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Replication

The role of action simulation on intentions to purchase products☆

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ABSTRACT

Previous research suggested that consumers' intentions to purchase products are increased when the product's depiction affords an action with the dominant hand than with the non-dominant hand. In eight experiments the authors obtained no evidence that consumers have higher intentions to buy products that are shown oriented towards their dominant hand than towards their non-dominant hand. The absence of a dominant hand advantage questions the role of action simulations in consumers' evaluations of visually depicted products.

Are people more likely to buy a product that looks easy to grasp than one that looks more difficult to grasp? Elder and Krishna (2012) found that participants reported higher intentions to purchase a visually depicted product if the graspable part of the product was oriented towards their dominant hand than towards their non-dominant hand. They argue that purchase intentions are influenced by how easily an action with the product comes to mind. This explanation hinges on the assumption that people mentally simulate potential actions with depicted objects as has been proposed by the grounded cognition framework (Barsalou, 1999; Glenberg, 1997) and that such simulations influence object evaluations (Eelen, Dewitte, & Warlop, 2013; Shen & Sengupta, 2012). Left–right compatibility effects in simple decision tasks support this view (Tucker & Ellis, 1998), but these effects are very subtle, and lead to a small processing advantage of around 10 ms. One may wonder if such small advantages could cause a large enough increase in fluency to influence purchase intentions.

Moreover, some studies suggest that the left–right compatibility effect is not caused by automatically activated affordances. Motor simulations are not activated automatically by object pictures, but rather seem to depend on explicit task instructions (Bub & Masson, 2010; Yu, Abrams, & Zacks, 2014). Proctor and Miles (2014) argued that there is little evidence that motor affordances are activated at all by object pictures and that compatibility effects are better explained by spatial correspondences between stimulus and response (Cho & Proctor, 2010). This raises the question whether the effects of visual orientation on behavior intention as obtained by Elder and Krishna (2012) reflect such stimulus–response correspondence effects rather than actual purchase intentions. In their study, participants responded with a mouse click on a Likert scale with lower ratings on the left

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and higher ratings on the right. Handle orientation may directly influence the horizontal position of the response, resulting in higher ratings for right oriented handles. Since a large majority of the participants was right-handed, stimulus–response compatibility could thus have resulted in higher average ratings for products oriented towards the dominant hand than the non-dominant hand. To explore this possibility, we manipulated the orientation of the response scale (horizontal or vertical), the direction of the scale, and whether the response was given by clicking a mouse or typing a number key. In addition, we varied whether the product remained visible while participants indicated their purchase intention, because activation of motor affordances should be strongest while an object is still visible. We presented a larger number and variety of items than Elder and Krishna.

Cohen's *d* effect sizes in Elder and Krishna (2012) varied between 0.48 (medium) and 0.87 (large). In our experiments we manipulated the match effect within subjects, and scale orientation and direction between subjects. With approximately 50 participants in each condition we had sufficient power (larger than .95) to find medium effect sizes.

1. Experiments

Below is a general description of the method and results of eight experiments. Table 1 provides an overview and details are described in the Supplementary materials.

1.1. Method

1.1.1. Participants

We recruited 896 participants through Amazon's Mechanical Turk. Six participants failed to answer all questions and three participants did not use the row of number keys on their keyboard for all ratings (Experiment 5). Their data were excluded from the analysis, leaving 887 participants (357 females, $M_{age} = 32.0$, $SD_{age} = 10.2$, age range 18–69, 116 left-handed). In addition, 95 students at the Erasmus University participated in a lab version (Experiment 8).

1.1.2. Materials

Photographs of 12 products were used: *sprayer*, *stapler*, *blow dryer*, *drill*, *frying pan*, *screwdriver*, *kettle*, *tennis racket*, *thermos cup*, *pocket knife*, *electric shaver*, and *iron* (Experiments 1 to 6 and 8) and *cream of spinach soup*, *chocolate cake*, *hot chocolate*, *ice cream*, *mashed potatoes*, *pizza slice*, *popsicle*, *rice*, *sandwich*, *spaghetti*, *tea*, and *vanilla yogurt* (Experiment 7). Each photograph showed an affordance on one side and was mirrored to create two orientations for each product. Participants saw only one version of each product, six left-oriented and six right-oriented. Across participants and experimental conditions each product was presented equally often in both orientations.

