CHAPTER 10

# The Psychology of Risk: The Behavioral Finance Perspective

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*Abstract:* Since the mid-1970s, hundreds of academic studies have been conducted in risk perception-oriented research within the social sciences (e.g., nonfinancial areas) across various branches of learning. The academic foundation pertaining to the "psychological aspects" of risk perception studies in behavioral finance, accounting, and economics developed from the earlier works on risky behaviors and hazardous activities. This research on risky and hazardous situations was based on studies performed at Decision Research (an organization founded in 1976 by Paul Slovic) on risk perception documenting specific behavioral risk characteristics from psychology that can be applied within a financial and investment decision-making context. A notable theme within the risk perception literature is how an investor processes information and the various behavioral finance theories and issues that might influence a person's perception of risk within the judgment process. The different behavioral finance theories and concepts that influence an individual's perception of risk for different types of financial services and investment products are heuristics, overconfidence, prospect theory, loss aversion, representativeness, framing, anchoring, familiarity bias, perceived control, expert knowledge, affect (feelings), and worry.

*Keywords:* risk, perception, risk perception, perceived risk, judgment, decision making, behavioral decision theory (BDT) , behavioral risk characteristics , behavioral accounting, standard finance, behavioral finance , behavioral economics, psychology, financial psychology, social sciences, efficient market hypothesis, rationality, bounded rationality, classical decision theory, information overload

An emerging subject matter within the behavioral finance literature is the notion of perceived risk pertaining to novice and expert investors. The author provides an overview of the specific concepts of perceived risk and perception for the financial scholar since these two issues are essential for developing a greater understanding and appreciation for the *psychology of risk*. The next section discusses the notion of classical decision making as the cornerstone of standard finance which is based on the idea of rationality in which investors devise judgments (e.g., the *efficient market hypothesis*). In contrast, the alternative viewpoint offers behavioral decision theory as the foundation for behavioral finance in which individuals formulate decisions according to the assumptions of bounded rationality (e.g., prospect theory). The reader is presented with a discussion on the major behavioral finance themes (that is, cognitive and emotional factors) that might influence an investor's perception of risk for different types of financial products and investment services. A major purpose of this chapter was to bring together the main themes within the risk perception literature that should provide other researchers a strong foundation for conducting research in this behavioral finance topic area.

Perceived risk (risk perception) is the subjective decision making process that individuals employ concerning the assessment of risk and the degree of uncertainty. The term is most frequently utilized in regards to risky personal activities and potential dangers such as environmental issues, health concerns or new technologies. The study of perceived risk developed from the discovery that novices and experts repeatedly failed to agree on the meaning of risk and the degree of riskiness for different types of technologies and hazards. Perception is the process by which an individual is in search of preeminent clarification of sensory information so that he or she can make a final judgment based on their level of expertise and past experience.

In the 1970s and 1980s, researchers at Decision Research, especially Paul Slovic, Baruch Fischhoff, and Sarah Lichtenstein, developed a survey-oriented research approach for investigating perceived risk that is still prominent today. In particular, the risk perception literature from psychology possesses a strong academic and theoretical foundation for conducting future research endeavors for behavioral finance experts. Within the social sciences, the risk perception literature has demonstrated that a considerable number of cognitive and emotional factors influence a person's risk perception for non-financial decisions. The behavioral finance literature reveals many of these cognitive (mental) and affective (emotional) characteristics can be applied to the judgment process in relating to how an investor perceives risk for various types of financial services and investment instruments such as heuristics, overconfidence, prospect theory, loss aversion, representativeness, framing, anchoring, familiarity bias, perceived control, expert knowledge, affect (feelings), and worry.

Since the early 1990s, the work of the Decision Research organization started to crossover to a wider spectrum of disciplines such as behavioral finance, accounting, and economics. In particular, Decision Research academics began to apply a host of behavioral risk characteristics (that is, cognitive and emotional issues), various findings, and research approaches from the social sciences to risk perception studies within the realm of financial and investment decision making. (See, for example, Olsen [1997]); MacGregor, Slovic, Berry, and Evensky [1999]; MacGregor, Slovic, Dreman and Berry [2000]; Olsen [2000]; Olsen [2001]; Olsen and Cox [2001]; Finucane [2002]; and Olsen [2004].) Academics from outside the Decision Research group have also extended this risk perception work within financial psychology, behavioral accounting, economic psychology, and consumer behavior. (See, for example, Byrne [2005]; Diacon and Ennew [2001]; Diacon [2002, 2004]; Ganzach [2000]; Goszczynska and Guewa-Lesny [2000a, 2000b]; Holtgrave and Weber [1993]; Jordan and Kaas [2002]; Koonce, Lipe, and McAnally [2005]; Koonce, McAnally and Mercer [2001, 2005]; Parikakis, Merikas, and Syriopoulos [2006]; Ricciardi [2004]; Shefrin [2001b]; Schlomer [1997]; Warneryd [2001]; and Weber and Hsee [1998].)

## WHAT IS RISK PERCEPTION?

Since the 1960s, the topic of perceived risk has been employed to explain consumers' behavior. In effect, within the framework of consumer behavior, perceived risk is the risk a consumer believes exists in the purchase of goods or services from a particular merchant, whether or not a risk actually exists. The concept of *perceived risk* has a strong foundation in the area of consumer behavior that is rather analogous to the discipline of behavioral finance (that is, there are similarities regarding the decision-making process of consumers and investors). Bauer (1960), a noted consumer behavioralist, introduced the notion of perceived risk when he provided this perspective:

> Consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he cannot anticipate with anything approximating certainty, and some of which are likely to be unpleasant. At the very least, any one purchase competes for the consumer's financial resources with a vast array of alternate uses of that money . . . Unfortunate consumer decisions have cost men frustration and blisters, their

> self-esteem and the esteem of others, their wives, their jobs, and even their lives . . . It is inconceivable that the consumer can consider more than a few of the possible consequences of his actions, and it is seldom that he can anticipate even these few consequences with a high degree of certainty. When it comes to the purchase of large ticket items the perception of risk can become traumatic. (p. 24)

Cox and Rich (1964) provided a more precise definition of perceived risk; it's a function of consequences (the dollar at risk from the purchase decision) and uncertainty (the person's feeling of subjective uncertainty that he or she could "gain" or "lose" from the transaction). Stone and Gronhaug (1993) made the argument that the marketing discipline mainly focuses on investigating the potential negative outcomes of perceived risk. This focus on the negative side of risk is similar to the area of behavioral finance in which researchers examine downside risk, the potential for below target returns, or the possibility of catastrophic loss. Jacoby and Kaplan (1972) and Tarpey and Peter (1975) developed six components or dimensions of perceived risk, including financial, product performance, social, psychological, physical, and time/convenience loss. Tarpey and Peter were not solely concerned with the consumers' judgments as related to perceived risk (in which consumers minimize risk). They investigated two additional aspects: (1) perceived risk in which the consumer makes purchase decisions that he or she maximizes perceived gain and (2) net perceived return in which the decision maker's assessment consists both of risk and return. These two components are analogous to the tenets of modern portfolio theory (MPT) in financial theory: the positive relationship between risk and return.

Human judgments, impressions and opinions are fashioned by our backgrounds, personal understanding, and professional experiences. Researchers have demonstrated that various factors influence a person's risk perception and an ever-growing body of research has attempted to define risk, categorize its attributes, and comprehend (understand) these diverse issues and their specific effects (see Slovic, 1988). In some academic disciplines, findings reveal that perceived risk has more significance than actual risk within the decision-making process. Over the years, risk perception studies have been conducted across a wide range of academic fields, with the leading ones from the social sciences, primarily from psychology. In essence, "these groups were interdisciplinary, but the leading academic involvement has been psychological and the methodology mainly 'psychometrics.' Other disciplines to be involved in the field have been economics, sociology and anthropology" (Lee, 1999, p. 9).

The notion of perceived risk has a strong historical presence and broad application across various business fields such as behavioral accounting, consumer behavior, marketing, and behavioral finance. These academic disciplines attempt to examine how a person's feelings, values, and attitudes influence their reactions to risk, along with the influences of cultural factors, and issues of group behavior. Individuals frequently misperceive risk linked with a specific activity because they lack certain information. Without accurate information or with misinformation, people could make an incorrect judgment or decision.

All of these different issues demonstrate that a person may possess more than one viewpoint regarding the acceptability or possibility of a risky activity depending upon which factor a person identifies at a certain period of time. So it is understandable that we cannot simply define risk perception to a single statistical probability of objective risk (e.g., the variance of a distribution) or a purely behavioral perspective (e.,g., the principles of heuristics or mental shortcuts). Instead, the notion of perceived risk is best utilized with an approach that is interdisciplinary and multidimensional in nature for a given decision, situation, activity or event as pointed out in Ricciardi (2004) and Ricciardi (2006). When an individual makes judgments relating to a financial instrument the process incorporates both a collection of financial risk measurements and behavioral risk indicators (Ricciardi, 2004). Weber (2004) has offered this perspective of risk perception:

> First, perceived risk appears to be subjective and, in its subjectivity, casual. That is, people's behavior is mediated by their perceptions of risk. Second, risk perception, like all other perception, is relative. We seem to be hardwired for relative rather than absolute evaluation. Relative judgments require comparisons, so many of our judgments are comparative in nature even in situations where economic rationality would ask for absolute judgment. Closer attention to the regularities between objective events and subjective sensation and perception well documented within the discipline of psychophysics may provide additional insights for the modeling of economic judgments and choice. (p. 172)

Risk is a distinct attribute for each individual for the reason that what is perceived by one person as a major risk may be perceived by another as a minor risk. Risk is a normal aspect of everyone's daily lives; the idea that a judgment has "zero risk" or "no degree of uncertainty" does not exist. Risk perception is the way people "see" or "feel" toward a potential danger or hazard. The concept of risk perception attempts to explain the evaluation of a risky situation (event) on the basis of instinctive and complex decision making, personal knowledge, and acquired information from the outside environment (e.g., different media sources). Sitkin and Weingart (1995) defined risk perception as "an individual's assessment of how risky a situation is in terms of probabilistic estimates of the degree of situational uncertainty, how controllable that uncertainty is, and confidence in those estimates" (p. 1575). Falconer (2002) provided this viewpoint:

> Although we use the term risk perception to mean how people react to various risks, in fact it is probably truer to state that people react to hazards rather that the more nebulous concept of risk. These reactions have a number of dimensions and are not simply reactions to physical hazard itself, but they are shaped by the value systems held by individuals and groups. (p. 1)

The prevalent technical jargon within the risk perception literature has emphasized the terminology risk, hazard, danger, damage, catastrophic or injury as the basis for a definition of the overall concept of perceived risk. Risk perception encompasses both a component of hazard and risk; the concept appears to entail an overall awareness, experience or understanding of the hazards or dangers,

the chances or possible outcomes of a specific event or activity. MacCrimmon and Wehrung (1988) in the field of management define perceived risk into three main groupings: (1) the amount of the loss, (2) the possibility of loss, and (3) the exposure to loss. Essentially, perceived risk is a person's opinion (viewpoint) of the likelihood of risk (the potential of exposure to loss, danger or harm) associated with engaging in a specific activity. Renn (1990) provided a summary of findings in which perceived risk is a function of the following eight items:

1. Intuitive heuristics, such as availability, anchoring, overconfidence, and others.
2. Perceived average losses over time.
3. Situational characteristics of the risk or the consequences of the risk event.
4. Associations with the risk sources.
5. Credibility and trust in risk-handling institutions and agencies.
6. Media coverage (social amplification of risk-related information).
7. Judgment of others (reference groups).
8. Personal experiences with risk (familiarity). (p. 4)

## WHAT IS PERCEPTION?

As a general rule, academic studies on risk or investor perception fail to express a working or introductory definition of the term "perception" or neglect to address the issue of perception in any substantive form or discussion, whereas works by Chiang and Vennkatech (1988), Epstein and Pava (1994), Epstein and Pava (1995), and Pinegar and Ravichandran (2003) provide the term "perception" in the title and failed to discuss the term or concept again in their writings. Unfortunately, this is rather misleading to the reader in regards to the true subject matter of the academic work. Even though much of the research on perception is basic knowledge for researchers in the behavioral sciences and organizational behavior, it has been essentially disregarded or not adopted for application by researchers in traditional finance. The work of Gooding (1973) on the subject of investor perception provides the only work in finance that has provided an extensive discussion of perception in terms of a behavioral perspective. Only a small number of research papers by economists have addressed the notion of perception in a substantive manner in works by Schwartz (1987), Schwartz (1998), and Weber (2004).

