“Seeing through consumers’ eyes”: Exploring online restaurant selection behaviors using eye-tracking technology

by

Xiaoye Li

B.S., Beijing International Studies University, 2010
M.S., University of Houston, 2012

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hospitality Management
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

Abstract

With the advancement of the Internet and information technology, consumers have access to a massive amount of information before purchase. In the hospitality industry, consumers frequently search online information to make decisions. However, there has been limited hospitality research exploring the actual information search behaviors in the online setting. The purpose of this research was to assess the actual information search behaviors of consumers when choosing restaurants through consumer review websites. To accomplish the purpose, three mixed-methods were used including eye-tracking experiments (Phase I), qualitative, retrospective think-aloud (RTA) interviews (Phase II), and a scenario-based survey (Phase III).

In the eye-tracking experiments, 30 participants were recruited and instructed to conduct restaurant search tasks. Variables included fixation duration, fixation count, and visit count, indicating how long and how often consumers' attention had been attracted to certain information areas. The eye-tracking data was also visualized through heat maps and gaze plots.

Following eye-tracking experiments, RTA interviews were conducted to investigate the underlying thinking process of consumers. A playback of the recorded eye-tracking video was presented to each participant while participants verbalized their thinking process and reasoning of information search behaviors. The interviews were recorded, transcribed, and analyzed through grounded-theory model to identify important information elements.

To overcome the limited generalizability of the eye-tracking experiments and interviews, a scenario-based survey was created, and seven hypotheses were developed to evaluate impacts of online reviews, images, and advertisements on consumers' interests and restaurant visit intentions based on the results of Phases I and II. Restaurant selection scenarios were provided to the participants to look through screenshots of webpages in order to mimic the online

environment. The online survey company Amazon MTurk was used for data collection. A total of 406 usable survey responses were collected and analyzed using descriptive statistics, one-sample Chi-square tests, and visualized heat maps.

Eye-tracking experiment results revealed that images, consumer reviews, and filter functions were the top information areas to which consumers paid considerable attention. Advertisements in Yelp also received much attention from participants, but during RTA interviews, advertisements were found to be less impactful for consumers' decision-making than the number of reviews, images with food items, and consumer reviews. Five out of seven hypotheses in Phase III were supported, indicating that it was mostly consistent with findings of the eye-tracking experiments and interviews (Phase I and II). Specifically, consumers' interests and intentions to visit restaurants were greater for restaurants with a higher number of reviews, food images, and without advertisements. Consumers also were more interested in extremely rated reviews and preferred evenly-distributed image groups.

This study contributes to the existing hospitality literature related to consumer behavior with the utilization of the innovative, combined methods of eye-tracking technology, RTA interviews, and scenario-based survey. This approach allowed the researcher to obtain a holistic view of actual consumer behavior, thinking process accompanying the behavior as well as the verification with large sample. Consumer review websites and restaurateurs were provided with specific recommendations to enhance the online user experience and improve customer satisfaction, respectively.

Words: 499

Keywords: Consumer behavior, online information search, restaurant selections, consumer review websites

“Seeing through consumers’ eyes”: Exploring online restaurant selection behaviors using eye-tracking technology

by

Xiaoye Li

B.S., Beijing International Studies University, 2010
M.S., University of Houston, 2012

A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hospitality Management
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2018

Approved by:

Major Professor
Dr. Junehee Kwon

Copyright

Abstract

With the advancement of the Internet and information technology, consumers have access to a massive amount of information before purchase. In the hospitality industry, consumers frequently search online information to make decisions. However, there has been limited hospitality research exploring the actual information search behaviors in the online setting. The purpose of this research was to assess the actual information search behaviors of consumers when choosing restaurants through consumer review websites. To accomplish the purpose, three mixed-methods were used including eye-tracking experiments (Phase I), qualitative, retrospective think-aloud (RTA) interviews (Phase II), and a scenario-based survey (Phase III).

In the eye-tracking experiments, 30 participants were recruited and instructed to conduct restaurant search tasks. Variables included fixation duration, fixation count, and visit count, indicating how long and how often consumers' attention had been attracted to certain information areas. The eye-tracking data was also visualized through heat maps and gaze plots.

Following eye-tracking experiments, RTA interviews were conducted to investigate the underlying thinking process of consumers. A playback of the recorded eye-tracking videos was presented to each participant while participants verbalized their thinking process and reasoning of information search behaviors. The interviews were recorded, transcribed, and analyzed through grounded-theory model to identify important information elements.

To overcome the limited generalizability of the eye-tracking experiments and interviews, a scenario-based survey was created, and seven hypotheses were developed to evaluate impacts of online reviews, images, and advertisements on consumers' interests and restaurant visit intentions based on the results of Phases I and II. Restaurant selection scenarios were provided to the participants to look through screenshots of webpages in order to mimic the online

environment. The online survey company Amazon MTurk was used for data collection. A total of 406 usable survey responses were collected and analyzed using descriptive statistics, one-sample Chi-square tests, and visualized heat maps.

Eye-tracking experiment results revealed that images, consumer reviews, and filter functions were the top information areas to which consumers paid considerable attention. Advertisements in Yelp also received much attention from participants, but during RTA interviews, advertisements were found to be less impactful for consumers' decision-making than the number of reviews, images with food items, and consumer reviews. Five out of seven hypotheses in Phase III were supported, indicating that it was mostly consistent with findings of the eye-tracking experiments and interviews (Phase I and II). Specifically, consumers' interests and intentions to visit restaurants were greater for restaurants with a higher number of reviews, food images, and without advertisements. Consumers also were more interested in extremely rated reviews and preferred evenly-distributed image groups.

This study contribute to the existing hospitality literature related to consumer behavior with the utilization of the innovative, combined methods of eye-tracking technology, RTA interviews, and scenario-based survey. This approach allowed the researcher to obtain a holistic view of actual consumer behavior, thinking process accompanying the behavior as well as the verification with large sample. Consumer review websites and restaurateurs were provided with specific recommendations to enhance the online user experience and improve customer satisfaction, respectively.

