FRAMING EFFECTS IN THEORY AND IN PRACTICE

Anton Kühberger
University of Salzburg, Austria

Keywords: Behavioral decision theory, behavioral economics, bias, choice, framing, prospect theory, regulatory focus, risk, subjective expected utility, utility

Contents

Summary

The framing effect is the finding that different descriptions of formally identical problems can result in different choices. Specifically, describing the outcomes as gains or losses relative to a reference point leads to different risk attitudes. In general, the framing phenomenon consists in the finding that people are generally risk-averse with gains and risk-seeking with losses. It is argued that the framing effect is a consequence of reference dependency, which is a basic feature of human information processing. Reference dependency, and two other basic features, namely diminishing sensitivity, and loss aversion, which were first described in prospect theory, influence decisions in multiple, but predictable, ways. A review of the applied literature that discusses the persuasiveness of the effect in practice shows that the framing effect is not restricted to laboratory situations. Finally recent research is discussed, which reveals the influence of the type of framing manipulation, as well as the interaction between framing and regulatory focus.

1. Introduction

Think about the following dilemma. You are offered the following bet: dependent on a fair coin you either win $50 000 or you lose $30 000. Would you accept this bet?

If you are like most people, you will reject the bet. To be sure, you know that accepting offers a larger expected return, since, in the long run, every single draw will pay you $10 000. Thus, you know that playing the gamble is the better choice, but nevertheless you refuse to play.

This example, as well as numerous others, shows that sometimes people act in a way that is not in accordance with the prescriptions of the subjective expected utility model (SEU). However, they do not violate SEU because the problem is too complex to identify the best option. They violate SEU for good other reasons beyond the domain of SEU. SEU assumes that people come to problems armed with a clear and reasonably complete set of preferences, and process decision tasks according to this given preference structure. This assumption is almost certainly false. Rather, preferences are constructed online and much of what we see coming out of individual decision experiments are custom-built responses which are at least partially conditioned by the character of the particular task and the nature of the instruments designed to elicit them. Thus decision making is a function not only of the utilities of different options, but also of additional features that are not captured by standard utility treatments. Put differently, in the prediction of people's choices, some percentage of the variance is due to the utility, and a significant percentage is due to other features.

One such feature that explains about 10% of the variance is the framing of the decision problem. Tversky and Kahneman introduced the notion of a decision frame. A decision frame refers to the decision maker's conception of acts, outcomes, and contingencies associated with a particular choice. The frame is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision maker. The classical demonstration of the influence of the different wording of formally identical problems is the Asian disease problem:

Problem 1:

Imagine that the U.S. 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 are 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?

Now consider this problem with a slightly different verbal description of the outcomes:

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?

In the positively framed version of the Asian disease problem, about 70% of the respondents preferred saving 200 lives for sure, over the option that offered a 1/3 chance of saving 600 lives. In the negatively framed version, however, about 70% of the respondents preferred the 1/3 chance of loosing no lives over the sure loss of 400 lives. From a formal point of view, options A and B in Problem 1 are indistinguishable from options C and D in Problem 2; the options yield either exactly 200 lives (sure options) or an expected value of 200 lives (risky options). Thus, there should not be any systematic preference. But there is a framing effect: a systematic tendency of risk-aversion for the positively framed problem, and of risk-seeking for the negatively framed problem. This framing is of small to moderate size (mean d = 0.31 in a meta-analysis based on 230 effect-sizes), but shows considerable variance (roughly 20% of effect-sizes negative).

The present paper gives a summary account of the diverse findings of the framing literature. As this summary shows, some basic principles of human judgment lead to a diversity of biases in decision making and choice. The following section describes these basic features. Then their consequences for decisions other than simple experimental gambles are summarized. Finally a need-based theory of motivation is introduced which, in conjunction with these features, explains why the framing effect can change in direction in some instances.