The notion of perception or perceived risk implies that there is a subjective or qualitative component, which is not acknowledged by most academics from the disciplines of finance, accounting, and economics. Webster's dictionary has defined perception as "the act of perceiving or the ability to perceive; mental grasp of objects, qualities, etc. by means of the senses; awareness; comprehension." Wade and Tavris (1996) provided this "behavioral meaning of perception" as the "process by which the brain organizes and interprets sensory information" (p. 198). Researchers in the field of organizational behavior have offered these two viewpoints on perception:

1. The key to understanding perception is to recognize that it is a unique interpretation of the situation, not an exact recording of it. In short, perception is a very complex cognitive process that yields a unique picture of the world, a picture that may be quite different from reality. (Luthans, 1998, p. 101)
2. Perception is the selection and organization of environmental stimuli to provide meaningful experiences for the perceiver. It represents the psychological process whereby people take information from the environment and make sense of their world. Perception includes an awareness of the world—events, people, objects, situations, and so on—and involves searching for, obtaining, and processing information about that world. (Hellriegel, Slocum, and Woodman, 1989, pp. 61–62)

Perception is how we become conscious about the world and ourselves in the world. Perception is also fundamental to understanding behavior since this process is the technique by which stimuli affect an individual. In other words, perception is a method by which a person organizes and interprets their sensory intuitions in order to give meaning to their environment regarding their awareness of "events" or "things" rather than simply characteristics or qualities. The process of perception involves a search for the best explanation of sensory information an individual can arrive at based on a person's knowledge and past experience. At some point during this perceptual process, illusions can be intense examples of how an individual might misconstrue information and incorrectly process this information (Gregory 2001). Ittelson and Kilpatrick (1951) provided this point of view on perception:

> What is perception? Why do we see what we see, feel what we feel, hear what we hear? We act in terms of what we perceive; our acts lead to new perceptions; these lead to new acts, and so on in the incredibility complex process that constitutes life. Clearly, then an understanding of the process by which man becomes aware of himself and his world is basic to any adequate understanding of human behavior . . . perception is a functional affair based on action, experience and probability. (pp. 50, 55)

Morgan and King (1966), elaborated further with their description of perception from the field of psychology. They provided two distinctive definitions of perception:

1. Tough-minded behavioralists, when they use the term at all define perception as the process of discrimination among stimuli. The idea is if an individual can perceive differences among stimuli, he will be able to make responses which show others that he can discriminate among the stimuli. . . . This definition avoids terms such as experience, and it has a certain appeal because it applies to what one can measure in an experiment. (p. 341)
2. Another definition of perception is that it refers to the world as experienced—as seen, heard, felt, smelled, and tasted. Of course we cannot put ourselves in another's place, but we can accept another person's verbal reports of his experience. We can also use our own experience to give us some good clues to the other person's experience. (p. 341)

The academic literature has revealed a wide interpretation among the different branches of psychology regarding the exact meaning of the concept of perception. (See Allport [1955], Garner, Hake, and Eriksen [1956], Hochberg [1964], Morgan and King [1966], Schiffman [1976], Bartley [1980], Faust [1984], McBurney and Collings [1984], Cutting [1987], Rock [1990], Rice [1993], and Rock [1995].) This is a similar predicament in terms of the different interpretations of risk across various disciplines. Researchers from the area of finance and investments should focus on these basic characteristics of perception:

- An individual's perception is based on their past experience of a similar event, situation or activity.
- People focus or pay attention to, different components (information) of the same situation.
- A major premise of perception is individuals have the ability to only process a limited number of facts and pieces of information at a time in order to make a judgment or decision concerning a certain activity, event or situation.
- In general, it's human nature to organize information so we can make sense of it. (We have a tendency to make new stimuli match what we already understand and know about our environment.)
- A stimulus (impulse) that is not received by an individual person has no influence (effect) on their behavior while, the stimulus they believe to be authentic, even though factually inaccurate or unreal, will affect it.
- Perception is the process by which each individual senses reality and arrives at a specific understanding, opinion, or viewpoint.
- What an individual believes he or she perceives may not truly exist.
- A person's behavior is based on their perception of what reality is, not necessarily on reality itself.
- Lastly, perception is an active process of decision making, which results in different people having rather different, even opposing, views of the same event, situation or activity.

One final perspective is the one presented by Kast and Rosenzweig (1974) who summarized the entire discussion of perception:

> A direct line of "truth" is often assumed, but each person really has only one point of view based on individualistic perceptions of the real world. Some considerations can be verified in order that several or many individuals can agree on a consistent set of facts. However, in most real-life situations many conditions are not verifiable and heavily value laden. Even when facts are established, their meaning or significance may vary considerably for different individuals. (p. 252)

## A Visual Presentation of the Perceptual Process: The Litterer Perception Formation Model

Here we discuss Litterer's simple perception formation model (Litterer, 1965), shown in Figure 10.1, from the area of organizational behavior in order to provide a visual

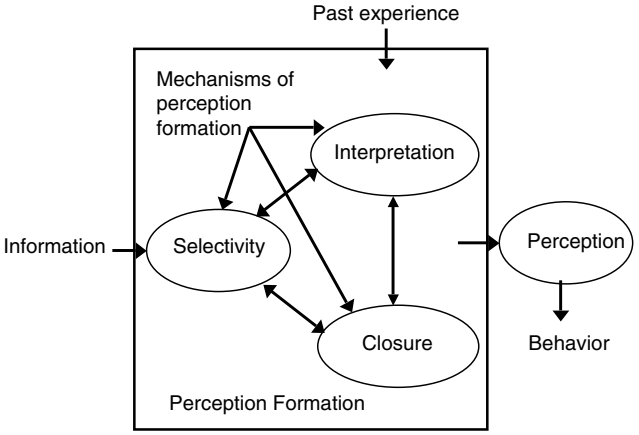


**Figure 10.1** The Litterer Perception Formation Model
*Source:* Litterer, J. A. (1965). *The Analysis of Organizations*, p. 64. New York: John Wiley & Sons.

presentation and further explanation of the perceptual decision-making process. This model provides a good application of the previous discussion of perception. This perception model has been described in detail by Kast and Rosenzweig (1974) and Kast and Rosenzweig (1985) from the field of management and applied in finance by Gooding (1973) in an extensive research study on investor perception.

Litterer's model provides an illustration regarding how perceptions are produced and thus affects an individual's behavior. There are two inputs (external factors) to this perceptual process, which are information (e.g., financial data) and past experience of the individual (e.g., the decision making process of the investor). The model contains three "mechanisms" of perception formation that are considered internal factors (developed from within a person) which are selectivity, interpretation and closure. The notion of selectivity (selective perception) is an individual only selects specific information from an overwhelming amount of choices that is received (that is, a method for contending with information overload). In essence, we can only concentrate on and clearly perceive only a few stimuli at a time. Other activities or situations are received less visibly, and the remaining stimuli become secondary information in which we are only partially aware of. During this stage, a person might unconsciously foresee outcomes, which are positive (e.g., high returns for their personal investment portfolio). A person may assign a higher than reasonable likelihood of a specific outcome if it is intensely attractive to that individual decision maker. Ultimately, this category of selectivity can be related to voluntary (conscious) or involuntary (unconscious) behavior since a person might not decide upon the rational (optimal) decision and instead select from a set of less desirable choices (that is, the idea underlying the principles of prospect theory and heuristics). However, the choices might not be "less desirable," at least in some cases. These options might be the only feasible ones available given the circumstances, lack of data or pressure of time.

The purpose of the second mechanism known as interpretation makes the assumption that the same stimulus (e.g., a specific risky behavior or hazardous activity) can

be understood in a different way among a number of decision makers. This process of interpretation relies on a person's past experience and value system. This mechanism provides a structure for decoding a variety of stimuli since an individual has an inclination to think or act in a certain way regarding a specific situation or activity. Lastly, the closure mechanism in perception formation concerns the tendency of individuals to have a "complete picture" of any specified activity or situation. Therefore, an individual may perceive more than the information appears to reveal. When a person processes the information, he or she attaches additional information to whatever appears suitable in order to close the thought process and make it significant. "Closure and interpretation have a feedback to selectivity and hence affect the functioning of this mechanism in subsequent information processing" (Kast and Rosenzweig, 1970, p. 218).

Our discussion of perception has provided some important principles on the perceptual process that should provide an enhanced understanding of the notion of perceived risk throughout this chapter. The discussion has attempted to demonstrate the complexity of the perceptual decision-making process from a behavioral finance viewpoint. The awareness of this perceptual process is connected directly to how investors process information under the assumptions of behavioral finance such as bounded rationality, heuristics, cognitive factors, and affective (emotional) issues.

## JUDGMENT AND DECISION MAKING: HOW DO INVESTORS PROCESS INFORMATION WITHIN ACADEMIC FINANCE?

The finance literature has two major viewpoints in terms of how individual investors and financial professionals process information:

1. The standard finance academic's viewpoint that investors make decisions according to the assumptions of the efficient market hypothesis.
2. The behavioral finance literature's perspective that individuals make judgments based on and are influenced by heuristics, cognitive factors, and affective (emotional) issues.

In order to understand and consider the notion of the psychology of risk, it is necessary to have a basic knowledge of how information is processed from a standard and behavioral finance points of view.

### The Standard Finance Viewpoint: The Efficient Market Hypothesis

Since the 1960s, the efficient market hypothesis (EMH) has been one of the most important theories within standard finance (Ricciardi, 2004, 2006). The central premise of the EMH is that financial markets are efficient in the sense that investors within these markets process information instantaneously and that stock prices completely reflect all existing information according to Fama (1965a, 1965b). The following is a brief description of each of the three different types of market efficiency:

1. **The weak form.** The market is efficient with respect to the history of all past market prices and information is fully reflected in securities values.
2. **The semistrong form.** The market is efficient in which all publicly available information is fully reflected in securities values.
3. **The strong form.** The market is efficient in that all information is fully reflected in securities prices.

Nichols (1993) provided this point of view on the EMH, "implicit in Fama's hypothesis are two important ideas: first, that investors are rational; and second, that rational investors trade only on new information, not on intuition" (p. 3). In other words, participants exist in a market in which investors have complete information (knowledge), make rational judgments and maximize expected utility. The long-lasting dialogue (debate) about the validity of this theory has provoked an assortment of academic research endeavors that have investigated the accuracy of the three different forms of market efficiency. In reality, most individual investors are surprised when informed that a vast amount of substantive research supports the EMH in one form or another.

Modern financial theory (standard finance) is based on the premise that individuals are rational in their approach to their investment decisions. College students and financial experts are taught that investors make investment choices on the basis of all available information (public and private) according to the tenets of the EMH. For example, an individual utilizes a specific investment tool such as stock valuation that is applied in a rational and systematic manner. Ultimately, the objective of this approach for investors is the achievement of increased financial wealth. Advocates of the efficient market theory argue that it is futile to practice or to apply certain investment techniques or styles since an investor's expertise and prospects are already reflected either in a specific stock price or the overall financial market. Therefore, it is unrealistic for investors to spend their valuable time and resources in order to attempt to "outperform the market." Professional investment managers and behavioral finance academics have suggested that market inefficiencies (e.g., the evidence in the existence of market anomalies such as the January Effect) exist at certain points in time. First, the argument for market inefficiency would allow for arbitrage opportunities (the chance to find mispriced securities and generate superior returns) within financial markets. If some investors believe the chance to arbitrage does exist, they will attempt to identify a security first so they can profit by exploiting that information and utilize a specific active investment style such as technical analysis.

