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Embodied Persuasion: How Holding Your Smartphone Changes Your Product Perception

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ABSTRACT

Online shopping through mobile devices has dramatically increased worldwide. This research investigates the role embodied interactions may play in stimulating virtual product experience in mobile commerce settings. Drawing on research on virtual product experience and embodied cognition, we hypothesize that holding a mobile device in hands (vs. putting the mobile device on the table) is more likely to create an illusion that the products being viewed are actually present in the real world and to stimulate imagery consumption experience, leading to higher purchase intention and choice satisfaction. This effect is more salient for desirable products than for undesirable products. We describe an experiment design for testing the hypotheses, report preliminary data analysis results, and discuss the potential theoretical and practical implications of this study.

Keywords

Embodied cognition, embodied interaction, interface design, mobile commerce.

INTRODUCTION

Online shopping through mobile devices has dramatically increased worldwide. The 2014 Black Friday weekend saw 49.6% of all online traffic from mobile devices, an increase of 25% over the previous year (IBM, 2014). Mobile devices enable consumers to shop anywhere anytime. For example, they could browse websites on the go, holding and interacting with the devices with their hands, or explore products with the devices steadily put on the table (Microsoft, 2015). As online consumers are rapidly migrating from desktops to mobile devices, inquiries into their interactions with the devices (e.g., hand grip) will have widespread impact.

Prior literature on human bodily interaction with devices has focused on the usability perspective (e.g., Wobbrock, Myers and Aung, 2008). However, the effects of hand grip may go beyond task performance. Recently, an

embodied view of the interplay between human behavior and IT artifacts grants bodily interaction a central role in human decision making and behaviors, and underscores the importance of bodily, sensorimotor, and social aspects of humans' interaction with IT artifacts (Dourish, 2001). It motivates us to investigate whether and how hand grip would influence consumers' behaviors in mobile commerce.

Answers to this question are timely and important to both practitioners and researchers. Conveying convincing product experience in online shopping context remains a challenge for online retailers. The mediated nature of online shopping via mobile devices prevents consumers from exploring and experiencing products prior to purchase and thus increases the distance between products and consumers (Jarvenpaa and Todd, 1996). To shorten such distance, advanced product presentation formats have been proposed to facilitate the extent to which consumers can virtually feel, touch, and experience the products, i.e., *virtual product experience* (Jiang and Benbasat, 2004). Extant literature on virtual product experience has focused on the cognitive (e.g., perceived control and product learning) and affective (e.g., playfulness and flow) capabilities of product presentation formats in the *virtual* environment (e.g., Jiang and Benbasat, 2007; Li, Daugherty and Biocca, 2001; Suh and Lee, 2005). Very limited research has examined the interplay between consumers' bodily interactions with the technology in the *physical* world and their mental simulation of product experience in the *virtual* environment. Furthermore, it has been shown that product perception through the use of IT artifacts would influence consumer behavior (e.g., Jiang and Benbasat, 2007; Liet al., 2001; Suh and Lee, 2005). Yet, not much is known about how product perception through the use of IT artifacts could be influenced by our own behavior.

Motivated by these research gaps, this study intends to explore the effects of bodily interactions with mobile devices in the context of mobile commerce. Specifically, we aim to examine how hand grip changes consumers'

product perception, and consequently determines purchase intention and choice satisfaction.

