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the consilient observer
applying cross-discipline frameworks to investing

con • sil'i • ence, n. [con- + salire to leap]
interlocking explanations of cause and effect between disciplines

All Systems Go

Emotion and Intuition in Decision-Making

People base their judgments of an activity or a technology not only on what they think *about it but also on what they* feel *about it. If they like an activity, they are moved toward judging the risks as low and the benefits as high; if they dislike it, they tend to judge the opposite—high risk and low benefit. Under this model, affect comes prior to, and directs, judgments of risk and benefit.*

Slovic, Finucane, Peters, and MacGregor
Risk as Analysis and Risk as Fellings [1]

We sometimes delude ourselves that we proceed in a rational manner and weight all of the pros and cons of various alternatives. But this is seldom the actual case. Quite often "I decided in favor of X" is no more than "I liked X" . . . We buy the cars we "like," choose the jobs and houses we find "attractive," and then justify these choices by various reasons.

Robert B. Zajonc
Feeling and Thinking: Preferences Need No Inferences [2]

The strategies of human reason probably did not develop, in either evolution or any single individual, without the guiding force of the mechanisms of biological regulation, of which emotion and feeling are notable expressions. Moreover, even after reasoning strategies become established in the formative years, their effective deployment probably depends, to a considerable extent, on the continued ability to experience feelings.

Antonio Damasio
Descartes' Error: Emotion, Reason, and the Human Brain [3]

Emotions and Decisions

Neuroscientist Antonio Damasio describes how early in his career he realized that traditional views on rationality had to be wrong. He saw a patient with all the faculties for rational behavior intact—attention, memory, logic. But brain damage had eviscerated the man's ability to experience feelings, and with it had robbed him of the ability to make successful decisions day to day. Damasio saw the link: Impaired feelings and flawed decisions go hand in hand. [4]

Damasio's later work confirmed his observation. In one experiment, he harnessed subjects to a skin conductance response (SCR) machine and asked them to flip over cards from one of four decks; two of the decks generated gains (in play money) and the other two were losers. As the subjects turned cards, Damasio asked them what they thought was going on. After about 10 turns, the subjects started showing physical reactions when they reached for a losing deck. About 50 cards into the experiment, the subjects articulated a hunch that two of the four decks were riskier. And it took another 30 cards for the subjects to explain why their hunch was right. [5]

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This experiment provided two remarkable decision-making lessons. First, the unconscious knew what was going on before the conscious did. Second, even the subjects who never articulated what was going on had unconscious physical reactions that guided their decisions.

When Damasio replicated the experiment on brain-damaged patients, he saw none of the typical reactions. The SCR and verbal descriptions confirmed that the patients had no idea what was going on—either unconsciously or consciously. [6]

Two Follows One

In his Nobel Prize lecture, Daniel Kahneman describes two systems of decision-making. [7] System 1, the experiential system, is "fast, automatic, effortless, associative, and difficult to control or modify." System 2 is analytical, and is "slower, serial, effortful, and deliberately controlled." Exhibit 1 compares these systems.

Exhibit 1: Comparison of the Experiential and Analytical Systems

Experiential System	Analytical System
1. Holistic	1. Analytic
2. Affective: Pleasure-pain oriented (what feels good)	2. Logical: Reason oriented (what is sensible)
3. Associationistic connections	3. Logical connections
4. Behavior mediated by "vibes" from past experiences	4. Behavior mediated by conscious appraisal of events
5. Encodes reality in concrete images, metaphors, and narratives	5. Encodes reality in abstract symbols, words, and numbers
6. More rapid processing: Oriented toward immediate action	6. Slower processing: Oriented toward delayed action
7. Slower to change: Changes with repetitive or intense experience	7. Changes more rapidly: Changes with speed of thought
8. More crudely differentiated: Broad generalization gradient; stereotypical thinking	8. More highly differentiated
9. More crudely integrated: Dissociative, emotional	9. More highly integrated: Cross-context processing
10. Experienced passively and preconsciously: We are seized by our emotions	10. Experienced actively and consciously: We are in control of our thoughts
11. Self-evidently valid: "Experiencing is believing"	11. Requires justification via logic and evidence

Source: Seymour Epstein, "Intergration of the Cognitive and the Psycholdynamic Unconscious," *American Psychologist*, Vol. 49, 8, August 1994.

