

# NOTES

## CHAPTER 1 : THE SUBTLE FACULTY

1. For instance, the brain stem, just above the spinal cord, houses the neural barometer that senses our relation to the environment, and raises or lowers our energy arousal and attention according to how vigilant we need to be. But each aspect of attention has its own distinct circuitry. For more detail on the basics, see Michael Posner and Steven Petersen, “The Attention System of the Human Brain,” *Annual Review of Neuroscience* 13 (1990): 25–42.
2. These systems include, for example, the biological and ecological; economic and social; and chemical and physical—both Newtonian and quantum.
3. M. I. Posner and M. K. Rothbart, “Research on Attention Networks as a Model for the Integration of Psychological Science,” *Annual Review of Psychology* 58 (2007): 1–27, at 6.
4. Anne Treisman, “How the Deployment of Attention Determines What We See,” *Visual Search and Attention* 14 (2006): 4–8.
5. See Nielsen Wire, December 15, 2011, [http://blog.nielsen.com/nielsen-wire/online\\_mobile/new-mobile-obsession-u-s-teens-triple-data-usage](http://blog.nielsen.com/nielsen-wire/online_mobile/new-mobile-obsession-u-s-teens-triple-data-usage).
6. Mark Bauerlein, “Why Gen-Y Johnny Can’t Read Nonverbal Cues,” *Wall Street Journal*, August 28, 2009.
7. Criteria for being “addicted” do not specify an absolute number of hours for game playing (or bouts of drinking, for that matter), but rather focus on how the habit creates problems in other parts of life—at school, socially, or in the family. A bad gaming habit can create personal havoc on a par with drugs or drinking. Daphne Bavelier et al., “Brains on Video Games,” *Nature Reviews Neuroscience* 12 (December 2011): 763–68.
8. Wade Roush, “Social Machines,” *Technology Review*, August 2005.
9. Herbert Simon, “Designing Organizations for an Information-Rich

World,” in Donald M. Lambertson, ed., *The Economics of Communication and Information* (Cheltenham, UK: Edward Elgar, 1997), quoted in Thomas H. Davenport and John C. Back, *The Attention Economy* (Boston: Harvard Business School Press, 2001), p. 11.

## CHAPTER 2: BASICS

1. William James, *Principles of Psychology*, 1890, cited in Jonathan Schooler et al., “Meta-Awareness, Perceptual Decoupling and the Wandering Mind,” *Trends in Cognitive Science* 15, no. 7 (July 2011): 319–26.
2. Ronald E. Smith et al., “Measurement and Correlates of Sport-Specific Cognitive and Somatic Trait Anxiety: The Sport Anxiety Scale,” *Anxiety, Stress & Coping: An International Journal* 2, no. 4 (1990): 263–80.
3. Trying to focus on one thing and ignore everything else represents a conflict of sorts for the brain. The mediator in such mental conflicts is the anterior cingulate cortex (ACC), which spots these problems and recruits other parts of the brain to solve them. To home in on a focus of attention the ACC taps the prefrontal areas for cognitive control; they squelch the distracting circuits and amplify those for full focus.
4. Each of these essentials reflects aspects of attention that figure in our exploration here. Richard J. Davidson and Sharon Begley, *The Emotional Life of Your Brain* (New York: Hudson Street Press, 2012).
5. Heleen A. Slagter et al., “Theta Phase Synchrony and Conscious Target Perception: Impact of Intensive Mental Training,” *Journal of Cognitive Neuroscience* 21, no. 8 (2009): 1536–49.
6. The prefrontal cortex sustains our attention while a nearby region, the parietal cortex, points it toward a particular target. When our concentration blurs, these regions go quiet and our focus becomes rudderless, flitting from one thing to another as each draws our attention.
7. In such studies the brains of people with ADHD exhibit far less activity in the prefrontal area and show less phase-locking synchrony: A. M. Kelly et al., “Recent Advances in Structural and Functional Brain Imaging Studies of Attention-Deficit/Hyperactivity Disorder,” *Behavioral and Brain Functions* 4 (2008): 8.
8. Jonathan Smallwood et al., “Counting the Cost of an Absent Mind: Mind Wandering as an Underrecognized Influence on Educational Performance,” *Psychonomic Bulletin & Review* 14, no. 12 (2007): 230–36.
9. Nicholas Carr, *The Shallows* (New York: Norton, 2011).
10. Martin Heidegger, *Discourse on Thinking* (New York: Harper & Row,

- 1966), p. 56. Heidegger is cited in Carr, *The Shallows*, in the latter's warning on "what the internet is doing to our brains"—not much good, in his view.
11. George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," *Psychological Review* 63 (1956): 81–97.
  12. Steven J. Luck and Edward K. Vogel, "The Capacity for Visual Working Memory for Features and Conjunctions," *Nature* 390 (1997): 279–81.
  13. Clara Moskowitz, "Mind's Limit Found: 4 Things at Once," *LiveScience*, April 27, 2008, <http://www.livescience.com/2493-mind-limit-4.html>.
  14. David Garlan et al., "Toward Distraction-Free Pervasive Computing," *Pervasive Computing* 1, no. 2 (2002): 22–31.
  15. Clay Shirky, *Here Comes Everybody* (New York: Penguin, 2009).
  16. In organizational politics, weak ties can be a hidden strength. In matrixed organizations, instead of working through lines of command, people often have to influence someone over whom they have no direct control. Weak ties amount to social capital, relationships you can draw on for help and advice. Without any natural links to another group you need to influence, chances are slim.
  17. See Thomas Malone's interview at Edge.org, <http://edge.org/conversation/collective-intelligence>.
  18. Howard Gardner, William Damon, and Mihaly Csikszentmihalyi, *Good Work: When Excellence and Ethics Meet* (New York: Basic Books, 2001); Mihaly Csikszentmihalyi, *Good Business* (New York: Viking, 2003).
  19. Mihaly Csikszentmihalyi and Reed Larson, *Being Adolescent: Conflict and Growth in the Teenage Years* (New York: Basic Books, 1984).
  20. There may even be a moderate level of default network activation while we are in "the zone." Michael Esterman et al., "In the Zone or Zoning Out? Tracking Behavioral and Neural Fluctuations During Sustained Attention," *Cerebral Cortex*, <http://cercor.oxfordjournals.org/content/early/2012/08/31/cercor.bhs261.full>, August 31, 2012.

### CHAPTER 3: ATTENTION TOP AND BOTTOM

1. Henri Poincaré, quoted in Arthur Koestler, *The Act of Creation* (London: Hutchinson, 1964), pp. 115–16.
2. Some cognitive scientists call these systems separate "minds." I've referred to the top-down system as the "high road" and the bottom-up as

the “low road” in my book *Social Intelligence* (New York: Bantam, 2006). Daniel Kahneman, in his book *Thinking Fast and Slow* (New York: Farrar, Straus & Giroux, 2012), uses the terms *system 1* and *system 2*, which he calls “expository fictions.” I find these hard to keep straight, like Thing One and Thing Two in *The Cat in the Hat*. That said, the more one delves into the neural wiring, the less satisfying “top” and “bottom” become. But they will do.

