## Page locators in italics indicate exhibits.

academic finance community, 37 Ackerman, Ernest, 159 action, 155 adaptability, 154. See also complex adaptive systems adaptive decision rules, 219 advertising, 88 affect, 86-88, 87 after-tax measures, 161, 166 agency costs, 57, 64 agent-based models, 233, 246, 256 aggregate return, 141 aggregation, 194, 197 Alliance Capital, 73 analysts, imitation and, 93 analytical decision making, 84-86, 85 anchoring, 14, 95, 223 Anderson, Philip, 204 anomalies, 32 ante, 28 ant examples, 90-92, 92, 188, 190, 194 appropriate reference class, 37 arbitrage, 90, 93, 96 Ariane rocket, 35 Arrow, Kenneth, 35

Arthur, W. Brian, 101
Asch, Solomon, 79
Asch experiment, 79, 79
asset life, average, 144
asset price distributions, 210–11
As the Future Catches You
(Enriquez), 126
attribute-based approach, 33–34
authority, 78, 80
automobile industry, 121, 132
availability heuristic, 220
averages, 100
Axtell, Rob, 231, 233

Babe Ruth effect, 24
baboons, 267n. 1
Baer, Gregory, 49, 264n. 8, 265n. 9
Bak, Per, 232
Barlow, Horace, 190
baseball, 47–48, 264nn. 6, 7
basketball, 46, 47
Beat the Dealer (Thorp), 27, 28
beauty-contest metaphor, 100
behavioral finance, 12, 69, 94–95, 256. See also loss aversion; psychology of investing

behaviors: anchoring, 14, Campbell, Donald, 146, 191 capital, tangible vs. intangible, 226; certainty and, 11–12; herding, 98, 207; information 161 - 63overload, 13; pattern-seeking, capital-asset pricing model 46-47, 70 (CAPM), 32 Beinhocker, Eric, 156 capital gains taxes, 161 belief, 30, 36, 37 card experiment, 84, 107 bell curve, 186 Carlile, Paul, 29, 30-31, 32 Benartzi, Shlomo, 53, 54-55 cash flow return on investment Bernoulli, Daniel, 105, (CFROI), 166–67, 167; 209 - 10downturns, 169 cash-flow-to-net-income ratio, Bernstein, Peter, 31, 39 163-64 Bernstein, William, 59 BetFair, 196 categorization, 29-33 Bet with the Best (Crist), 26–27 cause and effect, 31, 185–86, Bezos, Jeff, 130 219; complex adaptive blackjack, 27, 36 systems and, 218, 219; Black-Scholes options-pricing human explanation for, 218, model, 37-38, 205 219; press reports, 224–26, 225-26, 227-28 Bogle, Jack C., 19–20, 260n. 3 bomb search, 97, 201 cause and effect thinking, boom-and-bust phenomenon, 207 - 8134-36 cave paintings, 126 Bosch-Domènech, Antoni, 94 centralized control, 218, 221 boundary rules, 152 certainty/uncertainty, 11–13 Brady commission, 219 Chamberlain, Wilt, 47 Chan, Louis K. C., 235 brain development, 120, 136 Buffett, Warren, 15, 26, 55, 65, change, 96 204, 246-48 character traits, 2 buy-and-hold strategy, 55-56 chess-game analogy, 149-51, *150* Calculated Risks (Gigerenzer), Christensen, Clayton M., 29, 36 - 3730–33, 235, 240 Calvin, William, 217 Churchill, Winston, 121, 124 Cialdini, Robert, 78, 81 Camerer, Colin, 256–57

circumstance-based approach, 30, 33 Citron, Robert, 102–3 city-size distributions, 231, 232, 233 classical economic theory, 85, 94 clockspeed, 144-47, 145; evolution of investors, 147 Clockspeed: Winning Industry Control in the Age of Temporary Advantage (Fine), 144 coin-toss experiment, 46-47, 48–50, 212–14, 212, 213, 285n. 6 collective: accuracy of, 162-63; decision making, 57-58, 76, 83–85, 151–54, *153*; investment edge, 165, 166; markets created from, 164-65; problem solving, 163–64, 183-84, 230n. 3. See also diversity Columbia Business School, 255 commitment, 78, 81, 95 communication technology, 126 - 29companies: average asset life, 144; niches, 236-37 company size: distribution of, 230, 231–32, 233–34; growth rates and, 235-40 competence, circle of, 28 competitive advantage, 144-46, 153–54; growth and returns, 165-66

