Asian Journal of Social Psychology (2003), 6, 117-132.

Risk Perception and Risky Choice: Situational, Informational, and Dispositional Effects

Xiao-Fei Xie

Psychology Department
Peking University
P.R. China

X.T. Wang

Psychology Department
University of South Dakota
USA

Correspondence concerning this article should be addressed to X.T. Wang, Psychology Department, University of South Dakota, Vermillion, SD 57069, USA, or via e-mail at xtwang@usd.edu.

ABSTRACT

We investigated how situational (gain-loss), informational (opportunity-threat framing), and dispositional (achievement motive and avoidance motive) variables affected opportunity-threat perception and risky choice in managerial decision-making contexts. In Study 1, the risk preference of the participants showed a reflection effect due to situational differences (gain or loss) and a partial framing effect caused by presenting the same choice information in terms of either opportunities or threats. However, both effects were in the opposite direction of predictions from prospect theory (Kahneman & Tversky, 1979). Gains and positive framing enhanced risk-seeking preference whereas losses and negative framing augmented risk-averse preference. Risk-seeking choices were mediated by opportunity perception whereas risk-averse choices were mediated by threat perception. In Study 2, the participants high in achievement motive perceived greater opportunities in a negative situation, and the participants high in avoidance motive perceived greater threats in a positive situation, suggesting that ambition (achievement motive) operates more significantly in the face of adversities whereas cautiousness (avoidance motive) functions more significantly in prosperity.

KEY WORDS: risky choice; managerial decisions; risk perception; perceived opportunities and threats; achievement motive; reflection effects; framing effects

Risk preference indicated in risky choices has been a main focus of the studies in behavioral decision making. Confronted with a sure option and a gamble of equivalent expected value, one may either choose the sure option by being risk averse or choose the gamble by being risk taking. We propose that three of the dimensions underlying risky choices are situational, informational, and dispositional. We investigated how situational (gain-loss), informational (opportunity-threat framing), and dispositional (achievement motive and avoidance motive) variables affected risk (opportunity-threat) perception of the decision makers and their risk preference in making managerial decisions. In two studies, both conducted in China, we first examined how gain-loss situations and the framing of choice outcomes affected risk perception and risk preference in a gain-loss dependent manner. Secondly, we investigated how such gain-loss dependent perception of opportunities and threats varied as a function of the decision maker's achievement motive and avoidance motive.

STUDY 1

Reflection Effects vs. Framing Effects

Studies of risky choice over the last two decades have revealed a diversity of cognitive and social variables that influence decision-making under risk. Among these findings, reflection effects and framing effects have drawn a great deal of research attention following the seminal work by Kahneman and Tversky (1979; Tversky & Kahneman, 1981).

Reflection effects refer to the finding that people tend to be more risk averse for choice options involving gains but more risk seeking for choice options involving losses. The gain-loss dependent risk preferences thus are like reverse mirror reflections of each other. For example, a person who prefers a sure gain of $100 to its gamble equivalent of having 50 percent chance to gain $200 and 50 percent chance to gain nothing may reverse his risk preference to favor a gamble with a 50-50 chance of losing $200 and 50-50 chance of losing nothing to its sure-thing equivalent of losing $100.

Framing effects, on the other hand, refer to an irrational reversal in risk preference as a result of how the information about the same choice outcomes is framed or presented. When the expected outcome is framed as-if it is a gain, one tends to be risk averse. However, when the same outcome is framed as-if it is a loss, one becomes risk seeking. For example, a reduction of $200 from a total of $600 can be framed either as "$400 will be saved" or as "$200 will be lost". When an expected outcome is framed as-if it is a gain, decision makers tend to be risk averse, preferring the sure option of saving $400 to the gamble of having a two-thirds chance of saving $600 and a one-third chance of saving nothing. However, when the same outcome is framed as-if it is a loss, decision makers often become risk seeking, preferring the gamble with a two-thirds chance of losing nothing and a one-third chance of losing $600 to the sure option of losing $200.

In this case, the reversal in risk preference is not due to a real situational difference (i.e., gains vs. losses) but the ways of presenting (framing) the same choice outcomes as if they are gains or losses. In fact, irrespective of the positive or negative framing, the jeopardized situation (i.e., an expected loss of one-third of the total amount) remains the same. This type of framing has been called risky choice framing (for different types of framing effects, see Levin, Schneider, & Gaeth, 1998).

As shown by the above examples, reflection effects and framing effects are conceptually distinct. First, the former is situational (i.e., whether a situation is good or bad), but the latter is informational (i.e., how information of choice outcomes is presented). Secondly, the reversal in risk preference found in framing effects is a violation of the descriptive invariance axiom of normative rationality, which requires that different descriptions of the same choice options should yield the same preference. In contrast, reflection effects are not a violation of any kind of normative utility axiom but are a variation in risk preference that is sensitive to gain-loss situations.

Although such conceptual distinctions between reflection effects and framing effects have been explicitly discussed (e.g., Fagley, 1993; Wang, 1996), the two are still often discussed as the same phenomenon in the literature of risky choice. In this study, both framing and reflection effects were tested using a 2 by 2 factorial design in an attempt to empirically dissociate the two kinds of effects on risky choices.

