Hand Dominance Influences Taste Perception: Support for the Body-Specificity Hypothesis

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Embodied cognition is a growing paradigm within the cognitive sciences, emerging in the study of developmental psychology, neuroscience, linguistics, and philosophy of mind (Wilson, 2002). According to this viewpoint, the environment plays a formative role in the development of cognitive processes; cognition is 'embodied' because it arises from bodily interactions with the environment (Thelen, Schoner, Scheier, & Smith, 2001). Indeed, as Clark (1998) notes, "biological brains are first and foremost the control systems for biological bodies" (p. 506), thus proponents of embodied cognition emphasize that cognitive processes are inherently tied to the body's action and sensorimotor experience (Feldman & Narayanan, 2004).

Consistent with the premises of embodied cognition, cognitive neuroscientists have found that some concepts and thoughts are comprised of mental simulations of bodily experiences (for review, see Gallese & Lakoff, 2005). Based on these findings, Daniel Casasanto (2009) proposed the *body-specificity hypothesis*, suggesting that "people with different bodily characteristics, who interact with their physical environments in systematically different ways, should form correspondingly different mental representations" (p. 351). Put simply, people with different bodies will also have different cognitions.

In 2009, Casasanto conducted his first examination of the body-specificity hypothesis with five complementary experiments, each investigating the link between hand dominance and mental representations of abstract concepts. Right-handed participants tended to associate rightward space with positive ideas and leftward space with negative ideas. Left-handed participants, however, showed the opposite pattern of association. Casasanto concluded that people implicitly associate positive concepts with the side of space in which they interact most fluently (their dominant side) and negative concepts with the side of space in which they interact less fluently (their non-dominant side).

These results, which offer compelling support for the body-specificity hypothesis, were the basis of numerous subsequent studies. For example, Casasanto and Jasmin (2010) analyzed footage of U.S. presidential election debates, and found that right-handed candidates tended to gesture with their right hands when speaking of positive concepts, but used their left hands when speaking of negative concepts. As predicted by the body-specificity hypothesis, left-handed candidates displayed the opposite pattern of gesturing. Another study demonstrated that when right-handers are forced to use only their left hand for several minutes, they subsequently display "left-handed cognitions"; that is, they begin to associate positive concepts with leftward space instead of rightward space (Casasanto & Chrysikou, in press). These studies, among others, overwhelmingly support the body-specificity hypothesis, and have inspired a new set of questions for future research.

The present study investigates whether the body-specificity hypothesis holds for perception as well as cognition. That is, does the way we physically interact with the world influence the way we perceive the world? There is growing evidence that this may be the case. For example, Quaquebeke and Giessner (2010) recently demonstrated that a referee's embodied cognitions – associating a soccer player's height with dominance – subsequently influence his perception of a foul and inform his judgment. Similarly, Horstmann (2010) demonstrated that participants perceive happy faces faster when accompanied with a high tone than with a low tone, and perceive angry faces faster when accompanied with a low tone than with a high tone. These results have also been attributed to the influence of embodied cognitions, for their basis is thought to be the conceptualization of both tones and facial emotions as either high or low. In this study, we wish to examine whether embodied cognitions can differentially influence the perception of taste. Specifically, we ask whether right- and left-handers perceive taste in systematically different ways, depending on which hand they use to hold a drink. Based on Casasanto's

previous findings, we hypothesize that right-handed individuals will tend to prefer a beverage held in their right hand over their left hand, and that left-handed individuals will demonstrate the opposite preference.

Method

Participants

A total of 42 participants (M_{Age} = 20.67, SD_{Age} = 2.21) were recruited to participate in the study, 23 of which were male. All participants were undergraduate students at the University of British Columbia. Only data for the 40 right-handed participants (21 males; M_{Age} = 20.68, SD_{Age} = 2.24) were analyzed. Data for the two left-handed participants were discarded, as results for at least 10 left-handed participants were required for a valid chi-square analysis.

Materials and Procedure

The experiment was presented and advertised as "The Pepsi Challenge"; we hoped that using a familiar title would activate a schema in the participants' minds, leading them to assume that we were testing whether they preferred Pepsi or Coca Cola. Indeed, very few participants asked questions regarding the experiment's purpose. Participants were asked to taste test two types of unlabelled cola and indicate their preference. Unbeknownst to participants, however, the two drinks were in fact the same type of cola: a mixture of equal parts Pepsi™ (Peterborough, ON) and Coca Cola™ (Toronto, ON). The cola was maintained at approximately 3 degrees Celsius in two unlabelled pitchers, and just prior to testing, about 10 millilitres of cola was poured into two 3 ounce Dixie™ disposable cups (Atlanta, GA). The cups were handed to the participants such that they held one in each hand. Participants were asked to taste one of the cola samples, wait five seconds, and then taste the second cola sample. The order in which the participants sampled the cola was counter-balanced such that half of the participants drank with

their right hand first and half drank with their left hand first. This eliminated a possible confound in which people may tended to (1) drink with their dominant hand first, and (2) prefer the drink they tasted first. After recording the participants' verbally-reported preference, the participants were asked to fill out a brief questionnaire, which contained a question regarding their hand dominance (see the Appendix for a copy of the questionnaire). Participants were thanked for their time and given the option of supplying their e-mail address to later receive a document detailing the results of the study.

