Supplemental Materials:

Attitudinal Effects of Stimulus Co-occurrence and Stimulus Relations:

Range and Limits of Intentional Control

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Experiment 1

Manipulation Checks

In line with the intended effect of the task-instruction manipulation, participants in the control-instructions condition reported a significantly stronger motivation to avoid being influenced by mere pairings than participants in the standard-instructions condition (*M*s = 4.70 vs. 3.58, respectively), $t(410) = 6.89$, $p < .001$, $d = 0.68$. However, participants in the two groups did not significantly differ in terms of their motivation to form impressions in line with the depicted causal relations (*M*s = 4.87 vs. 4.78, respectively), $t(410) = 0.64$, $p = .523$, $d = 0.06$.

ANOVA Results

The choice data were aggregated by calculating the relative proportions of *yes* vs. *no* responses for each of the four categories of CSs within each of the two Task Instructions conditions. Mean proportions and 95% confidence intervals of responses to the four kinds of stimuli in the two task-instruction conditions are presented in Table S1. Submitted to a 2 (US Valence) × 2 (CS-US Relation) × 2 (Task Instructions) mixed ANOVA, choice scores revealed a significant main effect of US Valence, $F(1, 410) = 72.06$, $p < .001$, $\eta_G^2 = .149$, and a significant main effect of CS-US Relation, $F(1, 410) = 5.20$, $p = .023$, $\eta_G^2 = .013$, which were qualified by a significant two-way interaction between US Valence and CS-US Relation, $F(1, 410) = 182.83$, $p < .001$, $\eta_G^2 = .308$. Post-hoc tests showed that, when the CSs were described as causing the USs, CSs paired with positive USs were chosen more frequently than CSs paired with negative USs, $t(411) = 15.10$, $p < .001$, $d = 0.744$. Conversely, when the CSs were described as preventing the USs, CSs paired with positive USs were chosen less frequently than CSs paired with negative USs, $t(411) = -6.37$, $p < .001$, $d = 0.314$. Moreover, when the CSs were paired with positive USs, CSs that were described as causing the USs were chosen more frequently than CSs that were

described as preventing the USs, $t(411) = 12.12$, $p < .001$, $d = 0.596$. Conversely, when the CSs were paired with negative USs, CSs that were described as causing the USs were chosen less frequently than CSs that were described as preventing the USs, $t(411) = -10.53$, $p < .001$, $d = 0.519$. The three-way interaction between US Valence, CS-US Relation, and Task Instructions was not statistically significant, $F(1, 410) = 1.61$, $p = .206$, $\eta_G^2 = .004$.

RCB Model

The RCB model was fit to the data with the three parameters varying freely across task-instructions conditions, $G^2(2) = 7.83$, $p = .020$, $w = .023$. This model was used as a baseline for tests whether the three model parameters are significantly different across task-instructions conditions. The analyses revealed a significant effect of Task Instructions on the *R* parameter (see Figure S1), $\Delta G^2(1) = 5.03$, $p = .025$, $w = .018$, indicating that relational information had a greater impact on participants' choices in the control-instructions condition compared to the standard-instructions condition. There were no significant effects of Task Instructions on the *C* parameter (see Figure S1), $\Delta G^2(1) = 2.34$, $p = .126$, $w = .013$, and the *B* parameter (see Figure S1), $\Delta G^2(1) = 0.46$, $p = .499$, $w = .006$.

Experiment 2

Manipulation Checks

Replicating the asymmetric effects of Task Instructions on self-reported motivations in Experiment 1, participants in the control-instructions condition reported a significantly stronger motivation to avoid being influenced by mere pairings than participants in the standard-instructions condition (*M*s = 5.52 vs. 3.77, respectively), $t(378) = 8.97$, $p < .001$, $d = 0.92$. However, participants in the two groups did not significantly differ in terms of their motivation

to form impressions in line with the depicted causal relations (*M*s = 5.70 vs. 5.85, respectively), $t(378) = 1.06$, $p = .289$, $d = 0.11$.

