

Self-framing of Risky Choice

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ABSTRACT

Previous research on framing effects has largely focused on how choice information framed by external sources influences the response of a decision maker. This research examined how decision makers framed choice options and how the hedonic tone of self-framing influenced their risk preference. By using pie charts and a complementary sentence-completion task in Experiment 1, participants were able to interpret and frame the expected choice outcomes themselves before making a choice between a sure option and a gamble in either a life–death or a monetary problem. Each of these self-frames (phrases) was then rated by a group of independent judges in terms of its hedonic tone. The hedonic tone of self-frames was mostly positive and was more positive in the life–death than the monetary context, suggesting a motivational function of self-framing. However, positive outcomes were still more likely to be framed positively than negative outcomes. In Experiment 2, choice outcomes were depicted with a whole-pie chart instead of a pie slice in order to emphasize positive and negative outcomes equally. The results showed that the hedonic tone of self-framing was still largely positive and more positive in the life domain than the monetary domain. However, compared to Experiment 1, the risk preference in the life–death domain was reversed, showing an outcome salience effect: when the pie-slice chart emphasized only survival outcomes, participants were more risk taking under positive hedonic frames whereas when the whole-pie chart depicted both survival and mortality outcomes, they became risk averse under positive frames. In sum, self-framing reflected a positive bias in encoding risk information and affected the risk preference of the decision maker. Like the tone of voice used in communication, the hedonic tone of self-framing, either positive or negative, can affect risk perception of a choice problem. Copyright © 2003 John Wiley & Sons, Ltd.

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INTRODUCTION

One of the active and proliferating research areas in the literature of behavioral decision making has been the study of framing effects, named after the finding that decision makers respond differently to different but

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effectively equivalent descriptions of the same decision problem (Tversky & Kahneman, 1981). Over the past decade, the existence of framing effects has been documented in many task domains with different kinds of respondents (for recent reviews see Levin, Schneider, & Gaeth, 1998, & Kühberger, 1998). However, previous research on framing effects has largely focused on how the choice information framed by external sources influences the response of a decision maker. Little is known about how decision makers themselves spontaneously encode and frame a choice problem.

Why study spontaneous self-framing?

A clear limitation of studies of framing effects where choice options are framed either positively or negatively by the experimenter is the inability to predict what hedonic frame a decision maker uses spontaneously when encoding choice options. Over the past years, an increasing number of investigators have noted the lack of research examining how decision makers spontaneously frame choice outcomes and risk information (e.g. Elliott & Archibald, 1989; Fischhoff, 1983; Thaler & Johnson, 1990; van Schie & van der Pligt, 1990).

Studies of self-framing would enrich our understanding of mechanisms underlying risky choices for the following reasons:

- (1) In real-life situations, choice options are commonly framed by the decision makers themselves.
- (2) Information about risks in the real world is often ambiguous, requiring self-generated interpretation.
- (3) It is important to know whether the positive and negative self-frames of expected outcomes have the same directional effects on choice behavior as do the external frames imposed by an experimenter or other people.
- (4) There are naturally occurring frames in life, such as the differing frames that are created by the buying and selling roles. Neale, Huber, and Northcraft (1987), for instance, found that in negotiation experiments sellers think about the focal transaction in terms of gaining resources whereas buyers view the transaction in terms of loss. Similarly, the hedonic tone of self-framing may be biased and situational.
- (5) Finally, in understanding the functionality of framing effects, it is useful to examine whether the hedonic tone of self-framing varies systematically as a function of the hedonic nature of a decision problem and whether self-framing affects the risk preference of the decision maker.

In a review of the framing literature, Levin, Schneider, and Gaeth (1998) pointed out the importance of studying self- or intrinsic-framing. They state 'the hedonic tone of the outcome at stake can be intrinsically positive (e.g. life) or intrinsically negative (e.g. debt), which may make the framing manipulation more complex or unnatural in the frame opposite the given hedonic tone' (p. 153). From this standpoint, one type of self-framing (positive or negative) may be more dominant than the other in different task domains.

Although the literature on self-framing is sparse, several experiments indicate that people prefer positive frames to negative frames (e.g. Elliott & Archibald, 1989; van Schie & van der Pligt, 1990). In addition, a decision maker's subjective framing of a choice problem as either a gain or loss is influenced by perspective (e.g. buyer or seller) and biased towards viewing his/her actions in a positive light (Beggan, 1994).

In these previous studies of self-framing, the participants were asked to indicate either which of the alternative frames provided by the researcher they preferred or the extent to which they thought that they would view a choice outcome as a gain or a loss. In the present study, to avoid the influence of explicitly provided frames, an equivocal pie-chart display of expected choice outcomes coupled with a sentence-completion task was used to explore how people spontaneously frame expected choice outcomes. The hedonic tone of the wording in self-framing was then measured and analyzed.

EXPERIMENT 1

Experiment 1 addressed the following questions: How would a decision maker verbalize or frame expected choice outcomes? Would the hedonic (affect-laden) tone of self-framing in turn influence choice behavior? More generally, what would be the functions of self-framing in risky decision-making?