2. Framing Effects in Theory

2.1. Prospect Theory

Together with the enormous amount of empirical work, different theoretical ideas were brought forward to describe and/or explain the findings. These models identify the source of the framing effect in formal characteristics, in cognitive or motivational processes, or on the physiological level. Formal modeling was most influential, where different value- and weighting functions are assumed, as in (cumulative) prospect theory. An example of a cognitive model is fuzzy-trace theory, which holds that framing effects follow from different levels of processing. Motivational modeling treat fears, wishes and desires to be the core concepts in explaining framing effects. Finally, affective balance theory is a neural network model to explain framing on the physiological level. Thus, there seems to be ample room for disagreement over the theoretical explanation of framing effects. Actually, however, there is only little dispute over theory. Prospect theory (PT) is in the lead, and almost all empirical work is done with this background.

PT distinguishes three phases of decision making: in the editing phase, outcomes are coded relative to a reference point and are assigned a subjective value, and probabilities are translated into decision weights. In the combination phase, subjective values and decision weights are combined, and in the decision phase, the prospect value is evaluated or a prospect is chosen. PT's essential new idea relates to the editing of choice situations: people's perception of outcomes is assumed to be in terms of PT's value function, which has tree important features: (1) The value function is defined over gains and losses relative to some reference point. That is, there is a focus on changes, rather than on wealth levels as in SEU. (2) Both the gains and loss functions display diminishing sensitivity. That is, the shape of the value function changes markedly at the reference point: above the reference point, in the domain of gains, the value function is concave, showing diminishing marginal value. Below the reference point, in the domain of losses, however, the value function is convex. Diminishing sensitivity reflects a basic psychophysical principle that the difference between \$10 and \$20 seems bigger than the difference between \$1000 and \$1010, irrespective of sign. (3) The value function is steeper for losses than for gains. This entails the principle of loss aversion, which means that the reaction to losses is stronger than the reaction to gains. In sum, the value function of PT encompasses three essential properties of human decision making: (i) reference dependence (value is measured in terms of changes from the status quo), (ii) diminishing sensitivity (the incremental impact of changes in value decreases), and loss aversion (the impact of a loss is greater than the impact of a gain of the same magnitude).

Applied to the Asian disease problem (see above), PT yields the following predictions: the framing of the outcomes in terms of "lives saved" induces an adoption of the reference point so that the disease is allowed to take its toll of 600 lives. Thus the outcomes of the two options are perceived as possible gains. Due to the concave value function for gains, $v(200) > 1/3v(600)$, and saving 200 people for sure is more attractive than saving 600 people with probability 1/3. In contrast, presenting the problem in terms of "lives lost," leads to an adoption of a reference point of zero people dying. Consequently, all possible outcomes are perceived as losses. On the convex value function for losses, however, $v(-400) < 2/3v(-600)$, and the option leading to the loss of 600 lives with p=2/3 is preferred over losing 400 lives for sure. Thus, we see risk aversion in the domain of gains, and risk seeking in the domain of losses; this pattern is usually called the framing effect. Note that the application of the label "frame" to descriptions of decision problems is used in two different ways: the formulation to which decision makers are exposed to is called a frame and so is the interpretation that they construct for themselves. Thus, framing is a label that can be used for two different things: an experimental manipulation as well as a constituent activity of decision making. This use of a single term blurs the important distinction between what decision makers do and what is done to them. The wealth of framing research is on the effects of framing, rather than on the activity of framing, and the present discussion mirrors this.

2.2. Incomplete Information

Take again that Asian disease problem. Program A in Problem 1 and program C in Problem 2 are not completely described. Program A states that 200 people will be saved. However, since a total of 600 lives are at stake, a complete description ought to specify

the fate of the other 400 people. Moreover, do people actually realize that information about the other people is missing? Similarly, program C in the negative framing condition specifies that 400 people will die. In order to be complete, program C ought to specify that 200 people will not die. Such an incomplete problem description makes some outcomes salient and hides others. In fact, it is easy to construct different versions of decision problems that are transparently equivalent when considered together but evoke different preferences when considered separately. Thus, framing effects are interesting, but somewhat awkward because they result from something that decision makers do *not* do: they do not spontaneously generate a common representation for decision problems that they would judge to be equivalent. Why is this so? Again the answer is not very exciting: because decision makers are generally quite passive and therefore inclined to accept any frame to which they are exposed. This is not only true for hypothetical decisions with relatively unimportant consequences, but also for real live decisions with important consequences. Framing effects are thus less significant for their contribution to theory than for their importance in the real world.

