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Risk-defusing in decisions by probability of detection of harm and promotion and prevention focus

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ABSTRACT

Risk-defusing operators (RDO) are actions that reduce risk, to be enacted either before a negative event occurs (pre-event RDOs) or afterwards (post-event RDOs). For post-event RDOs, detection probability of the negative events is relevant. Regulatory focus theory suggests that promotion-oriented individuals – independent whether it is a personal disposition or favored by situational cues – should focus on chances to succeed and therefore choose post-event RDOs more likely than prevention-oriented individuals who are likely to focus on possible failures and means to avoid them. In two experimental studies, we examined effects of detection probability and regulatory focus as a state variable on the choice of post-event RDOs. Results replicate findings that the likelihood to choose post-event RDOs increases with increasing detection probability of the negative events. Contrary to expectation, no clear effects of regulatory focus were found. Exploratory analyses showed some evidence that successful manipulation of regulatory focus might influence RDO choices if tasks are highly relevant for decision-makers.

The present paper investigates the use of risk-defusing operators in risky choice. We study quasi-realistic scenarios with decision-makers not only passively assessing the involved risk, but actively searching for additional actions that eliminate or reduce the risk of a negative outcome associated with an otherwise attractive alternative. We are especially interested in the distinction between risk-defusing actions that have to be initiated before a negative event (e.g., an infection by a dangerous disease) occurs (e.g., a vaccination) and those that have to be initiated after the negative event (e.g., a medical treatment). For the latter type of risk-defusing actions, it is crucial whether the occurrence of the negative event can be detected in due time to initiate the risk-defusing action (e.g., whether the infection can be diagnosed in time for a successful treatment). We expect differences in the choice of pre-event and post-event operations depending on the probability of detection of a negative event. Moreover, we expect also differences between people in a promotion-focused or a prevention-focused state regarding their preferences for pre-event or post-event risk-defusing actions in situations where detection of the negative event is uncertain.

1. Risky decisions and risk-defusing operators

Several influential decision theories (e.g., SEU, prospect theory and others, see Baron, 2008 for a review) see decisions as governed by two aspects: (a) the subjective values (i.e., utilities) of the consequences, and (b) the subjective probabilities of the consequences. Common decision situations that participants face in empirical studies are gambling tasks or lotteries. In the last decade, however, a number of studies question the generalizability of such value-by-probability approaches to all decision situations (e.g., Huber et al., 2001, 1997; Huber and Huber, 2003; Huber and Macho, 2001; Ranyard et al., 2001; Schulte-Mecklenbeck and Huber, 2003; Shiloh et al., 2006; Tyszka and Zaleskiewicz, 2006; Williamson et al., 2000). Decision behavior in quasi-realistic scenarios differs in two main respects from that in gambling tasks: (a) in many types of tasks – especially in emotionally laden tasks – decision-makers are not interested in the probability information as much as expected by rational choice theory, and (b) often risk-defusing behavior is a crucial component of the decision process. If decision-makers realize that an otherwise attractive alternative may produce a negative outcome, they may engage in seeking for means to reduce the risk of the negative outcome.

A risk-defusing operator (RDO) is an action intended by decision-makers to be performed in relation to a specific alternative and expected to decrease the associated risk of the negative

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outcome. RDOs are quite common in everyday risky decision situations (Huber and Huber, 2008). When people have to decide whether or not to travel into a region where an epidemic infectious disease is prevalent, they often attempt to find out whether they can get vaccinated against that disease instead of passively contemplating probabilities. People wanting to buy a new car but not being certain whether they can meet the monthly installments, may take out a consumer credit repayment insurance. It should be noted that including an RDO is not the same as searching for a new alternative. The concept of RDOs is closely related to the concept of control: an RDO provides the decision-maker with at least some control over the risk, and controllable risks are experienced as less grave than uncontrollable ones (e.g., Lion and Meertens, 2001; Vlek and Stallen, 1981; Weinstein, 1984). Identifying (or not identifying) an RDO has a crucial effect on choices. If the risk of a negative outcome associated with an otherwise desirable alternative can be defused by a RDO, it is chosen much more often than when not (Bär and Huber, 2008). Huber (2007) presents an overview of research into factors affecting the search for RDOs (e.g., attractiveness of the alternative, expectation of finding relevant information) and determinants of acceptance of RDOs (e.g., cost and effectiveness).

