

Understanding Consumers' Processing of Online Review Information

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Abstract

The purpose of this study is to determine the viewing patterns and reactions of average Internet users to various presentations of reviews and star ratings of an imagined hotel. Eye tracking methods are used to record viewing patterns and produce graphs and translation matrices indicating the flow of reading. Surveys are conducted to determine participant opinion of the hotel and correlated with eye tracking data.

Author Keywords

Eye tracking, online reviews, user-submitted reviews

Introduction

It is estimated that the number of Internet users around the world exceeds 900 million while the information traffic doubles every 1 to 1.5 years (Kaynar & Amichai-Hamburger, 2008). As Internet usage increases, an increasing number of Web users are purchasing goods from e-commerce sites. To aid them in their purchasing decisions, consumers have been increasingly drawn towards user-supplied reviews. Recent studies have shown that reading reviews have become a vital element in consumer decision-making, with over 60% of users consulting online reviews and 80% reporting feeling influenced by them. An existing body of research suggests that consumers are influenced by majority decisions (Cialdini 1999); while at the same time, weigh negative information much more heavily than positive information (Kahneman and Tversky 1979).

Ultimately, the purpose of such decision making is to avoid regret, which arises from a comparison between the factual outcome and an imagined outcome (Zeelenberg et al 2000).

Two studies have been performed by our research partners on this subject material in the past. One established that consumers will be more likely to purchase if the majority opinion is positive, and that consumers experience the most regret for making poor purchasing decisions. The second established that a relatively higher concentration of negative reviews would increase consumers' perceptions of risk, but was unable to show that very positive reviews would act as a buffer against negative reviews.

The purpose of this study is to determine how visitors read and process reviews in more detail than the previous two studies with an emphasis on eye tracking rather than survey data. Specifically, we will study the amount of time spent viewing each region, observe what transitions occur from one region to another, and correlate our observations with opinion survey responses.

Background

An experiment done by Park, Lee and Han in 2007 studied how different people would react to online reviews. They concluded that, in general, consumers with low involvement pay more attention to the raw number of reviews rather than their contents. Conversely, consumers with high involvement pay

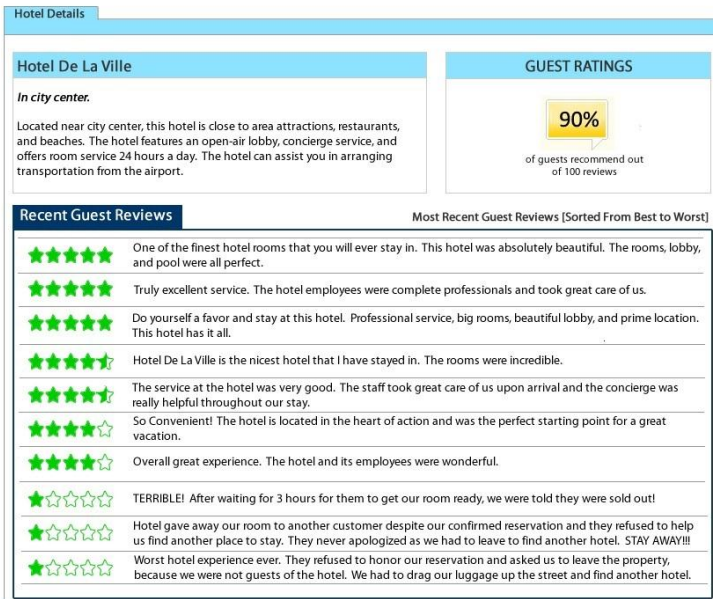


Figure 1 – Example stimulus

attention to the number of reviews when the reviews were of good quality. But their study did not prove to be consistent (Park, Lee & Han 2007), so they required more study. Our experiment is intended to expand on their work and study the effects of online reviews on purchasing decisions.

Several published studies in retail, both physical and online, suggests that consumers' decisions are influenced by the importance of attributes such as perceived value and quality of products, responsiveness, convenience, the company's reputation, customer service, information and order services provided, merchandise assortment, salesperson interaction, ability to shop from home, and economic utility (Eastlick & Feinberg 1999; Hansen & Deutscher 1977-78).

