Chapter 2

Literature Review

2.1 Sunk Cost Effect

Although the normative models of economic rationality consider that a sunk cost has already been incurred and is not relevant to the current decision, an individual is still affected by prior outcome when making real decisions. The psychological literature establishes that real decision makers are often influenced by historical or sunk costs.

Kahneman and Tversky (1979) developed a most promising descriptive model of decision making under uncertainty, called prospect theory. Their analysis suggested that "a person who has not made peace with his losses is likely to accept gambles that would be unacceptable to him otherwise." For example, after a day of betting on the racetrack and losing money, people are more likely to bet on the long shots (McGlothlin (1956)). This provided some support for the argument that a failure to accept losses induces risk seeking. The primary finding of the sunk cost effect, that people will throw good money after bad, seems to be well explained by the prospect theory.

Thaler (1980) suggested the hypothesis that paying for permission to use a good or service (costs that were incurred before the current decision) will increase the tendency to utilize the good, *certeris paribus*, which he called the sunk cost

effect. He presented some empirical evidence to support this hypothesis. For example, in Kahneman and Tversky's survey questions, people preferred the prospect of (0) to (-800, 0.2; 200, 0.8), while they showed a different preference to (-1000, 0.2) rather than (-200). The 200 cost subtracted from the former question to get the later could change the choice and is not regarded as sunk. Moreover, Thaler explained the sunk cost effect based on the prospect theory, as depicted in Figure 1. An investor begins at point A by considering an initial investment. After a considerable failed investment has been made, the investor is at point B. The value function is concave over gains and convex over losses, and is steeper for losses than for gains. Hence, an investor at point B, the location of a person who has paid a sunk cost, will risk small losses to obtain possible larger gains. Compared with an investor at point A, an investor at point B is more willing to make a risky investment: that is, to continue adding money to the sunk cost.

Insert Figure 1 here

Staw (1976) conducted an experiment to simulate a business investment decision, which examines the process of escalating commitment. Using a sample of 240 undergraduate students from the College of Commerce and Business Administration at the University of Illinois, Staw showed that when business school students feel responsible for an unsuccessful prior financial decisions, they add more money to that investment than if their prior decision is successful. This means that negative consequences breed further commitment of resources to a previously

losing investment. In a series of follow-up research studies, Staw and colleagues tried to explain this attitude according to a framework of self-justification in commitment to decisions (Staw (1976), Staw and Fox (1977), and Staw (1981)) or standards for consistency in action (Staw and Ross (1980) and Staw (1981)). Individuals may go beyond the passive distortion of adverse consequences in an effort to rationalize a behavioral error. By committing new resources, an individual could attempt to turn the situation around and rationalize the original options. In addition to self-justification, sunk cost effect may also result from the hero effect for administrators who are consistent in their actions, and are regarded as better leaders than those who always change from one line of behavior to another. Hence, they tend to stick to a losing course of action to maintain norms of consistency.

Arkes and Blumer (1985) investigated the sunk cost effect through a series of questionnaires administered to Ohio and Oregon college students. They found evidence that the sunk cost might influence decisions. And those who had incurred a greater sunk cost behaved more irrationally deviate from the prediction of rational economic theory. Such bias attitude is most likely due to the desire not to appear to be wasteful. Individuals in a sunk cost situation have an inflated estimate of the likelihood that the completed investment will be a success. If they ignore the sunk cost and stop the investment, then they would have to admit that they have failed, made an incorrect decision, and that the prior money and time were wasted.

2.2 House Money Effect

2.2.1 House Money Effect

Another set of papers investigated the effect of both prior losses and gains on decisions under uncertainty. Laughhunn and Payne (1984) examined the effects of both sunk costs and sunk gains on decisions under uncertainty. Thaler and Johnson (1990) extended their work in the same way. They began by identifying that most people use prior outcomes as a factor in evaluating a current decision under uncertainty. In particular, they found that after prior gains, people may take the gambles that they would not typically take, and that after prior losses they reject gambles that they would normally accept.

