SOCIAL BEHAVIOR AND PERSONALITY, 2014, *42*(1), 37-44

http://dx.doi.org/10.2224/sbp.2014.42.1.37

A REEXAMINATION OF THE ROBUSTNESS OF THE FRAMING EFFECT IN COGNITIVE PROCESSING

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We conducted 2 experiments on the framing effect; recording reaction times in the first using a questionnaire and in the second using a computer-programmed procedure. We found that a positive framing effect caused participants to make faster decisions and show an intuitive, heuristic, decision-making pattern; whereas a negative framing effect caused participants to make slower decisions and show a rational, analytical, decision-making pattern. These results suggest that when decision-making time is not strictly controlled, other potential factors such as individual and cultural differences may influence the robustness of the framing effect.

Keywords: cognitive processing, framing effect, robustness, decision making, information processing.

The framing effect has been a major topic of research in the psychology of judgment and decision making. The *framing effect* refers to the phenomenon that equivalent descriptions of a decision problem lead to different choices, depending on whether or not the choice is presented as a loss or as a gain (Tversky & Kahneman, 1981). Many researchers have shown that the framing effect is reliable, although overall effect sizes vary among research findings according to differences in design including manipulations of reference points, outcome salience, and response mode (choice vs. rating/judgment; Kühberger, 1998). A detailed description of the context (Bless, Betsch, & Franzen, 1998; LeBoeuf

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This study was supported by research grant NSFC 71072022 and China 973 project (2010CB8339004).
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& Shafir, 2003) also affects the outcome of the framing effect. Kahneman and Tversky (1982) argued that the framing effect may be related to individuals' information-processing styles. Dunegan (1993) found that participants who receive negative framing information show more analytical (rational analysis and reasoning) traits, whereas those who receive positive framing information show more heuristic (intuitive response) traits. The dual-systems model (Gilovich, Griffin, & Kahneman, 2002; Kahneman & Frederick, 2002; Stanovich & West, 2000) is based on the premise that individuals have two systems for decision making – a heuristic system based on intuition and an analytic system based on reason – and that different framing conditions may activate different cognitive systems.

Although many researchers have shown the existence of the framing effect (Fagley & Miller, 1990; Kühberger, 1998), results have been inconsistent. That is, sometimes decision makers take risks under both positive and negative framing conditions, with riskier choices made under negative framing conditions, which has been termed a *preference shift* (Levin, Schneider, & Gaeth, 1998). Researchers conducting studies with Chinese populations have found that participants are prone to take risks under both positive and negative framing conditions (Li, 2003; Wang, 1996). For instance, Zhang and Miao (2008) found that Chinese participants make risky decisions under both types of framing circumstances, with the number of lives concerned being expressed during the decision-making process as a social clue for their choices. Also, compared with large-group situations, participants in small-group situations take more risks.

In contrast to studies with Western participants, in which robust framing effects have been found, in studies with Chinese participants less frequent framing effects have been shown. Wang, Simons, and Brédart (2001) suggested that varying cultural backgrounds might contribute to such differences. Moreover, in most previous research, participants were not given time restrictions when they were asked to fill out questionnaires. This methodology provides participants with time for thorough consideration and, thus, makes it difficult to control other potential factors that might influence decision making. Wang et al. (2001) pointed out that although the framing effect influences one's decision making, its influence is much weaker than that of other factors such as social background, individual experiences, and personal traits. Allowing participants unlimited time for free thinking could result in other factors, such as social cues or individual experiences, influencing decision making, therefore leading to variable framing effects.

In the current study, we compared participants' decision making in time-uncontrolled and time-controlled conditions. In the latter condition, materials were presented on computers so that the procedure was subject to temporal control,

thus reducing the effects of other factors such as social cues and individual experiences. By analyzing participants' decision-making times, we were able to make inferences about information processing under different framing conditions. Our results in this study shed light on why framing effects are variable in many studies with Chinese participants.

Experiment 1

Experiment 1 was conducted using a questionnaire with no time limit, to replicate previous classic methods in research on framing effects.

Method

Participants and Procedure. Participants were 234 Chinese college students recruited from a variety of departments within a university in Beijing, China. Of these participants, 119 were assigned to the positive framing group (61 males, 58 females), and 115 were assigned to the negative framing group (57 males, 58 females).

We adopted Tversky and Kahneman's (1981) classical framing "Asian disease" problem[1]. For both positive and negative framing groups, Plan A was the less risky choice, and Plan B was the more risky choice (see Tables 1 and 2). Participants completed the Asian disease problem during regularly scheduled laboratory classes, and no time restrictions were imposed.

Results

The results of the questionnaire are shown in Table 1.

Table 1. *Participants' Choices in Experiment 1 According to Framing Group*

Decision	Positive framing group	Negative framing group
Plan A (low risk)	44 (37%)	38 (33%)
Plan B (high risk)	75 (63%)	77 (67%)
Total	119 (100%)	115 (100%)

[1] The "Asian disease" problem is a widely used classical scenario phrased as follows: Problem 1: Imagine that the US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the programs is as follows: If Program A is adopted, 200 people will be saved. If Program B is adopted, there is 1/3 probability that 600 people will be saved and 2/3 probability that no people will be saved. Which of the two programs would you favor?

Problem 2: If Program C is adopted, 400 people will die. If Program D is adopted, there is 1/3 probability that nobody will die and 2/3 probability that 600 people will die. Which of the two programs would you favor?

