UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Individual differences in encoding style moderate framing effects on risk-taking

Permalink

https://escholarship.org/uc/item/5fh7n5rk

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 47(0)

Authors

Mamakos, Michalis
Bodenhausen, Galen

Publication Date

2025

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at https://creativecommons.org/licenses/by/4.0/

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

Individual differences in encoding style moderate framing effects on risk-taking

Michalis Mamakos (mamakos@u.northwestern.edu)
Kellogg School of Management, Northwestern University
2211 Campus Drive, Evanston, IL 60208, USA

Galen V. Bodenhausen (galen@northwestern.edu)
Department of Psychology and Kellogg School of Management, Northwestern University
2029 Sheridan Road, Evanston, IL 60208, USA

Abstract

Risk attitudes determine how decision-makers resolve tradeoffs when decisions involve uncertainty. The framing of a decision problem can affect these attitudes. Regulatory focus theory holds that (promotion-focused) frames that emphasize acquiring gains induce higher risk-taking than (prevention-focused) frames that emphasize avoiding losses. Here, we examine how this framing effect is moderated by individual differences in the internality of encoding style—the readiness to construe stimuli in terms of expectancies and pre-existing categories. In two experiments, participants could obtain costly information to aid their focal decision; thus, a risky choice corresponded to obtaining little or no information. Payoffs were framed to emphasize either gaining a bonus or retaining an endowed budget. The results of both experiments suggested that individuals with a more internal encoding style were more likely to be affected by the payoff framing. These results suggest that framings' effectiveness on risk-taking depends on individual differences in cognitive processing style.

Keywords: decision-making; information search; regulatory focus; implicit cognition

Introduction

People differ in how readily stimuli activate their existing internal schemata (Lewicki, 2005). The amount of information that stimuli need to provide before implicit associations are activated is governed by encoding processes that individuals follow unconsciously (Hasher & Zacks, 1984; Lewicki et al., 1992; von Hippel et al., 1993). Individuals with an internal encoding style impose a low threshold on the information that stimuli must provide for such activations, and individuals with an external encoding style impose a high threshold. Those with an internal encoding style are more likely to identify covariations between variables after being exposed to stimuli (Stamov Roßnagel, 2001), even by imperfectly fitting interpretive schemata (Lewicki, 1986; Seger, 1994), compared to those with an external encoding style. Therefore, it is reasonable to expect that experimental stimuli targeting low-level cognitive processing mechanisms can be more effective for individuals with an internal encoding style—individuals who are more likely to activate existing schemata when processing the information provided by stimuli.

The present report examines how individual differences in encoding style moderate framing effects in decision-making under uncertainty. We focus on tasks where individuals are financially incentivized to make good decisions and where the experimental conditions tap into risk attitudes (Kühberger, 1998). These are conditions that alter only the framing of a task without affecting its objective economic utility. Although different task framings can be financially equivalent, the literature demonstrates that they can result in different decisions by psychologically inducing varying risk attitudes (DeKay et al., 2022). Framings that emphasize gains tend to induce risk-seeking attitudes, whereas those that emphasize loss prevention induce risk-averse attitudes (Kahneman & Tversky, 1979). Therefore, the approach of individuals to decisions involving tradeoffs is subject to cognitive biases that can be activated experimentally (Morewedge & Giblin, 2015). Consequently, these activations may be more likely for individuals with an internal (vs. external) encoding style, as these individuals are more sensitive to psychological differences between stimuli.

We employed an experimental setup in which participants made decisions about obtaining pre-decisional information before making a focal decision that determined their monetary reward. Participants were allowed to collect multiple pieces of information to aid their focal decision, but each piece collected reduced the reward earned if the focal decision was correct. Therefore, decisions about obtaining financially instrumental information involved a tradeoff between accuracy and cost. Naturally, this tradeoff gives rise to risk considerations. A risk-seeking attitude favors obtaining only a few pieces of information, allowing the focal decision to lead to a higher reward, albeit with a smaller probability. Conversely, a risk-averse attitude suggests obtaining multiple pieces of information to increase the probability of earning a reward, albeit of lesser value.