competitive strategy, 237; clockspeed, 144-47; fitness landscapes, 154-56; fundamental questions of, 154-55; leader/challenger dynamics, 137-38; managing for long term, 153-58; new entrants to market, 145-46; price-earnings ratios, 160-61; reversion to mean, 166-68; as simple rules, 151–52; winning behaviors in chess, 171–72. See also innovation complex adaptive systems, 218; cause and effect and, 222-23; control and, 218-19; properties and mechanisms, 218; stock market, 3, 185–86, 219 - 20complexity theory, 3, 186 Complexity (Waldrop), 3 compliance with requests, 78 computer industry, 132, 133, 134, 135 conformity, preference for, 91 consciousness, 216–17 consilience, 255-57; areas to address, 257 Consilience (Wilson), 2 consistency, 78–79, 81 constructs, 32 context, 30, 34, 38 control: complex adaptive systems and, 222-23; loss of, 72 - 73

conventions, 100 Cornell, Bradford, 159, 193 corporate routines, 142 Corporate Strategy Board, 141-42, 239-40 corpus callosum, 222 correctness, frequency vs. magnitude of, 24-28, *25*, 28 correlation, 226 cost of capital, reversion to, 166-68 costs: agency, 64; portfolio turnover and, 55, 57, 65 Craven, John, 97 creative destruction, 122, 139, 146 Creative Destruction (Foster and Kaplan), 140-42, 146-47 creative thinking, 191–92 Crist, Steven, 11, 26–27 critical state, 206, 224, 232 - 33cycle time, 144

Daimler-Benz Aerospace (DASA), 35

Damasio, Antonio, 83–85, 107

Darwin, Charles, 2, 153, 154

decision making: accuracy of collective, 218–20; analytical, 83–84; certainty, 11–12; decentralized systems, 193–97; decision markets, 195–96; emotions and, 84–86; experiential system,

84, 85, 85, 88; frame of, 53; individual vs. collective, 69-70, 84, 96-97, 217-20, 218; input diversity, 218–19; by insects, 185; markets and, 88–89; principles, 11–14; prospect theory, 24, 47, 86, 255–56; suboptimal, 85–86; weighing probabilities, 12. See also problem solving decision markets, 195–96 decision rules, adaptive, 218, 219 decision trees, 26 deductive processes, 99 Deep Blue, 149 DePodesta, Paul, 9 description, 31-33, 191 destruction, creative. See creative destruction determinism, 223 digital language, 127-29 DiMaggio, Joe, 48, 264n. 6, 7 discounted cash flow, 147, 157 discount rates, 161 disk drive industry, 132, 133, 134, 135 distribution, 37-39, 178; asset price, 206; city size, 231, 232, 233; company size, 230, 231, 233–34; experience vs. exposure, 204; fat tails, 93, 186, 203, 205 *206*, *207*; normal, 186, 205, 207; power laws and, 229-30; species, 235-36

diversity, 188-92; breakdown expectations, 99; deductive and in, 96–98; creative thinking, inductive processes, 99–102; 154–56; hard-wiring for, extrapolative, 240-42; leader/ 189-90; stock market challenger dynamics and, and, 101, 185-87. See also 137 - 38collective expected value, 10, 13-14, 39; Dow, Charles, 119 affect and, 86–88; loss aversion and, 52-53; Dow Jones Industrial Average, 163, 242 pari-mutuel betting and, downturns, 169 26–27; probability and, "Dow 36,000 theory," 55-56 25 - 26Dugatkin, Lee, 89 experience, 204 Durand, David, 209, 214 experiential decision making, 88 efficiency, of collective problem experts, limitations of, 195, solving, 185–86 198, 199 80/20 rule, 230 explanations, 222-23, 226, 228 Eisenhardt, Kathy, 152 exposure, 204 El Farol bar example, 101–2 Extraordinary Popular Delusions Ellis, Charles, 20–21 and the Madness of Crowds Elton, Charles, 236 (MacKay), 198 emotions, 84–85 extrapolative expectations hypothesis, 240-42. See also engineered systems, 217 Enriquez, Juan, 126 price-earnings ratios Enron, 64, 73 extreme-return days, 39 enterprise, 100-101, 260n. 3 Epstein, Richard, 23 falsifiability, 31, 32 equity funds, 18 Fama, Eugene, 145 equity-risk premium, fat-tail price distributions, 55–53, 163 93, 219; herding and, 207; evaluation, frequency of, 54 self-organized criticality, 206 feedback, 209, 220n. 5; evolution: average speed of, 144; of brain, 217–18; fitness mechanisms, 182, 208; negative, 78; positive, 78-81, landscapes and, 154-55; of investors, 147 111, 160 exit rules, 152 "feel, felt, found" method, 81