Different types of RDOs can be distinguished (Huber, 2007). For the present study, a distinction introduced by Huber and Huber (2003) is relevant. RDOs may have to be applied at different times in relation to the occurrence of a negative event: Pre-event RDOs have to be applied before a negative event happens, post-event RDOs (i.e., worst case plans) only need to be initiated if the event has occurred. Taking out travel insurance or a vaccination are typical pre-event RDOs. The insurance has to be contracted before the journey; also the vaccination needs to be taken before starting the vacation. However, a medical treatment that has to be initiated after becoming infected with a disease is a post-event RDO.

The positive effect of an RDO is set against its cost (Huber and Huber, 2003). A decision-maker weighs up costs and benefits of an RDO before deciding to apply it. Examples of RDO costs are the insurance premium, the price of a vaccination, or the time one has to sacrifice. The costs of a pre-event RDO are certain and have to be borne in any case, even if the negative event does not occur. In contrast, costs of a post-event RDO are contingent, and need only be borne if the negative event occurs. If both types of RDOs are available in a situation, the majority of decision-makers prefers a post-event RDO, provided that the negative event can be detected with certainty (Huber and Huber, 2003).

A post-event RDO needs to be initiated if the negative event has happened. Therefore a decision-maker must be able to detect the occurrence of the negative event with appropriate timing in order to trigger the RDO (Huber and Huber, 2003). In many cases, detection poses no problem. In other situations, detection is not guaranteed, as for example when a person decides to travel to a country where a life-threatening contagious disease is widespread and an infection might not be detected and treated in time. The post-event RDO could be applied too late, with serious consequences for the person's health. In such a situation it is advisable to fall back on a pre-event RDO, for example a vaccination. Huber and Huber (2003) showed that the majority of participants preferred pre-event RDOs when detection of the negative event was not guaranteed. If probability of detection was reduced from $p = 1$ to $p = .9$, most participants switched from choosing the option with a post-event RDO to the pre-event RDO. The theory of regulatory focus predicts systematic differences in the preference for different types of risk-defusing operators, depending on the willingness to accept uncertainty related to these choices.

2. Regulatory focus

According to the theory of regulatory focus (Higgins, 1997, 1998), people approach their goals by two motivational self-regulation systems. These systems coordinate human actions from goal definition to the perpetuation of actions to goal achievement (Holler et al., 2005). People under a promotion focus attempt to achieve success through a high degree of commitment. They are gain-oriented rather than loss-oriented, concerned with growth, and focus on the fulfillment of ideals, hopes and aspirations. People under a prevention focus have a distinct need for security and try cautiously to prevent unpleasant and undesirable outcomes. They are loss-oriented rather than gain-oriented, and attempt to satisfy the expectations of others. Irrespective of which kind of focus is dominant, people follow the hedonistic principle: they want to achieve pleasant states and avoid unpleasant ones. People with different regulatory focus differ, however, in how they attempt to reach the hedonistic goal and how it is represented internally. One and the same positive condition is represented under promotion focus as the occurrence of positive outcomes, whereas under prevention focus it is represented as the absence of negative outcomes. By analogy, a negative condition is represented as the absence of positive outcomes under promotion focus and as the occurrence of negative outcomes under prevention focus. Depending on their regulatory focus, people choose not only different goals (Brendl and Higgins, 1996) but also different strategies to pursue a goal (Higgins, 1997, 1998).

