ARTICLE IN PRESS

JCPS-00516; No. of pages: 6; 4C:

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ScienceDirect

Journal of Consumer Psychology xx, x (2015) xxx – xxx

JOURNAL OF CONSUMER PSYCHOLOGY

Research Report

Looks good to me: How eye movements influence product evaluation☆

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Received 29 August 2014; received in revised form 10 November 2015; accepted 15 November 2015

Abstract

When processing visually presented information, people move their eyes. This eye movement is governed by the employment of a general motor procedure related to direction. In three studies, we show that when subjects re-employ this directional motor procedure (that had been employed in a prior or contemporaneous (unrelated) task) when evaluating a product, a perception of fluency ensues, and this perception of fluency is then misattributed to the product under evaluation and enhances evaluations. We demonstrate the effect for intra-modal (repetition of eye movement) as well as cross-modal (contemporaneous eye and finger movements) settings.

Keywords: Eye movement; Fluency; Evaluation

The process of examining stimuli often involves directionally specific eye movements. In a retail environment, consumers may look at products on a shelf in a particular order. Online or when watching television commercials, consumers often look in a particular direction when processing text, animation, or dynamic product images. Similarly, stationary objects that implicitly convey direction (e.g., automobiles or shoes) might also invoke eye movement. We suggest that the experience of eye movement is governed by the employment of a general motor procedure related to direction. If consumers move their eyes from top to bottom when examining a product, they effectively employ a motor procedure of "moving downward." Drawing upon "fluency" research (Schwarz, 2004; Winkielman et al., 2003), we predict and observe that, if the direction of eye movement employed during product evaluation is perceived to be "easy" because it was recently employed, albeit in a different context, then product evaluations will be enhanced.

Further, fluency of eye movement can be experienced by either (a) prior, directionally similar movement in the same modality (i.e., eye movement followed by eye movement), or (b) contemporaneous, directionally similar movement in a different modality (e.g., finger and eye movement). That is, if consumers had moved their eyes in a particular direction recently, they would experience greater fluency if they were to employ the same eye movement later. Similarly, when consumers happen to make directionally specific motor movements that involve other body parts, they will find it easier to make directionally consistent movements with their eyes. If this eye movement occurs while processing information about a product, evaluation will be enhanced.

Three experiments examined these possibilities. Overall, our studies show that (a) repetition of an eye movement can enhance felt fluency, (b) a hand or arm movement (gross motor movement) that is accompanied by eye movement can also enhance felt fluency, and (c) this felt fluency can enhance product evaluations. These findings contribute to the literature on fluency by providing evidence that motor fluency might yield effects that are similar to those observed for perceptual and conceptual fluency. In addition, our results indicate that fluency effects might occur even when different motor modalities are implicated.

☆ The research for this project was supported by research grant GRF14502114 from the Research Grants Council, Hong Kong.
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http://dx.doi.org/10.1016/j.jcps.2015.11.003
1057-7408/

Please cite this article as: Shen, H., & Rao, A., Looks good to me: How eye movements influence product evaluation, *Journal of Consumer Psychology* (2015), http://dx.doi.org/10.1016/j.jcps.2015.11.003

Table 1
Object ratings as a function of number orientation and orientation of object appearance (Experiment 1). *

The orientation of number appearance			
	Top to bottom	Bottom to top	M_{diff}
Product evaluation			
Picture moved from top	.79 (31, 1.01)	−.10 (36, 1.29)	.89 ***
Picture moved from bottom	.05 (31, 1.46)	.53 (30, 1.33)	−.48
M_{diff}	.74 **	−.63 **	
Experienced fluency			
Picture moved from top	.91 (31, .81)	.39 (36, 1.13)	.52 **
Picture moved from bottom	.38 (31, 1.01)	1.02 (30, 1.11)	−.64 **
M_{diff}	.53 **	−.63 **	

Note: The number of participants per cell and standard deviations are shown in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Conceptual background

There is a small but emerging literature in marketing and consumer behavior that speaks to the issue of product location on consumer perceptions. For instance, Valanzuela and Raghubir (2009) observe that consumers believe that products placed in the middle of an array are the most popular. Relatedly, Deng and Kahn (2009) demonstrate that the physical location of a product image on a façade conveys information about its weight, such that images at the bottom or at the right side are deemed heavier. Similarly, Cai, Shen, and Hui (2012) show that consumers estimate higher prices for the products encountered on the right, rather than the left end of a continuum. Valanzueala, Raghubir, and Mitakakis (2013) find that consumers believe that products placed on the top shelf tend to be more expensive. These studies suggest that location can influence the perception of different types of product attributes which, in turn, can influence product evaluation.