financial services, 156, 287n. 11 financial statements, inflation and, 161 Fine, Charles, 144 Finucane, Melissa L., 83 Fisher, Lawrence, 31 fitness landscapes, 154–55, 158; short vs. long jumps, 156–57; types of, 155-56 flight simulators, 257 focus, 27–28; short-term, 62-64, 267-68n. 8. See also long term, management for Fooled by Randomness (Taleb), 25 Fortune 50, 237–39, *237* Foster, Richard, 139-42, 146 fractal systems, 211–12, *211* French, Kenneth, 145 frequencies, 37; magnitude vs., 23–27, *25*, 28 fruit flies (Drosophila melanogaster), 143-44 fundamental analysis, 16

Galton, Francis, 201
gambling, 7, 24, 69, 244,
247, 261n. 1
Gates, Bill, 111, 143
Gazzaniga, Michael, 222
General Electric, 278n. 11
General Theory of Employment,
The (Keynes), 99
Gensler, Gary, 49, 265n. 9
Gibrat's law, 238

Gigerenzer, Gerd, 35 global economy, 140, 161, 163 Go (game), 149 Gordon, Deborah, 194 Gorilla Game, The (Moore), 139 Gould, Stephen Jay, 46, 51 Greenspan, Alan, 71 Gross, Bill, 46, 49 gross domestic product (GDP), 123, *123*, 125, *125* growth rates, 280n. 9; company size and, 230–34; returns and, 165–66; species distribution, 235–36; stall point, 141–42, 241–42; variance of, 180, 237, 238, 238 growth-stock investing, 209–10 "Growth Stocks and the Petersburg Paradox" (Durand), 214 growth-stock valuation, 209-10 guppies, 89-90

handicapping, 7, 26–27, 87
Hanson, Robin D., 193
Hargadon, Andrew, 121, 122
Harmon, Butch, 153
Hayek, Freidrich, 198
hedge funds, 186, 191, 203
Henry, David, 203
herding, 91, 93, 98, 207
Hewlett-Packard, 201
hieroglyphics, 126, 127
hindsight bias, 100, 102–3
hitting streaks, 47–48,
264nn. 4, 7

Holland, John H., 148, 217
Hollywood Stock Exchange,
185, 195
honeybees, 185–86
hot hand phenomenon, 46
Howard, Jack, 97
how-to rules, 152
Human Behavior and the
Principle of Least Effort (Zipf),
229–30
Huston, Larry, 200

imitation, 70, 89–91, 93, 196-97, 219-20; fat tails and, 186; positive feedback and, 90–93; suboptimal, 85–86 impressions, 85–86 imprinting, 139 inactivity, value of, 55-58 incentives, 8, 63–64, 160 index funds, 15, 17 inductive processes, 99 Inefficient Markets: An Introduction to Behavioral Finance (Shleifer), 96 inflation, 161, 162 Influence: The Psychology of Persuasion (Cialdini), 78 information, 13, 91, 129 information cascades, 207, 224 information flows, 256 Innocentive, 200 innovation, 119-20, 276n. 4; communication technology, 126–29; considered by

market, 113-14; creation of wealth, 123–25; creative destruction, 122, 142; dynamics of, 131-34; leader/ challenger dynamics, 137-38; overproduction and pruning, 131–36, *135*; *phases* of, 131–32; recombination, 121-22, 154-55, 274n. 1. See also competitive strategy Innovation: The Attacker's Advantage (Foster), 140 Innovator's Solution. The (Christensen and Raynor), 240 insects, 185; ants, 97–98, 184–88, 189, 194; honeybees, 193–94; stock market parallels with, 194-95 instructions, 124 intelligence, diversity and, 190-91 Internet, 132–33, 133, 234 intuition, 85 investment business, 19-22, *21* investment philosophy: decisionmaking principles, 11–14; evaluation of winners, 17–19; internalizing, 8; long-term perspective, 7–8; process vs. outcome, 7, 10, 10; scouting report, 15–17. See also

