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# **An Eyetracking Study on Online Hotel Decision Making: The Effects of Images and Number of Options**

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## **ABSTRACT**

*Proving a satisfactory online hotel booking experience within limited space on web pages demands a thorough understanding of travelers' online decision-making behavior. This study investigates how images and number of hotel options displayed on a web page can affect consumers' decision-making process. Results show that when images were present, the participants spent more time evaluating each hotel option and viewed more hotel options. However, the participants spent less time evaluating each hotel option in the presentation mode featuring more options. Images help to reduce cognitive load and thus allow travelers to view more hotel options and in more depth. The set of 20 hotels are overwhelming to the decision makers.*

**Keywords:** *decision making, eye tracking, hotel, images.*

## **INTRODUCTION**

Millions of travelers visit various online travel sites looking for inexpensive products and convenient and enjoyable shopping experience. Especially, online hotel booking contributes to a large proportion of hotel sales (Carroll and Siguaw 2003). However, proving a satisfactory online shopping experience within limited space on web pages demands a thorough understanding of travelers' online decision making process in order for designers to customize and personalize websites (Argo, White, and Dahl 2006). Currently the most dominant travel websites (e.g. Expedia, Travelocity, Priceline, Orbitz, and Hotels.com) display a list of hotels sorted by recommendation, price, brand or location. Each hotel listing has one or more pictures, a brief introduction, hotel rates, and location information. How the consumers make decisions in this interactive and rich environment is largely unknown. In terms of the process of decision making, psychologists have proposed the additive utility model which asserts that the decision makers use utility function to evaluate different alternatives and pick an option (Tversky 1967). However, when facing many choices, decision makers tend to use frugal and convenient heuristics to save evaluation time and reduce cognitive load (.Gigerenzer and Todd 1999). For example, a study showed that decision makers followed a pairwise comparison when making purchases of automobiles (Russo and Rosen 1975). Using eye tracking methodology, Russo and Leclerc (1994) also demonstrated three stages of a nondurable purchase decision: orientation, evaluation, and verification. In tourism research area, research shows many attributes of a hotel influence travelers' choices, including rate, service quality, location, and value (Wong and Chi-Yung 2002). Past studies have revealed that the gender of the subjects, the complexity of web pages, and the viewing sequence will determine the cognitive process on web pages (Pan et al. 2004). Furthermore, web site characteristics such as color and image may affect social presence perception or information recall (Cyr et al. 2009; Zhang et al. 2003). The purpose of this study is

to use a mixed methodology (eyetracking, verbal protocol, and surveys) to examine the effects of images and the sizes of choice sets on the process of online hotel decision making.

## LITERATURE

Online Travel Agencies (OTAs) are similar in the format and number of products displayed in each result page after a user conducts a search. Studies showed that offering a large number of options is counterproductive (Schwartz 2004). The extensive choices were initially appealing to consumers; however, consumers felt less satisfied and more frustrated and regretted more about the choice they had made (Iyengar and Lepper 2000). The authors conjectured that the decisions makers are burdened by the responsibility of distinguishing good decisions from bad decisions. Vohs et al. (2008) state that making a choice involves conscious and effortful consideration among alternatives and requires elaborate information-processing capacity, which leads to a cost-depletion of self regulatory resources. "Self regulatory resources" is defined as underlying energy or strength for acts of self-regulation such as following plans and goals.

On a typical OTA site, a product is presented with both text and image to allow detailed examination. According to dual coding model (Paivio 1990), cognition involves the activity of two subsystems: a verbal system for dealing with text and a visual system for dealing with nonlinguistic objects, such as images. Compared to text, images are more likely to be coded both visually and verbally, resulting in the "picture superiority effect." Images are easier to recall because the greater number of memory codes for pictures represent multiple retrieval routes. Compared to the products with only text information, products with both text and images on a web page lead to shorter search times and better rate of recall (Hong, Thong, and Tam 2004). When the subjects were presented with cartoons consisting of a single picture and a relevant caption, the picture was not given full inspection until the caption had been read. Similar results were obtained when print ads with text and pictures were used (Rayner et al. 2001). People tend to spend more time looking at the text than the picture part of the advertisements. In addition, researchers find that people looked at the titles and descriptions longer than the images. Texts were used to make judgments and images as confirmatory evidence for selections (Hughes et al. 2003). Thus, the goal of this study is to investigate the effects of the number of options and the presence of images on the process of online hotel choice; the specific hypotheses are: **h1) the subjects will spend less time evaluating hotel sets with images;** **h2) the subjects will spend less time on each option in presentation modes featuring more options;** **h3) subjects will view more options in hotel sets with images.**