Hypotheses and predictions

Regarding possible functions of self-framing, two alternative effects of self-framing are conceivable. First, in evaluating choice options, the decision maker anticipates corresponding outcomes so that self-frames are used to reflect the nature of the anticipated outcomes. From the perspective of this *anticipatory functions hypothesis*, anticipated positive outcomes would likely to be framed in positive terms and anticipated negative outcomes would likely to be framed in negative terms. In other words, the more positive the anticipated outcomes are, the more positively these outcomes would be framed, and vice versa.

However, Taylor's (1991) mobilization–minimization model suggests an alternative preparatory function of the responses to risky events. According to this model, there are two phases of reactions to risky (threatening) events. These events first evoke strong mobilizing reactions from the organism; this mobilization of the organism is then followed by counteracting processes that reverse or minimize the responses elicited in the initial phase of responding. It can be argued that one of the ways to damp down the impact of a risky event after it is perceived is to encode (frame) the expected negative outcomes in a positive light.

From the perspective of a *preparatory functions hypothesis*, self-framing of choice outcomes serves as a motivational buffer for anticipated outcomes so that negative outcomes would be framed in more positive terms and positive outcomes would be framed in less positive terms. Given its motivational function, the overall hedonic tone of self-framing should be positive rather than negative. By a similar token, the hedonic tone of self-framing should be more positive when more valuable human lives are at stake compared to monetary assets. In addition, within the monetary domain, the greater the amount of money at risk, the more positive the tone of self-framing would be.

Maule's (1989) study of framing effects also suggests a preparatory function of self-framing. Maule conducted a think-aloud protocol analysis of the Asian disease problem introduced first by Tversky and Kahneman (1981). When the problem was presented in terms of the number of lives saved, the majority of the participants adopted a positive frame in their think-aloud responses and preferred the sure option. However, when the same problem was presented in terms of the number of lives lost, the majority of the participants adopted a mixed frame concerning both gains and losses. It appears that the participants were counterbalancing the loss frames presented to them by the experimenter.

In comparison, the anticipatory self-framing hypothesis emphasizes cognitive values of self-framing in actually reflecting the valence of risk at stake. The preparatory self-framing hypothesis, in contrast, focuses on affective and motivational values of self-framing in managing reactions to risky events. Neither hypothesis, however, is clear about what behavioral effects self-framing would have on risk preference. According to prospect theory (Kahneman & Tversky, 1979), positive frames lower the reference point of the decision maker and negative frames elevate the reference point. From this standpoint, the behavioral effects of self-framing on risk preference should be similar to the effects of external framing explicitly provided in a choice problem. Assuming that the value function of the decision maker would be concave above the reference point of status quo but convex below the reference point, choices would be risk averse under positive self-frames and risk seeking under negative self-frames.¹

Method

Participants and procedure

The participants were 225 undergraduate students (87 men and 138 women) who agreed to take part in the study for extra course credit. They averaged 20.9 years of age. Using a between-subjects design, each participant responded to only one binary choice problem. Four choice problems (two life problems and two

¹The terms 'positive framing' and 'negative framing' in this paper are used in the context of 'risky choice framing' according to the typology proposed by Levin, Schneider, and Gaeth (1998) to distinguish between attribute framing, goal framing, and risky choice framing. In particular, choice options (i.e. a sure thing and a gamble of the same expected value) were framed by participants in terms of either positive outcomes or negative outcomes.

monetary problems) were used in Experiment 1. Of the two hypothetical life–death problems, one involved 600 anonymous people, and one involved six relatives. The two monetary problems differed in the amount of money (\$6000 and \$6) at stake.

The expected outcomes of each choice problem were depicted by a pie chart following a cover story. The participants were asked to view the pie chart and provide their interpretations in a sentence completion task and then indicate which option they preferred.

Materials

A pie chart depicting choice outcomes was placed below a cover story of either a life–death or a monetary problem (see Appendix 1 for an example of the life–death problems).

The cover story of the life–death problems read as follows:

Imagine that 600 people (or six of your blood relatives) are infected by a fatal disease. There are two medical plans available. The estimated outcomes of the two plans are illustrated below.

After viewing a pie chart, the participants were given the following instruction:

Based on your interpretation of the pie display of the expected outcomes, complete the following sentences in your own words:

If Plan A is adopted, _____ people will _____. If Plan B is adopted, there is a one-third chance that _____ people will _____ and a two-thirds chance that _____ people will _____.

The cover story of the monetary problems read as follows:

Imagine that the company from which you bought \$6000 (or \$6) worth of stock has filed a claim for bankruptcy recently. The company now provides you with two alternative options to deal with your money.

The estimated outcomes of the two options were illustrated in a pie chart with a dollar value (e.g. \$6000 or \$2000) placed next to each of the pie slices.

The participants were then asked to complete the following sentences in their own words based on their interpretation of the pie chart:

If Option A is adopted, \$ _____ of your money will _____. If Plan B is adopted, there is a one-third chance that \$ _____ of your money will _____ and a two-thirds chance that \$ _____ of your money will _____.

The participants were asked to make a choice between the sure option and the gamble on another sheet of paper after they had completed the self-framing task.