The regulatory focus is determined by a person's disposition as well as by the situation (Higgins, 1997, 1998). Regulatory focus has been conceptualized as a trait and also as a state variable. It is assumed that people possess relatively stable personality characteristics which drive them to goal-orientation or to loss-orientation. Decision-making and behavior are, however, not exclusively determined by personality traits but also by situational cues which can either stimulate promotion or prevention orientation. For example, the wording of a task may enhance promotion or prevention orientation (Higgins et al., 1994). In several studies, people under promotion focus differed in their risk propensity from those under prevention focus (Crowe and Higgins, 1997; Higgins, 1997, 1998; Zhou and Pham, 2004). In a signal detection task, individuals under a promotion focus showed a risky response bias, whereas those under a prevention focus showed a conservative response bias (Crowe and Higgins, 1997). Zhou and Pham (2004) found different risk-taking tendencies in investment decisions.

It should also be mentioned that relations between regulatory focus theory and various personality concepts have been discussed. There are, for instance, similarities between the classical concepts of "locus of control" (Rotter, 1966), "sensation seeking" (Zuckerman, 1984), hope of success and fear of failure (Atkinson, 1957). In this paper, relations between these concepts are, however, not in the focus of attention.

The present experiments examine whether regulatory focus affects preferences for pre-event or post-event RDOs. We assume that in situations with uncertain detection of the negative event, individuals under prevention focus – be it due to their disposition or by situational circumstances – will more likely prefer pre-event RDOs than individuals under a promotion focus. This assumption is based on the studies on risk propensity mentioned above, but also on control considerations: Langens (2007) showed that promotion-focused individuals perceive to have higher control over the development of an event than prevention-focused ones. For a given level of detectability, people under prevention focus should therefore believe to have less control over detecting the negative event in time, and prefer to be on the safe side by choosing the pre-event RDO in situations of uncertain detection. If detection is certain, the majority of prevention and promotion-

focused decision-makers should prefer a post-event RDO: certain detection means the post-event RDO is more economic since it only needs to be applied if the negative event occurs and it is sure that the occurrence of a negative event will be detected in time so that post-event RDOs can successfully be applied. To summarize, our studies are designed to test and replicate the findings that detectability of a negative event influences the choice between pre-event and post-event RDOs. In addition, we assume that prevention-focused individuals are more likely to choose the pre-event RDO than promotion-focused individuals when detectability is uncertain, whereas this difference should be smaller when detectability is certain. We report findings from two experiments. In Study 1, a subtle priming method for inducing regulatory focus was used; in Study 2, a more direct method was used. In both studies we manipulated regulatory focus as a state variable.

3. Study 1

3.1. Method

Participants. One hundred and eighty participants (109 female, 71 male) with a median age of 23 years ($M = 24.26$, $SD = 5.64$) completed the questionnaires. The majority (170) were students in social sciences and humanities.

Material and procedure. To minimize distractions, participants were invited to the laboratory in small groups. They worked through three scenarios; in each scenario, they made a choice between one action containing a pre-event RDO and another action containing a post-event RDO. After completing all three scenarios, participants answered additional items related to the scenarios (e.g., manipulation checks, perception of the situation, ease of comprehension) and on demographic characteristics. The questionnaire took about 15 min to complete. Participants received € 3 in cash for their time.

Three quasi-realistic risky decision scenarios (adapted from Huber and Huber, 2003) were used: Tunnel, Newts and Cerebral Disease. In the Tunnel scenario, participants took the role of the manager of a firm planning to drill a tunnel through a mountain with a difficult geological structure. In the Newts scenario, participants took the role of a member of a committee whose task is to protect a rare endemic newt species against an invading foreign species. In the Cerebral Disease scenario, participants took the role of a patient considering medication against a brain disease. In all scenarios, two actions were offered: one with a pre-event RDO, the other with a post-event RDO. Participants were asked to choose the action they preferred. An example for a scenario is given in Appendix A.

