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by Loren Gary

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# Cognitive Bias: Systematic Errors in Decision Making

by Loren Gary

A DECEMBER 1997 article in *Harvard Management Update* described a purely rational approach to decision making. In real-world situations, however, managers' decision-making processes regularly fall short of this ideal. Nobel laureate Herbert Simon demonstrated 40 years ago that purely rational judgment is "bounded" by insufficient information about the definition of the problem and the relevant criteria, time and cost constraints on the quality and amount of data available, as well as by mental and perceptual constraints that inhibit decision makers' ability to determine the optimal choice. As a result, writes Max Bazerman, J. Jay Gerber Distinguished Professor of Dispute Resolution and Organization at Northwestern's Kellogg Graduate School of Management, decision makers "forego the best solution in favor of one that is acceptable or reasonable." To use the term Simon coined to describe these shortcuts, they *satisfice*.

Fifteen years after Simon published his work on bounded rationality, Amos Tversky and Daniel Kahneman produced an analysis of specific systematic biases, or simplifying strategies, that affect judgment. These strategies, known as *heuristics*, are "the standard rules that implicitly direct our judgment," explains Bazerman in *Judgment in Managerial Decision Making*. "They serve as a mechanism for coping with the complex environment surrounding our decisions."

Empirical research has identified "13 specific biases that affect the judgment of virtually all managers," Bazerman continues. Summarized in the accompanying table, these biases derive largely from three more general heuristics: the availability heuristic,

the representativeness heuristic, and anchoring and adjustment.

On average, the use of judgment heuristics produces far more adequate than inadequate decisions. Most of the time, however, we are oblivious to these heuristics and their impact on our decision making—and that lack of awareness can lead to trouble.

## The availability heuristic

"An event that evokes emotions and is vivid, easily imagined, and specific will be more 'available' from memory than will an event that is unemotional in nature, bland, difficult to imagine, or vague," declares Bazerman. "For example, the subordinate in close proximity to the manager's office will receive a more critical performance evaluation at year-end, since the manager is more aware of this subordinate's errors." Although this heuristic often produces accurate judgments, its fallibility lies in the fact that the availability of information about an event is also affected by other factors unrelated to the event being evaluated.

Three biases result from the availability heuristic: *ease of recall*, *retrievability*, and *presumed associations*. Take the ease-of-recall bias; purchasing behavior has been shown to be influenced by the vividness and frequency of the advertising message. Operating from memory, consumers often buy an inferior product because it's the one they remember.

## The representativeness heuristic

This category of cognitive bias, observes Bazerman, results from managers assessing "the likelihood of an event's occurrence by the similarity of that occurrence to their

stereotypes of similar occurrences." Thus, a manager may predict the success of a brand extension because of its resemblance to past successful extensions. This heuristic can lead to a "good first-cut approximation," Bazerman acknowledges, but relying on it when the information is insufficient will lead to miscalculations.

Biases emanating from the representativeness heuristic include *insensitivity to base rates*, *insensitivity to sample size*, *misconceptions of chance*, *regression to the mean*, and *the conjunction fallacy*. With the regression-to-the-mean bias, for example, we devise predictions "based on the assumption of perfect correlation with past data," Bazerman explains. That is, we may predict a certain sales volume for 1998 because we believe the sales experience for 1997 will be completely predictive—when, in fact, it is likely to be only partially predictive.

Or consider the conjunction fallacy. While simple statistics, writes Bazerman, can show that "a conjunction (a combination of two or more descriptors) cannot be more probable than any one of its descriptors, the conjunction fallacy predicts and demonstrates that a conjunction will be judged more probable than a single component descriptor when the conjunction appears more representative than the component descriptor." Thus, in a study conducted in July of 1982, experts evaluated "the probability of a complete suspension of diplomatic relations between the United States and the Soviet Union some time in 1983 to be *less likely* than the probability of a Russian invasion of Poland and a complete suspension of diplomatic relations" between the U.S. and the USSR.

## Anchoring and adjustment

"Managers make assessments by starting from an initial value and adjusting to yield a final decision," Bazerman writes. "The initial value, or starting point, may be suggested from historical precedent, from the way in which a

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problem is presented, or from random information....In ambiguous situations, a trivial factor can have a profound effect on our decision if it serves as the starting point from which we make adjustments.”

One of the biases that results from anchoring and adjustment is *insufficient anchor adjustment*. For example, a compensation system that awards an average increase of 5% to all employees can lead to inequities if some employees have been underpaid to begin with. Other biases that flow from anchoring and adjustment include the *conjunctive and disjunctive events bias*—we tend to overestimate the probability of events that must occur in conjunction with one another and underestimate the probability of disjunctive events, events that occur independently—and *overconfidence*, the tendency of decision makers to be, in Bazerman’s words, “most overconfident of the correctness of their answers when asked to respond to questions of moderate to extreme difficulty.”

