Something from nothing: Agency for deliberate nonactions

Supplementary Material

Content

Supplementary Analyses

  Responsibility ratings of Exp. 1

Supplementary Figures

  Figure S1: Trial procedure in Experiment 1
  Figure S2: Mean responsibility ratings by condition
  Figure S3: Trial procedure in Experiment 3a and 3b

Supplementary Tables

  Table S1: Descriptive statistics for Experiment 1
  Table S2: Bivariate correlations for Experiment 1 (agency)
  Table S3: Bivariate correlations for Experiment 1 (responsibility)
  Table S4: Descriptive statistics for Experiment 2
  Table S5: Descriptive statistics for Experiment 3a
  Table S6: Descriptive statistics for Experiment 3b

Supplementary Analyses: Responsibility ratings

Experiment 1: Responsibility ratings

Responsibility ratings in Experiment revealed that participants felt more responsible for free choice compared to forced choice actions and nonactions, $F(1, 32) = 81.52$, $p < .001$, $\eta_p^2 = 0.72$. Furthermore, participants felt more responsible for actions compared to nonactions, $F(1, 32) = 36.83$, $p < .001$, $\eta_p^2 = 0.54$. Descriptive data (see Table S1) suggested that the difference in responsibility ratings between actions and nonactions was smaller for free choice compared to forced choice responses, even though the interaction was not significant, $F(1,32) = 3.97$, $p = .055$, $\eta_p^2 = 0.11$. Similarly to the agency ratings, responsibility ratings for free nonactions were strongly correlated with those of free actions, $r = .654$, $p < .001$, whereas ratings of free and forced choice actions were not correlated, $r = -.144$, $p = .424$ (see Table S3).
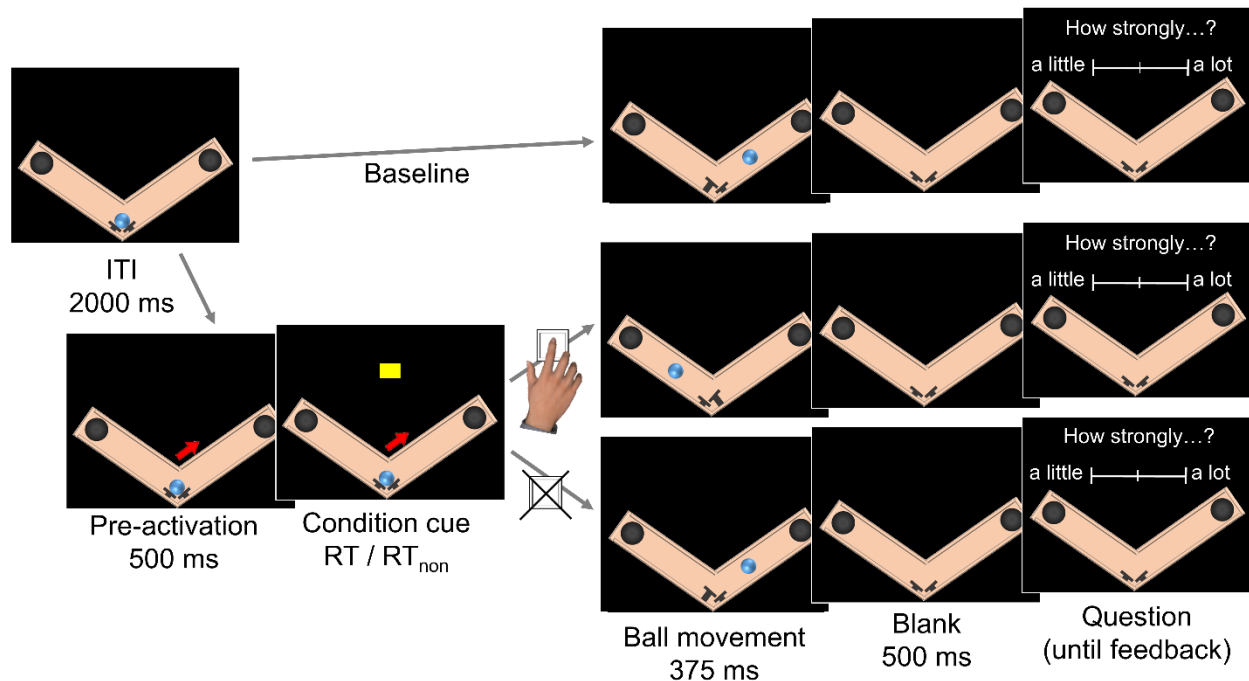
Fig. S1.

