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An eye-tracking study of the Elaboration Likelihood Model in online shopping

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ABSTRACT

This study uses eye-tracking to explore the Elaboration Likelihood Model (ELM) in online shopping. The results show that the peripheral cue did not have moderating effect on purchase intention, but had moderating effect on eye movement. Regarding purchase intention, the high elaboration had higher purchase intention than the low elaboration with a positive peripheral cue, but there was no difference in purchase intention between the high and low elaboration with a negative peripheral cue. Regarding eye movement, with a positive peripheral cue, the high elaboration group was observed to have longer fixation duration than the low elaboration group in two areas of interest (AOIs); however, with a negative peripheral cue, the low elaboration group had longer fixation on the whole page and two AOIs. In addition, the relationship between purchase intention and eye movement of the AOIs is more significant in the high elaboration group when given a negative peripheral cue and in the low elaboration group when given a positive peripheral cue. This study not only examines the postulates of the ELM, but also contributes to a better understanding of the cognitive processes of the ELM. These findings have practical implications for e-sellers to identify characteristics of consumers' elaboration in eye movement and designing customization and persuasive context for different elaboration groups in e-commerce.

1. Introduction

With the rapidly expanding growth of e-commerce, how consumers process information and the factors affecting their purchase decision become crucial. Studies have focused on the influence of consumers' personality traits based on motivation and/or ability and by external stimulus such as promotion messages and interface design. This area has been studied from three perspectives. First, the cognitive models of consumer behavior when consumers recognize, search, evaluate, and purchase products (Darley et al. 2010). Second, the Web flow or usability study of how web content and features influence the user attention and experience (Oinas-Kukkonen 2000, Konradt et al. 2012, Ehmke and Wilson 2007, Hasan et al. 2012). Lastly, the study of visual marketing on how top-down (originated from the consumer's personality traits) and bottom-up (the perceptual features or marketing messages) factors influence consumers' attention, how they process information, their preferences, and final decisions (Wedel and Pieters 2007, Bialkova and van Trijp 2011).

The Elaboration Likelihood Model (ELM) of Petty and Cacioppo (1986) illustrates how the key factors of consumer's personal traits and external stimulus influence information elaboration which determine perception and behavior in e-commerce (e.g. Pickard et al. 2012, Sicilia and Ruiz 2010, Tam and Ho 2005). The core of the ELM is that the elaboration continuum is based on a person's motivation and ability to think about and assess the qualities of the issue-relevant information in the persuasion context (Petty and Cacioppo 1986). With high motivation and high ability, elaboration likelihood is high, i.e., consumers tend to make a deeper and more conscious analysis of the issue-relevant information directly relating to his/her behavior. On the contrary, with low motivation and/or low ability, elaboration likelihood is low and consumers usually form their attitude or decision by some simple or peripheral cues (Petty and Cacioppo 1986). When dealing with the low elaboration group, framing message becomes a peripheral cue. This theory however has not been proven with consistency in consequent research results. Therefore, the issue deserves further investigation.

Information search in decision making activates human attention mechanism (Sandhusen 2008). The amount of information transmitted through the optic nerve often exceeds what the brain can process, so the brain has evolved mechanisms that only select a subset of relevant information for further processing (Wedel and

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Pieters 2007). Compare to a self-reporting questionnaire, eye tracker can be a more accurate instrument – it not only reveals cognitive processing but also helps in detecting potentially more subtle information-salience effects. Accordingly, this study used eye movement to lay the groundwork for examining the ELM in online shopping, i.e., this study explored the influence of the elaboration levels on information processing and purchase decision, and explored the effect of peripheral cue on the extent to which customer elaborate or process information. The findings of this study could be used to identify the characteristics of consumers' elaboration using eye movement and applied to the design of customization and persuasive context for different elaboration levels in e-commerce.

2. Literature review

2.1. Eye movement and cognitive processing

Human cognitive processing can represent the strategy of performing cognitive task, such as consumer decision making (Russo 1978). In order to identify the consumer's strategy and to infer the underlying cognitive strategy, eye tracking is a mean to observe user cognitive processes and to find out how specific visual features influence eye movement (Renshaw et al. 2003). Cognitive processing can be identified by tracking eye movements based on eye-mind hypotheses, as proposed by Just and Carpenter (1980). The eye-mind hypothesis assumes that no appreciable lag exists between what is being fixated and what is being processed. Therefore, the time taken to process a newly fixated word is directly indicated by the gaze duration (Just and Carpenter 1980), i.e., the assumption posits that what a person is looking at indicates that a person is currently thinking about or attending to.

