

Heuristics in Investor Decision Making

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Investors, even professionals, fall prey to important logical fallacies and psychological failings. Some of the latter are relatively new; others have been known for decades. These psychological pressures impact our decisions under conditions of uncertainty in a very predictable manner, not only in the marketplace, but in virtually every aspect of our lives. The bottom line is that these powerful forces lead most people to make the same mistakes time and again. Understanding them is your best protection against stampeding with the crowd, and may help you to profit from their mistakes instead. But as you read on you'll see it's much easier said than done.

Improving Your Market Odds

Despite what many economists and financial theorists assume, people are not good intuitive statisticians, particularly under difficult conditions. They do not calculate odds properly when making investment decisions, which causes consistent errors. First, we must learn why such mistakes occur so frequently. Once their nature is understood, we can develop a set of rules to help monitor our decisions and to provide a shield against serious mishap. We will then see how the contrarian strategies are anchored upon these intuitive statistical limitations.

In Simplification We Believe

Let's quickly review the limitations of man's information-processing capabilities, a sort of black hole that is constantly exerting great force on his decisions. According to Nobel laureate Herbert Simon, people are swamped with information and react consciously to only a small part of it. Simon also stated that when overwhelmed with facts, we select a small part of them and usually reach a different conclusion from what the entire data set would suggest.

Researchers have found that people react to this avalanche of data by adopting shortcuts or rules of thumb rather than formally calculating the actual odds of a given outcome. Known to psychologists as judgmental heuristics in technical jargon, these shortcuts are learning and simplifying strategies we use for managing large amounts of information. Backed by the experience of a lifetime, most of these judgmental shortcuts work exceptionally well, and allow us to cope with data that would otherwise overwhelm us.

Driving a car down a superhighway, for example, you concentrate only on operating the vehicle, on other traffic, and on traffic signs, screening out thousands of other distracting and disruptive bits of information. The rule of thumb is to focus solely on what directly affects our driving, and the rule is obviously a good one.

We also use selective processes in dealing with probabilities: in many of our decisions and judgments, we tend to be intuitive statisticians. We apply mental shortcuts that work well most of the time. We think our odds of survival are better when driving at 55 miles an hour than at 90 miles an hour, although few of us have ever bothered to check the actual numbers. A professional basketball team is likely to beat an amateur one, a discount computer store will probably sell personal computers more cheaply than Macy's or Bloomingdale's. And we might expect to get to a city 300 miles away faster by air than by ground (if it is not a United Express flight to a Colorado ski resort). There are dozens of examples that such procedures are valuable and immensely timesaving.

But being an intuitive statistician has limitations as well as blessings. The very simplifying processes that are normally efficient time-savers lead to systematic mistakes in investment decisions. They can make you believe the odds are dramatically different from what they actually are. As a result, they consistently shortchange the investor.

The distortions produced by the subjectively calculated probabilities are large, systematic, and difficult to eliminate, even after people have been made fully aware of them, as we'll see next.

The Bio's of "Representativeness"

Let us first look at one of the most common of the cognitive biases that Daniel Kahneman of Princeton and the late Amos Tversky of Stanford call "representativeness." The two professors show it's a natural human tendency to draw analogies and see identical situations where in fact there are important differences.

In the market, this means labeling two companies, or two market environments, as the same when the actual resemblance is superficial. Give people a little information and, click!, they pull out a picture they're familiar with, though it may only remotely represent the current situation.

An example: the aftermath of the 1987 crash. In five trading days the Dow fell 742 points, culminating with the 508 point decline on Black Monday, October 19. This wiped out almost \$1 trillion of value. "Is this 1929?" asked the media in bold headlines. Many investors taking this heuristical shortcut cowered in cash. They were caught up in the false parallel between 1987 and 1929.

Why? At the time, the situations seemed eerily similar. We had not had a stock market crash for 58 years. Generations grew up believing that because a Depression followed the 1929 Crash it would always happen this way. A large part of Wall Street's experts, the media, and the investing public agreed.

Overlooked was that the two crashes had only the remotest similarity. In the first place, 1929 was a special case. The nation has had numerous panics and crashes in the nineteenth and early twentieth centuries without a depression. Crashes or no, the thriving American economy always bounded back in short order.

In recounting how often they occurred, Victor Niederhoffer, in his insightful book, *The Education of a Speculator*; notes that Henry Clews wrote after the panic of 1837 that "Prices dropped to zero." The same observer casually stated a few pages later, "The panic of 1857 was much more sever." Clews doesn't say whether in the latter panic sellers actually had to pay buyers to cart away their stocks or bonds. In neither case was there a depression. So crash and depression were not synonymous.