Note that the pie chart was equivocal in that a pie slice depicting the sure option could be interpreted either as the number of lives (or the amount of money) saved or as the number of lives (or the amount of money) lost. That is, the one-third slice of pie can be interpreted either as ‘lives (or money) saved’ or as ‘lives (or money) lost.’ The two different interpretations of the one-third slice of pie would result in different expected values (i.e. one-third saved or two-thirds saved). For this reason, the data set in Experiment 1 only included the responses from the 225 participants, who interpreted the one-third slice of pie as representing the number of lives or the amount of money saved. The data from the 21 participants who interpreted the one-third slice as representing lives (or money) lost, were not included. The subjective probability of success, thus, was one-third for all the participants included in the analysis.

Rating and recording of the self-framing data

To achieve a more reliable and consistent coding of hedonic valence of self-framing, a group of forty peer raters (20 men and 20 women) were recruited from the same participant pool. All self-frames of the pie-chart

outcomes from the sentence-completion task for the life problems were listed in a random order on a sheet of paper. Another list of self-frames was made for the monetary problems. The peer raters were informed that these listed words and phrases were used by their fellow students to describe the outcomes of either a life–death problem or a monetary problem. The two lists of self-frames were presented to the raters in a balanced order. Half of the raters received the framing list of life–death problems first and half received the framing list of monetary problems first. The raters were asked to rate the overall hedonic tone of each framing expression on a five-point scale with the numbers 1 to 5 representing unpleasant and negative; slightly unpleasant and slightly negative; neutral; slightly pleasant and slightly positive; and pleasant and positive, respectively.

The self-frames used by the participants, frequency counts of these self-frames, and their mean scores of hedonic rating are listed in Appendix 2 and Appendix 3 for the life–death problems and monetary problems, respectively. In a few cases where a self-framing expression was unintentionally left out of the lists of Appendices 2 and 3, the hedonic score of the frame was determined by averaging the ratings received from three independent raters who gave their ratings with reference to Appendices 2 and 3.

For each participant, there were three rating scores: one for the sure outcome and two for the gamble outcomes. The average hedonic score was then obtained by giving the rating of the sure option a weight of 0.5 and the arithmetic average of the two ratings of the gamble option a weight of 0.5.

Results and discussion

Appendices 2 and 3 present two lists of self-frames provided by the participants in the life–death context and monetary context, respectively, with the mean score of hedonic rating and the frequency count for each of the frames.

Table 1 presents the mean scores of hedonic rating and percentages of the participants who chose the sure-thing option in the four experimental groups, two in the life domain and two in the monetary domain. Table 2 presents the effects of dichotomously classified self-frames on risk preference of the participants in the life and monetary domains.

The main findings are reported in the following:

- (1) *Positive bias in self-framing.* Of the 225 participants, 118 (52%) used positive frames with a hedonic rating score above 3.0 for all three outcomes in question (i.e. the sure outcome, the positive outcome of the game, and the negative outcome of the gamble). Only 12 participants (5%) used negative frames to describe the sure outcome as well as the gamble outcomes. The remaining 95 participants (42%) used mixed frames.

Table 1. Self-framing and choice preferences of the experimental group in Experiment 1

Experimental groups	<i>n</i>	Hedonic tone of self-framing	Overall choice of the sure option
\$6000	62	3.494 ± 0.118	77.4%
\$6	60	3.163 ± 0.120	60.0%
600 people	52	4.078 ± 0.125	54.9%
6 relatives	51	4.122 ± 0.125	44.9%

The hedonic tone of self-frames was rated by 40 independent raters on a five-point scale with the numbers 1 to 5 representing unpleasant, slightly unpleasant, neutral, slightly pleasant, and pleasant, respectively.

Table 2. Self-framing effect on risk preference in Experiment 1

Experimental groups	<i>n</i>	Hedonic tone of self-framing	Choice of the sure option		Overall choice of the sure option
			Positive self-frames	Negative self-frames	
Money	122	3.331 ± 0.082	77.1%	60.7%	68.9%
Life	103	4.100 ± 0.089	44.2%	58.8%	51.5%

The hedonic tone of self-frames was rated by 40 independent raters on a five-point scale with the numbers 1 to 5 representing unpleasant, slightly unpleasant, neutral, slightly pleasant, and pleasant, respectively.

The participants were dichotomously classified into either the positive or the negative (less positive) self-framing category, using a median split. The median hedonic ratings of self-frames were 4.60 and 3.61 for the life–death and monetary problems, respectively.

It was evident that the observed positive bias in self-framing was a phenomenon of baseline shift where negative outcomes were frequently framed in a positive light. However, the relative tone of self-framing for positive outcomes as compared to that for negative outcomes was rarely reversed. Positive outcomes were still more likely to be framed positively than negative outcomes whereas negative outcomes were still more likely to be framed negatively than positive outcomes. Of the 81 participants who framed the gamble outcomes with opposite hedonic tones, 72 (89%) framed positive outcomes in a positive tone and framed the negative outcomes in a negative tone.