Our research falls into the broad family of papers on location, though we invoke a different theoretical lens to study the phenomenon we observe and the process that accounts for it. Specifically, as we examine next, we suggest that the location in which a product is presented or toward which a product is moving could affect the direction of consumers' eye movement while examining this product. If consumers find it easy to move their eyes during product evaluation either because of prior eye movement or movement of other parts of the body, they would misattribute the ease they experience to the product. Consequently, product evaluation will be enhanced as well. Next, we discuss our conceptualization in greater detail.

Perceptual fluency due to eye movement

People evaluate stimuli favorably when the information associated with the object under evaluation is easy to process (Schwarz, 2004). For instance, it is easier to process a stimulus if previously viewed stimuli had similar perceptual or conceptual features (Lee & Labroo, 2004).

We argue that, in addition to features of the stimuli, a novel factor that may also influence fluency is the movement that people employ to process the stimulus. In particular, we examine the role of similar repeated eye movements in generating fluency. That is, when people employ directionally specific eye movements to process visual stimuli (e.g. viewing a product presented in a particular location; tracking animation or dynamic product images), the ease of making eye movements may contribute to felt fluency. Specifically, the employment of a particular (eye movement related) motor procedure during evaluation may yield the perception of fluency if that particular motor procedure had been recently employed, albeit on a different task. For instance, if a person had recently observed objects descending in her visual field, the subsequent reading of text from top to bottom would fit with this person's recently experienced eye movement and would produce a sense of "feeling right" about the experience of processing the textual information, and might then be misattributed to the material being read (cf., Cesario et al., 2004; Kim et al., 2009).

The transfer of motor fluency across modalities

Reusing an eye movement is premised on the similarity in muscular movement generating a sense of fluency (Krakauer & Shadmehr, 2006). However, the experience of movement could exist at a more abstract level as well.

There is evidence to support this contention. People's eyes often respond proactively to stimuli (Land, 2006; Land & Furneaux, 1997). Some ingenious research suggests that eye movement and the movement of other body parts (cross-modal consistency) may be part of an integrated system that does not require the eyes to collect visual information (which is their principal biological function). Foerster et al. (2012) found that when people make hand movements, their eyes orient toward a location ahead of the hands *even in the dark*. Similarly, people are better able to ignore distracting voices if they look away from the speaker that produces the auditory distraction (Reisberg, 1978). This cross-modal attention literature suggests that people may use their eyes as self-instruction about where their other modalities should attend (Reisberg, 1978). Seemingly, eyes move not simply to capture

Table 2
Object ratings as a function of ball orientation and orientation of object display (Experiment 2). *

The orientation of ball appearance			
	Left to right	Right to left	M_{diff}
Product evaluation			
Pen oriented toward the right	.56 (34, 1.32)	−.20 (32, 1.05)	.76 **
Pen oriented toward the left	−.13 (34, 1.20)	.35 (31, 1.25)	−.48
M_{diff}	.69 **	−.55*	
Shoe oriented toward the right	−.17 (35, 1.32)	−.63 (35, 1.51)	.46
Shoe oriented toward the left	−.50 (33, 1.17)	.22 (36, 1.15)	−.72 **
M_{diff}	.33	−.85 ***	

Note: The number of participants per cell and standard deviations are shown in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

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visual information but also to signal the direction in which a bodily motion ought to be oriented (Foerster et al., 2012). Because eye movements are quite tightly coupled, temporally and spatially, with motor actions, eye movements become an integral part of the motor program itself (Land, Mennie, & Rusted, 1999). When an action has become "automatic," it is not just the motor acts themselves that become automated, it is the complete control system responsible for their execution, which include sensory elements such as eyes (Land et al., 1999).

Based on the above considerations, we expect that when a motor movement employs a particular modality (such as finger or hand movement), a contemporaneous motor movement employing a different modality (such as eye movement) ought to generate an experience of fluency, because both experiences are tightly coupled to execute a motor program. Therefore, if processing information about a product visually involves specific eye movements, the evaluation of the product could be influenced by previous eye movement or the movement of other parts of the body. Three experiments examined these predictions.

Experiment 1

Experiment 1 examines our foundational claim, that the re-use of recently employed eye movement during evaluation yields enhanced evaluations.