Opportunities and Threats Perceived in Gains and Losses

Kahneman and Tversky's (1979) prospect theory assumes an S-shaped value function that is concave over gains and convex over losses, implying diminishing marginal value as the size of gains or losses increases. Thus, the concavity of the value function in gains entails risk aversion and the convexity of the value function in losses entails risk seeking. These predictions based on gains and losses rather than on total wealth have also received strong empirical support (e.g., Tversky & Kahneman, 1992). In contrast to the gain-loss dichotomy, in management and organizational studies, risky choice is often examined in terms of threats versus opportunities. For instance, the threat-rigidity model proposed by Staw, Sandelands, and Dutton (1981) posits that in the face of threat organizations and individuals tend to be risk averse because of rigid routine reactions to threats. Sitkin and Pablo (1992) point out that the common proposition in the management literature that people and organizations are more risk seeking for opportunities than for threats, seemingly contradicts the proposition derived from prospect theory. To further explore the roles of the gain-loss dichotomy and opportunity-threat dichotomy in risky choice, this study intends to examine how risks are perceived as threats and opportunities in gain situations versus in loss situations.

Most if not all risks contain two defining components: opportunity and threat. The Chinese word "? ? (Wei-Ji)", meaning risk or crisis, is literally a combination of two characters, one meaning threat (danger) and the other meaning opportunity. Opportunities exist in not only gain situations but also in loss situations. Similarly, threats exist in not only loss situations but also in gain situations. Thus, one may perceive opportunities or threats or both at the same time in either gains or losses. From this perspective, the gain-loss dimension could be independent of the opportunity-threat dimension in determining decisions at risk.

One possible approach to investigating the relationship between the two dimensions at issue is to study the effects of gain-loss situations and opportunity-threat framing on risky choice in a 2 x 2 design. An initial contribution to understanding the relationship was made in a study by Highhouse and Yüce (1996). The study demonstrates that when the positive framing addresses opportunities and the negative framing emphasizes threats, reversed framing effects occur, where the participants were risk seeking under the positive opportunity-frame but risk averse under the negative threat-frame. In addition, a separate reflection effect was also evident, where the participants were more risk averse in positive situation than in a negative situation, and vice versa.

Study 1 intends to further address several important issues that were left unexplored in the Highhouse and Yüce (1996) study. First, in their study the gain-loss variable was confounded with the task variable. The gain scenario involved a joint-venture case whereas the loss scenario involved a lawsuit case. Therefore, the observed reflection (gain-loss) effect needs to be separated from the possible effects of task (joint-venture versus litigation) manipulation. In Study 1, we tested reflection effects by presenting the same task scenario in either a gain situation or a loss situation.

Second, in the Highhouse and Yüce (1996) study, the perception of risks as either threats or opportunities was used to validate the effectiveness of the framing manipulation (i.e., the threat framing vs. the opportunity framing). However, it was not reported whether the threat perception and opportunity perception varied as a function of gain-loss situations. In Study 1, we investigated the relationship between gain-loss situation and threat-opportunity perception.

The preceding conceptual analysis led to the following hypotheses.

Hypothesis 1. Reflection effects are mainly caused by the curvature of the decision maker's value function (i.e., concave or convex function) whereas framing effects are mainly a result of a shift in reference point. The two effects on risk preference thus should be separable. Main effects of both gain-loss manipulation and opportunity-threat framing were expected. In particular, according to the S-shaped value function of prospect theory (Kahneman & Tversky, 1979), the participants were expected to be more risk averse in a gain situation but more risk seeking in a loss situation. In addition, according to the threat-rigidity model (Staw, Sandelands, & Dutton, 1981) the participants were expected to be more risk seeking under an opportunity frame but more risk averse under a threat frame (i.e., a reversed framing effect).

Hypothesis 2. Highhouse and Yüce (1996) argue that the constructs "opportunity" and "threat" in the management literature are distinct from Kahneman and Tversky's "gain domain" and "loss domain". They suggest that the gain and loss situations influence decision–making perspectives whereas the opportunity and threat manipulation affects risk perception. In Study 1, we explored an alternative possibility that the effects of both gain-loss variable and opportunity-threat variable on risky choice are mediated by risk perception. We expected that a gain situation and opportunity framing would enhance the perception of opportunities, and a loss situation and threat framing would exacerbate the perception of threats.

Method

Participants

One hundred and forty two students (78 men and 64 women) recruited from two universities in Beijing, China participated in Study 1. Their average age was 21.2 years.

Materials and Procedure

In Study 1, we used a joint-venture problem described in a memo from the head of a special team assigned to investigate the prospects of a project in a Chinese business context. The problem concerns whether to pursue the project independently or as a joint venture with ATC, a main competing company in the market. The memo was similar to that developed by MacCrimmon and Wehrung for a risk in-basket exercise (1986, p. 311), except that we had four versions of the memo (2 gain-loss situations x 2 opportunity-threat frames).

As illustrated in the following scenarios, the gain-loss situations were presented in the cover story either as a profitable "after-tax return on investment" or as an "expected loss in investment". The framing manipulation was presented either in terms of opportunities and the chance of success ("Our chance of getting a large market share is high. We have a 1 in 3 chance of getting a large market share") or in terms of threats and the chance of failure ("Our chance of getting a small market share is high. We have a 2 in 3 chance of getting a small market share").

The joint-venture scenario in the gain situation under the opportunity frame (i.e., the **ATCgo** version) read as follows:

> "Our new analysis indicates that, if we choose to compete with ATC, capturing a large market share would give us an after-tax return on investment of 22%, while capturing a small market share would give us a return of 10%. We estimate that our chance of getting a large market share is high. We have a 1 in 3 chance of getting a large market share. If we were to team up with ATC on the terms proposed, our return would be 14% after tax, with the same total investment."