As predicted from a preparatory standpoint, the mean hedonic tone of the participants' self-framing was overall positive in both the life domain and monetary domain. Of the 225 participants, 167 (74.2%) framed the choice outcomes with an overall positive tone (i.e. a hedonic rating score greater than 3.0), $\chi^2(1, n = 225) = 52.80, p < 0.0001$.

- (2) *Preparatory versus anticipatory functions of self-framing.* The mean hedonic rating of self-framing of the life–death outcomes ($M = 4.10$) was significantly higher (more positive) than the mean hedonic rating of the monetary outcomes ($M = 3.33$), $F(1, 223) = 40.30, p < 0.0001$.

A chi-square analysis also showed that there were significantly more participants (89%) in the life–death situations using positive self-frames with a hedonic rating above the neutral (3.0) point than those in the monetary situations (61%), $\chi^2(1, n = 225) = 22.63, p < 0.0001$.

Thus, the results of Experiment 1, in general, lent support to the preparatory self-framing hypothesis rather than the anticipatory self-framing hypothesis.

However, the difference in the hedonic ratings of self-framing between the \$6000 group ($M = 3.49$) and the \$6 group ($M = 3.16$) did not reach the significance level of $p < 0.05$; $F(1, 120) = 3.45, p < 0.066$. Similarly, no significant difference was found in the hedonic tone of self-framing between the 600-people group ($M = 4.08$) and the six-relative group ($M = 4.12$). It appears that the value of kin survival offset the effects due to the difference in the number of lives at stake.

- (3) *Behavioral effects of self-framing on risky choice.* A partial effect of self-framing on participants' risk preference was observed (see Table 2). Using a median split, the hedonic rating scores of self-frames were classified into either a positive or a negative (less positive) category for the life–death and monetary problems, separately. It should be noted that the self-frames classified into the negative category were in many cases only less positive due to the prevalence of positive framing (e.g. in the life domain, 89% of the participants framed the choice outcomes with a hedonic score above the neutral point).

The overall effect of self-framing was not significant. However, a self-framing effect on risk preference was significant in the monetary domain: the percentage (77.1%) of the participants who were risk averse was significantly higher under positive self-frames than that (60.7%) under negative self-frames, $\chi^2(1, n = 122) = 3.82, p < 0.05$.

This effect was consistent with the assumption that positive self-frames of choice outcomes shift the reference point downward and make the value function of a decision maker more concave whereas negative self-frames shift the reference point upward and make the value function more convex. The direction of the self-framing effect found in Experiment 1 was the same as that of risky choice framing effects. Meta analyses of studies of risky choice framing reveals a relatively consistent tendency for people to take risks when options are framed negatively than when options are framed positively (see Levin, Schneider, & Gaeth, 1998).²

However, it should be noted that the risk-preference pattern in the life–death context was the opposite of that in the monetary context. Participants were more likely to make the risky choice for a positive self-frame than a less-positive self-frame. Only 44% of the participants chose the sure option with positive self-frames but 59% of the participants chose the sure option with less positive self-frames. However, this reversed trend of self-framing effects was not statistically significant, $\chi^2(1, n = 103) = 2.20$, $p < 0.139$. This issue was further addressed in Experiment 2.

- (4) *Effects of task domain, social-group context, and monetary amount.* As a validity check for using pie charts, we examined whether risk preference of the participants would remain sensitive to the task domain (life versus money), social group context (600 people versus six relatives), and the amount of money (\$6000 versus \$6), as suggested by our previous studies with only verbal information about expected choice outcomes (e.g. Wang, 1996a, 1996b).

First, the percentage of risk-averse choices was higher in the monetary domain (69%) than in the life domain (52%), $\chi^2(1, n = 225) = 7.10$, $p < 0.008$.

Second, the participants were more risk averse in the 600-people context but more risk seeking in the six-relatives context. In the large group context, 65% of participants chose the sure-thing option. However, the risk preference was reversed in the kin context where 63% of participants chose the gamble option, $\chi^2(1, n = 103) = 8.16$, $p < 0.004$.

Third, the risk preference was also sensitive to the amount of money at stake. The overall choice of the sure option was 77% in the \$6000 group, and was reduced to 60% in the \$6 group, $\chi^2(1, n = 122) = 4.31$, $p < 0.038$.

EXPERIMENT 2

Experiment 2 adopted a whole-pie chart to display expected choice outcomes in a balanced manner. In contrast to the pie-slice chart used in Experiment 1, the whole-pie chart equally emphasized positive and negative outcomes by showing both the percentage saved and the percentage lost regarding expected choice outcomes (for example, see Appendix 1). The whole-pie chart showed both the one-third slice and the two-thirds slice. A possible bias of the pie-slice chart used in Experiment 1 is that showing only the one-third slice may prompt the participants to see the slice as ‘what remains’ not ‘what has been taken away.’ As suggested by a reviewer of this paper, to avoid cueing a particular frame, a pie display of expected choice outcomes should depict both the one-third slice and the two-thirds slice.