The house money effect is a phenomenon that was first mentioned by Thaler and Johnson (1990). It refers to a pattern in which people are prone to take more risk when they have just experienced a successful investment. Gamblers refer to this feeling as playing with the house's money. After a big win, gamblers do not fully regard the new money as their own. Because they do not fully integrate their winnings with their own money, these gamblers act like they are betting with the casino's money. According to the quasi-hedonic editing hypothesis, a prior loss might induce an increase in risk aversion: a loss that comes after other losses is more painful and the subsequent loss is not integrated with the prior outcome. Conversely, after a gain, the pain of subsequent loss can be "cancelled" against the feeling of happiness from the prior gain, and investors are less risk averse and

increase their risk seeking. In short, people are less risk averse following earlier gains and more risk averse after losses.

2.2.2 Experimental Evidences of House Money Effect

There is disparate experimental evidence on how prior gains and losses influence risk-taking behavior, and the effect it has on decision-making. Some evidence supports the house money effect (Thaler and Johnson (1990), Battalio, Kagel, and Jiranyakul (1990), Keasy and Moon (1996), Ackert, Charupat, Church, and Deaves (2003)), but some not (Clark (2002).)

According to Thaler and Johnson (1990), prior gains affect subsequent risk attitudes and decision choices by investors. Suppose that you have just won $15, you then have the opportunity to bet $4.5 on a coin toss. Do you take on the bet? Seventy-seven percent of the participants in Thaler and Johnson's study took the bet. After just receiving their windfall of $15, most people were willing to take the risk. In contrast, when subjects were asked to take a bet on a coin toss without acquiring the $15, only 41% took the gamble. This means that people are more willing to take a risk after a windfall even when they do not conventionally lean toward taking a risk.

Battalio, Kagel, and Jiranyakul (1990) presented results from both hypothetical and real money experiments that support the house money effect of risk seeking over several gambles with prior gains.

Keasy and Moon (1996) designed a new experiment in the context of capital expenditure decisions, which may uncover whether the house money effect can also hold for a common business decision. They took two runs of the experiment and presented 15 capital expenditure projects to participants and found additional support for the house money effect. The evidence showed that prior gains shift behavior toward risk seeking, yet prior losses do not shift behavior toward more risk aversion.

Ackert, Charupat, Church, and Deaves (2003), were the first to experimentally test the house money effect in a market setting. They examined the influence of the house money effect on asset pricing in a multi-period setting, and provided strong supporting evidence. By giving a larger sum of money at the start of a market session, traders might bid higher to obtain an asset, and the market prices were significantly higher afterwards.

However, in the case of the voluntary contribution mechanism for public goods Clark (2002) found no evidence of the house money effect, which suggested that free initial money does not contort successive contributions in the voluntary contribution mechanism environment.

2.2.3 Asset Pricing Model Considering House Money Effect

Barberis, Huang, and Santos (2001) developed a theoretical asset pricing model. They appealed to the experimental evidence, concerning the dynamic

features of risk aversion and considered the house money effect in their settings, according to the investor's preference. The experimental evidence suggests that the degree of risk aversion is not the same in all situations, but depends on prior gains and losses. To capture this idea, Barberis, Huang, and Santos modified the utility function by incorporating a state variable that tracks past gains and losses on the stock market. The investors' sensitivity to losses is determined by the state variable that reflects the experimental evidence described above.

A model of this kind can help to explain and exhibit phenomena of both the equity premium and volatility puzzles. The volatility puzzle can be explained as follows: suppose that there is good news, and the stock market rises, generating prior gains for investors. These investors are now less cautious about stocks, because any losses will be cushioned by the prior gains. Therefore, they are less risk averse and push prices up still further, and thus add to return volatility. The equity premium can be explained as follows: the returns' high volatility represents that stocks always perform poorly, which creates substantial discomfort for risk-averse investors. Consequently, a large premium is required to persuade them to hold stocks.