Experimental variations concerned detection probability of the negative event and situational regulatory focus. Detection probability of the negative event was varied in three levels: 40%, 90% and 100%. It was described in the post-event RDO action using natural numbers. Participants read that the negative event would be detected in 40 of 100 cases, in 90 of 100 cases, or in any case for sure. For each scenario (Tunnel, Newts, and Cerebral Disease), detection probability varied between-subjects. In addition, detection probability varied within-subjects across scenarios: e.g., if the Tunnel scenario had 40% detection probability, the Newts scenario had 90% and the Cerebral Disease Scenario 100%. All possible combinations of detection probability were counterbalanced; however, the order of scenario topics (Tunnel, Newts, and Cerebral Disease) was held constant because earlier studies showed no order effect of topics (e.g., Huber and Huber, 2003; Huber and Huber, 2008). This resulted in six different questionnaire versions. Participants were randomly assigned to questionnaire versions and to situational regulatory focus conditions.

Situational regulatory focus was manipulated in an indirect way: The prevention focus group was instructed to press both hands against the tabletop from above; the promotion focus group was instructed to press both hands against the tabletop from below (Förster et al., 1998) while reading the scenarios. Certain body movements can, in a subtle manner, trigger emotional processes and information processing (Adelman and Zajonc, 1989). Movements directed towards one's own body – for example, flexing the arm – represent an approach motivation and are associated with intake or consumption of a desired stimulus. Movements directed away from one's own body – for example, straightening the arm – are associated with rejection and represent avoidance motivation (Cacioppo et al., 1993). The instruction was printed on each page containing a scenario. It ensured that before making their decision in each scenario, participants had either pressed the tabletop from below (promotion focus) or from above (prevention focus) for the whole time necessary to read the scenario. The instruction for hands-pressing argued that this was to help to increase concentration; after the experiment, participants were debriefed.

The main dependent variable was the choice of pre-event RDO or post-event RDO in the three scenarios. Additional variables were collected after participants had worked through all three scenarios. As manipulation check for detection probability, participants reported for each scenario how likely they think the detection of the negative event to be by putting a mark on a 100 mm line labeled "under no circumstances" on one end and "completely certain" on the other end. As manipulation check for regulatory focus, participants had to rate what they had primarily paid attention to during working on the respective scenario, by putting a mark on a 100 mm line labeled "reducing danger" on one end and "increasing chances" on the other end. For each scenario, participants rated the subjective negativity of the negative event by putting a mark on a 100 mm line labeled "neutral" on one end and "very negative" on the other end. Participants also were asked how threatening they perceived the respective scenario, how complex they perceived the problem and how easy it was to comprehend (5-point scale, "not at all" to "extremely").

3.2. Results

Manipulation checks showed that the information about the detectability of the negative event was understood by participants. Within-subject comparisons showed a significant effect of manipulated detection probability on the subjective probability ratings, $F(2, 356) = 66.62$, $p < .01$, $\eta^2 = .27$. Ratings for the 40% condition ($M = 45.31$, $SD = 22.02$) were significantly lower than ratings for the 90% condition ($M = 62.79$, $SD = 24.96$), $F(1, 178) = 52.30$, $p < .01$, $\eta^2 = .27$. Ratings for the 90% condition were significantly lower than for the 100% condition ($M = 72.28$, $SD = 23.66$), $F(1, 178) = 14.82$, $p < .01$, $\eta^2 = .08$. The manipulation check for situational regulatory focus was unsuccessful, $t(177) = -0.15$, $p = .88$; the two groups pressing the tabletop from above or below did not differ in their focus on reducing danger versus increasing chances, averaged over the three scenarios. Also, no effects of this manipulation on the perception of detection probabilities or subjective negativity of events were found. Overall, participants judged the scenarios as moderately complex ($M = 3.16$, $SD = 0.65$, 5-point scale), but still as rather easy to comprehend ($M = 3.91$, $SD = 0.61$).

Logistic regressions were performed for each scenario separately.[1] In a first step, detection probability was included in the model. In a second step, pressing the tabletop from above or below was included and in a third step, the interaction effect was

[1] Additional analyses showed that the presentation order of detection probability levels did not influence choices.

Table 1
Choice of post-event RDO, Study 1.

