

# The Effect of Abstract and Concrete Thinking on Risk-Taking Behavior in Women and Men

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## Abstract

Recent studies have demonstrated that participants with an abstract mind-set (high construal level [CL]) showed an increased risk affinity when compared with those with a concrete way of thinking (low CL). With regard to the importance of replicating research findings, we conducted a replication study and re-investigated the CL effect on risk-taking. Furthermore, we extended previous research by comparing experimental groups with a control group as well as by exploring effects of sex. The CL effect on risk-taking was as expected. However, risk-taking by the control group did not differ from that by the experimental groups. Both women and men took less risk after receiving concrete priming rather than abstract priming. However, men were generally more risk-seeking compared with women. Both effects (men being more risk-seeking than women and the CL effect) were successfully replicated.

## Keywords

construal level, thinking style, risk-taking, Balloon Analogue Risk Task, men and women, replication study

These days there is an ongoing debate regarding the replication problem of priming effects (see for instance, Cesario, 2014; Lerner, Streicher, Sachs, Raue, & Frey, 2016). Consequently, researchers are called upon to replicate research findings. This could be done by exact or conceptual replications, which comprise some variance (for instance, within the used measures or sample in comparison with the original study; Stroebe & Strack, 2014). Recently, Lerner, Streicher, Sachs, Raue, and Frey (2014) have shown that people's thinking style influences their risk-taking behavior. In particular, participant's mind-set/construal level (CL) influences their risk propensity; those that think abstractly showed an increased risk propensity compared with those with a concrete mind-set.

In their studies, Lerner and colleagues (2014) referred to construal level theory (CLT; Trope & Liberman, 2010), which states that the way people think about events or objects is subject to the perceived psychological distance ("the subjective experience that something is close or far away from self, here and now," Trope & Liberman, 2010, p. 440). The more distant (e.g., in time) a target is perceived, the more abstract the target representation becomes. Moreover, abstractly represented targets are perceived as more distant than concretely represented targets. One explanation why abstract thinking leads to more risk affinity compared with concrete thinking stems from a further CLT prediction:

Abstract thinking promotes sensitivity to desirability considerations (i.e., value of an end-state of an action: for instance, amount of money gained within a risky task), and concrete thinking promotes sensitivity to feasibility considerations (i.e., ease of achieving the end-state; Lerner et al., 2014; Raue, Streicher, Lerner, & Frey, 2015; Sagristano, Trope, & Liberman, 2002).

However, the research presented by Lerner et al. (2014) has two short comings, which we aim to address: First, the previous research had no control groups. The addition of a control group, with no mind-set manipulation, enables a direct comparison between the risk-taking behavior of participants who are abstract or concrete primed with those whose mind-sets are not externally influenced. To do this, the following hypotheses were formulated:

**Hypothesis 1:** Abstract thinking will result in more risk-taking behavior than concrete thinking.

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**Hypothesis 2:** Risk-taking behavior of participants without mind-set manipulation differs significantly from the behavior of participants who receive mind-set manipulation.

Second, there was a surplus of women to men in the studies by Lerner et al. (2014). This raises the question whether CL effect could be sex-independent and, as such, potentially introduce a bias to the results. Previous research has shown that men take more risks than women (for an overview, see Byrnes, Miller, & Schafer, 1999). However, in the absence of other published studies that show differences in CL effects between the sexes, we propose that the differences in risk-taking between the sexes is constant across different mind-sets. To explore this notion, the following hypotheses were formulated:

**Hypothesis 3:** Male participants show more risk-taking behavior than female participants irrespective of the mind-set.

**Hypothesis 4:** There is no relationship between CL and sex in risk-taking behavior.

To investigate our hypotheses, we experimentally tested the impact of CL on risk-taking behavior via CL priming and a risk-taking task used by Lerner et al. (2014).

The present study is a replication of the CL effect and extends previous research by addressing two short comings: adding a control group and a gender-balanced sample.