LITERATURE REVIEW

Virtual Product Experience

Like users of mouse-driven desktops, consumers who visit online shopping websites via mobile devices are unable to touch and feel merchandise prior to purchase. The mediated nature of online shopping via mobile devices constrains the extent to which consumers can feel and experience products, raises barriers to product perception, and creates the “distance” between consumers and products (Jarvenpaa and Todd, 1996). To overcome these barriers, designs of IT artifacts have been proposed to enable *virtual product experience*, that is, an online experience which simulates consumers’ feel, touch, and trial of products (Jiang and Benbasat, 2004). Prior research on virtual product experience has investigated the design and impact of product presentation formats on virtual product experience, which is likely to affect purchase intentions. Furthermore, the perception of local presence has been proposed to explain the mechanism underlying the influences of product presentation formats on virtual product experience. Local presence refers to the extent to which an individual can experience objects presented online as actually being there with him/her in the offline environment (Verhagen, Vonkeman, Feldberg and Verhagen, 2014). However, it remains unexplored whether *virtual* product experience can be induced by bodily interaction with the technology (e.g., mobile devices) in the *physical* environment. This study proposes that consumers’ product perception mediated by mobile devices could be influenced by their postures when using and interacting with the devices. It underscores consumers’ bodily interaction (especially hand grip) with mobile devices as an emerging approach for generating the perception of local presence and thus evoking virtual product experience.

Embodied Interaction

Embodied cognition has rapidly been recognized as one of the key pillars involved in human decision making, affect, and behavior (Johnson, 1987; Lakoff and Johnson, 1999). The principal claim of research on embodied cognition suggests that abstract meaning attributions are deeply rooted in people’s bodily interactions in and with the environment (Semin and Smith, 2008; Wilson, 2002). Thus, seemingly irrelevant bodily actions are capable of influencing our cognition. It has been demonstrated that people process and represent abstract information by mentally simulating motor actions performed on concrete objects in a wide range of non-computer-mediated contexts. For example, adopting an expansive bodily posture with open limbs (vs. a contractive position with closed limbs) generates greater risk taking (Carney, Cuddy and Yap, 2010), while arm flexion (vs. arm extension) leads to preference and purchase intentions for

vice over virtue products (Van den Bergh, Schmitt and Warlop, 2011).

Furthermore, there has also been a surge of interest in *embodied interaction*, or the study of interaction design that focuses on bodily, sensorimotor, and social aspects of human-computer interaction (Dourish, 2001). In this view, humans could leverage embodied experiences through the use of metaphors to structure and comprehend their interactions with IT artifacts (Antle, Corness and Droumeva, 2009). Such metaphors link concrete bodily experiences with IT artifacts and abstract concepts in a distant or virtual domain (Barsalou, 2008; Landau, Meier and Keefer, 2010). Extant research on embodied interaction has shown that metaphors-based interface improves task performance and user engagement in computer-mediated interactions that rely on bodily movement (Antle et al., 2009; Bianchi-Berthouze, 2013; Howison, Trninic, Reinholz and Abrahamson, 2011).

The emerging viewpoint of embodied interaction has several implications for studying interaction with mobile devices. First, our bodily interactions with mobile devices are capable of influencing our product perceptions. In our daily interactions with IT artifacts, we may implicitly associate bodily postures with *image schema*, or “a recurring, dynamic pattern of perceptual interactions and motor programs that gives coherence and structure to our experiences” (Johnson, 1987, p. xiv). Thus, consumers might process abstract product perceptions by mentally simulating concrete motor actions performed on mobile devices. Second, different types of hand grip involve distinct motor actions performed on the same device displaying the identical content, and thus are likely to convey different abstract meanings. Therefore, the effects of hand grip on product perception should be important for studies on virtual product experience.

RESEARCH MODEL AND HYPOTHESES

We examine two types of hand grip which are commonly used to interact with mobile devices when consumers are browsing and purchasing products online, namely holding the device in hands or putting the device on the table (Microsoft, 2015).

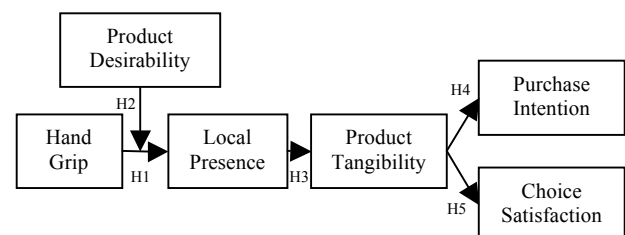


Figure 1. Research Model

The Effect of Hand Grip on Local Presence

Hands are our primary means to acquire information and to manipulate the environment. Experiences with our hands allow for the development and application of