Words: 499

Keywords: Consumer behavior, online information search, restaurant selections, consumer review websites

Table of Contents

List of Figures xiii
List of Tables xiv
Acknowledgement xv
Dedication xvi
Chapter 1 - Introduction 1
Introduction 1
Problem Statement 5
Purpose of the Study 6
Significance of the Study 7
Practical Implications 8
Limitations 9
References 10
Chapter 2 - Literature Review 14
Consumer Behavior and Decision Making Process 14
Theoretical Background of Consumer Behavior 14
Consumer Decision Process Model 16
Understanding Consumers in Hospitality Industry 19
Online Consumer Behavior and Information Search 21
Internet and Online Purchase 21
Online Consumer Behavior in Hospitality Industry 23
Decision Making in Online Restaurant Selection 28
Influential Factors for Traditional Restaurant Choices 28
Restaurant Selections in the Online Setting 30
Information Search and Decision Making for Online Restaurant Selection 31
Eye Tracking Methodology 33
Attention Patterns and Decision Making 33
Eye Tracking, Attention, and Cognitive Process 35
Eye Tracking and Consumer Behavior 36
Retrospective Think-aloud Interviews 39
References 40

Chapter 3 - Methodology 54
Phase I. Eye-tracking Experiment 54
Participants 54
Recruitment Procedure 55
Apparatus and Procedure 56
Pilot Study 58
Data Analysis 58
Measurement of Interests 58
Data Visualization 60
Phase II. Qualitative Study (Retrospective Think-aloud Interviews) 61
Participants 61
Procedure 61
Data Analysis 62
Phase III. Quantitative Study (Survey) 64
Sample 65
Design of Study 65
Information Search Scenarios 65
Experience in Consumer Review Websites and Demographic Characteristics 68
Data Collection 68
Data Analysis 69
References 69
Chapter 4 - Exploring online restaurant selection behaviors using eye-tracking technology and retrospective think-aloud interviews 73
Abstract 73
Introduction 74
Literature Review 76
Consumer Decision Making and Online Information Search 76
Selecting Restaurants in the Online Setting 79
Eye-Tracking Methodology 81
Retrospective Think-aloud Interviews 84
Methodology 86

Sample Selection 86
Eye-Tracking Experiment 87
Apparatus 87
Procedure 87
Data Collection 88
Data Analysis 89
Measurement of Interests 89
Data Visualization 90
Retrospective Think-aloud Interviews 91
Procedure 91
Data Collection and Analysis 91
Results and Discussion 93
Participant Profile 93
Areas of Interests in Information Search Stages 94
Areas of Interests in browsing stage 94
Areas of interests in deliberation stage 94
Descriptive Statistics 95
Eye-tracking Measures 95
Fixation Duration 96
Fixation Count 97
Visit Count 97
Data Visualization 98
Heat Maps 98
Gaze Plots 99
Retrospective Think-aloud Interviews 101
Images 101
Advertisements 102
Consumer Reviews 103
Comparison between Two Websites 105
Conclusion and Implications 106
Theoretical Implications 107

Managerial Implications 108
Limitations and Recommendations for Future Research 109
Acknowledgement 110
References 111
Chapter 5 - Exploring the effects of online reviews, images, and advertisements on consumers' online restaurant choice 160
Abstract 160
Introduction 161
Literature Review 162
Online Information Search and Restaurant Selections 162
Features of Online Information and Hypotheses 164
Online Reviews 165
Images 166
Advertisements 168
Methodology 169
Target Population and the Study Sample 169
Design of Research Instrument 169
Information Search Scenarios 169
Variances in Online Reviews 170
Images 170
Advertisements 171
Experience in Consumer Review Websites and Demographic Characteristics 171
Data Collection 172
Data Analysis 173
Results and Discussion 173
Sample Profile 173
Hypotheses Testing 174
Online Reviews 174
Images 176
Advertisements 176
Data Visualization 177

Perceived Importance of Factors for Making Restaurant Choices 179
Conclusion and Implications 180
Theoretical Implications 180
Managerial Implications 181
Limitations and Future Research 183
Acknowledgement 184
References 184
Chapter 6 - Summary and Conclusions 208
Summary of Research 208
Phase I. Eye Tracking Study 210
Phase II. Retrospective Think-aloud Interviews 216
Phase III. Scenario-based Online Survey 219
Implications 222
Theoretical Implications 222
Practical Implications 223
Limitations and Recommendations for Future Research 225
References 226
Appendix A - Kansas State University IRB Approval 229
Appendix B - Participant Recruitment Survey (Phase I and II) 232
Appendix C - Informed Consent Form (Phase I and II) 236
Appendix D - Online Survey (Phase III) 239

List of Figures

Figure 2.1 Consumer Decision Process Mode 17
Figure 2.2 Two-Stage Disaggregate Choice Model 32
Figure 3.1 Maximum variation matrix of phase I and II participants 56
Figure 3.2 Illustration of areas of interests (AOIs) in a webpage 59
Figure 4.1 Two-Stage Disaggregate Choice Model 130
Figure 4.2 Maximum variation sampling matrix 131
Figure 4.3 Illustration of areas of interests (AOIs) on Yelp website 132
Figure 4.4 Areas of interests during browsing stage on TripAdvisor and Yelp homepages 133
Figure 4.5 Areas of interests during browsing stage on TripAdvisor 134
Figure 4.6 Areas of interests during browsing stage on Yelp 136
Figure 4.7 Areas of interests during deliberation stage on TripAdvisor 138
Figure 4.8 Areas of interests during deliberation stage on Yelp 141
Figure 4.9 Fixation duration by information type in browsing stage 143
Figure 4.10 Fixation duration by information type in deliberation stage 144
Figure 4.11 Fixation count by information type in browsing stage 145
Figure 4.12 Fixation count by information type in deliberation stage 146
Figure 4.13 Visit count by information type in browsing stage 147
Figure 4.14 Visit count by information type in deliberation stage 148
Figure 4.15 Heat maps for websites in browsing stage 149
Figure 4.16 Heat maps for websites in deliberation stage 151
Figure 4.17 Gaze plots for websites in browsing stage 153
Figure 4.18 Gaze plots for websites in deliberation stage 156
Figure 5.1 Format of groups of images 202
Figure 5.2 Heat maps of clicks for restaurants with different numbers of reviews 203
Figure 5.3 Heat maps of clicks for online reviews with different start ratings 204
Figure 5.4 Heat map of clicks for restaurant images 205
Figure 5.5 Heat maps of clicks for image groups 206
Figure 5.6 Heat map of clicks for advertisements 207
Figure 6.1 Gaze plots representing consumers' attention sequence 216