Trial procedure in Experiment 1. Each trial started with the display of a V-shaped pinball machine and the ball in rest (top left picture). In the ***baseline*** condition (top row), the ball was then launched into the left or right direction and participants had no opportunity to influence the ball direction. In all other conditions, an arrow was displayed after trial start, signifying the pre-activated direction. Then, a colored rectangle indicated participant's task in the current trial. A yellow rectangle indicated that participants could choose between pressing a key and not pressing a key (***free action*** or ***free nonaction***). A green rectangle triggered participants to press a key (***forced action***), a red rectangle triggered participants not to press a key (***forced nonaction***). If participants did not press a key, the ball was launched into the pre-activated direction. Pressing a key changed the direction and the ball was launched into the opposite direction. In some trials, the agency or the responsibility question was presented to the participants after the ball movement. For all other trials, the question was not displayed and the trial ended after the ball movement. Stimuli are not drawn to scale to increase legibility.
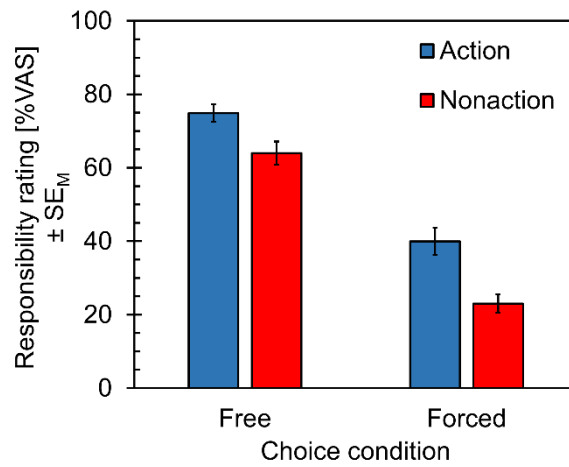
Fig. S2.

Mean responsibility ratings in Experiment 1 on a visual analog scale (VAS) as a function of choice condition (free vs. forced) and response type (action vs. nonaction). Error bars indicate standard errors of the mean (SE_M).
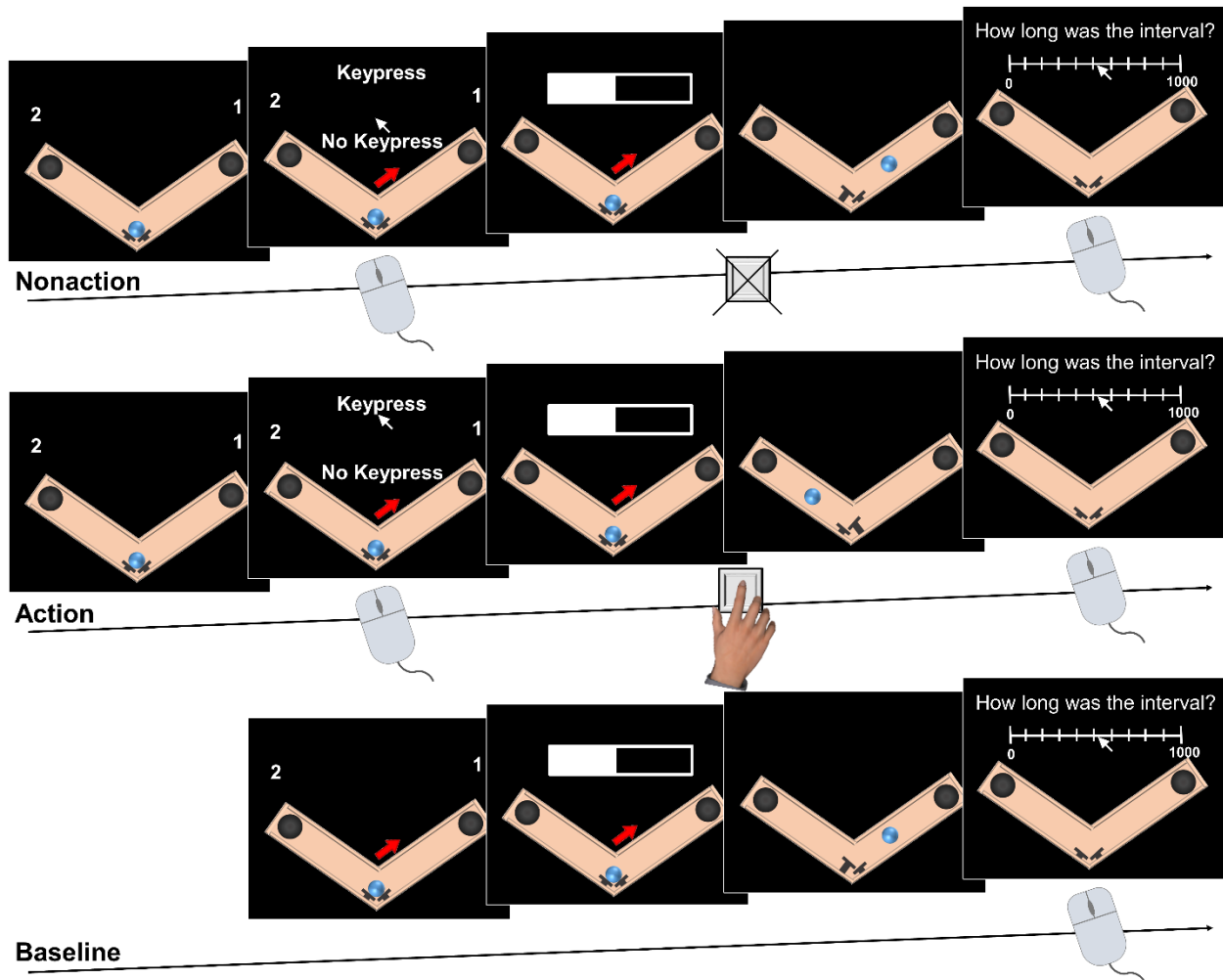
Fig. S3.