Nevertheless, supporters of the efficient market philosophy believe current prices already reflect all knowledge (information) about a security or market. Secondly, if market inefficiencies exist this implies investors may sometimes make irrational investment decisions or judgments

that do not comply with the strong assumptions of rationality. Therefore, this would demonstrate that individuals are influenced by some different types of cognitive (mental) processes and/or affective (emotional) factors. These types of behaviors in tandem with market inefficiencies could result in the following issues: (1) investor perceptions are influenced by their current risk judgments concerning a certain financial instrument or the overall markets, and (2) individuals failure to discover and determine the right investment such as selecting a stock or mutual fund investment.

### The Behavioral Finance Perspective: The Significance of Information Overload and the Role of Cognitive Factors

The question that should be asked regarding the assumptions of the EMH is "Do investors process information this logically, efficiently, properly, and neatly?" Faust (1984) made this observation about the poor judgment abilities of scientists and other experts in which "cognitive limitations . . . lead to frequent judgment error and . . . set surprisingly harsh restrictions on the capacity to manage complex information and to make decisions" (p. 3). Statman (2005) provided this perspective, "Investors were never 'rational' as defined by standard finance. They were 'normal' in 1945, and they remain normal today" (p. 31).

In recent years, individual investors, investment professionals, and financial academics are sometimes overwhelmed by the amount of available information and the abundant investment choices with the advancement of information technology and the Internet. These new forms of Internet communication include online search engines, chat rooms, bulletin boards, web sites, blogs, and online trading. For investors, a direct link exists between the cognitive biases and heuristics (rules of thumb) espoused by behavioral finance and the problems associated with information overload. *Information overload* is defined as "occurring when the information processing demands on an individual's time to perform interactions and internal calculations exceed the supply or capacity of time available for such processing" (Schick, Gordon, and Haka, 1990, p. 199). In the future, this problem of "information overload" can only be expected to worsen when the following statistics in terms of the expected upsurge of available information attributed to the Internet Revolution are considered:

> **300,000:** Number of years has taken the world population to accumulate 12 exabytes of information (the equivalent of 50,000 times the volume of the Library of Congress), according to a study by the University of California at Berkeley.
> **2.5:** Number of years that experts predict it will take to create the next 12 exabytes. (Macintyre, 2001, p. 112)

This observation concerning the relationship between the tenets of behavioral finance and the problems of information overload is supported by Paredes (2003), who wrote:

> Studies making up the field of behavioral finance show that investing decisions can be influenced by various cognitive biases on the part of investors, analysts, and others . . . An extensive psychology literature shows that people can become overloaded with information and make worse decisions with more information. In particular, studies show that when faced with complicated tasks, such as those involving lots of information, people tend to adopt simplifying decision strategies that require less cognitive effort but that are less accurate than more complex decision strategies. The basic intuition of information overload is that people might make better decisions by bringing a more complex decision strategy to bear on less information than by bringing a simpler decision strategy to bear on more information. (p. 1)

Behavioral finance focuses on the theories and concepts that influence the risk judgment and final decision-making process of investors, which includes factors known as cognitive bias or mental mistakes (errors) (Ricciardi, 2004, 2006). As human beings we utilize specific mental mechanisms for processing and problem solving during our decision making known as cognitive processes. Cognitive processes are the mental skills that permit an individual to comprehend and recognize the things surrounding you. This process is taken a step further in terms of the cognitive factors and mental errors committed by investors. Those in the behavioral finance camp study the understanding of how people think and identify errors made in managing information known as heuristics (rules of thumb) by all types of investors. Researchers in financial psychology (behavioral finance) have conducted studies that have shown humans are remarkably illogical regarding their money, finances, and investments. (See, for example, Kahneman, Slovic, and Tversky [1982]; Plous [1993]; Piatelli-Palmarini [1994]; Olsen [1998]; Olsen and Khaki [1998]; Shefrin [2000]; Shefrin [2001a]; Warneryd [2001]; Nofsinger [2002]; Bazerman [2005]; Shefrin [2005]; Adams and Finn [2006]; Pompian [2006]; and Ricciardi [2006].) In essence, decision making pertaining to risk frequently departs from the standard finance's assumptions of rationality and instead adheres to the ideas associated with behavioral finance's tenets of bounded rationality. Later in this chapter, we examine the affective (emotional) aspects of how investors make risk assessments and judgments according to the principles of behavioral finance.

## FINANCIAL AND INVESTMENT DECISION MAKING: ISSUES OF RATIONALITY

This section provides a general overview of the debate between classical decision making (the proponents of standard finance) and behavioral decision making (the supporters of behavioral finance). Rational financial and investment decision making has been the cornerstone of traditional (standard) finance since the 1960s. The standard finance literature advances the notion of rationality in which individuals make logical and coherent financial and investment choices. In contrast, behavioral finance

researchers have supported the concept of behavioral decision theory in which the concepts of bounded rationality, cognitive limitations, heuristics, and affect (feelings) are the central theoretical foundation. Customarily, standard finance has rejected the notion that certain behavioral and psychological factors might influence and prevent individuals from making optimal investment decisions. Curtis (2004) provided this assessment of both schools of academic thought:

> Modern portfolio theory represents the best learning we have about how capital markets actually operate, while behavioral finance offers the best insights into how investors actually behave. But markets don't care what investors think of as risk, and hence idiosyncratic ideas about risk and what to do about it are bound to harm our long-term investment results. On the other hand, Daniel Kahneman, Amos Tversky, and their followers have demonstrated beyond doubt that we all harbor idiosyncratic ideas and that we tend to act on them, regardless of the costs to our economic welfare. (p. 21)

According to classical decision theory, the standard finance investor makes judgments within a clearly defined set of circumstances, knows all possible alternatives and consequences, and selects the optimum solution. The discipline of standard finance has advanced and flourished on four basic premises in terms of rational behavior:

1. Investors make rational (optimal) decisions.
2. Investors' objectives are entirely financial in nature, in which they are assumed to maximize wealth.
3. Individuals are unbiased in their expectations regarding the future.
4. Individuals act in their own best (self) interests.

Classical decision theory has often been described as the basic model of how investors process information and make final investment decisions. According to Statman (1999), an attractive aspect of the standard finance perspective is "it uses a minimum of tools to build a unified theory intended to answer all the questions of finance" (p. 19). Thus, by advocating rationality, standard finance researchers have been able to create influential theories such as modern portfolio theory (MPT) and EMH. At the same time, these researchers have been able to develop effective risk analysis and investment tools such as the arbitrage pricing theory (APT), the capital asset pricing model (CAPM), and the Black-Scholes option pricing model in which investors can value financial securities and provide analysis in an attempt to predict the expected risk and return relationship for specific investment products. Nevertheless, an extensive debate has ensued about the validity of rational choice (that is, issues of rationality) between the disciplines of economics and psychology in works by Arrow (1982), Hogarth and Reder (1986), Antonides (1996), Conlisk (1996), Schwartz (1998), and Carrillo and Brocas (2004). According to Arrow (1982), the "hypotheses of rationality have been under attack for empirical falsity almost as long as they have been employed in economics" (p. 1).

Psychologists from the branches of cognitive and experimental psychology have made the argument that the basic assumptions of classical decision theory are incorrect since individuals often act in a less than fully rational manner. According to the assumptions of behavioral decision making, the behavioral finance investor makes judgments in relation to a problem that is not clearly defined, has limited knowledge of possible outcomes and their consequences, and chooses a satisfactory outcome. The disciplines of behavioral finance and economics were founded on the principles of bounded rationality by Simon (1956) in which a person utilizes a modified version of rational choice that takes into account knowledge limitations, cognitive issues, and emotional factors. Singer and Singer (1985) described the difference between two sets of decision makers from this viewpoint, "economists seek to explain the aggregate behavior of markets, psychologists try to describe and explain actual behavior of individuals" (p. 113). A noteworthy criticism of standard finance was offered by Skubic and McGoun (2002), "for a discipline having individual choice as one of its fundamental tenets, finance surprisingly pays little attention to the individual" (p. 478).

## The Standard Finance Viewpoint: Classical Decision Theory

Within the fields of finance and economics, there is still an ongoing debate relating to the subject of rationality. As explained earlier in this chapter, traditional economics and standard finance are based on the classical model of rational economic decision making. In general, standard finance assumes that all individuals are wealth maximizers. In other words, an investor is considered rational if that person selects the most preferred choice, customarily defined as maximizing an individual's utility or value function. This rational investment decision maker is assumed to maximize profits, possess complete knowledge, and capitalize on his or her own economic well-being. Moreover, rational behavior described by the classical model of decision making employs a well-structured judgment process based on the maximization of value, a painstaking and all-inclusive search for all information, and an in-depth analysis of alternatives. Classical decision theory makes the assumption that an individual makes well-informed systematic decisions which are in their own self-interest and the decision maker is acting in a world of complete certainty. March and Shapira (1987), provide the following assessment:

> In classical decision theory, risk is most commonly concerned as reflecting variation in the distribution of possible outcomes, their likelihoods, and their subjective values. Risk is measured either by nonlinearities in the revealed utility for money or by the variance of the probability distribution of possible gains and losses associated with a particular alternative. (p. 1404)

Under the tenets of rational behavior, an investor is assumed to possess the skill to predict and consider all pertinent issues in making judgments and to have infinite computational ability. Rationality suggests that individuals, firms, and markets are able to predict future events without bias and with full access to relevant information

at the time the decision is to be made. A person cannot select a course of action that is not presented or cannot consider information that is unknown.

Those in the camps of standard finance and conventional economics make the assumption that an individual investor based on the notion of rational behavior maximizes an objective value function under a specified collection of restrictions in a world of perfect markets. The basis of the work by Savage (1954) focused on expected utility, which is the central aspect of the neoclassical theory of rational economic behavior. Decisions are made based on the following three assumptions: (1) within a predetermined collection of objective outcomes and parameters; (2) with (subjectively) known probability distributions of outcomes for each option; and (3) in such a way as to maximize the expected value of a given utility function. Moreover, Doucouliagos (1994) described three key notions of rationality, which are: "(1) maximizing (optimizing) behavior; (2) the cognitive ability to exercise rational choice; and (3) individualistic behavior and independent tastes and preferences" (p. 877). While Coughin commented, "the neoclassical model in economics is built on the concept of the economic actor who is a rational calculator operating in a free and competitive marketplace" (1993, p. A8).

The optimal or normative approach to financial decision-making has emphasized that rationality as the foundation of standard finance theories and models such as the EMH, modern portfolio theory, the CAPM, and the dividend discount model. These theories and concepts are based on the notion that investors behave in a rational, predictable, and an unbiased manner. Ricciardi and Simon (2000a) provided this standpoint on the judgment process:

> Investment decisions regarding an individual stock or within the entire portfolio with the objective of maximizing their profits for a minimum level of risk. Rational investors will only make an investment decision (buy, hold, or sell) in a systematic or logical manner after they have applied some sort of accepted investment approach such as fundamental analysis. (p. 7)

The assumption made is that investors utilize conventional investment techniques or financial models that have an established historical presence.

## The Behavioral Finance Perspective: Behavioral Decision Theory

Behavioral economics and financial psychology have explored various degrees of rationality and irrational behavior in which individuals and groups may act or behave differently in the real world, departing from the constrained assumptions of rationality supported by the standard finance literature. The alternative disciplines of behavioral finance, economics, and accounting depart from the purely traditional statistical and mathematical models in which rationality (that is, classical decision theory) has been the centerpiece of the accepted theory across a spectrum of different disciplines (e.g., standard finance, conventional economics, traditional accounting).