ANOVA Results

The choice data were aggregated In line with the procedures in Experiment 1. Mean proportions and 95% confidence intervals of responses to the four kinds of stimuli in the two task-instruction conditions are presented in Table S1. Submitted to a 2 (US Valence) × 2 (CS-US Relation) × 2 (Task Instructions) mixed ANOVA, choice scores revealed a significant main effect of US Valence, $F(1, 378) = 20.28$, $p < .001$, $\eta_G^2 = .051$, a significant main effect of Task Instructions, $F(1, 378) = 4.23$, $p = .040$, $\eta_G^2 = .011$, and a significant two-way interaction between US Valence and CS-US Relation, $F(1, 378) = 49.37$, $p < .001$, $\eta_G^2 = .116$. Post-hoc tests showed that, when the CSs were described as causing the USs, CSs paired with positive USs were chosen more frequently than CSs paired with negative USs, $t(379) = 7.32$, $p < .001$, $d = 0.375$. Conversely, when the CSs were described as preventing the USs, CSs paired with positive USs were chosen less frequently than CSs paired with negative USs, $t(379) = -1.86$, $p = .064$, $d = 0.095$. Moreover, when the CSs were paired with positive USs, CSs that were described as causing the USs were chosen more frequently than CSs that were described as preventing the USs, $t(379) = 5.61$, $p < .001$, $d = 0.288$. Conversely, when the CSs were paired with negative USs, CSs that were described as causing the USs were chosen less frequently than CSs that were described as preventing the USs, $t(379) = -6.08$, $p < .001$, $d = 0.312$. The three-way interaction between US Valence, CS-US Relation, and Task Instructions was not statistically significant, $F(1, 378) = 0.84$, $p = .360$, $\eta_G^2 = .002$.

RCB Model

The RCB model fit the data well with the three parameters varying freely across task-instructions conditions, $G^2(2) = 0.17$, $p = .921$, $w = .004$. Further analyses revealed a significant effect of Task Instructions on the *B* parameter (see Figure S2), $\Delta G^2(1) = 16.77$, $p < .001$, $w = .037$, indicating that participants in the standard-instructions condition had a stronger response bias to reject the products than participants in the control-instructions condition. There were no significant effects of Task Instructions on the *C* parameter (see Figure S2), $\Delta G^2(1) = 0.54$, $p = .462$, $w = .007$, and the *R* parameter (see Figure S2), $\Delta G^2(1) = 1.75$, $p = .186$, $w = .012$.

Experiment 3

Manipulation Checks

Replicating the asymmetric effects of Task Instructions on self-reported motivations in Experiments 1 and 2, participants in the control-instructions condition reported a significantly stronger motivation to avoid being influenced by mere pairings than participants in the standard-instructions condition (*M*s = 5.49 vs. 4.03), $t(360) = 7.62$, $p < .001$, $d = 0.80$. However, participants in the two groups did not significantly differ in terms of their motivation to form impressions in line with the depicted causal relations (*M*s = 5.74 vs. 5.86), $t(360) = 0.82$, $p = .412$, $d = 0.09$.

ANOVA Results

The choice data were aggregated in line with the procedures in Experiments 1 and 2. Mean proportions and 95% confidence intervals of responses to the four kinds of stimuli in the two task-instruction conditions are presented in Table S1. Submitted to a 2 (US Valence) × 2 (CS-US Relation) × 2 (Task Instructions) mixed ANOVA, choice scores revealed a significant main effect of US Valence, $F(1, 360) = 9.76$, $p = .002$, $\eta_G^2 = .026$, a significant main effect of

Task Instructions, $F(1, 360) = 8.71$, $p = .003$, $\eta_G^2 = .024$, and a significant two-way interaction between US Valence and CS-US Relation, $F(1, 360) = 45.22$, $p < .001$, $\eta_G^2 = .112$. Post-hoc tests showed that, when the CSs were described as causing the USs, CSs paired with positive USs were chosen more frequently than CSs paired with negative USs, $t(361) = 6.71$, $p < .001$, $d = 0.353$. Conversely, when the CSs were described as preventing the USs, CSs paired with positive USs were chosen less frequently than CSs paired with negative USs, $t(361) = -2.46$, $p = .014$, $d = 0.129$. Moreover, when the CSs were paired with positive USs, CSs that were described as causing the USs were chosen more frequently than CSs that were described as preventing the USs, $t(361) = 5.89$, $p < .001$, $d = 0.294$. Conversely, when the CSs were paired with negative USs, CSs that were described as causing the USs were chosen less frequently than CSs that were described as preventing the USs, $t(361) = -5.58$, $p < .001$, $d = 0.293$. The three-way interaction between US Valence, CS-US Relation, and Task Instructions was not statistically significant, $F(1, 360) = 1.42$, $p = .234$, $\eta_G^2 = .004$.

