



Reports

If you can't grab it, it won't grab you: The effect of restricting the dominant hand on target evaluations[☆]

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ABSTRACT

This research examines whether and how holding one object influences evaluations of another. Across four studies, we find that occupying the dominant (vs. non-dominant) hand leads to lower evaluations of the target object; further, process data suggests that this effect occurs because dominant hand restriction impairs the ease with which the perceiver simulates holding the target. Boundary conditions that document effect attenuation and reversal are also consistent with this premise. Collectively, the studies offer support for a circular chain of influence between the perception and action systems.

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Introduction

Consider the following scenarios: a) you are at a party, holding a drink, when the hosts ask for your opinion of a small artifact that they have recently bought, and which is lying in front of you; b) you are at the cereal aisle in the supermarket, a shopping bag in hand, trying to decide which brand of cereal to buy; c) you are using the remote control to change channels on the TV, when your child walks in holding a crafts project she has just completed, demanding to know what you think of it.

All three scenarios feature a common theme: being asked to evaluate a target object while holding another object in one's hand. The question this research seeks to answer is: does liking of the target object change simply because one's hand is occupied, and does it matter whether the hand in question is the dominant or non-dominant one? We argue in the affirmative to both questions. Specifically, we make the case that having the dominant hand occupied inhibits one from forming a mental image of reaching out and holding the target, leading to lower evaluations.

We arrive at this thesis by integrating three different premises arising from recent theoretical perspectives that postulate a strong association between perceptual, motor and cognitive systems (Barsalou, 1999; Briñol & Petty, 2008; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Building on the notion of action affordances (Gibson, 1979), the first premise states that mere perception of a target object

can spontaneously cause the perceiver to form a mental representation of how s/he might act upon the object – even without the action itself taking place. For instance, seeing a knife can spontaneously activate a mental representation of reaching out and holding it by the hilt; similarly, seeing the picture of a cup can induce a mental simulation of curling one's fingers around its handle (Glenberg, 1997; Tucker & Ellis, 1998). The second core premise is that features of the perceiver's bodily state can influence the ease of forming mental representations in general (Niedenthal, Brauer, Halberstadt, & Innes-Ker, 2001). In one illustration of this principle, participants found it harder to process a sentence describing a backward motion (e.g., “open the drawer”) if they themselves had been induced to make a forward rather than a backward movement at that time (Glenberg & Kaschak, 2002). Third, paralleling established findings regarding the positive impact of perceptual fluency on preferences (Reber, Schwarz, & Winkelman, 2004), the ease with which people simulate acting upon the target object should influence liking for that object. In one study, for example (Ping, Dhillon, & Beilock, 2009), participants who were asked to choose between two objects by moving the preferred object to a specified location revealed a preference for the object that was comparatively easy to grasp (i.e., handle pointed towards rather than away from the participant; see also Beilock & Holt, 2007; Casasanto & Chrysikou, 2011).

These three propositions form the conceptual platform for the current inquiry. Viewing an object that one would normally hold in order to use (e.g., a packet of cereal, a pen, etc.) should spontaneously induce a mental representation of the required action – i.e., reaching out with one's dominant hand to hold the object (cf. Tucker & Ellis, 1998). If, however, the dominant hand is restricted (e.g., because it is currently holding another object), this should hamper the ease of mentally representing this action (cf. Glenberg & Kaschak, 2002) – participants might, for instance, imagine holding the object with their non-dominant hand,

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which is used less often and is therefore less fluently simulated (Casasanto, 2009; Casasanto & Chrysikou, 2011). As a result of reduced fluency, the object should be less preferred when the dominant hand is restricted as compared to when it is unrestricted (cf. Ping et al., 2009).

The reasoning underlying our prediction yields testable boundary conditions as well. First, the hypothesized influence of hand restriction on preferences should be observed only if the target object is one that participants spontaneously think of holding. For instance, such thoughts and images are likely to be induced by a picture of a soft drink bottle, but not upon exposure to its logo alone — thus, hand restriction should affect liking for the soft drink only in the former case. Second, while having to hold an object (i.e., the restricting object) in the dominant hand should typically restrict the ease with which one imagines acting upon the target object, this does not hold true for all types of restricting objects. In some cases, the object being held may actually facilitate use of the target object; our conceptualization predicts that target evaluations will then be positively influenced. For example, although holding a ball in one's dominant hand while evaluating a plate of food should produce the basic lower-liking effect, holding a fork might actually aid in stimulating the action of reaching toward the food and, therefore, should enhance liking for the food.