Our experimental conditions determined the regulatory focus induced by the framing of the task (Higgins, 1998). Regulatory focus theory suggests that two motivational orientations, promotion and prevention focus, govern the preferred strategies for goal pursuit. Promotion-focused individuals prefer eager strategies and prioritize achieving accomplishments that align with their aspirations. Prevention-focused individuals prefer vigilant strategies and prioritize avoiding undesirable outcomes that threaten their security. Regulatory focus can be situationally activated by experimentally manipulating a task framing to induce either a promotion or a prevention focus (Crower & Higgins, 1997; Shah et al., 1998; Lee et al., 2010).

In D. Barner, N.R. Bramley, A. Ruggeri and C.M. Walker (Eds.), *Proceedings of the 47th Annual Conference of the Cognitive Science Society* ©2025 the author(s). This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY).

Regulatory focus has been strongly linked to risk-taking (Bryant & Dunford, 2008). A high promotion focus predicts risk-seeking behavior to achieve the best possible outcome, and a high prevention focus predicts risk-averse behavior to avoid the worst possible outcome (Friedman & Förster, 2001). This link between regulatory focus and risk-taking has been identified both when the regulatory focus is assessed as an individual difference (Hamstra et al., 2011) and when it is experimentally induced (Halamish et al., 2008). Therefore, in our experimental setup, individuals induced with a promotion focus should be more likely to obtain a few pieces of information (the risky choice) than the individuals induced with a prevention focus. However, this differential effect of the two experimental conditions can be moderated by individual differences in the propensity to activate existing internal schemata related to the task framing. A risk-taking approach that aligns with the induced regulatory focus should be more likely for individuals with an internal (vs. external) encoding style.

We present results from two experiments. The main effects of the induced regulatory focus were examined in a previous broader study (Mamakos & Bodenhausen, 2024), where data on individual differences were collected but not analyzed. Here, we examine how individual differences in encoding style moderate the impact of the induced regulatory focus on risk-taking. These individual differences were measured with the Encoding Style Questionnaire (Lewicki, 2005), which assesses the propensity to experience "split-second illusions" (see Table 1). Because individuals with a highly internal encoding style are more likely to impose imperfect encoding schemata on the stimulus, these individuals are more prone to erroneously identifying known objects in place of the stimulus.

Experiment 1

In this experiment, we examined whether dispositional encoding style would moderate the risk-taking effects of situationally induced regulatory focus in a task where decision-makers could obtain costly information before making a focal decision.

Method

Participants and Design A between-subjects manipulation of the framing of a decision-making task determined the induced regulatory focus (promotion vs. prevention). We recruited five hundred participants on Prolific and excluded eighty-two of them who failed either of two attention checks, as preregistered (https://aspredicted.org/B7Z_NFH). One week after the experiment, an invitation to complete scales of individual differences was sent to these 418 participants, with $N = 361$ of them (86%) accepting it.

Procedure Participants were told they would complete a decision-making task based on a dataset collected from actual companies. A random assignment of participants to either promotion or prevention focus determined the wording of the instructions they received, which consisted of three paragraphs. The first paragraph was:

> An industrial company has been developing and testing out two potential new products, which we refer to here as product X and product Y. The company's intention is to greenlight one of these products. Your [in promotion focus: goal; in prevention focus: task] is to predict which one of these products the company decided to greenlight. Before you make your prediction, you can obtain up to five pieces of information that the company could consider during the development of the two products. Each piece of information can help you make the right prediction.

Thus, the wording of the first paragraph differed for the two conditions by only one word (goal vs. task) to emphasize the goal accomplishment associated with promotion focus or the task responsibility associated with prevention focus. The second paragraph differed entirely for participants in the promotion-focus vs. prevention-focus condition. Participants in the promotion-focus condition read:

> If you accomplish your goal of predicting which product was greenlighted by the company, you will earn a bonus. This bonus will be \$0.70 minus \$0.05 for each piece of information you choose to examine.

Participants in the prevention-focus condition read:

> You start with a budget of \$0.70. To not lose this budget completely, you must meet the task requirement of predicting which product was greenlighted by the company. For each piece of information you choose to examine, the budget decreases by \$0.05. You will keep the leftover budget.