The alternative perspective is known as *behavioral decision theory* (*BDT*), which has an extensive academic history within the social sciences such as cognitive and experimental psychology that has provided a more descriptive and realistic model of human behavior. The basis of this theory is that individuals systematically infringe upon (violate) the normative tenets of economic (finance) rationality by: (1) miscalculating (underestimating or overestimating) probabilities, and (2) making choices between different options based on noneconomic (nonfinancial) factors. (See, for example, Edwards [1954], Slovic [1972], Slovic, Fischhoff, and Lichtenstein [1977], Einhorn and Hogarth [1981], Kahneman, Slovic and Tversky [1982], Slovic, Lichtenstein, and Fischhoff [1988], Weber [1994], Gigerenzer and Goldstein [1996], Mellers, Schwartz, and Cooke [1998], Mullainathan and Thaler [2000], Shefrin [2001a], Warneryd [2001], Gowda and Fox [2002], Bazerman [2005], Barberis and Thaler [2005], Coleman [2006], and Taylor-Gooby and Zinn [2006].)

BDT explains how the human aspects of decision making affect individuals such as the measurement of common systematic errors that result in individual investors and professional investors departing from rational behavior. In its simplest form, the behavioral decision maker is influenced by what he or she perceives in a given situation, event, or circumstance. For this discussion, one of the substantive aspects of BDT is the significant role of *bounded rationality*. Bounded rationality proposes that decision makers are limited by their values and unconscious reflexes, skills, and habits as identified by Simon (1947, 1956, and 1997). In effect, bounded rationality is the premise that economic rationality has its limitations, especially during the judgment process under conditions of risk and uncertainty. According to Ricciardi (2006), investors would identify more with the tenets of bounded rationality proposed by behavioral finance instead of the limited constraints of rationality espoused by standard finance.

According to behavioral finance decision theory (the descriptive model), an investor displays cognitive bias, heuristics (rules of thumb), and affective (emotional) factors that have been disregarded by the assumptions of rationality under *classical finance decision theory* (the normative model). Shefrin (2000) clarifies the difference between cognitive and emotional issues, "cognitive aspects concern the way people organize their information, while the emotional aspects deal with the way people *feel* as they register information" (p. 29). Olsen (2001) provided the following perspective of the behavioral finance decision-making process:

- Financial decision makers' preferences tend to be multifaceted, open to change and often formed during the decision process itself.
- Financial decision makers are satisficers and not optimizers.
- Financial decision makers are adaptive in the sense that the nature of the decision and environment within which it is made influence the type of the process utilized.

- Financial decision makers are neurologically predisposed to incorporate affect (emotion) into the decision process. (p. 158)

Behavioral finance is based on the assumption that individuals are sometimes irrational or only quasi-rational (Thaler, 1994), and they are often inconsistent in terms of strict rationality in their investment decisions relative to standard finance's notion of rationality. Additionally, behavioral finance advocates believe that investors make decisions at different levels of rationality or satisfaction according to Mullainathan and Thaler (2000) and individuals should realize the importance of understanding the notion of bounded rationality as indicated by Barberis and Thaler (2005) and Bazerman (2005). Investor judgment is influenced by internal and external factors such as: (1) the psychology of other individuals or groups within the marketplace (e.g., the notion of crowd psychology, herd behavior) and (2) the favorable or unfavorable memory of a prior financial or investment decision (this is dependent on whether the final outcome of the judgment was a success (gain) or failure (loss)).

A well-established premise (assumption) in behavioral finance is that investors make decisions according to the principles of prospect theory. Prospect theory emphasizes that there are lasting biases affected by cognitive and affective (emotional) processes that influence an individual's decisions under specific circumstances of risk-taking behavior and uncertainty. Schwartz (1998) stated that prospect theory makes the assumption an investor will assess outcomes in terms of gains or losses in relation to a specific reference point instead of the final value within their overall investment portfolio. Bernstein (1997) commented that "prospect theory discovered behavior patterns that had never been recognized by proponents of rational decision-making. . . . First, emotion often destroys the self-control that is essential to rational decision-making. Second, people are unable to understand fully what they are dealing with" (p. 24). Investors function in a world in which they are overconfident, hate to lose money, and at times, are extremely greedy, though all this is often in a predictable manner. Investors have revealed feelings of a "cynical nature" such as dread, worry, and procrastination, whereas other finance individuals have demonstrated a "hopeful state of mind" of pleasure, happiness, and grandiosity.

The Nobel Prize winner Herbert Simon criticized the discipline of standard economics for its reliance and support of the premise of rationality. In 1947, he offered this extensive criticism on the limits of standard rationality because it falls short of actual behavior in at least three aspects:

1. Rationality requires complete knowledge and anticipation of the consequences that will follow on each choice. In fact, knowledge of consequences is always fragmentary.
2. Since the consequences lie in the future imagination must supply the lack of experienced feeling in attaching value to them. But values can be only imperfectly anticipated.
3. Rationality requires a choice among all possible alternative behaviors. In actual behavior, only a very few of all these possible alternatives ever come to mind. (Simon, 1947, p. 81)

Furthermore, Simon (1956) rejected rational models of choice for ignoring situational and personal limitations, such as time and cognitive ability. In the 1950s, Simon developed and advanced the notion of *bounded rationality* that explored the psychological aspects that influence the economic judgment process. Kaufman, Lewin, Mincer, and Cummings (1989) provided this portrayal of a more realistic and practical person from the social sciences:

> A textbook description of behavioral man would run along the following lines: individuals typically do not maximize, but rather select the first alternative outcome that satisfies their aspiration level, and because there are severe limits to information and knowledge of alternative outcomes, people act on the basis of a simplified, ill-structured mental abstraction of the real world-an abstraction that is influenced by personal perceptions and past experiences. Although this model of man is largely foreign to economists, in various guises it underlies much of the industrial relations-oriented research done by scholars in personnel, organizational behavior, and sociology (p. 76).

Simon's work focused on the idea that the decision maker possessed limited information (knowledge) and did not always seek the best potential choice because of limited resources and personal inclinations. In essence, an investor would satisfice financial utility rather than maximize it, sometimes accepting a satisfactory investment alternative rather than the optimal choice (that is, maximize gains and minimize losses). Regarding this matter, behavioral finance departs from one or more of the assumptions of classical decision-making underlying the theory of rational choice (that is, the standard finance viewpoint). Rather than maximizing expected utility, investors attempt to find answers by what Simon labels "satisficing" and can be described as the following:

> A method for making a choice from a set of alternatives encountered sequentially when one does not know much about the possibilities ahead of time. In such situations, there may be no optimal solution for when to stop searching for further alternatives . . . satisficing takes the shortcut of setting an adjustable aspiration level and ending the search for alternatives as soon as one is encountered that exceeds the aspiration level. *(Gigerenzer and Todd, 1999,* p. 13)

Academic models of judgment and decision making have to take into account "known limitations" concerning our mind's capacities. Since human beings have cognitive limitations, we must utilize approximate methods to handle complex decisions. These techniques include cognitive processes that largely prevent the need for further information investigations, heuristics (e.g., mental shortcuts) that direct our search and decide when it should end, and simple judgment rules that utilize the information found as implicitly. Thaler (2000) divulged this viewpoint

in terms the evolution of economic man:

> My predictions can be summarized quite easily: I am predicting that Homo Economicus will evolve into Homo Sapiens. This prediction shouldn't be an outlandish one. It seems logical that basing descriptive economic models on more realistic conceptions of economic agents is bound to increase the explanation power of the models. Still, a conservative economist might (emotionally) scoff: 'If this were a better way of doing economics, we would already be doing it that way!' Why aren't all my predictions already true? And why should I expect things to change? . . . we can hope that new scholars in other disciplines can do for economics what cognitive psychologists such as Kahneman and Tversky have already done: offer us useful findings and theories that are relatively easy to incorporate into economic models (p. 140).

Later research extended Simon's initial ideas on bounded rationality in terms of utilizing straightforward judgments known as heuristics (rules of thumb) in order to make complex decisions was based on the contributions of Kahneman and Tversky (1974) and Kahneman, Slovic, and Tversky (1982). Payne, Bettman, and Johnson (1993) established that simple decision strategies are utilized to reduce a set of choices before implementing a more multifaceted approach or trade-off strategy to the remaining options (alternatives). These divergences from classical decision-making theory and the assumptions of rationality are all too apparent in terms of the extensive list of items that influence a person's perception of risk such as heuristics, issues of overconfidence, the notion of prospect theory, the influence of loss aversion, the concept of representativeness, issues of framing, the topic of anchoring, the notion of familiarity bias, the factors of perceived control, the issues of expert knowledge, the role of affect (feelings), and the influence of worry. Later in this chapter, we will discuss theories and concepts of behavioral finance that influence the decision maker's judgment process and conflict with the tenets of rationality espoused by those in the standard finance camp.

In summary, Hirshleifer (2001) provided a remarkable discussion of the widespread criticisms from both sides of the debate on the issue of rationality. He revealed weaknesses argued by the two schools of academic thought pertaining to standard finance and behavioral finance. The following are criticisms of the standard finance viewpoint or what Hirshleifer termed the "objection to fully rational approach":

- Standard finance theory of rationality involves impossible capabilities of calculation.
- Judgments are assumed to be objective and quantitative within an investment setting.
- The financial data and findings do not support the assumptions of rational choice.
- Irrational investors and inefficient financial markets should arbitrage away efficiently priced securities.
- Investors according to the assumptions of irrationality (e.g., bounded rationality) take on more risk and become wealthier.
- Accurate investors will obtain the knowledge and experience (learn) to make bad investment judgments.

The following are criticisms of the *behavioral finance* perspective or what Hirshleifer coined the "objection to psychological approach":

- The so-called behavioral biases (e.g., the role of cognitive limitations, the tools of heuristics) are unscientific.
- The decision-making process involves factors that are subjective and qualitative in nature.
- Experiments in laboratory settings that produce supposed behavioral ideas and findings are not significant.
- Rational investors and the financial markets should arbitrage away mispriced securities.
- Investors according to the assumptions of rationality make better judgments and acquire greater wealth.
- Confused individuals will obtain the skills and abilities (learn) to make good investment decisions.

This section has provided a brief discussion of the ongoing debate between classical decision making (the standard finance viewpoint) and behavioral decision theory (the behavioral finance perspective). For a more in-depth perspective of the rationality debate consult this sample of papers by Slovic, Finucane, Peters, and MacGregor (2002a), (2002b), and (2004) that offered a psychological perspective in terms of the role of affect (emotions) and rational behavior; Rubinstein (2001) provided a standard finance viewpoint of market rationality; and Barberis and Thaler (2005) discussed the subject of managerial and bounded irrationality as part of their extensive literature review of the discipline of behavioral finance.

## WHAT ARE THE MAIN THEORIES AND CONCEPTS FROM BEHAVIORAL FINANCE THAT INFLUENCE AN INDIVIDUAL'S PERCEPTION OF RISK?

As explained earlier in this chapter, an extensive number of research studies within the social sciences have demonstrated various factors that influence a person's perception of risk for different types of risky behaviors and hazardous activities. Rohrmann (1999) documented that the investigation of risk judgments (the principal foundation of risk research) has focused on these six main issues:

1. Risk acceptance issues for individual versus societal concerns.
2. The fundamental aspects of how information is processed (that is, the influence of heuristics and cognitive biases).
3. The connection between perceived risk versus actual risk in terms of different categories of hazardous situations and activities.
4. The issue of personality traits and demographic differences among a diverse population of subjects and respondents.
5. The findings that risk perception studies have been linked to statistical data on hazardous activities and

then, applied to the development of risk communication programs for experts and the general public.
6. The central role of cultural factors among an international research sample for a variety of different countries.

