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Thinking,Fast and Slow by Daniel Kahneman

(review by)

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The very same biological machinery that enables us to reason also biases our judgments and slants us toward irrational behavior, leading to predictable human errors that may be impossible to correct. These are the insights of psychologists Daniel Kahneman and Amos Tversky, who collaborated over a quarter century and influenced the theory and practice of economics, finance and political science as well as public policy. Their research earned Kahneman a Nobel Prize in Economics in 2002. Tversky would have shared the Prize had it not been for his untimely death in 1996. The story of Kahneman and Tversky's friendship is recounted with affection and interwoven with the details of their scientific inquiries in *Thinking, Fast and Slow*, which is a scholarly work masquerading as a popular book. It has been on mainstream best-seller lists for months.

Two Systems Early in *Thinking, Fast and Slow*, Kahneman introduces us to our two inner beings, or *Systems*, which work together to generate our decisions and actions. In ordinary circumstances, we operate quickly, reflexively and effortlessly using *System 1*, which is a delicately tuned "mental shotgun" found in all highly-evolved species. System 1 keeps us alive by instantly identifying dangerous situations; it recognizes faces and enables us to drive our cars while listening to our radios. There is no sense of exertion connected with System 1 and we cannot shut it down. In contrast, lazy and analytical *System 2* distinguishes humans from other species; it facilitates our highest functions such as multiplying multi-digit numbers, passing up tempting desserts and deciding which stocks to buy. Systems 1 and 2 do not operate independently. For example, the information that System 2 uses to select stocks may be unobtrusively provided by System 1. Since System 1 is prone to provide recent information rather than a broad perspective, System 2 estimates may be biased.

Kahneman warns us that there is no physical basis for the two-system view:

> System 1 and System 2 are so central to the story I tell in this book that I must make it absolutely clear that they are fictitious characters. Systems 1 and 2 are not systems in in the standard sense of entities with interacting aspects or parts. And there is no one part of the brain that either of the systems would call home.

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Nevertheless, Kahneman endows readers with confidence in the existence of the two systems. Now, when I find one of my daughters surfing the web while "studying," I attribute the lapse to a temporary shutdown of lazy and fatigued System 2. Remarkably, my System 2, which is as lazy as anyone else's and just as susceptible to fatigue, enthusiastically participated in every experiment that Kahneman proposed. It is as though he applied his deep insight into how I think to keep me engaged with the challenging material in his book.

Even Statisticians Are Bad at Statistics System 1 has evolved to identify cause and effect, but not to analyze statistical relationships. Kahneman illustrates our ineptitude with statistics by introducing us to a fictional character whose profession we do not know.

> Tom W is of high intelligence, although lacking in true creativity. He has a need for order and clarity, and for neat and tidy systems in which every detail finds its appropriate place. His writing is rather dull and mechanical, occasionally enlivened by somewhat corny puns and flashes of imagination of the sci-fi type. He has a strong drive for competence. He seems to have little feel and little sympathy for other people, and does not enjoy interacting with others. Self-centered, he nonetheless has a deep moral sense.

When asked to guess the likeliest profession for Tom W from this list:

- computer science
- engineering
- business administration
- physical and life sciences
- library science
- law
- medicine
- education
- social science and social work

most of us—including trained statisticians—choose computer science, library science or engineering. After all, Tom is a geeky loner, and the remaining choices would entail some interest in other people.

However, there is an important element missing from this analysis. To illustrate with an extreme example, consider that the likelihood that Tom W would be President of the United States is very small even if he were well-suited for the role. Tom W may be well-suited for computer science, library science and engineering, but these professions may be relatively small compared to the others on the list. Kahneman explains that the "base probabilities" of the different professions are overlooked by quick-acting System 1, which replaced the more difficult question, "What is the likeliest profession for Tom W" with the simpler question, "For which profession is Tom W suited?". The (mis)use of judgments to estimate likelihoods is known as the *representativeness heuristic.*

Behavioral Economics and Behavioral Finance Kahneman dates the origin of behavioral economics to the early 1970s when Richard Thaler, a graduate student in economics at the University of Rochester, noticed something odd about one of his professors.

An avid wine collector, Thaler's professor was willing to sell a bottle of wine only at a large multiple of the price he paid for it. While this is unexceptional by itself—we all tend to be attached to our own possessions—Thaler was troubled by his realization that the price gap, which has come to be known as the *endowment effect*, is inconsistent with utility theory, which is one of the cornerstones of neoclassical economics.

Behavioral economics is concerned with the endowment effect and ten other so-called irrational tendencies (including representativeness) that distinguish human decision makers from the rational agents who populate the world of neoclassical economics. These irrational tendencies can be partly explained by the two-system model and they motivate a departure from neoclassical utility theory known as prospect theory, which is developed in Kahneman and Tversky (1979). In *Thinking, Fast and Slow*, Kahneman comments on its aims:

> Our theory was closely modeled on utility theory but departed from it in fundamental ways. Most important, our model was purely descriptive, and its goal was to document and explain systematic violations of the axioms of rationality in choices between gambles.

