerg, Mette K. Skamris Holm, and Søren L. Buhl, “How (In)accurate Are Demand Forecasts in Public Works Projects?” *Journal of the American Planning Association* 71 (2005): 131–46.
 - viii. “2002 Cost vs. Value Report,” *Remodeling*, November 20, 2002.
 - ix. Brent Flyvbjerg, “From Nobel Prize to Project Management: Getting Risks Right,” *Project Management Journal* 37 (2006): 5–15.
 - x. Hal R. Arkes and Catherine Blumer, “The Psychology of Sunk Cost,” *Organizational Behavior and Human Decision Processes* 35 (1985): 124–40. Hal R. Arkes and Peter Ayton, “The Sunk Cost and Concorde Effects: Are Humans Less Rational Than Lower Animals?” *Psychological Bulletin* 125 (1998): 591–600.

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- iii. Manju Puri and David T. Robinson, "Optimism and Economic Choice," *Journal of Financial Economics* 86 (2007): 71–99.
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- viii. Thomas Åstebro and Samir Elhedhli, "The Effectiveness of Simple Decision Heuristics: Forecasting Commercial Success for Early-Stage Ventures," *Management Science* 52 (2006): 395–409.
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- x. Eleanor F. Williams and Thomas Gilovich, "Do People Really Believe They Are Above Average?" *Journal of Experimental Social Psychology* 44 (2008): 1121–28.
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- xii. Ulrike Malmendier and Geoffrey Tate, "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction," *Journal of Financial Economics* 89 (2008): 20–43.
- xiii. Ulrike Malmendier and Geoffrey Tate, "Superstar CEOs," *Quarterly Journal of Economics* 124 (2009): 1593–1638.
- xiv. Paul D. Windschitl, Jason P. Rose, Michael T. Stalkfleet, and Andrew R. Smith, "Are People Excessive or Judicious in Their Egocentrism? A Modeling Approach to Understanding Bias and Accuracy in People's Optimism," *Journal of Personality and Social Psychology* 95 (2008): 252–73.
- xv. A form of competition neglect has also been observed in the time of day at which sellers on eBay choose to end their auctions. The easy question is: At what time is the total number of bidders the highest? Answer: around 7:00 p.m. EST. The question sellers should answer is harder: Considering how many other sellers end their auctions during peak hours, at what time will there be the most bidders looking at my auction? The answer: around noon, when the number of bidders is large relative to the number of sellers. The sellers who remember the

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- xviii. Kahneman and Lovallo, "Timid Choices and Bold Forecasts."
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فصل بیست و پنجم

- i. Clyde H. Coombs, Robyn M. Dawes, and Amos Tversky, *Mathematical Psychology: An Elementary Introduction* (Englewood Cliffs, NJ: Prentice-Hall, 1970).
- ii. This rule applies approximately to many dimensions of sensation and perception. It is known as Weber's law, after the German physiologist Ernst Heinrich Weber, who discovered it. Fechner drew on Weber's law to derive the logarithmic psychophysical function.
- iii. Bernoulli's intuition was correct, and economists still use the log of income or wealth in many contexts. For example, when Angus Deaton plotted the average life satisfaction of residents of many countries against the GDP of these countries, he used the logarithm of GDP as a measure of income. The relationship, it turns out, is extremely close: Residents of high-GDP countries are much more satisfied with the quality of their lives than are residents of poor countries, and a doubling of income yields approximately the same increment of satisfaction in rich and poor countries alike.

- iv. Nicholas Bernoulli, a cousin of Daniel Bernoulli, asked a question that can be paraphrased as follows: “You are invited to a game in which you toss a coin repeatedly. You receive \$2 if it shows heads, and the prize doubles with every successive toss that shows heads. The game ends when the coin first shows tails. How much would you pay for an opportunity to play that game?” People do not think the gamble is worth more than a few dollars, although its expected value is infinite—because the prize keeps growing, the expected value is \$1 for each toss, to infinity. However, the utility of the prizes grows much more slowly, which explains why the gamble is not attractive.
- v. Other factors contributed to the longevity of Bernoulli’s theory. One is that it is natural to formulate choices between gambles in terms of gains, or mixed gains and losses. Not many people thought about choices in which all options are bad, although we were by no means the first to observe risk seeking. Another fact that favors Bernoulli’s theory is that thinking in terms of final states of wealth and ignoring the past is often a very reasonable thing to do. Economists were traditionally concerned with rational choices, and Bernoulli’s model suited their goal.