## METHODOLOGY

Each participant was shown four sets of hotels, which were displayed on four separate mockup web pages. The first set featured five hotels, with two images of each hotel along with a text description; the second set featured five hotels with only text; the third set was comprised of twenty hotels along with two images each and text descriptions; the fourth set featured twenty hotels with text descriptions and no images. In the first and third sets, each hotel in the set displayed an internal image of the room and an image of the exterior of the hotel. For all four hotel sets, the text elements including price, location, and description were identical to the first and third sets respectively (sorted by price in the order of high to low), but randomized among all the hotels in order to avoid memory spillover factor. Each subject was asked to pick a hotel room from each of the four sets. An hour was set as the maximum of time for the task, though the subjects had the choice to finish early if they were satisfied with their hotel choices.

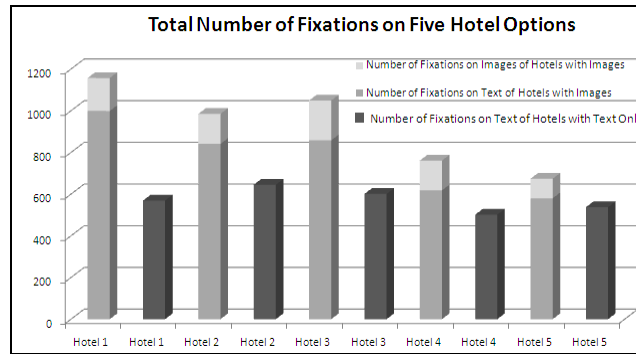
A combination of eye tracking methodology, verbal protocol, and surveys were adopted. Eye tracking methodology provides direct measures of eye movement in realistic stimulus-based settings (Rayner 1998). Eye movements consist of fixations, which are relative stable eye gazes lasting for about 200-300 milliseconds, and saccades, which are rapid eye movements of 3-5 degrees of visual angle. Eye tracking equipment is able to record the duration of each eye

fixation and the coordinates of the visual stimuli (Rayner 1998). Online screen capturing software (Camtasia Studio) recorded the subjects' verbal protocol (TechSmith 2008). Pre- and post-experiment surveys asked about the subjects' demographic information and travel and Internet use experience. The triangulation of these datasets provided a detailed pictures on the decision making process of hotel choices. Participants voluntarily signed up for a 90 minute time slot. Testing was commenced on October 25, 2007 and concluded on January 9, 2008 and took place in a lab on a southern liberal arts university campus. The participants were recruited through an online classified on the campus' email network. The majority of participants were faculty or staff of the university. Those who volunteered to participate in the study were compensated with \$30 in cash. The results of 16 subjects were deemed valid and included in the analysis of eye tracking data using Gazetracker (Pan et al. 2004).