2.2.4 Empirical Evidence of the House Money Effect

Brown, Chapel, Rosa and Walter (2002) provided additional empirical evidence of the house money effect. They examined data among different categories of investors, including individuals and institutional investors, in the

Australian Stock Market. They found very strong evidence that prior gains tend to cushion subsequent losses, and that investors who realize initial losses have a greater propensity to break even when given the appropriate opportunities. Moreover, the house money effect moderates the disposition effect for a longer investment horizon and mostly applied to long run behavior.

Massa and Simonov (2003) continued the line of empirical investigation by analyzing the effects of psychology biases on the risk-taking and stock-picking behavior of individuals in Sweden. In terms of risk-taking, they investigate the relationship between risk-taking and prior gains and losses. In terms of stock picking, they distinguish between behavioral and rational hypotheses (pure familiarity and information-based familiarity). Using annual data, the results support the house money effect hypothesis, that previous gains increase investor risk-taking, while previous losses reduce it. Their results were consistent with the findings of Brown et al. (2002), which suggest that loss aversion may appear in short-term behavior, while the house money effect mainly applies to long-term behavior. They provided evidence in favor of information-based familiarity. People considered familiarity as a proxy of the easy accessibility of information. Alternatively, this may suggested that the behavioral biases might diminish with investor sophistication or information.

Locke and Mann (2005) focused on the issue within a population of futures traders on the floor of the Chicago Mercantile Exchange. These professional traders, in general, did not appear to trade with the house money. However, success and

experience were related to the behavior. Traders with more experience were less likely to take more risk after a period of abnormal good profits than their less experienced counterparts.

2.3 Size and Hedonic Depreciation of House Money

2.3.1 Size of House Money

Arkes and Blumer (1985) illustrated with a field study that customers who pay more for a ticket for a ski trip or a season ticket to a theater would be more willing to go on the trip or attend more plays because of their higher sunk costs. Those who had paid more would have a greater sunk cost, thus resulting in a stronger sunk cost effect.

Arkes, Joyner, and Pezzo (1994) considered the effect of gains rather than costs. They proposed that the house money effect holds when prior gains are unanticipated as a windfall. We infer that investment gains should be large enough to be unanticipated and perceived as the house's money. Furthermore, the larger the size of the prior gain, the stronger the house money effect will be.

2.3.2 Hedonic Depreciation of House Money

Arkes and Blumer (1985) and Gourville and Soman (1998) argued that the sunk cost effect may weaken over time. In a real-money study, Arkes and Blumer

(1985), tested whether the family was more likely to go to a basketball game if they purchased the tickets a week before, rather than if they purchased the tickets a year before. That is, does the timing of sunk cost matter? Arkes and Blmer demonstrated that the observed effect lasted for half year, however the effect disappeared during the 6 to 9 month period.

In another recent study, Gourville and Soman (1998) focused on individual's consumption behavior in which costs preceded benefits, and inferred that this sort of sunk cost should depreciate over time. In a sequence of experiments, they found that a consumer will gradually accept the prepayment cost over time, thus decreasing the sunk cost effect on later consumption behavior. They called this phenomenon "payment depreciation".

Individuals are known to incorporate both positive and negative events into their status quo with passing time (Kahneman and Tversky (1979), Kahneman and Varey (1991), and Thaler (1985)). Studies showed that although a newly obtained asset might initially be viewed as a gain, it will gradually be incorporated into a person's wealth and become a part of the status quo, as evidenced by the "endowment effect" (Kahneman, Knetsch, and Thaler (1990) and Thaler (1980)).

2.4 Reference Point

The concept of reference point was introduced in prospect theory (Kahneman and Tversky (1979), Tversky and Kahneman (1991), and Tversky and Kahneman

(1992).) The value function is defined over gains and losses relative to a reference point, not over the wealth level suggested by normative economic models. Although prospect theory specifies the shape of the value function around the reference point, it does not specify where people set their reference point.

Kahneman (1992) reviewed theoretical works and experimental evidences on the role of reference points in choice behavior. They argued that the location of the reference point affects the coding of outcomes as gains and losses. The coding affects the frames and preferences due to characteristic discrepancy in the evaluation of positive and negative outcomes. In addition to the effect on the valuation, they also suggested that reference points again influence judgments of fairness— what is fair or unfair, and showed some studies in the context of business practices. Beside the status quo, they also considered the expectation or aspiration level as reference points.