The joint-venture scenario in the gain situation under the threat frame (i.e., the **ATCgt** version) read the same as the above, except the expected outcomes were framed as

"… We estimate that our chance of getting a small market share is high. We have a 2 in 3 chance of getting a small market share. …"

The joint-venture scenario in the loss situation under the opportunity frame (i.e., the **ATClo** version) read as follows:

> "Our new analysis indicates that, if we choose to compete with ATC, capturing a large market share would reduce our expected loss in investment to 10%, while capturing a small market share would lead to a 22% loss in investment. We estimate that our chance of getting a large market share is high. We have a 1 in 3 chance of getting a large market share. If we were to team up with ATC on the terms proposed, our loss in investment would be 14 percent."

The joint-venture scenario in the loss situation under the threat frame (i.e., the **ATClt** version) read the same as the above, except the expected outcomes were framed as

"… We estimate that our chance of getting a small market share is high. We have a 2 in 3 chance of getting a small market share. …"

In accordance with a 2 by 2 between-subjects design, the participants were randomly assigned to each of the four experimental conditions. That is, each participant was presented with one version of the joint-venture scenario. The participants were asked to imagine themselves in the role of a newly appointed vice-president of a large multinational corporation. The instructions emphasized that the vice-president must make the decision alone, given only the information available. The two dependent variables measured in Study 1 were risk preference and opportunity-threat perception.

Risk Preference Measure

After reading the scenario, each participant was asked to choose between the sure option (to team up with ATC) and the gamble (to compete with ATC). The risk averse choice of teaming up with ATC is denoted ATCra; and the risk seeking choice of competing with ATC is denoted ATCrs. The percentages of the participants choosing the risky gamble and the sure option were analyzed across gain and loss situations.

Perception Measure:

Each participant also received an instrument designed to assess the perceived opportunities and threats. The measure was adopted from the opportunity-threat perception scale used in Highhouse and Yüce study (1996), developed on the basis of Jackson and Dutton's (1988) empirical investigation of the terms associated most often with threats and opportunities. The measure contained five threat-items and five opportunity-items. The opportunity-related items included "Positive", "May gain and unlikely to lose", "Success is likely", "You have control", and "Opportunity". The threat-related items included "Negative", "May lose and unlikely to gain", "Personal loss involved", "Your actions constrained", and "Threat".

Participants were asked to indicate the degree to which each item was descriptive of the joint-venture scenario, on a seven-point scale that ranged from (1) "Not appropriate at all" to (7) "Completely appropriate". The opportunity scores and threat scores were measured and analyzed separately.

Results and Discussion

Effects of Gain-Loss Situation and Opportunity-Threat Framing on Risk Preference

The frequency and percentage data of risk preference are presented in Table 1. We defined significance level of a statistical test as $p < .05$.

An analysis of variance in risk preference (i.e., choice of the sure option or the gamble), showed a significant reflection effect due to the gain-loss manipulation, $F(1, 140) = 9.466$, $p < .003$. However, the overall effect of the opportunity-threat framing was not significant at the 0.05 alpha level, $F(1, 140) = 3.22$, $p < .075$. The framing effect was only significant in the loss situation, $F(1, 72) = 6.537$, $p < .013$ (see Table 1). The interaction effect between the gain-loss and framing variables was marginally significant, $F(1, 72) = 3.334$, $p < .070$.

Although, as indicated in Hypothesis 1, a significant reflection (gain-loss) effect was found, the direction of the effect on risk preference was the opposite of what was predicted according to the S-shaped value function of prospect theory. The participants were clearly more risk seeking in gains than in losses. In gains, the overall percentage of the participants choosing the gamble option averaged over the two framing conditions was 70%, but in the loss situation this percentage dropped to 45%. This reversed reflection effect can be better understood after we look at, in the following section, the relationship between risk preference and risk perception as measured by the opportunity scores and threat scores.

Consistent with previous findings by Highhouse and Yüce (1996), the partial framing effect observed in the loss situation was a reversed framing effect: The participants were more risk seeking under the positive (opportunity) framing than under the negative (threat) framing.

TABLE 1. Percentage of Participants Choosing the Risky Option across Gain-Loss Situations and Framing Conditions.

Joint-Venture (ATC) Problems			
	Opportunity Framing	**Threat Framing**	
Gain	25/36=69.4%	23/33=69.7%	48/69=69.6%
Loss	22/37=59.5%	11/36=30.6%	33/73=45.2%
	47/73=64.4%	34/69=49.3%	81/142=57.0%

Scores of Opportunity Perception and Threat Perception

Hypothesis 2 concerns the effects of the situational and framing manipulations on risk perception and possible mediating effects of risk perception. The findings were consistent with the prediction of Hypothesis 2. Both the gain-loss situation and framing manipulation significantly affected the scores of opportunity perception. The participants saw greater opportunities in the gain situation than in the loss situation, $F(1, 140) = 13.54$, $p < .0001$. Similarly, they saw greater opportunities under the opportunity frame than under the threat frame, $F(1, 140) = 4.47$, $p < .033$.

TABLE 2.Opportunity-Threat Perception Scores across Gain-Loss and Framing Conditions in the ATC Scenarios.

Opportunity Perception Scores			
Gain-Loss	**Framing**	**Mean ± SD**	**n**
Gain	Opportunity Framing	5.51 ± 0.96	36
	Threat Framing	5.38 ± 0.89	37
		5.45 ± 0.92	73
Loss	Opportunity Framing	5.12 ± 1.02	33
	Threat Framing	4.52 ± 1.14	36
		4.82 ± 1.12	69
Threat Perception Scores			
Gain	Opportunity Framing	3.14 ± 1.17	36
	Threat Framing	3.32 ± 0.89	37
		3.23 ± 1.04	73
Loss	Opportunity Framing	3.21 ± 0.97	33
	Threat Framing	3.80 ± 1.10	36
		3.50 ± 1.07	69

However, the gain-loss effects on the scores of threat perception were not significant. Only the framing manipulation had a significant effect, where the participants perceived greater threats under the threat framing and greater opportunities under the opportunity framing, $F(1, 140) = 4.87$, $p < .029$.