More important, it was apparent even then that the economic and investment climate was entirely different. My Forbes column of May 2, 1988, noted some of the differences clearly visible at the time. The column stated that although market savants and publications were presenting charts showing the breathtaking similarity between the market post-crash in 1988 with that of 1929, there was far less to it than met the eye. Back then the market rallied smartly after the debacle before beginning a free-fall in the spring of 1930, and many experts believed history would repeat itself 58 years later.

The similarities were obvious. The major averages had moved up 20% from the October 19, 1987, bottom and then skidded lower, again in a manner similar to early 1930. But as I warned readers; a chart, unlike a picture, is not always worth a thousand words; sometimes it is just downright misleading.

The economic and investment fundamentals of 1988 were worlds apart from those of 1930. At that time economic and financial conditions were beginning to blow apart, as the worst depression in the nation's history rapidly approached.

It was hard for even the most fervent gloom-and-doomer to argue that a parallel situation existed after the 1987 crash. The economy was rolling along at a rate above most estimates pre-crash and sharply above the recession levels projected in the weeks following the October 19 debacle.

Stock fundamentals were encouraging. The P/E of the S& P 500 was a little over 13 times earnings, down sharply from the 20 times earnings just prior to the 1987 crash, and below the long-term average of 15 to 16. The underlying fundamentals of the two periods were dramatically different. 1929 it wasn't. Investors who followed the representativeness bias missed an enormous buying opportunity: by July, 1997, the market quadrupled from that time.

The representativeness heuristic covers a number of common decision-making errors. Kahneman and Tversky defined this heuristic as a subjective judgment of the extent to which the event in question "is similar in essential properties to its parent population" or "reflects the salient features of the process by which it is generated." People often judge probabilities "by the degree to which A is representative of B, that is, by the degree to which A resembles B."

What are A and B? It depends. If you are estimating the probability that A came from B, A might be a person and B might be a group, say of doctors. The judgment you want to make in this case is the probability A is also a doctor. Or A might be an event and B might be a potential cause. Again you are judging the probability that A comes from B. A, for example, would be the similarity or representativeness in people's minds of the 1987 crash to B which, in this case, would be the 1929 crash and depression.

Because the definition of representativeness is abstract and a little hard to understand, let's look at some more concrete examples of how this heuristic works, and how it can lead to major mistakes in many situations.

First, it may give too much emphasis to the similarities between events (or samples), but not to the probability that they will occur. Again looking at the 1987 crash, it appeared similar to 1929 in its stunning decline, but this by itself did not mean that a Great Depression would follow. In fact, as we have seen, there have been many crashes, but only one Great Depression. Still, the dramatic event of the 1929 Crash followed by the Great Depression was an overpowering image. After the 1987 crash, people did not step back and try to logically assess

what the probabilities were that the next event would occur in an identical manner. Rather, by using the representativeness heuristic, or mental shortcut, they assumed this would be the outcome.

Second, representativeness may reduce the importance of variables that are critical in determining the event's probability. Again using the crash as an illustration, the major differences between the situations in 1987 and 1929, outlined in the Forbes article, were downplayed, with the focus solely on the market's plunge.

This type of representativeness bias occurs time and again in the marketplace. During the Gulf Crisis in the last half of 1990, for example, the stock market fell dramatically on the fears of a worldwide shortage of oil. The seizing of the Kuwaiti oil fields by Iraq, and the subsequent embargo on Iraqi oil, triggered the bias for both investors and the media. The surface similarities to the past indicated an oil shortage, followed by a skyrocketing increase in price, culminating in runaway inflation, as was the case in 1981, or a severe recession as in 1973-1974. Markets plunged, as investors fearfully recalled the battered sales of large cars and other gas-guzzlers including yachts (whose prices dropped sharply) as well as other economic horrors.

The representativeness bias worked in an identical manner to the way it had after the 1987 crash. Yet 1990 was dramatically different from 1973 or 1981.

I warned about the dangers of false parallels in a column written at the time. While it was impossible to predict the outcome of the Persian Gulf Crisis, the world was not facing a major protracted increase in oil prices.

Still, market pundits immediately compared this oil crisis with those of 1973/1974 and 1979/1980. Back in 1980, for example, oil experts stated that crude would reach \$100 a barrel by the end of the decade, at the latest. Then, too, leading dailies ran front-page series for months on how higher oil prices would permanently damage the economy. Some of the statistics conjured up to back the predictions were terrifying. One showed that at the then-current price of oil, almost the entire capital of the Western world would flow into the coffers of OPEC (Organization of Petroleum Exporting Countries) members. Another demonstrated that Saudi Arabia would accumulate more capital in six or seven years than the value of all stocks on the NYSE.

What actually happened? By the late 1980s oil had dropped to as low as \$12 a barrel. Fear sells newspapers and keeps people glued to the tube, but fear does not make money in the stock market.