List of Tables

Table 2.1 World Internet usage and population statistics 22
Table 2.2 Summary of literature on online consumer behavior in hospitality industry 25
Table 3.1 Examples of restaurant search tasks 58
Table 3.2 Questions for retrospective think-aloud interviews 63
Table 4.1 Questions for retrospective think-aloud interviews 120
Table 4.2 Maximum variation sampling illustration 121
Table 4.3 Characteristics of participants 122
Table 4.4 Descriptive statistics of eye-tracking experiments 123
Table 4.5 Ranking of areas of interests on TripAdvisor 124
Table 4.6 Ranking of areas of interests on Yelp 125
Table 4.7 Perceptions and attitudes toward images 126
Table 4.8 Perceptions and attitudes toward advertisements 127
Table 4.9 Perceptions and attitudes toward consumer reviews 128
Table 4.10 Comparison and comments for two websites 129
Table 5.1 Demographic characteristics of participants 192
Table 5.2 Characteristics of participants 193
Table 5.3 Results of one-sample Chi-Square test for consumers' interests among restaurants with different review quantity 194
Table 5.4 Results of one-sample Chi-Square test for consumers' visit intentions among restaurants with different review quantity 195
Table 5.5 Results of one-sample Chi-Square test for consumers' interests among restaurants with different review valence 196
Table 5.6 Results of one-sample Chi-Square test for consumers' interests for images 197
Table 5.7 Results of one-sample Chi-Square test for consumers' interests for image groups 198
Table 5.8 Results of one-sample Chi-Square test for consumers' interests for advertisements 199
Table 5.9 Results of one-sample Chi-Square test for consumers' visit intentions for advertisements 200
Table 5.10 Descriptive statistics of factors influencing online restaurant search 201
Table 6.1 Ranking of areas of interests on TripAdvisor 212
Table 6.2 Ranking of areas of interests on Yelp 213

Acknowledgement

It has been a challenging and exciting journey for me when I think of my dissertation. I would like to thank my major professor, Dr. Junehee Kwon, for her greatest help and guidance throughout this journey. She has been a great mentor for both my study, work, and life. I deeply appreciate all she has done for me throughout the four years of my Ph.D. program.

I would also like to express my sincere thanks to my supervisory committee members in the development of my dissertation: Dr. Kevin Roberts for his valuable insights into the development of scenario-based online survey; Dr. Bongsug Chae for detailed comments and suggestions regarding the hypotheses development and also big data analytics; Dr. Patrick Knight for his guidance on the data analyses and statistics in the development of different phases of the dissertation. I would also like to especially thank Dr. Jennifer Francois who generously offered me the opportunity to use the eye-tracking equipment at her lab and provided her valuable experience and suggestions for the eye-tracking experiments in terms of data collection and data analysis.

I would like to thank faculty members in the Department of Hospitality Management. They are encouraging and supportive for me to achieve my professional goals. Thank you, Drs. Michael Ottenbacher, Rebecca Gould, Jichul Jang, Kristin Malek, and Mrs. Nancy King. Moreover, I would like to thank Ms. Starla Hall for her assistance in the data collection for eye-tracking experiments. I am also grateful for having my inspiring colleagues and friends: Dr. Han Wen, Dr. Chen-Wei Tao, Dr. Hyeongjin (Harry) Jeon, Dr. Woohyuk Kim, Ms. Wenhao Zhang, Ms. Eunhye Park, Ms. Juhyun Kang, and Ms. Inneke Sarwono. I would also like to thank two funding agencies that provided the financial support for my dissertation research: The Graduate School and the College of Human Ecology at Kansas State University.

Dedication

To my loving parents Yong Li and Xiangchun Hou

and parents-in-law Wen Yu and Wanlan Zhang:

For their unconditional love and support.

I am proud and grateful to have such a happy family who are always there for me.

To my beloved husband, Li (Michael) Yu:

For his encouragement, trust, sacrifice, and companionship.

I would not have such an accomplishment without his love and support.

Chapter 1 - Introduction

Introduction

As one of the greatest innovations in the 21st century, the Internet has tremendously changed people's lifestyles and business environment (Blackwell, Miniard, & Engel, 2006). The number of global Internet users reached 3.8 billion in June 2017, which was more than 50% of the world population (Internet World Stats, 2017). In the U.S., the Internet usage has been more common, with approximately 88% of the U.S. population surfing online in their everyday life (Internet World Stats, 2017; US Census Bureau, 2016). The Internet has also provided consumers with unprecedented power to access a massive amount of information before making purchase decisions (Chiang, Dholakia, & Westin, 2005). It has influenced consumers' purchase decisions in various areas including travel, dining, entertainment, investments, electronics, and automobiles (DoubleClick, 2004).

In the hospitality industry, consumers have become increasingly reliant on online information sources before making their purchase decisions (Lu, Ba, Huang, & Feng, 2013). Because most hospitality products and services are intangible, and it is difficult to evaluate the experience before purchase, consumers often seek as much information as possible to reduce the perceived uncertainty and risks while making their purchase decisions (Litvin, Goldsmith, & Pan, 2008). Previous research has shown that more than 70% of consumers search extensive online information before making hospitality-related choices (Xie, Zhang, & Zhang, 2014).

Online Travel Agencies and Consumer Review Websites (CRWs) are among the most frequently used online platforms through which consumers usually search for hotels, restaurants, or travel-related information (Xiang, Magnini, & Fesenmaier, 2015). For example, Expedia, one of the leading OTAs, has claimed to have 86 billion gross bookings, generating $9.8 billion in

revenue by the third quarter of 2017 (Expedia, 2018). A popular CRW, TripAdvisor, has reported 455 million average monthly unique visitors and 570 million total reviews by the third quarter of 2017 (TripAdvisor, 2018).