Mediating Effects of Risk Perception on Risk Preference

Viewing the risk preference data and the risk perception data together, the results showed that the perception of opportunities facilitated the risk-seeking choice and the perception of threats augmented the risk-averse choice.

Pearson correlations between the participants' risk preference and their opportunity perception scores and between risk preference and their threat perception scores were both significant. In particular, the opportunity perception scores positively correlated with the risk-seeking preference, $r(142) = .20$, $p < .019$, two-tailed. In contrast, the threat perception scores were negatively correlated with the risk-seeking preference, $r(142) = -.24$, $p < .005$, two-tailed.

These results shed lights onto the question regarding the reversed reflection effects, where the participants were more risk seeking in the gain ACT scenarios than in the loss ACT scenarios, and vice versa. The reversed reflection effect may be better understood by viewing risk perception as a mediating factor in determining risk preference of the decision maker. That is, gain-loss situations indirectly influence risky choice by means of the perception of risk as either opportunities or threats. In making the joint-venture decisions, the gain situation fostered the perception of opportunities more than the perception of threats whereas the loss situation enhanced the perception of threats more than the perception of opportunities. In turn, when the perception of opportunities was higher in gains and lower in losses, so did the risk-seeking preference of the participants.

To further test the hypothesis of mediating effects of risk perception on risk preference we conducted a hierarchical analysis of logistic regression to see if the gain-loss and framing effects would be reduced or disappear when the two perception variables were introduced into the regression model. If the perception of opportunities and threats did mediate the effects of the gain-loss and framing variables, the gain-loss and framing effects on risky choice would be minimized when the two perception variables were introduced into the regression model. As Table 3 shows, in Block 0, each of the main effects of gain-loss, framing, opportunity perception, threat perception and the interaction effects between gain-loss and framing and between the two perception variables were tested along in terms of their individual effect on risk preference while other effects were not entered into the equation. In Block 0, the main effects of gain-loss, opportunity perception and threat perception were significant; and the gain-loss variable interacted significantly with both the opportunity perception and threat perception.

In Block 1, we started with the two independent variables (gain-loss and framing) and their interaction effect. Then in Block 2, the two perception variables (opportunity perception and threat perception) were added. Within Blocks 1 and 2, however, variables were entered simultaneously. Only the gain-loss effect was significant in Block 1. The effect of the gain-loss variable disappeared in Block 2. Overall, the logistic regression analysis showed that when the perceptions of opportunities and threats were controlled, the effects of the independent variables became minimized and disappeared. The finding suggests that the effects of the gain-loss situation and framing on risk preference are partially mediated by perceived opportunities and threats.

In line with the proposition that risk perception mediates the situational and informational effects on risk preference, Weber and Milliman (1997) argue that people with a negative risk attitude would prefer a gamble to a sure thing of equal expected value in a gain situation if they perceive the sure thing as riskier than the gamble; they would prefer a sure thing to a gamble in a loss situation if they perceive the gamble as riskier, thus showing a reversed reflection effect. Thus, the relatively variable risk

preference evidenced in empirical studies of behavioral decision making is not due to a variable risk attitude but is often a result of changes in risk perception (Weber, Blais, & Betz, 2002).

TABLE 3. Logistic Regression of the Risk-Averse and Risk-Taking Choices on Gain-Loss Situation, Opportunity-Threat Framing, Opportunity Perception, and Threat Perception in Study 1.

Block 0	Wald Score	p
Gain-Loss (GL)	8.590**	< .003
Framing (F)	3.304	.069
GL * F	2.956	.086
Opportunity Perception (OP)	5.502*	< .019
Threat Perception (TP)	7.932**	< .005
OP * TP	2.355	.125
OP * GL	8.677**	< .003
OP * F	3.259	.071
TP * GL	6.464*	< .011
TP * F	2.413	.120
Block 1	**Wald Score**	**p**
GL	8.457**	< .004
F	3.315	.097
GL * F	2.857	.091
Block 2	**Wald Score**	**p**
GL	.321	.571
F	.986	.321
GL * F	.110	.741
OP	3.349	.067
TP	2.267	.132

Note. * $p < .05$; ** $p < .01$.

STUDY 2

A Motivational Dimension Underlying Risk Perception

Study 1 revealed that the participants' perception of opportunities and threats was dependent on the gain-loss situations and correlated with risk preference. Study 2 further examined dispositional causes of such gain-loss dependent risk perception. If risky choice is mediated by risk perception of the decision maker, a key question then would be who is more likely to perceive opportunities or threats in gains vs. losses.

Various experiments have shown that risky decisions are not only sensitive to situational variables but are also affected by individual predispositions towards risk (Bromiley & Curley, 1992). Perceiving risky events as either threats or opportunities may be in part a function of individual

dispositions. Some recent discussions (Higgins, 1997; Levin, Schneider, & Gaeth, 1998) have brought attention to the motivational basis of risky choice, particularly the motivational effects on risk perception. The focus of Study 2 was placed on achievement motives.

Hypothesis 3. We hypothesized that the achievement motive directs attention to opportunities and the avoidance motive directs attention to threats in a gain-loss dependant manner. That is, the achievement motive would manifest most significantly in loss situations where the focus of attention tends to be on threats for an average person. In contrast, the avoidance motive would exhibit its effects most significantly in gain situations where the focus of attention tends to be on opportunities for an average person.

This hypothesis was derived from a synthesis of three theoretical constructs: attention locus on either security or potential (Lopes, 1984, 1987), self-regulatory focus on either promotion or prevention (Higgins, 1997), and motivation for achievement or avoidance (Atkinson, 1957).