## Study

### Method

Students (93 women, 90 men,  $M_{age} = 23.76$ ,  $SD_{age} = 6.23$ ) were recruited on university campus to take part in the study in exchange for course credit. Participants were assigned to a 3 (CL condition: concrete vs. control vs. abstract; randomly assigned)  $\times$  2 (sex: female vs. male; equally assigned) design. The experimental groups received either abstract or concrete mind-set/CL priming whereas the control group received no priming. A why-versus-how task (identically to the priming used by Lerner et al., 2014, in their Studies 3-5; adapted from Freitas, Gollwitzer, & Trope, 2004; Wakslak & Trope, 2009; for an overview, see Burgoon, Henderson, & Markman, 2013) was used as CL manipulation. In the abstract condition, participants answered six why-questions (e.g., “Why do people take part in competitions?”) by considering the underlying reasons for, and purposes of, an action. In the concrete condition, participants answered six how-questions (e.g., “How to prepare for an exam?”) by considering the way an action is carried out.

Participants’ risk-taking behavior was measured using the Balloon Analogue Risk Task (BART; adapted from Lejuez et al., 2002). Previous studies have shown that the BART is a reliable measurement of risk-taking propensity (Lejuez,

Aklin, Zvolensky, & Pedulla, 2003). In this task, participants receive 30 computer-simulated balloons, which they can inflate by clicking a “pump” button (with each click the balloon inflates and the participants receive a virtual 5¢). The money accumulates until either the participant decides to finish the round and save the accumulated money by pressing the *collect* button, or until the balloon bursts (due to too many pumps), which leads to a total loss of the accumulated money for that balloon. The aim of the BART is to collect as much money as possible.

Participants were not informed as to how many pumps would burst a balloon. The number of pumps required to burst the balloons was random but constant across participants.

### Results

Two risk-taking indicators of the BART-data were calculated following the recommendation of Lejuez et al. (2002): mean number of pumps per balloon that did not burst (*mean clicks*) and total number of burst balloons (*bursts*). In addition, and in line with Lerner et al. (2014), a risk index of the z-standardized means of both measures was calculated (cf. Hiemer & Abele, 2012) as these indicators were sufficiently highly correlated,  $r = .656$ ,  $p < .001$ .

Results of 3 (CL condition: concrete vs. control vs. abstract)  $\times$  2 (sex: female vs. male) ANOVAs revealed no significant main effect for CL on *mean clicks*,  $F(2, 182) = 2.189$ ,  $p = .115$ ,  $\eta^2 = .024$ , but marginally significant main effects on *bursts*,  $F(2, 182) = 2.79$ ,  $p = .064$ ,  $\eta^2 = .031$ , and risk index,  $F(2, 182) = 3.03$ ,  $p = .051$ ,  $\eta^2 = .033$ . Mean values indicate that concrete thinkers have a lower, and abstract thinkers a higher, risk propensity (Table 1). Post hoc tests (Fisher’s least significant difference; LSD) revealed that abstract and concrete thinkers differed significantly in their risk-taking behavior across all indicators (*mean clicks*,  $p = .038$ ; *bursts*,  $p = .019$ ; risk index,  $p = .015$ ). Thus, the findings of Lerner et al. (2014) were replicated and Hypothesis 1 confirmed.

There were no significant differences in risk-taking between the control group and the experimental groups, although, descriptively, the differences in risky behavior were as expected.<sup>1</sup> Therefore, based on the results to this study, we cannot conclude that the experimental group of abstract/concrete thinkers took more or less risks than the control group of nonprimed participants. Thus, Hypothesis 2 could not be confirmed.

In the ANOVA tests, the influence of the participant’s sex on risk-taking behavior showed significant main effects in that men took more risk in the BART than women on *mean clicks*,  $F(1, 182) = 9.94$ ,  $p = .002$ ,  $\eta^2 = .053$ ; *bursts*,  $F(1, 182) = 5.17$ ,  $p = .024$ ,  $\eta^2 = .028$ ; as well as for the risk index,  $F(1, 182) = 9.00$ ,  $p = .003$ ,  $\eta^2 = .048$ . However, this influence was smaller in the experimental groups than in the control group across the three different CL conditions. In the control condition, males took significantly more risks than females on

