



Aver and Aversion

What Two Recent Experiments Mean for Investors

It is a decisive fact about a person whether he possesses the freedom to act independently, or whether he characteristically submits to group pressures.

Solomon E. Asch
*Effects of Group Pressure Upon the Modification and Distortion of Judgments*¹

It's possible that people who are . . . good investors may have what you call functional psychopathy. They don't react emotionally to things.

Antoine Bechara
*Lessons From the Brain-Damaged Investor*²

Scanning the Horizon

One of the most fascinating areas of research today intersects investing, decision-making, and neuroscience. While the edifice of finance theory still leans heavily on the rational investor, practitioners have known for centuries that investors often act suboptimally. Until recently, however, we had no cohesive theory to explain investor behavior.

That all changed in the 1970s, when Daniel Kahneman and Amos Tversky developed prospect theory, which describes how people systematically make decisions that deviate from the theoretical ideal. They found, for example, that individuals are consistently overconfident, anchor on irrelevant figures and don't adjust appropriately, and alter their decisions based on how problems are presented to them. Prospect theory catalyzed the new field of behavioral finance, dedicated to the study of cognitive errors and decision-making biases in business and investing settings.

Though it represents a huge leap forward, prospect theory still fails to reveal *why* people make the decisions they do. Advances in neuroscience now allow researchers to peer into the brains of subjects, providing the first tantalizing glimpses of what's actually going on as people decide. Economist Colin Camerer likens the plunge into neuroscience to the first family on the block to have a television in the 1950s: the picture may be fuzzy and you may need to tweak the rabbit ears, but the new images and insights are exhilarating.

In recent months researchers released two new papers with important implications for investors. The first paper adds insight into a classic social psychology study by using the latest functional magnetic resonance imaging (fMRI) technology. The second underscores the power of loss aversion by showing that certain brain-damaged subjects do better than healthy individuals in an investing game. We briefly review both studies and discuss their significance for the investment process.

Seeing is Believing (What the Group Tells You to Believe)

In the 1940s, psychologist Solomon Asch conducted what is now one of the best-known studies of social conformity. Specifically, Asch examined how individuals react when faced with a majority clearly giving wrong answers.

Asch's experimental group consisted of eight members: seven in the know and one subject. To start, Asch asked the group to solve a very simple problem: determine which of three lines is of equal length to the standard line. (See Exhibit 1.) Going around the table, each participant named their choice aloud. In the first couple control trials, all of the participants got the right answers.

Exhibit 1: The Task from Asch's Experiment

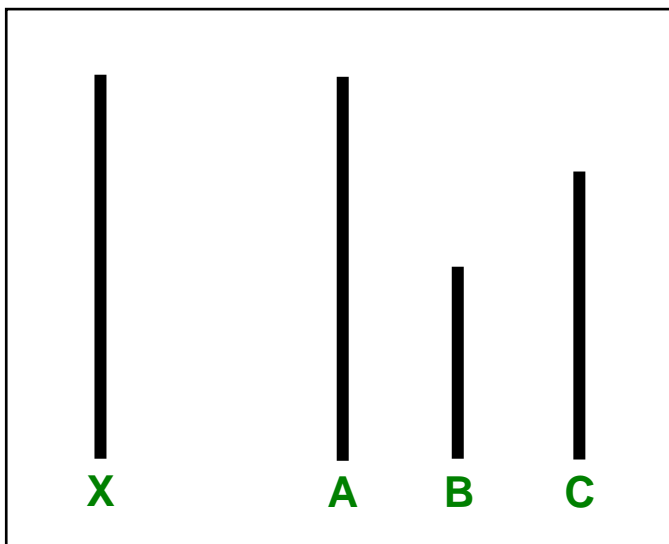


Illustration created by Legg Mason Capital Management to replicate the concepts used in the Solomon Asch experiment— Source: S. E. Asch, "Effects of Group Pressure Upon the Modification and Distortion of Judgment," in Harold Guetzkow, ed., *Groups, Leadership and Men* (Pittsburgh, PA: Carnegie Press, 1951).

After a few trials, Asch signaled the seven members to start making obvious mistakes. While many subjects showed signs of emotional strain, including shock at the group's evident errors, a full 33 percent of the subject group's answers stayed consistent with those of the majority. The high conformity level is a striking result, especially for such an unambiguous task.³

Asch also noticed "extreme individual differences" among the subjects. For example, one-quarter of the subjects remained completely independent while one-third went with the consensus more often than not. Today, we'd say the individuals had varying adoption thresholds—people embrace new fads, ideas, or social activities at different rates.⁴ This variation in individual behavior intrigued Asch, and he attempted to categorize the forms of reaction.