The increasing popularity of online platforms has reshaped consumer behavior. Consumers have utilized online information and gained more confidence in their purchase decisions. This has transformed the traditional consumer behavior to online consumer behavior (Kwong, Cheung, Zhu, Limayem, & Viehland, 2002; Lu et al., 2013; Lu, Yang, & Yuksel, 2015). Compared to the traditional consumer behavior, the biggest difference of online consumer behavior is the availability of massive information (Mazaheri, Richard, & Lorache, 2011). While in traditional purchase scenarios, consumers seek from both internal (e.g., personal memories) and external information sources (e.g., family, friends, and advertisements) before making any purchase decisions (Chiang et al., 2005). In the online context, as consumers seek a large amount of information through various sources, the decision-making process could be more complicated (Mazaheri et al., 2011). In this case, understanding consumers' information search behaviors in the online setting is crucial for hospitality companies to further influence their decision-making process (Chiang et al., 2005).

Numerous studies have explored online consumer behavior in the hospitality industry. However, little is known about the actual information search behaviors and decision-making processes. Most previous research has focused on identifying features or effects of online information sources, such as online reviews, user-generated-content, or electronic word-of-mouth (Kwok, Xie, & Richards, 2017; Lu & Stepchenkova, 2015; Schuckert, Liu, & Law, 2015). For example, previous research has shown that online reviews, especially those with extreme star ratings, had a significant impact on consumers' perceived usefulness of online information (Park

& Nicolau, 2015). The valence, volume, and variety of online reviews significantly affected hospitality companies' business performance (Kim, Lim, & Brymer, 2015). One study found that a half-star rating increase may bring up to 19% more business to hospitality companies (Anderson & Magruder, 2012). While these studies have been insightful in revealing some aspects of the online consumer behavior, the findings are fragmented and inadequate to provide a holistic view of the actual online information search behaviors of consumers (Kwok et al., 2017; Kwong et al., 2002).

Furthermore, the majority of existing literature in hospitality has used traditional quantitative methods, such as self-reported surveys (Liu, Law, Rong, & Hall, 2013; Liu & Park, 2015; Mauri & Minazzi, 2013; Tsao, Hsieh, Shih, & Lin, 2015; Yen & Tang, 2015); and the qualitative methods such as content analysis (Berenzan, Raab, Tanford, & Kim, 2015; Mkono, 2012; Pantelidis, 2010) and thematic analysis (Nicely & Ghazali, 2014; Mkono, 2012). Although these research findings have provided insights for understanding consumers' perceptions and behavioral intentions, little is known regarding the actual behaviors of consumers (Kwok et al., 2017).

Eye tracking, a novel technology, could allow researchers to precisely capture the eye movements of consumers and objectively reveal actual consumer behavior (Robson & Noone, 2014). According to the Eye-Mind Assumption in cognitive psychology, eye movements are a good reflection of people's attention and cognitive process (Day, Lin, Huang, & Chuang, 2009). When it comes to evaluating online consumer behavior for hospitality-related decisions, identifying the visual behavior or attention patterns is especially important (Robson & Noone, 2014). Therefore, eye-tracking technology has enormous potential in hospitality research to

reveal consumers' actual information search behaviors and online decision-making processes (Robson & Noone, 2014).

A retrospective think-aloud (RTA) interview is a verbal protocol which enables researchers to have a deep understanding of consumer behavior with people verbalizing their cognitive thinking process and reasoning after certain behaviors (Fonteyn, Kuipers, & Grobe, 1993). RTA protocol is based on the assumptions that the verbalization process can reflect the cognitive process of recordable behaviors; and this procedure of information acquisition and processing can be obtained via verbal data (Ericsson & Simon, 1984). The RTA interview has also been regarded as an appropriate and effective method in combination with the eye-tracking experiments (Elbabour, Alhadreti, & Mayhew, 2017). Thus, by combining the eye-tracking experiments and RTA interviews, researchers are able to obtain more in-depth information of consumers' thinking process and reasoning of their recorded information search behaviors (Fonteyn et al., 1993).

Therefore, the purpose of this research was to identify consumers' actual information search behaviors and thinking process when using CRWs for online restaurant selections. In this study, the eye-tracking experiments (Phase I), followed by retrospective think-aloud interviews (Phase II), were used to explore consumers' online restaurant search behaviors and thinking process. Eye-tracking measures, fixation duration, fixation count, and visit count were identified. Aggregated eye movements and attention patterns were visualized using heat maps and gaze plots, providing a graphical representation of the information search behaviors and cognitive process. With the results from eye-tracking experiments and RTA interviews, a scenario-based survey was further conducted to examine online consumer behavior with a large number of participants (Phase III). The findings from this research have contributed to the hospitality

research by providing valuable insights into the study of online consumer behavior, especially information search behaviors and decision-making processes for restaurant selections.

Problem Statement

As an increasing number of consumers in the hospitality industry make purchase decisions based on information available online, it is particularly important for both practitioners and researchers to understand consumer behavior in the online setting (Chiang et al., 2005). Although previous studies have explored some aspects of online consumer behaviors, most of them have been focused on the features and effects of online information sources such as online reviews or electronic word-of-mouth (Kwok et al., 2017). There is limited research exploring the actual information search behaviors and thinking process of consumers when they search in CRWs to make decisions.

The restaurant industry has been determined as the context of this study because of the popularity of CRWs, which greatly influence consumers' restaurant choices (Lu et al., 2013). Consumers frequently use websites such as Yelp or TripAdvisor to seek dining options (Bilgihan, Peng, & Kandampully, 2014). As millions of consumers are using these websites to assist in their dining choices, understanding their online decision-making processes and information search behaviors would be beneficial for CRWsand restaurant operators to enhance online user experience, as well as to improve customer satisfaction and business outcomes (Pan, Zhang, & Law, 2013).

Thus, this study was conducted to fill the research gaps exploring the following questions:

- What is the overall decision-making process of consumers when they search for restaurants in CRWs?

