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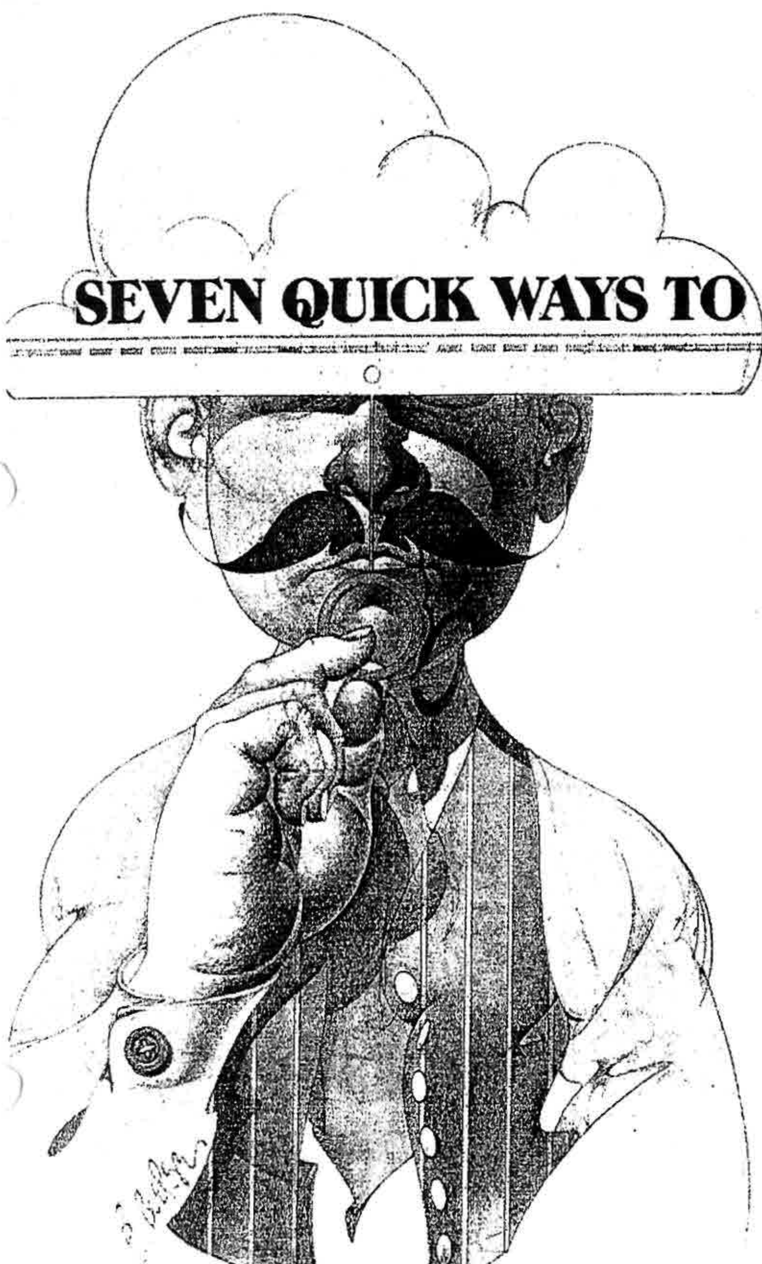
# Floundering in Fallacy

The human mind is facile at self-delusion.
Here are some common and treasured ways to make wrong guesses about the future.

by Carole Wade Offir

*What a piece of work is man! How noble in reason! How infinite in faculties! in form and moving how express and admirable! in action, how like an angel! in apprehension, how like a god! the beauty of the world! the paragon of animals!*

# SEVEN QUICK WAYS TO KID YOURSELF



HAMLET'S PAEAN TO MAN is so stirring, one is tempted to believe it. But real men and women, though capable of being noble and reasonable, are finite in faculty. Faced with the task of judging the past or predicting the future, they frequently bog down in biases and flounder in fallacies, revealing themselves to be flawed gods.

Baruch Fischhoff (see page 70) has demonstrated that when we have to judge a decision made in the past, we scrutinize it through the clarifying spectacles of hindsight. We're apt to condemn decision makers who made mistakes instead of trying to understand why their decisions seemed right at the time. This self-deceiving habit of hindsight makes us less realistic in assessing future events than we should be.

Several of Fischhoff's colleagues have studied other psychological screens that make us see the future dimly. They are concerned with how we arrive at generalizations and how we decide that one event is very likely to happen while another is not. Despite our best efforts to be rational, we consistently make certain kinds of errors without realizing it. Some examples:

**THE GAMBLER'S FALLACY**

Suppose you toss a coin four times. Each time it comes up heads. What are the odds that it will come up tails if you throw it again?