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- i. Stanley S. Stevens, “To Honor Fechner and Repeal His Law,” *Science* 133 (1961): 80–86. Stevens, *Psychophysics*.
- ii. Writing this sentence reminded me that the graph of the value function has already been used as an emblem. Every Nobel laureate receives an individual certificate with a personalized drawing, which is presumably chosen by the committee. My illustration was a stylized rendition of figure 10.
- iii. The loss aversion ratio is often found to be in the range of 1.5 and 2.5: Nathan Novemsky and Daniel Kahneman, “The Boundaries of Loss Aversion,” *Journal of Marketing Research* 42 (2005): 119–28.

- iv. Peter Sokol-Hessner et al., "Thinking Like a Trader Selectively Reduces Individuals' Loss Aversion," *PNAS* 106 (2009): 5035–40.
- v. For several consecutive years, I gave a guest lecture in the introductory finance class of my colleague Burton Malkiel. I discussed the implausibility of Bernoulli's theory each year. I noticed a distinct change in my colleague's attitude when I first mentioned Rabin's proof. He was now prepared to take the conclusion much more seriously than in the past. Mathematical arguments have a definitive quality that is more compelling than appeals to common sense. Economists are particularly sensitive to this advantage.
- vi. The intuition of the proof can be illustrated by an example. Suppose an individual's wealth is W , and she rejects a gamble with equal probabilities to win \$11 or lose \$10. If the utility function for wealth is concave (bent down), the preference implies that the value of \$1 has decreased by over 9% over an interval of \$21! This is an extraordinarily steep decline and the effect increases steadily as the gambles become more extreme.
- vii. Matthew Rabin, "Risk Aversion and Expected-Utility Theory: A Calibration Theorem," *Econometrica* 68 (2000): 1281–92. Matthew Rabin and Richard H. Thaler, "Anomalies: Risk Aversion," *Journal of Economic Perspectives* 15 (2001): 219–32.
- viii. Several theorists have proposed versions of regret theories that are built on the idea that people are able to anticipate how their future experiences will be affected by the options that did not materialize and/or by the choices they did not make: David E. Bell, "Regret in Decision Making Under Uncertainty," *Operations Research* 30 (1982): 961–81. Graham Loomes and Robert Sugden, "Regret Theory: An Alternative to Rational Choice Under Uncertainty," *Economic Journal* 92 (1982): 805–25. Barbara A. Mellers, "Choice and the Relative Pleasure of Consequences," *Psychological Bulletin* 126 (2000): 910–24. Barbara A. Mellers, Alan Schwartz, and Ilana Ritov, "Emotion-Based Choice," *Journal of Experimental Psychology—General*

128 (1999): 332–45. Decision makers' choices between gambles depend on whether they expect to know the outcome of the gamble they did not choose. Ilana Ritov, "Probability of Regret: Anticipation of Uncertainty Resolution in Choice," *Organizational Behavior and Human Decision Processes* 66 (1966): 228–36.

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- i. A theoretical analysis that assumes loss aversion predicts a pronounced kink of the indifference curve at the reference point: Amos Tversky and Daniel Kahneman, "Loss Aversion in Riskless Choice: A Reference-Dependent Model," *Quarterly Journal of Economics* 106 (1991): 1039–61. Jack Knetsch observed these kinks in an experimental study: "Preferences and Nonreversibility of Indifference Curves," *Journal of Economic Behavior & Organization* 17 (1992): 131–39.
- ii. Alan B. Krueger and Andreas Mueller, "Job Search and Job Finding in a Period of Mass Unemployment: Evidence from High-Frequency Longitudinal Data," working paper, Princeton University Industrial Relations Section, January 2011.
- iii. Technically, the theory allows the buying price to be slightly lower than the selling price because of what economists call an "income effect": The buyer and the seller are not equally wealthy, because the seller has an extra bottle. However, the effect in this case is negligible since \$50 is a minute fraction of the professor's wealth. The theory would predict that this income effect would not change his willingness to pay by even a penny.
- iv. The economist Alan Krueger reported on a study he conducted on the occasion of taking his father to the Super Bowl: "We asked fans who had won the right to buy a pair of tickets for \$325 or \$400 each in a lottery whether they would have been willing to pay \$3,000 a ticket if they had lost in the lottery and whether they would have sold their tickets if someone had