Then, the headers of 5 pieces of information were presented to the participants, with each header concerning an attribute in which one product could outperform the other (more innovative, more competitive price, fewer competitors, purchased more frequently, entering a new market for the company), but without revealing the outperforming product. Participants were instructed that to reveal the product outperforming the other product in an attribute, they had to click on a button next to the attribute's header. For instance, participants could decide to find out whether it is product X or product Y that is more innovative.

These pieces of information could be obtained sequentially. The content of a piece of information (i.e., product X or product Y) was randomized across participants and attributes (unbeknownst to them during the experiment, all participants received the full bonus of \$0.70 once the whole sample was collected). Participants could make their focal decision at any point. Thus, by making their prediction about the greenlighted product, they implicitly chose to

terminate their information search (unless they had collected all five pieces of information).

One week after the experiment, participants were invited to complete 7-point Likert scales measuring the internality of encoding style (Lewicki, 2005), the traits of openness and conscientiousness (Johnson et al., 2014), and chronic promotion and prevention focus (Higgins et al., 2001).

Defining Risky Choice

Notice that collecting zero pieces of information before making a focal decision corresponds to a random guess that earns the maximum possible bonus with a probability of 50%. Collecting exactly one piece provides the minimal basis for non-random guessing, favoring one product (either X or Y), with no psychological difference associated with which product it happens to be. Moreover, participants who had examined the same two (or more) attributes could have collected different information (because of content randomization), complicating the interpretation of the total number of pieces of information obtained.

For these reasons, we defined a risky choice as collecting either zero or one (vs. at least two) pieces of information before making a focal decision.

Results

We first examined the psychometric properties of the Encoding Style Questionnaire. A reliability analysis revealed sufficiently high internal consistency ($\alpha = .82$), and a scree test suggested exactly one factor, as the first factor had an eigenvalue of 3.57 and the second of 0.49. Table 1 reports the factor loadings of the 1-factor solution that determined the individuals' internality of encoding style, with more positive responses to the scale's items indicating higher internality. Even though not all items loaded equally on the factor, all loadings were sufficiently high ($\geq .46$). To assess the construct's discriminant validity, we examined its correlation with the other measured traits. In Table 2, we observe that the internality of the encoding style was sufficiently distinct, as its highest (in magnitude) correlation was only $-.30$ (with chronic prevention focus).

Next, we examined the (dispositional) internality of encoding style as a moderator of the induced regulatory focus' effect on risk-taking. We conducted a logistic regression with its dependent variable coding whether a participant made a risky choice (at most one piece of information) or not (at least two pieces of information). The independent variables consisted of a binary variable coding the experimental condition, the z-scored internality of the encoding style, and their interaction.

Table 1. Factor loadings for the 9 items of the Encoding Style Questionnaire.

Item	Experiment 1	Experiment 2
When waiting on someone in the airport, do you sometimes think that other people coming off the plane are the person you are waiting for?	.47	.46
Have you ever walked through the woods and thought for a split second that a piece of wood or a rock was an animal?	.70	.67
For a split second from a distance, do you sometimes mistake strangers for people you already know?	.70	.69
Sometimes when driving down the road, do you see a piece of paper blowing in the wind, and for a split second think it might be an animal?	.73	.72
From a distance in a crowded parking lot, have you ever mistaken another car for your own?	.50	.56
Have you ever tried calling someone and thought for a split second that you heard their voice when someone else answers?	.58	.58
Have you ever seen a piece of rubber tire on the road while you were driving and for a split second thought it was an animal or something?	.66	.67
Have you ever seen a commercial or had a conversation about food and thought you could actually smell it?	.46	.52
Have you ever noticed something like a piece of paper just to the left or right of you and for a split second thought it was something else?	.77	.72

Table 2. Correlations with internality of encoding style.