But all of this was forgotten as the crisis developed in the late summer of 1990. In fact, the differences between the Gulf Crisis and the two previous oil crises were remarkable. In 1990 the world was facing an oil glut, not the shortages of the two earlier occasions. Oil prices, rather than tripling as they did in the seventies, were up only about 30% in the 1990 crisis. Too, this time around the OPEC members had not banded together to increase prices. Instead they had mostly condemned the Iraqi aggression and felt threatened by it. The OPEC cartel indicated it would make up the Iraq-Kuwait difference to keep prices from rising further. With the 50-year-plus supply the Saudis and some of the other producers had, and their pressing need for hard cash, economic considerations ranked up there with altruism. Finally, there was a unanimity among the major powers in response to the crisis that had not occurred in well over a century.

The analysis strongly indicated that oil prices were not destined to move higher for long, if at all. The panic that gripped many investors had created the finest buying opportunity of the decade.

You can see the representativeness bias resulted in a near identical investor reaction to the Gulf Crisis as it did to the 1987 crash. First, people put undue weight on the surface similarities between the potential oil crisis of 1990 and those of 1973/1974 and 1980. Secondly, investors again downplayed the critical differences between the two periods the article outlined, which were far more important than the casual resemblances. Again, the bias contributed to major investor errors in decision-making.

As I'm sure you have guessed, the representativeness heuristic can apply just as forcefully to a company or an industry as to the market as a whole. Here is one such an example:

In 1993 Dell Computer collapsed on Wall Street, losing 50% of its value in months. One day it had a market capitalization of \$4.6 billion; six months later, it was just over \$2.2 billion. Same company but worth less than half as much, and trading at only 4.6 times the previous year's earnings. What caused the drop? Earnings were weak, as the company took some major charges while repositioning its personal computer lines and restructuring its marketing.

What probably happened was this: two other industry leaders, IBM and Digital Equipment Corporation (DEC), were weak, and investors lumped the three companies together. IBM was in temporary trouble, while DEC's was more serious. Dell was not. It was a very different kind of company with different products. Its repositioning was fabulously successful and it went on to become a major player in the personal computer (PC) industry. If you had

bought it at its 1993 low, you would have increased your money more than 59-fold by late 1997. The representativeness bias worked the same way as in the two previous examples.

Kahneman and Tversky's findings, which have been repeatedly confirmed, are particularly important to our understanding of stock market errors.

The Law of Small Numbers

The representativeness bias is responsible at least in part for a number of other major and oft-repeated errors. All mutual fund organizations work from the principle that investors flock to better-performing mutual funds even though financial researchers have shown that the "hot" funds in one time period are often the poorest performers in another. The final verdict on the sizzling funds in the 1982/1983 market was disastrous. Ditto for the aggressive-growth funds of 1991 to 1997. Investors lost billions of dollars in these funds. Many, although far more risky, could not hold a candle to the long-term records of many conservative, blue-chip mutual funds.

Still, people are continually enticed by such "hot" performance, even if it lasts for brief periods. Because of this susceptibility, brokers or analysts who have had one or two stocks move up sharply, or technicians who call one turn correctly, are believed to have established a credible record and can readily find market followings.

Likewise, an advisory service that is right for a brief time can beat its drums loudly. One market-letter writer was featured prominently in the Sunday New York Times for being bearish in July of 1996, as the market dropped rapidly. He was right for three weeks but missed the enormous rally of the prior 18 months, as well as the subsequent rise for the balance of 1996, which kept him out of the market as it spiked 80%.

In fact, it doesn't matter if the advisor is wrong repeatedly; the name of the game is to get a dramatic prediction out there. A well-timed call can bring huge rewards to a popular newsletter writer. Eugene Lerner, a former finance professor who heads Disciplined Investment Advisors, a market-letter writer, speaking of what making a bearish call in a declining market can do, said, "If the market goes down for the next three years you'll be as rich as Croesus. The next time around, everyone will listen to you." With hundreds and hundreds of advisory letters out there someone has to be right. Again, it's just the odds.

Elaine Garzarelli gained near immortality when she purportedly "called" the 1987 crash. Although, as the market strategist for Shearson Lehman, her forecast was never published in a research report, nor indeed communicated to its clients, she still received widespread recognition and publicity for this call, which was made in a short TV interview on CNBC.

Since this "brilliant call," her record, according to a fellow strategist, "has been somewhat mixed, like most of us." Still, her remark on CNBC that the Dow could drop sharply from its then 5300 level rocked an already nervous market on July 23, 1996. What had been a 40-point gain for the Dow turned into a 40-point loss, a good deal of which was attributed to her comments. Only a few days earlier, Ms. Garzarelli had predicted The Dow would rise to 6400 from its then value of 5400. Even so, people widely followed her because of "the great call in 1987."