Using purely descriptive categorizations based on close observation during the trials, Asch devised three categories to explain the behavior of the subjects who mostly went with the majority:

- *Distortion of perception.* This group is unaware that the majority distorted their estimates.
- *Distortion of judgment.* These subjects conclude that their perceptions are inaccurate and the group is right.
- *Distortion of action.* These individuals suppress their own views and knowingly go with the majority.

The results of Asch's experiments have obvious relevance for markets. Group choices—revealed simply as stock price performance—tempt investors to go with the majority, albeit to varying degrees. But Asch, who

died in 1996, never fully understood what went on in the minds of the subjects as they faced the majority's wrong choices.

In a recently published study, brain researchers picked up where Asch left off.⁵ The scientists ran a modified version of Asch's original study, asking the subjects to decide whether rotated three-dimensional geometric shapes were the same or different. Like the original experiment, the researchers cued actors to give wrong answers. Consistent with the main result decades earlier, the subjects went with the group's incorrect answers 41 percent of the time.

Today's scientists had something Asch could only dream of—an fMRI machine, allowing them to see which brain regions were active as the subjects made their choices. For the first time, the scientists could directly link social conformity with brain activity.

In effect, the scientists could test Asch's descriptive categories. If the subject's distortions were based on judgment or action, the scientists would expect activity in the forebrain—an area that deals with monitoring conflict and planning. On the other hand, if the distortions were due to perception—a category to which “very few subjects” belonged, according to Asch—the changes would be in the posterior brain areas that control vision and spatial perception.⁶

As it turns out, in conforming subjects the scientists saw activity in the areas that work on mental rotation, suggesting *the majority's choice actually affects perception*. Further, the subjects that remained independent showed activity in the amygdala and caudate nucleus, regions associated with emotional salience.

Most people, and especially investors, try to perceive situations clearly and without bias. But this research flies in the face of that objective. The study's leader, Gregory Berns, summed up the findings: “We like to think that seeing is believing,” but the study suggests, “seeing is believing what the group tells you to believe.”

Damage = Good?

One of prospect theory's most important contributions to finance is loss aversion, the idea that for most people, losses loom larger than corresponding gains.⁷ The empirical evidence suggests we feel losses about two to two-and-a-half times more than we feel gains. Loss aversion is a clear-cut deviation from expected utility theory.

What gives? The decision frame shows one significant difference between expected utility theory and prospect theory. Expected utility considers gains and losses in the context of an investor's total wealth, while prospect theory considers gains and losses versus isolated components of wealth, like changes in a stock price. Investors tend to make decisions based on reference points, not the big picture.

Ripples from loss aversion touch many facets of investing, including the endowment effect,⁸ the disposition effect,⁹ and myopic loss aversion.¹⁰ One of loss aversion's most basic implications is that investors willingly turn down positive expected value financial propositions.

This point was famously made by economist Paul Samuelson, who in the 1960s offered a colleague a simple and attractive bet: call a fair coin toss right and you'll get \$200, call it wrong and you'll pay me \$100. His dining partner turned down the positive-expected-value proposition, replying, “I won't bet because I would feel the \$100 loss more than the \$200 gain.”¹¹

So loss aversion can lead to some very suboptimal decisions, especially in a portfolio setting. Further, just as Asch found a wide range of conformity thresholds, investors likely vary substantially in their loss aversion ratios. Here's where the new study comes in.¹²

Researchers decided to pit brain-damaged patients against normal subjects in an investment game. The brain-damaged patients had normal IQs, and the regions of their brains associated with logic and cognitive reasoning were fine. The damage was in the part of the brain controlling emotions: the patients didn't have normal experiences of fear or anxiety.

In a simple game, researchers set up 20 rounds of coin tosses. Each player started with \$20. For every round, the individuals could play or sit out. If they played, they handed the experimenter \$1. The experimenter flipped a coin, with a \$2.50 payoff for a tails flip (\$1.50 net of the dollar to play) and nothing for a heads (equivalent to a \$1 loss). If they didn't play a given round, the subjects got to keep their dollar. The goal was to end up with the most money possible.

The game is not hard to figure out. Since for each round the expected value is higher to invest than not to invest (\$1.25 versus \$1.00), the best strategy is to invest in every round.

So who did better, the brain-damaged or normal subjects? It wasn't close. The brain-damaged patients ended up with about 13 percent more money than the normal patients (\$25.70 versus \$22.80). Why? The brain-damaged patients participated in 45 percent more rounds than the normal players.