Method and procedures

One hundred twenty-eight students participated in a 2 × 2 between-subjects factorial design. They were told that we were interested in students' memory ability and that they would be asked to memorize certain numbers. They were sequentially exposed to four numbers on a computer screen. In one condition, the numbers descended to the middle of the screen, while in another condition, the numbers ascended to the middle of the screen, thus generating downward or upward eye movement. After each number appeared, participants were asked to memorize it and then click on a mouse to generate the next number.

After memorization, participants were asked to evaluate an image of a chair, purportedly as a filler task. (All stimuli and procedural details for all experiments are available in the Web Appendix). The image either descended to the middle of the screen or ascended to the middle of the screen, depending on condition. The evaluation scales ranged from −3 to +3 (unattractive/attractive, unfavorable/favorable; $r = .81$, $p < .001$). Next, in an attempt to measure perceptions of fluency, participants were asked how they had felt at the time when they were examining the image of the chair, on a 3-item, 7-point scale (−3 = "unpleasant," "felt wrong," "difficult to process"; +3 = "pleasant," "felt right," "easy to process," Alpha = .80) (see Higgins et al., 2003; Shen, Jiang, & Adaval, 2010 for similar measures of fluency). Finally, participants completed a memory test in which they were exposed to five numbers and were asked to identify that number that had not appeared during the initial task.

Results

Product evaluation

The 2-way interaction on product evaluation was significant (F (1, 124) = 9.14, $p < .01$, $\eta_p^2 = .07$). As shown in Table 1, participants who saw numbers that descended evaluated the chair more favorably if the chair descended rather than if it ascended (.79 vs. .05, respectively, $t(124) = 2.27$, $p < .05$, $\eta_p^2 = .04$). However, participants who saw numbers that ascended evaluated the chair less favorably if the chair descended rather than if it ascended (−.10 vs. .53, respectively, $t(124) = 1.99$, $p < .05$, $\eta_p^2 = .03$).

Mediating role of experienced fluency

The 2-way interaction on the experienced fluency measure was significant (F (1, 124) = 10.39, $p < .01$, $\eta_p^2 = .08$). People who saw numbers that descended experienced greater fluency if the chair descended rather than if it ascended (.91 vs. .38, respectively, $t(124) = 2.08$, $p < .05$, $\eta_p^2 = .03$), whereas the reverse was true for participants who saw numbers that ascended (.39 vs. 1.02, $t(124) = 2.49$, $p < .05$, $\eta_p^2 = .05$).

Furthermore, experienced fluency had a significant effect on evaluation (β = .76, t (126) = 8.59, $p < .001$). The mean indirect effect of consistency in motor procedures on evaluation through fluency (based on 1000 bootstrap samples) was significant, with a point estimate of .42 and a 95% confidence interval excluding zero (.16–.76) (Preacher & Hayes, 2004). This analysis indicates that experienced fluency mediates the effect of the consistency between the initial motor procedure and the procedure employed while examining the object under evaluation.

Experiment 2

Experiment 2 examines our phenomenon in a marketing context. We appeal to previous research that suggests that peoples' eye movement can be triggered by cues such as the direction of another person's attention (e.g., eye gaze direction, head position, pointing gestures) or directional signals such as arrows (Kingstone et al., 2003; Birmingham, Bischof, & Kingstone, 2009). Therefore, the manner in which objects imbued with directional information are displayed may provide information about direction that then influences eye movement. For example, a knife or pen may point in a particular direction, and a car or bicycle, or apparel such as shoes, may also suggest a particular direction, thus implicitly guiding eye movement. In this experiment, we examine whether the evaluation of a stationary object that has a particular directional orientation can be enhanced if the evaluator has recently employed the eye movement suggested by the implicit directionality of the object.

Method and procedures

Two hundred seventy undergraduate students in Hong Kong participated in this study. Participants were first asked to look at an animation in which four balls either moved from the left to the right side of a computer screen or from right to left, depending on condition. Subsequently, in a purportedly

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unrelated task, participants were asked to form an impression of a product on the computer screen as quickly as possible. The object was either a pen or a sports shoe. We manipulated the directionality of the display of the object on the screen. The writing tip of the pen (or the toe of the sports shoe) was directed toward either the right or the left side of the screen. This procedure yielded a 2 × 2 between-subjects factorial design, similar to the one employed in Experiment 1.