Szymanski and Hise (2000) investigated the role of online convenience, merchandising in the form of product offerings and product information, site design, transaction security, and consumers' satisfaction. They found that convenience, product information, site design, and transaction security had a statistically significant influence on satisfaction with online shopping.

METHODOLOGY

Apparatus

For this study we used a Tobii 1750 eye tracker to collect eye movement data. The resolution was set to



Figure 2 – AOIs in example stimulus

1280x1024 pixels. The eye tracking equipment is located at the above and below the display. Eye position data was sampled at 50 Hz, with a position accuracy of $\sim 0.5^\circ$. Subjects sat approximately 50 cm away from the display, which provided the stimulus.

Stimulus

Each subject was presented with one randomly chosen mock Web review from a pool of four. The stimuli were designed to resemble a travel Web site for the fictional Hotel De La Ville and its fictional guests' experiences, represented as short reviews and a star rating. The reviews and ratings are presented as the most recent added to the site and are mostly positive, with three variable reviews and ratings (neutral/negative) grouped at the bottom of the page. Additionally, a variable overall rating (70% / 90%) presented as the average of all previously submitted ratings appears in the top-right corner. We defined 6 areas of interest (AOI) as the hotel description, overall rating, positive star ratings, positive reviews, negative/neutral star ratings, and negative/neutral reviews. A representative stimulus is presented in Figure 1, and again with AOIs outlined in Figure 2.

Subjects

Students in the Clemson University marketing department were recruited for the experiment. 33 participants were tested, all of whom were in the 18-24 age group. The study was presented as an extra credit opportunity.

Experimental Design

To help understand the decision-making process of consumers when confronted with online reviews, we designed a study to measure reactions when presented with differing review content. Survey results were paired with eye tracking data to match eye movements with perception, and to determine if poor perception of the mock hotel and increased perception of risk correlated with increased time spent viewing negative review AOIs.

Eye tracking data was processed and analyzed in Tobii Studio to determine location, duration, and frequency of fixation points. Simple graphs like heat maps were generated for illustrative purposes. Transition matrices were compiled to illustrate common AOI transitions. The relationship between participants' opinions about the hotel and overall time spent in varying AOIs was graphed.

One of the four stimuli was presented to each subject in sequence, effectively randomizing the pairing of displayed stimulus to participant. This was done to prevent "burnout" of the stimulus. We found that, during experimental development, participants would observe small changes between each mock review and ignore the larger, more important details after viewing more than one.

Procedure

The experiment was carried out in one session. The participant arrived and was briefed on the purpose of the study, the procedure, and the usage of the eye tracking station. After being seated at the Tobii 1750, the participant was guided through the tracker calibration process using a 5-point grid.

Each participant was then shown one of the four hotel review mockups at random, with instructions to skim it for important information. The Tobii 1750 tracker recorded the participant's eye movements at this time. When the participant felt that he or she had seen enough, the mouse button was clicked to end the tracking session and proceed to the next phase of the study.

Following the eye tracking session was a quick survey to determine the participant's reaction to the review mockup. The participant was asked to determine the maximum dollar amount they would be willing to pay

for the hypothetical room and rate their impression of the hotel, their willingness to recommend it to others, their anticipated future satisfaction with the room, and overall perceived risk of the transaction.

RESULTS

Overview

Eye tracking data was read and processed using Python scripts. We specifically attempted to ascertain the amount of time spent in each AOI, the number of transitions that occurred between each AOI, and overall metric of the reactions each participant had to the hotel after reading the review. Additionally, we generated heat maps for each review image to better understand where participants spent most of their time reading. A representative sample of the heat maps from 90% reviews is displayed in Figs. 3 and 4 below:



Figure 3: Heat map for 90%-neutral review



Figure 4: Heat map for 90%-negative reviews

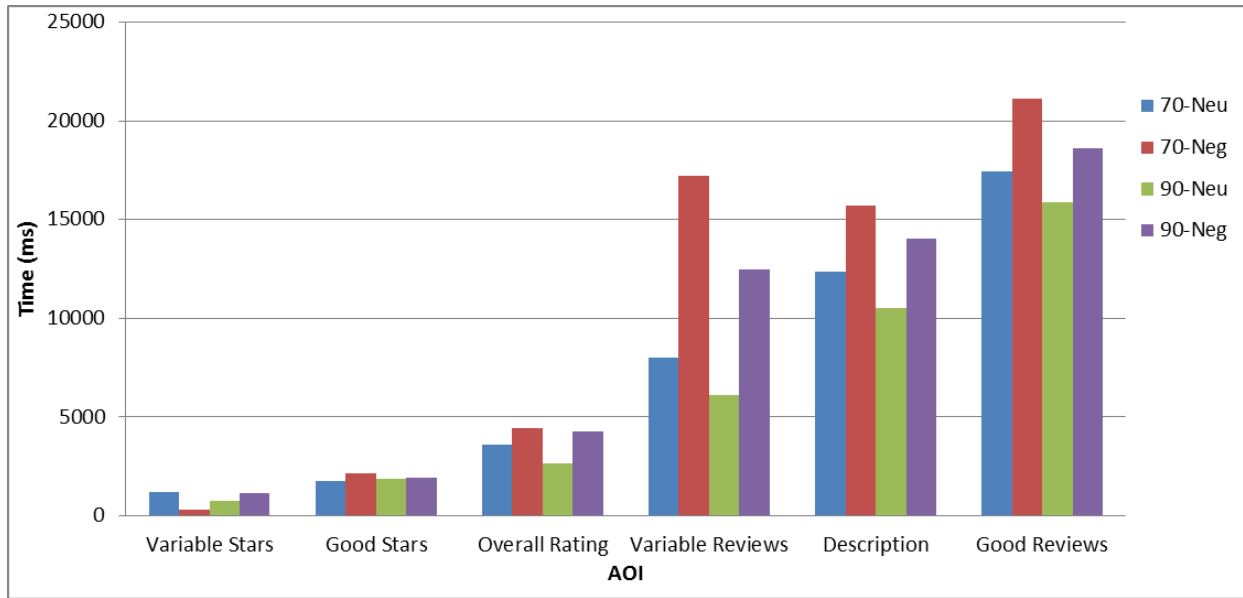


Figure 5: Mean time spent in each AOI by review type

Figure 5 depicts the mean time spent viewing each AOI by review type, written as overall rating and quality of review. Each listed AOI corresponds with the AOIs depicted in Figure 2.

Figures 6 and 7 depict transition matrices for AOI transitions.

Figure 8 depicts the mean of selected user responses. Numbers in columns 3 and 4 are on a scale from 1-7, with 1 being least likely and 7 being most likely.

Discussion

Observing the heat maps in Figs. 4 and 5, we can see that participants spent a lot of time reading certain areas of the review. As expected, a significant amount of time was spent reading the description and overall score. However, we note that negative reviews received more consistent and longer viewing than the neutral reviews, as evidenced by the increased amount of yellow and red in the corresponding AOIs.

Observing the mean time spent in each AOI by review type, we see that, when reviews were negative, participants generally viewed almost all AOIs about twice as long as they did when reviews were neutral. The most dramatic increase in viewing time is evident between the variable reviews, suggesting that participants read negative reviews longer and more carefully than neutral reviews.

We note that good reviews and hotel description AOIs were, as a group, read the longest out of all other AOIs. We must assume that this is at least in part due to the fact that these are largest in both size and textual content. However, we see a similar increasing effect as reviews shift from neutral to negative.

We also note that, in addition to the increasing effect from neutral to negative reviews, participants spent more time viewing the majority of the AOIs if the overall score was lower.