Another issue examined by using the whole-pie charts in Experiment 2 concerned the effects of outcome salience. Van Schie and van der Pligt (1995) made a distinction between framing the same choice problems in terms of either gains or losses (called prospect framing) and emphasizing either only positive outcomes or only negative outcomes of choice options (called outcome salience). The general finding of studies on

²However, in a management context, opportunities and risk taking and threats and risk aversion are often conceptually correlated. The reversed framing effects, wherein risk taking is more common under the positive than the negative frame, was also reported (e.g. Highhouse & Yüce, 1996).

outcome salience is that the majority of decision makers prefer the risky option if the outcomes of the risky option are described in terms of probability of success, while presenting the complementary probability of failure increases risk-averse choices. Van Schie and van der Pligt (1995) showed empirical evidence of independent impacts of prospect framing and outcome salience on risk preference. The participants were more risk averse when choosing between two options in a gain problem as compared to a loss problem. Independent of this classical effect of gain–loss framing, emphasizing the chance of positive outcomes of a gamble led to increased risk-seeking preference for the gamble option compared to emphasizing the chance of negative outcomes.

Displaying only the pie-slice depicting positive outcomes instead of the whole pie in Experiment 1 could lead to an outcome-salience effect, making the gamble option more attractive. Moreover, expected outcomes could be more salient when human lives are concerned than when money is concerned.

It was noted in Experiment 1 that self-framing had a reversed effect on risk preference in the life–death context. That is, with positive self-frames, more participants chose the gamble option rather than the sure option, and vice versa. According to the interpretations offered by the participants in Experiment 1, the pie-slice illustrated only the survival outcome rather than the mortality outcome of the choice problem.

Adopting a whole-pie display, Experiment 2 was intended to investigate the following research questions: First, would the overall hedonic tone of self-framing remain positive as found in Experiment 1? Second, what behavioral effects would the balanced whole-pie charts have compared to the pie-slice charts that emphasized only the positive outcomes of the choice options? Third, given a whole-pie display, would the overall hedonic tone of self-framing still be more positive in the life domain than in the monetary domain as suggested by the preparatory functions hypothesis of self-framing?

Method

Participants and procedure

The participants were 230 undergraduate students (155 females and 75 males) who agreed to take part in the study for extra course credit. They averaged 21.1 years of age. The participants were randomly assigned to one of the two experimental groups. The participants in one group received the 600-lives problem, and the participants in the other group received the \$6000 problem. The procedure was the same as that used in Experiment 1.

Materials and recording of the self-framing data

Except for using a new whole-pie display (see Appendix 1), the method for coding self-frames generated in the sentence completion task was the same as that used in Experiment 1.

Results and discussion

Table 3 presents the mean hedonic ratings of self-framing and choice preference data for the life and monetary problems.

Of the 230 participants, 188 interpreted the one-third slice as representing the number of lives (or the amount of money) saved, and 42 interpreted it as representing the number or the amount lost. Thus, for 188 participants, the expected value of the life–death and monetary problems was one-third of the total value, and for 42 participants the expected value of the outcomes was two-thirds of the total value.

The results from Experiment 2 were comparable with those found in Experiment 1.

First, as predicted from a preparatory standpoint, the majority of the participants (73%) framed the choice outcomes with an overall positive tone (i.e. a hedonic-rating score greater than 3.0), $\chi^2(1, n = 230) = 48.84$, $p < 0.0001$.

Table 3. Self-framing and choice preferences with life and money problems in Experiment 2

Experimental groups	<i>n</i>	Hedonic tone of self-framing	Choice of the sure option		Overall choice of the sure option
			Positive self-frames	Negative self-frames	
\$6000	115	3.280 ± 0.091	70.5%	61.1%	66.1%
600 people	115	3.930 ± 0.091	70.7%	49.1%	60.0%

The hedonic tone of self-frames was rated by 40 independent raters on a five-point scale with the numbers 1 to 5 representing unpleasant, slightly unpleasant, neutral, slightly pleasant, and pleasant, respectively.

The participants were dichotomously classified into either the positive or the negative (less positive) self-framing category, using a median split. The median hedonic ratings of self-frames were 4.30 and 3.60 for the life–death and monetary problems, respectively.

Of the 230 participants, 123 (53%) used positive frames for all three outcomes in question (i.e. the sure outcome, the positive outcome of the game, and the negative outcome of the gamble). Only 24 participants (10%) used negative frames to describe the sure outcome as well as the gamble outcomes. The remaining 83 participants (36%) used mixed frames.

Consistent with the results of Experiment 1, the positive bias in self-framing was a result of a baseline shift rather than framing negative outcomes more positively. Of the 66 participants who framed the gamble outcomes with opposite hedonic frames, 51 (77%) framed positive outcomes in a positive tone and negative outcomes in a negative tone.

Second, as predicted from the viewpoint of preparatory functions of self-framing, the hedonic tone of self-framing was more positive in the life domain ($M = 3.93$) than in the monetary domain ($M = 3.28$), $F(1, 225) = 25.37$, $p < 0.0001$.

A chi-square analysis also showed that self-frames with a hedonic rating above the neutral (3.0) point were significantly more prevalent in the 600-people group (84%) than in the \$6000 group (63%), $\chi^2(1, n = 230) = 12.72$, $p < 0.0004$.