RCB Model

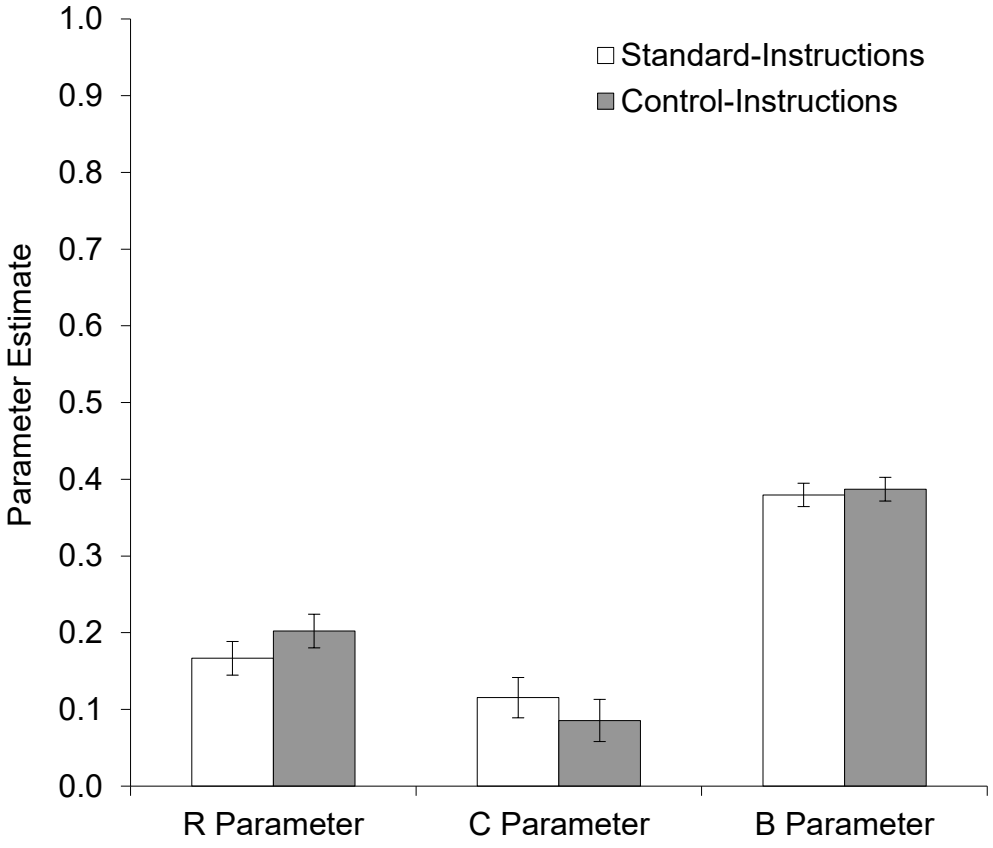
The RCB model fit the data well with the three parameters varying freely across task-instructions conditions, $G^2(2) = 1.98$, $p = .371$, $w = .013$. Further analyses revealed a significant effect of Task Instructions on the *B* parameter (see Figure S3), $\Delta G^2(1) = 39.41$, $p < .001$, $w = .058$, indicating that participants in the standard-instructions condition had a response bias to reject the products whereas participants in the control-instructions had a response bias to accept the products. More importantly, there was a significant effect of Task Instructions on the *R* parameter (see Figure S3), $\Delta G^2(1) = 4.35$, $p = .037$, $w = .019$, indicating that relational information had a greater impact on participants' choices in the control-instructions condition compared to the standard-instructions condition. The *C* parameter showed a marginal effect of

Task Instructions in a direction that was opposite to the instructions (see Figure S3), $\Delta G^2(1) = 3.02$, $p = .082$, $w = .016$, in that mere occurrence tended to have a greater impact on participants' choices in the control-instructions condition compared to the standard-instructions condition.

Table S1. Mean proportions and 95% confidence intervals of choice responses (yes vs. no) as a function of valence of co-occurring stimulus (positive vs. negative) and relation to co-occurring stimulus (stimulus causes vs. prevents co-occurring stimulus).