Results

If participants experienced greater fluency while evaluating the object whose orientation was consistent with the direction in which the balls moved in the animation, that feeling of fluency would likely be misattributed to the object and yield enhanced favorable evaluations. The type of product (pen vs. shoe) had a main effect on evaluation ($p < .01$), but this finding is of no theoretical interest and since this variable did not yield any higher order interactions ($F < 1$), we pooled the results across products (Cho & Schwarz, 2010). The two-way interaction between the direction of ball movement and the orientation of the object was significant (F (1, 266) = 15.40, $p < .001$, $\eta_p^2 = .06$). As shown in Table 2, when participants had originally seen balls moving from left to right, they judged the product more favorably if it was directed toward the right than toward the left (.19 vs. −.31, $t(266) = 2.30$, $p < .05$, $\eta_p^2 = .02$). However, when they had seen balls moving from right to left, they judged the product less favorably if it was directed toward the right than toward the left (−.43 vs. .28, $t(266) = 3.24$, $p < .01$, $\eta_p^2 = .04$).

Experiment 3

Experiment 3 was designed to assess whether the effect observed in experiments 1 and 2 (an intra-modal manifestation of fluency driven evaluations) will also be observed when multiple modes are directionally consistent. Specifically, experiments 1and 2 examined whether eye movements during evaluation that were directionally consistent with previously employed eye movement would enhance evaluations. In this experiment, we assess whether the direction of prior finger movement has an impact on product evaluations that draw the eye in a particular direction (consistent versus inconsistent with the finger movement).

Our conceptual argument relies on the premise that, if eye movement is an integral part of a motor program (Land et al., 1999), people ought to automatically move their eyes in the direction that their finger moves, while turning over pages. When they use their fingers to go from one page to the next, their eyes will be likely to follow the direction in which their finger had moved.

We introduce an additional conceptual wrinkle to the finger–eye coordination story best explicated as follows. Our original thesis predicts that if one moves one's eyes from right to left in an initial task, and then when one follows an object from right to left in a subsequent task, it will yield fluency-driven effects that generate enhanced evaluation. By definition, this object under evaluation concludes its movement on the left hand side of the observer's field of vision. Therefore, in this study, rather than manipulate direction of movement, we manipulate location of the object to be evaluated on a horizontal (left–right) axis on a computer screen. Our prediction is that, following a page-turning exercise, people's eyes would move to the spot where finger movement ceases. Consequently, upon arriving at a new page, people would find it easier to attend to the option that appears on the side toward which their eyes had originally moved (e.g., the option on the left of the page, following a right to left page turning exercise), especially if they need to make a quick impression of options. The experienced fluency that follows will likely then be misattributed to the product being evaluated and yield enhanced preference (see Atalay, Bodur, & Rasolofoarison, 2012; Shen & Sengupta, 2014).

Pretest

We conducted a pretest to assess whether the evaluation of a product might depend on its location (rather than movement) following a directional task. One hundred forty-two participants were first asked to memorize four numbers that appeared sequentially on a screen. Those numbers either descended or ascended onto the screen. After that, in a purportedly unrelated task, participants were asked to form an impression of two cupcakes that were presented along a vertical dimension, as quickly as possible, and then were asked to choose one of them. We found that for participants who had been exposed to numbers that ascended onto the screen, 69% of participants (53 out of 77) preferred the cupcake located at the top. However, for participants who had been exposed to numbers that descended onto the screen, only 51% of participants (33 out of 65) preferred the cupcake located at the top ($\chi^2 = 4.81$, $p < .05$). Manipulating the direction of eye movement seemingly subsequently influences the choice of products depending on their location in one's visual field. Similarly, we expect that if finger and eye movement are part of the same motor system, we should observe similar effects of finger movement on product choice.

Procedures

One hundred thirty-six students participated in this study. They were given an iPad on which they sequentially viewed four screens. Instructions regarding the study were presented while viewing the first two screens. Participants were told that we were interested in students' preference for cupcakes and that participants needed to form an impression of cupcakes that they would view, as quickly as possible. Cupcakes were shown along a horizontal dimension on the third screen. After they finished forming an impression of the cupcakes, participants proceeded to the last screen, where they were asked to indicate their preference for the cupcakes. In one condition, participants' progress from one screen to the next required them to swipe their finger across the screen from right to left. In the other condition, participants were required to swipe their finger from left to right.