3. Kahneman, *Thinking Fast and Slow*, p. 31.
4. The human spine is another of many instances where evolution has come up with a good-enough, but not perfect, design: building upon older systems that single-column stack of bones works adequately—though a flexible tripod of three columns would have been much stronger. Anyone with a slipped disk or cervical arthritis can testify to the imperfections.
5. Lolo Jones in Sean Gregory, “Lolo’s No Choke,” *Time*, July 30, 2012, pp. 32–38.
6. Sian Beilock et al., “When Paying Attention Becomes Counter-Productive,” *Journal of Experimental Psychology* 18, no. 1 (2002): 6–16.
7. Efforts to relax are likely to go wrong, especially in moments when we are straining to perform. See Daniel Wegner, “Ironic Effects of Trying to Relax Under Stress,” *Behaviour Research and Therapy* 35, no. 1 (1997): 11–21.
8. Daniel Wegner, “How to Think, Say, or Do Precisely the Worst Thing for Any Occasion,” *Science*, July 3, 2009, pp. 48–50.
9. Christian Merz et al., “Stress Impairs Retrieval of Socially Relevant Information,” *Behavioral Neuroscience* 124, no. 2 (2010): 288–93.
10. “Unshrinkable,” *Harper’s Magazine*, December 2009, pp. 26–27.
11. Yuko Hakamata et al., “Attention Bias Modification Treatment,” *Biological Psychiatry* 68, no. 11 (2010): 982–90.
12. When psychologists gave the socially anxious folks sessions where their gaze was encouraged to go to neutral or friendly faces in a crowd, rather than fixating on rejecting ones, two thirds had lost their uneasiness. Norman B. Schmidt et al., “Attention Training for Generalized Social Anxiety Disorder,” *Journal of Abnormal Psychology* 118, no. 1 (2009): 5–14.
13. Roy Y. J. Chua and Xi Zou (Canny), “The Devil Wears Prada? Effects of Exposure to Luxury Goods on Cognition and Decision Making,” Harvard Business School Organizational Behavior Unit Working Paper No. 10-034, November 2, 2009, <http://ssrn.com/abstract=1498525> or <http://dx.doi.org/10.2139/ssrn.1498525>.

14. Gavan J. Fitzsimmons et al., "Non-Conscious Influences on Consumer Choice," *Marketing Letters* 13, no. 3 (2002): 269–79.
15. Patrik Vuilleumier and Yang-Ming Huang, "Emotional Attention: Uncovering the Mechanisms of Affective Biases in Perception," *Current Directions in Psychological Science* 18, no. 3 (2009): 148–52.
16. Arne Ohman et al., "Emotion Drives Attention: Detecting the Snake in the Grass," *Journal of Experimental Psychology: General* 130, no. 3 (2001): 466–78.
17. Elizabeth Blagrove and Derrick Watson, "Visual Marking and Facial Affect: Can an Emotional Face Be Ignored?" *Emotion* 10, no. 2 (2010): 147–68.
18. A. J. Schackman et al., "Reduced Capacity to Sustain Positive Emotion in Major Depression Reflects Diminished Maintenance of Fronto-Striatal Brain Activation," *Proceedings of the National Academy of Sciences* 106 (2009): 22445–50.
19. Ellen Langer, *Mindfulness* (Reading, MA: Addison-Wesley, 1989).

#### CHAPTER 4: THE VALUE OF A MIND ADRIFT

1. Eric Klinger, "Daydreaming and Fantasizing: Thought Flow and Motivation," in K. D. Markman et al., eds., *Handbook of Imagination and Mental Stimulation* (New York: Psychology Press, 2009), pp. 225–40.
2. Kalina Christoff, "Undirected Thought: Neural Determinants and Correlates," *Brain Research* 1428 (January 2012): 51–59.
3. *Ibid.*, p. 57.
4. Kalina Christoff et al., "Experience Sampling During fMRI Reveals Default Network and Executive System Contributions to Mind Wandering," *Proceedings of the National Academy of Sciences* 106, no. 21 (May 26, 2009): 8719–24. The key executive areas are the anterior cingulate cortex and dorsolateral prefrontal cortex. Default areas are the medial prefrontal cortex and related circuits.
5. J. Wiley and A. F. Jarosz, "Working Memory Capacity, Attentional Focus, and Problem Solving," *Current Directions in Psychological Science* 21 (August 2012): 258–62.
6. Jonathan Schooler et al., "Meta-Awareness, Perceptual Decoupling, and the Wandering Mind," *Trends in Cognitive Science* 15, no. 7 (July 2011): 319–26.
7. Quoted in Steven Johnson, *Where Good Ideas Come From* (New York: Riverhead, 2010).

8. Holly White and Priti Singh, "Creative Style and Achievement in Adults with ADHD," *Personality and Individual Differences* 50, no. 5 (2011): 673–77.
9. Kirsten Weir, "Pay Attention to Me," *Monitor on Psychology*, March 2012, pp. 70–72.
10. Shelley Carson et al., "Decreased Latent Inhibition Is Associated with Increased Creative Achievement in High-Functioning Individuals," *Journal of Personality and Social Psychology* 85, no. 3 (September 2003): 499–506.
11. Siyuan Liu et al., "Neural Correlates of Lyrical Improvisation: An fMRI Study of Freestyle Rap," *Scientific Reports* 2, no. 834 (November 2012).
12. The Einstein quote was cited by Robert L. Oldershaw in a comment posted to *Nature* on May 21, 2012.
13. Jaime Lutz, "Peter Schweitzer, Code Breaker, Photographer; Loved Music; at 80," *Boston Globe*, November 17, 2011, p. B14.
14. More than twelve thousand daily diary entries from the 238 knowledge workers were used. See Teresa Amabile and Steven Kramer, "The Power of Small Wins," *Harvard Business Review*, May 2011, pp. 72–80.

## CHAPTER 5: FINDING BALANCE

1. That question has been asked of thousands of people by an iPhone app that rings them at random moments through the day. Almost half the time people's minds had wandered away from the activity they were engaged in. Harvard psychologists Matthew Killingsworth and Daniel Gilbert, who developed the app, analyzed the reports from 2,250 American men and women to see how often their minds were elsewhere, and what their moods were. See Matthew Killingsworth and Daniel Gilbert, "A Wandering Mind Is an Unhappy Mind," *Science*, November 12, 2010, p. 932.
2. Seeing the medial prefrontal cortex as the site of "me" oversimplifies a bit, though many cognitive neuroscientists find this convenient. A more complex version of "me," the self, is seen as an emergent phenomenon based on the activity of many neural circuits, the prefrontal medial among them. See, e.g., J. Smallwood and J. W. Schooler, "The Restless Mind," *Psychological Bulletin* 132 (2006): 946–58.
3. Norman A. S. Farb et al., "Attending to the Present: Mindfulness Meditation Reveals Distinct Neural Modes of Self-Reference," *Social Cognitive and Affective Neuroscience* 2 (2007): 313–22.

4. Or so we humans project onto animals.
5. E. D. Reichle et al., “Eye Movements During Mindless Reading,” *Psychological Science* 21 (July 2010): 1300–1310.
6. J. Smallwood et al., “Going AWOL in the Brain—Mind Wandering Reduces Cortical Analysis of the Task Environment,” *Journal of Cognitive Neuroscience* 20, no. 3 (March 2008): 458–69; J. W. Y. Kam et al., “Slow Fluctuations in Attentional Control of Sensory Cortex,” *Journal of Cognitive Neuroscience* 23 (2011): 460–70.
7. Cedric Galera, “Mind Wandering and Driving: Responsibility Case-Control Study,” *British Medical Journal*, published online December 13, 2012, doi: 10.1136/bmj.e8105.
8. Which means that these brain circuits are not always working in opposition.
9. K. D. Gerlach et al., “Solving Future Problems: Default Network and Executive Activity Associated with Goal-Directed Mental Simulations,” *Neuroimage* 55 (2011): 1816–24.
10. Conversely, the less we notice our mind has wandered, the stronger the activity in the underlying neural zones, and the greater their disruptive force on the task at hand. At least two prefrontal brain regions involved in that meander are among the very ones that also can notice we have gone off track: the dorsolateral prefrontal cortex and dorsal anterior cingulate.
11. Christoff et al., “Experience Sampling During fMRI Reveals Default Network and Executive System Contributions to Mind Wandering.” A technical note: this study used a ten-second window in the probe for mind wandering; ten seconds is a long time in the mind’s activity. So the conclusion that both executive and medial circuits are involved is open to objections. Moreover, the authors note, this conclusion is based on reverse inference, the assumption that if a brain region activates during a mental task, it is a neural basis for that task. For higher cognitive abilities this may not hold up, since the same region can be activated by multiple and very different mental processes. If true, this finding challenges the assumption that the executive and default networks always operate in opposition to each other—that is, if one is active the other is quiet. This may, indeed, be the case in very specific mental operations, like intense focus on a task at hand. But in much of mental life it may help to mix heightened focus with a daydreamy openness. It certainly helps pass the time on a long drive. See also M. D. Fox et al., “The Human Brain Is Intrinsically Organized into Dynamic, Anticorrelated Functional Net-