Stan Weinstein, editor of The Professional Tape Reader, an advisory letter headquartered in Hollywood, Florida, advertises week after week that the market is heading south. He naturally tells potential subscribers that following his advice will make them mega-bucks. Mr. Weinstein's track record leaves much to be desired. According to the Hulbert Financial Digest, his advice has significantly underperformed the market.

The truth is, market-letter writers have been wrong in their judgments far more often than they would like to remember. However, advisors understand that the public considers short-term results meaningful when they are, more often than not, simply chance. Those in the public eye usually gain large numbers of new subscribers for being right by random luck.

Which brings us to another important probability error that falls under the broad rubric of representativeness. Amos Tversky and Daniel Kahneman call this one the "law of small numbers." Examining journals in psychology and education, they found that researchers systematically overstated the importance of findings taken from small samples. The statistically valid "law of large numbers" states that large samples will usually be highly representative of the population from which they are drawn; for example, public opinion polls are fairly accurate because they draw on large and representative groups. The smaller the sample used, however (or the shorter the record), the more likely the findings are chance rather than meaningful.

Yet the Tversky and Kahneman study showed that typical psychological or educational experimenters gamble their research theories on samples so small that the results have a very high probability of being chance. This is the same as gambling on the single good call of an investment advisor. The psychologists and educators are far

too confident in the significance of results based on a few observations or a short period of time, even though they are trained in statistical techniques and are aware of the dangers.

Note how readily people over generalize the meaning of a small number of supporting facts. Limited statistical evidence seems to satisfy our intuition no matter how inadequate the depiction of reality. Sometimes the evidence we accept runs to the absurd. A good example of the major overemphasis on small numbers is the almost blind faith investors place in governmental economic releases on employment, industrial production, the consumer price index, the money supply, the leading economic indicators, et cetera.

These statistics frequently trigger major stock- and bond-market reactions, particularly if the news is bad. For example, investors are concerned about the possibility of rising prices. If the unemployment rate drops two-tenths of one percent in a month when it was expected to be unchanged, or if industrial production climbs slightly more than the experts expected, stock prices can fall, at times sharply.

Should this happen? No. Flash statistics, more times than not, are near worthless. Initial economic and Fed figures are revised significantly for weeks or months after their release, as new and "better" information flows in. Thus, an increase in the money supply can turn into a decrease, or a large drop in the leading indicators can change to a moderate increase. These revisions occur with such regularity you would think that investors, particularly pros, would treat them with the skepticism they deserve.

Alas, the real world refuses to follow the textbooks. Experience notwithstanding, investors treat as gospel all authoritative-sounding releases that they think pinpoint the development of important trends.

An example of how instant news threw investors into a tailspin occurred in July of 1996. Preliminary statistics indicated the economy was beginning to gain steam. The flash figures showed that GDP (gross domestic product) would rise at a 3% rate in the next several quarters, a rate higher than expected. Many people, convinced by these statistics that rising interest rates were imminent, bailed out of the stock market that month. By the end of that year, the GDP growth figures had been revised down significantly (unofficially, a minimum of a dozen times, and officially at least twice). The market rocketed ahead to new highs to August 1997, but a lot of investors had retreated to the sidelines on the preliminary bad news

Just as irrational is the overreaction to every utterance by a Greenspan or other senior Fed or government official, no matter how offhanded. Like ancient priests examining chicken entrails to foretell events, many pros scrutinize every remark and act upon it immediately, even though they are not sure what it is they are acting on. Remember here the advice of a world champion chess player when asked how to avoid making a bad move. His answer: "Sit on your hands."

But professional investors don't sit on their hands; they dance on tiptoe, ready to flit after the least particle of information as if it were a strongly documented trend. The law of small numbers, in such cases, results in decisions sometimes bordering on the inane.

Tversky and Kahneman's findings, which have been repeatedly confirmed, are particularly important to our understanding of some stock market errors.

The law of averages indicates that many experts will have excellent record & usually playing popular trends & often for months and sometimes for several years, only to stumble disastrously later. If you buy the record just after a period of spectacular performance, chances are the letter writer or manager will not sustain it.

This is the sad lesson to be learned from the records of the market-letter writers above and from the turbo-charged, aggressive growth managers of mutual funds in the mid-eighties, many of whom forlornly traded their hot hands in for a bartender's apron or UPS uniform after decimating their clients' portfolios It is the same lesson that investors over the centuries have had to relearn with each new supposedly unbeatable market opportunity.

Case Rate vs Base Rate

A third flaw, in many ways parallel to the second, also indicates man's shortcomings as an intuitive statistician. In making decisions, we become overly immersed in the details of a particular situation and neglect the outcome of similar situations in our experience. These past outcomes are called prior probabilities, and logically should help to guide similar choices in the present.