offered them \$3,000 apiece. Ninety-four percent said they would not have bought for \$3,000, and ninety-two percent said they would not have sold at that price.” He concludes that “rationality was in short supply at the Super Bowl.” Alan B. Krueger, “Supply and Demand: An Economist Goes to the Super Bowl,” *Milken Institute Review: A Journal of Economic Policy* 3 (2001): 22–29.

- v. Strictly speaking, loss aversion refers to the anticipated pleasure and pain, which determine choices. These anticipations could be wrong in some cases. Deborah A. Kermer et al., “Loss Aversion Is an Affective Forecasting Error,” *Psychological Science* 17 (2006): 649–53.
- vi. Novemsky and Kahneman, “The Boundaries of Loss Aversion.”
- vii. Imagine that all the participants are ordered in a line by the redemption value assigned to them. Now randomly allocate tokens to half the individuals in the line. Half of the people in the front of the line will not have a token, and half of the people at the end of the line will own one. These people (half of the total) are expected to move by trading places with each other, so that in the end everyone in the first half of the line has a token, and no one behind them does.
- viii. Brian Knutson et al., “Neural Antecedents of the Endowment Effect,” *Neuron* 58 (2008): 814–22. Brian Knutson and Stephanie M. Greer, “Anticipatory Affect: Neural Correlates and Consequences for Choice,” *Philosophical Transactions of the Royal Society B* 363 (2008): 3771–86.
- ix. A review of the price of risk, based on “international data from 16 different countries during over 100 years,” yielded an estimate of 2.3, “in striking agreement with estimates obtained in the very different methodology of laboratory experiments of individual decision-making”: Moshe Levy, “Loss Aversion and the Price of Risk,” *Quantitative Finance* 10 (2010): 1009–22.
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- The Case of Local Telephone Calls,” *Journal of Regulatory Economics* 8 (1995): 285–98. Bruce G. S. Hardie, Eric J. Johnson, and Peter S. Fader, “Modeling Loss Aversion and Reference Dependence Effects on Brand Choice,” *Marketing Science* 12 (1993): 378–94.
- xi. Colin Camerer, “Three Cheers—Psychological, Theoretical, Empirical—for Loss Aversion,” *Journal of Marketing Research* 42 (2005): 129–33. Colin F. Camerer, “Prospect Theory in the Wild: Evidence from the Field,” in *Choices, Values, and Frames*, ed. Daniel Kahneman and Amos Tversky (New York: Russell Sage Foundation, 2000), 288–300.
- xii. David Genesove and Christopher Mayer, “Loss Aversion and Seller Behavior: Evidence from the Housing Market,” *Quarterly Journal of Economics* 116 (2001): 1233–60.
- xiii. John A. List, “Does Market Experience Eliminate Market Anomalies?” *Quarterly Journal of Economics* 118 (2003): 47–71.
- xiv. Jack L. Knetsch, “The Endowment Effect and Evidence of Nonreversible Indifference Curves,” *American Economic Review* 79 (1989): 1277–84.
- xv. Charles R. Plott and Kathryn Zeiler, “The Willingness to Pay–Willingness to Accept Gap, the ‘Endowment Effect,’ Subject Misconceptions, and Experimental Procedures for Eliciting Valuations,” *American Economic Review* 95 (2005): 530–45. Charles Plott, a leading experimental economist, has been very skeptical of the endowment effect and has attempted to show that it is not a “fundamental aspect of human preference” but rather an outcome of inferior technique. Plott and Zeiler believe that participants who show the endowment effect are under some misconception about what their true values are, and they modified the procedures of the original experiments to eliminate the misconceptions. They devised an elaborate training procedure in which the participants experienced the roles of both buyers and sellers, and were explicitly taught to assess their true values. As expected, the endowment effect disappeared. Plott and Zeiler view their method as an