Only data for the right-hand participants were analyzed. Data were expressed in terms of frequency of right-hand and left-hand drink preference. A chi-square test of goodness-of-fit, with an alpha of .05, was performed to determine whether the right and left hand were equally preferred by the participants. Data were analyzed using SPSS software (IBM, Somers, NY).

Results

Of the 40 right-handed participants, 27 preferred the drink in their right hand and 13 preferred the drink in their left hand. Chi-square analysis revealed that the participants' preference for the right-hand drink and left-hand drink were not equally distributed, $\chi^2(1, N = 40) = 4.90$, $p < .05$ (see Figure 1).

Discussion

Consistent with our hypothesis, right-handed participants were significantly more likely to prefer the drink held in their right hand than in their left hand. This result provides additional support for Casasanto's (2009) *body-specificity hypothesis:* the way we physically interact with the world influences the way we form mental representations. Furthermore, this result extends the body-specificity hypothesis to perception as well as cognition; the way we physically interact with the world also influences the way we *perceive* the world. The likely mechanism behind this finding is that the body first influences the nature of embodied cognitions, which in turn influence

perception. The participants unknowingly relied on embodied cognitions when they could not utilize any other perceptual cues in the environment. That is, because the drinks tasted the same, but the participants were convinced that they differed, the participants' perception was informed by cues based on body position. We can infer that a significant number of the participants utilized embodied cognitions of abstract concepts like "good" and "bad" when perceiving an ambiguous situation.

This proposed mechanism is consistent with the findings of previous literature. Quaquebeke and Giessner (2010) found that embodied cognitions based on a soccer player's relative height (where vertical axis is associated with abstract concepts of dominance) subsequently informed a referee's perception of a foul. Likewise, Horstmann (2010) found that the perception of happy or angry faces can be influenced by embodied cognitions based on a simultaneously-presented tone (where pitch height is associated with abstract concepts of "high" and "low" emotions). Thus, the current findings – along with the mechanisms they imply – are consistent with past research in general, as well as Casasanto's body-specificity hypothesis in particular.

Future research should continue to investigate the role of embodied cognitions in perception. It is necessary for the present study to be replicated with left-handed participants. Until then, we cannot rule out an alternative explanation for our results based on linguistic metaphors of the English language. English idioms often associate good things with rightward space ("the right answer", "my right-hand man") and bad things with leftward space ("out in left field", "two left feet"). Casasanto (2009) ruled out the influence of language by demonstrating that left-handers make the opposite associations. Thus, we expect that a replication of the current study would allow for a more conclusive reinforcement of the body-specificity hypothesis.

References

Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in right- and left-handers. *Journal of Experimental Psychology: General, 138*(3), 351–367.

Casasanto, D., & Chrysikou, E.G. (in press). When left is "right": Motor fluency shapes abstract concepts. *Psychological Science.*

Casasanto, D., & Jasmin, K. (2010). Good and bad in the hands of politicians: Spontaneous gestures during positive and negative speech. *PLoS ONE, 5*(7), e11805.

Clark, A. (1998). Embodied, situated, and distributed cognition. In W. Bechtel & G. Graham (Eds.), *A companion to cognitive science* (pp. 506-517). Malden, MA: Blackwell.

Feldman, J., & Narayanan, S. (2004). Embodied meaning in a neural theory of language. *Brain and Language, 89,* 385–392.

Gallese, V. S., & Lakoff, G. (2005). The brain's concepts: The role of the sensory-motor system in conceptual knowledge. *Cognitive Neuropsychology, 22,* 455–479.

Horstmann, G. (2010). Tone-affect compatibility with affective stimuli and affective responses. *The Quarterly Journal of Experimental Psychology, 63*(11), 2239–2250.

Quaquebeke, N., & Giessner, S. R. (2010). How embodied cognitions affect judgments: Height-related attribution bias in football foul calls. *Journal of Sport & Exercise Psychology, 32*(1), 3–22.

Thelen, E., Schoner, G., Scheier, C., & Smith, L. B. (2001). The dynamics of embodiment: A field theory of infant perservative reaching. *Behavioral and Brain Sciences, 24,* 1–86.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin and Review, 9*(4), 625-636.