Trial procedure in Experiment 3a and 3b. Each trial started with the display of a V-shaped pinball machine, the ball in rest and the number of shots to the left and right within a block, displayed above the respective pinball arms. Then, an arrow was displayed signifying the pre-activated direction and participants could choose between a keypress and no keypress using the mouse. After their selection, a progress bar appeared. When the progress bar was filled completely, the ball was shot into the pre-activated direction after a certain delay, if participants had chosen no keypress (nonaction, top row). If participants had chosen the keypress, they could press the key any time after the progress bar was filled completely, causing the ball to be shot in the opposite direction after a certain delay (action, middle row). In the baseline condition (bottom row), participants could not choose between a keypress and no keypress. The progress bar started automatically and when it was filled completely, the ball was shot in the pre-activated direction after a certain delay. After the ball movement, participants indicated their estimation of the delay on a visual analog scale. In one out of four trials, the time estimation question was replaced by the agency question. Stimuli are not drawn to scale.

Table S1. Mean agency ratings and responsibility ratings on the visual analogue scale (in %VAS) and the respective standard errors of the mean (*SE*) in Experiment 1 as a function of action type and choice.

	Free		Forced		Baseline
	Action	**Nonaction**	**Action**	**Nonaction**	
Agency Question					
Mean Rating	76.5	57.7	46.8	17.9	16.0
(*SE*)	(2.5)	(3.7)	(3.8)	(2.2)	(2.6)
Responsibility Question					
Mean Rating	74.9	64.0	40.0	23.0	-
(*SE*)	(2.4)	(3.1)	(3.7)	(2.5)	

Table S2. Bivariate correlations of the mean agency ratings as a function of action type and choice in Experiment 1 across participants. The upper diagonal lists correlation coefficients, the lower diagonal gives the corresponding *p*-values.

	Free Action	Free Nonaction	Forced Action	Forced Nonaction
Free Action		.754	.384	.457
Free Nonaction	< .001		-.034	.440
Forced Action	.027	.850		.615
Forced Nonaction	.008	.010	< .001	

Table S3. Bivariate correlations of the mean responsibility ratings as a function of action type and choice in Experiment 1 across participants. The upper diagonal lists correlation coefficients, the lower diagonal gives the corresponding *p*-values.

	Free Action	Free Nonaction	Forced Action	Forced Nonaction
Free Action		.654	-.144	-.298
Free Nonaction	< .001		-.295	-.131
Forced Action	.424	.095		.564
Forced Nonaction	.092	.468	.001	

Table S4. Mean agency ratings on the visual analogue scale (in %VAS) and mean time estimation error (in ms; computed as the participant's estimation of tone presentation minus actual time of tone presentation) in Experiment 2 for actions, nonactions and the baseline condition with the respective standard errors of the mean (*SE*).

	Action	Nonaction	Baseline
Agency Rating	83.9	19.9	3.4
(*SE*)	(20.2)	(23.5)	(6.3)
Estimation error	-59.3	-9.0	13.7
(*SE*)	(16.8)	(9.6)	(8.2)

Table S5. Mean agency ratings on the visual analogue scale (in %VAS) and mean interval estimates (in ms) in Experiment 3a for actions, nonactions and the baseline condition with the respective standard errors of the mean (*SE*).

	Action-effect delay	Action	Nonaction	Baseline
Agency Rating (*SE*)	100	73.9	50.6	16.1
		(4.6)	(4.6)	(4.5)
	400	73.2	50.0	13.6
		(5.2)	(4.3)	(3.6)
	700	70.6	44.4	15.1
		(4.9)	(4.4)	(6.3)
Interval estimate (*SE*)	100	330	315	311
		(37.3)	(28.0)	(28.0)
	400	437	465	498
		(29.6)	(20.4)	(20.8)
	700	540	627	644
		(24.4)	(26.4)	(24.1)

Table S6. Mean agency ratings on the visual analogue scale (in %VAS) and mean interval estimates (in ms) in Experiment 3b for actions, nonactions and the baseline condition with the respective standard errors of the mean (*SE*).

	Action-effect delay	Action	Nonaction	Baseline
Agency Rating (*SE*)	300	77.6	39.1	13.1
		(3.1)	(4.3)	(3.3)
	500	72.2	38.1	12.8
		(3.5)	(4.8)	(2.8)
	700	72.1	37.1	13.4
		(3.2)	(4.0)	(3.0)
Interval estimate (*SE*)	300	344	331	329
		(22.7)	(16.1)	(13.8)
	500	428	455	474
		(24.1)	(19.1)	(13.1)
	700	484	565	608
		(26.0)	(22.3)	(24.4)