The Effects of Information Format and Reading Task on Mobile User's Reading Behavior: A Cognitive Fit Perspective

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Abstract. The ownership of mobile devices rapidly expand which results to the behavior of reading is transformed. A central feature to the success of mobile publications is the design of an effective interface to link text to image information. However, the suitability of the prevalent information formats in supporting various mobile reading tasks is not known. Using the cognitive fit theory as the theoretical framework, we developed a research model to investigate the fit between information format and reading task, and examined its influence on mobile user's reading performance and perceptions of reading experience. As the information format has been shown to affect readers' mobile reading behavior, even when the information content is held constant, the practical implications for mobile publication designers include providing both types of information format on their mobile publications and matching the appropriate information format to the individual reader's task.

Keywords: cognitive fit theory, interface design, mobile publication, multi-touch gesture, reading experience.

1 Introduction

Ownership of mobile devices (also known as pad, tablet and smart phone) are growing. In order to seize widespread business opportunities, individuals such as designers, traditional media publishers, ad agencies, and companies of all sizes want to create, distribute, monetize, and optimize engaging content and publications for mobile devices [1]. A central feature to the success of mobile publications is the design of an effective interface to link text to image information. However, the specification of mobile publication is totally different from web or even paper. Moreover, the suitability of the prevalent information formats in supporting various mobile reading tasks is not known. Therefore, in this research, our objective is to present a research model to investigate the fit between information format and reading task, and examine its influence on mobile user's reading performance and perceptions of reading experience. Grounded on our research, mobile publication designers could match the appropriate information format to the different purpose of the publications based on reader's tasks in order to provide complete reading experience.

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2 Theoretical Background

2.1 Cognitive Fit Theory

The cognitive fit theory was developed to help understand how the fit between the presentation format and the decision-making task can influence individuals' problem solving performance [2]. It basically argues that the performance of problem solving depends on both the problem representation (hereinafter referred to as "information format") and the nature of the task. Different information formats, such as tables and graphics, emphasize different types of information and problem-solving processes. Similarly, different problem-solving tasks, such as trend detection and data value retrieval, also emphasize different types of information and problem-solving processes [3]. The cognitive fit theory suggests that when both the information format and the task emphasize the same types of information and processes, a cognitive fit will occur, which produces a consistent mental representation for problem solving. However, when there is a mismatch between the information format and the task, cognitive fit will not take place. Problem solvers will then need to transform some of the mental representation, inducing additional effort and resulting in relatively lower performance than when there is a cognitive fit.

2.2 Reading Tasks: Searching versus Browsing

The most important feature of content is segmentation due to the different preferences fulfilling various tasks. Take a female teenager as an example, she prefers scanning a gossip magazine to take some rest rather than skimming businesses journal because distinct readership has own interest on the specific type of publications. While searching and browsing are deemed to be distinct activities on the e-publications, researchers also recognized that they represent two ends of a continuum rather than a strict dichotomy [4]. Prior research mainly focus on e-commerce domain which means readers will act differently when they have different reading tasks in mind. [3] However, e-publications on mobile devices should renew an outstanding perspective. We differentiate between searching tasks and browsing tasks by the degree to which readers are specific about their studying objectives.

2.3 Information Format: Tap versus Swipe

Information format is defined as the presentation and organization of information about the available alternatives and their attributes [5]. Not mention to the mobile devices has already revolutionized the way that how people perceive the content presentation. The existence of multi-touch gesture or device sensors such as tap, swipe, gyroscope, and accelerator brings more playfulness for readers to have immersive reading experience. Take automobile chassis for an example, as Figure 1, readers can understand more detail about the structure of the car. These two presentations are used extensively in the present mobile publication applications including catalogs and magazines (which we will refer to as App in this paper).