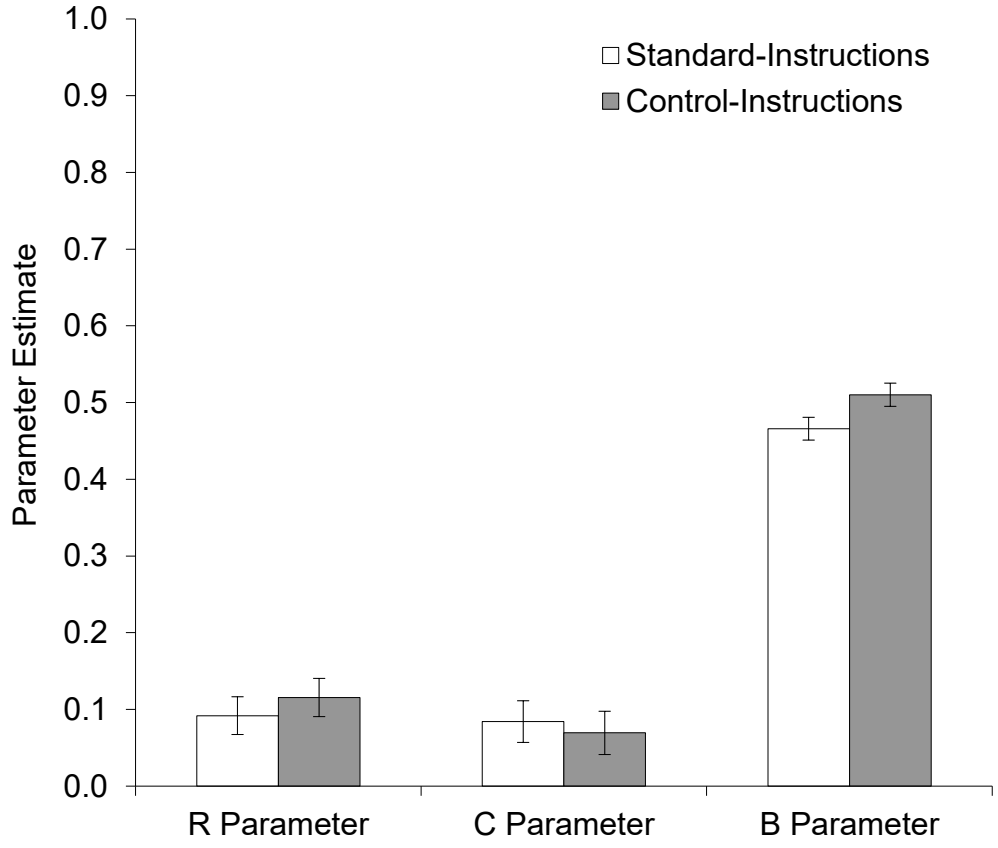
	Positive Co-Occurring Stimulus				Negative Co-Occurring Stimulus			
	Stimulus Causes Co-Occurring Stimulus		Stimulus Prevents Co-Occurring Stimulus		Stimulus Causes Co-Occurring Stimulus		Stimulus Prevents Co-Occurring Stimulus	
	M	95% CI	*M*	95% CI	*M*	95% CI	*M*	95% CI
Experiment 1								
standard-instructions	.558	[.523, .594]	.361	[.329, .393]	.293	[.262, .323]	.431	[.396, .466]
control-instructions	.559	[.523, .595]	.345	[.313, .378]	.287	[.257, .318]	.479	[.444, .514]
Experiment 2								
standard-instructions	.555	[.512, .597]	.469	[.429, .509]	.387	[.344, .429]	.480	[.440, .521]
control-instructions	.599	[.555, .642]	.483	[.443, .524]	.422	[.379, .465]	.451	[.500, .582]
Experiment 3								
standard-instructions	.539	[.498, .580]	.448	[.405, .491]	.428	[.384, .473]	.497	[.456, .538]
control-instructions	.620	[.578, .661]	.520	[.476, .564]	.442	[.397, .488]	.571	[.530, .613]

Figure S1. Parameter estimates without model restrictions as a function of instructions (standard-instructions vs. control-instructions), Experiment 1.