Lopes (1984, 1987) argued that individuals differ in their relative attention to the worst outcomes in a payoff distribution ("security" minded) or the best outcomes ("potential" minded). Lopes' security-potential and aspiration level model considers not only situational variables but also individual dispositions. Consistent with the concept of threat-opportunity perception, the security-potential distinction suggests that a decision maker has two loci in perceiving risks. It is thus conceivable that a "security" minded person sees greater threats even in gains whereas a "potential" minded person sees greater opportunities even in losses.

One dispositional difference that may underlie the differential attentions to opportunities and threats is the balance between the motive to achieve a success (achievement motive) and the motive to avoid a failure (avoidance motive). Much of the study on achievement goals has been grounded in classic motivation theory (e.g., Atkinson, 1957; Atkinson, Bastian, Earl, & Litwin, 1960). According to Atkinson (1957), an individual's motive for an action is determined by two counter-directional tendencies: desire for success and the concomitant fear of failure. In a situation where achievement goals are concerned, both tendencies would be operating and a preponderance of one motive or the other determines the preference for tasks of a certain difficulty level. Factor analytic work has shown that achievement motive and avoidance motive independently influence achievement goals (e.g., Elliot & Harackiewicz, 1996).

More recently, Higgins (1997) argues that to discover the true nature of approach-avoidance motivation, psychologists need to move beyond the general but oversimplified hedonic principle that people approach to pleasure and avoid pain. He proposed a conceptual distinction between self-regulation with a promotion focus (accomplishments and aspirations) and self-regulation with a prevention focus (safety and responsibilities). Higgins suggests that the analysis on the regulatory focus should help us better understand a wide range of phenomena, including motivational basis of risky decisions. Of particular interest to the present discussion is the prediction that opportunity-threat perception is differentially affected by the regulatory focus of motivation.

Built on the aforementioned three lines of related research, we argue that the attentional and self-regulatory focus should be reflected in a decision maker's perception of opportunities and threats and vary as a function of motivational focus on achieving success (reaching a goal) vs. avoiding failure (falling below a bottom-line). In addition, the motivational influence on opportunity-threat perception would manifest in a gain-loss dependent manner. We anticipated that achievement motivation would be

needed most in adverse conditions whereas avoidance motivation would be most useful in favorable situations.

In study 2, we examined how the achievement motive and avoidance motive would affect the perception of risks by directing attention to either opportunities or threats in adverse versus favorable situations.

Method

Participants

Two hundred and seventy six volunteer students (120 females and 156 males) from three universities in Beijing and Chongqing areas of mainland China participated in Study 2. Their average age was 21.4 years.

Materials and Procedure

We used two managerial decision scenarios: a lawsuit problem and a joint-venture problem, similar to those originally developed by MacCrimmon and Wehrung (1986, pp. 307-312). The lawsuit problem presents an adverse situation of a production company named PMG and the joint-venture problem presents a favorable situation concerning another production corporate named ATC. Since the focus of the study was on the effects of individual dispositional variables on risk perception in favorable or adverse situation, the gain-loss situations were not balanced as in Study 1. The task situation (lawsuit vs. joint-venture) was used as a within subject variable.

In order to focus more on the motivational effects instead of verbal effects on opportunity-threat perception, we did not use the "strong" version of opportunity-threat framing as in Study 1, such as "… the chance of our winning (losing) the case is high". In Study 2, under the positive framing only the chance of success was stated, and under the negative framing only the chance of failure was stated. The cover story of the two ACT (joint-venture) scenarios was the same as those used in Study 1. The joint-venture scenario under the positive frame read as: "… We estimate a 1 in 3 chance of getting a large market share." Under the negative frame the above sentence was replaced with "… We estimate a 2 in 3 chance of getting a small market share".

In contrast to the favorable situation of getting more market share described in the ATC scenarios, the litigation (PMG) scenarios presented participants with an adverse situation in a memo from the director of a subsidiary describing a dilemma concerning whether to fight an impending patent violation suit or settle out of court.

The litigation scenario under the positive framing and negative framing (in parenthesis) read as follows:

> "PMG has threatened to sue our company for patent violation. The case has not yet been filed in court, since PMG are waiting to hear our response to their offer to settle out of court. They have proposed that we pay them ¥300,000 in cash. If we do not agree to this proposal, PMG will file their suit. If we lose in court, we will incur about ¥900,000 damage reparation. On the other hand, if we win in court, we will not need to pay anything. Our corporate lawyer estimates that we have a 1 in 3 chance of winning the case (a 2 in 3 chance of losing the case)."

Each participant was presented with two managerial decision scenarios (i.e., ATC and PMG) with the framing condition and the order of the scenarios counterbalanced. Following each individual

case, participants were asked to indicate on a 7-point scale how agreeable they were to each of the choice alternatives, with 1 representing completely disagree and 7 representing completely agree.

For the ATC scenario, the score of the risk averse choice (to team up with ATC) is denoted ATCra; and the score of the risk seeking choice (to compete with ATC) is denoted ATCrs. Similarly, for the PMG case, PMGra represents the score of the risk-averse choice (to settle out of court) and PMGrs represents the score of the risk-seeking choice (to engage in a lawsuit). For all these dependent measures, a higher number indicates a stronger preference, either risk averse or risk seeking.

After making each choice, the participants were then given a measure of the perceived opportunities and threats for the ATC and PMG problems. The perception measures were the same as those used in Study 1.