For the Asian disease problem it has been shown that the systematical variation of the information presented results in either risk-aversion for gains and risk-seeking for losses (i.e., the standard framing effect; e.g., Option A described as: 200 people will be saved), no framing effect (e.g., Option A described as: 200 people will be saved and 400 people will not be saved), or a reversal of the framing effect (e.g., Option A described as: 400 people will not be saved). We can call this the additive method, since information that is usually left implicit is added to the sure option. The idea can be extended by applying a subtractive method to the risky option. In the classical problem, the risky option is completely described since it gives both possible outcomes. Subtracting information from the risky option results, for instance, in "If Program B is adopted, there is 1/3 probability that 600 people will be saved," and the outcomes of the other 2/3 probability remain implicit.

Research using additive and subtractive method shows that the framing effect does not exist with complete information. Specifically, adding information to the sure option, or making information lack symmetrically (by subtracting information from the risky option), makes the framing effect disappear. In other words, the framing effect depends on a violation of the assumption of complementarity, which holds that people somehow infer the implicit information.

As said above, BDT has shown that such an assumption is generally misled. If complementarity is not violated (e.g., by using the additive method), or if complementarity is symmetrically violated (by the use of the subtractive method), no framing effect is to be expected. A framing effect is only to be expected in the case of an asymmetrical violation of complementarity, that is, if the sure option is described partially and the risky option is described completely (this is the usual way of framing problems), or vice versa. However, one characteristic of real-world decisions is that they are often already framed when we encounter them. That is, usually we are exposed to parts of the information only, since people tend to describe situation from their personal (framed) point of view. This implies that framing effects might be very important for practical matters. The next section evaluates this implication.

-
-
-

Bibliography

Higgins E.T. (1997). Beyond pleasure and pain. *American Psychologist*, **52**, 1280–1300. [This presents a general overview over the concept of regulatory focus.]

Kahneman D. and Tversky A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, **47**, 263–291. [This introduces prospect theory, which still is one of the most influential descriptive models for risky choice.]

Kahneman D. and Tversky A. (2000). *Choices, Values, and Frames*. pp 840 New York: Cambridge University Press. [This reader summarizes the work of Kahneman and Tversky and of researchers following their lead.]

Kluger A.N., Yaniv I., and Kühberger A. (2001). *Needs, Self-regulation, and Risk Preference*. Manuscript submitted for publication. [Shows the usefulness of framing and regulatory focus for predicting risk attitude both theoretically and empirically.]

Kühberger A. (1995). The framing of decisions: A new look at old problems. *Organizational Behavior and Human Decision Processes*, **62**, 230–240. [This is the first empirical demonstration that shows that the complementarity assumption is crucial for framing.]

Kühberger A. (1998). The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes*, **75**, 23–55. [Presents a meta-analysis showing the size and robustness of framing effects.]

Levin I.P., Schneider S.L., and 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. [Presents a typology of framing manipulations and their effects.]

Payne J.W., Bettman J.R., and Johnson E.J. (1992). Behavioral decision research: A constructive processing perspective. *Annual Review of Psychology*, **43**, 87–131. [This is a classic showing that preferences are constructed online.]

Rothman A.J., and Salovey P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, **121**, 3–19. [This presents a view that unifies the different findings for framing and health behavior.]

Tversky A. and Kahneman D. (1981). The framing of decisions and the psychology of choice. *Science*, **211**, 453–458. [This is the classic introduction of the framing concept with the Asian disease problem.]

Biographical Sketch

Anton Kühberger is Associate Professor of Psychology of the University of Salzburg, Austria. He received his doctoral degree in psychology from the University of Salzburg. He has done extensive research in judgment and decision making, especially in the context of risk and uncertainty. His interests are both basic and applied. Dr. Kühberger has more than 20 publications, including articles in scientific journals such as *Behavioral and Brain Sciences*, and *Organizational Behavior and Human Decision Processes.* He is a member of several scientific societies and committee member of the *European Society for Philosophy and Psychology.*