

## NOTES

### INTRODUCTION

- 1 *If ants are such busy workers*: This quote is attributed to Marie Dressler. See, for example, Marie Dressler—Biography. IMDb. Retrieved November 6, 2012, from <http://www.imdb.com/name/nm0237597/bio>.
- 2 “Illusion is the first of all pleasures”: T. Smollett and J. Morley, eds., *The Works of Voltaire: The Maid of Orleans (La Pucelle d’Orléans)*, vol. 41 (New York: E. R. DuMont, 1901), 90.
- 4 *By scarcity, we mean*: This definition of scarcity is inherently subjective. One person with a lot of wealth but many desires can in principle experience the same scarcity as another with less wealth (and fewer desires). This subjective definition of scarcity is essential for understanding the psychology. Of course the *consequences* depend on both the psychology and the material reality. We are taking this subjective approach only to understand the psychology. When we analyze problems—poverty, for example, in chapter 7—we will combine both the subjective and the objective.
- 4 *people having too few social bonds*: In his seminal book, Robert Putnam showed across a diverse set of data a trend in Americans’ participation in civic institutions. See Robert D. Putnam, *Bowling*

*Alone: The Collapse and Revival of American Community* (New York: Simon & Schuster, 2000). Since then, the field has been transformed by the influx of large amounts of data on social interaction. See Jim Giles, “Computational Social Science: Making the Links,” *Nature* 488 (August 23, 2012): 448–50. Of course the importance of social capital—the inverse of social scarcity—by now is discussed in a wide variety of problems from economic development to the value of cities.

5 **the Allies realized they had a problem:** Todd Tucker, *The Great Starvation Experiment: Ancel Keys and the Men Who Starved for Science* (Minneapolis: University of Minnesota Press, 2008).

5 **a team at the University of Minnesota:** A. Keys, J. Brožek, A. Henschel, O. Mickelson, and H. L. Taylor, *The Biology of Human Starvation*, 2 vols. (Oxford: University of Minnesota Press, 1950).

6 **The men became impatient waiting in line:** S. A. Russell, *Hunger: An Unnatural History* (New York: Basic Books, 2006).

8 **One recent study asked subjects to come to a lab around lunchtime:** R. Radel and C. Clement-Guillotin, “Evidence of Motivational Influences in Early Visual Perception: Hunger Modulates Conscious Access,” *Psychological Science* 23, no. 3 (2012): 232–34. doi:10.1177/0956797611427920.

8 **fast enough to remain beyond conscious control:** B. Libet, C. A. Gleason, E. W. Wright, and D. K. Pearl, “Time of Conscious Intention to Act in Relation to Onset of Cerebral Activity (Readiness-Potential): The Unconscious Initiation of a Freely Voluntary Act,” *Brain* 106, no. 3 (1983): 623–42.

9 **One study finds that when subjects are thirsty:** H. Aarts, A. Dijksterhuis, and P. de Vries, “On the Psychology of Drinking: Being Thirsty and Perceptually Ready,” *British Journal of Psychology* 92, no. 4 (2001): 631–42. doi:10.1348/000712601162383.

9 **the size of regular U.S. coins:** P. Saugstad and P. Schioldborg, “Value and Size Perception,” *Scandinavian Journal of Psychology* 7, no. 1 (1966): 102–14. doi:10.1111/j.1467-9450.1966.tb01344.x.

9 **The coins “looked” largest to the poorer children:** In visual perception, a greater focus does not necessarily mean greater accuracy. Several studies have found that both motivation and attention

- can penetrate and guide early visual processing. Psychophysical, neurophysiological, and behavioral evidence suggests that attention changes the strength of a stimulus by increasing its salience, and thus can enhance its perceptual representation, improving or impairing various aspects of visual performance. For example, observers report perceiving the attended stimulus as being higher in contrast than it really is. Marisa Carrasco, Sam Ling, and Sarah Read, “Attention Alters Appearance,” *Nature Neuroscience* 7 (2004), 308–13; Yaffa Yeshurun and Marisa Carrasco, “Attention Improves or Impairs Visual Performance by Enhancing Spatial Resolution,” *Nature* 396 (Nov. 5, 1998), 72–75; Rémi Radel and Corentin Clément Guillotin, “Evidence of Motivational Influences in Early Visual Perception: Hunger Modulates Conscious Access,” *Psychological Science* 23, no. 3 (2012), 232–34.
- 9 **the coins captured the focus of poor children:** In this study, the poor children value the coins more than the rich children. Of course many other features vary between poor and rich children. More recent work has experimentally induced value, rather than taking population level differences in value. For a recent paper using this approach see Brian A. Anderson, Patryk A. Laurent, and Steven Yantis, “Value-driven Attentional Capture,” *Proceedings of the National Academy of Sciences* 108, no. 25 (2011): 10367–71.
- 9 **“subjective expansion of time”:** P. U. Tse, J. Intriligator, J. Rivest, and P. Cavanagh, “Attention and the Subjective Expansion of Time,” *Attention, Perception, and Psychophysics* 66, no. 7 (2004): 1171–89.
- 9 **flashed pictures of faces for one second:** W. L. Gardner, Valerie Pickett, and Megan Knowles, “On the Outside Looking In: Loneliness and Social Monitoring,” *Personality and Social Psychology Bulletin* 31, no. 11 (2005): 1549–60. doi:10.1177/0146167205277208.
- 10 **their loneliness might imply social ineptitude or inexperience:** This is not to say that the lonely have greater social skills all around. Quite the opposite. We must be very precise about what we mean by “social skills.” This study measures capacity to decode social cues. On the other hand, numerous studies have shown the lonely do show a lower capacity to regulate behavior in social settings. In chapter 6, we will argue that this diminished performance in

- regulating their behavior in social settings is also a predictable consequence of scarcity. A wonderful book explores these ideas in much greater detail: John T. Cacioppo and William Patrick, *Loneliness: Human Nature and the Need for Social Connection* (New York: W. W. Norton, 2008).
- 10 **One study asked people to read from someone's diary:** See W. L. Gardner, C. L. Pickett, and M. B. Brewer, "Social Exclusion and Selective Memory: How the Need to Belong Influences Memory for Social Events," *Personality and Social Psychology Bulletin* 26, no. 4 (2000): 486–96. doi:10.1177/0146167200266007.
- 10 **Suddenly, Bradley cannot escape noticing connections:** W. L. Gardner, Valerie Pickett, and Megan Knowles, "On the Outside Looking In: Loneliness and Social Monitoring," *Personality and Social Psychology Bulletin* 31, no. 11 (2005): 1549–60.
- 11 **European paleontologists in nineteenth-century China:** K. Vitasek, M. Ledyard, and K. Manrodt, *Vested Outsourcing: Five Rules That Will Transform Outsourcing* (New York: Palgrave Macmillan, 2010).
- 12 **the feeling of scarcity depends:** A. F. Bennett, "Structural and Functional Determinates of Metabolic Rate," *American Zoologist* 28, no. 2 (1988): 699–708.
- 12 **we are unhappy:** The word *scarcity* is also used to describe a different effect in psychology. The *scarcity principle*, as it is often called, captures the idea that when there is less of something people want more of it. Marketers use this idea extensively, for example, with limited-time offers, by making sure the shelves are only partly stocked for online offers that say "only 3 left." See chapter 7 of this book for a nice description of the scarcity principle: Robert B. Cialdini, *Influence: Science and Practice*, vol. 4 (Boston, Mass.: Allyn and Bacon, 2001).
- 12 **Scarcity leads to dissatisfaction and struggle:** In economics, this is the principle of increasing utility. Having more of a resource provides greater utility or well-being. In the vast majority of economic analyses—as in our work—these preferences, the utility functions, so to speak, are also taken as given.
- 12 **mindsets created by particular instances of scarcity:** One study on dieting and mood is Peter J. Rogers, "A Healthy Body, a Healthy Mind: Long-Term Impact of Diet on Mood and Cognitive Function," *Proceedings—Nutrition Society of London* 60, no. 1 (CABI Publishing, 1999, 2001). A more recent study has examined the

physiological pathways: Doris Stangl and Sandrine Thruet, "Impact of Diet on Adult Hippocampal Neurogenesis," *Genes and Nutrition* 4, no. 4 (2009): 271–82. For a discussion of culture and poverty, see the recent collection of articles in David J. Harding, Michèle Lamont, and Mario Luis Small, eds., *The Annals of the American Academy of Political and Social Science* 629 (May 2010).