	Experiment 1	Experiment 2
Openness	.10	.12*
Conscientiousness	−.23***	−.25***
Chronic promotion focus	−.11*	−.10
Chronic prevention focus	−.30***	−.27***

* $p < .05$, *** $p < .001$

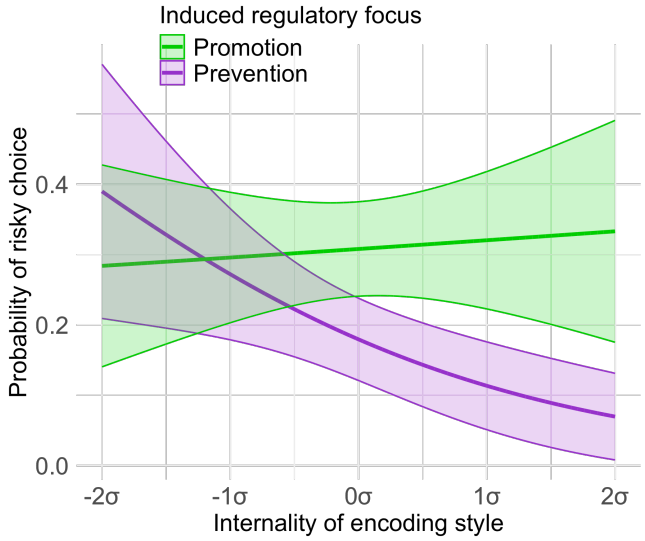
Table 3. Logistic regression results for risky choice.

	Experiment 1	Experiment 2
Intercept	−1.52***	−0.51**
Promotion	0.71**	0.71**
Internality of encoding style	−0.54**	−0.21
Promotion × Internality of encoding style	0.59*	0.48*

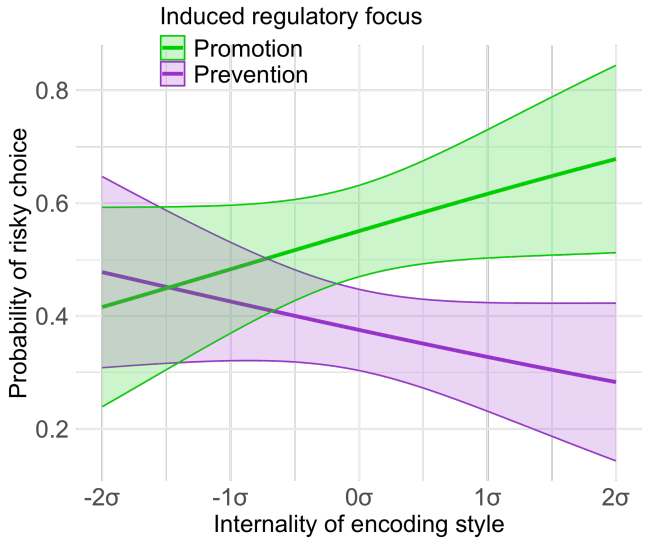
* $p < .05$, ** $p < .01$, *** $p < .001$

In Table 3, we observe a significant main effect of the induced regulatory focus, with a promotion focus increasing the probability of making a risky choice ($b = 0.71$, $p < .01$). The internality of encoding style was also a significant, albeit negative, predictor of making a risky choice ($b = −0.54$, $p < .01$). The most important observation for our study is that there was a significant positive interaction between the two predictors ($b = 0.59$, $p < .02$). This implies that the induced regulatory focus was indeed more likely to affect the risk-taking behavior of the individuals with a more internal encoding style.

To jointly take into perspective the main effects and the interaction effect of this logistic regression model, Figure 1a presents this model's estimated probability of making a risky choice for different values of the predictors. We observe that for individuals with below-average (< 0σ) internality of encoding style, the confidence intervals of the estimated probability for a risky choice are largely overlapping (or even identical) for an induced promotion and prevention focus. This suggests that the induced regulatory focus did not affect individuals with an external encoding style. However, for individuals with above-average (> 0σ) internality of encoding style, those induced with a promotion focus were clearly estimated to be more likely to make a risky choice than their prevention-focused counterparts.



(a) Experiment 1



(b) Experiment 2

Figure 1. Estimates of the logistic regression model for the probability of making a risky choice (collection of 0 or 1 piece of information), with 95% confidence intervals.

Experiment 2

The second experiment was designed to replicate the previous experiment in a different context (about political candidates rather than products) and for a different maximum bonus ($0.50 rather than $0.70). The two experiments were otherwise identical.

Method

Participants and Design A between-subjects manipulation of the task's framing determined the induced regulatory focus (promotion vs. prevention). Five hundred participants were recruited on Prolific, with one hundred and one of them being excluded for failing either of two attention checks. The 399 participants were invited one week after the experiment to complete scales of individual differences, and $N = 324$ of them (81%) accepted it.