But they tend not to. This shows up clearly in an experiment made with a group of advanced psychology students. The group was given a brief personality analysis of a graduate student, said to have been written by a psychologist who had conducted some tests several years earlier. The analysis was not only outdated but contained no indication of the subject's academic preference. Psychology students are taught that profiles of this

sort can be enormously inaccurate. The study, which follows, was intended to provide them with nothing of practical value.

Here it is:

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 dull and rather 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 feeling and little sympathy for other people, and does not enjoy interacting with others. Self-centered, he nevertheless has a deep moral sense.

Tom W. is currently a graduate student. Please rank the following nine fields of graduate specialization in order of the likelihood that Tom W. is now a student in that field. Let rank one be the most probable choice:

- Business Administration
- Computer Sciences
- Engineering
- Humanities and Education
- Law
- Library Science
- Medicine
- Physical and Life Sciences
- Social Science and Social Work

Given the lack of substantive content, the graduate students should have ignored the analysis entirely, and made choices by the percentage of graduate students in each field \bar{D} information that had been provided for them. It was assumed they would act upon the real data. At least, according to the laws of normative probability, this was what was expected of them. According to these laws, the more unreliable the available information in a specific situation (called the case rate \bar{D} in this example the profile of Tom W.), the more one should rely on established percentages (called the base rate \bar{D} in this instance the percentage of students enrolled in each field).

Did the group look at the base rate percentages? No. This experiment and others like it demonstrated that the students relied entirely upon the profile and decided that computer sciences and engineering were the two most probable fields for Tom W. to enter, even though each had relatively few people in them. In spite of their training to the contrary, the psychology students based their decisions on unreliable information, ignoring the more pertinent data. Nonetheless they were confident their decisions were made on the facts.

A parallel example in the stock market is the emphasis people put on the outlook for each exciting initial public offering or concept stock (the case rate), even though the substantiating data is usually flimsy at best. Still, investors rarely examine the high probability of loss in such issues (the base rate). Instead, most buyers of hot IPOs in the 1980s and 1990s focused on the individual story and forgot that over 80% of these issues had dropped in price after the 1962 and 1968 market breaks. Here again, the prior probabilities, although essential, were ignored.

The greater the complexity and uncertainty in the investment situation, the less emphasis you should place on your current appraisal, and the more you should look to the rate of success or failure of similar situations in the past for guidance.

Put another way, rather than attempting to obtain every fact and sliver of information about a difficult investment situation (much of which is contradictory, irrelevant, and difficult to evaluate correctly), you should, if possible, gauge the long-term record of success or failure of a particular course of action.

The same rule could be applied to a broad number of investment situations. For example, if you like a concept stock, you might take a cross-section of favorites of other periods and see how they worked out; or if you decide to try your hand at market timing, examine how well the system you selected has worked over time.

In each instance, the information in the particular case being examined should, where possible, be supplemented by evidence of the long-term record of similar situations \bar{D} the base rate \bar{D} before making your decision.

Regression to the Mean

The three previous cognitive biases, stemming from representativeness, buttress one of the most important and consistent sources of investment error. As intuitive statisticians, we do not comprehend the principle of regression to the mean. Although the terminology sounds formidable, the concept is simple. This statistical phenomenon was noted over 100 years ago by Sir Francis Galton, a pioneer in eugenics.

In studying the height of men, Galton found that the tallest men usually had shorter sons, while the shortest men usually had taller sons. Since many tall men come from families of average height, they are likely to have children shorter than they are, and vice versa. In both cases, the height of the children was less extreme than the height of the fathers.

The study of this phenomenon gave rise to the term regression, which has since been documented in many areas. The effects of regression are all around us. In our experience, most outstanding fathers have somewhat disappointing sons, brilliant wives have duller husbands, people who seem to be ill adjusted often improve, and those considered extra-ordinarily fortunate eventually have a run of bad luck.

Regression to the mean, although alien to us intuitively, occurs frequently. Take the reaction we have to a baseball player's batting average. Although a player may be hitting .300 for the season, his batting will be uneven. He will not get three hits in every ten times at bat. Sometimes he will bat .500 or more, well above his average (or mean), and other times he will be lucky to hit .125. Over 162 games, whether the batter hits .125 or .500 in any dozen or so games makes little difference to the average. But rather than realizing that the player's performance over a week or a month can deviate widely from his season's average, we tend to focus only on the immediate past record. The player is believed to be in a "hitting streak" or a "slump." Fans, sportscasters, and, unfortunately, the players themselves place too much emphasis on brief periods and forget the long-term average, to which the players will likely regress.