- What is the overall distribution of consumers' attention to various information areas?
- What information elements attract consumers' majority amount of attention?
- What information elements receive most frequent attention from consumers?
- What is the sequence of consumers' attention when they search for restaurants in CRWs?
- What are the most influential information elements that affect consumers' online decision making for restaurant selections?
- What are consumers' perceptions and attitudes toward online advertisements?
- What differences do consumers think between TripAdvisor and Yelp in terms of their online restaurant search?

Purpose of the Study

The purpose of the study was to explore the actual information search behaviors and decision-making process when making restaurant choices online through CRWs. Mixed methods were used to accomplish this purpose, including eye-tracking experiments, qualitative approach using the retrospective think-aloud interviews, as well as quantitative online survey.

The specific objectives of the eye tracking experiments (Phase I) were:

1. To accurately obtain the eye movements of consumers when they search online information in CRWs for making restaurant choices; and
2. To evaluate attention patterns and eye movement features of consumers during their online information search process.

The specific objectives of the retrospective think-aloud interviews (Phase II) were:

1. To explore consumers' thinking process of their online restaurant selection and decision making in CRWs; and

2. To connect the thinking process and reasoning with their online information search behaviors.

The specific objectives of the online survey (Phase III) were:

1. To verify consumers' visual preferences and online information search behaviors that were identified from the eye tracking study and interviews; and
2. To explore consumers' perceptions and preferences to specific information areas of the CRWs.

Significance of the Study

Consumer review websites (CRWs) play an important role in assisting consumers with their decision making for hospitality products, such as booking a hotel or selecting a restaurant (Bilgilan et al., 2014). Numerous studies have explored online consumer behavior in the hospitality industry. However, few of them have examined the actual information search behaviors of consumers when they use CRWs for restaurant selections. Most have focused on identifying the features and effects of online reviews (Kwok et al., 2017). This study aimed to identify the actual information search behaviors and obtain a holistic view of consumers' online decision-making processes, and therefore, the results from this study contribute to the existing literature with a complete view of online consumer behavior for restaurant choices.

In addition, in the exploration of online consumer behavior, the majority of previous studies have been based on the traditional consumer behavior models or theories, such as Theory of Planned Behavior, Theory of Reasoned Action, and Technology Acceptance Model, to explore online consumer behavior (Blackwell, Miniard, & Engel, 2006; Kwong et al., 2002). While these traditional theories may be useful in examining traditional consumer behavior, they may not adequately examine all aspects of online consumer behavior due to the unique

characteristics of the online environment (Robson & Noone, 2014). The Two-Stage Disaggregate Choice Model was adopted in this research as the basic theoretical model as it has been utilized for the evaluation of online information search behaviors of consumers in previous hospitality research (Robson & Noone, 2014). Eye-tracking technology was used to capture consumers' actual eye movements and attention patterns, which led to a better understanding of online decision-making process in the hospitality research (Kwok et al., 2017).

Further, previous studies utilized traditional quantitative (e.g., surveys), qualitative methods (e.g., content analysis), or mixed methods in the exploration of consumer behavior or behavioral intentions (Schuckert et al., 2015). These methods might not accurately reflect the actual consumer behavior (Robson & Noone, 2014). Therefore, the results of this study allowed researchers to extend the existing literature related to online consumer behavior by using the eye-tracking technology and providing an objective way to identify the actual behaviors, rather than the self-reported perceptions or behavioral intentions.

Practical Implications

The findings have provided practical implications for different stakeholders in the hospitality industry. First, this research allowed consumer review websites such as Yelp and TripAdvisor to identify strengths and weaknesses of their websites based on consumers' actual experience. Ultimately, they could find ways to improve their websites to cater to the needs and wants of consumers.

In addition, it has been beneficial for the restaurateurs in their future operations. The eye-tracking technology revealed what information consumers attended to; as well as how long and how often consumers had paid their attention to specific information elements during their information search experiences. Recognizing these results, restaurateurs would have a better

understanding of consumers' preferences and decision-making process when they select restaurants and search information through consumer review websites.

Limitations

There are several limitations of this research. First, due to the high cost and the limited number of the eye-tracking device, the number of participants in the eye-tracking experiments was limited. However, securing representative data has not been the main goal of the eye-tracking research (Mitterer-Daltoé, Queiroz, Fiszman, & Varela, 2014; Pan, Zhang, & Law 2013; Wedel & Pieters, 2008). Rather, it is valued as the eye-tracking technology is capable of capturing people's actual and natural behaviors. To overcome limitations of the research in the first two phases, a scenario-based survey was conducted (Phase III).

Second, the focus of the study was consumers' information search behaviors and decision-making process for restaurant selections in CRWs. Therefore, the results may not be generalizable beyond information search and selection behaviors of consumers in the restaurant industry. In addition, the top two CRWs (i.e., Yelp and TripAdvisor) were used as the online platforms for all phases of the study. Therefore, results of this study may not be generalizable for dissimilar CRWs or other websites, such as online search engines (e.g., Google) or social networking sites (e.g., Facebook, Instagram).

Further, a desktop computer with eye-tracking device was used to identify consumers' information search behaviors and thinking process in the eye-tracking experiments, and therefore, results may not be generalizable to reveal consumer behavior in using other devices (e.g., laptop, smart phone, tablet, etc.). Lastly, majority of research participants in all three phases of the study resided in the U.S. Therefore, the data may not be generalizable to other countries.

References

Anderson, M., & Magruder, J. (2012). Learning from the crowd: Regression discontinuity estimates of the effects of an online review database. *The Economic Journal, 122*, 957-989.

Berezan, O., Raab, C., Tanford, S., & Kim, Y. S. (2015). Evaluating loyalty constructs among hotel reward program members using eWOM. *Journal of Hospitality & Tourism Research, 39,* 198-224.

Bilgihan, A., Peng, C., & Kandampully, J. (2014). Generation Y's dining information seeking and sharing behavior on social networking sites: An exploratory study. *International Journal of Contemporary Hospitality Management, 26,* 349-366.

