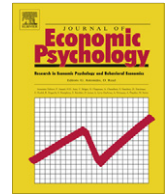




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Motivation and affective processing biases in risky decision making: A counter-regulation account

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ABSTRACT

We hypothesized that framing possible outcomes of decisions in terms of gains vs. losses should increase the salience of information that is incongruent in valence (counter-regulation principle: gain frame – negativity bias, loss frame – positivity bias). These incongruent attentional biases in the processing of positive and negative outcomes of risky options can explain why people tend to avoid risky options in a gain frame but tend to choose risky options in a loss frame. In line with our expectations, Experiment 1 revealed incongruent effects of framing on attentional biases for positive vs. negative stimuli in an evaluation task. In addition, valence bias predicted risk-seeking vs. risk-averse decisions and mediated the effect of framing on decision making. Two additional experiments investigated effects of valence biases on risky decision making by manipulating affective processing directly with an attention training task. Inducing a positivity (negativity) bias produced risk-seeking (risk-averse) decision behavior by enhancing the salience of win- or loss-related information in a gambling task with ambivalent color stimuli (Experiment 2) and by enhancing the impact of gain or loss outcomes on decision making in a coin toss (Experiment 3).

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1. Introduction

Human behavior is extremely flexible, enabling us to pursue different goals – often in parallel or in close temporal succession – and to quickly adapt to various situational contexts and life-events. A context-dependent tuning of automatic attention allocation has been demonstrated in various studies and has been argued to be of crucial importance for an adaptive functioning in goal pursuit, emotion regulation, and self-regulation (Koole, 2009; Koole & Kuhl, 2008; Koole & Rothermund, 2011; Koranyi & Rothermund, 2012b, 2012c; Rothermund, Voss, & Wentura, 2008; Smith et al., 2006; Tipper, 1992; Wilson & Gottman, 1996).

Specifically, several studies demonstrated that the processing of valent stimuli is under motivational control and yielded evidence for what has been called the “counter-regulation principle” of attention allocation (for a review, see Rothermund, 2011). The basic assumption of counter-regulation is that a superordinate motivational focus on either gains or losses increases

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automatic attention allocation to stimuli that are *opposite in valence* to the current affective-motivational state. Several experiments revealed that experiencing or anticipating positive (negative) outcomes and events increases the salience of negative (positive) information (Akalis, 2008; Derryberry, 1993; Ellenbogen, Schwartzman, Stewart, & Walker, 2002; Rothermund, 2003; Rothermund, Gast, & Wentura, 2011; Rothermund, Wentura, & Bak, 2001; Rothermund et al., 2008; Wentura, Voss, & Rothermund, 2009). Automatic allocation of attention to information that is antagonistic to the current emotional or motivational state helps to maintain a balanced view on things. By counteracting an escalation of affective states and motivational orientations, counter-regulation thus serves to prevent emotional and motivational extremities, impulsivity, and rigidity (Koole & Rothermund, 2011; Quirin, Bode, & Kuhl, 2011; Rothermund, 2011; Schwager & Rothermund, submitted for publication).

The aim of the current study is to transfer the idea of counter-regulation to the domain of risky decision making. Negative and positive outcomes of decisions are a key feature of choice situations. More specifically, humans tend to focus on the *change* of the status quo (gains or losses) rather than on the absolute value of outcomes when making decisions (Kahneman & Tversky, 1979). Importantly, *framing* potential outcomes in terms of either gains or losses has been shown to have a marked impact on decision making: When choosing between a “risky” and a “secure” option that have similar absolute expected values, people in a loss frame tend to prefer the risky option whereas people in a gain frame behave risk averse (so-called “reflection effect”; Kahneman & Tversky, 1984; for a review on findings, see Kühberger, 1998).

The standard explanation for the framing effect focuses on the fact that the risky option always includes a more extreme outcome than the secure option (this follows from the fact that both options are assumed to have the same expected value). Since objective outcomes are translated into subjective utilities by an s-shaped gradient (Kahneman & Tversky, 1984), extreme gains (losses) are subjectively experienced as being less valuable (harmful) due to the asymptotic shape of the value function. This in turn induces a tendency to avoid the (less valuable) risky option for gains but to prefer the (less harmful) risky option for losses. Some other explanations have been proposed in the literature to account for the effects of framing on risk seeking vs. risk aversion (e.g., Kühberger & Tanner, 2010). Most of these explanations are similar to the original explanation, however, in that they focus on the translation of objective gains and losses into subjective value, assuming either quantitative or qualitative differences with regard to the subjective representation of outcomes of risky and secure options.

Counter-regulation in affective processing provides an alternative explanation for framing effects on decision making that focuses on the motivational implications of the gain vs. loss framing. Our account consists of two parts (see Fig. 1). First, we assume that a framing manipulation induces a corresponding motivational orientation. Framing outcomes in terms of gains or losses is equivalent to creating a positive or negative outcome focus. According to the counter-regulation principle, such a positive/negative outcome focus is accompanied by an automatic attention allocation to information of the opposite valence (Rothermund et al., 2001, 2008). Thus, in a gain frame negative information should increase in salience, whereas in a loss frame positive aspects should tend to catch or hold attention. This will be referred to as the incongruency effect of framing on attention allocation.

The second part of our model postulates that these incongruent attentional biases are the basis for the differential readiness to choose the risky option in the two framing conditions. A positive or negative valence bias increases the salience of corresponding outcomes of the decision situation, which leads to an overweighting of these outcomes in the resulting decision. Accordingly, the salience of negative outcomes should increase in a gain frame resulting in a tendency to avoid the behavioral option that might lead to the most negative outcome. To the contrary, in a loss frame, positive outcomes should become more salient resulting in a tendency to choose the option that might produce the most positive outcome. The impact of attentional valence biases on the salience of positive and negative outcomes is referred to as a congruency effect.

The important point is that only the risky options comprise a possible outcome that deviates in valence from the general framing, and these outcomes should become more salient due to an incongruent attentional bias: In a gain frame, the risky option includes the only possible negative outcome (the “no gain” outcome; all other outcomes are positive). An attentional bias towards framing-discrepant outcomes should increase the salience of this negative outcome in the gain frame and should also increase the subjective weight that is given to this possible outcome. Focusing on the negative outcome thus should lead to a reduction of the attractiveness of the risky option resulting in avoidance of the risky option in a gain frame. In a loss frame, on the other hand, only the risky option contains a possible positive outcome (the “no loss” outcome; all other outcomes are negative). An attentional bias towards positive information which is proposed to occur in a loss frame should thus increase the attractiveness of the risky option by making the possibility of not losing anything that is contained

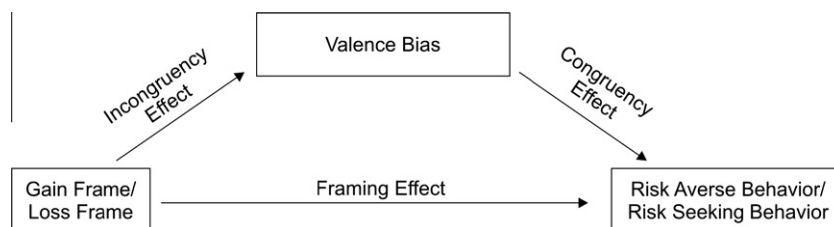


Fig. 1. The hypothesized model for the framing effect. The figure illustrates the incongruent effect of framing on valence biases (path a) as predicted by counter-regulation theory (Rothermund et al., 2008) and the congruent effect of these biases on the readiness to assume risks (path b). Together, these paths are assumed to mediate effects of framing on risk behavior (path c).

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