important improvement of technique. Psychologists would consider the method severely deficient, because it communicates to the participants a message of what the experimenters consider appropriate behavior, which happens to coincide with the experimenters' theory. Plott and Zeiler's favored version of Knetsch's exchange experiment is similarly biased: It does not allow the owner of the good to have physical possession of it, which is crucial to the effect. See Charles R. Plott and Kathryn Zeiler, "Exchange Asymmetries Incorrectly Interpreted as Evidence of Endowment Effect Theory and Prospect Theory?" *American Economic Review* 97 (2007): 1449–66. There may be an impasse here, where each side rejects the methods required by the other.

- xvi. In their studies of decision making under poverty, Eldar Shafir, Sendhil Mullainathan, and their colleagues have observed other instances in which poverty induces economic behavior that is in some respects more realistic and more rational than that of people who are better off. The poor are more likely to respond to real outcomes than to their description. Marianne Bertrand, Sendhil Mullainathan, and Eldar Shafir, "Behavioral Economics and Marketing in Aid of Decision Making Among the Poor," *Journal of Public Policy & Marketing* 25 (2006): 8–23.
- xvii. The conclusion that money spent on purchases is not experienced as a loss is more likely to be true for people who are relatively well-off. The key may be whether you are aware when you buy one good that you will not be unable to afford another good. Novemsky and Kahneman, "The Boundaries of Loss Aversion." Ian Bateman et al., "Testing Competing Models of Loss Aversion: An Adversarial Collaboration," *Journal of Public Economics* 89 (2005): 1561–80.

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 - iii. Elaine Fox et al., "Facial Expressions of Emotion: Are Angry Faces Detected More Efficiently?" *Cognition & Emotion* 14 (2000): 61–92.
 - iv. Christine Hansen and Randal Hansen, "Finding the Face in the Crowd: An Anger Superiority Effect," *Journal of Personality and Social Psychology* 54 (1988): 917–24.
 - v. Jos J. A. Van Berkum et al., "Right or Wrong? The Brain's Fast Response to Morally Objectionable Statements," *Psychological Science* 20 (2009): 1092–99.
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 - viii. Michel Cabanac, "Pleasure: The Common Currency," *Journal of Theoretical Biology* 155 (1992): 173–200.
 - ix. Chip Heath, Richard P. Larrick, and George Wu, "Goals as Reference Points," *Cognitive Psychology* 38 (1999): 79–109.
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- xi. Daniel Kahneman, “Reference Points, Anchors, Norms, and Mixed Feelings,” *Organizational Behavior and Human Decision Processes* 51 (1992): 296–312.
- xii. John Alcock, *Animal Behavior: An Evolutionary Approach* (Sunderland, MA: Sinauer Associates, 2009), 278–84, cited by Eyal Zamir, “Law and Psychology: The Crucial Role of Reference Points and Loss Aversion,” working paper, Hebrew University, 2011.
- xiii. Daniel Kahneman, Jack L. Knetsch, and Richard H. Thaler, “Fairness as a Constraint on Profit Seeking: Entitlements in the Market,” *The American Economic Review* 76 (1986): 728–41.
- xiv. Ernst Fehr, Lorenz Goette, and Christian Zehnder, “A Behavioral Account of the Labor Market: The Role of Fairness Concerns,” *Annual Review of Economics* 1 (2009): 355–84. Eric T. Anderson and Duncan I. Simester, “Price Stickiness and Customer Antagonism,” *Quarterly Journal of Economics* 125 (2010): 729–65.
- xv. Dominique de Quervain et al., “The Neural Basis of Altruistic Punishment,” *Science* 305 (2004): 1254–58.
- xvi. David Cohen and Jack L. Knetsch, “Judicial Choice and Disparities Between Measures of Economic Value,” *Osgoode Hall Law Review* 30 (1992): 737–70. Russell Korobkin, “The Endowment Effect and Legal Analysis,” *Northwestern University Law Review* 97 (2003): 1227–93.
- xvii. Zamir, “*Law and Psychology*.”