Appendix

The following in an example of the questionnaire that participants were asked to fill out upon completion of the taste test. The question regarding hand dominance ("are you right handed?") was the parameter of interest; all other questions were included simply to conceal the purpose of the experiment.

THE PEPSI CHALLENGE

DRINK	SUBJECT	Age	Sex	Are you colour blind?	Do you wear glasses/contacts?	Are you right handed?	Do you drink pop at least once a week?	Do you prefer Pepsi or Coke?
☑ ☐	--	21	M	NO	YES	YES	YES	PEPSI
☐ ☐	01							
☐ ☐	02							
☐ ☐	03							
☐ ☐	04							
☐ ☐	05							
☐ ☐	06							
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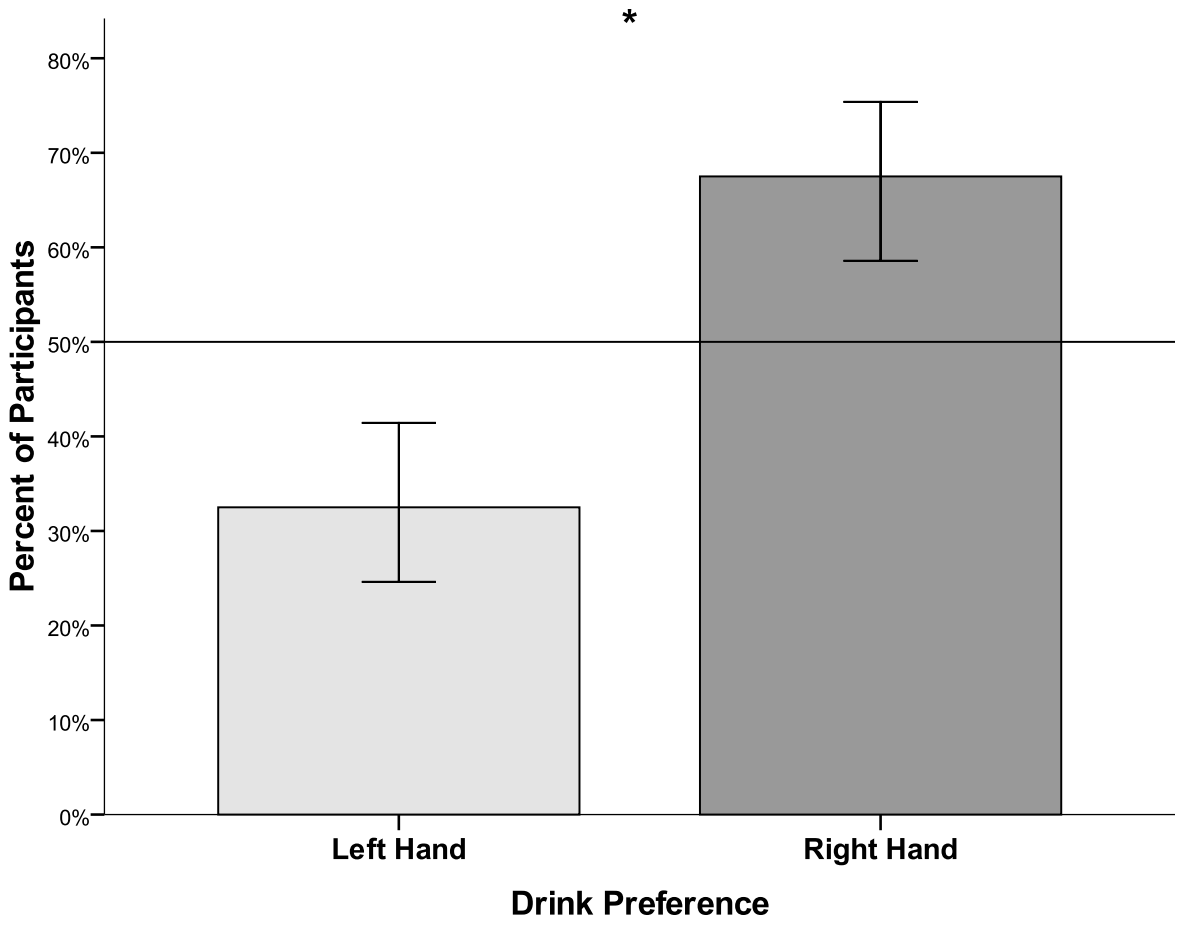
☐ ☐	17							
☐ ☐	18							
☐ ☐	19							
☐ ☐	20							
☐ ☐	21							

Figure Caption

Figure 1. Percent of participants that preferred the drink held in the right hand (n = 27) or left hand (n = 13), with participants demonstrating a significant preference for the drink held in the right hand, where * indicates $p < .05$, error bars represent 95% confidence intervals, and the horizontal line represents expected values if preferences were random (50%).


*
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent of Participants
Left Hand
Right Hand
Drink Preference