Scenario	Detection probability		
	40%	90%	100%
Tunnel	12[a] (20%)	18[a] (30%)	40[b] (67%)
Newts	12[a] (20%)	29[b] (48%)	29[b] (48%)
Cerebral disease	13[a] (22%)	25[b] (42%)	46[c] (77%)

Note: Base $n = 60$ per cell. Cells with different superscripts differ in the effect of detection probability on likelihood to choose the post-event RDO.

included. To control for a potential accumulation of Type I-error, a Bonferroni correction was used to adjust the critical p-level to .05/3 = .017. For the Tunnel scenario, a significant effect of detection probability was found, Wald (2) = 27.78, $p < .01$, Nagelkerke $R^2 = .21$. Neither the inclusion of the direction of pressing the tabletop, $\chi^2(1) = 0.45$, $p = .50$, nor the inclusion of the interaction effect, $\chi^2(2) = 3.73$, $p = .16$, further improved the model. For the Newts scenario, the effect of detection probability was significant, Wald (2) = 12.66, $p < .01$, Nagelkerke $R^2 = .10$. Again, the inclusion of the direction of pressing the tabletop, $\chi^2(1) = 0.10$, $p = .75$, or the interaction effect, $\chi^2(2) = 0.03$, $p = .98$, did not improve the model. For the Cerebral Disease scenario, detection probability was found significant, Wald (2) = 32.89, $p < .01$, Nagelkerke $R^2 = .26$. Neither the direction of pressing the tabletop, $\chi^2(1) = 1.81$, $p = .18$, nor the interaction effect, $\chi^2(2) = 0.41$, $p = .81$, further improved the model.

Table 1 shows that in all three scenarios, the number of participants choosing the post-event RDO increased with detection probability. Without considering the topic of the scenario, 21% of participants chose the post-event RDO when detection probability was low; 40% of participants did so when detection probability was high; and 64% did so when detection was certain. A Cochran-Q test indicates a clear difference across detection probability within respondents, $Q(df = 2, N = 180) = 62.73$, $p < .01$, with significant differences between all probability levels.

In an exploratory analysis, we used the manipulation check items for situational regulatory focus (focusing on reducing danger versus increasing chances) instead of the experimental manipulation of the direction of pressing the tabletop. For the Tunnel scenario, the inclusion of the manipulation check item improved the model to some extent, $\chi^2(1) = 5.12$, $p = .02$; however, the inclusion of the interaction term did not improve it further, $\chi^2(2) = 0.78$, $p = .68$. For the Newts scenario, inclusion of the manipulation check item did not improve the model, $\chi^2(1) = 0.02$, $p = .90$; the inclusion of the interaction term improved the model slightly, $\chi^2(2) = 6.89$, $p = .03$. For the Cerebral Disease scenario, again inclusion of the manipulation check item improved the model, $\chi^2(1) = 4.01$, $p = .04$, whereas the interaction term did not, $\chi^2(2) = 0.45$, $p = .80$. In light of the necessary Bonferroni correction, these effects can only be considered marginally significant. For both the Tunnel scenario and the Cerebral Disease scenario, the regression parameters pointed in the expected direction: the more participants reported to have focused on increasing chances (as opposed to reducing danger), the more likely they were to choose the post-event RDO (Tunnel: $B = 0.02$, Wald ($df = 1$) = 4.94, $p = .03$; Cerebral disease: $B = .01$, Wald ($df = 1$) = 3.93, $p = .05$). In the Newts scenario, the tendency for an interaction effect indicates that this effect only occurs in the 100% condition ($B = 0.02$, Wald ($df = 1$) = 4.42, $p = .04$).

To summarize, the findings show a clear effect of detection probability in line with earlier findings. The induction of a situational regulatory focus seems to have been unsuccessful, neither showing effects on the manipulation check nor on the dependent variable. However, exploratory analyses indicate some correspondence between the choices of post-event RDOs and the manipulation check items for regulatory focus. Missing effects of regulatory focus in Study 1 could be due to the subtle manipulation of regulatory focus. Therefore, a second study was conducted which corresponds to Study 1 with regard to design, but differs in the way regulatory focus was manipulated.