Motivation Measure:

Each participant was given the Organizational Behavior Motive Scale for Managers (OBMS) designed for Chinese participants (Guo, 1998). Each participant was given two sub-scales from the OBMS, measuring achievement motive and avoidance motive of the participant. There were 18 items designed to measure achievement motive, 16 items to measure avoidance motive, and 8 items for validity control. Each item was a statement, such as "I often feel nervous when performing a task that lacks the certainty of success" or "I like to try the tasks that others fail to complete." Both the achievement motive and avoidance motive measures used a 1 to 5 scale, representing completely disagree, mostly disagree, neither disagree nor agree (hard to say), mostly agree, and completely agree, respectively.

This indigenous Chinese version of motivation scale has been tested and validated using student participants and professional participants (see Yu & Yang, 1992; Mao, 1993; Qian & Chen, 1997).

Results and Discussion

Achievement-Avoidance Motives and Opportunity-Threat Perceptions

The results of Study 2 supported Hypothesis 3 (see Table 4). The achievement motive (Ach) was most effective on opportunity perception in the loss (PMG) situation, and the avoidance motive (Avo) was most effective on threat perception in the gain (ATC) situation.

Using the mean (3.73) of the Ach scores as a splitting point, we first classified the participants into either the high Ach or low Ach group. The participants in these two groups had significantly different Ach scores: Ach (low) = 3.32 ± 0.36 ($n = 142$), Ach (high) = 4.17 ± 0.31 ($n = 134$), $F(1, 274) = 435.61$, $p < .0001$. As predicted, in the adverse PMG situation but not in the favorable ACT situation, the participants in the high Ach group had a significantly higher mean score of opportunity perception (PMGoppt = 5.02 ± 1.08) than those in the low Ach group (PMGoppt = 4.45 ± 1.01, $F(1, 274) = 20.72$, $p < .0001$). However, no significant difference in the mean scores of threat perception was found between the two groups of participants. Thus, the higher the achievement motive, the greater opportunities would be perceived in a loss (adverse) situation.

Using the mean of (3.18) of the Avo scores as a splitting point, we then classified the participants into either the high Avo or low Avo group. The participants in these two groups had significantly different Avo scores: Avo (low) = 2.68 ± 0.37 ($n = 135$), Avo (high) = 3.65 ± 0.34 ($n = 141$), $F(1, 274) = 519.28$, $p < .0001$. Again as predicted, in the ATC situation but not in the PMG situation, the participants in the high Avo group had a significantly higher mean score of threat

perception (ATCthreat = 2.98 ± 0.98) than those in the low Avo group (ATCthreat = 2.73 ± 0.89), F (1, 274) = 2.15, p < .032. However, no significant difference in opportunity perception was found between the two groups of participants. Thus, the higher the avoidance motive, the greater threats would be perceived in a gain (favorable) situation.

Pearson correlation tests further confirmed Hypothesis 3. Two significant correlations were found between the achievement motive scores and the opportunity perception scores in the PMG situation, r (276) = .211, p < .01 (two-tailed), and between the avoidance motive scores and the threat perception scores in the ATC situation, r (276) = .145, p < .05 (two-tailed). The participants who had a higher achievement motive saw greater opportunities at risk even when things are going badly (in the PMG situation). In contrast, the participants who had a higher avoidance motive saw greater threats at risk even when things are going well (in the ATC situation).

TABLE 4. Perception of Opportunities and Threats as a Function of Achievement and Avoidance Motives in Study 2.

	Predictions	
	Favorable Situation	Adverse Situation
Achievement Motive	No Motivational Effects	Enhanced Opportunity Perception
Avoidance Motive	Enhanced Threat Perception	No Motivational Effects
	Results	
	ATC Scenario (Joint-Venture)	PMG Scenario (Lawsuit)
Achievement Motive	M1 = 5.47, M2 = 5.42 Not significant	M3 = 5.02, M4 = 4.45 F = 20.72, p < .0001
Avoidance Motive	M5 = 2.98, M6 = 2.73 F = 2.15, p < .032	M7 = 3.53, M8 = 3.31 Not significant

Note:
M1 = Mean score of opportunity perception for the high achievement motive group in the ATC situation,
M2 = Mean score of opportunity perception for the low achievement motive group in the ATC situation,
M3 = Mean score of opportunity perception for the high achievement motive group in the PMG situation,
M4 = Mean score of opportunity perception for the low achievement motive group in the PMG situation,
M5 = Mean score of threat perception for the high avoidance motive group in the ACT situation,
M6 = Mean score of threat perception for the low avoidance motive group in the ACT situation,
M7 = Mean score of threat perception for the high avoidance motive group in the PMG situation,
M8 = Mean score of threat perception for the low avoidance motive group in the PMG situation.

Reflection and Framing Effects

Both the risk-seeking measure and the risk-aversion measure showed a significant situational (reflection) effect. For the risk-aversion measures, PMGra (M = 4.09) was significantly higher than ATCra (M = 3.55); F (1, 275) = 8.21; p < .004. For the risk-seeking measures, ATCrs (M = 3.55) was significantly higher than PMGrs (M = 3.18); F (1, 275) = 3.91; p < .049. Both measures showed that the participants were more risk seeking in the gain (ATC) situation but more risk averse in the loss (PMG) situation.

The framing effect was partially found. Of the four risk preference mean scores (the mean risk-aversion scores in the ATC and PMG situations and the mean risk-seeking scores in the ATC and PMG situations), the predicted framing effect was significant only in the PMGra measures (M = 4.36 under the opportunity frame and M = 3.75 under the treat frame, F (1, 274) = 5.07, p < .025). The participants were more risk seeking under the opportunity frame than under the threat frame.

Overall, the reflection effects and framing effects found in Study 1 and Study 2 were consistent with each other and suggest that in managerial contexts positive situations and positive framing promote risk seeking while negative situations and negative framing augment risk aversion.