Ricciardi (2004) offers a comprehensive list of behavioral risk characteristics (see Table 10.1) that were examined by risk perception researchers in behavioral finance and accounting within a financial and investment setting. Table 10.1 provides the specific behavioral risk indicators that were examined by researchers in these two disciplines: (1) 12 risk behavioral attributes (characteristics) within behavioral accounting based on 12 research studies for the time period of 1975 to 2003, and (2) 111 behavioral risk indicators within behavioral finance for 71 endeavors for the time period of 1969 to 2002. However, below we will only provide a brief discussion of the prevalent cognitive issues and affective (emotional) factors of behavioral finance that influence a person's perception of risk including: heuristics, overconfidence, prospect theory, loss aversion, representativeness, framing, anchoring, familiarity bias, perceived control, expert knowledge, affect (feelings), and worry.

## Heuristics

Kahneman, Slovic, and Tversky (1982) noted that when individuals are faced with a complex judgment such as a statistical probability, frequency or incomplete information; various subjects utilize a limited number of heuristics that reduce the decision to a simpler task. Heuristics are simple and general rules a person employs to solve a specific category of problems under conditions that involve a high degree of risk-taking behavior and uncertainty. Myers (1989) provided this viewpoint on heuristics, "all of us have a repertoire of these strategies based on bits of knowledge we have picked up, rules we have learned, or hypotheses that worked in the past" (p. 286). These strategies known as heuristics in the formal sense are "rules of thumbs" that are considered very common in all types of decision-making situations. Furthermore, heuristics are a "cognitive tool" for reducing the time of the decision-making process for an individual investor or investment professional. In essence, "heuristics are mental shortcuts or strategies derived from our past experience that get us where we need to go quickly, but at the cost of sending us in the wrong direction" (Ricciardi and Simon, 2001, p. 19) or introducing biases that result in over or underestimating the actual outcome. An investor utilizes heuristics when given a narrow time frame in which he or she has to assess difficult financial circumstances and investment choices. Eventually, these mental processes (heuristics) result in the individual making "investment errors" based on their intuitive judgments. Plous (1993) wrote:

> For example, it is easier to estimate how likely an outcome is by using a heuristic than by tallying every past occurrence of the outcome and dividing by the total number of times the outcome could have occurred. In most cases, rough approximations are sufficient (just as people often satisfice rather than optimize). (p. 109)

The significance of heuristics in the domain of risk-taking behavior and uncertainty has been a major source of research within the area of judgment and decision making in works by Tversky and Kahneman (1973), Kahneman, Slovic, and Tversky (1982), Slovic (2000), and Gilovich, Griffin, and Kahneman (2002). Two major types of factors that have an affect on a person's perception of risk are the availability heuristic and overconfidence as indicated by Slovic, Fischhoff, and Lichtenstein (1979).

### Availability Heuristic

One of the underlying principles of risk perception research has been the availability heuristic based on the work of Tversky and Kahneman (1973). This heuristic is utilized in order to judge the likelihood or frequency of an event or occurrence. In various experiments in psychology, the findings have revealed individuals tend to be biased by information that is easier to recall, influenced by information that is vivid, well-publicized, or recent. An individual that employs the availability heuristic will be guided to judge the degree of risk of a behavior or hazardous activity as highly probable or frequent if examples of it are easy to remember or visualize. Furthermore, the availability heuristic provides the inclination for an individual to form their decisions on information that is easily available to them. The main issues that have involved the availability heuristic are (1) activities that induce emotions, (2) tasks that are intensely dramatic, and (3) actions that have occurred more recently have a propensity to be more accessible in our recent memory. Schwartz (1998) described the availability heuristic in this manner:

> Biases may arise because the ease which specific instances can be recalled from memory affects judgments about the relative frequency and importance of data. This leads to overestimation of the probability of well-publicized or dramatic events . . . or recent events along with the underestimation of less recent, publicized or dramatic events . . . A prominent example of the availability bias is the belief of most people that homicides (which are highly publicized) are more common than suicides, but, in fact, the reverse is true. (p. 64)

Another example of the application of the availability heuristic is a strong majority of individuals (subjects) are more likely to express or experience a high degree of anxiety (an increase in perceived risk) over flying in an airplane than driving in an automobile. This increased anxiety (fear) among the general public towards flying in airplanes occurs because of the extensive media coverage of the few major airline accidents ultimately increases an individual's perception of the risk, whereas an individual feels safer driving in an automobile. This is because an individual has the perception of control of the risky situation or task known as personal control. This conflicts with classical decision theory (that is, the standard finance perspective) since the rational choice (decision) is to fly in an airplane rather than to drive in a car if the person only considers and examines the statistical data on safety. The safety statistics reveal the number of automobile accidents and deaths from driving a car is far greater than the number of airplane crashes and deaths from airline accidents.

**Table 10.1** Risk Perception Studies from Behavioral Finance and Accounting: A Master List of Behavioral Risk Characteristics (Indicators)

Behavioral Accounting: 12 Behavioral Risk Attributes for 12 Research Studies

1. Familiarity factor or issues of familiarity (influence of stock name vs. withholding name of company)
2. Search for additional information
3. Worry
4. Voluntary
5. Control
6. Chance of a catastrophic outcome
7. Familiarity/Newness (new or old risk)
8. Immediacy (immediate or overtime)
9. Knowledge by management
10. Knowledge by participant
11. Loss outcome
12. Gain outcome

Behavioral Finance: 111 Behavioral Risk Indicators for 71 Research Endeavors

1. Quality of the stock
2. Financial loss
3. Concern for others
4. Optimism (Issues of confidence)
5. Complexity
6. Prestige of investment ownership
7. Personal attention requirement
8. Personal attention allowed
9. Locus of control
10. Potential for a large loss
11. Potential for a gain
12. Investor's knowledge
13. Objective knowledge factor
14. Worry factor
15. Confidence in own knowledge
16. Control
17. Knowledge
18. Catastrophic potential
19. Dread
20. Voluntariness
21. Equity
22. Novelty
23. Regret theory
24. Uncertainty
25. Framing
26. Multiple reference points
27. Prior Gains
28. Prior Losses
29. Degree of internalization
30. Frequency
31. Degree of externalization
32. Frequency
33. Psychological risk characteristic
34. Financial knowledge
35. Outcome uncertainty
36. Potential gains and losses
37. Perceived safety
38. Situational framing
39. Personal expectations,
40. Perceived control
41. Risk-seeking behavior
42. Adequacy of regulation
43. Attention
44. Knowledge factor
45. Likelihood of losing money
46. Time horizon
47. Typicality
48. Anxiety
49. Familiarity
50. Postponement of losses
51. Clarity of information
52. Independence of investment
53. Trust
54. Availability of information
55. Catastrophic risk
56. Ambiguity (uncertainty)
57. Confidence
58. The level of investment
59. Degree of hazard (and gain)
60. Chance of incurring a large loss
61. Economic expectations
62. Financial knowledge index
63. Chance or incurring a large gain
64. Locus of control index
65. Money ethics variable
66. Law of small numbers factor
67. Illusion of control
68. Overconfidence
69. Ability of competitors
70. Possibility of a loss
71. Magnitude of a loss
72. Gathering more information
73. Control over situation
74. Drawing on expertise
75. Consulting with colleagues
76. Sharing responsibility
77. Reputation
78. Seriousness
79. Losses delayed
80. Not known to investors
81. Not known to experts
82. Lose all money
83. Adverse effect on economy
84. Losses unobservable
85. Complex to understand
86. Unacceptable sales pressure
87. Unsound advice
88. Poor investor protection
89. No regulation
90. Unethical
91. Monitoring time
92. Information prior to purchase
93. Ruin
94. Perceived outcome control
95. Gain (favorable position)
96. Loss (unfavorable position)
97. Self-efficacy
98. Knowledge of investment principles
99. Control the possible returns of the decision
100. Control the risks involved in the problem
101. Personal consideration of making the decision
102. Familiarity assets vs. unfamiliarity assets
103. Taking more time to reach a decision
104. Reducing the number of decisions
105. Concern for below-target returns
106. Ruinous loss (potential for large loss)
107. Acquaintances who invest in instrument
108. Divergence of opinion (uncertainty)
109. Inability to estimate total amount of potential loss
110. Perceived personal control (Internal locus of control)
111. Uncertainty measure (lack of information, inability to assign probabilities with degree of confidence)

## Overconfidence

Overconfidence is another characteristic that influences a person's risk perception since there are many ways in which an individual tends to be overconfident about their decisions in terms of risk-taking behavior. Within the behavioral finance literature, overconfidence is one of the most documented biases according to Daniel and Titman (2000). Confidence can be described as the "belief in oneself and one's abilities with full conviction" whereas "overconfidence can be taken a step further in which overconfidence takes this self-reliant behavior to an extreme" (Ricciardi and Simon, 2000a, p. 13). As human beings, we have an inclination to overestimate our own skills, abilities, and predictions for success. Myers (1989) provided this viewpoint on the decision making process:

> Our use of quick and easy heuristics when forming judgments and our bias toward seeking confirmation rather than refutation of our ideas can give rise to the overconfidence phenomenon, an overestimation of the accuracy of our current knowledge. (p. 293)

A classic study in psychology by Fischhoff, Slovic, and Lichtenstein (1977) explored the issue of overconfidence. They provided a group of subjects (individuals) with a collection of knowledge-based questions. Each of the individuals in the research endeavor had to evaluate a set of predetermined questions in which the answers were absolute. Nevertheless, the participants in the study did not necessarily have knowledge of the answers to the survey questions. For each answer, a subject was expected to provide a percentage or score that measured their degree of confidence in terms of whether the person thought their answer was accurate. In summary, Ricciardi and Simon (2000a) provided this interpretation of the study:

> The results of this study demonstrated a widespread and consistent tendency of overconfidence. For instance, people who gave incorrect answers to 10 percent of the questions (thus the individual should have rated themselves at 90 percent) instead predicted with 100 percent degree of confidence their answers were correct. In addition, for a sample of incorrect answers, the participants rated the likelihood of their responses being incorrect at 1:1000, 1:10,000 and even 1:1,000,000. The difference between the reliability of the replies and the degree of overconfidence was consistent throughout the study. (p. 4)

Ultimately, individuals are very confident in their choices formed under the rules of heuristics and are considerably inattentive in terms of the exact manner in which their decision was formed.

Another category of overconfident behavior is the notion of the "It won't happen to me" bias. In this instance, individuals tend to consider themselves invulnerable to specific risky activities or events on an individual basis, while they would readily concede to these risks on a societal level. For instance, most individuals have a tendency to believe they are better than the average driver, more likely to live past the age of 80, and are less likely to be injured by consumer goods according to Slovic, Fischhoff, and Lichtenstein (1980). While Strong (2006) provided this viewpoint on the psychology of overconfidence, "most people think they are . . . above average in intelligence, and most investors think they are above-average stock pickers" (p. 278).

Within the risk perception literature, this overconfident behavior extends to expert individuals (e.g., safety inspectors) in which they ignore or underestimate the odds of a risky behavior or hazardous activity. When experts are required to rely on intuitive judgment, rather than on statistical data, they are prone to making the same variety of errors as novices (e.g., the general public). Slovic, Fischhoff, and Lichtenstein (1980) pointed out the existence of this expert overconfident behavior in the domain of technology occurred for several reasons such as failure to contemplate the way human mistakes influence technological systems, the notion of overconfidence in scientific knowledge, inattentiveness to how technological systems perform together as a whole, and failure to predict how people respond to safety procedures.

## Prospect Theory

The seminal work by Kahneman and Tversky (1979) advocated a new theory under conditions of risk-taking behavior and uncertainty known as prospect theory. Olsen (1997) noted prospect theory "gives weight to the cognitive limitations of human decision makers" (p. 63). Under the assumptions of prospect theory, an investor departs from the notion of rationality espoused by classical decision theory (the standard finance perspective) and instead an individual makes decisions on the basis of bounded rationality advocated by behavioral decision theory (the behavioral finance viewpoint). Kahneman and Tversky's prospect theory is based on the notion that people are loss averse in which they are more concerned with losses than gains. In effect, an investor on an individual basis will assign more significance to avoiding a loss than to achieving a gain.

