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An investigation of effort–accuracy trade-off and the impact of self-efficacy on Web searching behaviors

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Abstract

One of the major barriers to the electronic commerce is that Web users may waste a lot of time and effort to search for information. Previous research suggests that both goal and experience are important factors influencing user's Web search behavior. In the aspect of goal motivation, the effort–accuracy trade-off model provides a good explanation for the choice of a strategy. Yet, this trade-off model does not consider the impact of the experience. The Social Cognitive Theory (SCT) may make up for this weakness by means of the construct called self-efficacy, which reflects the effect of experience. In this study, we explore if there indeed exists a trade-off effect between effort and accuracy in Web searching behaviors and how self-efficacy may impact the trade-off effect. The results show that while the emphasis of accuracy will increase the level of effort by low self-efficacy subjects, the trade-off between effort-saving and accuracy-seeking does not exist for individuals of higher self-efficacy.
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1. Introduction

The rapid growth of World Wide Web (WWW) has significantly increased the quantity of data available to WWW users but at the same time reduced the accessibility of information [14]. Information explosion causes significant cognitive overload. The nonlinearity of the hyperlinked documents may further cause disorientation of people who lose their sense of location and direction. WWW users may waste a lot of time and effort in struggling with inconsistent information that is distributed on Web. Therefore, how one may find information effectively has become an important issue to WWW users. Research must be directed at understanding users' Web search behavior to provide guidance for the design of WWW applications.

Several previous studies have responded to this concern. Hoffman and Novak [10] suggest two kinds of browsing behaviors: goal-directed and experiential. In this view, people who adopt a goal-directed strategy

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look for specific information, while the experiential users mainly attempt to make sense through their acts and the resulting system's responses. Similarly, Murphy [17] suggests that searching and surfing are two major ways to browse the Web sites. Searching refers to specific information finding activity while surfing means that people simply browse Web pages for curiosity or fun. In another study, Vandenbosch and Higgins [23] find that scan- and focus-search are two ways to acquire information through Internet. In scan-search, people simply browse with no specific question to resolve, while focus-search occurs when people want specific information for specific problem. Collectively, these studies suggest that goal is very important. People who have an explicit goal will adopt a directed, focused strategy to search.

To be specific, in the aspect of goal motivation, the effort–accuracy trade-off model [12,20] provides a good explanation for the choice of a strategy. According to this model, people, as rational and adaptive decision-makers, have a reservoir of strategies from which they can choose to realize their goal. Furthermore, they will attempt to minimize the cost and/or maximize the return when selecting search strategies. Thus, people will choose a more sophisticated, and therefore, more effort-demanding strategy when their goal is to seek for an accurate result. Conversely, a less effort-consuming strategy will be employed when they do not care much for a specific outcome. Several laboratory experiments have confirmed this prediction [20].

However, many other studies have shown that in naturalistic environment, people often stick to the same strategy regardless of situational differences [13]. For example, in researching computer usage, Olson and Nilsen [19] find that expert users do not change their access method. Similarly, Hammond et al. [9] show that people rely on a rapid, low analytical control strategy to solve their problem if they are experienced and if there are a large number of cues. Finally, Beach and Mitchell [6,16] propose the image theory that stresses the intuitive and automatic aspects of decision-making in real-world settings. In their view, people are creatures of the past experience, which produce a strong image that they can use to test the acceptability and compatibility of an alternative when making decisions. An option is rejected when the weighted violation of the criteria exceeds some critical threshold. Furthermore, making judgment about the compatibility of an option with one's image is a rapid, smooth process that can be characterized as intuition. An analytical process is evoked only if there are more than one acceptable alternative. These findings collectively suggest that people intuitively adopt one well-known alternative to solve problems when they become experienced with this particular problem domain. Thus, to effectively apply the effort–accuracy trade-off model to explain real-world search behaviors, an additional factor, experience, must be considered.

We should note that goal motivation and experience are not mutually exclusive. Rather, according to the Social Cognitive Theory [3], they are reciprocally determined. In this theory, experienced people who are also confident in their capability may adopt a goal level that is higher than one adopted by novices. Conversely, people of insufficient experience and low self-conviction may wonder and give up easily when facing trivial challenges. More importantly, experts may rely on intuitive strategies over analytical ones and can still manage to maintain their level of performance without expanding more effort. The Social Cognitive Theory therefore provides an appropriate perspective to complement the effort–accuracy trade-off model.

Thus, in this study, we set out to reexamine the effort–accuracy trade-off theory by considering the impact of experience. Two questions are asked in this study. First, "is there an effort–accuracy trade-off on WWW search decision?" and, second, "how does one's experience influence the effort–accuracy trade-off on WWW search decision?" Note that according to the Social Cognitive Theory, people's success or failure in their past experience can be indexed by a psychological construct called self-efficacy. Thus, the second question is rephrased as "how does one's perceived self-efficacy influence the effort–accuracy trade-off on WWW search decision?" A three-trial experiment was conducted to address these issues.

This paper is organized as follows. Section 2 reviews the theoretical basis from which four hypotheses are developed. Sections 3 and 4 describe the research design and data analysis, respectively. Finally, we discuss the effect of self-efficacy on the effort–accuracy trade-off model in Section 5 and provide a conclusion in Section 6.