In sum, we argue that holding an object in one's dominant hand will typically reduce liking for a target object, but that this effect will be moderated both by the nature of the target (holdable or not — Study 2) and of the object being held (compatible or incompatible with using the target: Study 4).

Study 1

The objective of Study 1 was to provide initial evidence that restricting the dominant (vs. non-dominant) hand while evaluating a target object can lead to lower evaluations of that object.

In all studies reported here, participants were students at a Hong Kong university who received extra course credit as an incentive for participation. Only right-handed individuals were included in the studies. Further, based on past research which has shown that pictures of a target object are sufficient to spontaneously induce a mental representation of holding that object (Tucker & Ellis, 1998), the target object in all studies was represented pictorially.

Method

Study 1 used a 2 (occupied hand: right/left) \times 2 (target object: box of candies vs. plate of fruit salad) between-subjects design; seventy-three students participated in it. The study purportedly sought to assess people's opinions of a table-tennis ball made by a local company. Each participant was seated at a desk and randomly assigned to one of two conditions, one of which required them to hold the ball with the right hand, and the other with the left hand. They were also told that their feedback about the ball would be more reliable if they held it for some time, and that accordingly, they would be asked to complete an unrelated filler task as they continued to hold the ball. This "filler" task required all participants to form an impression of the target object (candy vs. fruit), whose picture was shown as a PowerPoint slide in the center of a computer screen placed in front of each participant. Two different target objects were assessed in order to check whether our predictions generalized to both hedonic (candy) and relatively healthy (fruit) target objects; there was no a priori reason to expect a different pattern across the two.

After they had viewed the target image for 10 s, participants were asked to click to the next slide on the computer presentation. This slide instructed them to keep the ball down on the desk. At this point, the experimenter passed around a questionnaire, in which participants were asked to report their impressions of the ball on a scale from -3 (unfavorable) to $+3$ (favorable). Next, they provided their evaluations of the target object on three seven-point scales ($-3 =$ "unattractive",

"unfavorable", "negative"; $+3 =$ "attractive", "favorable", "positive"; $\alpha = .95$).

Results

No difference was observed in evaluations of the restricting object (the ball) regardless of whether it was held in the right or left hand (0.64 vs. 0.65, respectively, $F < 1$) — this was true in the subsequent studies as well and is therefore not reiterated. Our key prediction had to do with evaluations of the target object: we argued that these would be less favorable when the dominant (vs. non-dominant) hand was occupied. In support, participants evaluated the target product less favorably when they were holding the ball in their right hand ($M = 0.98$, $SD = 1.27$) as compared to the left hand ($M = 1.53$, $SD = 1.00$; $F(1, 71) = 4.37$, $p < .05$, $\eta^2 = .06$). This effect obtained regardless of whether the target object was a box of candies ($M = 1.00$, $SD = 1.50$ vs. $M = 1.48$, $SD = 1.01$) or a plate of fruit salad ($M = .96$, $SD = 1.02$ vs. $M = 1.60$, $SD = 1.00$).

Study 2

Study 2 both replicates the lower-liking effect observed above, and also examines a boundary condition. We have argued that when the target object is such that it spontaneously causes people to imagine holding it, restricting the dominant hand will lower target evaluations because such restriction detracts from the ease of forming the action representation. Logically therefore, the lower-liking effect should not obtain if the target object is not a "holdable" one to begin with — i.e., if the target does not spontaneously induce the perceiver to think in terms of holding it.

Method

Sixty seven students took part in this 2 (occupied hand: right/left) \times 2 (target object representation: picture of a soda can vs. picture of the soda logo) between-subjects study, which followed an identical procedure to that of Study 1 apart from the change in target object. Participants were told that while they were holding the ball and forming an impression of it, they would also be asked to evaluate a soda brand as a "filler" task. They were then exposed either to a picture of a can of 7-up soda or a picture of just the brand logo for 7-up, on a computer screen in front of them (see Fig. 1 for those pictures). The image was exposed for 10 s; subsequently, participants were asked to release the ball and provide their evaluations both of the ball and of the product (7-up soda) on the same attitude items used in Study 1.