1.1.3. Procedure

Participants answered the question “How likely would you be to buy this [product name]?” on a scale from 1 to 9 for each product. The endpoints were labeled *very unlikely* and *very likely*. In Experiments 2, 5, and 8 the scale direction was manipulated between participants, in all other experiments 1 meant *very unlikely* and 9 meant *very likely*. In Experiments 1 and 6, product and question were displayed simultaneously. In the other experiments the product was shown first, disappeared after a space bar press, followed by the question. In Experiments 1, 2, and 7 the response scale was presented as a row of nine buttons, ordered from 1 to 9, oriented horizontally, with 1 on the left and 9 on the right, or vertically, with 1 at the top and 9 at the bottom. Participants responded by clicking the button of their choice. In Experiments 3, 4, 5, 6, and 8 participants typed a number between 1 and 9 using the row of number keys at the top of their keyboard.

Summarizing, product orientation was manipulated within participants. Handedness was a subject variable. Scale orientation and scale direction were manipulated between participants: participants were randomly assigned to conditions.

Table 1
Overview of experiments.

Exp	Picture	Response mode	Scale orientation	Scale direction
1	Visible during response	Mouse click	Horizontal *or* vertical	1–9: low–high intention
2	Disappears before response	Mouse click	Horizontal *or* vertical	1–9: low–high intention *or* 1–9: high–low intention
3	Disappears before response	Numeric key press	Horizontal	1–9: low–high intention
4	Disappears before response	Numeric key press	Horizontal	1–9: high–low intention
5	Disappears before response	Numeric key press	Horizontal	1–9: low–high intention *or* 1–9: high–low intention
6	Visible during response	Numeric key press	Horizontal	1–9: low–high intention
7	Disappears before response	Mouse click	Horizontal	1–9: low–high intention
8	Disappears before response	Numeric key press	Horizontal	1–9: low–high intention *or* 1–9: high–low intention

Table 2
Overview of results.

Exp	Condition	N (left-handers)	Match M (SD)	Mismatch M (SD)	Effect size	Significance test	Bayes JZS factor
Elder and Krishna (2012)							
1a		37, 44	5.76 (1.89)	4.70 (2.22)	0.51	$t(79) = 2.29, p = .025$	0.6
1b		30, 32	4.63 (2.24)	3.06 (2.09)	0.72	$t(60) = 2.86, p = .006$	0.2
2		42, 43	4.55 (1.80)	3.67 (1.85)	0.48	$t(83) = 2.22, p = .029$	0.6
3	Positive	34, 40	6.59 (2.03)	5.33 (2.63)	0.54	$t(72) = 2.28, p = .026$	0.6
	Negative	44, 40	3.02 (2.38)	4.08 (2.61)	−0.42	$t(82) = -1.95, p = .055$	1.1
4		39, 39	4.79 (1.34)	3.44 (1.75)	0.87	$t(76) = 3.83, p < .001$	0.01
Present study							
1	Mouse						
	Horizontal	51 (3)	4.56 (1.14)	4.57 (1.30)	−0.01	$t(50) = -0.02, p = .986$	9.0
	Vertical	50 (6)	4.52 (1.43)	4.63 (1.43)	−0.07	$t(49) = -0.51, p = .610$	7.9
2	Mouse						
	Horizontal						
	Low-high	50 (9)	4.09 (1.59)	3.92 (1.53)	0.12	$t(49) = 0.85, p = .402$	6.3
	High-low	50 (5)	4.86 (1.25)	4.90 (1.36)	−0.03	$t(49) = -0.18, p = .858$	8.8
	Vertical						
	Low-high	50 (7)	4.52 (1.44)	4.66 (1.68)	−0.09	$t(49) = -0.68, p = .500$	7.1
	High-low	50 (3)	4.82 (1.36)	4.89 (1.28)	−0.05	$t(49) = -0.37, p = .712$	8.4
3	Keyboard	103 (14)	4.86 (1.41)	4.63 (1.45)	0.16	$t(102) = 1.70, p = .093$	3.1
4	Keyboard	99 (15)	4.80 (1.31)	4.87 (1.14)	−0.05	$t(98) = -0.47, p = .642$	11.2
5	Keyboard	187 (28)					
	Low–high	94 (18)	4.80 (1.43)	4.74 (1.36)	0.05	$t(93) = 0.42, p = .676$	11.2
	High–low	93 (10)	4.78 (1.33)	4.84 (1.43)	−0.05	$t(92) = -0.47, p = .638$	10.9
6	Keyboard	97 (14)	4.53 (1.54)	4.77 (1.55)	−0.20	$t(96) = -1.94, p = .056$	2.0
7	Mouse						
	Horizontal	100 (12)	5.37 (1.33)	5.78 (1.42)	−0.37	$t(99) = -3.58, p = .001$	0.03
8	Keyboard	95 (10)					
	Low–high	42 (7)	4.40 (1.30)	4.58 (1.33)	−0.18	$t(48) = -1.29, p = .202$	4.0
	High–low	43 (3)	4.46 (1.29)	4.62 (1.31)	−0.11	$t(45) = -0.75, p = .456$	6.5