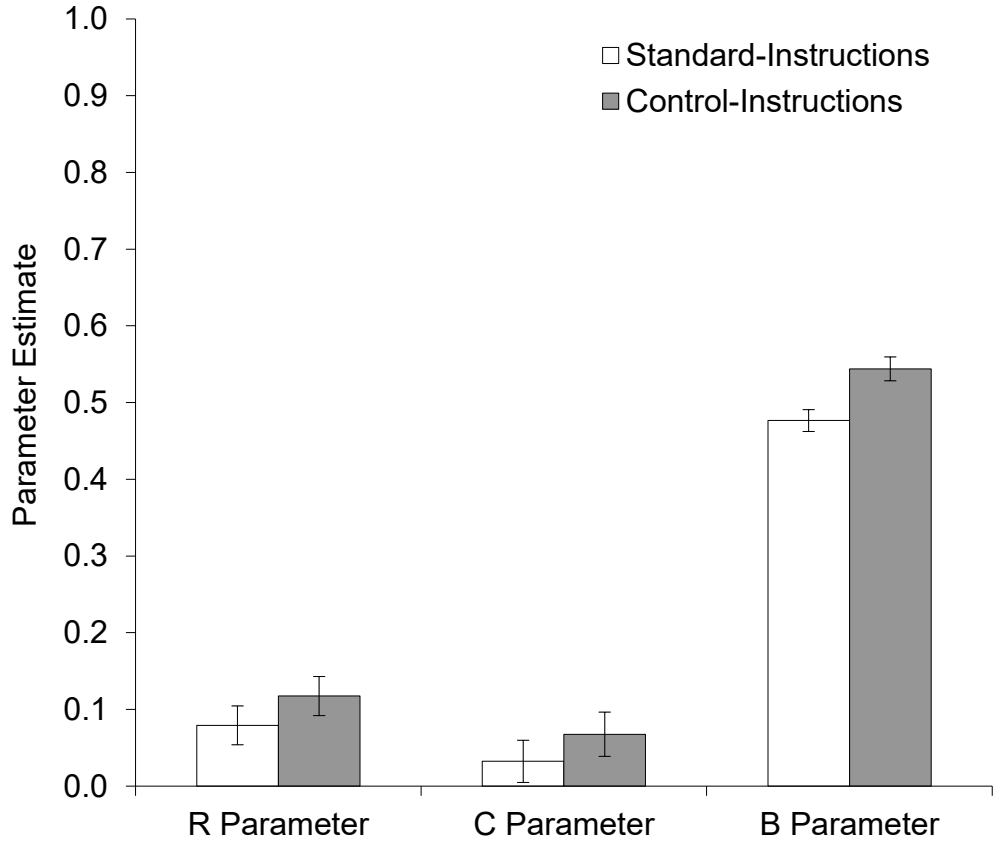
Note. The *R* parameter captures effects of stimulus relations; the *C* parameter captures effects of stimulus co-occurrence; the *B* parameter captures general response biases. The neutral reference point for *R* and *C* is 0; the neutral reference point for *B* is 0.5, with scores higher than 0.5 reflecting a general bias toward positive responses and scores lower than 0.5 reflecting a general bias toward negative responses. Error bars depict 95% confidence intervals.

Figure S2. Parameter estimates without model restrictions as a function of instructions (standard-instructions vs. control-instructions), Experiment 2.



Note. The *R* parameter captures effects of stimulus relations; the *C* parameter captures effects of stimulus co-occurrence; the *B* parameter captures general response biases. The neutral reference point for *R* and *C* is 0; the neutral reference point for *B* is 0.5, with scores higher than 0.5 reflecting a general bias toward positive responses and scores lower than 0.5 reflecting a general bias toward negative responses. Error bars depict 95% confidence intervals.

Figure S3. Parameter estimates without model restrictions as a function of instructions (standard-instructions vs. control-instructions), Experiment 3.



Note. The *R* parameter captures effects of stimulus relations; the *C* parameter captures effects of stimulus co-occurrence; the *B* parameter captures general response biases. The neutral reference point for *R* and *C* is 0; the neutral reference point for *B* is 0.5, with scores higher than 0.5 reflecting a general bias toward positive responses and scores lower than 0.5 reflecting a general bias toward negative responses. Error bars depict 95% confidence intervals.