psychology of investing

investment process, 8, 10–11, 110 investment profession, 19–22, 244 investors: average holding period, 73, 75; diversity of, 90–92, 186, 187–89; evolution of, 144; understanding of power laws, 230–31 Iowa Electronic Markets (IEM), 195

janitor's dream, 217, 219 jellybean-jar experiment, 97, 201 Johnson, Norman, 187–90 judgment, 85

Kahneman, Daniel, 24, 46, 69, 85, 255; decision-making model, 85–86
Kaplan, Sarah, 139–42, 146
Karceski, Jason, 235, 240
Kasparov, Garry, 149
Kaufman, Peter, 2
Keynes, John Maynard, 91, 99–103
Knight, Frank, 35, 36
Krugman, Paul, 229
kurtosis, 38

lack of representation, 16 Lakonishok, Joseph, 165, 235, 240 Laplace, Pierre Simon, 223

Laplace's demon, 223–24 leader/challenger dynamics, 137 - 38LeDoux, Joseph, 222 Legg Mason Value Trust, 33 - 34Leinweber, David, 226 Lev, Baruch, 159 Lewis, Michael, 9, 44 life cycle: clockspeed, 144-47, of companies, 72–73, 72; of fruit flies, 143-44; of industries, 239 liking, 78, 80 limited-time offers, 80 linear models, 219 lions, 137, 172 liquidity, 16 lollapalooza effects, 80 long term, management for, 7-8, 64, 148-49; strategies for winners, 149–51; strategy as simple rules, 151–52 Long Term Capital Management, 186, 204 long-term investment, loss aversion and, 52-54 Lorie, James, 31 loss, risk and, 35-36 loss aversion, 12, 24, 26, 53–54; equity-risk premium, 53–55; exhibits, *56–58*; myopic, 52-54, 57; portfolio turnover, 55-59, 56; ratio of risk to reward, 57, 59; utility, 58, 59

lottery players, 87 Lowenstein, Roger, 205–7 luck, 50–51

MacGregor, Donald G., 83 MacKay, Charles, 92, 198 Malkiel, Burton, 262n. 2 Mandelbrot, Benoit B., 209, 213-14, 231, 256 market capitalization, 16 markets: bubbles and crashes. 91, 93; collective decisions and, 69-70, 189-90; decision, 173–75; effect of psychology on, 100; efficiency of, 32, 96; innovation considered by, 134-35; interpreting, 224-25; new entrants and competitive strategy, 139-40; parallels with insect colonies, 195–97 market timing, 38, 39 Mastering the Dynamics of Innovation (Utterback), 131 - 32mathematical expression, symbols for, 126 maze problem, 188 McKinsey Quarterly, 199 mean, reversion to, 166-69, 253 mental-models approach, 2 Milgram, Stanley, 80, 256 Miller, Bill, 33, 48-50, 265 Moneyball (Lewis), 9, 44 money managers, 8, 90; scouting report and, 15–16; stresses on, 72 - 76

Moore, Geoffrey, 139
Moore's Law, 126, 274n. 5
Morningstar, 75
multidisciplinary perspective.

See consilience
Munger, Charlie, 2, 26,
77, 80, 94
mutual funds, 19–20, 93
myopic loss aversion, 53,
57, 59

NASA, 35–36, 37 negative feedback, 90–91 Nelson, Richard R., 274n. 1 network theory, 185, 256–57 neuroscience, 255–56 Newton, Isaac, 216, 223 New York Times, 80, 165 niches, 236, 237 Nicklaus, Jack, 153 Niederhoffer, Victor, 203, 204 nonlinearity, 208, 218, 219, 224 nonstationarity, 160–61, 163, 164

opportunities, limited, 28 options, 12, 260n. 11, 261n. 4 outperforming stocks, 18; percentage of, 23–26, 25, 50; probability of, 48–51, 49 outsourcing, 124 overproduction and pruning, 131–36, 132, 133, 134, 135 ox weight problem, 201