Prospect theory is based on the premise in Markowitz (1952) that human decisions are driven by *changes* in the level of wealth, and not its absolute level. However the effect is strongly asymmetric: human aversion to a loss is greater than human affinity for a gain of equal magnitude. Thaler (1980) explains the endowment effect with this principle of *loss aversion*, and in *Thinking, Fast and Slow*, Kahneman specifically addresses the issue of Thaler's professor:

> The values were unequal because of loss aversion: giving up a bottle of nice wine is more painful than getting an equally good bottle is pleasurable.

Behavioral finance is closely related to behavioral economics; Shefrin (2009) describes behavioral finance as "the application of psychology to financial decision making and financial markets," and much of the psychology comes from experimental results of Kahneman and Tversky. Shefrin (2009) argues that the fields of neoclassical and behavioral finance have begun to merge:

> ...I suggest that finance is moving to a new paradigm that will combine structures from neoclassical finance and realistic assumptions from behavioral finance.

To date, however, the two fields have operated in parallel by offering competing explanations for empirical observations. An example is the beta puzzle, which was first documented in Black et al. (1972), and which asserts that high-beta securities tend to have returns that are lower than returns that are predicted by the Capital Asset Pricing Model. Cowan and Wilderman (2011) provide a neoclassical analysis of the beta puzzle. They show that returns to high-beta securities have convex dependence on market returns. As a result, high-beta securities carry implicit downside protection, for which some return is sacrificed. In contrast, Baker et al. (2011) provide a behavioral analysis of the beta puzzle. They draw an analogy between high beta stocks and lotteries, which are preferred by human decision makers because of the *possibility effect*: our tendency to overpay, by rational standards, for a high payoff that is highly unlikely.

Game Changer Like most basketball fans of my generation, I grew up believing in the hot hand: it was a good bet for a player to pass the ball to a teammate who had a recent scoring streak. This universally acknowledged and time-honored strategy was discredited when Amos Tversky and two co-authors, Thomas Gilovich and Robert Vallone, published a statistical study of the 1980–1981 shooting records of the Philadelphia 76ers and the 1980–1981 and 1981–1982 free-throw records of the Boston Celtics. Gilovich et al. (1985) concludes:

> The belief in the hot hand and the "detection" of streaks in random sequences is attributed to a general misconception of chance according to which even short random sequences are thought to be highly representative of their generating processes.

The hot hand is a cognitive illusion, and the fact that there is no such thing as a hot hand has implications for how basketball ought to be played. However, new results need not lead to new behaviors. Hall of Fame Coach Red Auerbach, who was President of the Boston Celtics when the hot hand study was released, famously gave his views on Tversky and the study:

> Who is this guy? So, he makes a study. I couldn't care less.

More than twenty-five years after the publication of Gilovich et al. (1985), the myth of the hot hand persists. The quotation below is taken from a May 10, 2012 article in AOL Sporting News describing a basketball game between the Boston Celtics and the Atlanta Hawks.

> The Hawks controlled the game early, limiting the Celtics to 35.0 percent shooting in the first quarter, and riding the hot hand of small forward Marvin Williams to a 28-20 lead in the second quarter.

And more than thirty years after the publication of Kahneman and Tversky (1979), the myth of the rational agent persists. Early in June, I participated in a conference on Risk Modeling and Surveillance at Stanford University, where Amos Tversky was a Professor of Psychology for nearly twenty years. With the goal of improving our understanding of financial markets and pre-empting future global crises, leading researchers from around the world presented their best ideas. Expected utility of a rational agent was maximized in many lectures; there was but one mention of a behavioral bias, and it was incidental.

Kahneman addresses the persistent dominance of utility theory over prospect theory:

> Most graduate students in economics have heard about prospect theory and loss aversion, but you are unlikely to find these terms in the index of an introductory text in economics. I am sometimes pained by this omission, but in fact it is quite reasonable, because of the central role of rationality in basic economic theory. The standard concepts and results that undergraduates are taught are most easily explained by assuming that Econs do not make foolish mistakes. This assumption is truly necessary, and it would be undermined by introducing the Humans of prospect theory, whose evaluations of outcomes are unreasonably short-sighted.

I disagree with the last point. I can envision a basic curriculum in economics that includes prospect theory. Utility theory is entrenched, so Kahneman and Tversky's endowment effect implies that prospect theory faces a high hurdle. However, *Thinking, Fast and Slow*, a rare scholarly work that almost anyone can enjoy, may just push prospect theory over the edge.

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