فصل بیست‌ونهم

- i. Including exposure to a “Dutch book,” which is a set of gambles that your incorrect preferences commit you to accept and is guaranteed to end up in a loss.

- ii. Readers who are familiar with the Allais paradoxes will recognize that this version is new. It is both much simpler and actually a stronger violation than the original paradox. The left-hand option is preferred in the first problem. The second problem is obtained by adding a more valuable prospect to the left than to the right, but the right-hand option is now preferred.
- iii. As the distinguished economist Kenneth Arrow recently described the event, the participants in the meeting paid little attention to what he called “Allais’s little experiment.” Personal conversation, March 16, 2011.
- iv. The table shows decision weights for gains. Estimates for losses were very similar.
- v. Ming Hsu, Ian Krajbich, Chen Zhao, and Colin F. Camerer, “Neural Response to Reward Anticipation under Risk Is Nonlinear in Probabilities,” *Journal of Neuroscience* 29 (2009): 2231–37.
- vi.
- vii. W. Kip Viscusi, Wesley A. Magat, and Joel Huber, “An Investigation of the Rationality of Consumer Valuations of Multiple Health Risks,” *RAND Journal of Economics* 18 (1987): 465–79.
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Jeffrey J. Rachlinski, "Gains, Losses and the Psychology of Litigation," *Southern California Law Review* 70 (1996): 113–85.
Samuel R. Gross and Kent D. Syverud, "Getting to No: A Study of Settlement Negotiations and the Selection of Cases for Trial," *Michigan Law Review* 90 (1991): 319–93.

- xi. Chris Guthrie, "Framing Frivolous Litigation: A Psychological Theory," *University of Chicago Law Review* 67 (2000): 163–216.

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- ii. Ibid. Cass R. Sunstein, "Probability Neglect: Emotions, Worst Cases, and Law," *Yale Law Journal* 112 (2002): 61–107. See notes to chapter 13: Damasio, *Descartes' Error*. Slovic, Finucane, Peters, and MacGregor, "The Affect Heuristic."
- iii. Craig R. Fox, "Strength of Evidence, Judged Probability, and Choice Under Uncertainty," *Cognitive Psychology* 38 (1999): 167–89.
- iv. Judgments of the probabilities of an event and its complement do not always add up to 100%. When people are asked about a topic they know very little about ("What is your probability that the temperature in Bangkok will exceed 100° tomorrow at noon?"), the judged probabilities of the event and its complement add up to less than 100%.
- v. In cumulative prospect theory, decision weights for gains and losses are not assumed to be equal, as they were in the original version of prospect theory that I describe.
- vi. The question about the two urns was invented by Dale T. Miller, William Turnbull, and Cathy McFarland, "When a Coincidence Is Suspicious: The Role of Mental Simulation," *Journal of Personality and Social Psychology* 57 (1989): 581–89. Seymour Epstein and his colleagues argued for an interpretation of it in

- terms of two systems: Lee A. Kirkpatrick and Seymour Epstein, "Cognitive-Experiential Self-Theory and Subjective Probability: Evidence for Two Conceptual Systems," *Journal of Personality and Social Psychology* 63 (1992): 534–44.
- vii. Kimihiko Yamagishi, "When a 12.86% Mortality Is More Dangerous Than 24.14%: Implications for Risk Communication," *Applied Cognitive Psychology* 11 (1997): 495–506.
- viii. Slovic, Monahan, and MacGregor, "Violence Risk Assessment and Risk Communication."
- ix. Jonathan J. Koehler, "When Are People Persuaded by DNA Match Statistics?" *Law and Human Behavior* 25 (2001): 493–513.
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- xii. Hertwig and Erev, "The Description-Experience Gap."