- works,” *Proceedings of the National Academy of Sciences* 102 (July 5, 2005): 9673–78.
12. Catherine Fassbender, “A Lack of Default Network Suppression Is Linked to Increased Distractibility in ADHD,” *Brain Research* 1273 (2009): 114–28.
  13. The test for open awareness is called the “attentional blink.” See H. A. Slagter et al., “Mental Training Affects Distribution of Limited Brain Resources,” *PLoS Biology* 5 (2007): e138.
  14. William Falk, writing in the *The Week*, August 10, 2012, p. 3.
  15. Stephen Kaplan, “Meditation, Restoration, and the Management of Mental Fatigue,” *Environment and Behavior* 33, no. 4 (July 2001): 480–505, <http://eab.sagepub.com/content/33/4/480>.
  16. Marc Berman, Jon Jonides, and Stephen Kaplan, “The Cognitive Benefits of Interacting with Nature,” *Psychological Science* 19, no. 12 (2008): 1207–12.
  17. Ibid.
  18. Gary Felsten, “Where to Take a Study Break on the College Campus: An Attention Restoration Theory Perspective,” *Journal of Environmental Psychology* 29, no. 1 (March 2009): 160–67.

## CHAPTER 6: THE INNER RUDDER

1. A technique called “focusing” guides people in how to tap into this vast out-of-awareness body-of-life wisdom, by sensing subtle internal shifts in feelings. See Eugene Gendlin, *Focusing* (New York: Bantam, 1981).
2. John Allman, “The von Economo Neurons in the Frontoinsular and Anterior Cingulate Cortex,” *Annals of the New York Academy of Sciences* 1225 (2011): 59–71.
3. Lev Grossman and Harry McCracken, “The Inventor of the Future,” *Time*, October 17, 2011, p. 44.
4. A. D. Craig, “How Do You Feel? Interoception: The Sense of the Physiological Condition of the Body,” *Nature Reviews Neuroscience* 3 (2002): 655–66.
5. Arthur D. Craig, “How Do You Feel—Now? The Anterior Insula and Human Awareness,” *Nature Reviews Neuroscience* 10, no. 1 (January 2009): 59–70.
6. G. Bird et al., “Empathic Brain Responses in Insula Are Modulated by Levels of Alexithymia but Not Autism,” *Brain* 133 (2010): 1515–25.
7. Somatic markers: this circuitry includes the right somatosensory insular



cortex and the amygdala, among others. Antonio Damasio, *The Feeling of What Happens* (New York: Harcourt, 1999).

8. Farb et al., "Attending to the Present."

## CHAPTER 7: SEEING OURSELVES AS OTHERS SEE US

1. See Fabio Sala, "Executive Blindspots: Discrepancies Between Self-Other Ratings," *Journal of Consulting Psychology: Research and Practice* 54, no. 4 (2003): 222–29.
2. Bill George and Doug Baker, *True North Groups* (San Francisco: Berrett-Koehler, 2011), p. 28.
3. Nalini Ambady et al., "Surgeon's Tone of Voice: A Clue to Malpractice History," *Surgery* 132, no. 1 (2002): 5–9.
4. Michael J. Newcombe and Neal M. Ashkanasy, "The Role of Affective Congruence in Perceptions of Leaders: An Experimental Study," *Leadership Quarterly* 13, no. 5 (2002): 601–604.
5. Kahneman, *Thinking Fast and Slow*, p. 216.
6. John U. Ogbu, *Minority Education and Caste: The American System in Cross-Cultural Perspective* (New York: Academic, 1978).

## CHAPTER 8: A RECIPE FOR SELF-CONTROL

1. M. K. Rothbart et al., "Self-Regulation and Emotion in Infancy," in Nancy Eisenberg and R. A. Fabes, eds., *Emotion and Its Regulation in Early Development: New Directions for Child Development* No. 55 (San Francisco: Jossey-Bass, 1992), pp. 7–23.
2. Many scientific disciplines see self-control as critical to well-being. Behavioral geneticists look at how much of these abilities is due to our genes, how much to the family environment we grow up in. Developmental psychologists monitor how children master self-control as they mature, getting progressively better at the delay of gratification, managing impulse, emotional self-regulation, planning, and conscientiousness. Health specialists see a link between self-control and life span, while sociologists focus on low self-control as a predictor of joblessness and crime. Psychiatrists look at childhood diagnoses like attention deficits and hyperactivity while people are young, and later in life psychiatric disorders, smoking, unsafe sex, and drunk driving. Finally, economists speculate that self-control might be a key both to financial well-being and to reducing crime.
3. Posner and Rothbart, "Research on Attention Networks as a Model for

the Integration of Psychological Science.” The network for the alerting system weaves together the thalamus and the right frontal and parietal cortex and is modulated by acetylcholine. Orienting weaves together structures in the superior parietal, temporal parietal junction, frontal eye fields, and superior colliculus, and is modulated by norepinephrine. Executive attention involves the anterior cingulate, lateral ventral prefrontal, and basal ganglia areas, and is modulated by dopamine.

4. Selective attention seems to have some heritability, though there is little to none for alerting, where we maintain a state of readiness for whatever comes next. See J. Fan et al., “Assessing the Heritability of Attentional Networks,” *BMC Neuroscience* 2 (2001): 14.
5. Lawrence J. Schweinhart et al., *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40* (Ypsilanti, MI: High/Scope Press, 2005).
6. J. J. Heckman, “Skill Formation and the Economics of Investing in Disadvantaged Children,” *Science* 312 (2006): 1900–1902.
7. Terrie E. Moffitt et al., “A Gradient of Childhood Self-Control Predicts Health, Wealth and Public Safety,” *Proceedings of the National Academy of Sciences* 108, no. 7 (February 15, 2011): 2693–98, <http://www.pnas.org/cgi/doi/10.1073/pnas.1010076108>.
8. They were assessed variously by their teachers, their parents, trained observers, and themselves, at ages 3, 5, 7, 9, and 11.
9. June Tangney et al., “High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success,” *Journal of Personality* 72, no. 2 (2004): 271–323.
10. Tom Hertz, “Understanding Mobility in America,” Center for American Progress, 2006.
11. Thanks to Sam Anderson, whose article “In Defense of Distraction” gave me this idea. *New York*, May 17, 2009, <http://nymag.com/news/features/56793/index7.html>.
12. Jeanne Nakamura, “Optimal Experience and the Uses of Talent,” in Mihalyi and Isabella Csikszentmihalyi, eds., *Optimal Experience* (New York: Cambridge University Press, 1988).
13. Davidson and Begley, *The Emotional Life of Your Brain*.
14. Adele Diamond et al., “Preschool Program Improves Cognitive Control,” *Science* 318 (2007): 1387–88.
15. Angela Duckworth and Martin E. P. Seligman, “Self-Discipline Outdoes IQ in Predicting Academic Performance of Adolescents,” *Psychological Science* 16, no. 12 (2005): 939–44.

16. B. J. Casey et al., "Behavioral and Neural Correlates of Delay of Gratification 40 Years Later," *Proceedings of the National Academy of Sciences* 108, no. 36 (September 6, 2011): 14998–15003, <http://www.pnas.org/cgi/doi/10.1073/pnas.1108561108>.
17. Jeanne McCaffery et al., "Less Activation in the Left Dorsolateral Prefrontal Cortex in the Reanalysis of the Response to a Meal in Obese Than in Lean Women and Its Association with Successful Weight Loss," *American Journal of Clinical Nutrition* 90, no. 4 (October 2009): 928–34.
18. Walter Mischel, quoted in Jonah Lehrer, "Don't!" *New Yorker*, May 18, 2009.
19. The tale is told in Buddhaghosa, *The Path to Purification*, trans. Bhikku Nanomoli (Boulder, CO: Shambhala, 1979), I, p. 55.