**Table 1.** Risk Behavior by Condition.

	Mind-set			CL effect-size (concrete vs. abstract)
	Concrete ( <i>n</i> = 60)	Control ( <i>n</i> = 65)	Abstract ( <i>n</i> = 58)	
Risk-taking	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>D</i>
Mean clicks	11.28 <sub>a</sub> (5.96)	12.46 (6.18)	13.69 <sub>b</sub> (6.98)	.375
Men ( <i>n</i> = 90)	12.43 <sub>a</sub> (7.00)	14.19 (7.03)	15.28 (8.58)	.371
Women ( <i>n</i> = 93)	10.14 (4.53)	10.89 (4.88)	12.11 (4.51)	.443
Bursts	7.70 <sub>a</sub> (3.09)	8.23 (2.66)	8.89 <sub>b</sub> (2.52)	.425
Men	8.13 <sub>a</sub> (3.50)	8.87 (2.97)	9.24 (2.68)	.361
Women	7.26 <sub>a</sub> (2.61)	7.64 (2.22)	8.55 <sub>b</sub> (2.35)	.528
Risk Index	-0.19 <sub>a</sub> (0.93)	-0.00 (0.88)	0.20 <sub>b</sub> (0.88)	.434
Men	-0.02 (1.08)	0.24 (1.02)	0.39 (1.04)	.393
Women	-0.36 <sub>a</sub> (0.74)	-0.23 (0.66)	0.02 <sub>b</sub> (0.65)	.554

Note. Means with differing subscripts within rows are significantly different at  $p < .05$  (based on Fisher's LSD post hoc paired comparisons). CL = construal level.

mean clicks,  $F(1, 64) = 4.88, p = .031, \eta^2 = .072$ , as well as on the risk index,  $F(1, 64) = 4.99, p = .029, \eta^2 = .072$ , and the results were marginally significant on *bursts*,  $F(1, 64) = 3.56, p = .064, \eta^2 = .054$ . However, although the mean values for participants in the concrete condition indicated that male participants took more risks than female participants, the main effect of sex was not significant for *mean clicks*,  $F(1, 59) = 2.27, p = .137, \eta^2 = .038$ ; *bursts*,  $F(1, 59) = 1.18, p = .282, \eta^2 = .020$ ; or risk index,  $F(1, 59) = 1.93, p = .169, \eta^2 = .032$ .

A similar relationship was found in the abstract condition; means indicated that men took more risks than women, but ANOVAs' results showed only a marginally significant main effect on *mean clicks*,  $F(1, 57) = 3.09, p = .084, \eta^2 = .052$ , and no significant main effect on *bursts*,  $F(1, 57) = 1.08, p = .302, \eta^2 = .019$ , and risk index,  $F(1, 57) = 2.62, p = .111, \eta^2 = .045$ . Thus, Hypothesis 3, that is, male participants show more risk-taking behavior than female participants irrespective of the mind-set, could not be confirmed for an abstract mind-set. Means indicated that male participants showed higher risk propensity across all conditions. However, the difference between sexes was strongest in the control condition, as effect sizes showed, but not significant in both experimental conditions.

There were no interaction effects of sex and CL across all indicators,  $ps > .859$ . Thus, abstract mind-set manipulation seemed to increase, and concrete mind-set manipulation seemed to decrease risk-taking behavior in both women and men. Furthermore, results indicate that both abstract and concrete thinking reduces the sex difference in risk-taking behavior in comparison with the control condition. These results confirm Hypothesis 4, in that there is no relationship between CL and sex on risk-taking behavior (see Table 1).

## Discussion

The present research is a successful replication study of the CL effect. Although replications are of enormous importance,

they are not very popular with researchers. One reason might be that replications often are perceived as not very interesting and less informative than new findings, especially when the investigated effect is not a prominent one. This leads to the question of what is high in replication value and who decides on that? Given the under-representation of replication studies, literature proves that despite the so-called "replication crisis" in psychology, these studies have difficulties to find their way to relevant scientific journals.

Results of the present study showed that adapting concrete thinking leads to lower risk-taking than abstract thinking (cf. Lermer et al., 2014). Furthermore, the present research extends previous findings: First, it cannot be concluded that abstract or concrete thinking either increases or decreases risk-taking behavior per se. The degree of risk-taking behavior was descriptively as expected for the experimental groups' risk propensity (lower risk-taking by abstract thinkers and higher risk-taking by concrete thinkers), but the differences between the control condition and the experimental conditions were not significant. In other words, the CL effect was only found in the comparison of abstract and concrete thinkers, and not to the comparison of participants who did not receive a mind-set manipulation (i.e., control), with those who received an abstract or concrete mind-set manipulation.