Separate analyses using data only from the 188 participants whose subjective probability of success was one-third revealed a similar difference in the tone of self-framing between the life group and the money group. The mean score of hedonic rating was 3.96 for the life group and 3.41 for the money group, $F(1, 186) = 16.34$, $p < 0.0001$. The percentage of the participants who framed the choice outcomes positively with a hedonic rating above the neutral point was higher in the life group (84%) than in the money group (66%), $\chi^2(1, n = 188) = 7.59$, $p < 0.006$.

Third, the effect of self-framing on risk preference was significant, $\chi^2(1, n = 230) = 5.74$, $p < 0.02$. The directional effect of self-framing on risk preference was more evident in the life domain (see Table 3). In the 600-people group, participants who self-framed the choice options more positively, using a median split, were more risk averse, and vice versa, $\chi^2(1, n = 115) = 5.57$, $p < 0.02$.

The data from only the participants whose subjective probability of success was one-third revealed a similar directional effect of self-framing on choice preference, $\chi^2(1, n = 87) = 3.93$, $p < 0.05$.

Fourth, the effects of pie displays (outcome salience effects) were found in the life domain by comparing the data of risk preference with those from Experiment 1. A two by two (2 categories of self-framing \times 2 kinds of pie display) chi-square analysis showed a significant difference in risk preference, $\chi^2(3, n = 218) = 9.26$, $p < 0.026$. This result suggests that self-framing effects were dependent on the way choice information was displayed. With the balanced whole-pie display, participants were more likely to be risk averse under positive self-frames than under less positive self-frames. In contrast, with the pie-slice chart

emphasizing only the positive outcomes of the choice options, participants were more likely to be risk seeking under positive self-frames than under less positive ones.

GENERAL DISCUSSION

Goal setting and preparatory functions of self-framing

Most real-world situations are inherently ambiguous, and thus they can be framed differently in terms of chances of winning or chances of losing, positive outcomes or negative outcomes, and achievement goals or avoidance goals.

Having people frame choice alternatives themselves creates a new angle to study the effects of choice information on decision making under risk. Two alternative hypotheses were examined in Experiment 1 concerning functions of self-framing. Consistent with the preparatory self-framing hypothesis rather than the anticipatory self-framing hypothesis, the hedonic tone of self-framing was positively biased, and was more positive when decision problems (life vs. money) were presumably more highly valued. Experiment 2, using a balanced whole-pie display, lent further support to the hypothesis of preparatory functions of self-framing, showing consistent results with the findings of Experiment 1. These findings suggest that decision makers not only had a positive bias in encoding risk information but also adjusted the hedonic tone of self-framing to reduce the psychological impact of expected negative events.

Preparatory functions of self-framing draw attention to the motivational basis of risky choices. Lopes (1987) argues that theories of risk taking need to consider 'the motivational and emotional factors that give risky choice its experiential texture' (p. 263). In Lopes's (1987) two-factors model of risky choice, aspiration level is a situational factor. The task situation-dependent self-framing demonstrated in the different hedonic tones in life vs. money domain suggests that self-framing is involved in goal setting and adjustment of aspiration level in decision making.

Positive bias in encoding risk information

The positive bias in the hedonic tone of self-framing observed in Experiments 1 and 2 is consistent with the arguments of the regulatory-focus hypothesis (Higgins, 1997). Higgins proposed a conceptual distinction between self-regulation with a promotion focus (accomplishments and aspirations) and self-regulation with a preventive focus (safety and responsibilities). In one study (Higgins, 1997), college students were put in a promotion focus by framing a decision in terms of the likelihood of getting into an honors society or in a prevention focus by framing a decision in terms of the likelihood of being rejected by an honors society. Students were then asked whether they would take a particularly difficult course in their major. Consistent with the regulatory-focus hypothesis, students were much more likely to say that they would take the class under promotion framing than under prevention framing.

Schneider (2001) suggests that using the promotion system for goal attainment is beneficial because it allows people to frame new situations in terms of approach goals. Thus, in order to maintain this promotion focus, people must view the world optimistically, which requires interpreting potentially ambiguous information in the best possible light (see also Markman & Medin, 2002).

Taylor and Brown (1988) argue that normal human thought is skewed in a positive direction and is characterized by three positive biases: an overly positive conception of the self; an exaggerated perception of personal control; and unrealistic optimism about the future. The current findings add to the list a positive bias in encoding risk information. Taylor and Brown also suggest that these positive biases are adaptive because they promote the attributes usually considered characteristic of mental health (Taylor & Brown, 1988).

Outcome salience in information display and effects of self-framing on risk preference

The hedonic tone of self-framing affected the risk preference of the participants in making monetary decisions as well as life–death decisions. Following the analysis of prospect theory (Kahneman & Tversky, 1979), the tone of self-framing may shift the reference point reflecting the status quo of the decision maker so that the curvature of the value function becomes more concave above the reference point and convex below the reference point.