Investors utilize a compartment in their brains or a type of "mental bookkeeping" during the decision-making process. For instance, an investor individualizes each financial decision into a separate account in their mind known as mental accounting. This investor has an inclination to focus on a specific reference point (e.g., the purchase price for a stock or the original stock investment cost) and their desire is to close each account with a profit (gain) for that single transaction. Heilar, Lonie, Power, and Sinclair (2001) described prospect theory from this perspective:

> This theory separates the decision choice process into two stages; in the first stage the menu of available choices is framed and edited in accordance with the decision maker's prior perceptions; in the second stage these prospects are evaluated in relation to the decision maker's subjective assessment of their likelihood of occurrence. The prospect with the highest expected outcome is selected. (p. 11)

A major component of prospect theory is known as the value function (see Figure 10.2). The individual value with respect to gains and losses are in comparison to a reference point in which the values for negative deviations from the reference point will be greater than the values placed

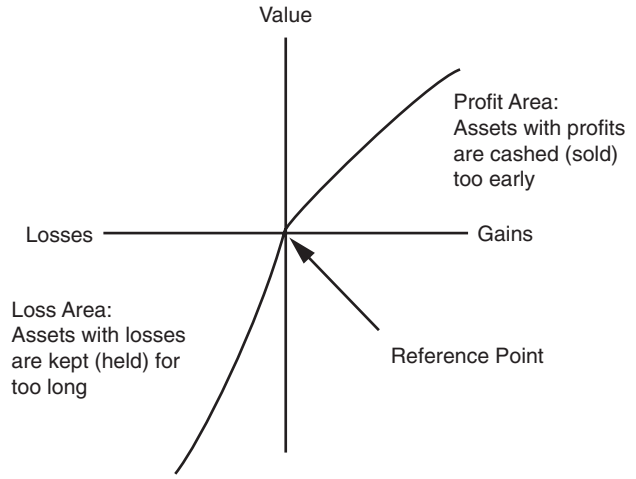


**Figure 10.2** Prospect Theory—A Hypothetical Value Function

on positive deviations. Investors treat outcomes as losses or gains from a subjective reference in two aspects: (1) people are risk averse with their investments which are performing well (that is, investment gains) and as a result they have an inclination to cash in their profits too early and (2) individuals are risk seekers for losses (that is, loss averse) and in order to avoid a realized loss they will take a gamble (by avoiding to sell the asset) that could result in an even greater loss. Furthermore, the argument is made that individuals weigh probabilities in a non-linear manner: small probabilities are overvalued (over-weighted) while changes in middle-range probabilities are undervalued (underweighted). Kahneman (2003) commented:

> The shift from wealth to changes of wealth as carriers of utility is significant because of a property of preferences we later labeled loss aversion . . . Loss aversion is manifest in the extraordinary reluctance to accept risk that is observed when people are offered a gamble on the toss of a coin. Most will reject a gamble in which they might lose $20, unless they are offered more than $40 if they win. (p. 726)

For instance, in the actual experiment by Kahneman and Tversky (1979) subjects were asked to evaluate a pair of gambles and to choose one of the options.

**Experiment 1:** Consider a decision between these two alternatives:
**Choice A:** A certain reward of $7,500 or
**Choice B:** An 80% chance of gaining $10,000, with a 20% likelihood of being paid $ 0.
**Question:** Which choice would give you the best prospect to capitalize on your profits?

A high percentage of individuals (that is, strong majority of subjects) selected the first option (Choice A), which is in effect the "sure gain." Kahneman and Tversky found that a large percentage of individuals happen to be risk averse when presented with the prospect of an investment profit. Accordingly, people selected Choice A which is the definite gain of $7,500 and this is considered the less preferred option. If individuals had selected Choice B, their general outlook on an aggregate basis would be a better option since there is a larger increase in wealth of $8,000. Within a portfolio of investments, the result would be calculated by: ($10,000 × 80%) + (0 + 20%) = $8,000. Most people are bothered (that is, may feel dread or worry) by the 20% likelihood in Choice B of a monetary result of zero (nothing). This alternative demonstrates the notion that diverse categories of investors prefer financial options that offer a high degree of certainty such as a "lump sum of cash" and have an aversion toward ambiguity (uncertainty).

An additional experiment (illustration) incorporates the expectations of losing money together with the uncertainty associated with this entire process.

**Experiment 2:** Consider the following options:
**Choice C:** A realized (fixed) loss of $7,500 or
**Choice D:** An 80% chance of losing $10,000, with a 20% possibility of losing no money at all.
**Question:** Which selection would give you the best opportunity to minimize your losses?

Most participants preferred Choice D because "the prospect for a 20% chance of not losing any money" despite the fact that this choice has more risk since within a portfolio of investments the result would be an $8,000 loss. Therefore, as indicated by standard finance (that is, tenets of classical decision theory), Choice C is the acceptable (rational) decision. Curran stated, "because people's horror of loses exceeds even their aversion to risks, say Kahneman and Tversky, they are willing to take risks—even bad risks" (1986, p. 64). Lastly, Naughton (2002) offered the following perspective on prospect theory: "Their work revolutionized the field of financial economics by proposing that behavioural biases in general, and prospect theory in particular are better explanations of how decisions are made in risky situations" (p. 110).

## Loss Aversion

Olsen (2000) noted "Early research, using utility-based models, suggested that investment risk could be measured by return distribution moments such as variance or skewness" (p. 50). In contrast, other researchers explored the subjective aspects of risk and discovered that individuals are loss averse. As explained earlier, a central assumption of prospect theory is the notion of loss aversion in which people designate more significance to losses than they allocate to gains. The notion of loss aversion is contrary to the tenets of modern portfolio theory since the discipline of standard finance makes the assumption that a loss and gain is equivalent (identical). In other words, according to basic statistical analysis, a loss is simply a "negative profit" and is thus, weighted in the same manner. From an investment standpoint, during the decision-making process, many investors appear thin-skinned and vulnerable to losses, and highly determined not to realize a financial loss. In some instances, investors exhibit a tendency or increased readiness to take risks in the desire of reducing or avoiding the entire loss (see Figure 10.2).

A main premise of loss aversion is that an individual is less likely to sell an investment at a loss than to sell an

investment that has increased in value even if expected returns are held constant. Several academic experiments in psychology have demonstrated that for some investors a loss bothers them twice as much in absolute terms than the pleasure from an equal gain. For example, an investor that loses $10,000 on a specific stock feels twice as much pain than if that person had a $10,000 profit (reward) on the same exact investment. Mendintz (1999) commented "we'll do foolish things to avoid finalizing and accepting losses that have already happened—a phenomenon many of us know as throwing good money after bad. So we'll spend hundreds of dollars to fix an old car not because it makes economic sense, but because we've already spent a lot on it" (p. 81). These "errors in judgment" often lead or result in an investor not selling their losing investment even though it is the correct financial decision.

## Representativeness

Another important heuristic that affects a person's perception of risk is known as representativeness. Behavioral finance refers to a fundamental mental mechanism that we set in motion because of abstract rules known as mental shortcuts that are part of the judgment process based on the work of Tversky and Kahneman (1971). "Decision makers manifesting this heuristic are willing to develop broad, and sometimes very detailed generalizations about a person or phenomenon based on only a few attributes of the person or phenomenon" (Busenitz, 1999, p. 330). Human beings utilize mental shortcuts that make it complicated to analyze new investment information accurately and without bias. Representativeness reflects the belief that a member of a category (e.g., risky behavior or hazardous activity) should resemble others in the same class and that, in effect, should resemble the cause that produced it. Ricciardi and Simon (2001) provided this perspective:

> Representativeness is but one of a number of heuristics that people use to render complex problems manageable. The concept of representativeness proposes that humans have an automatic inclination to make judgments based on the similarity of items, or predict future uncertain events by taking a small portion of data and drawing a holistic conclusion. (p. 21)

The representativeness heuristic is based on the notion that we tend to form an opinion in terms of events by how much they resemble other events which we are familiar. In so doing, we ignore relevant facts that should be included in our decision-making process, but are not. For instance, investors frequently predict the performance of an initial public offering by relating it to the previous investment's success (gain) or failure (loss). In some circumstances, shortcuts are beneficial, but in the case of investment decisions, they tend to render the person's judgments unreceptive to change. Some investors feel that this approach to the judgment process is so accurate; therefore, the desired outcome is irrefutable. This sometimes leads an investor to arrive at a conclusion quite different from what he or she intended and different from the desirable and correct conclusion. The noted scholar Piatelli-Palmarini (1994) made the point that the individual investor does not even realize that this thought process brought them someplace else. Our brain assumes that situations with similar traits are, in fact, identical when in reality they reveal a tendency to be quite different. Eaton (2000) illustrated the importance of this concept for investors:

> The effect of representativeness in investment decisions can be seen when certain shared qualities are used to classify stocks. Two companies that report poor results may be both classified as poor companies, with bad management and unexciting prospects. This may not be true, however. A tendency to label stocks as either bad-to-own or good-to-own based on a limited number of characteristics will lead to errors when other relevant characteristics are not considered. (p. 5)

Busenitz (1999) attempted to determine the risk-taking behavior of entrepreneurs who begin new business ventures as it relates to the area of cognitive psychology and decision making. He suggested that entrepreneurial risk-taking behavior can be attributed to the notion that entrepreneurs utilize heuristics and biases more than other types of business executives, which is likely to result in them perceiving a lesser amount of risk in a given decision circumstance. Busenitz asked two groups to fill out a questionnaire: entrepreneurs (124 usable responses) and corporate managers of large firms (95 usable responses) by measuring specific risk characteristics including overconfidence, representativeness, risk propensity, age, and education. The findings revealed that entrepreneurs certainly utilized representativeness (that is, they demonstrated a inclination to over generalize from a few factors or observations) more in their decision making practices and were more overconfident than senior managers of large organizations.

## Framing

Another indicator that influences a person's perception of risk is the format (frame) in which a situation or choice is presented. A person reveals framing behavior when an indistinguishable or equivalent depiction of an outcome or item results in a different final decision or inclination. Kahneman and Tversky (1979) utilized framing effects from two significant perspectives within the decision making process: (1) the environment or context of the decision and (2) the format in which the question is framed or worded. Essentially, the framing process is an evaluation of the degree of rationality in making decisions by constructing an examination of whether the equivalent question provided to an individual in two distinct but equal means will generate the same response. Duchon, Ashmos, and Dunegan (1991) presented this depiction of framing:

> Decision makers evaluate negative and positive outcomes differently. Their response to losses is more extreme than their response to gains which suggests, psychologically, the displeasure of a loss is greater than the pleasure of gaining the same amount. Thus, decision makers are inclined to take risks in the face of sure losses, and not take risks in the face of sure gains. (p. 15)

This next framing example is informative for understanding how individuals make decisions in terms of their

investments. For example, consider the "distinctive impressions" presented by these two options:

**Option A:** Would you invest all your money in a new business if you had a 50% chance of succeeding brilliantly?
**Option B:** Would you invest all your money in a new business if you had a 50% chance of failing miserably?

According to Weber (1991), "The success-frame in A makes it seem more appealing than the failure-framed B, although the probability of success versus failure is the same for both" (p. 96). In most instances, people choose the alternative that "seems less risky" which is Option A. The explanation for the selection of Option A was that this alternative provided the appearance that it is more psychologically soothing and pleasing instead of Option B as the best option. Research suggests that this concept proves that people tend to default to a form of mental sluggishness. We know we are biased, but we chose not to correct our heuristic perceptions, according to Ricciardi and Simon (2001, p. 24). Interestingly, an individual will consent to the situation as offered and make no attempt to reformulate it in a comparable and balanced manner (Piatelli-Palmarini 1994).