- 14 **The structure of human memory:** E. R. Kandel, *In Search of Memory: The Emergence of a New Science of Mind* (New York: W. W. Norton, 2007).

### 1. FOCUSING AND TUNNELING

- 19 **Do you have an idea for your story yet?:** MOOD—Calvin and Hobbes—Full Story. Retrieved from <http://web.mit.edu/manoli/mood/www/calvin-full.html>.
- 19 **all the reviewers raved about:** *Dirtcandy*. Retrieved from <http://www.dirtcandynyc.com/?p=731>.
- 20 **"The Crispy Tofu that's on the menu":** *Dirtcandy*. Retrieved from <http://www.dirtcandynyc.com/?p=2508>. One might think that Amanda Cohen had put this dish on her menu simply to capitalize on her *Iron Chef* celebrity: people come in wanting to taste the dish from the show. But she had the dish on her menu well before the show even aired. This was more than a marketing gimmick.
- 20 **months and years of prior experience and hard work:** The relationship between creativity and time pressure is significantly more complicated than this story implies. In many cases time pressure can inhibit creativity. Here's an intuition that has worked for us. When the task requires fanning out—the generation of new ideas—time pressure is an impediment. When the task requires fanning in—synthesizing a large set of ideas into one (as in Cohen's case)—time pressure can be helpful. A very nice article that reviews these ideas and their original extensive research is Teresa M. Amabile, Constance N. Hadley, and Steven J. Kramer, "Creativity Under the Gun," *Harvard Business Review* (August 1, 2002).
- 21 **has made a living out of studying them:** Though there has been follow-up work, the original article on this topic remains a good first read: Connie J. Gersick, "Time and Transition in Work Teams: Toward a New Model of Group Development," *Academy of Management Journal* 31, no. 1 (1988): 9–41. In this original research, she

- sat through every group meeting of eight groups. Though we simplify and talk about one meeting, the process she studied takes place over several meetings. Ruth Wageman, Colin M. Fisher, and J. Richard Hackman, in “Leading Teams When the Time Is Right” (*Organizational Dynamics* 38, no. 3 [2009] 192–203), discuss how these insights can be used by leaders. At the midpoint transition, the group will be particularly primed for a change, one that leaders can use.
- 22 **undergraduates were paid to proofread three essays:** D. Ariely and K. Wertenbroch, “Procrastination, Deadlines, and Performance: Self-Control by Precommitment,” *Psychological Science* 13, no. 3 (2002): 219–24. An earlier study found that college students were more likely to return an optional worksheet for pay when they had only one week to complete it compared to when they had three weeks; A. Tversky and E. Shafir, “Choice under Conflict: The Dynamics of Deferred Decision,” *Psychological Science* 3, no. 6 (1992): 358–61. Economists have theorized about the power of deadlines using a different framework—hyperbolic discounting—our tendency to disproportionately weigh the present over the future. See Shane Frederick, George Loewenstein, and Ted O’Donoghue, “Time Discounting: A Critical Review,” *Journal of Economic Literature* (2002) for an overview. Intermediate deadlines make us more effective, in this view, by translating distant future rewards into immediate present ones.
- 23 **A study by the psychologist Jaime Kurtz:** J. L. Kurtz, “Looking to the Future to Appreciate the Present: The Benefits of Perceived Temporal Scarcity,” *Psychological Science* 19, no. 12 (2008): 1238–41. doi:10.1111/j.1467-9280.2008.02231.x.
- 23 **some customers are mailed a coupon:** J. J. Inman and L. McAlister, “Do Coupon Expiration Dates Affect Consumer Behavior?” *Journal of Marketing Research* (1994): 423–28; A. Krishna and Z. J. Zhang, “Short or Long-Duration Coupons: The Effect of the Expiration Date on the Profitability of Coupon Promotions,” *Management Science* 45, no. 8 (1999): 1041–56.
- 23 **salespeople work hardest:** An example of a paper documenting this effect is Paul Oyer, “Fiscal Year Ends and Nonlinear Incentive Contracts: The Effect on Business Seasonality,” *The Quarterly Journal of Economics* 113, no. 1 (1998): 149–85. His interpretation is less psychological than ours—attributing it to substitution of effort over time.

- 23 as payday got closer: S. Kaur, M. Kremer, and S. Mullainathan, “Self-Control and the Development of Work Arrangements,” *American Economic Review Papers and Proceedings* (2010).
- 23 “An Englishman’s mind works best”: M. Hastings, *Finest Years: Churchill as Warlord, 1940–45* (London: HarperPress, 2009).
- 24 a video game based on Angry Birds: Here we describe a set of studies briefly. Details of these, including sample sizes and more careful statistical tests, can be found in Shah, Mullainathan, and Shafir, “Some Consequences of Having Too Little,” *Science* 338, no. 6107 (November 2012): 682–85.
- 26 the blueberry rich did not earn anywhere near twice as much: It is also not the case that the blueberry rich simply got bored or did not want to spend as much time with the task. If that were the case, they could have played fewer rounds overall and stopped early.
- 27 Just as we cannot effectively tickle ourselves: Evidence on self-tickling ranges from experiments where self-tickling happens through control of an independent object to fMRI data. A wonderful review is in Sarah-Jayne Blakemore, Daniel Wolpert, and Chris Frith, “Why Can’t You Tickle Yourself?” *Neuroreport* 11, no. 11 (2000): R11–R16. The prevailing view is that self-produced movement can be predicted and its effects can be attenuated. We know of no such careful empirical work on imagined deadlines or time pressure. The renegotiation problem is often discussed. An imagined deadline does not feel pressing because in the back of one’s mind is the knowledge that you can always renegotiate it with yourself.
- 27 At 10 p.m. on April 23, 2005: *State Fire Marshal’s Office Firefighter Fatality Investigation*, no. 05-307-04, Texas Department of Insurance, Austin, Texas. We thank Jessica Gross for helpful research on this case, and Dr. Burton Clark for helpful correspondence.
- 28 vehicle accidents as the second leading cause of firefighter deaths: P. R. LeBlanc and R. F. Fahy, *Full Report: Firefighter Fatalities in the United States—2004* (Quincy, Mass.: National Fire Protection Association, 2005).
- 28 between 20 and 25 percent of firefighter fatalities: Firefighter fatality retrospective study, April 2002. (Prepared for the Federal Emergency Management Agency, United States Fire Service, National Fire Data Center, by TriData Corporation, Arlington, Virginia).