4. Study 2

4.1. Method

Participants. One hundred and eighty participants completed the questionnaires; four had to be excluded due to missing data in key variables. The remaining sample consisted of 176 participants (135 female, 41 male) with a median age of 24 years ($M = 24.39$, $SD = 4.07$). The majority ($n = 165$) were students in social sciences and humanities.

Material and procedure. Both the material used and the procedure were identical to Study 1, with the exception of the manipulation of regulatory focus.

Situational regulatory focus was experimentally induced through a regulatory focus priming task modeled after Freitas and Higgins (2002) (Study 2), and successfully employed by Holler et al. (2008). In the promotion focus condition, participants read a short text about the relevance of wishes. Participants had to write down one personally important wish, and up to five strategies to realize that wish. In the prevention focus condition, participants read a short text about the relevance of obligations. Participants had to write down one personally important obligation, and up to five avoidance strategies. After this task, they started on the scenarios.

4.2. Results

Manipulation checks showed participants understood the information about the detectability of the negative event. Within-subject comparisons showed a significant effect of manipulated detection probability on the subjective probability ratings, $F(2, 350) = 56.08$, $p < .01$, $\eta^2 = .24$. Ratings for the 40% condition ($M = 47.71$, $SD = 22.08$) were significantly lower than ratings for the 90% condition ($M = 65.10$, $SD = 22.48$), $F(1, 175) = 57.90$, $p < .01$, $\eta^2 = .25$. Ratings for the 90% condition were significantly lower than for the 100% condition ($M = 71.09$, $SD = 24.72$), $F(1, 175) = 7.93$, $p < .01$, $\eta^2 = .04$. The manipulation check for situational regulatory focus indicates an effect of concentrating on wishes versus obligations. Averaging over the three scenarios, participants concentrating on wishes (promotion focus, $M = 39.04$, $SD = 19.55$) reported to have focused more on increasing their chances during working on the scenarios (as opposed to reducing danger) than participants concentrating on obligations (prevention focus, $M = 33.43$, $SD = 21.52$), $t(174) = -1.81$, $p = .036$ one-sided. Situational regulatory focus also showed the expected effect on subjective negativity: The prevention group ($M = 64.38$, $SD = 17.46$) judged the events as more negative than the promotion group ($M = 57.79$, $SD = 17.21$), $t(174) = 2.52$, $p < .01$ one-sided. However, subjective detection probability was not influenced by situational regulatory focus, $F(3, 172) = 1.66$, $p = .18$. Overall, participants judged the scenarios as moderately complex ($M = 3.28$, $SD = 0.59$, 5-point scale), but still as rather easy to comprehend ($M = 3.87$, $SD = 0.54$).

Logistic regressions were performed for each scenario separately, in the same analysis strategy as in Study 1.[2] For the Tunnel scenario, a significant effect of detection probability was found, Wald (2) = 19.68, $p < .01$, Nagelkerke $R^2 = .16$. Neither the inclusion of situational regulatory focus, $\chi^2(1) = 0.33$, $p = .56$, nor the inclusion of the interaction effect, $\chi^2(2) = 2.29$, $p = .32$, significantly

[2] Again, additional analyses showed no effects of presentation order of detection probability levels on choices.

Table 2
Choice of post-event RDO, Study 2.

Scenario	Detection probability		
	40%	90%	100%
Tunnel	11^{a+} (18%)	16^{a} (28%)	33^{b} (57%)
Newts	16^{a} (28%)	35^{b+} (58%)	36^{b} (62%)
Cerebral disease	14^{a} (24%)	27^{b} (47%)	43^{c+} (72%)

Note: Base $n = 58$ per cell, except $^{+}$ $n = 60$. Cells with different superscripts differ in the effect of detection probability on likelihood to choose the post-event RDO.

improved the model. For the Newts scenario, detection probability was significant, Wald (2) = 15.75, $p < .01$, Nagelkerke $R^2 = .12$. Neither situational regulatory focus, $\chi^2(1) = 0.13$, $p = .71$, nor the interaction effect, $\chi^2(2) = 0.52$, $p = .77$, improved the model. For the Cerebral Disease scenario, detection probability was also significant, Wald (2) = 24.48, $p < .01$, Nagelkerke $R^2 = .20$. The inclusion of situational regulatory focus, $\chi^2(1) = 0.53$, $p = .47$, or the interaction effect, $\chi^2(2) = 0.43$, $p = .81$, did not improve the model.