Second, results support the empirically well-replicated findings that men take more risks than women. However, the present research also shows that this difference between the sexes is reduced when participants adopt an abstract or concrete mind-set. Differences in risk-taking between the sexes were not significant when participants received an abstract or concrete mind-set manipulation (however, the descriptive difference remained in the expected direction). Effect sizes revealed that differences in the behavior of the sexes were strongest for participants with no mind-set manipulation. One explanation for the reduced effect in the experimental

conditions might be due to floor and/or ceiling effects, in that, we assume that the CL impact on risk-taking in the BART is limited to certain degrees of risk aversion and risk affinity.

In conclusion, our results empirically support the CL effect on risk behavior as reported by Lerner and colleagues (2014): Abstract, rather than concrete, thinking increases risk-taking behavior. Moreover, the general influence of CL priming on risk behavior seems to be similar in men and women. However, results indicate that typical differences in risk behavior between the sexes are reduced when participants have adopted an abstract or concrete mind-set.

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### Note

1. Contrast analyses led to same results.

### References

- Burgoon, E. M., Henderson, M. D., & Markman, A. B. (2013). There are many ways to see the forest for the trees: A tour guide for abstraction. *Perspectives on Psychological Science*, 8, 501-520. doi:10.1177/1745691613497964
- Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125, 367-383. doi:10.1037//0033-2909.125.3.367
- Cesario, J. (2014). Priming, replication, and the hardest science. *Perspectives on Psychological Science*, 9(1), 40-48. doi:10.1177/1745691613513470
- Freitas, A. L., Gollwitzer, P., & Trope, Y. (2004). The influence of abstract and concrete mindsets on anticipating and guiding others' self-regulatory efforts. *Journal of Experimental Social Psychology*, 40, 739-752. doi:10.1016/j.jesp.2004.04.003
- Hiemer, J., & Abele, A. E. (2012). High power = Motivation? Low power = Situation? The impact of power, power stability and power motivation on risk-taking. *Personality and Individual Differences*, 53, 486-490. doi:10.1016/j.paid.2012.04.008
- Lejuez, C. W., Aklin, W., Zvolensky, M., & Pedulla, C. (2003). Evaluation of the Balloon Analogue Risk Task (BART) as a predictor of adolescent real-world risk-taking behaviours. *Journal of Adolescence*, 26, 475-479. doi:10.1016/S0140-1971(03)00036-8
- Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., & Brown, R. (2002). Evaluation of a behavioral measure of risk taking: The Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology Applied*, 8(2), 75-84. doi:10.1037//1076-898X.8.2.75
- Lerner, E., Streicher, B., Sachs, R., Raue, M., & Frey, D. (2014). The effect of construal level on risk-taking. *European Journal of Social Psychology*, 45, 99-109. doi:10.1002/ejsp.2067
- Lerner, E., Streicher, B., Sachs, R., Raue, M., & Frey, D. (2016). Thinking concretely increases the perceived likelihood of risks: The effect of construal level on risk estimation. *Risk Analysis*, 36, 623-637. doi:10.1111/risa.12445
- Raue, M., Streicher, B., Lerner, E., & Frey, D. (2015). How far does it feel? Construal level and decisions under risk. *Journal of Applied Research in Memory and Cognition*, 4, 256-264. doi:10.1016/j.jarmac.2014.09.005
- Sagristano, M. D., Trope, Y., & Liberman, N. (2002). Time-dependent gambling: Odds now, money later. *Journal of Experimental Psychology General*, 131, 364-376. doi:10.1037//0096-3445.131.3.364
- Stroebe, W., & Strack, F. (2014). The alleged crisis and the illusion of exact replication. *Perspectives on Psychological Science*, 9, 59-71. doi:10.1177/1745691613514450
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, 117, 440-463. doi:10.1037/a0018963
- Wakslak, C., & Trope, Y. (2009). The effect of construal level on subjective probability estimates. *Psychological Science*, 20, 52-58. doi:10.1111/j.1467-9280.2008.02250.x

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