conceptual and metaphorical knowledge. Holding, in daily language, is often used to convey a sense of possessiveness, reality, and approach, as indicated by figurative phrases such as “hold property worth millions”, “hold the title to the car”, “hold true”, and “hold promise”. Because of these couplings, we automatically and subconsciously associate “holding something in hands” with “having something being there for us”. In contrast, the word “put” is usually used to express a sense of distance and avoidance, as evidenced by phrases such as “put our feelings aside” and “put away our fears”. Consequently, we might intuitively activate an association between “putting something on the table” and “putting something aside and considering until later”. Thus, when consumers are holding their mobile devices in hands, it is relatively easier to induce the sense that the products viewed are being there ready for further inspection, making the mental representation of the products more vivid in one’s mind. However, browsing product information from a mobile device kept on a table is similar to viewing a printed product catalogue set on the table, making it difficult for consumers to perceive the products in a way that resembles actual unmediated product inspection. Thus, we postulate that **H1: Holding the mobile device in hands (vs. putting the mobile device on the table) is likely to elicit a higher local presence.**

To validate our hypothesized association between holding the mobile device in hands and reality-related concepts and that between putting the mobile device on the table and distance-related concepts, we examine the interaction effect of hand grip and product desirability on consumers’ perception of local presence. Specifically, we expect that the effect of hand grip on the perception of local presence would be more salient when consumers are browsing an assortment of desirable (vs. undesirable) products. When browsing and evaluating an assortment of desirable products (e.g., lovely teddy bears), consumers are likely to feel inspired to induce a sense of perceiving the products in real usage scenarios. Holding the mobile devices in hands supports such induced perception, leading to a higher level of local presence, compared with putting the mobile devices on the table. In contrast, when viewing an assortment of undesirable products (e.g., disgusting toy insects), consumers might feel uncomfortable and unmotivated to imagine experiencing the undesirable products in reality (Morales and Fitzsimons, 2007). Thus, consumers are likely to discard the product assortment regardless of whether they are holding their mobile devices in hands or putting the devices on the table. Therefore, we hypothesize that **H2: The effect of hand grip on local presence will be moderated by product desirability.**

The Effect of Local Presence on Product Tangibility

Prior literature suggests that a sense of local presence is able to shorten the distance between consumers and products (Verhagen et al., 2014). This is because the perception of local presence facilitates an inspection of

the products in a way that resembles physical product trial (Grigorovici and Constantin, 2004). Consequently, it becomes easier to access product information through senses (Biocca and Delaney, 1995) and comprehend product information mentally (Klein, 2003; Liet al., 2001). Thus, the perception of local presence entails an easier and more vivid mental simulation of touch. That is, consumers will perceive the products being viewed as more tangible. Therefore, we hypothesize that **H3: Local presence will positively influence product tangibility.**

The Effect of Product Tangibility on Purchase Intention and Choice Satisfaction

The perceived tangibility of products promotes a more vivid mental visualization of touching the products in real consumption experiences. As vivid mental imagery more closely resembles the actual usage scenarios than cognitive elaboration does (Bone and Ellen, 1992), and it would in turn lead to higher valuation of the products (Peck, Barger and Webb, 2013; Peck and Childers, 2003) and greater purchase intention (Schlosser, 2003). Hence, we postulate that **H4: Product tangibility will positively influence purchase intention.**

Furthermore, the mental visualization of touching resulting from product tangibility is likely to ease the pre-purchase product evaluation, induce a vision of consumption experiences of all alternatives in consumers’ consideration, and help consumers form more realistic expectations of product performance in real usage scenarios (Laroche, Bergeron and Goutaland, 2001; Laroche, Yang, McDougall and Bergeron, 2005). Consequently, consumers perceiving a higher level of product tangibility are more likely to be satisfied with their choices. **H5: Product tangibility will positively influence choice satisfaction.**

RESEARCH METHODOLOGY

We tested the research model and hypotheses in an experiment which employed a 2 (hand grip: put the device on the table vs. hold the device in hands) by 2 (product desirability: desirable vs. undesirable) between-subjects design. We asked the participants to bring their own smartphones to the experiment, and randomly assigned them to one of the four conditions.