## CHAPTER 9: THE WOMAN WHO KNEW TOO MUCH

1. Justine Cassell et al., "Speech-Gesture Mismatches: Evidence for One Underlying Representation of Linguistic and Nonlinguistic Information," *Pragmatics & Cognition* 7, no. 1 (1999): 1–34.
2. Facial expressions during marital conflict that have been coded using the Specific Affect Coding System (SPAFF) accurately predict the number of months of marital separation within the next four years. In particular, the fleeting facial expression of contempt seems to be highly predictive. John Gottman et al., "Facial Expressions During Marital Conflict," *Journal of Family Conflict* 1, no. 1 (2001): 37–57.
3. F. Ramseyer and W. Tschacher, "Nonverbal Synchrony in Psychotherapy: Relationship Quality and Outcome Are Reflected by Coordinated Body-Movement." *Journal of Consulting and Clinical Psychology* 79 (2011): 284–95.
4. Justine Cassell et al., "BEAT: The Behavior Expression Animation Toolkit," *Proceedings of SIGGRAPH '01*, August 12–17, 2001, Los Angeles, pp. 477–86.

## CHAPTER 10: THE EMPATHY TRIAD

1. Each of the three kinds of empathy has its own neural building blocks and course of development. Empathy in all its faces draws on a huge array of brain structures. For one analysis see Jean Decety, "The Neurodevelopment of Empathy," *Developmental Neuroscience* 32 (2010): 257–67.

2. For details of the circuitry for each kind of empathy, see Ezequiel Gleichgerrcht and Jean Decety, "The Costs of Empathy Among Health Professionals," in Jean Decety, ed., *Empathy: From Bench to Bedside* (Cambridge, MA: MIT Press, 2012).
3. Alan Mulally, CEO Ford Motor Company, quoted in Adam Bryant, *The Corner Office* (New York: Times Books, 2011), p. 14.
4. John Seabrook, "Suffering Souls," *New Yorker*, November 10, 2008.
5. "Empathic cruelty" occurs when one person's brain mirrors the distress of another but also takes pleasure in the suffering. D. de Quervain et al., "The Neural Basis of Altruistic Punishment," *Science* 305 (2004): 1254–58.
6. Cleckley quoted in Seabrook, "Suffering Souls."
7. On the dissociation between emotional and cognitive processing in sociopaths, see, e.g., Kent Kiehl et al., "Limbic Abnormalities in Affective Processing by Criminal Psychopaths as Revealed by Functional Magnetic Resonance Imaging," *Biological Psychiatry* 50 (2001): 677–84; Niels Bribaumer et al., "Deficient Fear Conditioning in Psychopathy," *Archives of General Psychiatry* 62 (2005): 799–805.
8. Joseph Newman et al., "Delay of Gratification in Psychopathic and Nonpsychopathic Offenders," *Journal of Abnormal Psychology* 101, no. 4 (1992): 630–36.
9. See, e.g., Loren Dyck, "Resonance and Dissonance in Professional Helping Relationships at the Dyadic Level" (Ph.D. diss., Department of Organizational Behavior, Case Western Reserve University, May 2010).
10. Emotional empathy neural wiring includes the amygdala, hypothalamus, hippocampus, and orbitofrontal cortex. See Decety, "The Neurodevelopment of Empathy," for neural details on this and other forms of empathy.
11. Greg J. Stephens et al., "Speaker-Listener Neural Coupling Underlies Successful Communication," *Proceedings of the National Academy of Sciences* 107, no. 32 (2010): 14425–30.
12. Circuits in the social brain read the other person's emotions, intentions, and actions and simultaneously activate in our own brain those same brain regions, giving us an inner sense of what's going on in the other person. Along with mirror neurons, circuitry like the ventromedial prefrontal cortex is key. See Jean Decety, "To What Extent Is the Experience of Empathy Mediated by Shared Neural Circuits?" *Emotion Review* 2, no. 3 (2010): 204–207. In studies of hundreds of people watching clips of those in pain, Decety finds no gender difference in how their brains respond—but a big

difference in their social response: women rate themselves as more empathic than do men.

13. P. L. Jackson et al., "To What Extent Do We Share the Pain of Others? Insight from the Neural Bases of Pain Empathy," *Pain* 125 (2006): 5–9.
14. Singer finds that the insula records pain, suffering, and negative affect, while another circuit in the orbitofrontal cortex responds to pleasant sensations, like a soft touch from someone. Tania Singer et al., "A Common Role of Insula in Feelings, Empathy and Uncertainty," *Trends in Cognitive Sciences* 13, no. 8 (2009): 334–40; C. Lamm and T. Singer, "The Role of Anterior Insular Cortex in Social Emotions," *Brain Structure & Function* 241, nos. 5–6 (2010): 579–91.
15. C. J. Limb et al., "Neural Substrates of Spontaneous Musical Performance: An fMRI Study of Jazz Improvisation," *PLoS ONE* 3, no. 2 (2008).
16. Jean Decety and Claus Lamm, "The Role of the Right Temporoparietal Junction in Social Interaction: How Low-Level Computational Processes Contribute to Meta-Cognition," *Neuroscientist* 13, no. 6 (2007): 580–93.
17. Jean Decety, presentation to the Consortium for Research on Emotional Intelligence in Organizations, Cambridge, MA: May 6, 2011.
18. Sharee Light and Carolyn Zahn-Waxler, "The Nature and Forms of Empathy in the First Years of Life," in Decety, ed., *Empathy: From Bench to Bedside*.
19. See, e.g., Carr, *The Shallows*.
20. C. Daniel Batson et al., "An Additional Antecedent to Empathic Concern: Valuing the Welfare of the Person in Need," *Journal of Personality and Social Psychology* 93, no. 1 (2007): 65–74. Also, Grit Hein et al., "Neural Responses to Ingroup and Outgroup Members' Suffering Predict Individual Differences in Costly Helping," *Neuron* 68, no. 1 (2010): 149–60.
21. Subjects witnessing either people who have previously behaved unfairly in economic games or outgroup members suffering pain did not show the habitual empathic response in the anterior insula cortex and anterior cingulate cortex but instead showed increased activation in the nucleus accumbens, an area associated with reward processing. Tania Singer et al., "Empathic Neural Responses Are Modulated by the Perceived Fairness of Others," *Nature* 439 (2006): 466–69.
22. Chiara Sambo et al., "Knowing You Care: Effects of Perceived Empathy and Attachment Style on Pain Perception," *Pain* 151, no. 3 (2010): 687–93.

23. John Couhelan et al., “Let Me See If I Have This Right . . . : Words That Build Empathy,” *Annals of Internal Medicine* 135, no. 3 (2001): 221–27.
24. See, e.g., W. Levinson et al., “Physician-Patient Communication: The Relationship with Malpractice Claims Among Primary Care Physicians and Surgeons,” *Journal of the American Medical Association* 277 (1997): 553–69.
25. Jean Decety et al., “Physicians Down-Regulate Their Pain-Empathy Response: An ERP Study,” *Neuroimage* 50, no. 4 (2010): 1676–82.
26. William Osler quoted in Decety, ed., *Empathy: From Bench to Bedside*, p. 230.
27. Jodi Halpern, “Clinical Empathy in Medical Care,” *ibid.*
28. M. Hojat et al., “The Devil Is in the Third Year: A Longitudinal Study of Erosion of Empathy in Medical School,” *Academic Medicine* 84, no. 9 (2009): 1182–91.
29. Helen Riess et al., “Empathy Training for Resident Physicians: A Randomized Controlled Trial of a Neuroscience-Informed Curriculum,” *Journal of General Internal Medicine* 27, no. 10 (2012): 1280–86.
30. Helen Riess, “Empathy in Medicine: A Neurobiological Perspective,” *Journal of the American Medical Association* 304, no. 14 (2010): 1604–1605.