Regression occurs in many instances where it is not expected and yet is bound to happen. Israeli Air Force flight instructors were chagrined after they praised a student for a successful execution of a complex maneuver, because it was normally followed by a poorer one the next time. Conversely, when they criticized a bad maneuver, a better one usually followed. What they did not understand was that at the level of training of these student pilots, there was no more consistency in their maneuvers than in the daily batting figures of baseball players. Bad exercises would be followed by well-executed ones and vice versa. Their flying regressed to the mean. Correlating the maneuver quality to their remarks, the instructors erroneously concluded that criticism was helpful to learning and praise detrimental, a conclusion universally rejected by learning theory researchers.

How does this work in the stock market? According to the classic work on stock returns of Ibbotson and Sinquefeld, then at the University of Chicago, stocks have returned 10.5% annually (price appreciation and dividends) over the last 70 years, against a return of about 5.6% for bonds. An earlier study by the Cowles Commission showed much the same return for stocks going back to the 1880s.

As Figure 10-1 shows, however, the return has been anything but consistent. Not unlike the number of hits a .300 career hitter will get in individual games over a few weeks. There have been long periods when stocks have returned more than the 10.5% mean. Within each of these periods, there have been times when stocks performed sensationally, rising sometimes 50% or more in a year. At other times, they have seemed to free-fall. Stocks, then, although they have a consistent average, also have "streaks" and "slumps".

For investors, the long-term rate of return of common stocks, like the batting average of a ballplayer, is the important thing to remember. However, as intuitive statisticians, we find it very hard to do so. Market history provides a continuous example of our adherence to the belief that deviations from the norm are, in fact, the new norm.

The investor of 1927 and 1928 or 1996 and 1997 thought that returns of 30 to 40% were in order from that time on, although they diverged far from the mean. In 1932 and 1974, he believed huge losses were inevitable, although they, too, deviated sharply from the long-term mean. The investor of mid-1982, observing the insipid performance of the Dow Jones Industrial Average (which was lower at the time than in 1965) believed stocks were no longer a viable investment instrument.

Business Week ran a cover story, just before the Great Bull Market began in July 1982, entitled "The Death of Equities." In 1987, after the Dow had nearly quadrupled its level of 1982, I attended a dinner of money managers just prior to the crash. The almost universal opinion at the table was that stocks would go much higher. The table was right for another ten days.

The same scenarios have been enacted at every major market peak and trough. Studies of investment advisor buying and selling indicate that most experts are closely tied, if not pilloried, to the current market's movement. The prevalent belief is always that extreme returns, whether positive or negative, will persist. The far more likely probability is that they are the outliers on a chart plotting returns, and that succeeding patterns will regress towards the mean.

We can mask the relevance of these long-term returns by detailed study of a specific trend and by intense involvement in it. Even those who are aware of these long-term standards cannot always see them clearly because of preoccupation with short-term conditions.

Returns that are extremely high or low should be treated as deviations from long-term norms. The long-term return of the market might be viewed like the average height of men. Just as it is unlikely that abnormally tall men will beget even taller men, it is unlikely that abnormally high returns will follow already high returns. In both cases, the principle of regression to the mean will most probably apply, and the next series of returns will be less extreme.

Because experts in the stock market are no more aware of the principles of regression than anyone else, each sharp price deviation from past norms is explained by a new, spurious theory. This, together with other cognitive biases we will examine, leaves the investor vulnerable to the fashions of the marketplace, however far removed prices may be from intrinsic worth.

If it Looks Good, It Must Taste Good

There is yet another powerful heuristic bias stemming from representativeness. This is the intuitive belief that inputs and outputs should be closely correlated. We believe, in other words, that consistent inputs allow greater predictability than inconsistent ones. Tests have shown, for example, that people are far more confident that a student will regularly have a B average if he has two B's rather than an A and a C, although the belief is not statistically valid. Or if the description of a company is very favorable, "a very high profit is most representative of that description," and vice-versa. This fallacy usually leads to consistent errors in the market.

The direct application of this finding is the manner in which investors equate a good stock with a rising price and a poor stock with a falling one. One of the most common questions analysts, money managers, or brokers are asked is, "if the stock is doing good, why doesn't it go up?" or, "if contrarian strategies are so successful why aren't they working now?" The answer, of course, is that the value (the input) is often not recognized in the price (the output) for quite some time. Yet investors demand such immediate, though incorrect, feedback and can make serious mistakes as a consequence.

Another interesting aspect of this phenomenon is that investors mistakenly tend to place high confidence in extreme inputs or outputs. As we have seen, Internet stocks in the mid-1990s were believed to have sensational prospects (the input), which was confirmed by prices that moved up astronomically (as much as 10- or even 20-fold (the output)). The seemingly strong fundamentals went hand-in-hand with sharply rising prices for HMO stocks in the mid-1980s or for the computer leasing and medical technology stocks of 1968 and 1973. Extreme correlations look good and people are willing to accept them as reliable auguries, but as generations of investors have learned the hard way, they aren't.