We found that more than half of the participants chose Plan B, and fewer chose Plan A, regardless of the framing conditions.

A chi-square test revealed that under the condition of a positive framing effect, there was a significant difference between the number of participants who chose Plan A or B ($\chi^2 = 8.076$, $df = 1$, $p = .004$), with more participants tending to make a riskier choice. Under the condition of a negative framing effect, there was also a significant difference between the number of participants who chose Plan A or B ($\chi^2 = 13.226$, $df = 1$, $p < .001$), with more participants tending to make a riskier choice. However there was no significant difference in choices between the positive and negative framing groups ($\chi^2 = 0.397$, $df = 1$, $p = .529$).

Our results in this experiment show no framing effect. Both groups of participants made riskier choices but no preference shift was found. These results are consistent with those obtained by previous researchers, who found no framing effect among Chinese participants. Because we allowed the participants sufficient time to think about and complete the questionnaire, other potential factors may have been involved in the decision-making process, which may have reduced decision bias.

Experiment 2

Experiment 2 was conducted using a programmed computer procedure to enforce temporal control and reduce the influence of other potential factors.

Method

Participants and Procedure. Participants were 177 Chinese college students recruited from a university in Beijing, China. Of these participants, 86 were assigned to the positive framing group (41 males, 42 females), and 91 were assigned to the negative framing group (46 males, 45 females).

The Asian disease problem was presented on the screen of a computer in the laboratory. Participants completed the experiment one at a time, taking turns to use the same computer. They were asked to make their decisions as soon as possible, by clicking the mouse on either option "A" or option "B". Participants' choices and decision-making times were recorded by the computer. Participants were given several practice trials before completing the formal test.

Results

The results of Experiment 2 are shown in Table 2.

A chi-square test showed that, for the positive framing group, there was no significant difference between the number of participants who chose Plan A (60%) or B (40%; $\chi^2 = 3.767$, $df = 1$, $p = .052$), indicating that participants had no tendency to avoid risk under the condition of a positive framing effect.

Table 2. *Participants Choices in Experiment 2 According to Framing Group*

Decision	Positive framing group	Negative framing group
Plan A (low risk)	52 (60%)	22 (24%)
Plan B (high risk)	34 (40%)	69 (76%)
Total	86 (100%)	91 (100%)

For the negative framing group, there was a significant difference between the number of participants who chose Plan A (24%) or B (76%; $\chi^2 = 24.275$, $df = 1$, $p < .001$), indicating that participants were prone to make risky decisions under negative framing conditions. Choices for the positive and negative framing groups were significantly different ($\chi^2 = 23.933$, $df = 1$, $p < .001$). Our results in this experiment suggest that when participants had to make immediate choices without having time to undertake thorough consideration, they showed an altered risk preference and the framing effect was significant.

Table 3 shows a further comparison between decision times for the two groups. A t test showed that there was a significant difference in decision times between the positive and negative framing groups ($t = -3.460$, $df = 175$, $p < .001$). Participants in the positive framing group had significantly shorter decision times than did participants in the negative framing group. This finding implies that there are factors other than framing that influence individuals' decision making, leading to differences in information processing.

Table 3. *Decision time (in seconds) of positive and negative framing groups*

	Group	*n*	*M*	*SD*	SE
Decision time	Positive framing group	86	7.308	3.1944	.445
	Negative framing group	91	9.062	3.5277	.3698

General Discussion

The Experiment 1 results differ from those obtained in many studies conducted with Western participants, but they are consistent with studies conducted with Chinese participants (Li, 2003; Wang, 1996; Wang et al., 2001; Zhang & Miao, 2008). Cultural factors, such as those identified by Hofstede and Bond (1984) in their study of cross-cultural dimensions, may lead Chinese individuals to be more prone to taking risks. Hsee and Weber (1999) found that Chinese individuals are significantly more likely to seek risks when compared with American individuals. They explained this finding in terms of a *cushion hypothesis*, suggesting that people in a collectivist society, such as China, are more likely to receive help if they are in need (i.e., they will be *cushioned* if they fall) and, consequently, are less risk averse than people in an individualistic society such as the USA.

However, when requested to make a decision quickly, Chinese participants tended to behave like Western participants (i.e., a framing effect occurred). Therefore, in conditions that allow for thorough thinking and analysis, a cushion effect may exist, and other potential factors, such as individual and cultural differences, may also influence decision making. This might explain the variations among study results in framing effects on individuals' decision-making patterns. That is, when allowed limited time to think, an intuitive thinking style may result in an irrational choice, leading to the occurrence of the framing effect.

The Experiment 2 results also show that participants under the condition of a positive framing effect make quicker decisions, whereas participants under the condition of a negative framing effect make slower decisions. This shows that different framing conditions influence information processing, which is reflected by reaction times. Therefore, individuals under different framing conditions seem to use different cognitive systems. According to the dual-systems model theory (Gilovich et al., 2002; Kahneman & Frederick, 2002; Stanovich & West, 2000) and Dunegan's (1993) point of view, the riskier decisions made by participants under the condition of a positive framing effect in Experiment 2 may be attributed to the use of an intuitive, heuristic reasoning system with a fast information processing speed. By contrast, under the condition of a negative framing effect, participants may exhibit features of an analytic system with slow information processing speed.

One of the limitations in this study is that we made inferences about cognitive mechanisms and potential factors that may have influenced the decision-making process. Therefore, clear experimental evidence is warranted in future studies.

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