Blackwell, R. D., Miniard, P., & Engel, J. (2006). *Consumer behavior* (10th ed.). Mason, OH: Thomson Higher Education.

Chiang, K. P., Dholakia, R. R., & Westin, S. (2005). *e-Search: A conceptual framework of online consumer behavior in web systems design and online consumer behavior*. Hershey, PA: IGI Global.

Day, R. F., Lin, C. H., Huang, W. H., & Chuang, S. H. (2009). Effects of music tempo and task difficulty on multi-attribute decision-making: An eye-tracking approach. *Computers in Human Behavior, 25,* 130-143.

DoubleClick. (2004). *DoubleClick QI 2004 E-commerce Site Trend Report*. Retrieved from http://www.spunlogic.comlmedialpdflDoubleClickQI2004ECommerceTrendReport.pdf

Elbabour, F., Alhadreti, O., & Mayhew, P. (2017). Eye Tracking in Retrospective Think-Aloud Usability Testing: Is There Added Value? *Journal of Usability Studies*, *12*(3), 95-110.

Ericsson, K. A., & Simon, H. A. (1998). How to study thinking in everyday life: Contrasting think-aloud protocols with descriptions and explanations of thinking. *Mind, Culture, and Activity, 5*, 178-186.

Expedia. (2018). *Featuring some of the world's leading online travel brands*. Retrieved from http://www.expediainc.com/about/

Internet World Stats. (2017). *World internet users and 2017 population stats*. Retrieved from http://www.internetworldstats.com/stats.htm

Kim, W. G., Lim, H., & Brymer, R. A. (2015). The effectiveness of managing social media on hotel performance. *International Journal of Hospitality Management*, *44*, 165-171.

Kwok, L., Xie, K. L., & Richards, T. (2017). Thematic framework of online review research: A systematic analysis of contemporary literature on seven major hospitality and tourism journals. *International Journal of Contemporary Hospitality Management*, *29*, 307-354.

Kwong, T., Cheung, C., Zhu, L., Limayem, M., & Viehland, D. (2002). Online consumer behavior: an overview and analysis of the literature. *Proceedings of the Pacific Asia Conference of Information Systems, Tokyo, Japan*. Retrieved from http://www.pacis-net.org/file/2002/166.pdf

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2008). Electronic word-of-mouth in hospitality and tourism management. *Tourism Management, 29,* 458-468.

Liu, S., Law, R., Rong, J., Li, G., & Hall, J. (2013). Analyzing changes in hotel customers' expectations by trip mode. *International Journal of Hospitality Management*, *34*, 359-371.

Liu, Z., & Park, S. (2015). What makes a useful online review? Implication for travel product websites. *Tourism Management, 47,* 140-151.

Lu, Q. S., Yang, Y., & Yuksel, U. (2015). The impact of a new online channel: An empirical study. *Annals of Tourism Research, 54,* 136-155.

Lu, W., & Stepchenkova, S. (2015). User-generated content as a research mode in tourism and hospitality applications: Topics, methods, and software. *Journal of Hospitality Marketing & Management*, *24*(2), 119-154.

Lu, X., Ba, S., Huang, L., & Feng, Y. (2013). Promotional marketing or word-of-mouth? Evidence from online restaurant reviews. *Information Systems Research, 24*, 596-612.

Mauri, A. G., & Minazzi, R. (2013). Web reviews influence on expectations and purchasing intentions of hotel potential customers. *International Journal of Hospitality Management, 34*, 99-107.

Mazaheri, E., Richard, M. O., & Laroche, M. (2011). Online consumer behavior: Comparing Canadian and Chinese website visitors. *Journal of Business Research, 64,* 958-965.

Mkono, M. (2012). A netnographic examination of constructive authenticity in Victoria Falls tourist (restaurant) experiences. *International Journal of Hospitality Management, 31*, 387–394.

Nicely, A., & Ghazali, R. M. (2014). Demystifying visitor harassment. *Annals of Tourism Research, 48,* 266-269.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly*, *54*, 74-83.

Pantelidis, I. S. (2010). Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quarterly, 51*, 483-491.

Park, S., & Nicolau, J. L. (2015). Asymmetric effects of online consumer reviews. *Annals of Tourism Research, 50,* 67-83.

Robson, S. K. A, & Noone, B. (2014). Show me what you see, tell me what you think: Using eye tracking for hospitality research. *Cornell Hospitality Report, 14*(17), 6-12.

Schuckert, M., Liu, X., & Law, R. (2015). Hospitality and tourism online reviews: Recent trends and future directions. *Journal of Travel & Tourism Marketing*, *32*, 608-621.

TripAdvisor (2018). *About TripAdvisor*. Retrieved from https://tripadvisor.mediaroom.com/us-about-us

Tsao, W. C., Hsieh, M. T., Shih, L. W., & Lin, T. M. (2015). Compliance with eWOM: The influence of hotel reviews on booking intention from the perspective of consumer conformity. *International Journal of Hospitality Management*, *46*, 99-111.

U.S. Census Bureau. (2016). *Quick facts United States.* Retrieved from https://www.census.gov/quickfacts/fact/table/US/PST045217

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of Retailing and Consumer Services*, *22*, 244-249.

Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management*, *43*, 1-12.

Yen, C. L. A., & Tang, C. H. H. (2015). Hotel attributes performance, eWOM motivations, and media choice. *International Journal of Hospitality Management, 46,* 79-88.

Chapter 2 - Literature Review

The purpose of this study was to identify the information search behaviors and decision-making processes of consumers when making restaurant selections in consumer review websites. This chapter consists of three sections: (a) an introduction of consumer behavior theories and consumer decision process model; (b) a discussion of online consumer behavior, information search, and decision making; and (c) an overview of eye tracking methodology and retrospective think-aloud interviews.

Consumer Behavior and Decision Making Process

Theoretical Background of Consumer Behavior

Consumer behavior is defined as, "the activities people undertake when obtaining, consuming, and disposing of products and services." (Blackwell, Miniard, & Engel, 2006, p.8). Consumer behavior is important in all types of businesses because most of the economic activities are based on the exchanges of products and services with consumers (Bartels & Johnson, 2015). With the increasing market competition and ever-changing needs of consumers, companies have been striving to achieve customer satisfaction to attract and retain consumers (Blackwell et al., 2006).