Participants were informed to sit on the chairs naturally while performing an online shopping task. Half of the participants were required to put their smartphones on the table when doing the task, while the remaining half were required to hold their smartphones in hands when performing the task. We manipulated product desirability by creating two hypothetical online shopping scenarios: to choose a gift toy for themselves or a friend (desirable condition) or to choose a scary, disgusting toy for Halloween tricks (undesirable condition). Participants were given the shopping scenario vignette, and then shown either an assortment of five lovely toy bears (desirable condition) or an assortment of five disgusting

toy insects (undesirable condition). Within each assortment, they could select any product to open a page with more product information (including more product images and detailed product descriptions), and could return to the assortment at any time. Once they had made their choice, they were required to complete an online survey questionnaire with items measuring their perception of local presence, product tangibility, purchase intention, and choice satisfaction. To verify the effectiveness of the manipulation of product desirability, we asked participants to indicate the extent to which they felt inspired towards the products (Laros and Steenkamp, 2005). Measurement items for local presence were adapted from existing studies on presence (Verhagen et al., 2014). The six-item scale developed by Laroche et al. (2005) was adapted to measure product tangibility. Purchase intention and choice satisfaction were each measured by three items adapted from prior research on consumer online shopping behavior (Fitzsimons, 2000). All items were measured using a 7-point Likert scale anchored from “strongly disagree” to “strongly agree”. Participants were also required to report the brand and model of their smartphones used in this experiment (to calculate screen size), and their demographic information.

PRELIMINARY RESULTS AND DISCUSSION

Eighty-one university students participated in the study, and were compensated with a \$10 cash voucher. They were randomly assigned to one of the four conditions. As expected, participants assigned to desirable conditions feel more inspired towards the products compared with those assigned to undesirable conditions ($M_s = 3.40$ vs. 2.71 , $F(1, 80) = 4.79$, $p < .05$). To test whether different types of hand grip elicit varying perceptions of local presence, local presence scores were submitted to a 2 (hand grip) \times 2 (product desirability) ANOVA. The analysis revealed only an interaction of hand grip and product desirability on local presence ($F(1, 77) = 7.15$, $p < .05$, $\eta^2 = .049$); neither of the two main effects alone was significant (hand grip: $F(1, 77) = .42$, $p > .1$; product desirability: $F(1, 77) = 2.23$, $p > .1$). Thus, H1 was not supported while H2 was supported, as seen in the significant interaction effect. Planned contrast showed that when browsing desirable products, holding smartphones in hands generated marginally higher level of local presence than putting smartphones on the table did ($M_s = 4.56$ vs. 3.78 , $F(1, 77) = 3.46$, $p = .067$). However, when browsing undesirable products, holding smartphones in hands generated slightly lower level of local presence, compared with putting smartphones on the table, but this effect was not significant ($M_s = 3.52$ vs. 3.93 , $F(1, 77) = .92$, $p > .1$). This suggests that hand grip interacts with product type to affect consumer perception.

We then verified the psychometric properties of the latent constructs and examined the structural model in PLS. As hypothesized, higher level of local presence increased participants' perception of product tangibility ($\beta = .620$, $t = 10.0$), and local presence explained 38.5% of the

variance in product tangibility. Furthermore, product tangibility increased both purchase intention ($\beta = .487$, $t = 5.23$) and choice satisfaction ($\beta = .479$, $t = 5.82$). Together, these factors explained 23.7% of the variance in purchase intention and 23.0% of the variance in choice satisfaction. Therefore, H3, H4, and H5 were supported.