Risk Perception and Risky Choice

Overall, the participants saw greater opportunities in the ATC situation (M = 5.44) than in the PMG situation (M = 4.73), t (276) = 9.662, p < .0001. In contrast, participants saw greater threats in the PMG situation (M = 3.43) than in the ATC situation (M = 2.86), t (276) = 8.59, p < .0001.

Would the perceived opportunities and threats in turn influence the risk preference of the participants? Linear regression analyses showed several significant correlations between the gain-loss (ATC vs. PMG) situation and risk preferences of the participants. In the gain situation, risk preference measured by either the risk-averse scores (ATCra) or the risk-seeking scores (ATCrs) was correlated with the scores of threat perception (ATCthreat) but not the scores of opportunity perception (ATCoppt). The regression of the ATCra scores on ATCthreat showed a significant effect, F (1, 274) = 4.37, p < .038 while the regression of the ATCrs scores on ATCthreat showed a marginally significant effect, F (1, 274) = 3.60, p < .059.

In contrast, risk preferences in the loss situation (PMGra or PMGrs) was correlated with the scores of opportunity perception (PMGoppt) but not the scores of threat perception (PMGthreat). The regressions of both PMGra and PMGrs scores on PMGoppt showed significant effects, F (1, 274) = 5.21, p < .023, and F (1, 274) = 14.35, p < .0001, respectively.

The above findings suggest that in the organizational contexts of the present study risk preference in gains was primarily mediated by the perception of threats whereas risk preference in losses was primarily mediated by the perception of opportunities.

GENERAL DISCUSSION

The two studies focused on one relationship and three possible dimensions underlying decision making at risk: the relationship between risk perception and risk preference, and the effects of situational (gain-loss), informational (opportunity-threat framing), and dispositional (achievement motives) factors on risk perception and risky choice.

In Study 1, we found a reversed reflection effect and a reversed framing effect (only in the loss situation). Both effects were in the opposite direction of the predictions derived from prospect theory

(Kahneman & Tversky, 1979). The participants were more risk seeking in gains and under positive (opportunity) framing and more risk averse in losses and under negative (threat) framing.

Recent meta-analyses have shown that framing effects are generally robust although most cases involve a shift rather than reversal of risk preference (Kühberger, 1998; Levin, Schneider & Gaeth, 1998). The framing literature has also suggested some antecedent conditions for the occurrence of framing effects. For example, the classical framing effect demonstrated using the Asian disease problem or life-death problems alike only occurs in large anonymous and stranger group contexts and disappears in small and family group contexts (e.g., Wang, 1996, Wang, Simons, & Brédart, 2001). Framing effects are absent or reduced in those who are high in need for cognition (Smith & Levin, 1996) or when a decision rationale is required (Fagley & Miller, 1987; Takemura, 1994) or a causal schema is provided (Jou, Shanteau, & Harris, 1996). Wang (1996) argue that framing effects as evidenced particularly in a reversal in risk preference due to different framings of the same choice outcomes are indicative of ambiguity in risk assessment and indecisiveness in choice selection.

The partial effect of the opportunity-threat framing found in Study 1 suggests a reduced framing effect arguably due to the managerial context presented in the scenarios where both the non-stranger social group settings and the presumed responsibility for a justifiable decision would decrease the effects of verbal framing. If this postulation holds to be correct, we would see an even stronger reduction or disappearance of framing effects if the participants were real managers rather than undergraduate students. This serves as a testable prediction for a future study.

The effects of the gain-loss situation and information framing on risk preference appear to be mediated at least partially by the perception of risk as either opportunities and/or threats. The perceptions of opportunities and threats played a central role in mediating choice behavior. The risk preference of the participants closely followed their perception of risk in the managerial scenarios. The gain situations and the opportunity framing increased the perception of opportunities whereas the loss situations and the threat framing augmented the perception of threats. In turn, a greater opportunity perception led to more risk-seeking choices whereas a greater threat perception resulted in more risk-averse choices. Together, these results suggest that both situational and informational variables affect choice behavior by means of their effects on risk perception.

The perception of opportunities and threats was sensitive not only to situational and informational variables but also to the dispositional differences in achievement motivation. In Study 2, we proposed that achievement motive would enhance opportunity perception most significantly in adverse situations whereas avoidance motive would strengthen threat perception most significantly in favorable situations.

Consistent with this prediction, we demonstrated that the achievement motive showed its strongest effects in the lawsuit situation, where individuals with a higher achievement motive were more likely to see risks as opportunities even the situation was negative. In contrast, the motive to avoid failure had its strongest effects in the joint-venture situation, where individuals with a higher avoidance motive were more likely to see risks as threats even the situation was positive. Interestingly, risk preferences in gains and losses were also differentially correlated with the two types of risk perception. In gains, risk preference was primarily correlated with the perception of threats whereas preference in losses was primarily correlated with the perception of opportunities.

In favorable situations, goals for success should be more salient to everyone, but those with a higher avoidance motive also pay much heed to potential threats. In contrast, in adverse situations, the

primary focus of decision makers should be on the bottom lines for survival, but those with a higher achievement motive also keep in mind potential opportunities. The result suggests that ambition (the achievement motive) acts most significantly in the face of adversities whereas cautiousness (the avoidance motive) functions most effectively in prosperity.