Even though the normal subjects intellectually knew what to do, loss aversion took over. Researcher Baba Shiv comments, "they know the right thing to do is invest in every single round, but when they actually get into the game, they just start reacting to the outcomes of previous rounds."¹³ Normal participants only invested in 41 percent of rounds following a loss, less than half the rate of the brain-damaged patients.

This research raises an intriguing question: is it possible that successful investors simply have a lower loss aversion ratio than the rest of the population? And if so, how much of the difference can we attribute to hard wiring versus the culture of the investor's firm?

None of this is to say healthy emotions are undesirable. In fact, the personal finances of the brain-damaged patients in the study were awful. Three-quarters of them had experienced bankruptcy because their risk-seeking behavior led to poor decisions and their lack of emotional intelligence allowed them to get involved with some unscrupulous people.

Conclusion: Self-Awareness, Heterogeneity, and Culture

We believe these studies provide at least three lessons.

First, they may help raise *self-awareness*, through a basic understanding and recognition of behavioral pitfalls. When you feel attracted to an investment opportunity because lots of other people are participating, you need to recognize that your perception of the problem may start to be jeopardized. The antidote includes diversifying your information sources and quantifying the expectations an asset price reflects.

Coping with loss aversion requires thinking in terms of a portfolio instead of individual stocks, assessing a company's value independent of where the stock has traded before (or your purchase price), and a constant focus on expected value.

Second, these studies underscore the *wide variation* in personalities and preferences. As the Asch study showed, people follow the crowd with varying degrees of willingness. Likewise, your loss aversion ratio can help or hinder your investment results, based on your circumstances. Make sure your personality and investment approach are compatible.

Finally, while both adoption thresholds and loss aversion ratios may be hard-wired to some degree, investment firm *culture* undoubtedly plays a critical role in long-term success. Some important dimensions of a healthy culture include sufficient input and cognitive diversity, team support in periods of difficult results (which are inevitable), and an unyielding focus on investment process versus outcome.

Endnotes

¹ S.E. Asch, "Effects of Group Pressure Upon the Modification and Distortion of Judgments," in Harold Guetzkow, ed., *Groups, Leadership and Men* (Pittsburgh, PA: Carnegie University Press, 1951), 177.

² Jane Spencer, "Lessons From the Brain-Damaged Investor," *The Wall Street Journal*, July 21, 2005.

³ Asch tested some side issues, as well. First, he allowed the majority to air their answers but asked the subject to answer in private. Under these conditions, the subjects did not conform to the norm. Second, Asch varied the size of the opposing majority. He found the tendency of the subject to agree with the majority was largely independent of the absolute number. He also found that if even one of the group members agreed with the subject, the subject was much less likely to provide an incorrect answer. Even a small crack in unanimity led to a sharp reduction in wrong answers.

⁴ Duncan J. Watts, *Six Degrees: The Science of a Connected Age* (New York: W.W. Norton & Company, 2003), 221-226.

⁵ Gregory S. Berns, Jonathan Chappelow, Caroline F. Zink, Giuseppe Pagnoni, Megan Martin-Skurski, and Jim Richards, "Neurobiological Correlates of Social Conformity and Independence During Mental Rotation," *Biological Psychiatry*, June 22, 2005.

See http://staff.washington.edu/xtoph/anth469metro/metrop_readings/Berns_Conformity.pdf.

⁶ Sandra Blakeslee, "What Other People Say May Change What You See," *The New York Times*, June 28, 2005.

⁷ Amos Tversky and Daniel Kahneman, "Loss Aversion in Riskless Choice," *The Quarterly Journal of Economics*, Vol. 106, 4, November 1991.

See <http://loss-aversion.behaviouralfinance.net/TvKa91.pdf>.

⁸ Daniel Kahneman, Jack L. Knetsch, and Richard H. Thaler, "The Endowment Effect, Loss Aversion, and Status Quo Bias," *The Journal of Economic Perspectives*, Vol. 5, 1, 1991.

⁹ Hersh Shefrin and Meir Statman, "The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence," *Journal of Finance*, Vol. 40, 1985.

¹⁰ Shlomo Benartzi and Richard H. Thaler, "Myopic Loss Aversion and the Equity Risk Premium Puzzle," *The Quarterly Journal of Economics*, February 1995.

¹¹ Paul A. Samuelson, "Risk and Uncertainty: A Fallacy of Large Numbers," *Scientia*, XCVIII, 1963.

¹² Baba Shiv, George Loewenstein, Antoine Bechara, Hanna Damasio, and Antonio R. Damasio, "Investment Behavior and the Negative Side of Emotion," *Psychological Science*, Vol. 16, 6, 2005.

¹³ Spencer.

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