Understanding how consumers make decisions has been an essential element in the study of consumer behavior. Early economists and mathematicians started to study decision-making processes of consumers almost 300 years ago (Bray, 2008). One of the earliest theories is the Utility Theory, stating that people make decisions in order to reach the maximization of the desired outcomes or utility (von Neumann & Morgenstern, 1947). The model assumes that consumers are rational, consistent, and fully aware of all available information to optimize the "utility" of their decisions (Simon, 1955; von Neumann & Morgenstern, 1947). While the Utility

Theory is one of the fundamental models in predicting consumer behavior in economics, it has been challenged over the years as numerous studies have discovered that irrationality and inconsistency are common in consumer decision-making processes, and that consumers could rarely have full access to all relevant information to make best decisions (Bray, 2008; Kontek, 2010; Simon, 1959).

To overcome the limitations of the Utility Theory, the Bounded Rational Theory was further developed with the assumptions that consumers usually have limited cognitive capacity in information processing when they make decisions (Simon, 1972). Thus, consumers would usually prioritize the information when they make decisions with a large amount of information (Orquin & Loose, 2013). This theory also posits that consumers seek satisfaction for their needs when making purchase decisions, rather than maximizing utility (Kahneman, 2003; Simon, 1972).

Compared to the Utility Theory, Bounded Rational Theory has been regarded as more robust in explaining consumer behavior, with the considerations of cognitive capacity limitation and information prioritization (Buchanan & O'Connell, 2006; Orquin & Loose, 2013; Richarme, 2005). Although these two theories have different assumptions of consumers' decision-making behaviors, it is important to note that they both have focused on how consumers acquire and process information for purchase decisions (Simon, 1972; von Neumann & Morgenstern, 1947). While one states that consumers process complete information rationally, the other assumes that consumers have limited cognitive capability in information acquisition and processing (Schwartz, 2002; Simon, 1972). From these theories, researchers concluded that information is critical in the decision-making process and thus, understanding how consumers search and

process information would be the key when identifying consumer behavior and decision-making processes (Simon, 1972).

Consumer Decision Process Model

Understanding how consumers make decisions is most important in the exploration of consumer behavior (Orquin & Loose, 2013). Among multiple decision models developed throughout the years, the Consumer Decision Process (CDP) model has been regarded as one of the most sophisticated models in providing a clear road map of consumers' decision-making processes and factors impacting their choices (Bray, 2008). Developed by researchers in 1968, the CDP model has been examined and revised to this day (Blackwell et al., 2006) (Figure 2.1).

As depicted in Figure 2.1, this model is comprised of four parts: *input, information process, decision process,* and *influential variables*. The *decision process* is the core section in this model as it explains the decision-making processes of consumers with the detailed seven steps: need recognition, information search, pre-purchase evaluation of alternatives, purchase, consumption, post-consumption evaluation, and divestment (Blackwell et al., 2006). The decision process starts with the need recognition when a consumer recognizes a need or desire to purchase any product. The second stage is the information search process. Having information from various sources, consumers may narrow it down to only a number of options and evaluate among alternatives. Purchase and consumption stages are the next two steps when consumers make the purchase decision and start using the product. Post-consumption evaluation follows the consumption process with the identified status of being either satisfied or dissatisfied, which may affect future purchases greatly. The last stage is divestment, which includes the final activities such as disposal or recycling of the products (Blackwell et al., 2006).