- 28 had graduated from a safety class the year before: C. Lumry (January 21, 2010). *Amarillo Firefighter Fatality*—COFT | Council On Firefighter Training. Retrieved from <http://www.coft-oklahoma.org/news-updates/m.blog/21/amarillo-firefighter-fatality>.
- 28 “I don’t know of a firefighter”: C. Dickinson, *Chief’s Corner* (February 27, 2007), retrieved from <http://www.saratogacofire.com/seatbelt.htm>.
- 29 the narrowing of the visual field: L. J. Williams, “Tunnel Vision Induced by a Foveal Load Manipulation,” *Human Factors* 27, no. 2 (1985): 221–27. By *tunneling* vision, researchers refer to something quite concrete that they have studied for years, sometimes at the level of the actual eye. People are made to focus on a target that’s in front of the fovea, the center of the eye’s retina. Then, items are presented at the parafoveal level, surrounding the fovea, where visual acuity is lower. And they measure people’s ability to detect those items at the periphery while they perform various tasks at the center. And what they find is quite remarkable. They keep all the visual information intact and slightly alter people’s task. For example, all subjects see the same A, and some have to decide whether it’s the letter A (easy) whereas others have to decide whether it’s a vowel (harder). And what they find is that although the visual experience is identical, those who have to think harder about the foveal A are less good at detecting items at the periphery. As they focus more on the task, they tunnel and lose peripheral vision. While this is at the level of the physical eye, *tunneling* also refers to the cognitive equivalent of this visual experience. It is a single-mindedness that misses much of what’s peripheral.
- 29 “To photograph is to frame”: Susan Sontag, *Regarding the Pain of Others* (New York: Farrar, Straus and Giroux, 2002), 46.
- 31 *not* to give you “milk” and “snow”: N. J. Slamecka, “The Question of Associative Growth in the Learning of Categorized Material,” *Journal of Verbal Learning and Verbal Behavior* 11, no. 3 (1972): 324–32. Another study asked people to name states in the United States and found that “helping” them by giving them some state names only decreased the total number recalled. See Raymond Nickerson, “Retrieval Inhibition from Part-Set Cuing: A Persisting Enigma in Memory Research,” *Memory and Cognition* 12, no. 6 (November 1984): 531–52.
- 31 subjects were asked to write down a personal goal: J. Y. Shah, R.



- Friedman, and A. W. Kruglanski, "Forgetting All Else: On the Antecedents and Consequences of Goal Shielding," *Journal of Personality and Social Psychology* 83, no. 6 (2002): 1261.
- 31 **Psychologists call this goal inhibition:** C. M. MacLeod, "The Concept of Inhibition in Cognition," in *Inhibition in Cognition*, ed. David S. Gorfein and Colin M. Macleod (Washington, D.C.: American Psychological Association, 2007), 3–23.
- 34 **Subjects had to retrieve from memory:** The illustration here shows only a few items in shades of gray. The actual experiment differed from this in two ways. First, subjects faced many more items. Second, the items were in different colors and these colors also had to be recalled.
- 34 **They earned less even though they had more total guesses:** These results are from an unpublished experiment. Subjects earned 7 percent less when given one and three guesses than when given one guess in both cases ( $N = 33$ ,  $p < .05$ ).
- 35 **I took a speed-reading course:** Woody Allen—Biography, IMDb, <http://www.imdb.com/name/nm0000095/bio>.
- 35 **So you want to save an extra \$10,000:** B. Arends, "How to Save \$10,000 by Next Thanksgiving," *Wall Street Journal*, November 20, 2011. Retrieved from <http://online.wsj.com/article/SB10001424052970204323904577040101565437734.html>.
- 36 **from health insurance to crop insurance:** A brief discussion and a list of examples can be found in Michael J. McCord, Barbara Magnoni, and Emily Zimmerman, "A Microinsurance Puzzle: How Do Demand Factors Link to Client Value?" *MILK Brief*, no. 7. Available at [http://www.microinsurancecentre.org/milk-project/milk-docs/doc\\_details/835-milk-brief-7-a-microinsurance-puzzle-how-do-demand-factors-link-to-client-value.html](http://www.microinsurancecentre.org/milk-project/milk-docs/doc_details/835-milk-brief-7-a-microinsurance-puzzle-how-do-demand-factors-link-to-client-value.html).
- 36 **more than 90 percent of farmers:** X. Giné, R. Townsend, and J. Vickery, "Patterns of Rainfall Insurance Participation in Rural India," *The World Bank Economic Review* 22, no. 3 (2008): 539–66.
- 36 **The same is true of health insurance:** A. Aizer, "Low Take-Up in Medicaid: Does Outreach Matter and for Whom?" *The American Economic Review* 93, no. 2 (2003): 238–41.
- 36 **worse than driving at above legal alcohol levels:** D. L. Strayer, F. A. Drews, and D. J. Crouch, "A Comparison of the Cell Phone Driver and the Drunk Driver," *Human Factors* 48, no. 2 (2006): 381–91. Also, D. Redelmeier and R. Tibshirani, "Association Between

- Cellular-Telephone Calls and Motor Vehicle Collisions,” *New England Journal of Medicine* 336, no. 7 (1997), 453–58. Note also that a recent large-scale naturalistic study surprisingly found little effect of cell phone use on crash probabilities. See Saurabh Bhargava and Vikram Pathania, “Driving Under the (Cellular) Influence” (2008), available at SSRN 1129978. This latter study, which avoids some of the problems that typically plague field-based studies of driving risk, is intriguing, yet it contradicts a large body of other data and will need to await follow-up investigation.
- 36 **eating while driving can be as big a danger:** There are no experiments we know of on eating while driving. The best data we have are from the “100-car study” in which one hundred cars were fitted with monitoring devices and tracked for twelve to thirteen months, resulting in 43,000 hours and over two million vehicle miles worth of data. They found that eating while driving increased the odds of a crash or near crash by 57 percent. Talking on a cell phone increased the risk by 29 percent. Dialing the cell phone, however, increases the risk by 279 percent, illustrating a key finding of the study that visual distraction is still extremely deadly. See Sheila G. Klauer et al., “The Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data,” no. HS-810 594 (2006).
- 36 **41 percent of Americans:** See Paul Taylor and C. Funk, “Americans and Their Cars: Is the Romance on the Skids?” (2006), available on the Pew Research Center website.
- 36 **people consume more calories when they are distracted:** B. Boon, W. Stroebe, H. Schut, and R. Ijntema, “Ironic Processes in the Eating Behaviour of Restrained Eaters,” *British Journal of Health Psychology* 7, no. 1 (2002): 1–10.
- 37 **In lean times, many small businesses:** “Recession-Proof Your Business,” *About.com Small Business: Canada*, retrieved October 22, 2012, from <http://sbinfocanada.about.com/od/management/a/recessionproof.htm>.
- 38 **the person himself regrets it:** The idea that we are at conflict with ourselves—that we do something that we ourselves do not want us to do—has a rich history. Most often it is viewed as a consequence of self-control problems. See, e.g., T. C. Schelling, “Self-

Command in Practice, in Policy and in a Theory of Rational Choice,” *American Economic Review* 74 (1984): 1–11.