فصل سی و یکم

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- ii. Hersh Shefrin and Meir Statman, "The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence," *Journal of Finance* 40 (1985): 777–90. Terrance Odean, "Are Investors Reluctant to Realize Their Losses?" *Journal of Finance* 53 (1998): 1775–98.
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- iv. Darrin R. Lehman, Richard O. Lempert, and Richard E. Nisbett, "The Effects of Graduate Training on Reasoning: Formal Discipline and Thinking about Everyday-Life Events," *American Psychologist* 43 (1988): 431–42.
- v. Marcel Zeelenberg and Rik Pieters, "A Theory of Regret Regulation 1.0," *Journal of Consumer Psychology* 17 (2007): 3–18.
- vi. Kahneman and Miller, "Norm Theory."
- vii. The hitchhiker question was inspired by a famous example discussed by the legal philosophers Hart and Honoré: "A woman married to a man who suffers from an ulcerated condition of the stomach might identify eating parsnips as the cause of his indigestion. The doctor might identify the ulcerated condition as the cause and the meal as a mere occasion." Unusual events call for causal explanations and also evoke counterfactual thoughts, and the two are closely related. The

same event can be compared to either a personal norm or the norm of other people, leading to different counterfactuals, different causal attributions, and different emotions (regret or blame): Herbert L. A. Hart and Tony Honoré, *Causation in the Law* (New York: Oxford University Press, 1985), 33.

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- x. Cass R. Sunstein, Daniel Kahneman, David Schkade, and Ilana Ritov, "Predictably Incoherent Judgments," *Stanford Law Review* 54 (2002): 1190.

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- vii. Eric J. Johnson and Daniel Goldstein, "Do Defaults Save Lives?" *Science* 302 (2003): 1338–39.

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- ii. Ed Diener, Derrick Wirtz, and Shigehiro Oishi, "End Effects of Rated Life Quality: The James Dean Effect," *Psychological Science* 12 (2001): 124–28. The same series of experiments also tested for the peak-end rule in an unhappy life and found similar results: Jen was not judged twice as unhappy if she lived miserably for 60 years rather than 30, but she was regarded as considerably happier if 5 mildly miserable years were added just before her death.

فصل سی‌وهفتم

- i. Another question that has been used frequently is, "Taken all together, how would you say things are these days? Would you say that you are very happy, pretty happy, or not too happy?" This question is included in the General Social Survey in the

United States, and its correlations with other variables suggest a mix of satisfaction and experienced happiness. A pure measure of life evaluation used in the Gallup surveys is the Cantril Self-Anchoring Striving Scale, in which the respondent rates his or her current life on a ladder scale in which 0 is “the worst possible life for you” and 10 is “the best possible life for you.” The language suggests that people should anchor on what they consider possible for them, but the evidence shows that people all over the world have a common standard for what a good life is, which accounts for the extraordinarily high correlation ($r = .84$) between the GDP of countries and the average ladder score of their citizens. Angus Deaton, “Income, Health, and Well-Being Around the World: Evidence from the Gallup World Poll,” *Journal of Economic Perspectives* 22 (2008): 53–72.

- ii. The economist was Alan Krueger of Princeton, noted for his innovative analyses of unusual data. The psychologists were David Schkade, who had methodological expertise; Arthur Stone, an expert on health psychology, experience sampling, and ecological momentary assessment; Norbert Schwarz, a social psychologist who was also an expert on survey method and had contributed experimental critiques of well-being research, including the experiment on which a dime left on a copying machine influenced subsequent reports of life satisfaction.
- iii. In some applications, the individual also provides physiological information, such as continuous recordings of heart rate, occasional records of blood pressure, or samples of saliva for chemical analysis. The method is called Ecological Momentary Assessment: Arthur A. Stone, Saul S. Shiffman, and Marten W. DeVries, “Ecological Momentary Assessment Well-Being: The Foundations of Hedonic Psychology,” in Kahneman, Diener, and Schwarz, *Well-Being*, 26–39.
- iv. Daniel Kahneman et al., “A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method,” *Science*