In Kahneman's model, System 1 uses perception and intuition to generate *impressions* of objects. These impressions are involuntary, and an individual may not be able to verbalize them. He argues that System 2 is involved in all *judgments*, whether or not the individual is making decisions overtly. Intuition is a judgment that reflects an impression. Kahneman's work (along with his collaborator Amos Tversky) shows how impressions can lead to judgments that are suboptimal according to classical economic theory.

So the evidence suggests that you can't separate emotions (System 1) from decisions (System 2). In fact, as Damasio showed, System 1 needs to operate normally in order for you to make good judgments. From an investor's standpoint, two questions become central: What influences our impressions and how do these impressions shape perceptions of risk and reward?

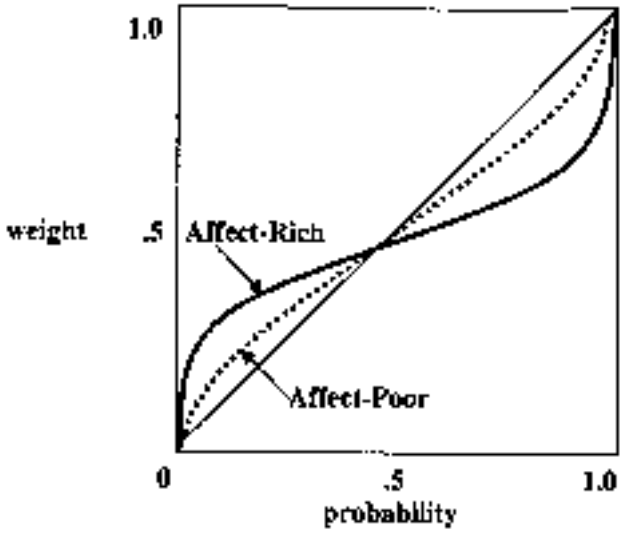
The Affect Heuristic

One of the main shapers of our impressions is what psychiatrists call affect. [8] Affect is the "goodness" or "badness" we feel based on a stimulus. For example, a word like "treasure" generates positive affect, while a word like "hate" is negative.

Affect operates in the realm of System 1, and hence is rapid and automatic. And affect often directs our impressions in a reasonable way: Most things you feel good about *are* good. But affect, like other heuristics (or rules of thumb), has biases. Investors need to heed the biases that emanate from affect.

Affect is a noteworthy extension to prospect theory—which shows that investors are risk adverse when facing gains and risk seeking when facing losses. Experiments show that affect—how we feel about a financial opportunity—can *amplify* the suboptimal biases that arise from prospect theory. (See Exhibit 2.)

Exhibit 2: Affective Psychology of Risk



Source: Yuval Rottenstreich and Christopher K. Hsee, "Money, Kisses, and Electric Shocks," *Psychological Science*, Vol. 12, 3, May 2001.

Let's get more concrete. The goal of an investor is to buy an asset below its expected value. Expected value is the weighted-average value for a distribution of possible outcomes. You calculate expected value by multiplying the *payoff* for a given outcome by the *probability* that the outcome will occur.

Research on affect demonstrates two central principles related to expected value. First, when the outcomes of an opportunity don't have strong affective meaning, we tend to overweight the probabilities. Second, when the outcome does have strong affective meaning, we tend to overweight the outcome.

Paul Slovic tested the first principle, probability dominance, with a simple experiment. He asked subjects to rate one of 16 gambles by crossing various probabilities (7/36, 14/36, 21/36, and 28/36) and various payoffs ($3, $6, $9, and $12). He found that even though the subjects wanted to weight the probability and payoffs equally (and thought they had done so), *the actual weighting for probability was 5 to 16 times higher than for payoff*. [9]

The researchers posit that the subjects leaned on probabilities because there was no way for them to judge the attractiveness of the payoffs—the payoffs lacked affective meaning. Scientists see examples of this probability dominance in other fields as well, including studies of life-saving interventions.