## CHAPTER 11: SOCIAL SENSITIVITY

1. Prince Philip quoted in Ferdinand Mount, “The Long Road to Windsor,” *Wall Street Journal*, November 14, 2011, p. A15.
2. Kim Dalton et al., “Gaze Fixation and the Neural Circuitry of Face Processing in Autism,” *Nature Neuroscience* 8 (2005): 519–26. Richard Davidson has proposed that for those with autism, failure to understand what is appropriate in a social situation stems from a deficit in acquiring social intuition.
3. This is still under debate, with some studies showing this effect, others not.
4. See, e.g., Michael W. Kraus et al., “Social Class Rank, Threat Vigilance, and Hostile Reactivity,” *Personality and Social Psychology Bulletin* 37, no. 10 (2011): 1376–88.
5. Michael Kraus and Dacher Keltner, “Signs of Socioeconomic Status,” *Psychological Science* 20, no. 1 (2009): 99–106.
6. Gerben A. van Kleef et al., “Power, Distress, and Compassion,” *Psychological Science* 19, no. 12 (2008): 1315–22.

7. Michael Kraus, Stephane Cote, and Dacher Keltner, “Social Class, Contextualism, and Empathic Accuracy,” *Psychological Science* 21, no. 11 (2010): 1716–23.
8. Ryan Rowe et al., “Automated Social Hierarchy Detection Through Email Network Analysis,” Proceedings of the 9th WebKDD and 1st SNA-KDD 2007 Workshop on Web Mining and Social Network Analysis, 2007, 109–117.

## CHAPTER 12: PATTERNS, SYSTEMS, AND MESSES

1. K. Levin et al., “Playing It Forward: Path Dependency, Progressive Incrementalism, and the ‘Super Wicked’ Problem of Global Climate Change,” *IOP Conference Series: Earth and Environmental Science* 50, no. 6 (2009).
2. Russell Ackoff, “The Art and Science of Mess Management,” *Interfaces*, February 1981, pp. 20–26.
3. Jeremy Ginsberg et al., “Detecting Influenza Epidemics Using Search Engine Query Data,” *Nature* 457 (2009): 1012–14.
4. So I was told by Thomas Davenport, Harvard Business School.
5. But bringing people into the information equation can also complicate things: there’s jealousy over who controls data, infighting, and organizational politics that can prevent information sharing or lead to hoarding and to simply ignoring data.
6. Thomas Davenport’s book in progress, tentatively called “Keeping Up with the Quants,” was reported in Steve Lohr, “Sure, Big Data Is Great: but So Is Intuition,” *New York Times*, December 30, 2012, Business, p. 3.
7. As reported by Lohr, “Sure, Big Data Is Great.”

## CHAPTER 13: SYSTEM BLINDNESS

1. Of course, the “system” that got into the room was just a partial slice of larger, interlocking systems, such as the information dispersal system, which is in the midst of shifting from print to digital formats.
2. John D. Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World* (New York: McGraw-Hill, 2000).
3. See my book *Ecological Intelligence* (New York: Broadway, 2009) for more details on supply chains, emissions, and the true environmental cost of things man-made. Or see Annie Leonard’s twenty-minute video, “The Story of Stuff,” <http://www.storyofstuff.org>.

4. Originally proposed by Yale psychologist Frank Keil's group, the illusion has been extended from purely mechanical or natural systems to social, economic, and political ones. See, e.g., Adam L. Alter et al., "Missing the Trees for the Forest: A Construal Level Account of the Illusion of Explanatory Depth," *Journal of Personality and Social Psychology* 99, no. 3 (2010): 436–51. That illusion may be at play in this book, when it has to do with the broad strokes with which I paint a wide variety of cognitive, emotional, social, and neural systems. This risk is inherent in science journalism. That's why this book has lots of endnotes, for those who want to pursue these threads of understanding. Congratulations for reading this one.
5. See, e.g., Elke Weber, "Experience-Based and Description-Based Perceptions of Longterm Risk: Why Global Warming Does Not Scare Us (Yet)," *Climatic Change* 77 (2006): 103–20.

## CHAPTER 14: DISTANT THREATS

1. Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2010).
2. Johan Rockstrom et al., "A Safe Operating Space for Humanity," *Nature* 461 (2009): 472–75.
3. Will Steffen et al., "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio: A Journal of the Human Environment* 36, no. 8 (2007): 614–21.
4. China's carbon economy, based on World Bank figures, as reported in Fred Pearce, "Over the Top," *New Scientist*, June 16, 2012, pp. 38–43. On the other hand, see "China Plans Asia's Biggest Coal-Fired Power Plant," at <http://phys.org/news/2011-12-china-asia-biggest-coal-fired-power.html>.
5. When a global consumer goods company used LCA to analyze its CO<sub>2</sub> footprint, it turned out the biggest factor was when customers heated water to use warm-water detergents (conveniently displacing responsibility to the consumer—you wonder what the second through tenth factors were).
6. The German social theorist Niklas Luhmann argues that every major human system organizes around a single principle. For the economy, it's money; for politics, power; for the social world, love. And so the most elegant decisions in these realms become manageably binary: money/no money; power/no power; love/no love. Perhaps it is no co-



incidence that our brain applies a primal either/or decision rule in every moment of perception; the micro-instant we notice something, the emotional centers summate our relevant experience and tag it “like” or “don’t like.” Niklas Luhmann’s work in the original German on sociological systems theory has not yet been translated into English, though it has been highly influential throughout Eastern Europe. I have read only secondhand accounts and been briefed on the key points by Georg Vielmetter, whose dissertation was based in part on Luhmann’s theories.

7. Streamlined versions of life cycle analysis software are being designed that can do this.
8. Jack D. Shepard et al., “Chronically Elevated Corticosterone in the Amygdala Increases Corticotropin Releasing Factor mRNA in the Dorsolateral Bed Nucleus of Stria Terminalis Following Duress,” *Behavioral Brain Research* 17, no. 1 (2006): 193–96.
9. That was the premise of my book *Ecological Intelligence: The Hidden Impacts of What We Buy* (New York: Random House, 2009).
10. U.S. Department of Energy data shows that water heating accounts for 18–20 percent of residential energy use nationally. In New England, annual water heating costs for a family of four range from \$500 to well above \$800, depending on the fuel used. Data from the Residential Energy Consumption Survey also shows that only 12 percent of U.S. homes have an insulating blanket installed on their water heater tank, despite the fact that such a blanket, which costs only about \$20, can save \$70 per year in energy consumption and will last for the life of your water heater (which is thirteen years, on average). The simple act of installing water heater blankets and adjusting temperatures to 120 degrees Fahrenheit could cut total U.S. household energy consumption by approximately 2 percent, along with providing major benefits for the climate, biodiversity, and human health—and the economy.
11. The children in the school will give the blankets away to households throughout the community, and make a deal: houses that get the blankets will give the first nine months of savings back to the school, then just keep the money after that. In all, that should raise around \$15,000. The school will keep \$5,000 to help do things like make needed playground improvements. It will use the remaining \$10,000 to buy water blankets to give away to two other schools to do the same.
12. The specifics differ for each of the many polluting emissions—for some the payback point is in months; for others, years. For instance, there

are two major classes of particulate emissions, both of which penetrate deeply into our lungs. Their reduction rates vary, but handprints roll the total consequence for health and biodiversity loss of all types of pollution in a single score.

13. Will Wright, quoted in Chris Baker, "The Creator," *Wired*, August 2012, p. 68.
14. Celia Pearce, "Sims, Battlebots, Cellular Automata, God and Go," *Game Studies*, July 2002, p. 1.
15. Outdoor air pollution contributed to 1.2 million premature deaths in China; the global total was 3.2 million. See "Global Burden of Disease Study 2010," *The Lancet*, December 13, 2013.
16. My book *Ecoliterate*, cowritten with Lisa Bennett and Zenobia Barlow of the Center for Ecoliteracy, makes the argument for engaging students' emotions in environmental education, though it does not include the kind of curriculum described here.
17. Paul Hawken, "Reflection," *Garrison Institute Newsletter*, Spring 2012, p. 9.