However, the directional effects of self-framing on risk preference can be reversed by placing differential emphasis on positive choice outcomes or negative choice outcomes. Consistent with the conceptual distinction between prospect framing and outcome salience proposed by van Schie and van der Pligt (1995), the pie-slice chart emphasizing the positive outcomes of the choice options led to more risk-taking choices under positive self-frames than negative (less positive) self-frames whereas the whole-pie charts illustrating both the positive and negative outcomes of the options resulted in more risk-taking choices under negative self-frames than positive ones, and vice versa. It appears that the direction of a self-framing effect is in part determined by the focus or emphasis of information displays on either positive outcomes, negative outcomes or both.

It is not clear so far why the above effects of pie displays found in the life domain were not the same in the monetary domain. The present measures of hedonic tone of self-framing were not able to capture the connotation of self-framing that could distinguish differences in encoding monetary risks and life–death risks with the two different information displays.

It is also noteworthy that although procedural caution was taken to require the participants to frame the displayed options before making a choice, the causal relationship between self-framing and risky choice was still uncertain. The current sentence-completion task with a pie chart could not reveal the flow of thought in terms of the relationship between self-framing and risk preference. Future studies using think-aloud protocols should be able to examine the direction of causality more closely.

Self-framing in contexts

One of the concerns about using pie charts was that the informational ambiguity in such graphical displays could blur the choice preference and reduce sensitivity to variables such as the task domain of the decision problem (life vs. money), social group context (600 people vs. six relatives), and the amount of money (\$6000 vs. \$6) at stake. The context effects, however, were still significant when pie charts were used to display choice information. In Experiment 1, participants demonstrated different risk preferences to different amounts of money, in different task domains, and under different social group conditions.

These results were consistent with our previous findings showing that people became more risk seeking in kinship contexts in order to save all the kin at stake. The pattern of risk preference found in our previous studies (Wang, 1996a, 1996b; Wang, Simons, & Brédart, 2001) indicated a ‘we-group’ vs. ‘they-group’ risk attitude, where framing effects occurred only in large group contexts with 600, 6000, or 6 billion anonymous people at risk, but disappeared in group contexts with fewer than 100 people. In small or kinship group contexts, participants were unambiguously risk seeking.

The effects of money amount have been also found in our previous studies (e.g. Wang, 1996b) using the same cover story with verbally framed choice outcomes, where participants were more risk averse when the amount of money at stake was \$6000 than when it was \$6. The reason for a risk-taking preference when less money is involved appears to be different from that when a small group is at stake. Our previous studies (Wang, 1996a, 1996b) showed that the pattern of risk preference in the life domain varied as a step function with a clear splitting range of around 100 endangered people, where the participants were more risk averse when the number of lives at stake was above the range and more risk seeking when the number of lives at stake was below the range. This phenomenon correlates with the fact that human group size rarely exceeds 100 in our evolutionary history (for more discussion see Wang, 1996a). In contrast, the percentage of

risk-seeking choices in the monetary domain linearly declined as the amount at stake increased. In making monetary decisions, people were more cautious and risk averse when the amount of money mattered more.

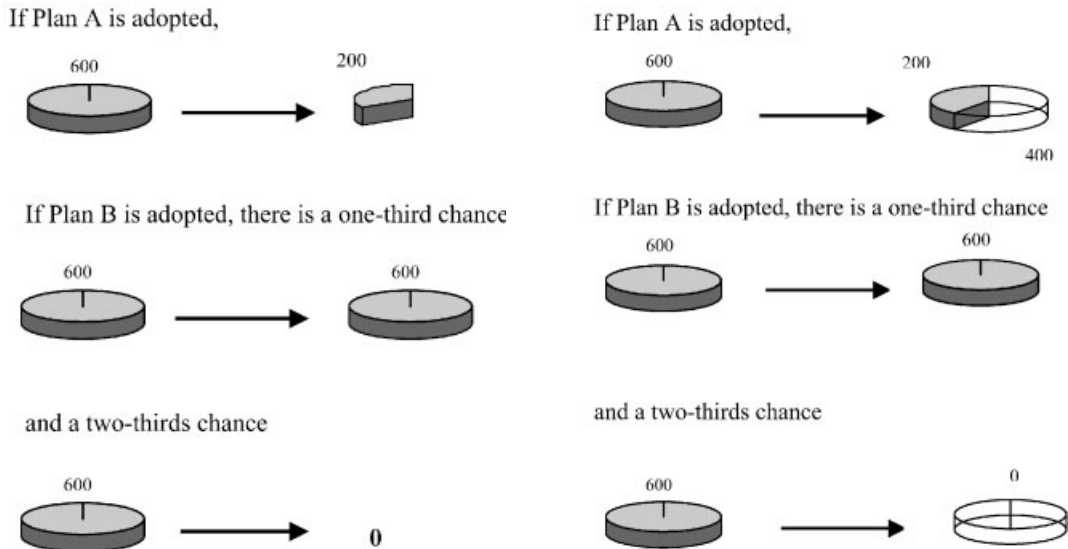
Self-framing and motivational adaptation to risky events

Frames of choice options are different ways of presenting information to others with different communication intentions in mind whereas self-frames of choice outcomes serve as motivational markers reflecting the goal setting or aspiration level of the decision maker. Like the tone of voice used in communication, the hedonic tone of self-framing, either positive or negative, can affect risk perception of a choice problem.