Academic researchers have found that small changes in the wording of judgments can have a prominent effect on choice behavior. "Subtle differences in how risks are presented can have marked effects on how they are perceived" (Slovic, Fischhoff, and Lichtenstein, 1982, p. 483). Thus, framing effects (that is, the presentation of information) can be utilized to modify an individual's perception of risk. For instance, Sitkin and Weingart (1995) investigated the association between a framing problem, risk perception, and risk-taking behavior. The subjects were 63 college students that were provided with a car-racing scenario (case study) in which the continued sponsorship of the venture was dependent on the success of winning. The decision-making process in terms of the case study was presented with a framing problem based on a potential for a gain or a prospect for a loss. The risk component of the case study instrument (that is, the car-racing scenario) was evaluated with specific risk attributes that included the probability of participation, the significance of opportunity versus the significance of the decision, the potential loss, the potential gain, whether this judgment was a negative or positive situation, and the likelihood of success. The findings for the study revealed that (1) situations that were framed positively were perceived as higher risk than circumstances that are framed negatively and (2) the extent (degree) to which subjects made risky decisions were inversely related to their level of given risk perception.

## Anchoring

Anchoring is used to explain the strong inclination we all have to latch on to a belief that may or may not be truthful, and use it as a reference point for upcoming decisions according to Ricciardi and Simon (2001). The process of anchoring within the decision-making process is utilized by an individual to solve intricate problems by selecting an initial reference point and slowly adjusting to arrive at a final judgment. For instance, "one of the most frequent anchors is a past event or trend. In attempting to project sales of a product for the coming year, a marketer often begins by looking at sales volumes for past years. This approach tends to put too much weight on past history and does not give enough weight to other factors" (Anderson, 1998, p. 94). Hammond, Keeney, and Raiffa (1998) presented this illustration of anchoring:

How would you answer these two questions?

**Question 1:** Is the population of Turkey greater than 35 million?
**Question 2:** What's your best estimate of Turkey's population?

Most people who replied to Question 2 were influenced by the "population of 35 million figure" that was revealed in Question 1 even though it has no factual foundation. The authors of this study utilized two anchoring scenarios: (1) for 50% of the experiments the "35 million figure" was employed and (2) for the other 50% of the cases this number was increased to a "100 million figure." The responses to Question 2 increased by millions when Question 1 was changed to the "100 million figure." The findings of this study illustrated that when people make judgments, their minds give inappropriate significance or overweighs the value of the original information. First impressions, rough calculations or statistical figures anchor subsequent thinking and choices (see Hammond, Keeney, and Raiffa, 1998).

Finally, if you reflect on the last risky activity you participated in, chances are that you formed an opinion of this event immediately upon engaging in it. From now on you will proceed to view each new bit of knowledge about this risky activity (e.g., mountain climbing) based on your first impression. Perhaps the cliché "you never get another opportunity to make a good first impression" is more truthful and accurate than we recognized, when you contemplate this anchoring effect. To further complicate this bias, even when individuals know they are anchoring, it is difficult to pull up the anchor. "Revising an intuitive, impulsive judgment will never be sufficient to undo the original judgment completely. Consciously or unconsciously, we always remain anchored to our original opinion, and we correct that view only starting from the same opinion" (Piatelli-Palmarini, 1994, p. 127).

## Familiarity Bias

Familiarity bias has been a subject of inquiry within the risk perception literature for an array of disciplines from the social sciences and business administration fields. In basic terms, "people prefer things that are familiar to them. People root for the local sports teams. Employees like to own their company's stock. The sports teams and the company are familiar to them" (Nofsinger, 2002, p. 64). Within the risk domain, familiarity bias is an inclination or prejudice that alters an individual's perception. When individuals make assessments of risky behaviors and hazardous activities for studies within cognitive psychology; the findings have shown people are more comfortable and tolerant of risk when they are personally familiar with a specific circumstance or activity. For example, risks that are familiar are feared less than those that are unfamiliar;

this provides an explanation as to why people overreact to unexpected information.

The term familiarity has been described by Gigerenzer and Todd (1999, p. 57) as "to denote a *degree* of knowledge or experience a person has respect to a task or object." Whittlesea (1993) provided a noteworthy description of the concept of familiarity from a behavioral perspective:

> A feeling of familiarity is the sine qua non of remembering. Judgments about one's personal past that are not accompanied by a feeling of familiarity do not feel like remembering, but instead feel like guessing or problem solving. In contrast, a feeling of familiarity is usually sufficient to make one feel one is remembering, whether or not the feeling is accompanied by recall of the detail of a prior experience. (p. 1235)

Gilovich (1981) presented this viewpoint on familiarity, "we form associations between existing circumstances and past situations and are influenced by what we consider to be the implications of these past events" (p. 797). Furthermore, Shefrin (2005) noted the relationship between familiarity bias and representativeness in which individuals "are prone to be excessively optimistic when they have familiarity with a situation and are able to picture themselves as representative of a successful person in that situation" (p. 46).

Since 1975, the psychology of familiarity has been a popular area of investigation within the behavioral accounting risk perception literature. In particular, familiarity bias was the main behavioral risk characteristic (indicator) in which behavioral accounting risk perception researchers explored for 12 research studies during the time period of 1975 to 2002 (see Ricciardi (2004)). Within the behavioral finance literature, familiarity bias has been applied in several areas of financial and investment decision making: (1) International finance and asset allocation in which investors have demonstrated a preference for investing in domestic stocks (familiar assets) rather than international stocks (unfamiliar assets); (2) Employee's that have invested most of their retirement savings in their company's stock (familiar assets); and (3) Portfolio managers have demonstrated a tendency to invest money in local companies or stocks with recognizable brand names or reputations. The risk perception literature review by Ricciardi (2004) revealed the notion of familiarity was addressed or alluded to in a number of research endeavors in behavioral finance. Baker and Nofsinger (2002) provided this description of familiarity bias from a behavioral finance point of view:

> People often prefer things that have some familiarity to them. Consequently, investors tend to put too much faith in familiar stocks. Because those stocks are familiar, investors tend to believe that they are less risky than other companies or even safer than a diversified portfolio. (p. 101)

## The Issue of Perceived Control

The association between control and perceived risk has been a prevalent topic in psychology since the late 1970s. Natalier (2001) offered this illustration of the relationship between control and a risky behavior (e.g., the act of riding on a motorcycle) "when the interaction between motorcyclist, motorcycle and environment is flawless, perfect control can be achieved. Control is the ability to foresee and navigate potential hazards, thus erasing risk in a material way" (p. 71). Strong (2006) presented this portrayal of the psychology of control within a gambling environment:

> Casinos are one of the great laboratories of human behavior. At the craps table, it is observable that when the dice shooter needs to throw a high number, he gives them a good, hard pitch to the end of the table. A low number, however, demands a nice gentle toss. Realistically, the force of the throw has nothing to do with the outcome of a random event like the throw of dice. Psychologists refer to this behavior as *illusion of control*. We like to pretend we are influencing the outcome by our method of throwing the dice. If you force the issue, even a seasoned gambler will probably admit that the dice outcome is random. (pp. 273–274)

The academic literature in the social sciences has offered a wide range of views on the true meaning of control. Two main forms of control are (1) locus of control (external versus internal control) and 2) perceived control (illusion of control). A person's locus of control explains the degree to which he or she perceives the ability to exert control over their own behavior and personal outcomes of a specific situation (see Rotter, 1971). External locus of control provides a person with the perception that chance or outside factors influence one's decision or final outcome of an event. Internal locus of control is the perception or belief that a person controls his or her own destiny in terms of the outcome of a judgment or circumstance.

Langer (1983) provided a different perspective of the psychology of control (perceived control) as the "active belief that one has a choice among responses that are differentially effective in achieving the desired outcome" (p. 20). According to Baker and Nofsinger (2002, p. 103): "People often believe that they have influence over the outcome of uncontrollable events." All types of individuals (e.g., experts, novices), to some extent, reveal a natural tendency and need to control situations that they encounter each day. People profess a desire to attempt to control a certain situation with the main objective of influencing the results or outcomes in their favor. Even in instances when control of an outcome is obviously in short supply; a person perceives that one has control over the outcome of a situation known as illusion of control as noted by Langer (1975). In effect, illusion of control makes a person believe based on their skills or diligence that he or she can influence and control the outcome of a random decision or situation (that is, based on the belief in their expertise, skill or ability to avoid large monetary losses) according to MacCrimmon and Wehrung (1988).

Within the literature on finance and investment decision making, the notion of how control influences an investor's perception of risk has become a well-noted and established area of inquiry. The academic studies in behavioral accounting by Koonce, McAnally, and Mercer (2001) and Koonce, McAnally, and Mercer (2005) have utilized a host of behavioral risk characteristics (indicators) which included a *control factor* developed by the Decision Research organization within the social science risk perception literature. The literature review in behavioral finance by Ricciardi (2004) revealed that since the early

1980s, the association between control and perceived risk has been a leading area of analysis. In particular, researchers from behavioral finance have focused their work on two main categories of control:. First is the relationship between locus of control and risk-taking behavior in works by McInish (1980), McInish (1982), Maital, Filer and Simon (1986), and Grable and Joo (2000). Second is a collection of control issues and variables that have included perceived control, the feeling of control, controllability, and the illusion of control in 11 studies (see Holtgrave and Weber [1993], Olsen [1997], Sarasvathy, Simon, and Lave [1998], Williams and Voon [1999], Houghton, Simon, Aquino, and Goldberg [2000], Goszczynska and Guewa-Lesny [2000a, 2000b], Heilar, Lonie, Power, and Sinclair [2001], Weber, Blais, and Betz [2002], Forlani [2002], and Dulebohn [2002]).

## The Significance of Expert Knowledge

Since the late 1970s, the psychology of expert knowledge (that is, novices versus experts) and its relationship to perceived risk has been an established research theme in the social sciences. The risk perception literature has documented that changes in the level of a person's knowledge can result in an adjustment to their risk perception for a specific activity or situation. For instance, the more individuals perceive an activity as difficult to understand (a lower degree of perceived knowledge) the increased anxiety or fear they have towards it. *Webster's Dictionary* defines an expert as "a person who is very skillful or highly trained and informed in some special field" and knowledge as the "fact or condition of knowing something with familiarity gained through experience or association." Hayek (1945) offered this perspective of how an extensive group of decision makers (e.g., investors in the financial markets) assess information: "the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess" (p. 519).

Lee (1999) offered this assessment of the association between the degree of knowledge and perceived risk:

> [C]hanging knowledge . . . can change risk perceptions. For example, several studies have shown that provision of information about a risk (e.g. from electromagnetic fields or radon) can increase risk perception. . . . On the other hand, however, even anecdotal evidence suggests that people with the same level of knowledge about risk (e.g. experts on a risk issue) may nevertheless disagree in their risk evaluation. . . . Scientists as well as risk managers and politicians often complain about laypeople's lack of knowledge of science and technology and the associated risks in particular . . . These knowledge gaps are often blamed for leading to unreasonable risk perception . . . The reasoning assumes a simple, monotone and inverse casual relationship between knowledge and perceived risk: the smaller the knowledge, the higher the perceived risk. Empirical research, however, suggests that the relationship between knowledge and risk perception is more complex. While some studies, in particular nuclear power, established the inverse relationship, others failed to demonstrate an association. (p. 7)

Within the academic finance literature, the significance of the level of knowledge and how this behavioral issue might influence an investment professional's perception of risk has developed into a highly prominent area of analysis. The risk perception studies in behavioral accounting by Koonce, McAnally, and Mercer (2001) and Koonce, McAnally, and Mercer (2005) have employed a collection of behavioral risk indicators which also comprised a knowledge characteristic. The behavioral finance risk perception literature review by Ricciardi (2004) demonstrated that the affiliation between the notion of knowledge (expertise) and perceived risk (risk-taking behavior) within the academic research has been a leading area of study since the mid-1980s in a number of studies.