Note. Effect sizes are calculated as Cohen's *d*. In Elder and Krishna (2012) match was manipulated between participants, therefore Ns are provided for match and mismatch separately. Elder and Krishna used a scale from 1–7, we used a scale from 1–9. Effect sizes are negative when mean ratings are higher for mismatch than match items, i.e., when the effect is opposite from the predicted direction. All t-tests are two-tailed. The Bayes JZS factor gives the odds in favor of the null hypothesis over the alternative hypothesis, for example a factor of 5 means that, given the data, the null hypothesis (no difference between Match and Mismatch) is 5 times more likely than the alternative hypothesis (Rouder, Speckman, Sun, Morey, & Iverson, 2009).

1.2. Results

For each participant the mean ratings per condition were calculated. Reversed scales were recoded. The data were analyzed with repeated measures ANOVAs and the Bayesian Information Criterion. A full report of these analyses plus figures of the means per condition can be found in the Supplementary materials. Summarizing, in none of the experiments did we find an interaction between handedness and product orientation, except for an effect in the direction opposite to what was expected in Experiment 8, nor did we find effects of scale orientation or scale direction. We also did not find a relation between match effect and product valence, nor did we find that differences across stimuli masked a match effect (see Supplementary materials). For easier comparison we present the means for Match (orientation towards dominant hand) and Mismatch (orientation away from dominant hand), and *t*-statistics, Bayes JZS factors, and Cohen's *d*s for the differences in Table 2.

2. Discussion

In eight experiments we have not found evidence that participants indicated higher intentions to purchase products that are oriented towards their dominant hand than towards their non-dominant hand. Thus, we have not replicated Elder and Krishna's (2012) results, despite sufficient power to find such effects. Moreover, the Bayesian analyses showed positive to strong evidence for the null hypotheses that there were no interactions between handedness and product orientation.

We explored several factors that could have played a role in the match effect. First, our results showed that visual availability of the product during the rating did not influence the results. Second, holding a computer mouse might have interfered with activation of a motor affordance, but we found similar results when participants responded empty-handed by key presses. Third, scale orientation and direction did not affect the results, indicating that the match effect was not the result of overlap in spatial codes between stimulus and response. Fourth, unlike Elder and Krishna (2012), we did not find larger match effects for positive than negative products, although we should note that we did not directly manipulate product valence.

In sum, we have not found an explanation for the differences in results between Elder and Krishna (2012) and the current study. Our study was very similar to theirs on many aspects, and additional analyses showed that variations in procedure or materials could not explain the different results. Our results indicate that the effects that Elder and Krishna presented are not as robust as one might think on the basis of their study alone. A few other studies obtained conceptually similar effects of potential motor actions on object liking or preference. One showed greater liking for real objects that actually needed to be grasped with the dominant compared to non-dominant hand (Ping, Dhillon, & Beilock, 2009). We should be careful to compare responses to real objects and pictures, because motor actions to objects and to pictures are different. Two other studies showed similar effects for object pictures, but only for a subset of participants (Eelen et al., 2013) or in a study where attention was focused on grasping actions by instructing participants to hold an object or were asked about their mental simulation of action (Shen & Sengupta, 2012). Much recent research shows that object pictures (in contrast to real objects) are unlikely to spontaneously activate motor simulations, but rather do so only when participants have actual action intentions or are primed to think of motor actions earlier in an experiment (Bub & Masson, 2010; Yu et al., 2014). It is possible that researchers sometimes unintentionally prime motor actions, for example in their instruction or in some other aspect of the experimental situation. We do not know if this was the case in Elder and Krishna's study.

Based on Elder and Krishna's study alone, researchers, advertisers, and other people interested in influencing consumer behavior would probably assume that the effect of handle orientation in object pictures on intention to purchase is very robust and should be taken into account. Our results, however, show that, for object pictures, the effect of potential actions is limited and probably negligible.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ijresmar.2016.03.006.

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