Pandolfini, Bruce, 149-51 predictability, loss of, 72-73 pari-mutuel betting, 10, 26–27 prediction, 39, 201, 256 pattern seeking, 46–47, 70 price changes, press reports and, payoff, 10, 12, 39 224–26, *225–26*, *227–28* Pearson, Puggy, 69, 70 price-earnings ratios (P/Es), 33; per capita GDP growth, 123, bounded parameters, 163–64; *123*, 125, *125* growth and returns, 141–42; Peters, Ellen, 83 nonstationarity of, 160-61; pharmaceutical industry, 199-200 reversion to mean, 166-68; Philosophical Essay on tangible vs. intangible capital, Probabilities, A (Laplace), 223 161–63; tax rates and, Pollock, Jackson, 249-50; 161, 162 Number 8, 1949, 250 prices: expected value and, 10, Poor Charlie's Almanack 13–14; S-curve phenomenon, (Kaufman), 2 138-41, 138 poor-thinking problem, 95 prioritizing, 14 portfolios: concentration, 17; priority rules, 152 construction, 208; fat tails and probabilistic fields, 7, 26. performance, 186; frequency of See also gambling; evaluation, 52; large cap, 242; handicapping; investment leveraged, 205; performance vs. philosophy percentage of outperforming probability, 36-37; expected stocks, 23-26, 25 value and, 25-26; extremeportfolio turnover, 17, 75, 101, return days, 38-39; 147; costs, 55, 57, 75; loss frequency-based, 37; loss aversion, 52–55, *53*; stress aversion and, 54-55; and, 74, 75–76 outperforming stocks, 49-50, positive feedback, 90-93, 49; propensity-based, 37; 135, 196 two-by-two matrix, 10; power laws, 186, 229–34; uncertainty and risk, 35–36; company-size distribution weighing, 12 and, 230-31, 233; fractals probability dominance, 86-88 and, 211–12; investor problem solving, collective understanding of, 230-31; mechanisms for, 185-86, Zipf's law, 231-33 221 - 22

process clockspeed, 144 186; equity-risk premium, Procter & Gamble, 200, 241 53–56; growth and, 163–64; product clockspeed, 144 reversion to cost of capital, 165-69; total returns propensities, 37 to shareholder (TRS), proportionality, 186 prospect theory, 24, 53, 86, 139–41, *140* 255-56 risk, 35–36; equity-risk premium, 53-56, 139; psychology of investing, 81–82; compliance with requests, explanation for, 209-11 78-79; deductive and risk-reward relationship, inductive processes, 99–102; 208, 256 rival and nonrival goods, 124, hindsight bias, 100, 102, 103; individual and collective 274n, 24 decisions, 69-70, 76, 187-90, Rogers, Jim, 260n. 11, 261n. 4 189; market, effect on, 95–96; Roll, Richard, 32 stress, 71–75; tendencies Roman alphabet, 127 of human behavior, 78–80; Romer, Paul, 123–24 roulette, 11, 36, 39 Tupperware parties, 79–81. See also investment philosophy Rubin, Robert, 9, 11-14, 62 Purcell, Ed, 48 Ruefli, Timothy W., 143, "Pyramid of Numbers," 236 145, 165 rules: adaptive, 219, 220; simple, rationality, 93, 99, 105 151 - 52Raup, David, 134 Russo, Jay, 10, 13 Raynor, Michael E., 235, 240 Ruth, Babe, 24, 25, 27 reciprocity, 78, 80-81 recombination, 121-22, St. Petersburg Paradox, 209–10, 274n. 1 214-15 reductionism, 216–17 Samuelson, Paul, 52–53 reflexivity, 93 S&P 500, 15, 16–18, *18*, *19*, requests, compliance with, *50*, 205, *206*, *207*, *225–26*, 78-79 225, 288n. 10 return on investment, 26–27, S&P Index Committee, 16–17 54; CFROI, 166–70, 167, sand-pile metaphor, 224, 233 288n. 10; distribution of, Santa Fe Institute (SFI), 2–3