CONCLUSION AND DISCUSSION

The present study seeks to understand the effects of consumers' physical bodily interactions with mobile devices on their virtual product perception and behaviors. This study extends the prior literature in a number of ways. First, it will complement the conventional approach in studying virtual product experience by highlighting the impacts of physical bodily interactions with technology on consumers' virtual product experience. This research brings in the new perspectives arguing that consumers' product perception would be shaped by their bodily interactions with the technology, for the same presentation format of the product information. Second, the results may add to a growing body of literature on the applicability of embodied cognition in computer-mediated contexts (Antle et al., 2009; Garg, 2012; Loke and Robertson, 2013). It represents an early exploration into the roles of hand grip in influencing consumer behaviors in mobile commerce context. Practically, this paper explores the validity of embodied cognition perspective as a source of design guidelines. For instance, mobile commerce practitioners might leverage built-in sensors to detect hand grips, include product interactions that encourage hand grips by consumers and adapt their interface design (e.g., vividness of product presentation) to improve consumers' virtual product experience.

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REFERENCES

1. Antle, A.N., Corness, G. and Droumeva, M. (2009) What the Body Knows: Exploring the Benefits of Embodied Metaphors in Hybrid Physical Digital Environments, *Interacting with Computers*, 21, 1, 66-75.
2. Barsalou, L.W. (2008) Grounded Cognition, *Annual Review of Psychology*, 59, 617-645.
3. Bianchi-Berthouze, N. (2013) Understanding the Role of Body Movement in Player Engagement, *Human-Computer Interaction*, 28, 1, 40-75.
4. Biocca, F. and Delaney, B. (1995) Immersive Virtual Reality Technology. In: *Communication in the Age of Virtual Reality*, F. Biocca and M.R. Levy (eds.), 57-124. Lawrence Erlbaum, Hillsdale.
5. Bone, P.F. and Ellen, P.S. (1992) The Generation and Consequences of Communication-Evoked Imagery, *Journal of Consumer Research*, 19, 1, 93-104.