Many people think the likelihood of getting tails on the fifth toss is greater than 50 percent. But that is impossible: if the

coin is fair, the probability of tails (or heads) is one half, no matter what happened on previous tosses. Of course, over the very long run, 50 percent of the tosses will result in heads, but that need not be true in the short run.

Similarly, if you ask people which random sequence of heads and tails is more likely, HTTHTH or HHHTTT, they usually choose the first one. In fact, the sequences are equally likely. To those who make the error, "random" seems to mean "without apparent pattern."

As psychologists Amos Tversky and Daniel Kahneman put it, "The gambler feels that the fairness of the coin entitles him to expect that any deviation in one direction will soon be cancelled by a corresponding deviation in the other. Even the fairest of coins, however, given the limitations of its memory and moral sense, cannot be as fair as the gambler expects it to be."

Misunderstanding about the laws of chance can dominate a gambler's betting strategy. A person at the roulette wheel may feel confident that red will win after black has won two or three times in a row, and feel cheated if, after he bets on red, the ball lands once again on black.

The gambler's fallacy has many consequences outside the casino. For example, the parents of three boys may decide to have another child only because they're sure they're due for a girl. Subjectively, the odds may seem to be 80 or 90 percent. Statistically, though, the likelihood of a girl is the same as it always was—about 50 percent. Anytime you feel that it's time for a turn in luck, either way, better see if you're caught in the gambler's fallacy.

**FAITH IN SMALL NUMBERS**

The gambler's fallacy is really one variation of a more general misconception, that a small random sample of things or events will have all the characteristics of the large population from which it was drawn. This belief is sometimes justified; often it is not.

When we blindly assume that a small group is representative of a larger one, we may reach unwarranted conclusions on the basis of what we know about the small group. Thus, after hearing only a few man-on-the-street interviews, we may go around proclaiming that "most people" hold such and such a view. Scientists, who are supposed to know better, also sometimes generalize after studying only a handful of subjects. They may be too quick to accept positive results from a small study, only to find later that their results can't be replicated by anyone else. Or, they may become needlessly discouraged when they fail to find what they expected, and decide not to pursue what could turn out to be a worthwhile line of research. And many an executive reaches for "mother-in-law data" and makes decisions on the basis of a sample of one in his own tight little environment.

**FORGETTING REGRESSION**

If you compile a list of the tallest men in your community (using some arbitrary cutoff point), and then list the heights of their sons, you'll find that the sons are, *on the average*, shorter than the fathers. Similarly, if you compare the shortest men in the community with their sons, the sons will be, on the average, taller than the fathers. This statistical phenomenon is called "regression toward the mean."

There are many everyday instances of regression toward the mean, but most people don't recognize them. For example, a teacher may expect students who get very high grades on an exam to score just as well on the next test, and expect students who did very poorly to do just as poorly the next time. But because of regression toward the mean, after the second test the teacher is likely to be a bit disappointed in the first group and pleasantly surprised by the second. Keep in mind that we're talking here about group averages, not the score of each individual.

Tversky and Kahneman relate this problem to people's belief that a predicted outcome (e.g., scores on the second test) must be representative of, or similar to, the factor we use to make the prediction (e.g., scores on the first test). When the prediction turns out to be wrong, we search for the cause. In our classroom example, the teacher may conclude that she's doing something right with the dull group (praising or punishing them) and something wrong with the bright group, when actually, her efforts may have had little to do with the results.

**THE AVAILABILITY TRAP**

People overestimate the probability of an event when it's easy to think of relevant examples or imagine plausible scenarios. Tversky and Kahneman call this the problem of availability.

Consider a simple question. If a word is selected at random from an English text, which alternative is more likely: that it will start with the letter *k* or that it will have *k* as its third letter? Tversky and Kahneman found that most people think *k* is more likely to be in the first position. In truth, a typical text contains twice as many words with *k* in the third position as it does words beginning with *k*. Apparently, people fail to recognize this fact because it's easier to think of words starting with *k*.

In everyday life, this sort of error may be quite common. Thus, no matter how many times we hear that statistically speaking, airplane travel is safer than car travel, none of us really quite believes it.

We can all remember specific airplane disasters, but it's hard to recall a series of automobile accidents involving a large number of victims. So airplane fatalities seem more likely. You may have noticed that after an airplane crash occurs, you feel particularly uneasy about flying, because subjectively, the odds of your dying in an airplane seem to be extremely high.

