European Journal of Social Psychology
Eur. J. Soc. Psychol. **28**, 287–291 (1998)

Framing the framing effect: The impact of context cues on solutions to the 'Asian disease' problem

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Abstract

Participants were exposed to the 'Asian disease' problem (Tversky & Kahneman, 1981). When the problem was subtly framed as a medical decision problem previous findings were replicated: participants avoided the risky option when the problem was framed positively, but preferred the risky option when the problem was framed negatively. This reversal of preferences was eliminated however, when the same problem was subtly introduced as a statistical problem. The results are interpreted as evidence for the impact of context cues on the representation of decision problems. © *1998 John Wiley & Sons, Ltd.*

INTRODUCTION

Current research in decision making is strongly influenced by the prospect theory introduced by Kahneman and Tversky (1979). In contrast to normative decision theory (von Neumann & Morgenstern, 1947), prospect theory emphasizes the transformation processes involved in representing stated values (gains, losses) and stated probabilities when deciding between alternatives. The subjective representation of decision parameters is predicted by hypothetical weighting functions. The properties of the value weighting function allow for differential predictions concerning the subjective valuation of stated gains versus stated losses. Because the value function has a steeper slope in the negative than in the positive area, representing losses and gains, respectively, the same objective value looms larger when conceived as a loss rather than a gain.

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The reported research was supported by grant (A2) from the Deutsche Forschungsgemeinschaft to H. Bless within the Sonderforschungsbereich 504 'Rationalitätskonzepte, Entscheidungsverhalten und ökonomische Modellierung'.

CCC 0046–2772/98/020287–05$17.50
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Received 11 August 1996
Accepted 17 December 1996

The theory accounts for various empirical violations of the normative model. In this respect, the failure of invariance has received particular attention. In one of the most well-known studies in decision making Tversky and Kahneman (1981) illustrated this phenomena that is in contrast to the implications of the normative model. They demonstrated a reversal of preferences between two alternatives when the outcomes were framed positively rather than negatively (reflection effect). Specifically, they presented participants with the 'Asian disease' problem supposing that 600 individuals are infected with a deadly disease. Half of the participants received the gains-frame version of two alternative options, representing intervention programmes:

Option A: 200 individuals are saved.
Option B: with a probability of 1/3 600 individuals are saved and with a probability of 2/3 600 individuals will not be saved.

Although the two options have the same 'objective' product of probabilities and outcomes, participants preferred the sure (non-probabilistic) option A. The reversed pattern, however, was observed when the options were framed in terms of losses:

Option A: 400 individuals die.
Option B: with a probability of 1/3 600 individuals will not die and with a probability of 2/3 600 individuals will die.

In this case, participants' preferences were reversed, and the risky (probabilistic) option B was preferred over option A. It is argued that due to the steeper slope of the value function for losses than for gains, the chance of saving 400 additional lives with the risky option looms larger when the outcome is framed in terms of death rather than in terms of lives saved.

Obviously the framing of stated values and the transformation into subjective values is a crucial element in prospect theory's account for the reflection effect. The semantic framing of outcomes *per se* however, is apparently not sufficient. Just as the semantic meaning of an utterance has to be transformed into a pragmatic meaning (e.g. Grice, 1975), the 'objective' decision problem has to be transferred into a subjective representation of the problem. While cumulative evidence supports the basic assumptions of prospect theory, there seems still rather little knowledge about the underlying psychological mechanisms of the transformation process, i.e. what variables instigate and influence this transformation process (see van der Pligt, 1995).

One possible approach to these questions is to borrow from research in other domains that has addressed how individuals transfer semantically described situations into subjective representations. This research suggests that the transformation process may be elicited and influenced by context cues that are implicitly or explicitly provided when a scenario is presented. Most importantly, on the surface these context cues are often unrelated to the verbal description of the task. However, in combination with communication rules (Grice, 1975; Clark, 1985), in particular the maxim of relevance (Sperber & Wilson, 1986), these context cues often influence inferential processes that mediate participants' representation of the scenario; for examples see research on the representativeness heuristic (Schwarz, Scrack, Hilton, & Naderer, 1991), or on the conjunction fallacy (Hilton, 1995); for an overview see Schwarz (1994).

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In decision making, context cues may have several effects. First, they may affect the degree of transformation that is required to solve the task, and second, they may influence the nature of the transformation itself. Focusing on the first aspect, we assume that context cues may indirectly imply the degree of transformation processes. Given that framing effects depend on the transformation of objective into subjective values, framing effects should decrease the less the provided context cues suggest that a transformation process is essential for completing the task—independent of the 'objective' decision scenario. Note that a possibility to influence the degree of required transformation processes could be a very helpful first step in investigating the psychologocial aspects of the transformation processes more extensively.

To test these considerations we presented participants with the 'Asian disease' problem and manipulated the extent to which the context implied a need to transform the objective into subjective values and probabilities. We assume that participants perceive little need of transformation if they interpret the problem as a 'statistical problem', as in this case the objective values and probabilities provide a sound basis for a (statistical) decision. If so, we should expect a diminished reflection effect. In contrast, if participants interpret the situation as a 'medical decision' problem—as we expected based on an informal pretest—the provided values and probabilities need to be transformed into a subjective problem representation. In this case, we should replicate the well-known reflection effect.