The differential effects of achievement motive and avoidance motive on the perception of risk as opportunities and threats suggest that the decision makers consider simultaneously two reference points: the desired goals and the minimum requirement for the task. This proposition advocates for the choice models using two reference points. From this perspective, von Neumann and Morgenstern's (1947) expected utility theory assumes no reference point, and Kahneman and Tversky's (1979) prospect theory claims one reference point, separating gains from losses. Two-reference models take into account both the goal setting for "success" and the minimum requirement for "survival". For example, March and Shapira's variable risk preference model (March, 1988; March & Shapira, 1992; Shapira, 1995) assumes that risk preference of a decision maker is constrained by two reference points, one for "success" and one for "survival" (see also Wang, 2002). In line with two-reference models of risky choice, our results suggest that the achievement motive highlights goals for "success" and the avoidance motive directs attention to the minimum task requirement for "survival".

REFERENCES

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review,* **64**: 359-372.

Atkinson, J. W., Bastian, J. R., Earl, R. W., & Litwin, G. H. (1960). The achievement motive, goal-setting, and probability preferences. *Journal of Abnormal and Social Psychology,* **6**: 27-36.

Bromiley, P., & Curley, S. (1992). Individual differences in risk taking. In J. Yates (Ed.), *Risk taking behavior* (pp. 87-132). New York: Wiley.

Elliot, A., & Harackiewicz, J. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology,* **70**: 461-475.

Fagley, N. S., & Miller, P. M. (1987). The effects of decision framing on choice of risky vs. certain options. *Organizational Behavior and Human Decision Processes,* **39**: 264-277.

Fagley, N. S. (1993). A note concerning reflection effects versus framing effects. *Psychological Bulletin,* **113**: 451-452.

Guo, D. J. (Ed.). (1998). Report of the study of behavioral motivation measurement of managers. *Assessment Center, Personnel Department of P. R. China* (in Chinese).

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist,* **52**: 1280-1300.

Highhouse, S., & Yüce, P. (1996). Perspectives, perception, and risk-taking behavior. *Organizational Behavior and Human Decision Processes,* **65**: 159-167.

Jackson, S. E. & Dutton, J. E. (1988). Discerning threats and opportunities. *Administrative Science Quarterly,* **33**: 370-387.

Jou, J., Shanteau, J., & Harris, R. J. (1996). An information processing view of framing effects: The role of causal schemas in decision making. *Memory and Cognition,* **24**: 1-15.

Kahneman, D., & Tversky, A. (1979). Prospect theory. *Econometrica,* **47**: 263-292.

Kühberger, A. (1998). The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes,* **75**: 23-55.

Levin, I. P., Schneider, S., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes,* **76**: 149-188.

Lopes, L. L. (1984). Risk and distributional inequality. *Journal of Experimental Psychology: Human Perception and Performance,* **10**: 465-485.

Lopes, L. L. (1987). Between hope and fear: The Psychology of risk. *Advances in Experimental Social Psychology,* **20**: 255-295.

MacCrimmon, K. R., & Wehrung, D. A. (1986). *Taking risks: The management of uncertainty.* New York: Free Press.

March, J. G. (1988). Variable risk preferences and adaptive aspirations. *Journal of Economic Behavior and Organization,* **9**: 5-24.

March, J. G., & Shapira, Z. (1992). Variable risk preferences and the focus of attention. *Psychological Review,* **99**: 172-183.

Mao, J. P. (1993). A preliminary examination of achievement motives of contemporary Chinese collage students (in Chinese). *Journal of Social Psychology,* **3**: 10-16.

Qian, M. Y., & Chen, Z. G. (1997). A preliminary revision of achievement motive scale and the study of relevant factors (in Chinese). *Journal of Social Psychology,* **6**: 1-11.

Shapira, Z. (1995). *Risk taking: A managerial perspective.* New York: Russell Sage Foundation.

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review,* **17**: 9-38.

Smith, S. M., & Levin, I. P. (1996). Need for cognition and choice framing effects. *Journal of Behavioral Decision Making,* **9,** 283-290.

Staw, B., Sandelands, L., & Dutton, J. (1981). Threat-rigidity effects in organizational behavior: A multi-level analysis. *Administrative Science Quarterly,* **26**: 501-524.

Takemura, K. (1994). The influence of elaboration on the framing of decision. *Journal of Psychology*, **128**: 33-39.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science,* **211**: 453-458.

Tversky, A., & Kahneman, D. (1992) Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty,* **5**: 297-323.

Wang, X.T. (1996). Framing Effects: Dynamics and Task Domains. *Organizational Behavior and Human Decision Processes,* **68**, 145-157.

Wang, X.T. (2002). Risk as reproductive variance. *Evolution and Human Behavior*, **23**, 35-57.

Wang, X.T., Simons, F., & Brédart, S. (2001). Social cues and verbal framing in risky choice. *Journal of Behavioral Decision Making,* **14**: 1-15.

Weber, E. U., Blais, A. R. & Betz, N. E. (2002). A domain-specific risk attitude scale: Measuring risk perception and risk behaviors. *Journal of Behavioral Decision Making,* **15**: 263-290.

Weber, E. U., & Milliman, R. (1997). Perceived risk attitudes: Relating risk perception to risky choice. *Management Science,* **43**: 122-143.

Yu, A. B., & Yang, K. S. (1987). Social-oriented and individual-oriented achievement motivation: A conceptual and empirical analysis (in Chinese). *Bulletin of the Institute of Ethnology Academia Sinica*, **65**: 51-98.

ACKNOWLEDGMENTS

This study was partially supported by Grant 70171034 from the National Natural Science Foundation of China to the first author, and by Grant SBR-9876527 from the National Science Foundation of the United States to the second author. The study was conducted while the second author was a visiting scholar at the Department of Management of Organizations, School of Business and Management, Hong Kong University of Science and Technology. We thank Michael Granaas for his help with the data analysis, and Toshio Yamagishi and two anonymous reviewers for their constructive comments on an earlier version of this article.