In contrast, when payoffs are vivid—they carry substantial affective meaning—subjects tend to place too little emphasis on probabilities and too much emphasis on outcomes. For example, researchers find that lottery players tend to have the same feelings about playing the lottery whether the probability of winning is one-in-ten million or one-in-ten thousand because the payoff is so affective. This feature of the theory also offers an explanation as to why handicappers consistently overestimate the odds of a long shot at the racetrack, and why people fear flying.

The bottom line is that when investors feel good about an investment idea, they deem the risks low and the returns high irrespective of more objective probabilities. [10] And when they dislike an idea, the inverse is true—risk is high and reward is low. Great investors aren't too swayed by affect. Perhaps this is a result of how their System 1's are wired.

When the Experiential Fails

Our experiential systems function well by and large. When do they fail?

Our experiential system can fail us when outside forces manipulate it. One example is advertising. Advertisers often try to appeal to your affect by providing you with a vivid perception. So whenever you face a probability-and-outcome decision, be very aware of how you feel (or are being made to feel) about the outcomes, and try not to let that feeling cloud the objective probabilities.

Experiential systems also fail in nonlinear or nonstationary systems. In non-linear systems, cause and effect are not neatly linked. As a result, outcomes can be very counterintuitive. In nonstationary systems, the underlying statistical properties of the system change over time, which means that the past may not be a good predictor of the future. The stock market exhibits both nonlinearity and nonstationarity. Accordingly, investors must take a very methodical and self-aware approach to judging expected values.

Affect: Individual versus the Collective

One should be careful about extrapolating the affect heuristic to suggest that markets are inefficient. We all have our individual hard wiring and experiences, hence we are all going to feel affect in different ways. As markets are an aggregation of individual views, they can be efficient (or near efficient) provided that affect-driven biases are uncorrelated.

A dominant idea in Western society is that we should separate emotion and rationality. Advances in science show that such a separation is not only impossible but also undesirable. Yet successful investing requires a clear sense of probabilities and payoffs. Investors who are aware of affect are likely to make better decisions over time.

[1] Paul Slovic, Melissa L. Finucane, Ellen Peters, and Donald G. MacGregor, "Risk as Analysis and Risk as Feelings," *Decision Research.* www.decisionresearch.org/pdf/dr502.pdf.
[2] Robert B. Zajonc, "Feeling and Thinking: Preferences Need No Inferences," *American Psychologist*, 35, 1980, 151-175.
[3] Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: Avon Books, 1994), xii.
[4] Ibid., xi-xii.
[5] Thomas A. Stewart, "How to Think With Your Gut," *Business 2.0*, November 2002.
[6] Antonio R. Damasio, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (New York: Harcourt Brace & Company, 1999), 301-303. Antoine Bechara, Hanna Damasio, Daniel Tranel, and Antonio R. Damasio, "Deciding Advantageously Before Knowing the Advantageous Strategy," *Science*, 275, February 28, 1997, 1293-1295. http://psych.colorado.edu/~tito/sp03/7536/becahra_et_al_1997.pdf.
[7] Daniel Kahneman, "Maps of Bounded Rationality: A Perspective on Intuitive Judgment and Choice," *Nobel Prize Lecture*, December 8, 2002. http://www.nobel.se/economics/laureates/2002/kahnemann-lecture.pdf.
[8] Paul Slovic, Melissa Finucane, Ellen Peters, and Donald G. MacGregor, "The Affect Heuristic," in Gilovich, Griffin, and Kahneman (eds.) *Heuristics and Biases: The Psychology of Intuitive Judgment* (Cambridge, UK: Cambridge University Press, 2002), 397-420.
[9] Slovic, Finucane, Peters, and MacGregor.
[10] Donald G. MacGregor, "Imagery and Financial Judgment," *The Journal of Psychology and Financial Markets, Vol. 3, 1,* 2002, 15-22.

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