## CHAPTER 15: THE MYTH OF 10,000 HOURS

1. The biggest boost to the fame of the 10,000-hour rule was from Malcolm Gladwell's nearly perpetual best seller, *Outliers*. I, too, had a small hand in its popularity: in 1994 I wrote in the *New York Times* about the research this comes from—the work of Anders Ericsson, a cognitive scientist at Florida State University. His research found, for example, that top violinists in the best music academies had already practiced their instruments for 10,000 hours, while those who had done just 7,500 hours tended to be, literally, second fiddles. Daniel Goleman, "Peak Performance: Why Records Fall," *New York Times*, October 11, 1994, p. C1.
2. I interviewed Anders Ericsson for that 1994 *New York Times* article.
3. Anders Ericsson et al., "The Role of Deliberate Practice in the Acquisition of Expert Performance," *Psychological Review* 47 (1993): 273–305. Take Itzhak Perlman, who came to the Juilliard School—that hyperselective performing arts conservancy—as a prodigy at thirteen, and studied for eight years with Dorothy DeLay, his violin instructor there. She expected great discipline; her students practiced five hours a day, and DeLay gave them constant feedback and encouragement. For Perlman, that amounted to at least 12,000 hours of smart practice by the time he

left the school. But once you are launched, is that level of practice enough to let you coast on your own? Lifetime coaches are commonplace among professional performers: singers routinely rely on voice coaches, just as elite athletes do on their coaches. No one reaches world-class levels without a master teacher. Even Perlman still has a coach: his wife, Toby, herself a concert-level violinist, whom he met while at Juilliard. For more than forty years Perlman has valued her tough critiques as an “extra ear.”

4. And, remember, once a routine becomes automatic, trying to think about how you are executing it can interfere with that execution: top-down takes over from bottom-up, but not effectively.
5. K. Anders Ericsson, “Development of Elite Performance and Deliberate Practice,” in J. L. Starkes and K. Anders Ericsson, eds., *Expert Performance in Sports: Advances in Research on Sport Expertise* (Champaign, IL: Human Kinetics, 2003).
6. Although he studied and taught at Cambridge University, Thupten Jinpa tells me his accent actually comes from having learned spoken English in his youth by listening to the BBC World radio broadcasts to India.
7. I interviewed Herbert Simon for the *New York Times*. See Goleman, “Peak Performance: Why Records Fall.”
8. Wendy Hasenkamp et al., “Mind Wandering and Attention During Focused Attention,” *NeuroImage* 59, no. 1 (2012): 750–60.
9. Resting state connectivity in experienced meditators was increased between the medial region and parietal regions that are involved in disengaging of attention. This suggests that the regions that control disengagement have more access to the mPFC regions that may underlie self-related mind-wandering, suggesting a neuroplastic effect as practice made this connectivity stronger. Wendy Hasenkamp and Lawrence Barsalou, “Effects of Meditation Experience on Functional Connectivity of Distributed Brain Networks,” *Frontiers in Human Neuroscience* 6, no. 38 (2012): 1–14.
10. Larry David’s reactions to the Yankee Stadium crowd were reported in “The Neurotic Zen of Larry David,” *Rolling Stone*, August 4, 2011, p. 81.
11. Taylor Schmitz et al., “Opposing Influence of Affective State Valence on Visual Cortical Decoding,” *Journal of Neuroscience* 29, no. 22 (2009): 7199–7207.
12. Barbara Fredrickson, *Love 2.0* (New York: Hudson Street Press, 2013).
13. Davidson and Begley, *The Emotional Life of Your Brain*.
14. Anthony Jack et al., “Visioning in the Brain: An fMRI Study of Inspirational Coaching and Mentoring,” submitted for publication, 2013.
15. M. Losada and E. Heaphy, “The Role of Positivity and Connectivity in

- the Performance of Business Teams: A Nonlinear Dynamics Model,” *American Behavioral Scientist* 47, no. 6 (2004): 740–65.
16. B. L. Fredrickson and M. Losada, “Positive Affect and the Complex Dynamics of Human Flourishing,” *American Psychologist* 60, no. 7 (2005): 678–86.

## CHAPTER 16: BRAINS ON GAMES

1. The tale of Daniel Cates was told by Jay Kaspian Kang in “The Gambler,” *New York Times Magazine*, March 27, 2011, pp. 48–51.
2. Poker, of course, is not just a skill; a run of bad hands can put even the best player at a disadvantage. But a slight advantage in skill, if pursued over thousands of games, pays off. One trait of online poker winners is, understandably, a kind of fearless abandon about risk-taking, an essential attitude when you can lose hundreds of thousands of dollars in the blink of an eye.
3. Marc Smith was quoted in the *Boston Globe*, July 28, 2012, p. A6.
4. Daphne Bavelier et al., “Brains on Video Games,” *Nature Reviews Neuroscience* 12 (December 2011): 763–68.
5. Gentile, quoted *ibid.*
6. *Ibid.*
7. Enhanced aggression was the finding from the most comprehensive meta-analysis to date, based on 136 separate studies of a total of 30,296 gamers or controls. Craig A. Anderson, “An Update on the Effects of Playing Violent Video Games,” *Journal of Adolescence* 27 (2004): 113–22. But see also John L. Sherry, “Violent Video Games and Aggression: Why Can’t We Find Effects?” in Raymond Preiss et al., eds., *Mass Media Effects Research: Advances Through Meta-Analysis* (Mahwah, NJ: Lawrence Erlbaum, 2007), pp. 245–62.
8. The key part: the anterior cingulate gyrus. See M. R. Rueda et al., “Training, Maturation, and Genetic Influences on the Development of Executive Attention,” *Proceedings of the National Academy of Sciences* 102, no. 41 (2005): 1029–40.
9. There’s another brain correlate of ADD: underactivity in the prefrontal areas that manage attention, executive functioning, and self-control. M. K. Rothbart and M. I. Posner, “Temperament, Attention, and Developmental Psychopathology,” in D. Cicchetti and D. J. Cohen, eds., *Handbook of Developmental Psychopathology* (New York: Wiley, 2006), pp. 167–88.

10. O. Tucha et al., “Training of Attention Functions in Children with Attention Deficit Hyperactivity Disorder,” *Attention Deficit and Hyperactivity Disorders*, May 20, 2011.
11. Merzenich in Bavelier et al., “Brains on Video Games.”
12. Gus Tai, quoted in Jessica C. Kraft, “Digital Overload? There’s an App for That,” *New York Times*, Sunday, July 22, 2012, Education Supplement, p. 12.

## CHAPTER 17: BREATHING BUDDIES

1. The voice they listen to is my own, on a CD I narrated for Linda Lantieri, *Building Emotional Intelligence* (Boulder, CO: Sounds True, 2008). The script I read was written by Linda, based on her work with children in the New York public schools and elsewhere.
2. Linda Lantieri et al., “Building Inner Resilience in Students and Teachers,” in Gretchen Reevy and Erica Frydenberg, eds., *Personality, Stress and Coping: Implications for Education* (Charlotte, NC: Information Age, 2011), pp. 267–92.
3. So Richard Davidson told me, referring to a study still in progress at the Center for Investigating Healthy Minds.
4. Joseph A. Durlak et al., “The Impact of Enhancing Students’ Social/Emotional Learning: A Meta-Analysis of School-Based Universal Interventions,” *Child Development* 82, no. 1 (2011): 405–32.
5. Nathaniel R. Riggs et al., “The Mediation Role of Neurocognition in the Behavioral Outcomes of a Social-Emotional Prevention Program in Elementary School Students: Effects of the PATHS Curriculum,” *Prevention Science* 7, no. 1 (March 2006): 91–102.
6. Of course for some kids willpower comes naturally with ordinary practice, whether it’s via studying for next week’s test or saving up to buy an iPod.
7. Philip David Zelazo and Stephanie M. Carlson, “Hot and Cool Executive Function in Childhood and Adolescence: Development and Plasticity,” *Child Development Perspectives* 6, no. 4 (2012): 354–60.
8. Rueda et al., “Training, Maturation, and Genetic Influences on the Development of Executive Attention.”
9. Unless that imp of the perverse, impulse priming, enticed you to read this endnote.
10. Mark Greenberg, in an email.
11. As of this writing there is little direct research on the effects of

mindfulness on children's attention skills, although several studies are in the pipeline. For instance, in one pilot study with thirty preschoolers who got mindfulness plus "kindness training," Richard Davidson's group found improvements in attention and in kindness itself. At this writing, the study is being replicated with a sample of two hundred preschoolers; see <http://www.investigatinghealthy minds.org/cihmProjects.html#prek>.