6. Carney, D.R., Cuddy, A.J. and Yap, A.J. (2010) Power Posing Brief Nonverbal Displays Affect Neuroendocrine Levels and Risk Tolerance, *Psychological Science*, 21, 10, 1363-1368.
7. Dourish, P. (2001) Where the Action Is: The Foundations of Embodied Interaction. MIT Press, Cambridge, Mass.
8. Fitzsimons, G.J. (2000) Consumer Response to Stockouts, *Journal of Consumer Research*, 27, 2, 249-266.
9. Garg, A. (2012) Embodied Cognition, Human Computer Interaction, and Application Areas. In: *Computer Applications for Web, Human Computer Interaction, Signal and Image Processing, and Pattern Recognition*, T.-h. Kim, S. Mohammed, C. Ramos, J. Abawajy, B.-H. Kang and D. Ślęzak (eds.), 369-374. Springer Berlin Heidelberg.
10. Grigorovici, D.M. and Constantin, C.D. (2004) Experiencing Interactive Advertising Beyond Rich Media: Impacts of Ad Type and Presence on Brand Effectiveness in 3d Gaming Immersive Virtual Environments, *Journal of Interactive Advertising*, 5, 1, 22-36.
11. Howison, M., Trninic, D., Reinholz, D. and Abrahamson, D. (2011) The Mathematical Imagery Trainer: From Embodied Interaction to Conceptual Learning, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Vancouver, Canada.
12. IBM. (2014) Black Friday Results 2014. Retrieved from <http://www-01.ibm.com/software/marketing-solutions/benchmark-reports/black-friday-2014.html>
13. Jarvenpaa, S.L. and Todd, P.A. (1996) Consumer Reactions to Electronic Shopping on the World Wide Web, *International Journal of Electronic Commerce*, 1, 2, 59-88.
14. Jiang, Z. and Benbasat, I. (2004) Virtual Product Experience: Effects of Visual and Functional Control of Products on Perceived Diagnosticity and Flow in Electronic Shopping, *Journal of Management Information Systems*, 21, 3, 111-147.
15. Jiang, Z. and Benbasat, I. (2007) Investigating the Influence of the Functional Mechanisms of Online Product Presentations, *Information Systems Research*, 18, 4, 454-470.
16. Johnson, M. (1987) *The Body in the Mind: The Bodily Basis of Meaning, Reason and Imagination*. Chicago: University of Chicago Press.
17. Klein, L.R. (2003) Creating Virtual Product Experiences: The Role of Telepresence, *Journal of Interactive Marketing*, 17, 1, 41-55.
18. Lakoff, G. and Johnson, M. (1999) *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. Basic books, New York.
19. Landau, M.J., Meier, B.P. and Keefer, L.A. (2010) A Metaphor-Enriched Social Cognition, *Psychological Bulletin*, 136, 6, 1045.
20. Laroche, M., Bergeron, J. and Goutaland, C. (2001) A Three-Dimensional Scale of Intangibility, *Journal of Service Research*, 4, 1, 26-38.
21. Laroche, M., Yang, Z., McDougall, G.H. and Bergeron, J. (2005) Internet Versus Bricks-and-Mortar Retailers: An Investigation into Intangibility and Its Consequences, *Journal of Retailing*, 81, 4, 251-267.
22. Laros, F.J. and Steenkamp, J.-B.E. (2005) Emotions in Consumer Behavior: A Hierarchical Approach, *Journal of Business Research*, 58, 10, 1437-1445.
23. Li, H., Daugherty, T. and Biocca, F. (2001) Characteristics of Virtual Experience in Electronic Commerce: A Protocol Analysis, *Journal of Interactive Marketing*, 15, 3, 13-30.
24. Loke, L. and Robertson, T. (2013) Moving and Making Strange: An Embodied Approach to Movement-Based Interaction Design, *ACM Transactions on Computer-Human Interaction*, 20, 1, 1-25.
25. Microsoft. (2015) Device Interaction. Retrieved from <https://msdn.microsoft.com/en-us/library/windows/hardware/dn629624.aspx>
26. Morales, A.C. and Fitzsimons, G.J. (2007) Product Contagion: Changing Consumer Evaluations through Physical Contact with “Disgusting” Products, *Journal of Marketing Research*, 44, 2, 272-283.
27. Peck, J., Barger, V.A. and Webb, A. (2013) In Search of a Surrogate for Touch: The Effect of Haptic Imagery on Perceived Ownership, *Journal of Consumer Psychology*, 23, 2, 189-196.
28. Peck, J. and Childers, T.L. (2003) To Have and to Hold: The Influence of Haptic Information on Product Judgments, *Journal of Marketing*, 67, 2, 35-48.
29. Schlosser, A.E. (2003) Experiencing Products in the Virtual World: The Role of Goal and Imagery in Influencing Attitudes Versus Purchase Intentions, *Journal of Consumer Research*, 30, 2, 184-198.
30. Semin, G.R. and Smith, E.R. (2008) *Embodied Grounding: Social, Cognitive, Affective, and Neuroscientific Approaches*. Cambridge University Press, Cambridge.
31. Suh, K.-S. and Lee, Y.E. (2005) The Effects of Virtual Reality on Consumer Learning: An Empirical Investigation, *MIS Quarterly*, 29, 4, 673-697.
32. Van den Bergh, B., Schmitt, J. and Warlop, L. (2011) Embodied Myopia, *Journal of Marketing Research*, 48, 6, 1033-1044.
33. Verhagen, T., Vonkeman, C., Feldberg, F. and Verhagen, P. (2014) Present It Like It Is Here: Creating Local Presence to Improve Online Product Experiences, *Computers in Human Behavior*, 39, 270-280.
34. Wilson, M. (2002) Six Views of Embodied Cognition, *Psychonomic Bulletin & Review*, 9, 4, 625-636.
35. Wobbrock, J.O., Myers, B.A. and Aung, H.H. (2008) The Performance of Hand Postures in Front-and

Back-of-Device Interaction for Mobile Computing,
International Journal of Human-Computer Studies,

66, 12, 857-875.