By using the purchase price as reference points, many researchers studied the issue in behavioral finance focus on the disposition effect. Shefrin and Statman (1985) examined decisions to realize gains and losses in a market setting. The tendency of individual investors to hold losers too long and sell winners too early refers to the disposition effect. They considered the purchase price to be the reference price below which investors were reluctant to realize losses, while above which investors were eager to realize gains. They discussed evidence which suggested this disposition effect may holds in real-world financial markets and played an important role of individual investors' trading behavior.

Odean (1998) examined the disposition effect by studying the trading records for 10,000 individual accounts at a large discount brokerage house from January 1987 through December 1993. He used average purchase price as reference point and compared the selling price for each stock sold to its reference price to determine whether that stock is sold for a gain or a loss. The empirical findings showed that individual investors have a strong tendency to realize winners rather than losers. They also hold losing stocks too long and reluctant to realize their losses. However, in December, lots of investors attended to tax-motivated selling and realized losses at a higher rate than gains.

Among futures traders, Heisler (1994) examined whether small speculators, who trade an average of fewer than 100 contracts per trade and whose accounts should with more than 50 transactions, in the Treasury Bond futures market exhibit loss aversion behavior. The total profit of the trade is calculated as the sum of sale price times the number of contracts sold less sum of the purchase price times the number of contracts purchased. He also found evidence of the disposition effect. More successful traders earned on average a positive profit per contract, holding these positions for shorter time and trading frequently. While unsuccessful traders on average earned a negative profit, exhibiting a greater disposition toward loss aversion, holding positions longer and trading less frequently.

Weber and Camerer (1998) presented an experimental investigation of the disposition. They argued that these experiments enable them to correctly match the investors' selling decisions with the prices at which they bought stocks. Therefore

they could directly test for disposition effect. There were six stocks, which prices were independent of investor trading behavior, that subjects could buy and sell in the market. They considered two possible reference points: the purchase price and the previous period's price. Their findings were consistent with the results in Shefrin and Statman (1985), Odean (1998), and Heisler (1994), which also showed a disposition effect. Subjects were more likely to sell fewer when the price falls (a loss respect to the previous period's price) than when it rises. They also sold less when the price is below the purchase price than when it is above. The disposition effect presented in both setting of reference points suggested that multiple reference points affect framing and guide choices.

In the psychological literature, research on human learning and memory suggests that investors may set reference points according to two characteristics of the stock price: central tendency and extreme.

People are more likely to remember the general meaning of information than particular details— which being called meaning-based knowledge representations. In the book of Anderson (1990), he reviewed many domains of experiments, both verbal and visual information, such as language, pictures, text, and hedonic experience. An experiment was reported by Anderson (1974) in which he had subjects listen to a story with many sentences. He found that people are much more sensitive to meaning-significant changes in a sentence. Consider another experiment by Mandler and Ritchey (1977) in which they had subjects study pictures of scenes. They also found that people are sensitive to meaning-significant

changes in a picture. In sum people have better memory for the general meanings of visual or verbal information, however they have poor memory for the physical details.

However when people do remember particular details, they remember details that are most unusual and catch their eyes. Fredrickson and Kahneman (1992) presented two experiments refer to the phenomenon of duration neglect in evaluations of past emotional experiences. They demonstrated a weighted averaging model that most moments of an episode are assign zero weight in the evaluation while a few select “snapshots” receive larger weights. They offered and found evidences that duration of emotional episode played little role on the retroactive evaluations on human’s experiences, yet salient or striking moments come most readily to mind. Their findings were also consistent with Kundera (1991) that when people recall love affairs, their memory makes photographs rather than films, and at best only a few photographs.

In an experimental setting, Gneezy (1998) examined disposition effect and found evidence that the maximum stock price was a more effective reference point than the purchase price which suggested most in the previous studies. That is people might focus on extreme events when making investment decisions.