12. Smallwood et al., "Counting the Cost of an Absent Mind."
13. Stephen W. Porges, *The Polyvagal Theory* (New York: Norton, 2011).
14. I first heard this data presented by Barbara Fredrickson at a conference for the inauguration of the Center for Healthy Minds at the University of Wisconsin, on May 16, 2010. She reported the results in her book *Love 2.0*, cited above.
15. Judson Brewer et al., "Meditation Experience Is Associated with Differences in Default Mode Network Activity and Connectivity," *Proceedings of the National Academy of Sciences* 108, no. 50 (2011): 20254–59. The default mode decreases in activity when we engage in any focused task; the fact that it was less active during meditation is to be expected. The finding that experienced meditators are better at this mental task than naive controls suggests a training effect.
16. For another analogue of a nonorganic approach with unintended consequences, consider the Green Revolution in agriculture. In the 1960s the introduction of cheap chemical fertilizers in places like India disproved the dire predictions at the time that the world would soon run out of food. But this technological fix for famine prevention had an unanticipated downside: rivers, lakes, and huge patches of ocean where fertilizer concentrated began to "die." The nitrogen-boosted plant growth had a fatal impact in the world's waters.
17. Richard J. Davidson et al., "Alterations in Brain and Immune Function Produced by Mindfulness Meditation," *Psychosomatic Medicine* 65 (2003): 564–70.
18. Mindfulness (which takes short, regular sessions to learn, not hours and hours daily) avoids a danger inherent in gaming, which can deprive young people of huge hunks of time when they could be with other people—talking, playing, goofing off. Those are life's learning labs, where the social and emotional circuitry grows.
19. Daniel Siegel, *The Mindful Brain* (New York: Norton, 2007).
20. On the other hand, mindfulness does not remedy every need. Those of us who are tuned out of our own feelings—or who do not register pain

and distress in others—might also benefit from learning to pay attention in a different way. Here purposely focusing on our own distress and the pain of others might mean working at getting more deeply into our emotions and sustaining those feelings in our awareness. An approach like gestalt therapy, combined with mindfulness of our own sensations, might strengthen the circuitry that resonates with the insula.

21. See <http://www.siyli.org>.
22. I've paraphrased these questions, from Gill Crossland-Thackray, "Mindfulness at Work: What Are the Benefits?" *Guardian Careers*, December 21, 2012, <http://careers.guardian.co.uk/careers-blog/mindfulness-at-work-benefits>.
23. Typically this me-focused mode of mind comes and goes all day long (and all night, too—sleep studies find that if you wake people at any time of night and ask what they were just thinking, they always have a fresh thought to report).
24. Norman Farb et al., "Attending to the Present: Mindfulness Meditation Reveals Distinct Neural Modes of Self-Reference," *Social Cognitive Affective Neuroscience* 2, no. 4 (2007): 313–22. See also Aviva Berkovich-Ohana et al., "Mindfulness-Induced Changes in Gamma Band Activity," *Clinical Neurophysiology* 123, no. 4 (April 2012): 700–10.
25. Here's the technical language from Farb et al., "Attending to the Present": "In trained participants, EF resulted in more marked and pervasive reductions in the mPFC, and increased engagement of a right lateralised network, comprising the lateral PFC and viscerosomatic areas such as the insula, secondary somatosensory cortex and inferior parietal lobule. Functional connectivity analyses further demonstrated a strong coupling between the right insula and the mPFC in novices that was uncoupled in the mindfulness group."
26. Feidel Zeidan et al., "Mindfulness Meditation Improves Cognition: Evidence of Brief Mental Training," *Consciousness and Cognition* 19, no. 2 (June 2010) 597–605.
27. David M. Levy et al., "Initial Results from a Study of the Effects of Meditation on Multitasking Performance," *Proceedings of CHI '11 Extended Abstracts on Human Factors in Computing Systems*, 2011, pp. 2011–16.
28. See Tim Ryan, *A Mindful Nation* (Carlsbad, CA: Hay House, 2012), and Jeffrey Sachs, *The Price of Civilization* (New York: Random House, 2011).

## CHAPTER 18: HOW LEADERS DIRECT ATTENTION

1. Adam Bryant interviewed Steve Balmer in “Meetings, Version 2.0, at Microsoft,” *New York Times*, May 16, 2009.
2. Davenport and Back, *The Attention Economy*.
3. See, e.g., the summit on the Future of Story-Telling: <http://futureofstorytelling.org>.
4. See Howard Gardner with Emma Laskin, *Leading Minds: An Anatomy of Leadership* (New York: Basic Books, 1995).
5. Davenport and Back, *The Attention Economy*, cite data from a small company showing a very high (though less strong) correlation between what leaders focused on and the focus of employees. For a multinational, there was still a high (though less strong) correlation between the two.
6. William Ocasio of the Kellogg School of Management, who argues for viewing corporations in terms of the flow of attention, defines business strategy as organizing patterns of attention in a distinct focus of time and effort by the company on a particular set of issues, problems, opportunities, and threats. William Ocasio, “Towards an Attention-Based View of the Firm,” *Strategic Management Journal* 18, S1 (1997): 188.
7. Steve Jobs quoted in Walter Isaacson, “The Real Leadership Lessons of Steve Jobs,” *Harvard Business Review*, April 2012, pp. 93–102. As Jobs was dying of liver cancer he was visited by Larry Page, the Google cofounder who was about to take the reins as CEO there. Jobs’s advice to Page: instead of being all over the map, focus on a handful of products.
8. Michael Porter, “What Is Strategy?” *Harvard Business Review*, November–December, 1996, pp. 61–78.
9. Ian Marlow, “Lunch with RIM CEO Thorsten Heins: Time for a Bite, and Little Else,” *Globe and Mail*, August 24, 2012.
10. James Surowiecki, “BlackBerry Season,” *New Yorker*, February 13 and 20, 2012, p. 36.
11. Apple’s first iPod was released in 2001, the Zune in 2006. Microsoft killed the Zune in 2012, folding the software into its Xbox.
12. Clay Shirky, “Napster, Udacity, and the Academy,” November 12, 2012, [www.shirky.com/weblog](http://www.shirky.com/weblog).
13. Charles O’Reilly III and Michael Tushman, “The Ambidextrous Organization,” *Harvard Business Review*, April 2004, pp. 74–81.
14. James March, “Exploitation and Exploration in Organizational Learning,” *Organizational Science* 2, no. 1 (1991): 71–87.
15. Daniella Laureiro-Martinez et al., “An Ambidextrous Mind,” working



paper, Center for Research in Organization and Management, Milan, Italy, February 2012. Exploitation strategies are associated with activity in the brain's dopamine networks and the ventromedial prefrontal areas; exploration with areas for executive function and attention control.