The last two biases are *the confirmation trap* and *hindsight and the curse of knowledge*. Seeking confirmatory evidence while excluding the search for disconfirming information is an example of how the confirmation trap inserts itself into the decision-making process. Hindsight, writes Bazerman, refers to the research finding that “knowledge of an outcome increases an individual’s belief about the degree to which he or she would have predicted that outcome without the benefit of that knowledge.” The curse of knowledge is a phenomenon related to hindsight. In this instance, “knowledge that is psychologically available is hard to forget when a person is imagining how much others know”—which explains why technical writers regularly overestimate the average person’s ability to understand software-instruction manuals.

The key to improved judgment, writes Bazerman, “lies in learning to distinguish between appropriate and inappropriate uses of heuristics.” But it

isn’t getting any easier to accomplish that, says Quinn Spitzer, chairman and CEO of the management consulting firm Kepner-Tregoe in Princeton, New Jersey. The coauthor of *Heads You Win*, Spitzer maintains that “there is anecdotal as well as empirical evidence that the quality of managerial decision making is declining.” Citing a 1996 Reuters study that showed managers are being called upon to sift through increasing amounts of information and at the same time having to make decisions more rapidly, he lists three reasons for the decline.

“When the time frame for decision making becomes short, there’s a lack of attention to process—which allows all the judgment biases to come into play. We’re also finding a decline in data integrity. Your decision is only as good as the quality of information you’re dealing with; the larger the data set, the harder it becomes to distinguish fact from perception. Moreover, the data sets themselves are changing. Implementation of decisions tends to

## Summary of the 13 Cognitive Biases

### Biases emanating from the availability heuristic

#### Ease of recall

Individuals judge events that are more easily recalled from memory, based on vividness or recency, to be more numerous than events of equal frequency whose instances are less easily recalled.

#### Retrievability

Individuals are biased in their assessments of the frequency of events based on how their memory structures affect the search process.

#### Presumed associations

Individuals tend to overestimate the probabilities of two events co-occurring based on the number of similar associations that are easily recalled, whether from experience or social influence.

### Biases emanating from the representativeness heuristic

#### Insensitivity to base rates

Individuals tend to ignore base rates in assessing the likelihood of events when any other descriptive information is provided—even if it is irrelevant.

#### Insensitivity to sample size

Individuals frequently fail to appreciate the role of sample size in assessing the reliability of sample information.

#### Misconceptions of chance

Individuals expect that a sequence of data generated by a random process will look “random,” even when the sequence is too short for those expectations to be statistically valid.

#### Regression to the mean

Individuals tend to ignore the fact that extreme events tend to regress to the mean on subsequent trials.

#### The conjunction fallacy

Individuals falsely judge that conjunctions are more probable than a more global set of occurrences of which the conjunction is a subset.

#### Insufficient anchor adjustment

Individuals make estimates for values based upon an initial value (derived from past events, random assignment, or whatever information is available) and typically make insufficient adjustments from that anchor when establishing a final value.

### Conjunctive and disjunctive events bias

Individuals exhibit a bias toward overestimating the probability of conjunctive events and underestimating the probability of disjunctive events.

#### Overconfidence

Individuals tend to be overconfident of the infallibility of their judgments when answering moderately to extremely difficult questions.

### Two more general biases

#### The confirmation trap

Individuals tend to seek confirmatory information for what they think is true and neglect the search for disconfirmatory evidence.

#### Hindsight and the curse of knowledge

After finding out whether or not an event occurred, individuals tend to overestimate the degree to which they would have predicted the correct outcome. Furthermore, individuals fail to ignore information they possess that others do not when predicting others’ behavior.

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be slowed nowadays, often because one decision is chained to a number of other decisions. So from the time a decision is made to the time you're ready for implementation, the relevant data could have changed—the original conditions might no longer apply."

Even when you're in a time crunch, it's wise to take a moment to look at the larger decision landscape. Is the decision you've been presented actually the most important one you need to make right now? Are there other

key decisions that are linked to this one? If so, what are the precedence relationships, that is, how do those decisions need to be sequenced? But the most important thing is to have "a transparent decision-making process," advises Spitzer. "People in a company will probably disagree about whether there is sufficient, reliable data to support a particular decision, but with a transparent process they can still communicate with one another, explain their assumptions to one another." ■

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### *If you want to learn more . . .*

*Judgment in Managerial Decision Making* by Max Bazerman (4th ed., 1998, John Wiley & Sons, 179 pp., \$36.95, Tel. 800-CALL-WILEY or 212-850-6000)

*Heads You Win: How the Best Companies Think* by Quinn Spitzer and Ronald Evans (1997, Simon & Schuster, 283 pp., \$23.00, Tel. 800-223-2336 or 212-698-7000)

"Judgment Under Uncertainty: Heuristics and Biases" by Amos Tversky and Daniel Kahneman (*Science*, Vol. 185, 1974)