Research on stock options also provided evidence that the prior maximum is an important determinant of exercise behavior. Heach, Huddart, and Lang (1999) focused on the stock option exercise decisions of more than 50,000 employees at

seven companies, four were listed on the NYSE (New York Stock Exchange), and three are NASDAQ high-technology companies. They examined whether the psychological factors lead employees to exercise the stock options given by their firms. Since the options were granted by firms, there were no purchase prices can be regarded as the reference points. Stock price at issuance was not a reasonable reference point, because the option had no value if exercised at that price. Therefore they assumed that reference points may be set based on general or extreme values of the historical price distribution. They divided the historical price distribution to several percentiles, 25^{th}, 50^{th}, 75^{th}, or 100^{th} percentiles, and investigated the variant on exercise behavior on the stock price passes these price percentiles, respectively. Their findings showed that employees are more likely to exercise options when stock prices were above a prior high and the exercise increases most sharply when stock price exceeds a fifty-two week high. They suggested that maximum price acts as an important reference point and there might be a dynamic setting on reference points over time. Investors may monitor their investments over about one year, supporting the argument of Benartzi and Thaler (1995) that individuals seem to concentrate on the one-year horizon because of the salient information which commonly reports one-year maximum in financial press.

Huddart and Lang (2003) used the same data in the study of Heach, Huddart, and Lang (1999) but examined another issue on information distribution among employees. In particular, they investigated whether employees' exercise decisions predict future excess returns. They found strong evidence that exercise decisions

have information content which consistent with the semistrong efficient market hypothesis and such information is incorporated into price with 6 months. Moreover, as the results of Heach, Huddart, and Lang (1999), stock price attains a previous high cause increased exercise activity, but does not affect the future returns. Thus they suggested a mixed of factors in the determinant of exercise decisions. Economic concerns, psychology factors and information could all affect decisions. Their results suggested that employees are less likely to exercise options facing a price below the prior high (reluctant to realize a perceived loss), however if they receive some information that price may fall in the nearby future, they may exercise today to take information advantage.

Core and Guay (2001) focused on the non-executive employee stock option exercises for 756 firms during 1994 to 1997. Some of their results supported the findings in Heach, Huddart, and Lang (1999) that option exercises are related both to economic factors as well as to psychological factors. Individuals tended to set reference points with respect to stock price highs and lows. After controlling for the economic factors, option exercises were greater when stock price attains 12-month highs (lows.)

Poteshman and Serbin (2003) analyzed the early exercises of Chicago Board Option Exchange (CBOE) calls during the period from 1996 to 1999 by different classes of investors— customers of discount brokers, customers of full-service brokers, and traders at large investment houses who trade for their own firms. They found a large number of early exercises were identified as irrational and such

behavior was not equally distributed across investor types. And these irrational behaviors were activated by the stock price exceeding its 52-week highs. Moreover, they documented that reference point effect was more pronounced for discount and full-service customers than for firm proprietary traders. Their findings were also consistent with the above studies that individuals treat extreme values over the past year as reference points.

2.5 Underdiversification and Familiarity bias

This section incorporates several surveys, which study the tendency to invest in the familiar. Not only individual people but also professional people, and even fund managers, diversify their portfolio holdings much less than is suggested by normative models of portfolio choice. That is, familiarity leads to underdiversification. Investors allocate too much money to domestic stocks, locals companies, and their employers' stocks.

2.5.1 International Diversification Puzzle

French and Poterba (1991) reported that in the United States, Japan, and the United Kingdom, investors held 94%, 98%, and 83% of their equity investments, respectively, in their home countries. Despite the growing integration of international financial markets, and the dramatically falling barriers to international investment, holdings of domestic assets are still extremely high, which is expected

according to normative models of portfolio choice. They then computed and compared the perspective expected returns of investors in every country, showing that each investor was most optimistic about their own country's stock returns.

Baxter and Jermann (1997) showed further evidence that home bias was worse than people think, once we considered the human capital for the optimal portfolio choice. As human capital is the most non-traded asset, they found that returns to the domestic stock market were highly correlated with the returns to the human capital in the United States, Japan, the United Kingdom, and Germany. Optimally, as suggested by normative portfolio models, investors should short their own country's stock market to hedge the human capital risk. However their portfolios were still very far from a truly diversified world portfolio.