Results and discussion

We assumed that the picture of the actual can of soda should induce action representations, but not the picture of just the brand logo — accordingly, the effect of hand restriction on fluency, and thereby on product evaluations, was only expected in the former case. In the latter case, participants should not be thinking in terms of "holding" the logo irrespective of whether their dominant hand is occupied; therefore, no difference was expected in product evaluations. Supportive results were obtained. The interaction between restricted hand and target picture type was significant ($F(1, 63) = 4.94$, $p < .05$, $\eta^2 = .07$). The lower-liking effect was replicated when participants were exposed to the picture of the can — i.e., they reported lower product evaluations when their right hand was restricted as compared to the left hand ($M = 0.16$, $SD = 1.28$ vs. $M = 1.23$, $SD = 0.82$, respectively, $F(1, 63) = 7.09$, $p < .01$, $\eta^2 = .22$). However, the effect disappeared when participants were exposed to just the brand logo ($M = 1.05$, $SD = 1.01$ vs. $M = 0.84$, $SD = 1.44$, respectively, $F < 1$).

In finding that hand restriction lowers target object evaluations only for "holdable" objects, Study 2 obtains results consistent with

A soda can



A soda logo



Fig. 1. Pictures used in Study 2.

our arguments. Further, it helps to refute a possible alternate explanation for the lower-liking effect. Namely, it could be argued that restricting the dominant hand leads to a general feeling of discomfort and generalized negative affect, which then transfers on to any proximal evaluation. That such an effect was not obtained in the logo condition argues against this possibility.

Study 3

The studies reported so far document the lower-liking effect produced by hand restriction, and also identify a relevant boundary condition relating to the nature of the target object. While the latter finding is consistent with our posited process, Study 3 sought to obtain direct support for the contention that the lower-liking effect obtains because hand restriction impairs the fluency with which people imagine reaching out and holding the target object.

Method

Thirty-six students participated in this study. The procedure was similar to that used in the prior studies, with three changes. First, for greater generality, the restricting object was changed to a fork instead of a table tennis ball. Second, the target object was also changed, to a pen. A relatively utilitarian target object was deliberately chosen with generality again in mind, so as to extend our findings beyond the food/drink targets studied so far. Thus, the purported “filler” task now required participants to evaluate a pen whose picture was provided on the computer screen, while holding the fork in either the right or left hand.

Third, and of most importance, this study measured fluency of action simulation in addition to object evaluations. Specifically, after participants had put down the fork, the questionnaire first asked them to report the extent to which they had imagined themselves reaching toward and holding the pen, while they had been holding the fork

(−3 = not at all; +3 = a lot).¹ Next, in order to assess fluency, they were asked to indicate how they had felt about imagining this action, on a set of a four seven-point scales: −3 = difficult/unpleasant/felt wrong/uncomfortable; +3 = easy/pleasant/felt right/comfortable (fluency index $\alpha = .88$). While it might be argued that participants responded to these fluency items by imagining the action at the current moment (no fork in either hand) rather than at the earlier one (when they had a fork in one hand), this would result in high ease of imagining the action regardless of which hand was restricted earlier – contrary to our prediction. Finally, participants provided their evaluations of the target object (the pen) and the restricting object (the fork).

Results

Replicating the lower-liking effect, participants evaluated the pen less favorably when holding the fork in their right hand than in their left hand ($M = .41$, $SD = 1.19$ vs. $M = 1.20$, $SD = 0.91$, respectively), $F(1, 34) = 5.17$, $p < .05$, $\eta^2 = .13$. Further, although participants were equally likely to imagine themselves reaching toward and holding the pen across conditions ($M = 0.25$, $SD = 1.81$ vs. $M = 0.10$, $SD = 1.74$, respectively), $F < 1$, such simulation was deemed less fluent when the right hand was restricted as compared to the left hand ($M = 0.19$, $SD = 1.09$ vs. $M = 1.36$, $SD = 0.91$, respectively), $F(1, 34) = 12.41$, $p < .001$, $\eta^2 = .27$. Thus, hand restriction did not influence whether or not participants imagined reaching out towards the pen – but it did influence the ease of imagining this action.