## The Role of Affect (Feelings)

Brehmer (1987) was critical of the academic research within the social science risk perception literature since academics only explored cognitive issues and all but disregarded the affective reactions (emotional aspects) of psychological risk. However, during the late 1990s, social scientists began to explore both the cognitive and affective nature of perceived risk (see Hellessy, Grønhaug, and Kvitastein [1998]; Sjöberg [1998]; Slovic, MacGregor, and Peters [1998]; MacGregor, Slovic, Berry, and Evensky [1999]; Slovic [1999]; Finucane, Alhakami, Slovic, and Johnson [2000]; Loewenstein, Hsee, Weber, and Welsh [2001]; Pligt [2002]; Slovic, Finucane, Peters, and MacGregor [2002a, 2002b]; Slovic, Finucane, Peters, and MacGregor [2004]; Grasmück and Scholz [2005]; Keller, Siegrist, and Heinz [2006]; Leiserowitz [2006]; Peters, Västfjäll, Gärling, and Slovic [2006]; Slovic and Peters [2006]; and Slovic, Finucane, Peters, and MacGregor [2007]).

Finucane, Peters, and Slovic (2003) provided these two main themes of the meaning of affect: "(1) experienced as a feeling state (with or without consciousness) and (2) demarcating a positive or negative quality of a specific stimulus" (p. 328). Behavioral decision theorists have acknowledged that the study of the emotional responses (that is, issues of affect) is an essential aspect of how individuals make risk judgments. The significance of emotion (affect) within the social sciences is apparent in a number of books on the subject matter (see Strongman [1987]; Ortony, Clore, and Collins [1988]; Lewis and Haviland [1993]; Forgas [2001]; Musch and Klauer [2003]; Panksepp [2004]; and Rolls [2005]). Pligt (2002) depicted the progression of the role of cognitive factors and affective responses within the risk perception literature:

> Two different research traditions, one focusing on large-scale technological risks, the other on more personal risks associated with behavioral practices or hereditary factors . . . For a long time both focused on cognitive approaches to help our understanding of people's perception and acceptance of risks. Cognitive approaches were also used to help explain the relation between perceived risk and behavior. Only occasionally, emotions and motivational factors were taken into account. More recently this has changed, and research now attempts to incorporate both cognition and emotion. (p. 248)

Within the behavioral finance literature, a growing theme of investigation has been the influence of affect in the areas of perceived risk and investment decision making in a sample of endeavors (see Lifson and Geist [1999]; Williams and Voon [1999]; MacGregor, Slovic, Dreman and Berry [2000]; Olsen [2000]; Finucane, Peters, and Slovic [2003]; Dreman [2004]; Pixley [2004]; Lucey and Dowling [2005]; and Olson [2006]). Shefrin (2005) provided this behavioral finance perspective of affective (emotional) issues:

> Most managers base their decisions on what feels right to them emotionally. Psychologists use the technical term *affect* to mean emotional feeling, and they use the term *affect heuristic* to describe behavior that places heavy reliance on intuition or "gut feeling." As with other heuristics, affect heuristic involves mental shortcuts that can predispose managers to bias. (p. 10)

Finucane, Peters, and Slovic (2003) noted the importance for researchers to understand the different meanings of emotion, mood, and affect. An emotion is a state of consciousness (mind) connected to the arousal of feelings. In essence, an emotion is a mental condition that occurs impulsively rather than by conscious effort and is often associated by physiological changes (e.g., a specific feeling such as joy or hate). A mood (also known as feelings) refers to any of the subjective responses, pleasant or unpleasant, that a person might experience from a specific situation. In other words, a mood (feeling) is an affective state of awareness resulting from emotions. The notion of affect is the emotional complex (that is, positive or negative feelings) associated with an idea or mental state. In essence, affect is a "feeling" revealed as a reaction to a stimulus (e.g., a collection of financial information for a stock investment). Finucane, Peters, and Slovic (2003) elaborated further on this affective process:

> Individuals differ in the strength and speed of their positive and negative reactions, and stimuli themselves vary in the strength and speed with which they elicit positive and negative feelings. An affective reaction can be an enduring disposition strongly related to the stimulus. . ., but can also be a fleeting reaction or a weakly related response. . .The affective quality of a stimulus may vary with the context: The strength of positive or negative feelings may depend on what aspects of a stimulus stand out as most salient at any particular time. (p. 328)

Loewenstein, Hsee, Weber, and Welsh (2001) noted several valuable points associated with risk and affect. The emotional aspect of risk frequently departs from the cognitive influences of risk perceptions. For decisions under risk and uncertainty, affective responses (emotional consequences) commonly apply primary reactions to behavior above cognitive influences and cause behaviors that are not adaptive. Furthermore, affective reactions result in behavioral outcomes that diverge from what people considered the optimum outcome of a decision.

The cognitive factors that are mentioned involve how an individual processes information and what factors influences their perception of risk for a certain decision (e.g., issues of heuristics, framing, anchoring, representativeness). In essence, to fully understand the judgmental process of investors, researchers must consider both the cognitive and affective (emotional) aspects of how investors process information and perceive risk for a given activity, situation or circumstance.

## The Influence of Worry

The exploration by researchers in areas other than business into the significance of worry has slowly received increased attention within the risk perception literature. (See, for example, Drottz-Sjöberg and Sjöberg [1990]; MacGregor [1991]; Sjöberg [1998]; Baron, Hershey and Kunreuther [2000]; Constans [2001]; Rundmo [2002]; Sjöberg [2004]; Schnur, DiLorenzo, Montgomery, Erblich, Winkel, Hall, and Bovbjerg [2006]; and Peters, Slovic, Hibbard, and Tusler [2006].) During the 1970s, the original risk perception studies in psychology by researchers at the Decision Research organization alluded to "a negative feeling of concern (worry)" about risk known as dread or dreadness that influences a person's perception of risk towards a specific risky behavior or hazardous activity. In relation to the emotional aspects of risk, the process of worrying is a lasting concern with a past or an upcoming event. Worry is a category of risk assessment that makes a person feel as if he or she were reliving a past occasion or living out a future one, and the individual cannot stop these types of contemplations from happening.

A behavioral definition of worry is how a person might react towards a specific situation or decision that causes anxiety, fear, or unhappiness. MacGregor (1991) offered this overview of worry from a cognitive perspective:

> One way to think about worry is a cognitive process that occurs when we are uncertain about a future event or activity. In common usage, worry is often used synonymously with terms like 'fear' and 'anxiety.' However, in a strict sense, worry is a primarily a mental activity, whereas anxiety and fear include emotional components and associated physical responses . . . Worry is thinking about uncertainties, whereas anxiety includes the gut-level feeling that accompanies uncertainty. (p. 316)

Researchers in the area of risk perception from the social science literature have debated over whether worry (or the act of worrying) is a cognitive or affective (emotional) process. MacGregor (1991) considered worry from a cognitive perspective; Drottz-Sjöberg and Sjöberg (1990) and Constans (2001) considered worry from an emotional standpoint. Rundmo (2002) viewed worry as an affective reaction, Sjöberg (1998) recognized the problems in identifying the differences between emotional and cognitive concepts. Loewenstein, Hsee, Weber, and Welsh (2001) provided this perspective:

> The risk-as-feelings hypothesis . . . postulates that responses to risky situations (including decision making) result in part from direct (i.e., not cortically mediated) emotional influences, including feelings such as worry, fear, dread, or anxiety. People are assumed to evaluate risky alternatives at a cognitive level, as in traditional models, based largely on the probability and desirability of associated consequences. Such

> cognitive evaluation have affective consequences, and feeling states also exert a reciprocal influence on cognitive evaluations . . . Because their determinants are different, emotional reactions to risks can diverge from cognitive evaluations of the same risks . . . behavior is then determined by the interplay between these two, often conflicting, responses to a situation. (p. 270)

In the realm of finance, worry has practical application by everyday investors in the financial markets. The news media continually supports the "act of worrying" in the minds of stock market investors whenever they report news that the market has declined on any given day or released bad news from various sources such as online new stories, newspapers, and reports on business segments of television news. For instance, a headline from *BusinessWeek* in January 2002 suggested that before investors consider buying a stock of a company they should read the article entitled, "Investors' New Worry: 'Auditor Risk'" and another news story from *U.S. News & World Report* in 1994 read "Worry Over Weird Investments." In November 2006, another example was discussed in a news story from *Barron's* entitled "Google: 500 Reasons to Worry" because the stock had a closing price above $500 per share.

From an academic perspective, the notion of worry has followed the usual pattern in which this behavioral indicator was first explored within the risk perception literature in psychology and then crossed over to other alternative behavioral business disciplines. The behavioral risk indicator "worry" was a noteworthy finding in a small sample of risk perception studies in works by Koonce, McAnally, and Mercer (2001) and Koonce, McAnally, and Mercer (2005) in behavioral accounting, the study by Snelbecker, Roszkowski, and Cutler (1990) in behavioral economics, and the study by MacGregor, Slovic, Berry, and Evensky (1999) in behavioral finance.

## SUMMARY

This chapter provided a general discussion of the topics of perceived risk and perception. Risk perception (perceived risk) involves the subjective judgments that people utilize in terms of their evaluation of risk and the degree of uncertainty. The practice of perception is a technique by which people categorize and understand their sensory intuitions in order to provide an assessment of their surroundings with the recognition of "actions" or "objects" rather than simply factors or traits.

A considerable number of research studies on perceived risk and risk-taking behavior by social scientists have crossed over and are now applied in various business settings. The current risk perception research in behavioral finance, accounting, and economics were first started during the ground breaking studies on risky behaviors and hazardous activities at the Decision Research organization. Their influential research in perceived risk, as well as that by other social scientists, revealed:

- Perceived risk is quantifiable, foreseeable, subjective (qualitative), and descriptive in nature.
- Risk is determined by different types of behavioral risk characteristics (indicators) such as the degree of dread, worry, familiarity, and controllability.
- The assessment of risk between novices and experts differ for a wide range of risky activities and potential hazards.
- Cultural theory has investigated and determined the influence of culture instead of exclusively "individual psychology" as a reason for differences in risk assessments.
- Information obtained from trusted sources is assigned more credibility than information from distrusted sources.
- Risk possesses a degree of emotion (affect) as an essential aspect of the judgment and decision-making process.
- The notion of an inverse relationship between perceived risk and perceived gain (benefit).
- Outside forces such as media attention influence personal assessment and perspective of risk.

Classical decision making is the foundation of standard finance since it is based on the notion of rationality in which investors formulate financial decisions. As a matter of course, standard finance has discarded the view that the decision-making process is influenced by psychology in which individuals are sometimes prevented from making the most rational decisions. Behavioral finance is based on the premise that investors make decisions relative to the tenets of behavioral decision theory and bounded rationality. For instance, an investor displays cognitive and affective (emotional) issues during the decision-making process in the assessment of risk and the evaluation of a specific investment product or service.

Within the social sciences, the risk perception literature has established that a significant number of cognitive and affective (emotional) characteristics influence an individual's risk perception for non-financial judgments. The behavioral finance, economics, and accounting literature have revealed an assortment of these cognitive and affective issues exist during the financial decision making process in terms of how an investor perceives risk for a wide range of investment instruments (e.g., common stock, mutual fund) and financial services (e.g., tax planning, selecting a financial advisor).

This chapter provided an overview of these behavioral finance issues and theories that influence an investor's risk perception: the notion of heuristics, issues of overconfidence, the tenets of prospect theory, the influence of loss aversion, the concept of representativeness, issues of framing, the topic of anchoring, the notion of familiarity bias, the factors of perceived control, the issues of expert knowledge, the role of affect (feelings), and the influence of worry.

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