2.5.2 Local Equity Preference in Domestic Portfolios

Heath and Tversky (1991) conducted a series of experiments and provided evidence that people considered unfamiliar gambles riskier than familiar gambles, even when they allocated identical probability distribution to both gambles. This might also explain why investors have the tendency to invest without the benefit of diversification and focus on a small number of stocks with which they are familiar.

Coval and Moskowitz (1999) investigated the equity preference in U.S. money manager portfolios, and suggest additional dimensions to the geographic component for the portfolio choice. They found that money managers demonstrated

a strong preference toward investing in firms that were located 100 miles closer to their office than average U.S. firms. The bias increased with firm leverage, and decreased with firm size. Moreover, Coval and Moskowitz (2001) studied the behavior of mutual fund managers. They found abnormal returns for funds that hold nearby firms, and suggested that these funds might have information advantages.

Huberman (2001) studied the break-up of AT&T. The government broke up AT&T's local phone service into seven Regional Bell Operating Companies (RBOCs) in 1984. Huberman found that individuals chose to invest in their local RBOC more often than in any other RBOC even if the companies were listed on the same exchange. He attributed this behavior to a cognitive bias toward the familiar. Familiarity affects investors' investment choice, and they were more comfortable investing in the more familiar companies. Huberman also suggested that familiarity bias could affect investors' behavior in many other respects, such as the allocation of their employers' stocks in their retirement accounts.

Grinblatt and Keloharju (2001) used the comprehensive official records of shareholding and trade of households in Finland. They found that investors prefer to trade and hold stocks of Finnish firms with headquarters that were located closer to home. Investors were also likely to invest in firms that used their native language in company reports, and whose chief executive officer was of a similar cultural origin. Not only the distance, but also the language and culture background, might influence investors' investment choice to lean toward the familiar firms.

2.5.3 Investment in the Most Familiar: the Employer's Stock

Investment in the familiar extends to employees who choose to invest their retirement money in their company's stocks. Benartzi (2001) studied the allocation decisions in 401 (k) plans and found that workers had a strong preference toward holding their company stock instead of investing in other companies with their pension plans. Benartzi reported that over 30% of assets in large retirement savings plans were invested in employer stock. Employees themselves made this decision. They liked investing in the company stock because it was familiar and they tended to opt for what they knew.

2.6 Availability Bias

Heuristics refer to rules of thumb which make decision making easier. People rely on heuristic principles to make decisions in complex and uncertain environments. They always take mental short cut in the decision making process, rather than collect all relevant information and rationally evaluated. Although these heuristics are quite useful and effective, they sometimes lead to severe and systematic biases (Slovic (1972) and Kahneman and Tversky (1974).)

One of these heuristic principals is availability heuristic, first stated by Tversky and Kahneman (1973). When judging the probability of an event, people often recall their memories for related information. While this may be a good wise procedure, it can induce biased estimates due to not all memories are equally

available or retrievable. More current, more salient, easily associated events are weighted more which distort the estimate and biased decision making.

Tversky and Kahneman (1973) originally proposed availability heuristic hypothesis that people are prone to estimate the frequency or probability of events by the ease with which related examples come to mind. In their theory, availability is a mediating variable in the study of memory and is an ecologically well-grounded clue for the judgment of frequency, that is, frequent events are easier to access or recall than infrequent ones. Because not all information and instances could be equally accessed, they proposed that people attempt to recall some of them by availability— easier ones, such as more recent, more distinct, or more easily to imagine. As a consequent, they may not use the correct probability and produce systematic biases. For example, in the study of experiment 3, they asked subjects about the letter K's position in a word. "Consider the letter K. Is K more likely to appear in the first position or the third position?" is a typical question they asked.

Their theory suggested that, when people answered such a question, they made this judgment by thinking of words either beginning with K or having K as the third letter, i.e., by assessing the ease with words com to mind. It is easier to recall of words that start with K than in the third position. Consistent with their prediction, the results showed that subjects judged the letter K to be more frequent in the first than in the third position. However, in fact, the letter K is twice times as likely to appear as the third letter as the first one. The availability heuristic rule leads to judgment bias, in the above evidence, the harder it is to recall or imagine instances

of an event, the lower the judged probability of that event.