In all three scenarios, the number of participants choosing the post-event RDO increased with detection probability (Table 2). Without considering the topic of the scenario, 23% of participants chose the post-event RDO when detection probability was low; 44% did so when detection probability was high; and 63% did so when detection was certain. A Cochran-Q test indicates a clear difference across detection probability within respondents, $Q(df = 2, N = 176) = 57.76$, $p < .01$, with significant differences between all probability levels.

In an exploratory analysis, again the manipulation check items (increasing chances versus reducing danger) for situational regulatory focus were used instead of the experimental manipulation. For the Tunnel scenario, the inclusion of the manipulation check item improved the model significantly, $\chi^2(1) = 8.74$, $p < .01$, but inclusion of the interaction term did not improve it further, $\chi^2(2) = 0.29$, $p = .87$. For the Newts scenario, the manipulation check item, $\chi^2(1) = 0.08$, $p = .77$, and the interaction term, $\chi^2(2) = 0.82$, $p = .67$, did not improve the model. For the Cerebral Disease scenario, inclusion of the manipulation check item again improved the model, $\chi^2(1) = 10.29$, $p < .01$, but the interaction term did not, $\chi^2(2) = 1.20$, $p = .55$. For the Tunnel scenario and the Cerebral Disease scenario, the regression parameters both pointed in the expected direction: the stronger participants focused on increasing chances (versus reducing danger), the more likely they were to choose the post-event RDO (Tunnel: $B = 0.02$, Wald ($df = 1$) = 8.46, $p < .01$; Cerebral disease: $B = .02$, Wald ($df = 1$) = 9.65, $p < .01$). In addition, the average measure used as the overall manipulation check was positively correlated with the total number of choices of post-event RDOs, $r(n = 176) = .29$, $p < .01$.

5. Discussion

The results from both studies show that the choice of pre-event RDOs and post-event RDOs depends crucially on the detection probability of the negative event. With increasing detection probability (40%, 90% and 100%), more participants chose the post-event RDO. When detection was uncertain (40% and 90%), a majority preferred the pre-event RDO; when detection was certain (100%), a majority preferred the post-event RDO. In these aspects, the present results corroborate the findings by Huber and Huber (2003) in independent samples.

It is noteworthy that although a majority of participants chose the post-event RDO when detection was certain, not all participants did so: the general level of choosing the post-event RDO was 64% and 63% (68.5% in Huber and Huber, 2003). With certain detection, the post-event RDO should be more attractive because its costs are possible rather than certain. One possible explanation for the finding that some participants chose the pre-event RDO in spite of a certain detection of the negative event could be the complexity of the scenarios that led participants to perceive the certain detection as less than certain. The manipulation checks for detection probability indicate that many respondents rated the 100% detection level below the endpoint of the scale labeled "completely certain".

Besides the relevance of the detectability of the negative event, the present studies examined the relevance of regulatory focus. Although theoretical considerations provide a strong rationale for the hypothesis that individuals under promotion focus should choose differently than individuals under prevention focus, in particularly when detection of the negative event is uncertain, the results of the present experiments did not support this hypothesis. The experimental manipulations of situational regulatory focus, modeled closely after successful manipulations in other studies (e.g., Förster et al., 1998; Freitas and Higgins, 2002) showed no effects on the choice of pre-event versus post-event RDOs. The most plausible explanation is that the experimental manipulations were too weak in the current settings. Given that participants had to read through three quite complex scenarios, they might have been too occupied with understanding the details of the situation so that the induction of a strong situational regulatory focus did not succeed. In Study 1, the manipulation check items did not detect any effect; in Study 2, a rather small effect was found. In Study 2, manipulation of regulatory focus may not have been successful for all three scenarios as it may have faded after the first scenario already.