Procedure Participants were told they would complete a decision-making task. The first paragraph stated:

> We collected polls about two candidates (referred to as candidate X and candidate Y) who competed in a 2022 gubernatorial election. Your [in promotion focus: goal; in prevention focus: task] is to predict which candidate won the election. Before you make your prediction, you can obtain up to five pieces of information from the polls that were conducted before the election. Each piece of information can help you make the correct prediction.

The second paragraph was entirely determined by the regulatory focus condition to which the participants were assigned. For those assigned to promotion focus, it was:

> If you accomplish your goal of predicting which candidate won the election, you will earn a bonus. This bonus will be \$0.50 minus \$0.05 for each piece of information you choose to examine.

For the participants assigned to prevention focus, the second paragraph was:

> You start with a budget of \$0.50. To not lose this budget completely, you must meet the task requirement of predicting which candidate won the election. For each piece of information you choose to examine, the budget decreases by \$0.05. You will keep the leftover budget.

The 5 pieces of information the participants could collect concerned the candidate perceived to be a better communicator, more intelligent, more moral, more experienced, and more ambitious.

One week after the experiment, participants were invited to complete the same scales of individual differences employed in the first experiment. Risky choice was also defined exactly as in the first experiment.

Results

The psychometric properties of the Encoding Style Questionnaire were virtually identical to those found in the first experiment ($\alpha = .82$; the eigenvalue of the first factor was 3.55 and of the second factor 0.35). An inspection of Table 1 and Table 2 suggests that the factor loadings of the items and the construct's correlations with the other individual differences were also similar to those in the first experiment.

We now focus on the logistic regression results presented in Table 3. First, we observe that the estimate of the model's intercept was higher than in the first experiment ($b = -0.51$ vs. -1.52). This suggests that regardless of the induced regulatory focus and the internality of the encoding style, participants in the second experiment were generally more likely to make a risky choice than in the first experiment. This observation can be explained by the lower maximum bonus in the second experiment (\$0.50 vs. \$0.70), while the cost of a piece of information remained the same (\$0.05). This implies that the relative cost of a piece of information was higher in the second experiment, which incentivized participants to make a risky choice by collecting at most one piece of information.

The main effect of an induced promotion focus was identical to that in the first experiment ($b = 0.71$, $p < .01$), but not the internality of the encoding style ($b = -0.21$, $p > .17$). The interaction of these two predictors was significant also in this experiment ($b = 0.48$, $p < .04$), suggesting that differences in risk-taking behavior due to the induced regulatory focus were pronounced for the individuals with a highly internal encoding style.

In Figure 1b, we observe that for individuals with a low internality of encoding style (e.g., for -1σ), the model's estimated probability of making a risky choice did not differ significantly based on the induced regulatory focus. However, individuals with a highly internal encoding style were much more likely to make a risky choice when induced with a promotion than a prevention focus. For example, an individual with an internality of encoding style equal to 1σ was predicted to make a risky choice with a probability of about 60% when induced with a promotion focus, but only with a probability of about 30% when induced with a prevention focus.

We conclude that this second experiment replicated the findings of the first. The dispositional internality of encoding style moderated the induced regulatory focus' effect on risk-taking behavior. An induced promotion focus resulted in higher risk-taking than an induced prevention focus only for participants with a sufficiently high internal encoding style. Therefore, a low threshold for activating existing schemata when exposed to stimuli (internal encoding style) was generally required for an induced regulatory focus to affect risk-taking.

Combined Data

Past research on regulatory focus theory suggests that when situational and chronic motivational orientations align, people experience a regulatory fit that heightens the value of their actions (Higgins, 2005). We sought to examine whether this interaction between situational and chronic regulatory focus has a significant impact on the propensity of individuals to make a risky choice. Accounting for our findings about encoding style, this implies including a second interaction term in our model.

To examine this model with additional predictors, and because the previous analyses led to similar conclusions for

the two experiments, we combined these experiments' data to increase the sample size ($N = 685 = 361 + 324$). Following previously employed approaches (Cesario et al., 2004), we computed the chronic regulatory focus as the difference between the chronic promotion and prevention focus, which difference was then z-scored. We estimated two logistic regression models, one with and one without predictors about encoding style. Both models included a binary predictor about the experiment of the datapoints.