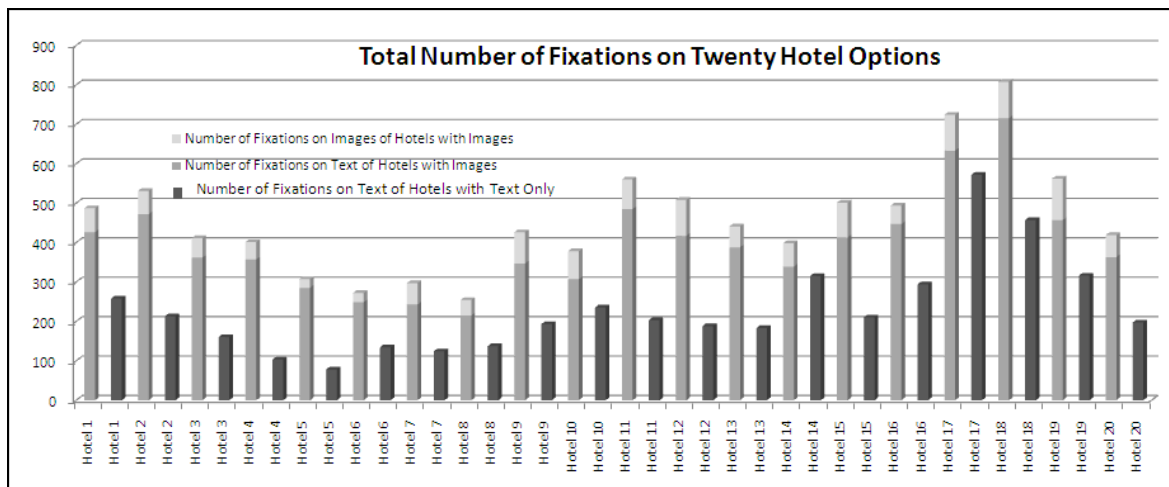
## RESULTS AND DISCUSSION

The results showed that the subjects spent an average of 267 second on the 20-hotel set with images and 157 seconds on the text-only 20-hotel set. For the 5-hotel set, they spent 132 seconds on the set with images and 85 seconds on the hotel set without images. Interestingly, the sets with images took much longer for the participants to evaluate than the text-only sets. They spent 1.6 – 1.7 times of time evaluating hotels with images than those only with text ( $p < .001$ ). Thus, **h1 was rejected**. In addition, the subjects spent about twice as long on the 20 option hotel sets with images (four times the number of options) than the 5 option sets with images. The subjects made an average of 675 fixations on each option of the 5 hotel set with images, compared to 312 fixations for the 20 hotel set with images; the subjects spent 146 fixations on the 5 hotel set with images, compared to 53 for the text-only 20 hotel set. Thus, **h2 is confirmed** in that the subjects used heuristics to reduce the cognitive effort for each option. The results of the percentage of participants who viewed the hotel options in all the positions also showed that images help the subjects view more hotel choices, especially for the sets with 20 hotel options. On average, the subjects viewed 14.8 hotels in text-only set, and 18.0 hotels in the set with images ( $p < .001$ ). Hotels at the beginning and end were viewed more frequently in the image condition, but not the middle ones: such as the number 3 in 5 hotel choices, and the number 7 and 8 in 20 hotel choices (Figure 1 and Figure 2). **Thus, h3 is confirmed.**

In addition, the average time of one fixation indicates the intensity of information processing (Rayner 1998). The participants spent more time per fixation on text-only hotel alternatives compared to the hotel options that also included images ( $p < .001$ ), indicating greater cognitive efforts. Text-only hotel sets required more of the subjects' cognitive efforts and as a result were harder to evaluate. The presence of images also increased the number of fixations on the text. The eye movement behavior on the 20 hotel options yielded similar results. Thus, the images of the hotels enabled subjects to conduct a smoother and easier evaluation. Figure 1 and Figure 2 illustrate the amount of fixation on different hotel alternatives given the four conditions. The two graphs show that the hotel options at the top of the scroll sets received more attention than those at the bottom, indicating a effect of interface (scroll sets) on the subjects' visual attentions.



**Figure 1 Number of Fixations on Five Hotel Sets**



**Figure 2 Number of Fixations on Twenty Hotel Sets**

### CONCLUSION

This study furthers the understanding of online hotel decision making process and provides guidance for design of OTAs. The set of 20 hotels seems to be overwhelming to the decision makers and thus certain hotel options were ignored. For each page scroll, the hotel options that appeared at the top received more attention than those at the bottom. Images help to reduce cognitive load and thus allow travelers to view more hotel options and in more depth. Thus, the inclusion of images that present a positive image of the hotel and help improve consumers' degree of interest and provide a higher level of enjoyment. In providing hotel options in their results, OTAs may keep a balance in the number of hotel alternatives provided to the user on a search results page. The sets with 20 hotel alternatives seemed to provide too much information for the subjects to digest. Limiting the number of options and considering the use of more images might help to maximize the overall user experience.

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