However, at the current stage, we would still maintain that situational regulatory focus has relevance for the choice of RDOs: The exploratory analyses with the manipulation check items indicate some correspondence between choices and whether participants focus on reducing danger or on increasing chances. In two of three scenarios, participants reporting that they focused on increasing chances were more likely to choose post-event RDOs; these patterns are in line with regulatory focus theory. Interestingly, the expected effect of regulatory focus was found in the Cerebral Disease and Tunnel scenarios but not in the Newts scenario. While in the Cerebral Disease task the person to be in likely danger is the respective participant, in the Tunnel task, participants imagined to be the responsible manager. In both scenarios the decision-makers were directly concerned with the outcome of a decision. In the Newts scenario participants imagined to be a member of a deciding committee. Responsibility for the decision was spread among committee members. Thus, no direct responsibility of the decision-maker and no direct affectedness by the decision were given. It could be assumed that regulatory focus is an important determinant of choices of pre- or post-event RDOs if the deciding persons are directly affected by their decisions, or highly engaged due to personal responsibility. In case of no direct personal consequences, regulatory focus could not be related to choices of different RDOs.

For future studies, we therefore suggest a two-sided approach: A strong manipulation of situational regulatory focus, and a thorough consideration of chosen scenarios regarding the direct affectedness of the individuals taking a decision and their engagement. Concerning scenarios, it seems plausible that regulatory focus – as a concept related to pursuing personal hedonistic goals – has more influence in situations that are related to such goals; i.e., situations that are personally relevant and engaging. Finally, it would be advisable to include a reliable measure for dispositional regulatory focus in future studies and assure that manipulation of situational regulatory focus corresponds to personal dispositions rather than operating against them which might erase or weaken effects of regulatory focus.

To summarize, the present studies provide additional evidence for the importance of detection probability for the choice of pre-event versus post-event RDOs. In spite of the strong theoretical arguments that regulatory focus should influence these choices,

the results provide only circumstantial evidence for an effect of regulatory focus. Future studies need to consider a strong manipulation and scenarios with a direct affectedness of decision-makers by their decisions to test the effect of regulatory focus on choices of pre-event versus post-event RDOs.

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Appendix A.

Example scenario

"Cerebral Disease"
For several weeks, you have suffered from dizziness and a disturbed sense of balance. A visit to the general practitioner did not solve the problem; therefore, you consulted a specialist in cerebral diseases. According to this specialist, you suffer from Berioencephalitis, which is a rare disease of the brain. Without treatment, it is lethal.
To treat Berioencephalitis, two reliable medications are available: SPINOX and LOFA. They cannot be taken in combination or in succession. The doctor advises to start with treatment as soon as possible. Which medication do you choose?

- Medication A: SPINOX
  As a potential side effect, SPINOX may damage a specific part of the brain, the spinocerebellum. Such a damage causes a slight paralysis of facial muscles for three months. This side effect can be reliably prevented by taking an additional drug, TREMOL, but in combination with SPINOX it causes severe headaches and nausea in the first weeks of treatment. TREMOL has to be taken preventative at the beginning of the treatment with SPINOX.
- Medication B: LOFA
  LOFA may damage nerve cells that are responsible for the functioning of the facial muscles which causes a slight paralysis of facial muscles for three months. This side effects of LOFA can be neutralized by taking an additional drug, RIGOLIN. The combination of the two drugs, however, causes severe headaches and nausea in the first weeks of treatment.
  A test has been developed to predict whether the paralysis caused by LOFA will occur. Only when this test predicts a paralysis, the doctor will prescribe RIGOLIN. RIGOLIN has then to be taken within 3 days to prevent the paralysis. The specialist tells you that the test detects a potential paralysis in 40 of 100 cases; in 60 of 100 cases, it does not.

Note: Translated from German. In this example, paralysis of facial muscles is the negative event; detectability is 40%. Taking SPINOX together with TREMOL is the action containing the pre-event RDO; taking LOFA, maybe together with RIGOLIN, is the action containing the post-event RDO.

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