The same thinking is applied to each crash and panic. Here the earnings estimates and outlooks (the inputs) erode as prices drop. Graham and Dodd, astute market clinicians that they were, saw the input-output relationship clearly. They wrote "an evitable rule of the market is that the prevalent theory of common stock valuations has developed in rather close conjunction with the change in the level of prices."

Demanding immediate success invariably leads to playing the fads or fashions currently performing well rather than investing on a solid basis. A course of investment, once charted, should be given time to work. Patience is a crucial but rare investment commodity. The problem is not as simple as it may appear; studies have shown that businessmen and other investors abhor uncertainty. To most people in the marketplace, quick input-output matching is an expected condition of successful investing.

On Shark Attacks and Falling Airplane Parts

What is more likely cause of death in the U.S.: being killed by a shark or by pieces falling from an airplane? Most people will answer that shark attacks are more probable. Shark attacks receive far more publicity than deaths from falling plane parts, and they are certainly far more graphic to imagine, especially if you've seen *Jaws*. Yet dying from falling airplane parts is thirty times more likely than being killed by a shark attack.

This is an example of availability, a heuristic which causes major investor errors. According to Tversky and Kahneman, this is a mental rule of thumb by which people "assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind".

As with most heuristics, or mental shortcuts, availability usually works quite well. By relying on availability to estimate the frequency or probability of an event, decision-makers are able to simplify what might otherwise be very difficult judgments.

This judgmental shortcut is accurate most of the time because we normally recall events more easily that have occurred frequently. Unfortunately our recall is influenced by other factors besides frequency, such as how recently the events have occurred, or how salient or emotionally charged they are. People recall good or bad events out of proportion to their actual frequency. The chances of being mauled by a grizzly bear at a national park are only one or two per million visitors, and the death rate is lower. Casualties from shark attacks are

probably an even smaller percentage of swimmers in coastal waters. But because of the emotionally charged nature of the dangers, we think such attacks happen much oftener than they really do.

It is the occurrence of disaster, rather than their probabilities of happening, that has an important impact on our buying of casualty insurance. The purchase of earthquake and airline insurance goes up sharply after a calamity, as does flood insurance.

As a result, the availability rule of thumb breaks down, leading to systematic biases. The bottom line is that availability, like most heuristics, causes us to frequently misread probabilities, and get into investment difficulties as a result.

Recently, saliency, and emotionally charged events often dominate decision-making in the stock market. Statements by experts, crowd participation, and recent experience strongly incline the investor to follow the prevailing trend.

In the 1990's small-capitalization growth stocks rocketed ahead of other equities. By early July 1996 this was almost the only game in town. The experience is repeated and salient to the investor, while the disastrous aftermath of the earlier speculation in aggressive growth issues in the sixties, seventies, and eighties has receded far back into memory.

The tendency of recent and salient events to move people away from the base-rate or long-term probabilities cannot be exaggerated. Time and again, we toss aside our long-term valuation guidelines because of the spectacular performance of seemingly sure winners. As psychologists have pointed out, this bias is tenacious.

A moment's reflection shows that this judgmental bias reinforces the others. Recent and salient events, whether positive or negative, strongly influence judgments of the future. People, it appears, become prisoners of such experience and view the future as an extension of the immediate past. The more memorable the circumstances, the more they are expected to persist, no matter how out-of-line with prior norms.

The defense here is to keep your eye on the long-term. While there is certainly no assured way to put recent or memorable experiences into absolute perspective, it might be helpful during periods of extreme pessimism or optimism to wander back to your library. If the market is tanking, reread the financial periodicals from the last major break. If you can, pick up *The Wall Street Journal*, turn to the market section, and read the wailing and sighing of expert after expert in August and September of 1990, just before the market began one of its sharpest recoveries. Similarly, when we have another speculative market, it would not be a bad idea to check the *Journal* again and read the comments made during the 1979 to 1983 or 1991 to 1998 bubbles. While rereading the daily press is not an elixir, I think it will help.

Anchoring and Hindsight Biases

We might briefly look at two other systematic biases that are relevant to the investment scene and tend to fix investment errors firmly in place. They are also difficult to correct, since they reinforce the others. The first is known as anchoring, another simplifying heuristic. In a complex situation, such as the marketplace, we will choose some natural starting point, such as a stock's current price, as a first cut at its value, and will make adjustments from here. The adjustments are typically insufficient. Thus, an investor in 1997 might have thought a price of \$91 was too high for Cascade Communications, a leader in PC networking, and that \$80 was more appropriate. But Cascade Communications was grossly overvalued at \$91 and dropped to \$22 before recovering modestly.