Slovic (1972) reviewed several important psychological topics of human judgment and its implications for investment decision making. He tried to enlighten the investor with many psychology's recent studies to perceive of human limitations as an information processor. He believed that a complete understanding of human limitations may benefit the decision maker rather than naïve faith in the perfection of human's intelligence. One of his related topics was focus on the biases in judgments of probability, variability, and correlation which referred to the availability bias that affects simple probability estimates. People tend to judge an event's probability on the ease with which instances of such event can be brought to mind. Any factors, such as salience, recency, and imaginability, that distort the ease of retrieval may results in systematic biases when people make everyday judgments.

Tversky and Kahneman (1974) demonstrated several cognitive biases that were originally caused by the reliance on judgmental heuristic. They described three heuristics that people are employed in the decision making under uncertainty: representativeness, availability, and anchoring. They listed biases induced by these heuristics and the applied and theoretical implications were also discussed. Availability heuristic is often employed when people tried to assess the probability or frequency of an object or event. People use the way by the ease of recall or retrieval from instances can be brought to mind. As a result, the reliance on availability produces predictable biases. When people judge the size of a category,

which instances are easily retrieved will appear larger than a category with same frequency whose instances are less retrievable. Salience, recent occurrences, and familiarity all might affect the retrievability of instances. For example, they mentioned a common experience that the subjective probability of traffic accidents rises briefly when someone sees a car crashed by the side of the road. They referred this to the biases due to the retrivability of instances.

Taylor and Fiske (1978) explored the results from studies on volume and availability of recall. Differential attention might produce differential volume of encoded information about salient event, people might have more data collect on the salient actor and accordingly, overserve that actor as the causal operator. Even though people might take in equal amounts of information about the salient and nonsalient events or actors, they could have information about the salient stimuli stored in a more easily retrieved type. They concluded that the availability could explain that information related to the salient event, actor, or attribute is stored at the top of the mental stacks or in some easily retrieved form.

Taylor (1982) discussed the issue on the availability bias in social perception and interaction. A main work of social psychology was to determine how people make social judgments in their every day life, such as predicting other one's behavior, estimating the power of someone else, and attributing causality. However, people always make errors in their judgments not only stem from motivational factors (hedonic relevance or selfish needs) but also the limited-capacity, capable of handling only a small amount of data at a time. Therefore the inability to deal with

complete, accurate information about another people and social interactions suggested that people use heuristics to make inference and judgments from insufficient, ambiguous, or unreliable data that are available. He proposed three ways to bias social process from using the availability heuristic. First, highly salient data may get excessive attention, be more available, and accordingly disproportionately affect judgments. A second source of availability biases came from how information is stored or retrieved. This was about the way to construct, and retrieve certain instances or infer, and interfere with others in the human memory system. The limited storage capacity memory might lead to retrieval biases, which might yield an unrepresentative data base. The final way in which availability can bias social judgments was through the use of rules, schemas, or other cognitive structures. These cognitive structures might lead people to make inferences that someone who does not share the same structure would not make. Take stereotyping as an example, expecting that a person will engage in a particular behavior can produce inferences that this man has engage in the behavior, yet he may not do so.

Folkes (1988) concerned with consumers' uncertainty about product performance. When consumers perceive risk in purchasing a product, their behavior would change apparently. The author designed four experimental studies to examine the influence of availability heuristic on the consumers' judgments about the likelihood of products performance. The results showed that product performance judgments were biased in ways predicted by the availability heuristic.

Examples of failure products were more accessible in memory. Moreover, distinctiveness was also the determinant factor that can influence perceived risk.

More recent study, Maley, Hunt, and Parr (2000) focused on the age effect on the availability bias. In the results of their two experiments showed that the availability bias was age invariant, and there were no significant age differences in either size or frequency-of-occurrence judgments for familiar verbal stimuli.