## 2. THE BANDWIDTH TAX

- 41 **the single umbrella term *bandwidth*:** Bandwidth, or computational capacity, has been studied under various guises, including several measures of intelligence, reasoning ability, short-term memory capacity, working-memory capacity, fluid intelligence, cognitive control, executive control, control of attention, conflict monitoring, and so forth. For professional researchers, some of these capture relevant distinctions, which are largely beyond our current scope. (Some researchers, for example, have posited that working-memory capacity is the prime component underlying many other measures; see, e.g., R. W. Engle, “Working Memory Capacity as Executive Attention,” *Current Directions in Psychological Science* 11 (2002): 19–23.)
- 42 **the conditions of a school in New Haven:** A. L. Bronzaft, “The Effect of a Noise Abatement Program on Reading Ability,” *Journal of Environmental Psychology* 1, no. 3 (1981): 215–22; A. L. Bronzaft and D. P. McCarthy, “The Effect of Elevated Train Noise on Reading Ability,” *Environment and Behavior* 7, no. 4 (1975): 517–28. doi:10.1177/001391657500700406.
- 42 **the powerful effects of even slight distraction:** A major focus in cognitive psychology has been the role of distraction in cognitive performance, particularly as it interacts with attention and cognitive load. Even supposedly minor distractions have been shown to have profound effects, often far beyond what intuition would suggest. Experimental studies of the effects of distraction have ranged from response time experiments to the use of simulators and to field studies and have looked at tasks as diverse as visual, auditory, and pain perception, driving, surgery, work performance, and educational attainment.
- 44 **Behavioral and neuroimaging studies:** Several studies by Lavie and colleagues have documented increased attentional capture by salient distractors during high memory load. In one study, for example, two unrelated tasks—visual attention and working memory—were combined. Increased load in the working memory

task was predicted to lower people's ability to avoid visual distractors. Imagine participating in this rather unusual experiment. You stare at a computer monitor and see a sequence of digits, say, 0, 3, 1, 2, 4, which you need to memorize. Then, you see famous names appear on the screen, which you are asked to classify as pop stars or politicians. The names are accompanied by faces, which you are asked to ignore. Then, at some point a digit appears, say, a 2, and your task is to report the digit that follows in the sequence you memorized (in this case, 4.) To make this more interesting, there are two variations. First, the load manipulation: under high memory load, the sequence of digits to memorize was different on each trial, whereas under low memory load, the digits were in a fixed order: 0, 1, 2, 3, 4. Clearly, you'd need to rehearse the fixed order sequence hardly at all, whereas the novel sequences would need to be actively rehearsed. In addition, the faces to be ignored changed: in the low distraction condition, the faces and names were "congruent"; Bill Clinton's face appeared with his name, and so did Mick Jagger's. But in the high distraction condition, these were incongruent: Clinton's face appeared with Jagger's name, and vice versa. This turns out to be quite distracting! And it turns out to be a lot more distracting when your working memory is loaded. The impact of the incongruent faces was much greater when people were under high- as opposed to low-memory load. See N. Lavie, "Distracted and Confused?: Selective Attention under Load," *Trends in Cognitive Sciences* 9, no. 2 (2005): 75–82.

44 **push a button when you see a red dot on the screen:** R. M. Piech, M. T. Pastorino, and D. H. Zald, "All I Saw Was the Cake: Hunger Effects on Attentional Capture by Visual Food Cues," *Appetite* 54, no. 3 (2010): 579. The notion that certain mental or physical events can capture attention has been an enduring topic in the study of attention owing to the importance of understanding how goal-directed and stimulus-driven processes interact in perception and cognition.

45 **we gave subjects word searches:** This is from unpublished work with Christopher Bryan; C. J. Bryan, S. Mullainathan, and E. Shafir, "Tempting Food, Cognitive Load and Impaired Decision-Making," invited talk at the United States Department of Agriculture, Economic Research Service, Washington, D.C., April 2010.

- 46 **The DONUT was the problem:** 389 subjects participated in the study. The difference in time taken by dieters after seeing food words versus neutral words was highly significant ( $p = .003$ ). As well, there was a significant interaction between the difference in times taken for neutral versus food words by dieters versus nondieters ( $p = .047$ ). Subjects were given modest incentives to find as many words as they could.
- 47 **Much like a central processor:** Cognitive and neuroscience researchers have focused on the mechanisms and brain structures by which executive or cognitive control guides behavior. See, for example, G. J. DiGirolamo, "Executive Attention: Conflict, Target Detection, and Cognitive Control," in *The Attentive Brain*, ed. Raja Parasuraman (Cambridge, Mass.: MIT Press, 1998), 401–23.
- 48 **Raven's Progressive Matrices test:** J. Raven et al., *Manual for Raven's Progressive Matrices and Vocabulary Scales*, research supplement no. 3, 2nd/3rd edition (Oxford: Oxford Psychologists Press/San Antonio, Tex.: The Psychological Corporation, 1990/2000): A compendium of international and North American normative and validity studies together with a review of the use of the RPM in neuropsychological assessment.
- 48 **It is a common component of IQ tests:** J. Raven, "The Raven's Progressive Matrices: Change and Stability over Culture and Time," *Cognitive Psychology* 41, no. 1 (2000): 1–48.
- 49 **Those who have familiarity with tests and test taking:** J. Raven, *Ibid.* It is worth noting that researchers have argued that gains from education can explain only a small fraction of gains in IQ scores; see, e.g., J. R. Flynn, "Massive IQ Gains in 14 Nations: What IQ Tests Really Measure," *Psychological Bulletin* 101 (1987): 171–91. A forceful case for environmental and cultural influences on IQ is Richard Nisbett's *Intelligence and How to Get It: Why Schools and Cultures Count* (New York: W. W. Norton, 2010).
- 49 **people in a New Jersey mall:** These experiments are summarized along with details on sample sizes and p-values in Anandi Mani, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao, "Poverty Impedes Cognitive Function" (working paper, 2012).
- 50 **unable to come up with \$2,000 in thirty days:** A. Lusardi, D. J. Schneider, and P. Tufano, *Financially Fragile Households: Evidence*

*and Implications* (National Bureau of Economic Research, Working Paper No. 17072, May 2011).

- 51 **the effects were equally big:** For those interested in the magnitude, the effect size ranged between Cohen's  $d$  of 0.88 and 0.94. Cohen's  $d$  can be calculated as the difference between means divided by the pooled standard deviation.
- 51 **a benchmark from a study on sleep:** L. Linde and M. Bergströme, "The Effect of One Night without Sleep on Problem-Solving and Immediate Recall," *Psychological Research* 54, no. 2 (1992): 127–36. In general, a large body of research has shown the detrimental effects of lack of sleep on a variety of cognitive processes, from attention and memory to planning and decision making. A compendium of the latest research is in Gerard A. Kerkhof and Hans Van Dongen, *Human Sleep and Cognition: Basic Research* 185 (Amsterdam: Elsevier Science, 2010).
- 52 **about five IQ points:** "What Is a Genius IQ Score?" *About.com Psychology*, retrieved October 23, 2012, from <http://psychology.about.com/od/psychologicaltesting/f/genius-iq-score.htm>.
- 52 **Walter Mischel and his colleagues:** W. Mischel, E. B. Ebbesen, and A. Raskoff Zeiss, "Cognitive and Attentional Mechanisms in Delay of Gratification," *Journal of Personality and Social Psychology* 21, no. 2 (1972): 204. In follow-up studies years later, Mischel and colleagues found a remarkable predictability of cognitive and social competencies in their now grown subjects, which has enriched researchers' thinking about the role of individual versus situational determinants of behavior; W. Mischel, Y. Shoda, and P. K. Peake, "The Nature of Adolescent Competencies Predicted by Preschool Delay of Gratification," *Journal of Personality and Social Psychology* 54, no. 4 (April 1988): 687–96.
- 53 **"the intimate contest for self-command":** Thomas C. Schelling, *Choice and Consequence* (Boston: Harvard University Press, 1985).
- 53 **personality, fatigue, and attention:** Roy Baumeister, Kathleen Vohs, Mark Muraven, and their collaborators have conducted numerous studies documenting what they call ego depletion, and the maintenance and reduction of executive and self-control. For a recent statement and review of the literature, see R. F. Baumeister and J. Tierney, *Willpower: Rediscovering the Greatest Human Strength* (New York: Penguin Press, 2011).