To test whether imagination fluency mediated the observed effect on object evaluation, we conducted a bootstrapping analysis (Preacher & Hayes, 2004). In addition to hand restriction influencing both fluency and evaluation (as above), fluency had a significant impact on object evaluation ($\beta = .41$, $t = 2.43$, $p < .05$). Furthermore, the mean indirect effect through fluency (based on 1000 bootstrap samples) was significant, with a point estimate of $-.48$ and a 95% confidence interval excluding zero (-1.07 to $-.12$). The direct effect of hand restriction on object evaluation (i.e., effect not mediated by fluency) was not significant ($\beta = -.31$, $t = -.83$, $p > .40$). This is suggestive of an indirect-only mediation (Zhao, Lynch, & Chen, 2010), which is the form of mediation that is consistent with full mediation in Baron and Kenny's (1986) procedure. The data from Study 3 is thus supportive of the premise that hand restriction leads to lower liking of the target object because it impairs the fluency of simulating the act of holding the object.

Study 4

Study 4 builds on our arguments to demonstrate a reversal of the lower-liking effect. While holding an object in the dominant hand typically lowers target evaluations, what if the object in hand facilitates (rather than hampers) the action that one would normally take with regard to using the target object? For example, while holding a fork in the dominant hand exercises a restrictive influence when evaluating a pen, a facilitatory effect should be observed if one is evaluating a plate of noodles – having a fork in one's dominant hand should actually make it easier to mentally simulate the action of reaching out and eating the noodles. If, as we have argued, reducing the ease of mentally simulating a relevant action lowers evaluations, facilitating such simulation should improve target object evaluations. Study 4 tests this possibility.

¹ This measure about extent of imagining the action was included only because, without it, participants might have found it strange to be asked the subsequent questions regarding fluency. We did not make a priori predictions about this measure. It is possible, of course, that the extent to which participants imagined the action (as distinct from the ease of such simulation) would also be influenced by hand restriction. Even without such an effect however, the influence of hand restriction should be observed on the fluency measure, which is our key mediating variable.

Method

Thirty students participated in this study. The procedure was similar to that of Study 3 except that the target object was a plate of noodles, a picture of which was displayed on the computer screen while participants held a fork in either their right or left hands. After putting down the fork, participants evaluated the noodles. They were then asked to report on the extent to which they had imagined reaching toward the noodles ($-3 = \text{not at all}$, $+3 = \text{a lot}$) and how easy it had been to imagine this action ($-3 = \text{very difficult}$, $+3 = \text{very easy}$). The latter measure assessed fluency (only a single item was used this time because of limitations on the study duration).

Results

We argued that when participants used the right hand to hold a fork, they would find it easier to imagine reaching towards the noodles and would accordingly like it more than when holding the fork in the non-dominant left hand. In support, participants evaluated the noodle more favorably when holding the fork in their right hand ($M = 0.95$, $SD = 1.81$) than in their left hand ($M = -0.24$, $SD = 1.35$), $F(1, 28) = 4.23$, $p < .05$, $\eta^2 = .13$. The extent to which they imagined reaching towards the noodles did not differ significantly across conditions ($M = 1.23$, $SD = 1.48$ vs. $M = 0.35$, $SD = 1.84$, respectively), $F(1, 28) = 1.98$, $p > .15$, $\eta^2 = .07$. Of importance however, the predicted difference was observed on the fluency measure: participants deemed it easier to imagine this action when holding the fork in the right hand rather than the left hand ($M = 1.62$, $SD = 1.26$ vs. $M = 0.47$, $SD = 1.33$), $F(1, 28) = 5.71$, $p < .05$, $\eta^2 = .17$.

We also assessed the mediating influence of fluency on target evaluations. In addition to hand restriction influencing both fluency and evaluations (as above), fluency was found to impact evaluations ($\beta = .46$, $t = 2.18$, $p < .05$). Furthermore, the mean indirect effect through fluency (based on 1000 bootstrap samples) was significant, with a point estimate of .53 and a 95% confidence interval excluding zero (.046 to 1.33) (Preacher & Hayes, 2004). The direct effect of hand restriction on object evaluation (i.e., effect not mediated by fluency) was not significant ($\beta = .65$, $t = 1.10$, $p > .25$). This was consistent with an indirect-only mediation (Zhao et al., 2010).

Study 4 thus documents a reversal of the findings observed in the previous studies. When the dominant hand is occupied with an object that facilitates the mental simulation of how one would use the target object, it improves the perceiver's evaluation of the target rather than detracting from it.

