NOTES

1. A Latticework of Mental Models

1. Charles Munger’s complete presentation to Dr. Babcock’s class, in lightly edited form, appears in the May 5, 1995, edition of Outstanding Investor Digest (OID), from which the passages quoted here are taken.

2. Benjamin Franklin, “Proposals Relating to the Education of the Youth in Pennsylvania,” 1749. All quotes from Franklin in this section of the chapter are taken from this pamphlet, with his original spelling intact.


5. Munger’s remarks to the Stanford class and his answers to questions from students appear in two issues of Outstanding Investor Digest, December 29, 1997, and March 13, 1998. Readers are encouraged to read the lecture, which OID editor Henri Emerson aptly describes as “Worldly Wisdom Revisited,” in its entirety.

2. Physics

1. Sir Isaac Newton’s first law of motion states that a moving object will continue to move in a straight line at a constant speed, and a stationary object will remain at rest unless acted on by an unbalanced force; this is the law of inertia. The second law
states that the acceleration produced on a body by a force is proportional to the magnitude of the force and inversely proportional to the mass of the object. The third law states that for every action there is an equal and opposite reaction.

2. Alfred Marshall takes another turn on our stage in Chapter 3.


4. Ibid., 269.

5. Ibid., 287.

6. Ibid., 288.


8. Ibid., 37.


3. Biology

1. Erasmus Darwin, a prominent and highly successful doctor, was also a poet. It was in his poetry, principally “Zoonomia,” that he chose to express his speculations about evolution, in which he was decidedly ahead of his time. His contemporary, Samuel Taylor Coleridge, took to calling his friend’s theories “darwinizing.” Although in later years Charles Darwin would claim he was not particularly influenced by his grandfather’s theories, it seems impossible that he was unaware of them.


3. For all that Charles Darwin was able to accomplish, he was not able to explain how variations in species occurred. That question was settled by Gregor Johann Mendel, an Austrian botanist and plant experimenter, who was the first to present a mathematical foundation of the science of genetics. Today, biologists understand that variations within a species are caused by the variations of the genes of its individual members.


5. American economists were paying attention, too. Most notable among them at the time was Thorstein Veblen at the University of Chicago. Today his reputation rests on his primary work, *The Theory of the Leisure Class*, in which he described his notion of conspicuous consumption. In his own time, his scholarly reputation was
somewhat overshadowed by his eccentric personal behavior and by his sardonic, satiric style of writing. Many contemporaries simply missed the satire. He frequently called for an evolutionary, post-Darwinian approach to the study of economics; unfortunately, he was light on specific details. Nonetheless, some of today’s scholars credit him as a pioneer in this approach. British economist Geoffrey Hodgson, for example, claims “Veblen’s writings constitute the first case of an evolutionary economics along Darwinian lines.” (G. M. Hodgson, “On the Evolution of Thorstein Veblen’s Evolutionary Economics,” Cambridge journal of economics 22 [1998]: 415–431.)

6. The poignancy is that, despite years of work, he never completed volume 2.

7. The Theory of Economic Development was of course written in Schumpeter’s native German. The common translation of the title is somewhat misleading. The German word entwicklung, usually translated as “development,” also means “evolution.” In fact, Schumpeter himself wrote to a colleague, while the book was in press, that the title was The Theory of Economic Evolution. (Esben Andersen, “Schumpeter’s General Theory of Social Evolution” [paper presented at the Conference on Neo-schumpeterian Economics, Trest, Czech Republic, June 2006].)


10. Ibid.


13. In an intriguing bit of serendipity, the conference, many months in the planning, was held in 1987, the same year as the stock market debacle that caused many people to question the concept of absolute equilibrium in the market.


15. Ibid., 1, 34.


17. Ibid.


4. Sociology


4. We have observed anecdotal evidence of emergent behavior, perhaps without realizing what we were seeing. The bestseller *Blind Man’s Bluff: The Untold Story of American Submarine Espionage*, by Sherry Sontag and Christopher Drew, presents a very compelling example of emergence. Early in the book, the authors relate a story of the 1966 crash of a B-52 carrying four atomic bombs. Three of the four bombs were soon recovered, but a fourth remained missing, with the Soviets quickly closing in. A naval engineer named John Craven was given the task of locating the missing bomb. He constructed several different scenarios of what possibly could have happened to the fourth bomb and asked members of his salvage team to wager a bet on where they thought the bomb could be. He then ran each possible location through a computer formula and—without ever going to sea—was able to pinpoint the exact location of the bomb based on a collective solution.