Sapolsky, Robert M., 71–72, social systems, power laws and, 267n. 1 230 - 33scarcity, 80, 82 social validation, 78, 79, 81 Schoemaker, Paul, 10, 13 software, 124, 156 science: insect studies, 97, Sornette, Didier, 214 185–87, 194–96 links between Soros, George, 93, 191, 203 hard and social, 185-86 space shuttle catastrophe, 35–36 scouting report, 15–17, 19 species distribution, 235-36, *236* S-curve phenomenon, 138-41, 138 speculation, 100-101, 260n. 3 sector representation, 16 Stalin, Josef, 121 stall point, 141-42, 239-42 Seeley, Thomas D., 193, 194 self-organized criticality, 206, Steinhardt, Michael, 11 223–24, 232; power laws and, stock market: as complex 232 - 33adaptive system, 3, 219–20, Seuss, Dr., 187 223-24; crash of 1987, 70, Shefrin, Hersh, 95, 102–3 212, 219; investor diversity Shleifer, Andrei, 96 and, 95-96, 98, 185-86; short-term focus, 74–76, outperforming stocks, 18, 267n. 8 24–27, *25*, 95–96; parallels with insect colonies, 195-96 Siegel, Jeremy, 37, 181 Simpson, Lou, 28 Stocks for the Long Run (Siegel), simulation, 190-91 37, 181 situations, evaluation of, 28 strategic options, 157 six degrees of separation, strategy. See competitive strategy 245–46, 256 streaks of success, 47–51, 47–48, skill, 47-51 264n. 7, 265n. 9; luck and, skin-conductance-response 50–51; skill and, 47–50 machine, 84 stress, 71–75; long-term focus Sklansky, David, 9 required, 76; loss of control slime mold, 29-30 and predictability, 72-73; Slovic, Paul, 83, 86 physical responses to, 73–76 snowball effect, 90 Strogatz, Steven, 221 social sciences, 185 Sull, Don, 152 Social Security, 159–60 Sundahl, David, 29, 30-31, 32

Sunder, Shyam, 94 Surowiecki, James, 198 survivorship bias, 167–68 sustained recovery, 169, *169* system 1 and 2 thinking, 84–86 systems, 84–85, 88

Taleb, Nassim Nicholas, 25, 260n. 11, 261n. 4 target prices, 14 tax rates, 161, 162 Technology Review, 144 technology stocks, 143, 214, 243 television industry, 132 Thaler, Richard H., 52, 54–55 theory: attribute-based approach, 29–30, 33–34; building, steps of, 30-33, 32; falsifiability, 31, 32 Thorp, Ed, 27, 28 time horizons, 52–59, 54, 56, *57*, *58*, 205 timing rules, 152 tipping point, 91–92 total return to shareholders (TRS), 139-41 140 tracking error, 57, 73, 91 transaction costs, 55, 161 traveling-salesman problem, 195 Treynor, Jack, 97 Tupperware parties, 77, 81 Tversky, Amos, 24, 46, 52, 69, 255 Twain, Mark, 99

Ulysses, 76 uncertainty, 35–36, 156; classifications, 36–39; expectations and, 100–102 U.S. Steel, 124 utility, 53, 54, 54, 58, 59, 265n. 1 Utterback, James, 131

valuation, investor evolution and, 147 value-at-risk (VaR) models, 205 value investors, 30, 33, 168 value traps, downturns, 168–70 volatility, 37–38, 38 "Vox Populi" (Galton), 201

Waldrop, Mitchell, 3 Watts, Duncan, 185 weak signals, 191 wealth, isolated components vs. total, 53 Welch, Ivo, 93 Welch, Jack, 278n. 11 Wermers, Russ, 93 wheel of fortune experiment, 226 - 28Why Stock Markets Crash (Sornette), 214 Wiggins, Robert R., 143, 145-46, 165 wild-hair alternative, 189, 190 Wilson, Edward O., v winner's curse, 112, 271n. 8 Winters, Sidney, 274n. 1

two-by-two matrix, 10

Wisdom of the Hive, The (Seeley), 193 Wolfram, Stephen, 216 Wolpert, Lewis, 221, 222 Woods, Tiger, 153–54, 155

Wright, Orville, 121-22

Zajonc, Robert B., 83 zebras, 71 Zeikel, Arthur, 191–92 Zipf, George K., 229 Zipf's law, 229, 231, 237