A commonly used illustration of descriptive framing is a picture of a glass of water that is half full and half empty. According to the descriptive invariance axiom of expected utility theory, in the eyes of the beholder a glass of water may be half full or half empty, but the beholder’s preference for the glass of water should not be changed or reversed as a result of whether the glass is perceived as being half full or half empty. After all, it is the same glass of water. However, the observed effects of self-framing on choice preference challenge this fundamental assumption of expected utility theory and suggest that self-framing not only is a result of the viewing perspective adopted by the decision maker, but is also involved in adjusting the aspiration level and risk preference of the decision maker.

APPENDIX 1

(1) An example of the pie-charts used in experiment 1 (2) An example of the pie-charts used in experiment 2



APPENDIX 2: HEDONIC RATINGS AND FREQUENCY COUNT OF THE SELF-FRAMES USED TO DESCRIBE THE EXPECTED OUTCOMES OF LIFE-DEATH PROBLEMS

Framing	Mean rating ($n = 40$)	Count
be destroyed	1.01	1
be eliminated	1.05	1
be killed	1.08	1
be terminated	1.05	1
die	1.33	20
die from the fatal disease	1.37	1
be ended	1.38	2
no longer exist	1.39	1
cease to exist	1.40	1
perish	1.40	3
cease	1.41	1
be ruined	1.48	1
be sacrificed	1.50	1
be taken as a result of the fatal disease	1.55	1
be gone	1.60	2
end in disease	1.63	1
be lost	1.80	37
be taken	1.80	2
be cut short	1.91	1
be in risk	2.44	1
be infected	2.44	5
be treated	3.30	1
be given antibodies	3.35	1
be given the medicine	3.38	1
be affected (by medical plan)	3.38	6
get away	3.40	1
exist	3.40	1
be spared	3.45	1
remain	3.50	1
kept on living	3.59	1
keep on going	3.59	1
not die but live	3.91	1
have a chance to survive	3.92	1
survive	4.15	7
be prolonged	4.16	1
be effective	4.16	2
stay (remain) alive	4.18	5
be alive	4.18	1
be helped.	4.19	1
be insured	4.21	1
be saved from death	4.23	1
survive the fatal disease	4.25	1
live	4.30	35
benefit	4.30	4
overcome the disease	4.33	1
be treated successfully	4.38	1
beat the disease	4.40	1
be saved	4.60	135
be cured	4.63	1
Total		300

The hedonic tone of self-frames was rated by 40 independent raters on a five-point scale with the numbers 1 to 5 representing unpleasant, slightly unpleasant, neutral, slightly pleasant, and pleasant, respectively.

APPENDIX 3: HEDONIC RATINGS AND FREQUENCY COUNT OF THE SELF-FRAMES USED TO DESCRIBE THE EXPECTED OUTCOMES OF MONETARY PROBLEMS

Framing	Mean rating ($n = 40$)	Count
be gone for good	1.18	1
disappear	1.28	4
be lost	1.30	75
be gone	1.33	4
be taken	1.33	2
amount to \$0	1.33	3
go down the drain	1.38	1
be \$0, nothing	1.38	7
be worthless	1.40	1
be taken in the bankrupt	1.44	1
be lost because of poor investing	1.60	1
become 1/3 of the value	2.08	3
amount to 1/3 of the value	2.16	1
be decreased	2.25	6
stay where it is	2.93	2
be left	3.00	4
be kept	3.05	6
be spared	3.07	1
be OK	3.10	1
be returned to me so that I break even	3.18	1
be all that it is worth	3.23	1
stay and be kept	3.25	1
still exist	3.27	1
break even	3.30	1
be mine	3.33	1
be received	3.40	5
give a $\frac{1}{2}$ return	3.48	1
remain viable	3.50	1
be all	3.53	1
be available for me	3.55	1
be maintained	3.56	1
stay (the same)	3.58	6
remain the same amount as initially invested	3.58	1
remain	3.60	13
be provided	3.61	1
be gotten back	3.63	5
be retained	3.69	6
be given for your profit	3.85	2
be earned	3.88	5
be returned/available to me	3.91	1
go back to you	3.95	1
be paid back to me	4.06	6
come back to you	4.10	7
amount to its total value	4.15	1
give you all return	4.15	1
be given back	4.16	19
be recovered	4.18	8
be refunded	4.20	14

Continues

APPENDIX 3. CONTINUED

be reinstated to you	4.20	1
be returned in full	4.25	1
be rewarded back to you	4.30	1
be gained back	4.30	4
be guaranteed	4.31	1
be retrieved	4.35	1
be saved	4.39	22
be redeemed	4.40	3
be returned	4.46	74
be reimbursed	4.49	5
Total		350

The hedonic tone of self-frames was rated by 40 independent raters on a five-point scale with the numbers 1 to 5 representing unpleasant, slightly unpleasant, neutral, slightly pleasant, and pleasant, respectively.

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