Table 4. Logistic regression results for risky choice on the combined data.

	(A)	(B)
Intercept	−0.50***	−0.51***
First Experiment	−0.97***	−0.98***
Promotion	0.67***	0.69***
Internality of encoding style		−0.35**
Promotion × Internality of encoding style		0.49**
Chronic regulatory focus	−0.06	0.01
Promotion × Chronic regulatory focus	0.15	0.07

* $p < .05$, ** $p < .01$, *** $p < .001$

The results in Table 4 suggest that neither the chronic regulatory focus nor its interaction with the induced regulatory focus were significant predictors of making a risky choice, regardless of whether predictors about encoding style were excluded (column A) or included (column B) in the model. Moreover, these results confirm the interactive effect of induced regulatory focus and internality of encoding style on the propensity to make a risky choice ($b = 0.49$, $p < .01$).

Therefore, the underlying processes governing the effect of the induced regulatory focus on risk-taking were not related to the individuals' chronic motivational orientation. Instead, these processes pertained to the propensity of individuals to activate their internal existing schemata as a response to a stimulus. Individuals with a more internal encoding style were more likely to detect a difference between the promotion and prevention framings and to exhibit a risky behavior that matched the induced regulatory focus.

General Discussion

The results of two experiments suggest that framing effects on risk-taking are moderated by individual differences in the internality of encoding style. Participants could collect costly information to aid their focal decision, with the collection of only a little information corresponding to risk-taking behavior. The results consistently showed that a promotion-focused (vs. prevention-focused) framing increased the probability of risk-taking only for the individuals with a sufficiently internal encoding style—those who tend to readily activate their internal existing schemata as a response to stimuli. No framing effect was found for the individuals with a highly external encoding style—those who impose a high threshold on the amount of information required in stimuli before their existing schemata are activated.

Notably, we did not find evidence for moderating effects of chronic regulatory focus. That is, the effectiveness of the situationally induced regulatory focus did not depend on the chronic motivational orientation of the individuals. Taken together, these results suggest that framing effects are moderated by differences in cognitive processing rather than alignment with the individuals' motivational orientation.

These results contribute to the literature on individual differences in decision-making (Franken & Muris, 2005). Most related are previous works employing Kahneman and Tversky's risky choice paradigm, which closely resembles but is not identical to the experimental setup (on an information search problem) we considered here. Our results align conceptually with previous findings showing that in the risky choice paradigm, framing effects are stronger for individuals with a more heuristic rather than a rational thinking style (Mahoney et al., 2011) and for individuals with low numeracy who face difficulties integrating complex numeric information (Peters & Levin, 2008). These observations are in line with our conclusion that framing effects on risk-taking are moderated by individual differences in cognitive processing. Collectively, these results highlight the importance of examining the heterogeneity of framing effects across individuals. Prior experimental work has largely neglected such heterogeneity considerations (Bryan et al., 2021), but they appear crucial to understanding framing effects. Our work suggests that encoding style is a general source of heterogeneity in framing effects that deserves further attention. Future work needs to delve deeper into the complex dynamics that govern automatic and deliberate reasoning (Gawronski & Bodenhausen, 2006) to improve our understanding of how individual differences in cognitive processing moderate framing effects on risk-taking.

Another possible direction for future work is to examine the extent to which these results are specific to their context. Frames can be strategically employed for persuasion in many real-life situations, such as by politicians to influence public opinion (Druckman, 2001) and by advertisers to sway consumers (Hirsh et al., 2012). We conjecture that the moderating effects of encoding style generalize across contexts where decisions must be made shortly after being exposed to a stimulus—contexts where there is limited room for prolonged deliberation. It is also unclear how social context affects the moderation of encoding style on framing effects. Further research is required to shed light on the generality of these moderating effects across contexts.

References

Bryan, C. J., Tipton, E., & Yeager, D. S. (2021). Behavioural science is unlikely to change the world without a heterogeneity revolution. *Nature Human Behaviour*, *5*(8), 980-989.

Bryant, P., & Dunford, R. (2008). The influence of regulatory focus on risky decision-making. *Applied Psychology*, *57*(2), 335-359.

Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory fit and persuasion: Transfer from "feeling right". *Journal of Personality and Social Psychology*, *86*(3), 388.

Crowe, E., & Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes*, *69*(2), 117-132.

DeKay, M. L., Rubinchik, N., Li, Z., & De Boeck, P. (2022). Accelerating psychological science with metastudies: A demonstration using the risky-choice framing effect. *Perspectives on Psychological Science*, *17*(6), 1704-1736.

Druckman, J. N. (2001). On the limits of framing effects: Who can frame? *The Journal of Politics*, *63*(4), 1041-1066.

Franken, I. H., & Muris, P. (2005). Individual differences in decision-making. *Personality and Individual Differences*, *39*(5), 991-998.

Friedman, R. S., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology*, *81*(6), 1001.

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: an integrative review of implicit and explicit attitude change. *Psychological Bulletin*, *132*(5), 692.

Halamish, V., Liberman, N., Higgins, E. T., & Idson, L. C. (2008). Regulatory focus effects on discounting over uncertainty for losses vs. gains. *Journal of Economic Psychology*, *29*(5), 654-666.

Hamstra, M. R., Bolderdijk, J. W., & Veldstra, J. L. (2011). Everyday risk taking as a function of regulatory focus. *Journal of Research in Personality*, *45*(1), 134-137.

Hasher, L., & Zacks, R. T. (1984). Automatic processing of fundamental information: the case of frequency of occurrence. *American Psychologist*, *39*(12), 1372.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in Experimental Social Psychology*, *30*.

Higgins, E. T. (2005). Value from regulatory fit. *Current directions in Psychological Science*, *14*(4), 209-213.

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology*, *31*(1), 3-23.

Hirsh, J. B., Kang, S. K., & Bodenhausen, G. V. (2012). Personalized persuasion: Tailoring persuasive appeals to recipients' personality traits. *Psychological Science*, *23*(6), 578-581.

Johnson, J. A. (2014). Measuring thirty facets of the Five Factor Model with a 120-item public domain inventory: Development of the IPIP-NEO-120. *Journal of Research in Personality*, *51*, 78-89.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263-292.

Kühberger, A. (1998). The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes*, *75*(1), 23-55.

Lee, A. Y., Keller, P. A., & Sternthal, B. (2010). Value from regulatory construal fit: The persuasive impact of fit between consumer goals and message concreteness. *Journal of Consumer Research*, *36*(5), 735-747.

Lewicki, P., Hill, T., & Czyzewska, M. (1992). Nonconscious acquisition of information. *American Psychologist*, *47*(6), 796.

Lewicki, P. (1986). Processing information about covariations that cannot be articulated. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *12*(1), 135.

Lewicki, P. (2005). Internal and external encoding style and social motivation. *Social motivation: Conscious and unconscious processes*, 194-209.

Mahoney, K. T., Buboltz, W., Levin, I. P., Doverspike, D., & Svyantek, D. J. (2011). Individual differences in a within-subjects risky-choice framing study. *Personality and Individual Differences*, *51*(3), 248-257.

Mamakos, M., & Bodenhausen, G. V. (2024). Motivational drivers of costly information search. *Cognition*, 244, 105715.

Morewedge, C. K., & Giblin, C. E. (2015). Explanations of the endowment effect: an integrative review. *Trends in Cognitive Sciences*, *19*(6), 339-348.

Peters, E., & Levin, I. P. (2008). Dissecting the risky-choice framing effect: Numeracy as an individual-difference factor in weighting risky and riskless options. *Judgment and Decision making*, *3*(6), 435-448.

Seger, C. A. (1994). Implicit learning. *Psychological Bulletin*, *115*(2), 163.

Shah, J., Higgins, T., & Friedman, R. S. (1998). Performance incentives and means: how regulatory focus influences goal attainment. *Journal of Personality and Social Psychology*, *74*(2), 285.

Stamov Roßnagel, C. (2001). Revealing hidden covariation detection: Evidence for implicit abstraction at study. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *27*(5), 1276.

von Hippel, W., Jonides, J., Hilton, J. L., & Narayan, S. (1993). Inhibitory effect of schematic processing on perceptual encoding. *Journal of Personality and Social Psychology*, *64*(6), 921.