- 53 **The children who were most successful in resisting:** Mischel, Ebbesen, and Raskoff Zeiss, “Cognitive and Attentional Mechanisms.”
- 53 **“Once you realize that willpower”:** J. Lehrer, “DON’T!” *New Yorker*, May 18, 2009.
- 54 **a memory task:** B. Shiv and A. Fedorikhin, “Heart and Mind in Conflict: The Interplay of Affect and Cognition in Consumer Decision Making,” *Journal of Consumer Research* 26, no. 3 (1999): 278–92. doi:10.1086/209563.
- 54 **a chicken foot cooked in a Chinese style:** W. von Hippel and K. Gonsalkorale, “‘That Is Bloody Revolting!’: Inhibitory Control of Thoughts Better Left Unsaid,” *Psychological Science* 16, no. 7 (2005): 497–500. doi:10.1111/j.0956-7976.2005.01563.x.
- 57 **As we expected:** The details of this study can also be found in Mani, Mullainathan, Shafir, and Zhao, “Poverty Impedes Cognitive Function.”
- 58 **It is hard for the same reason:** The standard Stroop task asks subjects to name the font colors of strings of letters. So *XKYD* may be written in a blue font and subjects must say “Blue.” The challenge of Stroop is that some of the strings themselves spell out a color. So for example *RED* may be written in a blue font, posing a challenge. A very nice summary of Stroop is found in Colin M. MacLeod, “Half a Century of Research on the Stroop Effect: An Integrative Review,” *Psychological Bulletin* 109, no. 2 (March 1991): 163–203. An oft-repeated anecdote is that the Stroop test was used to detect Soviet spies. Seeing *СИНИЙ* written in a red font poses no problem for most of us. But spies—due to their hidden fluency in Russian—would stumble on naming the red font because this is the Russian word for “blue.”
- 58 **On the executive control task:** Details in Mani, Mullainathan, Shafir, and Zhao, “Poverty Impedes Cognitive Function.”
- 59 **Worse nutrition and simple hunger:** See, for example, K. Alaimo, C. M. Olson, and E. A. Frongillo Jr., “Food Insufficiency and American School-Aged Children’s Cognitive, Academic, and Psychosocial Development,” *Pediatrics* 108, no. 1 (2001): 44–53.
- 60 **There are other minor quibbles:** One problem is that postharvest subjects were taking these tests a second time. Improved performance postharvest could be due just to experience with the test. To control for this, we held back one hundred randomly selected

farmers and had them take the test for the first time postharvest. Since they were randomly selected, we compared them to preharvest farmers and found a similar effect, suggesting our effects are not due to experience with the tests. We also surveyed a sample of farmers who were postharvest but who, due to delay in payments, were still poor. These postharvest farmers behaved similarly to the preharvest farmers, suggesting the mechanics of harvest do not drive our results.

- 60 **About that time, it occurred to me:** N. Kusz, "The Fat Lady Sings," in *The Bitch in the House: 26 Women Tell the Truth About Sex, Solitude, Work, Motherhood, and Marriage* (New York: William Morrow, 2002).
- 60 **because they are partly preoccupied with food:** D. Borchmann, *Fasting, Restrained Eating, and Cognitive Performance—A Literature Review from 1998 to 2006*.
- 61 **from a simple lack of calories:** One study found that giving dieters a chocolate bar—and thereby calories—actually worsened cognitive performance. This was attributed to the fact that they were now more preoccupied with food ("What will I need to give up for this chocolate bar?"). N. Jones and P. J. Rogers, "Preoccupation, Food, and Failure: An Investigation of Cognitive Performance Deficits in Dieters," *International Journal of Eating Disorders* 33, no. 2 (March 2003): 185–92.
- 61 **a dichotic listening task:** J. T. Cacioppo, J. M. Ernst, M. H. Burleson, M. K. McClintock, W. B. Malarkey, L. C. Hawkley, R. B. Kowalewski et al., "Lonely Traits and Concomitant Physiological Processes: The MacArthur Social Neuroscience Studies," *International Journal of Psychophysiology* 35, no. 2 (2000): 143–54.
- 61 **verbal information presented to the right ear is easier:** Ibid.
- 62 **now the lonely did significantly less well:** For an overview of all these studies, see John T. Cacioppo and William Patrick, *Loneliness: Human Nature and the Need for Social Connection* (New York: W. W. Norton, 2009).
- 62 **either socially well adjusted or else very lonely:** R. F. Baumeister, J. M. Twenge, and C. K. Nuss, "Effects of Social Exclusion on Cognitive Processes: Anticipated Aloneness Reduces Intelligent Thought," *Journal of Personality and Social Psychology* 83, no. 4 (2002): 817.



- 62 they ate roughly twice as many: R. F. Baumeister, C. N. DeWall, N. J. Ciarocco, and J. M. Twenge, "Social Exclusion Impairs Self-Regulation," *Journal of Personality and Social Psychology* 88, no. 4 (2005): 589.
- 62 a substantially higher consumption of fatty foods: W. Lauder, K. Mummery, M. Jones, and C. Caperchione, "A Comparison of Health Behaviours in Lonely and Non-Lonely Populations," *Psychology, Health and Medicine* 11, no. 2 (2006): 233–45. doi:10.1080/13548500500266607.
- 62 do worse on the heart–flower task: The details of this study can also be found in Mani, Mullainathan, Shafir, and Zhao, "Poverty Impedes Cognitive Function."
- 63 considerable progress in the understanding of stress: L. E. Bourne and R. A. Yaroush, "Stress and Cognition: A Cognitive Psychological Perspective," unpublished manuscript, NASA grant NAG2-1561 (2003), retrieved from [http://humansystems.arc.nasa.gov/eas/download/non\\_EAS/Stress\\_and\\_Cognition.pdf](http://humansystems.arc.nasa.gov/eas/download/non_EAS/Stress_and_Cognition.pdf). See also Bruce McEwen's *The End of Stress as We Know It* (New York: Joseph Henry Press/Dana Press, 2002).
- 63 the biochemistry of the generalized stress response: A wonderful summary of this area of research can be found in Robert M. Sapolsky, *Why Zebras Don't Get Ulcers* (New York: Henry Holt, 1994).
- 64 stress heightens working memory: S. Vijayraghavan, M. Wang, S. G. Birnbaum, G. V. Williams, and A. F. T. Arnsten, "Inverted-U Dopamine D1 Receptor Actions on Prefrontal Neurons Engaged in Working Memory," *Nature Neuroscience* 10, no. 3 (2007): 376–84. doi:10.1038/nn1846.
- 64 executive control might improve during periods of stress: G. Robert and J. Hockey, "Compensatory Control in the Regulation of Human Performance under Stress and High Workload: A Cognitive-Energetical Framework," *Biological Psychology* 45, no. 1 (1997): 73–93.