METHOD

One hundred and eighteen participants of the Universities of Heidelberg and Mannheim were randomly assigned to the conditions of a 2 (positive versus negative frame) $\times$ 2 (context cue: medicine versus statistical problem) factorial design. Participants were provided with the original version of the 'Asian disease' problem introduced by Tversky and Kahneman (1981) either in a positive or a negative semantic frame. We manipulated the context cue by printing either 'statistical research' or 'medical research' as a header in the upper right corner of the page. Participants' decisions for option A or B served as the dependent variable.

RESULTS

We coded the selection of option A with 0 and option B with 1 so that higher scores indicate preferences for the risky alternative. Following the suggestions by Rosenthal and Rosnow (1985) for the analysis of proportions, we submitted these scores to a 2 (frame) $\times$ 2 (context cue) factorial ANOVA that revealed the predicted significant interaction of frame and context cue, $F\,(1,114) = 4.03$, $p < 0.05$ (see Table 1). When provided with the context cue 'medical research' participants avoided the risky option if the problem was framed positively but preferred the risky option if the problem was framed negatively, $t(114) = 3.12$, $p < 0.01$, thus replicating previous research. As predicted, this effect was diminished however, when the same problem was subtly introduced as a statistical problem, $t < 1$.

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Table 1. Percentage of participants selecting the risky option as a function of semantic frame and context cue

	Context cue	
Semantic frame	Medical research	Statistical research
Gains	36	50
Losses	75	53

DISCUSSION

The reported findings suggest that subtle context cues may influence the degree of the reflection effect. Specifically, we observed a reflection effect when the context cue suggested a meaningful psychological situation, for example a medical decision problem. Presumably, this situation required participants to transform the objective values into subjective utilities. In combination with the assumption of a steeper slope of the utility function in the negative than in the positive area, this explains the preferences for the risky option when the outcomes are framed negatively and the preferences for the sure option when the outcomes are framed positively. This reflection effect was eliminated, however, when participants were provided with the context cue 'statistical research'. Presumably, this context cue reduced participants' need to transfer the provided objective values and probabilities into a subjective problem representation. As the reflection effect is mediated by this transformation, however, participants no longer preferred a more or less risky option as a function of the semantic framing.

Obviously, context cues that are not directly related to the content of the decision scenario may influence participants' inferences about the nature of this scenario. One explanation for this impact holds that participants applied communication rules when interpreting the task. As communicated information often comes with a guarantee of relevance (Sperber & Wilson, 1986), participants presumably inferred that the cue was relevant. As a consequence, the seemingly unrelated cue influenced the degree of transformation, and in turn the reflection effect. The present study does not directly address the underlying mediating processes. One may, for example, argue that the different context cues altered the relative salience of the provided information by directing people's attention to the probabilities (statistical problem) versus to the gains and losses (medical problem), with the latter entraining a reflection effect. Alternatively, the context cues may have altered the perceived importance of the different information independent of its salience.

Finally, it is interesting to note that research has rarely manipulated the transformation process itself. A better understanding of variables influencing the degree of transformation would allow for better predictions of when to expect framing effects (for the instability of framing effects see Slovic, Lichtenstein, & Fishhoff 1988). In this respect the presented findings may offer the possibility of influencing the degree of transformation processes. Such a first step may eventually allow the examination of the psychological processes underlying the often assumed transformation processes more closely.

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REFERENCES

Clark, H. H. (1985). Language and language users. In G. Lindzey, & E. Aronson (Eds), *Handbook of social psychology* (Vol. 2, pp. 179–232). New York: Random House.

Grice, H. P. (1975). Logic and conversation. In P. Cole, & J. L. Morgan (Eds), *Syntax and semantics* (Vol. 3: *Speech acts*. pp. 41–58). New York: Academic Press.

Hilton, D. J. (1995). The social context of reasoning: Conversational inference and rational judgment. *Psychological Bulletin*, **118**, 248–271.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An analysis of decision making under risk. *Econometrica*, **47**, 263–291.

Rosenthal, R., & Rosnow, R. L. (1985). *Contrast analysis*. Cambridge: Cambridge University Press.

Schwarz, N. (1994). Judgments in a social context: Biases, shortcomings, and the logic of conversation. In M. Zanna (Ed), *Advances in experimental social psychology* (Vol. 26). San Diego, CA: Academic Press.

Schwarz, N., Strack, F., Hilton, D. J., & Naderer, G. (1991). Base-rates representativeness and the logic of conversation. *Social Cognition*, **9**, 67–84.

Slovic, P., Lichtenstein, S., & Fishhoff, B. (1988). Decision making. In R. D. Atkinson, & R. J. Herrnstein (Eds), *Stevens handbook of experimental psychology* (Vol. 2, pp. 673–738). New York: Wiley.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition*. Cambridge, MA: Harvard University Press.

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

Van der Pligt, J. (1995). Prospect theory. In A. S. R. Manstead, & M. Hewstone (Eds), *Blackwell dictionary of social psychology* (pp. 460–463). Oxford: Blackwell.

Von Neumann, J., & Morgenstern, O. (1947). *Theory of games and economic behavior*. Princeton: Princeton University Press.

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