Results

When participants move their fingers to move from one screen to the next, their eyes will also likely spontaneously

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move in the same direction as their finger. Consequently, people will find it more fluent to pay visual attention to the cupcake that is at a location consistent with finger movement (i.e., left to right finger movement ought to yield enhanced preferences for objects situated on the right-hand side, relative to the left-hand side, of a horizontal axis, and vice versa) and will be more likely to choose it. Our results support this contention. When people swiped from right to left, 68% of participants (45 out of 66) preferred the cupcake located on the left. When people swiped from left to right, however, only 47% of participants (33 out of 70) preferred the cupcake located on the left. The difference between these percentages is statistically significant ($\chi^2 = 6.15$, $p = .01$).

Discussion

This study suggests that the choice of products that are located at different positions in the visual field is influenced by prior finger (and, presumably, associated eye) movement. These results imply that the ease of eye movement could be influenced both by previous eye movement as well as the movement of other parts of the body.

A potential rival explanation for our finding is that people might imagine themselves reaching for the option located at the spot where finger movement had ceased. However, our pretest results show that the effect occurs even when only eye movement was manipulated, a result that cannot be explained by anticipated ease of grasping.

General discussion

In three studies, we find that when (a) people's eye movement while processing a dynamic product image matched (versus mismatched) the eye movement employed recently, people experience great fluency which in turn increased product evaluation (Study 1); (b) the direction of eye movement can also be triggered by the directional orientation of product display (Study 2); and (c) eye movement can also be facilitated by a finger movement, and if the eyes moved in a direction toward where a product would later be discovered, product choice increases (Study 3).

Our theoretical contributions can be assessed on three dimensions. *First*, prior literature on fluency emphasizes the *content* of the stimulus and its impact on subsequent evaluative processes. If stimuli are easy to read, then the accompanying ease of processing may be misattributed to an unrelated object, which is then favorably evaluated (Kim, Rao, & Lee, 2009). Our research focuses on the motor procedures employed while observing that stimulus. Even for fine motor movement such as the movement of eyeballs, when an initial movement is consistent with the movement employed during evaluation, evaluations are enhanced due to experienced fluency. This motor fluency based finding is a novel finding that is not envisioned in the extant perceptual fluency literature.

Second, our research provides novel insights into how the eyes interact with other parts of the body. Prior research on embodied cognition suggests that people may mentally simulate the expected action associated with an object upon seeing it (Elder & Krishna, 2012). Our research is interested in how action triggers eye movement and the underlying mechanism in this arena is different from embodied cognition. Finger–eye coordination or similarity in movements of different body parts (see the Web appendix for a description of another study related to hand–eye coordination) is what drives the experience of fluency. These findings indicate that the experience of movement might exist at a more abstract level.

Third, our research contributes to the literature on physical location. Prior research has examined how physical location (high, on the right) might affect perceptions of expensiveness (Valenzuela et al., 2013; Cai et al., 2012) and images located at the bottom or right of a façade affect perceptions of heaviness (Deng & Kahn, 2009), which, in turn, could influence the evaluation of the product. Our research examines a different process according to which, physical location can affect the direction of eye movement, which in turn might impact felt fluency, and thus, evaluations.

From an applied perspective, this research offers straightforward practitioner implications. For example, would a chronically accessible motor procedure influence consumer judgment? Since people in most cultures typically read information from left to right, they ought to find it easier to move their eyes from left to right rather than from right to left. This implies that product image animation should be presented in a manner consistent with peoples' natural tendencies. Also, when presenting products imbued with directional information such as cars, shoes, or bicycles, marketers ought to orient them to point toward the right side of the display, which ought to enhance fluency.

Our findings also indicate that marketers should pay attention to the recent motor procedure that consumers might have employed, since irrelevant experiences might influence consumers' eye movement and their processing of products that are presented visually later. For example, during online shopping, consumers typically swipe leftward or upward to move the pictures of products on the screen of an iPad or a smartphone. As a result, they might be more likely to move their eyes toward the left side or the top of a product description. Therefore, marketers should present key messages in those areas of the visual field.

Several limitations of our research need to be acknowledged. *First*, we assume that the direction of eye movement is affected by the directional orientation of product display or the location in which a product is presented. Future research could track eye movement and provide more direct evidence for this process. *Second*, it is possible that making a quick impression (perhaps in a low involvement manner) generated our results; a more deliberate process might attenuate or eliminate the effect. *Third*, we examine consistency among eye and finger movement, but future research could examine whether consistency among other body parts might also yield similar results (e.g., the direction of hand movement or walking).

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jcps.2015.11.003.

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