### 3. PACKING AND SLACK

- 70 *The cost of one modern heavy bomber is this:* Dwight D. Eisenhower, *The Chance for Peace* (U.S. Government Printing Office, April 16, 1953).

- 72 a survey of commuters: Just over one hundred commuters were interviewed;  $p < .05$ .
- 72 The poor reported trade-off thinking almost twice as often as the better off: Interesting related results can be found here as well: Stephen Spiller, "Opportunity Cost Consideration," *Journal of Consumer Research* (forthcoming).
- 73 both the rich and the poor reported trade-offs: 274 subjects in Tamil Nadu were surveyed in 2009. Income here was proxied for by comparing rural and urban respondents—there was a sixfold difference between them in income. The difference for the blender was significant at  $p < .01$ . The difference for the TV was neither economically nor statistically significant (58.6 percent vs. 60.8 percent).
- 74 "don't have to; [they] make enough money": K. Van Ittersum, J. Pennings, and B. Wansink, "Trying Harder and Doing Worse: How Grocery Shoppers Track In-Store Spending," *Journal of Marketing* (2010), retrieved from [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1546461](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1546461).
- 74 A Dutch study: G. Antonides, I. Manon de Groot, and W. Fred van Raaij, "Mental Budgeting and the Management of Household Finance," *Journal of Economic Psychology* 32, no. 4 (2011): 546–55. doi:10.1016/j.joep.2011.04.001.
- 74 leaving 10 percent aside as "fun money": Simpler saving: "The 60% Solution," *MSNMoney*, retrieved October 24, 2012, from <http://money.msn.com/how-to-budget/a-simpler-way-to-save-the-60-percent-solution-jenkins.aspx?page=0>.
- 75 This mindset is a feature of abundance: For an alternative treatment of anticipated time slack, see G. Zaubergerman and J. G. Lynch, "Resource Slack and Propensity to Discount Delayed Investments of Time Versus Money," *Journal of Experimental Psychology: General* 134, no. 1 (2005): 23–37.
- 75 No man-made structure: J. M. Graham, *The Hive and the Honey Bee* (Hamilton, Ill.: Dadant & Sons, 1992).
- 75 a 10 percent tolerance: The reader fascinated by plywood tolerances can dig into various plywood tolerances in *Plywood Standards*, Voluntary Product Standard PS 1-09, National Institute of Standards and Technology, U.S. Department of Commerce, available at <http://gsi.nist.gov/global/docs/vps/PS-1-09.pdf>.
- 75 mud dauber wasps are also nest builders: H. J. Brockmann, "Diversity in the Nesting Behavior of Mud-Daubers (Trypoxylon

politum Say; Sphecidae),” *Florida Entomologist* 63, no. 1 (1980): 53–64.

- 77 **When the rich take a pause:** This rationale for slack is reminiscent of Herbert Simon’s argument that people do not maximize: they satisfice, doing well enough to get by. See Herbert A. Simon, “Rational Choice and the Structure of the Environment,” *Psychological Review* 63, no. 2 (1956): 129. In his view people lacked the cognitive resources to optimize. If we were to use his language, we would say that scarcity allows less satisfying behavior. While this captures some elements of slack, the impact of scarcity is more automatic and less controllable than this description implies. As we will see, the uncontrollability plays a central role in understanding scarcity.
- 77 **A house is just a pile of stuff:** George Carlin, *Brain Droppings* (New York: Hyperion, 1997), 37.
- 77 **cabinet castaways:** A terrific discussion of cabinet castaways can be found in Brian Wansink, S. Adam Brasel, and Stephen Amjad, “The Mystery of the Cabinet Castaway: Why We Buy Products We Never Use,” *Journal of Family and Consumer Science* 92, no. 1 (2000): 104–8. One reason we end up with so many castaways is what economists might call “option value.” When we buy we do not know if we will use the item but value the option of having it around just in case. The psychology can be more complex than this simple narrative. Under scarcity, we would argue, one would think more carefully—indeed, focus—on the odds of eventual use, carefully evaluating the option value, rather than opting for the nonchalant “just in case” scenario.
- 77 **over \$12 billion is spent annually on self-storage:** SSA | 2012 SSA *Fact Sheet*, retrieved from <http://www.selfstorage.org/ssa/Content/NavigationMenu/AboutSSA/FactSheet/default.htm>.
- 77 **“every American could stand”:** Ibid.
- 78 **“Human laziness has always been a big friend”:** J. Mooallem, “The Self-Storage Self,” *New York Times*, September 6, 2009, retrieved from <http://www.nytimes.com/2009/09/06/magazine/06self-storage-t.html>.
- 79 **hypothetical decision we presented to a group of university students:** D. A. Redelmeier and E. Shafir, “Medical Decision Making in Situations That Offer Multiple Alternatives,” *JAMA—Journal of the American Medical Association* 273, no. 4 (1995): 302–5.

- 80 **free *not* to choose:** M. Friedman and R. Friedman, *Free to Choose: A Personal Statement* (Orlando, Fla.: Mariner Books, 1990).
- 81 **estimate the time required to finish their senior theses:** R. Buehler, D. Griffin, and M. Ross, "Exploring the 'Planning Fallacy': Why People Underestimate Their Task Completion Times," *Journal of Personality and Social Psychology* 67, no. 3 (1994): 366.
- 81 **end up in "time trouble":** M. Sigman, "Response Time Distributions in Rapid Chess: A Large-Scale Decision-Making Experiment," *Frontiers in Neuroscience* 4 (2010). doi:10.3389/fnins.2010.00060.
- 82 **the *temptation tax* is regressive:** A. Banerjee and S. Mullainathan, *The Shape of Temptation: Implications for the Economic Lives of the Poor* (Working Paper No. w15973, National Bureau of Economic Research, 2010).
- 83 **Psychological biases often persist despite more extreme consequences:** People will behave differently if the stakes are high, was an early argument against the relevance of psychological findings for social phenomena. In the last two decades, research has shown that people's psychological biases affect decisions as consequential as their retirement or their health and mortality.
- 85 **needing to navigate a world that is computationally more complex:** The notion of computational complexity here can be understood by contrasting linear programming to integer programming. In linear programming, items can be infinitely subdivided—the logical extension of granularity. In integer programming, items must be packed in fixed units—the logical extension of bulkiness. Computer scientists have shown in a precise mathematical sense that integer programming is inherently harder than linear programming. A detailed introduction to these ideas can be found in Alexander Schrijver, *Theory of Linear and Integer Programming* (West Sussex, England: John Wiley & Sons, 1998).
- 86 **As Henry David Thoreau observed:** Thoreau himself took a different lesson from this observation. He advocated not for increasing your wealth but for moderating your desires. In our language, there are two ways to get slack. Either you get a bigger suitcase or you reduce the number of things you wish to pack into it.
- 86 **"A man is rich in proportion":** Henry David Thoreau, *Walden* (Yale University Press, 2006), 87.

## 4. EXPERTISE

87 **40 rupees (80 cents):** In this book we will simply use the nominal exchange rates to describe the value of foreign currency (rupees in this case) in dollars. This is perfectly valid for some uses, such as how much Alex should value the rupees. But in some cases this can be misleading because exchange rates do not account for price differences between countries. For example, a rupee goes further in India because many things are also cheaper there. In trying to assess income differences across countries, most economists adjust not only for exchange rates but also for *purchasing power parity*—a measure of price differences. Since this book is not intended to be a careful cross-country comparison of incomes, for ease of reading we simply use nominal exchange rates. But the reader should keep this distinction in mind.