- 306 (2004): 1776–80. Daniel Kahneman and Alan B. Krueger, “Developments in the Measurement of Subjective Well-Being,” *Journal of Economic Perspectives* 20 (2006): 3–24.
- v. Previous research had documented that people are able to “relive” feelings they had in a past situation when the situation is retrieved in sufficiently vivid detail. Michael D. Robinson and Gerald L. Clore, “Belief and Feeling: Evidence for an Accessibility Model of Emotional Self-Report,” *Psychological Bulletin* 128 (2002): 934–60.
- vi. *Alan B. Krueger, ed., Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being (Chicago: University of Chicago Press, 2009).*
- vii. Ed Diener, “Most People Are Happy,” *Psychological Science* 7 (1996): 181–85.
- viii. For a number of years I have been one of several Senior Scientists associated with the efforts of the Gallup Organization in the domain of well-being.
- ix. Daniel Kahneman and Angus Deaton, “High Income Improves Evaluation of Life but Not Emotional Well-Being,” *Proceedings of the National Academy of Sciences* 107 (2010): 16489–93.
- x. Dylan M. Smith, Kenneth M. Langa, Mohammed U. Kabeto, and Peter Ubel, “Health, Wealth, and Happiness: Financial Resources Buffer Subjective Well-Being After the Onset of a Disability,” *Psychological Science* 16 (2005): 663–66.
- xi. In a TED talk I presented in February 2010 I mentioned a preliminary estimate of \$60,000, which was later corrected.
- xii. Jordi Quoidbach, Elizabeth W. Dunn, K. V. Petrides, and Moïra Mikolajczak, “Money Giveth, Money Taketh Away: The Dual Effect of Wealth on Happiness,” *Psychological Science* 21 (2010): 759–63.

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- i. Andrew E. Clark, Ed Diener, and Yannis Georgellis, "Lags and Leads in Life Satisfaction: A Test of the Baseline Hypothesis." Paper presented at the German Socio-Economic Panel Conference, Berlin, Germany, 2001.
- ii. Daniel T. Gilbert and Timothy D. Wilson, "Why the Brain Talks to Itself: Sources of Error in Emotional Prediction," *Philosophical Transactions of the Royal Society B* 364 (2009): 1335–41.
- iii. Strack, Martin, and Schwarz, "Priming and Communication."
- iv. The original study was reported by Norbert Schwarz in his doctoral thesis (in German) "Mood as Information: On the Impact of Moods on the Evaluation of One's Life" (Heidelberg: Springer Verlag, 1987). It has been described in many places, notably Norbert Schwarz and Fritz Strack, "Reports of Subjective Well-Being: Judgmental Processes and Their Methodological Implications," in Kahneman, Diener, and Schwarz, *Well-Being*, 61–84.
- v. The study was described in William G. Bowen and Derek Curtis Bok, *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admissions* (Princeton: Princeton University Press, 1998). Some of Bowen and Bok's findings were reported by Carol Nickerson, Norbert Schwarz, and Ed Diener, "Financial Aspirations, Financial Success, and Overall Life Satisfaction: Who? and How?" *Journal of Happiness Studies* 8 (2007): 467–515.
- vi. Alexander Astin, M. R. King, and G. T. Richardson, "The American Freshman: National Norms for Fall 1976," Cooperative Institutional Research Program of the American Council on Education and the University of California at Los Angeles, Graduate School of Education, Laboratory for Research in Higher Education, 1976.
- vii. These results were presented in a talk at the American Economic Association annual meeting in 2004. Daniel