## CHAPTER 19: THE LEADER'S TRIPLE FOCUS

1. Rainer Greifeneder et al., "When Do People Rely on Affective and Cognitive Feelings in Judgment? A Review," *Personality and Social Psychology Review* 15, no. 2 (2011): 107–41.
2. Gerd Gigerenzer et al., *Simple Heuristics That Make Us Smart* (New York: Oxford University Press, 1999).
3. David A. Waldman, "Leadership and Neuroscience: Can We Revolutionize the Way That Inspirational Leaders Are Identified and Developed?" *Academy of Management Perspectives* 25, no. 1 (2011): 60–74.
4. Among brain areas crucial for emotional intelligence that also play key roles in varieties of attention: the anterior cingulate gyrus, the temporoparietal junction, the orbitofrontal cortex, and the ventromedial area. For brain areas in common for attention and emotional intelligence, see, e.g., Posner and Rothbart, "Research on Attention Networks as a Model for the Integration of Psychological Science"; R. Bar-On et al., "Exploring the Neurological Substrate of Emotional and Social Intelligence," *Brain* 126 (2003): 1790–1800. The story will no doubt become more complex, and the attention-emotional intelligence links even stronger, as more such research is done using a wider variety of EI measures and neuroscience methods.
5. Steve Balmer, CEO of Microsoft, in Bryant, "Meetings, Version 2.0."
6. Scott W. Spreier, Mary H. Fontaine, and Ruth L. Malloy, "Leadership Run Amok: The Destructive Potential of Overachievers," *Harvard Business Review*, June 2006, pp. 72–82.
7. McClelland was quoted *ibid.*
8. George Kohlrieser et al., *Care to Dare* (San Francisco: Jossey-Bass, 2012).
9. Estimates put the liabilities to BP from the Deepwater Horizon spill at close to \$40 billion; four BP executives face criminal charges for negligence.
10. Elizabeth Shogren, "BP: A Textbook Example of How Not to Handle PR," NPR, April 21, 2011.
11. Lyle Spencer and Signe Spencer, *Competence at Work* (New York: Wiley,

1993). Signe Spencer is global practice leader for Capability Assessment at Hay Group.

## CHAPTER 20: WHAT MAKES A LEADER?

1. Another reason the debate continues: competence models are typically proprietary information, commissioned by an organization to gain competitive advantage, and so are not typically shared publicly, let alone published in peer-reviewed journals—and so many academic psychologists dismiss the evidence (though many models have been published in peer-reviewed journals, too). Meanwhile other psychologists—mostly industrial/organizational specialists—continue creating competence models, which are used extensively throughout the organizational world. This bespeaks a wider rift between academics and practitioners, one that goes far beyond this particular debate.
2. Gerald Mount, “The Role of Emotional Intelligence in Developing International Business Capability: EI Provides Traction,” in Vanessa Druskat et al., eds., *Linking Emotional Intelligence and Performance at Work* (Mahwah, NJ: Lawrence Erlbaum, 2005). There are very few published studies like this analyzing competence models, in part because the models are often proprietary.
3. This was based on a sample of 404 leaders who had data on EI competencies, leadership styles, and organizational climate, analyzed by Yvonne Sell, Hay Group, London.
4. Tellingly, these leaders overly relied on a narrow range of leadership styles—typically pacesetter and command-and-control. Leadership styles display underlying EI leadership competencies; styles drive climate, and climate accounts for about 30 percent of business performance, according to data analyzed at Hay Group.
5. Alastair Robertson and Cathy Wail, “The Leader Within,” *Outlook 2* (1999): 19–23.
6. So I’m told by Cary Cherniss of the Rutgers Consortium for Research on Emotional Intelligence in Organizations, who has surveyed many competence models.
7. Vanessa Druskat and Steven Wolff, with their colleague Dr. Joan Manuel Batista-Foguet of the ESADE Business School in Barcelona, used this method. Vanessa Druskat, Joan M. Batista-Foguet, and Steven Wolff, “The Influence of Team Leader Competencies on the Emergence of Emotionally Competent Team Norms,” paper presented at the An-

nual Academy of Management Conference, San Antonio, TX, August 2011.

8. The metric: a leader's styles accounts for 50–70 percent of the climate. And climate, in turn, drives about 30 percent of business results due to that leader. The more strengths leaders have in the underlying emotional intelligence competencies, the more styles in their repertoire. (The problem: fewer than 10 percent of leaders are this effective. Most leaders have only one dominant style. Exhibiting three or more is high—and rare.) For those leaders high in self-awareness, followers rated the climate positive 92 percent of the time, while for those low the rating was positive just 22 percent of the time.
9. Jeffrey Sanchez-Burks and Quy Nguyen Huy, "Emotional Aperture and Strategic Change: The Accurate Recognition of Collective Emotions," *Organization Science* 20, no. 1 (2009): pp. 22–34.
10. T. Masuda et al., "Placing the Face in Context: Cultural Differences in the Perception of Facial Emotion," *Journal of Personality and Social Psychology* 94 (2008): 365–81.
11. Partnership for Public Service, "Critical Skills and Mission Critical Occupations, Leadership, Innovation," research report, 2011, <http://ourpublicservice.org/OPS/publications/viewcontentdetails.php?id=158>.
12. Simon Baron-Cohen, *The Essential Difference: Men, Women, and the Extreme Male Brain* (London: Allen Lane, 2003).
13. See Vanessa Urch Druskat and Steven B. Wolff, "Building the Emotional Intelligence of Groups," *Harvard Business Review*, March 2001, pp. 80–90.

## CHAPTER 21: LEADING FOR THE LONG FUTURE

1. Alvin Weinberg favored thorium-based reactors, because they are immune to Fukushima-type accidents; the spent fuel has a far shorter half-life than uranium and, unlike uranium, cannot become used in nuclear weapons. There is a movement to resurrect thorium reactors and replace uranium-based ones. See <http://www.the-weinberg-foundation.org/>.
2. I don't know if Alvin ever took that view as a public stand. As for me, I'd rather see our energy needs met by nonnuclear, noncoal, and non-petroleum-based systems one day.
3. Alvin Weinberg, "Social Institutions and Nuclear Energy," *Science*, July 7, 1972, p. 33.
4. National Intelligence Council, "Global Trends 2025: A Transformed World," November 2008.

5. Both these could be case studies (but are not) out of Ronald Heifetz and Marty Linsky, *Leadership on the Line* (Boston: Harvard Business Review Press, 2002). Heifetz's theory of adaptive leadership urges leaders to take unpopular stances like these when they are for the public good—and suggests savvy ways to handle the inevitable resistance.
6. Jonathan Rose, *The Well-Tempered City*, should be published in 2014.
7. Jim Collins makes a similar argument in his classic work *Good to Great* (New York: HarperBusiness, 2001). What Collins calls “Level Five” leaders take the long view, creating sustainable change. They seek prosperity over decades, not just for the quarterly return; they involve many stakeholders—not just stockholders—and create pride and loyalty in employees. They inspire commitment with a compelling vision and the corporate equivalent of immense focus and willpower, while remaining humble themselves. These are the leaders, Collins argues, of companies that are not just good, but great.
8. An Accenture survey of 750 global CEOs found that more than 90 percent endorse sustainability as a company goal. See <http://www.accenture.com/us-en/Pages/insight-un-global-compact-reports.aspx>.
9. Unilever does not buy directly from the farmers, but rather buys through suppliers, and will expand its web of suppliers to include those with strong networks of small farms.
10. While this will mean better profits, exactly what these might be will vary from crop to crop and season to season.
11. World Bank, “The Future of Small Farms: Synthesis Report,” World Development Report 2008, <http://wdronline.worldbank.org/worldbank/a/nonwdrdetail/87>.
12. John Mackey, co-CEO of Whole Foods Market, has been the front-and-center spokesman for this view, which he sees as part of “conscious capitalism.” Mackey, for example, gets a salary only 14 times greater than that of the lowest-paid Whole Foods workers; the fish sold there are carefully chosen so they do not deplete ocean biodiversity—among a long list of other tenets. See John Mackey and Raj Sisodia, *Conscious Capitalism* (Boston: Harvard Business Review Press, 2013). The view has caught the zeitgeist. See, e.g., Rosabeth Moss Kanter, “How Great Companies Think Differently,” *Harvard Business Review*, November 2011, pp. 66–78.
13. The five-rupee blade isn't the least expensive in India, but it's at a level most can afford. Ellen Byron, “Gillette's Latest Innovation in Razors: The 11-Cent Blade,” *Wall Street Journal*, October 1, 2010.

14. Job levels seem to link roughly to time horizons, the late consultant Elliott Jacques argued. Jobs like salesclerk or police officer, he proposed, encourage thinking in a time horizon of one day to three months; foremen and small-business owners tend to think in terms of three months to a year. The CEOs of smaller companies and division heads of larger ones might think as far as ten years ahead. And CEOs of global companies should think decades ahead. See Art Kleiner, "Elliott Jacques Levels with You," *Strategy + Business*, First Quarter, 2001.
15. Peter Senge's best-known book is *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday Business, 1990).