AOI transitions proved interesting. We found that

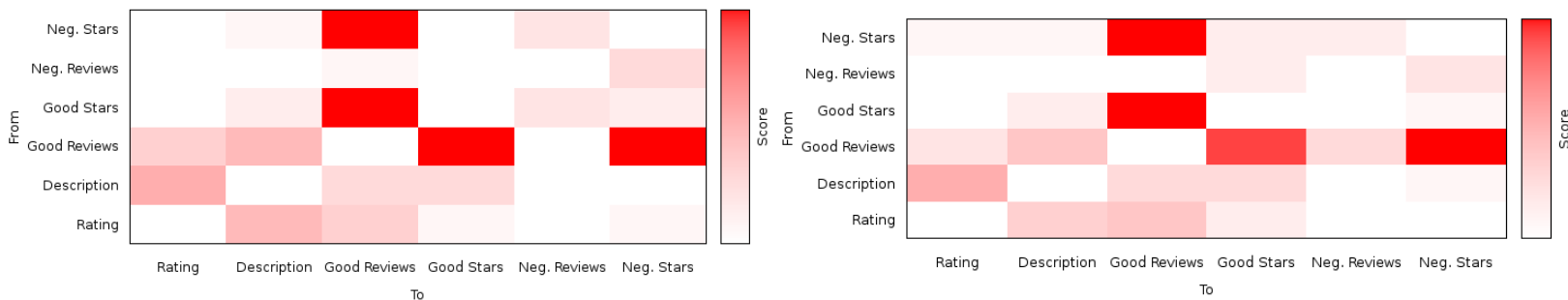


Figure 6: Transition matrices for 70%-negative and 90%-negative reviews, respectively, with mean transitions per group

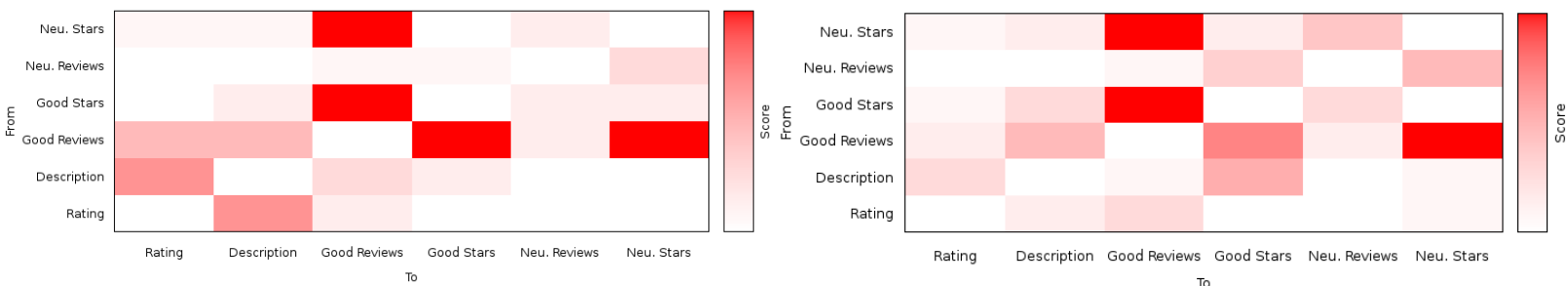


Figure 7: Transition matrices for 90%-neutral and 90%-neutral reviews, respectively, with mean transitions per group

participants transitioned frequently from good star ratings to good reviews in all images. This may be a consequence of the fact that participants spent a long time viewing the positive review AOI and the positive star ratings are adjacent. We observed higher activity amongst the good reviews, overall rating, and description AOIs with 70% review images. We also noted a high rate of activity between the good review and variable stars AOI in all cases, indicating participants were going back and forth between them. Finally, we noted that more transitions occurred from good reviews to the variable rating if the overall rating was 70%, indicating that participants went back to re-read the score.

Finally, feedback from the survey proved interesting. On average, participants decided that 70% and 90%-negative reviews were all worth less than \$175, only giving a higher appraisal for 90%-neutral reviews. Interestingly, participants seemed more likely to stay at the hotel if the variable reviews were negative. Unfortunately, determining why is beyond the scope of this study, and could prove interesting in further review.

Conclusion

This study has shown us that consumers spend significantly more time reading reviews the lower the overall score is, with the most time spent on a low overall score coupled with visible poor reviews. Additionally, there is a “doubling back” resulting in the reviewing of overall score from positive reviews if the overall score is poor. To that end, we recommend that any sites displaying similar product reviews arrange the layout so that the overall score is always visible.

ACKNOWLEDGMENTS

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Image	Price	Would Stay (Higher more favorable)	Would Recommend (Higher more favorable)
70-Neg	\$ 175.00	5.25	4.88
70-Neu	\$ 160.55	5.22	5.00
90-Neg	\$ 160.63	5.25	5.13
90-Neu	\$ 187.38	5.00	5.63

Figure 8: Chart of user responses

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