General discussion

As the vignettes in the opening paragraph illustrate, it is not uncommon for a person to be forming an impression of a target object while holding another object in one hand. This research argues that the latter should influence the former. In particular, because holding an object with the dominant hand tends to impair the ease with which the perceiver simulates reaching out and holding the target object, a less positive impression of the target will be formed. We find support for this lower-liking effect across multiple studies, using different target and restricting objects. We also obtain evidence for boundary conditions that are consistent with the proposed mechanism. The lower-liking effect is only observed when the representation of the target object is likely to spontaneously activate a "holding" action, not otherwise (Study 2); further, the effect is reversed if the object being held actually facilitates the act of reaching out and using the target object (Study 4). In sum, restricting the dominant hand (by occupying it) will typically lower evaluations of a target – but this effect is moderated both by the nature of the target and the nature of the restricting object.

Our findings are consistent with recent thought on grounded cognition, which postulates an integration of the perceptual and motor

systems (Barsalou, 1999; Williams, Huang, & Bargh, 2009). Well before the emergence of this perspective, of course, motivation research had already found evidence for one direction of this link: perception was found to instigate action, such that objects perceived favorably (unfavorably) tended to be approached (avoided; Higgins, 1997). Investigations building on the grounded cognition perspective have of late obtained robust evidence for the link in the reverse direction as well: thus, bodily states have been found to influence object perceptions and impressions – e.g., constraining the perceiver's facial expressions influences the ease of detecting emotional expressions in others (Niedenthal et al., 2001); approaching (avoiding) an object can enhance (lower) evaluations of the object (Labroo & Nielsen, 2010), etc. The current inquiry integrates these two links to argue that the dynamic between perception and action is perhaps best described as a circular interaction rather than uni-directional links: Object perception can lead to mental representations of an action, the fluency of which can in turn influence perceptions and evaluations of the object.

Of interest, some recent investigations have obtained findings related to the ideas presented here. For instance, as mentioned earlier, Ping et al. (2009) found that people liked an object (e.g., a cup) less when its handle was pointed away from rather than towards them. This finding is consistent with the premise that object liking can be influenced by the ease/difficulty of grasping the object. Several points of difference should also be noted, however. While the inquiry by Ping et al. (2009) exposed participants to the physical objects and required them to take action upon the object (by moving it to a pre-specified location), the current research merely provided pictorial representations of the objects – thus, even without action being required, the fluency of simulating an action was found sufficient to affect liking. Second, the current investigation was able to influence such fluency via the bodily state of the perceiver (restricting the dominant hand) rather than by changing the orientation of the target object, as in the Ping et al. (2009) research. Third, the current work built on the basic idea of simulation fluency to show how the lower-liking effect can be attenuated as well as reversed. Finally, our research provided evidence for the process by measuring simulation fluency; such measures were not included in the Ping et al. (2009) article.

The effect of hand restriction was also explored in a recent article which found that encouraging the sustained use of the non-dominant hand (by restricting the dominant one) in a prior task led participants to evaluate objects located on the non-dominant side more favorably in a subsequent evaluation task after all restrictions were removed (Casasanto & Chrysikou, 2011). While this is a fascinating line of inquiry, the underlying conceptualization and predictions are quite different from those of the current research. Casasanto and his co-authors suggest that people develop an implicit association between space and valence, based on the past experience of having dealt with the physical environment more fluently with one side of the body than the other (Casasanto & Jasmin, 2010). In this conceptualization, object evaluations are influenced by the simple transference of pre-established associations – hand restriction serves to influence such prior associations and is manipulated before the focal evaluation task. In contrast, hand restriction in the current research is held to influence the ease of mentally simulating an action upon the target object – and is therefore manipulated *during* the focal evaluation task. Furthermore, research on the space-valence association argues that spatial position will affect the evaluation of even abstract concepts – whether graspable or not, because participants simply associate one side with "good" and the other with "bad" (Casasanto, 2009). In contrast, the mental simulation perspective offered here argues that object evaluations are affected only if hand restriction influences the ease of simulating an action upon that object – thus, only the evaluations of "graspable" objects should be so affected, as Study 3 illustrates. In future work, it would be interesting to examine how object evaluations are interactively affected by prior hand restriction (via the space-valence association) and current hand restriction (via the ease of action simulation).

Finally, while the current work studies explicit evaluations – participants were told that they were being asked to form evaluations of the target object while holding the restricting object – it seems possible that these results will replicate even in cases where people are forming object impressions without being aware that they are doing so (implicit persuasion). Future research should examine this possibility, support for which would reinforce the perception–action–perception dynamic that has the potential to provide rich insights into our understanding of both perceptions and behavior.

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