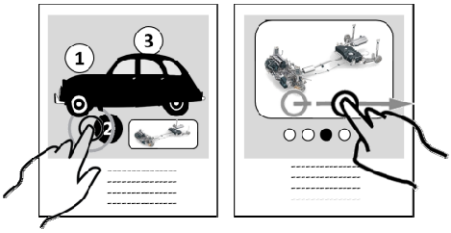

Fig. 1. Screen demonstrations of tap and swipe format

3 Research Model and Hypotheses

The research model is presented in Figure 2. According to prior research in reading behavior and human-computer interaction, users read books online for both goal-oriented and experiential reasons [6]. Therefore, two types of measures can be included when studying users' reading behavior. The first type is performance measures, including reading efficiency (as reflected by the time used) and communicative effectiveness (as reflected by the text/image information that readers can recall from the App). The second type is related to reading experience, such as readers' perceptions of cognitive effort in completing the reading tasks and their attitude toward using the App. Based on the prior theoretical background, we propose that when there is a match between the information formats (tap versus swipe) and the reading tasks (searching versus browsing), more positive outcomes in terms of the two types of measures will result. We firstly conducted a convenience subject in order to sketch the whole picture of the mobile reading experience, then in the next phase of our study we will collect more samples to evaluate the model.

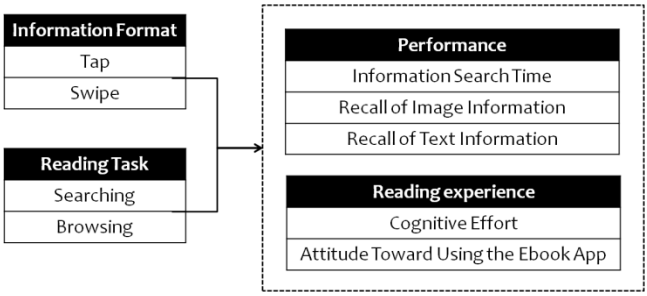

Fig. 2. Research model

3.1 Performance

Time is often used as an indicator of performance in certain tasks involving different information formats. [7] Less time indicates more efficient operation and better interface design, which are desirable to both system designers and system users. Recall is another dependent variable that is frequently adopted in IS research to

indicate the effectiveness of communication by different information formats [8]. Readers' recall of text/image information on the publication App can be used as an indication of the degree to which the publication App is successful in conveying ideas to the readers.

According to the earlier analysis, we propose an interaction effect between the information format and the reading task on performance measures. When there is a match between the two, readers will perform better in their reading processes, because effort expended on adjusting any mismatched mental representation can be minimized. Specifically, we expect that the swipe format, which supports local scanpaths, matches the browsing task, and the tap format, which supports global scanpaths, matches the searching task. As a result, not only will the readers' information search time be shorter (H1), but their recall of text/image information will be higher(H2).

- H1: Information search time will be shorter when the information format matches the reading task (i.e., the swipe information format matches the browsing task, and the tap information format matches the searching task).
- H2: Recall of text/image information will be higher when the information format matches the reading task (i.e., the swipe information format matches the browsing task, and the tap information format matches the searching task).

3.2 Reading Experience

The cognitive fit theory suggests that when there is a mismatch between the information format and the reading task, the readers will invest more effort in reading processes. Hence, we propose that cognitive effort will be lower when the information format matches the reading task (H3). Similarly, a more positive attitude from the reading experience will be formed if the readers' reading tasks are well supported by the information formats. Due to the matches between the swipe format and the browsing task and between the tap format and the searching task, we expect that attitude toward using the publication Apps will be more positive when the swipe format is provided for the browsing task and the tap format is provided for the searching task (H4).

- H3: Cognitive effort will be lower when the information format matches the reading task (i.e., the swipe information format matches the browsing task, and the tap information format matches the searching task).
- H4: Attitude towards using the publication Apps will be more positive when the information format matches the reading task (i.e., the swipe information format matches the browsing task, and the tap information format matches the searching task).

4 Discussions and Conclusions

Current study has proposed the role of information format in influencing readers' reading behavior. Utilizing the cognitive fit theory as the theoretical framework, our analysis suggests that mobile users' reading performance is influenced by both the presentation and tasks. By matching the information formats of an App page interface with mobile users' reading tasks, the time that readers spend searching for desired information can be shortened while their recall of text/image information on the App page site can be improved. Furthermore, readers may not consciously be aware of these effects, suggesting that editors or publishers can influence readers in a desired way by manipulating the information format to suit readers' reading tasks.

Future research can build on the findings of this study in other settings using different intervening variables. For example, they can examine whether the findings still hold when the content is in varied domains such as education, retail, travel, health or fashion. Moreover, the effects of other interface characteristics, such as animation of images or text and use of device sensor, can be examined. The predictive power of the cognitive fit theory and vision research in investigating the effects of the App page interface on readers' reading behavior can also be further explored. Continuing research will contribute to a better understanding of the role of the information format in improving reading performance in mobile cyberspace.

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