89 ***Imagine you have spent the day shopping:*** This is a slightly updated (for inflation) version of Tversky and Kahneman's famous "jacket-calculator" problem; A. Tversky and D. Kahneman, "The Framing of Decisions and the Psychology of Choice," *Science* 211, no. 4481 (1981): 453–58. See also R. Thaler, "Mental Accounting Matters," *Journal of Behavioral Decision Making* 12 (1999): 183–206.

89 **one can change the value of an hour:** Ofer H. Azar, "Relative Thinking Theory," *The Journal of Socio-Economics* 36, no. 1 (2007): 1–14.

90 **college students, MBAs, professional gamblers, and executives of all stripes:** Some studies have found similar effects using incentives. In one study, people were asked to solve algebra questions and were paid 6¢ for each correct answer. Some were given a base show-up fee of \$1, some \$3, and some \$10. The 6¢ per correct answer looked big for the \$1 group and small for the \$10 group. And indeed the \$1 group worked harder and answered more questions when their reward for their effort "looked larger." Some researchers with a sense of humor went to the 2003 North American Summer Meetings of the Econometric Society and obtained similar data with professional economists. Turns out that economists are no more skilled at rational decision making than the rest of us.

- 90 **a version of the laptop/DVD question:** The proportions of those advising to opt for the savings in the \$100 and \$1,000 conditions differed significantly for the high-income participants (Princeton Junction) but not for the low-income participants (Trenton); this study had  $N=123$ . C. C. Hall, *Decisions Under Poverty: A Behavioral Perspective on the Decision Making of the Poor* (PhD diss., Princeton University, 2008).
- 91 **The slight increase may be due to the feeling:** It is unlikely that these results are not merely due to “ceiling” effects, by there being less room for the poor to increase their willingness to go. While they are higher than for the well off, they are still well below 100 percent in their willingness to travel.
- 92 **a blindfolded subject held in one hand:** H. E. Ross, “Weber Then and Now,” *Perception* 24, no. 6 (1995): 599.
- 92 **people use more detergent when the cap is larger:** G. Trotta, “Some Laundry-Detergent Caps Can Lead to Overdosing,” June 5, 2009, retrieved from <http://news.consumerreports.org/home/2009/06/laundry-detergent-overdosing-caps-procter-and-gamble-method-sun-era-tide-cheer-all-consumer-reports-.html>.
- 93 **to replicate intervals of six, twelve, eighteen, and twenty-four seconds:** S. Grondin and P. R. Killeen, “Tracking Time with Song and Count: Different Weber Functions for Musicians and Nonmusicians,” *Attention, Perception, and Psychophysics* 71, no. 7 (2009): 1649–54.
- 93 **less likely to be affected by bottle height:** B. Wansink and K. Van Ittersum, “Bottoms Up! The Influence of Elongation on Pouring and Consumption Volume,” *Journal of Consumer Research* 30, no. 3 (2003): 455–63.
- 93 **shoppers exiting a supermarket:** I. M. Rosa-Díaz, “Price Knowledge: Effects of Consumers’ Attitudes Towards Prices, Demographics, and Socio-cultural Characteristics,” *Journal of Product and Brand Management* 13, no. 6 (2004): 406–28. doi:10.1108/10610420410560307.
- 93 **commuters in Boston:** The difference in proportion of correct answers between the high- and low-income respondents was statistically significant,  $p < .05$ ,  $N=104$ .
- 94 **rich and poor smokers respond:** Jacob Goldin and Tatiana Homonoff, “Smoke Gets in Your Eyes: Cigarette Tax Salience and

Regressivity,” *American Economic Journal: Economic Policy* 5, no. 1 (February 2013): 302–36.

94 **they are better at deciphering that the total price:** If all this paints a picture of the poor giving more attention because the stakes are higher, that is part of the point. The interesting implication here, though, is how this greater attentiveness changes the decision process, how it changes the “biases” that have been documented for a broad class of people.

94 **25 percent of brands:** J. K. Binkley and J. Bejnarowicz, “Consumer Price Awareness in Food Shopping: The Case of Quantity Surcharges,” *Journal of Retailing* 79, no. 1 (2003): 27–35. doi: 10.1016/S0022-4359(03)00005-8.

94 **“sneaky consumer product trick”:** “Sold Short? Are You Getting Less Than You Think? Let Us Count the Ways,” (*Consumer Reports*) February 2000, 24–26.

94 **supermarkets in low-income neighborhoods:** Ibid.

96 **“You would say, ‘I like vacations in the Bahamas’”:** Dan Ariely articulates the challenge of trade-off thinking here: <http://bigthink.com/ideas/17458>.

98 **purchased a cognac truffle for \$3:** Shane Frederick, Nathan Novemsky, Jing Wang, Ravi Dhar, and Stephen Nowlis, “Opportunity Cost of Neglect,” *Journal of Consumer Research* 36, no. 4 (2009): 553–61.

99 **The checker-shadow illusion:** There is a large array of demonstrations of the context dependence of perception. Ted Adelson’s checker-shadow illusion is one of our favorites. It is reproduced with permission. To experience this and other such illusions you can go to [http://web.mit.edu/persci/people/adelson/checker-shadow\\_illusion.html](http://web.mit.edu/persci/people/adelson/checker-shadow_illusion.html). For a more detailed discussion of the cognitive mechanisms underlying illusions such as these, see Edward H. Adelson, “Lightness Perception and Lightness Illusions,” *The New Cognitive Neurosciences* (1999): 339.

100 **Imagine you are lying on the beach on a hot day:** This is based on Richard Thaler, “Mental Accounting and Consumer Choice,” *Marketing Science* 4, no. 3 (1985): 199–214. Data collected with Anuj Shah in 2012. The well off showed a significant difference between frames, whereas the poor did not;  $p < .01$  ( $N = 148$ ).

101 **when gasoline prices go up:** J. Hastings and J. M. Shapiro, *Mental*

- Accounting and Consumer Choice: Evidence from Commodity Price Shocks* (Cambridge, Mass.: National Bureau of Economic Research, Working Paper No. 18248, 2012).
- 101 **The poor should be less prone to show this effect:** Data collected with Anuj Shah in 2012 support this prediction. We presented participants with versions of the tax-rebate versus the stock value scenarios. The well off showed a different proneness to spend under the two frames, whereas the poor did not;  $p < .05$  ( $N = 141$ ).
- 102 **You purchase a small season ticket package:** Data collected with Anuj Shah in 2012. The rich were more likely to choose the historical cost and the poor the replacement cost;  $p < .05$  in both cases ( $N = 98$ ).
- 102 **\$0 because the ticket is already paid for:** E. Shafir and R. H. Thaler, "Invest Now, Drink Later, Spend Never: On the Mental Accounting of Delayed Consumption," *Journal of Economic Psychology* 27 (2006): 694–712.
- 103 **Paul Ferraro and Laura Taylor:** Paul J. Ferraro and Laura O. Taylor, "Do Economists Recognize an Opportunity Cost When They See One? A Dismal Performance from the Dismal Science" (2005).
- 103 **"I have a hard time believing that this is possible":** This is from the blog *Marginal Revolution*. [http://marginalrevolution.com/marginalrevolution/2005/09/opportunity\\_cos.html](http://marginalrevolution.com/marginalrevolution/2005/09/opportunity_cos.html).