- Kahneman, “Puzzles of Well-Being,” paper presented at the meeting.
- viii. The question of how well people today can forecast the feelings of their descendants a hundred years from now is clearly relevant to the policy response to climate change, but it can be studied only indirectly, which is what we proposed to do.
 - ix. In posing the question, I was guilty of a confusion that I now try to avoid: Happiness and life satisfaction are not synonymous. Life satisfaction refers to your thoughts and feelings when you think about your life, which happens occasionally—including in surveys of well-being. Happiness describes the feelings people have as they live their normal life.
 - x. However, my wife has never conceded. She claims that only residents of Northern California are happier.
 - xi. Asian students generally reported lower satisfaction with their lives, and Asian students made up a much larger proportion of the samples in California than in the Midwest. Allowing for this difference, life satisfaction in the two regions was identical.
 - xii. Jing Xu and Norbert Schwarz have found that the quality of the car (as measured by Blue Book value) predicts the owners’ answer to a general question about their enjoyment of the car, and also predicts people’s pleasure during joyrides. But the quality of the car has no effect on people’s mood during normal commutes. Norbert Schwarz, Daniel Kahneman, and Jing Xu, “Global and Episodic Reports of Hedonic Experience,” in R. Belli, D. Alwin, and F. Stafford (eds.), *Using Calendar and Diary Methods in Life Events Research* (Newbury Park, CA: Sage), pp. 157–74.
 - xiii. The study is described in more detail in Kahneman, “Evaluation by Moments.”
 - xiv. Camille Wortman and Roxane C. Silver, “Coping with Irrevocable Loss, Cataclysms, Crises, and Catastrophes: Psychology in Action,” American Psychological Association, Master Lecture Series 6 (1987): 189–235.

- xv. Dylan Smith et al., “Misremembering Colostomies? Former Patients Give Lower Utility Ratings than Do Current Patients,” *Health Psychology* 25 (2006): 688–95. George Loewenstein and Peter A. Ubel, “Hedonic Adaptation and the Role of Decision and Experience Utility in Public Policy,” *Journal of Public Economics* 92 (2008): 1795–1810.
- xvi. Daniel Gilbert and Timothy D. Wilson, “Miswanting: Some Problems in Affective Forecasting,” in *Feeling and Thinking: The Role of Affect in Social Cognition*, ed. Joseph P. Forgas (New York: Cambridge University Press, 2000), 178–97.

نتیجه‌گیری

- i. Paul Dolan and Daniel Kahneman, “Interpretations of Utility and Their Implications for the Valuation of Health,” *Economic Journal* 118 (2008): 215–234. Loewenstein and Ubel, “Hedonic Adaptation and the Role of Decision and Experience Utility in Public Policy.”
- ii. Progress has been especially rapid in the UK, where the use of measures of well-being is now official government policy. These advances were due in good part to the influence of Lord Richard Layard’s book *Happiness: Lessons from a New Science*, first published in 2005. Layard is among the prominent economists and social scientists who have been drawn into the study of well-being and its implications. Other important sources are: Derek Bok, *The Politics of Happiness: What Government Can Learn from the New Research on Well-Being* (Princeton: Princeton University Press, 2010). Ed Diener, Richard Lucas, Ulrich Schimmack, and John F. Helliwell, *Well-Being for Public Policy* (New York: Oxford University Press, 2009). Alan B. Krueger, ed., *Measuring the Subjective Well-Being of Nations: National Account of Time Use and Well-Being* (Chicago: University of Chicago Press, 2009). Joseph E. Stiglitz, Amartya Sen, and Jean-Paul Fitoussi, *Report of the Commission on the Measurement of Economic Performance and Social Progress*. Paul

- Dolan, Richard Layard, and Robert Metcalfe, *Measuring Subjective Well-being for Public Policy: Recommendations on Measures* (London: Office for National Statistics, 2011).
- iii. The view of the mind that Dan Ariely has presented in *Predictably Irrational: The Hidden Forces That Shape Our Decisions* (New York: Harper, 2008) is not much different from mine, but we differ in our use of the term.
- iv. Gary S. Becker and Kevin M. Murphy, "A Theory of Rational Addiction," *Journal of Political Economics* 96 (1988): 675–700. Nudge: Richard H. Thaler and Cass R. Sunstein, *Nudge: Improving Decisions About Health, Wealth, and Happiness* (New Haven: Yale University Press, 2008).
- v. Atul Gawande, *The Checklist Manifesto: How to Get Things Right* (New York: Holt, 2009). Daniel Kahneman, Dan Lovallo, and Oliver Sibony, "The Big Idea: Before You Make That Big Decision ..." *Harvard Business Review* 89 (2011): 50–60.
- vi. Chip Heath, Richard P. Larrick, and Joshua Klayman, "Cognitive Repairs: How Organizational Practices Can Compensate for Individual Shortcomings," *Research in Organizational Behavior* 20 (1998): 1–37.

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