Our eyes remain relatively still during fixations (Rayner 1998). During a fixation, a contiguous area of the scene is projected onto the fovea for detailed visual processing (Wedel and Pieters 2007). One of the main measurements in eye-tracking research is fixation duration (see Fig. 1). The number under the circles is the fixation time in millisecond. The size of the circle represents the length of fixation duration. Longer fixations indicate more time spent interpreting or relating the component in the interface to internalized representations; in addition, longer fixation duration on each area of interest (AOI) implies that it is difficult to extract or interpret information from the display element of the AOI, or the object in the AOI is more engaging or needs further investigation in some way (Ehmke and Wilson 2007, Jacob and Karn 2003, Poole and Ball 2005). Furthermore, information extracted during fixations leads to consumers' memory, preference, and choice (Wedel and Pieters 2007); for example, the product information or the feature advertisement characteristics lead to attitude or purchase outcomes via their effect on consumers' attention (Lohse and Wu 2001, Maughan et al. 2007, Zhang et al. 2009).

2.2. Elaboration Likelihood Model

The Elaboration Likelihood Model (ELM) is a multi-process theory of persuasion about the processes underlying changes in attitudes; at the core of the ELM, the elaboration continuum is based on a person's motivation and ability to think about and assess qualities of the issue-relevant information in the persuasion context (Petty and Cacioppo 1986, Petty et al. 2004). The processing motivation refers to the perceived personal relevance or importance of the issues or objects (Petty and Wegener 1998, Wegener et al. 2009) which can affect the intensity of message processing. The processing ability, on the other hand, refers to the fact that people have the requisite knowledge to understand, interpret, and scrutinize available information (Wegener et al. 2009, Petty and Wegener 1998) which can determine the capability of elaborating upon the message.

When motivation and ability to think are high, the high elaboration is taken and the central route to persuasion should be particularly effective, which people tend to carefully and thoughtfully scrutinize all issue-relevant information in order to gain confidence in the correctness of one's view. On the other hand, when motivation and/or ability to think are low, the low elaboration is followed and the peripheral route becomes effective, which people might attain sufficient confidence by some simple or peripheral cues (Petty and Cacioppo 1986, Petty et al. 2004, 1983). Under the high elaboration condition, the allocation of cognitive resources to consider the issue is a controlled process; people will spend more cognitive effort on evaluating the issue-relevant information (Petty and Cacioppo 1986). On the other hand, the low elaboration would rely on an automatic process; people will spend less cognitive effort on evaluating the issue-relevant information but will rely on simple rules (Petty and Cacioppo 1986).

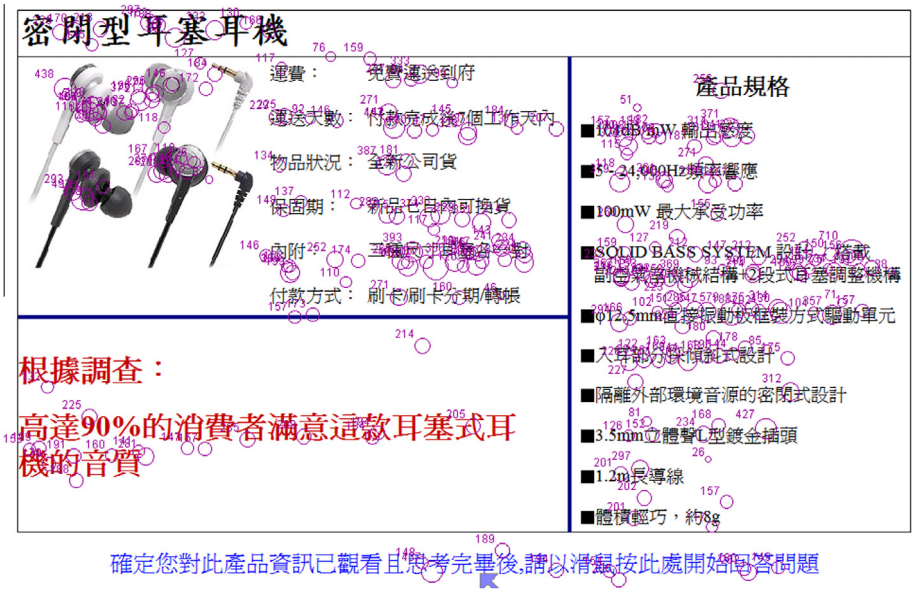

Fig. 1. The fixation duration in eye-tracking research.