## 5. BORROWING AND MYOPIA

- 105 **There is nothing in the prospect:** J. A. Riis, *How the Other Half Lives* (Boston, Mass.: Bedford/St. Martin's, 2010).
- 105 **Once a student in the Head Start child development program:** The Center for Responsible Lending's description of Sandra Harris's story can be found here: <http://www.responsiblelending.org/payday-lending/tools-resources/victims-2.html>.
- 107 **more than 23,000 payday lender branches:** M. Fellowes and M. Mabanta, *Banking on Wealth: America's New Retail Banking Infrastructure and Its Wealth-Building Potential* (Washington, D.C.: Brookings Institution, 2008).
- 107 **more than all the McDonald's:** McDonald's restaurants statistics—countries compared—NationMaster, retrieved from [http://www.nationmaster.com/graph/foo\\_mcd\\_res-food-mcdonalds-restaurants](http://www.nationmaster.com/graph/foo_mcd_res-food-mcdonalds-restaurants).



- 107 **and Starbucks:** Loxcel Starbucks Store Map FAQ, retrieved from <http://loxcel.com/sbux-faq.html>.
- 107 **\$3.5 billion in fees each year:** Fast Facts, retrieved October 24, 2012, from <http://www.responsiblelending.org/payday-lending/tools-resources/fast-facts.html>. Repeat business is so common in this industry that 98 percent of loan volume goes to repeat borrowers.
- 107 **18 percent of the poorest families:** A wonderful discussion of these issues can be found in Michael Barr, *No Slack* (Washington, D.C.: Brookings Institution Press, 2002).
- 107 **nearly 5 percent of the annual income of the poor:** K. Edin and L. Lein, *Making Ends Meet: How Single Mothers Survive Welfare and Low-Wage Work* (New York: Russell Sage Foundation Publications, 1997). For a captivating update on the economic lives of the American poor, see Sarah Halpern-Meekin, Kathryn Edin, Laura Tach, and Jennifer Sykes, *It's Not Like I'm Poor: How Working Families Make Ends Meet in a Post-Welfare World* (Berkeley: University of California Press, forthcoming).
- 108 **informal moneylenders who charge rates every bit as extreme:** See Abhijit Banerjee, "Contracting Constraints, Credit Markets, and Economic Development," in *Advances in Economics and Econometrics: Theory and Application*, Eighth World Congress of the Econometric Society, vol. 3, ed. Mathias Dewatripont, Lars Hansen, and S. Turnovsky (Cambridge: Cambridge University Press, 2004), 1–46.
- 110 **loans are particularly attractive:** The other common reason cited for excessive borrowing is myopia of some form. What is interesting in this narrative is that myopia here—tunneling—is not a generalized personal trait. Everyone tunnels when faced with scarcity. And recall that the same force that generates tunneling also generates the focus dividend. Unlike myopia, tunneling has positive consequences as well.
- 112 **Princeton undergraduates to play *Family Feud* in a controlled setting:** These studies can be found in Anuj Shah, Sendhil Mullainathan, and Eldar Shafir, "Some Consequences of Having Too Little," *Science* 338 (2013): 682–85.
- 114 **present bias:** A nice overview of present bias and other models of time discounting can be found in Shane Frederick and George Loewenstein, "Time Discounting and Time Preference: A Critical Review," *Journal of Economic Literature* (2002).

- 115 **Because machine uptime was important:** R. E. Bohn and R. Jaikumar, *Firefighting by Knowledge Workers* (Information Storage Industry Center, Graduate School of International Relations and Pacific Studies, University of California, 2000), retrieved from <http://isic.ucsd.edu/pdf/firefighting.pdf>.
- 117 **Steven Covey finds it helpful to classify tasks:** S. R. Covey, *The Seven Habits of Highly Effective People* (New York: Free Press, 2004).
- 119 **approximately one in four rural bridges:** *Bridges—Report Card for America's Infrastructure*, retrieved from <http://www.infrastructurereportcard.org/fact-sheet/bridges>.
- 119 **scarcity makes this problem a whole lot worse:** There are many studies of the planning fallacy. Good reviews are: Roger Buehler, Dale Griffin, and Michael Ross, "Inside the Planning Fallacy: The Causes and Consequences of Optimistic Time Predictions," in *Heuristics and Biases: The Psychology of Intuitive Judgment*, ed. Thomas Gilovich, Dale Griffin, and Daniel Kahneman (Cambridge: Cambridge University Press, 2002), 250–70; D. Lovallo and D. Kahneman, "Delusions of Success," *Harvard Business Review* (2003): 1–8. While there is no explicit study of the impact of scarcity, it follows naturally that the planning fallacy would prove more pronounced among those who are especially tunneling, as occurs under scarcity.

## 6. THE SCARCITY TRAP

- 123 **Everywhere is walking distance:** Quote from Steven Wright. In W. Way, *Oxymorons and Other Contradictions* (Bloomington, Ind.: AuthorHouse, 2005).
- 123 **A typical vendor buys about 1,000 rupees:** These data draw from Dean Karlan and Sendhil Mullainathan, "Debt Traps" (working paper, 2012).
- 123 **a little over \$2:** In this book when we report dollar equivalents, we simply convert using prevailing exchange rates. Yet many experts feel this can paint a misleading impression because people in different countries also face different prices. So the vendor, for example, will also have lower prices for food and other items. As a result, her income in nominal dollar terms does not adequately

reflect her purchasing power. Economists have suggested using purchasing power parity instead of nominal exchange rates. In the case of India, this would result in an income that is roughly 2.5 times higher for the vendor.

- 126 **An initial scarcity is compounded by behaviors that magnify it:** Economists and especially development economists have focused on what they call *poverty traps*—the notion that those who begin poor will stay poor. A commonly discussed mechanism is a lucrative investment opportunity that requires a fixed amount of capital. The rich have enough capital to make the investment while the poor will find it hard to save up enough money to do so. Other mechanisms discussed include aspirations and myopia. Relevant references can be found in Debraj Ray, “Development Economics,” *The New Palgrave Dictionary of Economics*, ed. Lawrence Blume and Steven Durlauf (2007).
- 127 **jewel loans at 13 percent annual interest:** This work can be found in Michael Faye and Sendhil Mullainathan, “Demand and Use of Credit in Rural India: An Experimental Analysis” (working paper, Harvard University, 2008).
- 129 **about ten distinct financial instruments on average:** Daryl Collins, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven, *Portfolios of the Poor: How the World’s Poor Live on \$2 a Day* (Princeton, N.J.: Princeton University Press, 2010).
- 129 **they work very few hours those days:** Though time use data in developing countries can be hard to come by, a very nice set of studies is found in Quentin Wodon and Mark Blackden, *Gender, Time Use, and Poverty in Sub-Saharan Africa* (Washington, D.C.: World Bank Press, 2006).
- 132 **little evidence to show that willpower capacity increases with use:** M. Muraven and R. F. Baumeister, “Self-Regulation and Depletion of Limited Resources: Does Self-Control Resemble a Muscle?” *Psychological Bulletin* 126, no. 2 (2000): 247–59. doi:10.1037//0033-2909.126.2.247.
- 132 **in a room with some highly tempting snacks:** K. D. Vohs and T. F. Heatherton, “Self-Regulatory Failure: A Resource-Depletion Approach,” *Psychological Science* 11, no. 3 (2000): 249–54.
- 136 **not able to come by \$2 every day:** D. Collins et al., *Portfolios of the Poor*.