The final bias is interesting. In looking back at past mistakes, researchers have found, people believe that each error could have been seen much more clearly, if only they hadn't been wearing dark or rose-colored glasses. The inevitability of what happened seems obvious in retrospect. Hindsight bias seriously impairs proper assessment of past errors and significantly limits what can be learned from experience.

I remember lunching with a number of money managers in 1991. They were bullish on the market, which was moving up strongly at the time. One manager, looking at the upsurge of financial stocks from the depressed levels of 1990, asked rhetorically, "How could we not have bought the financial stocks then?" In 1988, he asked the same question about other ultra cheap companies after the much more damaging 1987 crash. He'll likely ask it again after the next major surge.

This bias too is difficult to handle. That walk to the library may be as good a solution as any. I think you will see that the mistakes were far less obvious than they appear today.

Decisional Biases and Market Fashions

Now, with some knowledge of decisional biases, we can understand why the tug of fashion has always been so persistent and so influential on both the market population and the expert opinion of the day.

Whatever the fashion, the experts could demonstrate that the performance of a given investment was statistically superior to the other less-favored ones in the immediate past, and sometimes stayed that way for fairly long periods.

Tulip bulbs appreciated sharply for seven years until 1637. A Dutch expert in that year could easily show that for more than a decade tulips had returned considerably more than buildings, shops, or farms. The recent record was exciting, and rising prices seemed to justify more of the same.

The pattern continually repeats itself. A buyer of canal bonds in the 1830s or blue-chip stocks in 1929 could argue that though the instruments were dear, each had been a vastly superior holding in the recent past. Along with the 1929 Crash and the Depression came a decade-and-a-half passion for government bonds at near-zero interest rates.

Investing in good-grade common stocks again came into vogue in the 1959s and 1960s. By the end of the decade, the superior record of stocks through the postwar era had put investing in bonds in disrepute. Institutional Investor a magazine exceptionally adept at catching the prevailing trends, presented a dinosaur on the cover of its February 1969 issue with the caption, "Can The Bond Market Survive?" The article continued: "In the long run, the public market for straight debt might become obsolete."

The accumulation of stocks occurred just as their rates of return were beginning to decrease. Bonds immediately went on to provide better returns than stocks. Of course, as we know, it happened all over again. In 1982, the greatest bull market of the century for stocks began naturally at the time institutional funds were stampeding out of equities. As always after a major miscalculation, perceptions shifted radically. Money managers once again tilted sharply towards stocks, with enormous flows of new moneys pouring into equities in the past decade and a half.

Behind the statistics on expert failure, we saw that the professionals tended to play the fashions of the day, whatever they were. One fund manager, at the height of the two-tier market in 1972/1973, noting the skyrocketing prices of large growth stocks at the time, said that their performance stood out "like a beacon in the night." Both the growth stocks and the concept stocks were clobbered shortly thereafter.

Although market history provides convincing testimony about the ephemeral nature of fashion, it has captivated generation after generation of investors. Each fashion has its supporting statistics, the law of small numbers. The fashions are salient and easy to recall and are, of course, confirmed by rising prices and the inputs and outputs again. These biases, all of which interact, make it natural to project the prevailing trend well into the future. The common error each time is that, although the trend may have lasted for months, even for years, it was not representative and was often far removed from the performance of equities or bonds over longer periods (regression to the mean). In hindsight, we can readily see the errors and wonder why, if they were so obvious, we did not see them earlier.

The heuristic biases, which are all interactive, seem to flourish particularly well in the stock market and to result in a high rate of investor error. We are too apt to look at insufficient information in order to confirm a course of action, we are too inclined to put great emphasis on recent or emotionally compelling events, and we expect our decisions to be met with quick market confirmation. The more we discuss a course of actions and identify with it, the less we believe prior standards are valid. So each trend and fashion looks unique, is identified as such, and inevitably takes its toll. Knowledge that no fashion prevails for long is dismissed.

Shortcuts to Disaster

We find, then, that the information-processing shortcuts and heuristics which are highly efficient and timesaving in day-to-day situations, work systematically against us in the market place.

Only in recent years has it been recognized that people simply don't follow probability theory under conditions of uncertainty. The implications of these cognitive biases are enormous, not only in economics, management, and investments, but in virtually every area of decision-making. The tendency to underestimate or ignore prior probabilities in making a decision is undoubtedly the most significant problem of intuitive prediction in fields as diverse as financial analysis, accounting, geography, engineering, and military intelligence.

Cognitive biases, which affect each of us to a greater or lesser extent, are locked more firmly into place by the group pressures described earlier. When our own cognitive biases are reinforced by the powerful influence of

experts and peer groups we respect, and who interpret information in the same way, the pressure to follow becomes compelling.