People who practice a profession requiring them to make intuitive predictions about the future ought to be aware of this bias. Physicians, clinical psychologists, sportscasters, and political analysts may base a prediction on a past event that is salient, while ignoring others that are important but less memorable. The late Sewell Avery, while head of Montgomery Ward, kept the company stagnant for decades while waiting for another depression.

**ILLUSIONS OF CORRELATION**

Suppose you want to know whether marijuana use by teenagers is related to delinquency. A statistician would tell you to consider four kinds of students: marijuana users who are delinquents, marijuana users who aren't delinquents, delinquents who don't use marijuana,

and nondelinquents who don't use marijuana. If you take a random sample of students and tally the number of cases in each of these categories, you can apply a very simple mathematical formula to find out if there is a relationship between delinquency and pot.

Unfortunately, when people deal with problems of this sort, they tend to rely on the first category alone, looking at positive instances but not negative ones. Consequently, they may see an association where none exists. This bias is probably traceable to the availability trap; confirming instances are more noticeable or easier to recall than disconfirming ones. Much of our unconscious conditioning in everyday life invites us into illusions of correlation; the conventional wisdom of every profession is loaded with such confusion.

**OVERESTIMATING COMPOUND PROBABILITIES**

This psychological screen is a little harder for the layperson to understand, but can be explained with an example used by psychologist Paul Slovic. Suppose we wish to know the probability that a nuclear power plant will have a nuclear accident.

The plant uses a multiple safeguard system; an accident can occur only if several components of the system break down all at once or in rapid succession.

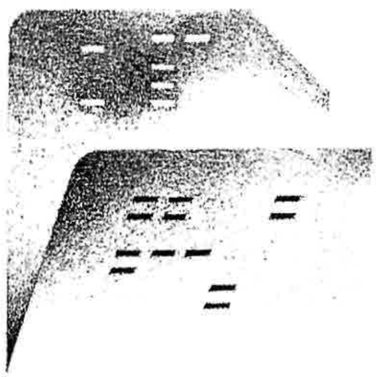
If we assume that these component breakdowns are independent of each other, we can calculate the probability of an accident by *multiplying* all the component probabilities. Thus, if there were only two components and the probability of each breaking down was 1/100, the probability of an accident would be only one in 10 thousand ($1/100 \times 1/100 = 1/10{,}000$).

But researchers find that people seem to estimate the probability of an event as if they're *adding* component probabilities, not multiplying them. That means they overestimate the likelihood of the event. When the possible outcome is a nuclear disaster, this bias may be a good thing. But there are other situations where it is not. Much of the caution that binds us into drab lives can be traced to adding the probabilites of disaster.

**MISUSING INFORMATION**

There are many ways in which we fail to evaluate information correctly when we make predictions or decisions. In one study, Kahneman and Tversky found that people who had to guess which field a graduate student was in relied on a phony "personality sketch" and ignored what they knew about the relative number of students enrolled in each field. The sketch was purportedly based on a psychologist's evaluation of the student's responses to a projective test given several years earlier. It depicted him as intelligent, lacking in true creativity, with a need for order and clarity. More than 95 percent of the subjects said the student was more likely to be in computer science than in the humanities or education.

Apparently the judges in this study matched the description to their stereotyped preconceptions about the kinds of students enrolled in computer science and the humanities. They did not realize that even if most of the computer-science students had these characteristics and most of the humanities and education



students did not, the odds that the student in question was in the humanities or education could still be high, simply because there are many more people enrolled in those fields.

The participants later indicated that they held projective tests in very low esteem. But that did not prevent them from using information supposedly derived from such a test. Information that appears to be specific in nature has an influence on us that is out of proportion to its true value [see "The P.T. Barnum Effect," by C. R. Snyder, PT, March].

If the mental pitfalls that show up in psychological experiments also snare us in ordinary situations, it is clear why we often make faulty decisions when serving on juries, buying a car, advising a patient, gambling in Las Vegas, or investing money. Our shortcomings have prompted some social scientists to suggest that we turn certain problems over to a more reliable decision maker—the computer. There is persuasive evidence that a computer, working with a mathematical model of decision-making, can make some kinds of predictions more accurately than human beings. The computer lets us reject the standard psychological screens.

Most decisions, though, will remain in human hands, if only because we enjoy the sense of responsibility and power we derive from making them. Therefore, we ought to learn what our biases are, and try to overcome them.

Associate editor Carole Wade Offir received her Ph.D. in psychology (specializing in psycholinguistics) from Stanford University. She

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