6. Ibid., xvi.

7. Ibid., xv.

8. Ibid., 41.


10. Ibid., 13.

11. Ibid., 13.


13. Ibid., 55.


5. Psychology


4. The frequency with which stocks and portfolios outperform the market on a frequency basis is rarely 100 percent. I have spent a good deal of time looking at holding periods of both individual stocks and portfolios and have found that the ones that
do outperform over long periods of time seem to do so about 40–60 percent of the periods. (See Robert G. Hagstrom, *The Warren Buffett Portfolio: Mastering the Power of the Focus Investment Strategy* [New York: John Wiley & Sons, 1999].) Still, there is much work to be done in this research area.


11. Ibid.

12. Ibid.


14. In this respect, the phrase “mental models” as used here is more specific than Charlie Munger’s use of the same phrase; his meaning is closer to “key principle, core idea” than to a sense of dimensional representation.


6. Philosophy


2. Ibid., 27.

3. Ibid., 28.


9. Amazon.com has been owned in my portfolios at Legg Mason Capital Management since 2003. It continues to be a top holding for the fund as well as our firm’s institutional separate accounts.


15. Ibid.


19. Ibid., 22.

20. Ibid., 23.


22. Ibid., 26.

23. Ibid., 31.

24. Correct use of the dividend discount model requires us to make difficult calculations. What will be the future growth rate of the company over its lifetime? How much cash will the company generate? What is the appropriate discount rate for projecting the growth of cash flows? Answers to these tough questions are necessary input variables. Adding to the difficulty is the fear that the uncertainty of long-range forecasts makes using the model suspect. A further difficulty is that determining value is highly sensitive to its initial condition; even a slight change in growth rate or discount factor can have a large effect on value. For this reason, investors often use shortcuts (second-order models) to determine value.


26. I am grateful to my friend and colleague Bill Miller for his insights on the philosophy of pragmatism and how it relates to the philosophy of investing.
7. Literature

1. A number of other institutions of higher learning have special liberal arts programs grounded in the works of history’s greatest thinkers. Some are part of the university’s honors programs while others are short-term intensive-study programs. St. John’s is the only university I am aware of that is dedicated to teaching the “great books,” and its list of curriculum materials is continuously reviewed and updated.

2. Indeed, St. John’s dates back to 1696, five years before Yale was founded, fifty years before Princeton, and fifty-three years before Franklin’s famous education manifesto.

3. Don Bell and Lee Munson were interviewed by the author June 7, 2000; Greg Curtis was interviewed November 10, 2011; Steve Bohlin was interviewed December 15, 2011.

4. Mortimer Adler served as editor of the fifty-four-volume Great Books of the Western World and as chairman of Encyclopedia Britannica’s board of editors for twenty years. Until his death on June 28, 2011, he remained active writing and speaking on his lifelong passion: the value of a broad general education based in the humanities.

5. Few reference works in any discipline have the staying power of How to Read a Book. The copy I own is from the thirty-sixth printing of the revised edition.


7. Ibid., 291.

8. Ibid., 301.

9. Ibid., 205.

10. Benjamin Doty was interviewed by the author on November 27, 2011.


15. Ibid., 61, 63.

8. Mathematics


4. Ibid.

5. Ibid.
9. J. L. Kelly’s most celebrated moment occurred in 1962 when he programmed an IBM 704 computer to synthesize speech. Kelly had built a “vocoder” (voice recorder synthesizer) and recreated the song “Daisy Bell” with musical accompaniment from Max Mathews. Coincidentally, Arthur C. Clarke was visiting the Bell Labs at the same time. Science fiction buffs already get the connection. In *2001: A Space Odyssey*, the computer HAL 9000 sings “Daisy Bell” as he is being put to sleep by astronaut Dave Bowman.

9. Decision Making

1. These three puzzles can be found in Shane Frederick, “Cognitive Reflection and Decision Making,” *Journal of economic perspectives* 19, no. 4 (Fall 2005): 25–42. The ball costs $.05. It takes 5 minutes for 100 machines to make 100 widgets. It will take 47 days for the lily pad to cover half the lake.


11. Ibid.

12. Ibid.


14. Ibid., 46.

15. I am indebted to John Holland, professor of psychology and engineering and computer science at the University of Michigan, for his graceful presentation on the concepts of building blocks, the need for models that are dynamic, and the flight simulator analogy.