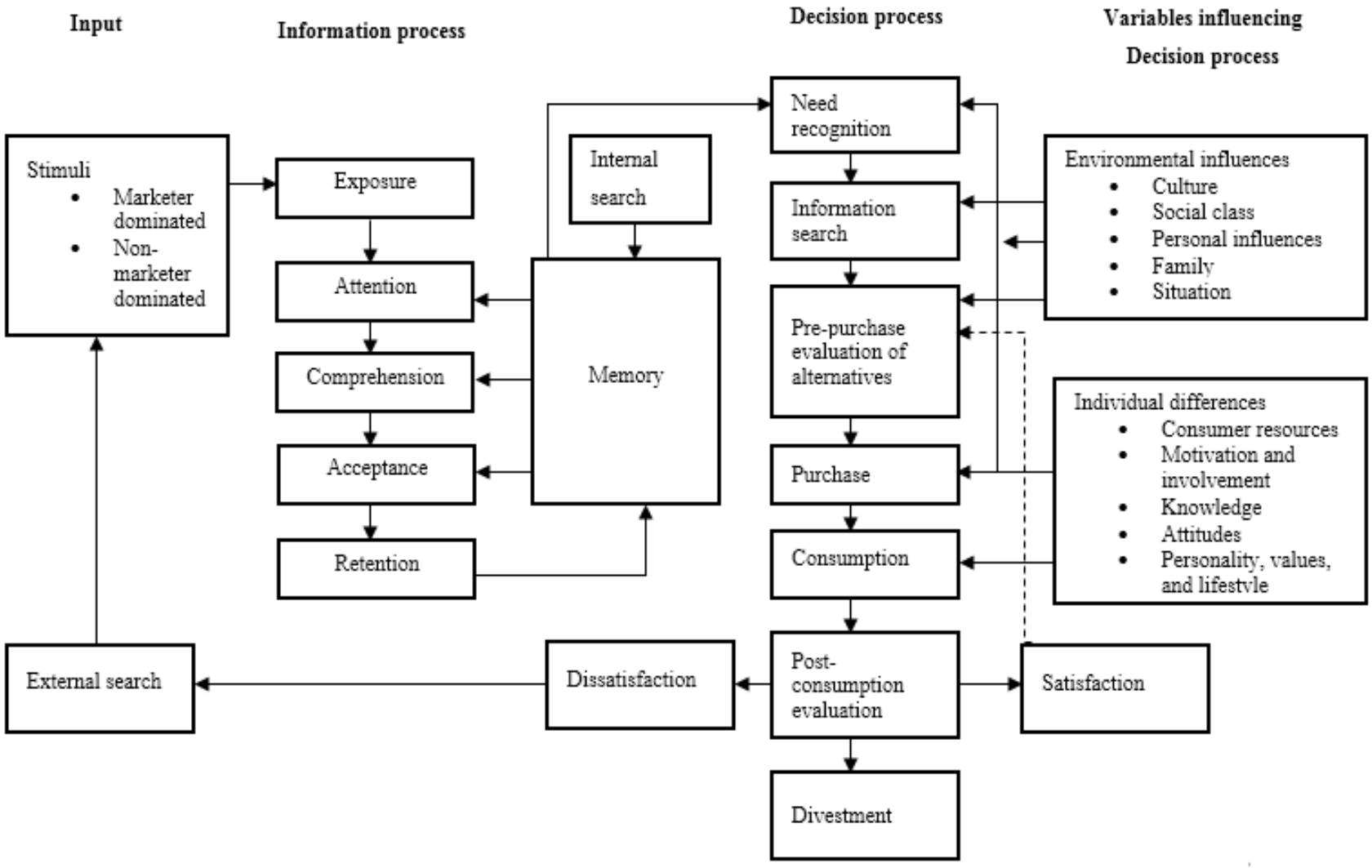


Figure 2.1 Consumer Decision Process Model. Adapted from "Consumer Behavior," R. D. Blackwell, P. W. Miniard, and J. F. Engel, 2006, p. 85. Copyright 2006 by the Thomson South-Western.

As indicated in the Bounded Rational Theory, consumers have limited cognitive capacity to process information and would prioritize the information according to certain heuristics (Simon, 1972). Consistent with the theory, it is demonstrated in the CDP model that consumers would conduct information search from various sources to make best decisions. Specifically, consumers search information both internally based on personal memories or experiences, and externally from family or friends through word-of-mouth, company advertisements, and marketing programs (Blackwell et al., 2006).

In terms of the external information search behaviors, it is presented in the CDP model with the detailed information process steps including exposure, attention, comprehension, acceptance, and retention (Blackwell et al., 2006) (Figure 2.1). First, consumers may be exposed to certain information such as company advertisement or promotional activities. Once consumers are provided with the external information, determining whether their attention is attracted to the information is important (step two, attention). It is argued that how consumers allocate their attention would depend on the relevancy of information and cognitive capacity of consumers. The further steps including comprehension, acceptance, and retention are the process when consumers analyze, choose, and store information to assist in their decision-making processes.

Being widely used in the consumer behavior studies, the CDP model has provided a solid foundation for researchers to understand consumers' decision-making processes (Bray, 2008; Milner & Rosenstreich, 2013, Richarme, 2005). Compared to other models such as the Theory of Planned Behavior, Theory of Reasoned Action, and Theory of Buyer Behavior; the CDP model is more comprehensive in presenting a detailed map with a multi-step process of consumers' decision-making processes (Milner & Rosenstreich, 2013). Further, among the consumer decision models, the CDP model is the only one that was developed in the 1960s and has been

revised to the current era (Bray, 2008). The recency and robustness of this model has made it popular among various consumer behavior models (Richarme, 2005).

In addition, the CDP model has been a good extension of previous theories in consumer behavior such as the Bounded Rational Theory. While the theories have presented a conceptual framework of overall consumer behavior, the CDP model has extended it with the detailed descriptions of decision-making processes and other influential factors (Bray, 2008). The inclusion of information process in the model has also presented a clear map of how consumers acquire and process relevant information when making purchase decisions (Blackwell et al., 2006).

Despite the popularity of CDP model, it has also received some critiques. The biggest critique is about the linear nature of this model (Erasmus, Boshoff, & Rousseau, 2001). It has been argued that consumers may not go through all the steps in the sequence illustrated in the model when making purchase decisions (Erasmus et al., 2001; Milner & Rosenstreich, 2013). For example, in case of repeat purchase or impulsive purchase scenarios, consumers do not necessarily pass through every step to make the final decisions. Further, the generalizability and fit of this model has also been challenged (Bray, 2008; Eramus et al., 2001). For example, the decision-making process of a financial product may be totally different from making a dining decision in terms of the scale of purchase and information search process (Milner & Rosenstreich, 2013).

Understanding Consumers in Hospitality Industry

Hospitality industry is the “people” industry where frequent exchanges of products and services occur between service providers and consumers (Mattila, 2004). Consumer behavior in the hospitality industry is unique because of the special characteristics of hospitality products:

intangibility and perishability (Reisinger, 2001). In addition, consumers are an indispensable part in the production and consumption of hospitality products and services (Reisinger, 2001). For example, when consumers go to a restaurant, their dining experience occurs at the same time when the food and services are presented to them (Johns & Pine, 2002). Considering the important role of consumers in the hospitality industry, it is essential for hospitality companies to understand consumer behavior and to further influence their decision-making processes (Dimanche & Havitz, 1995).

There have been a large number of studies related to consumer behavior in the hospitality research (Johns & Pine, 2002; Mattila; 2004). Mattila (2004) conducted a review study and identified that among diverse topics, the topic related to Internet and online consumer behavior has attracted increasing attention from hospitality researchers. Another review study conducted specifically for the restaurant industry has found that previous studies had focused primarily on the exploration of antecedents and attributes for consumer dining decisions, repurchase intentions, and customer satisfaction (Johns & Pine, 2002). Therefore, it can be concluded that while researchers have explored different aspects of consumer behavior in the hospitality industry, few of the them have been devoted to the information search behaviors prior to purchase decisions (Mattila, 2004; Johns & Pine, 2002).

Researchers have utilized different theories and models to explore consumer behavior in the hospitality industry. Traditional theories such as Expectancy-Disconfirmation Theory, the Theory of Planned Behavior, Theory of Reasoned Action, SERQUAL Model are among the most popular ones in previous studies (Kwong, Cheung, Zhu, Limayem, & Viehland, 2002). Of these, the Expectancy-Disconfirmation Theory was used to evaluate customer satisfaction (Johns & Pine, 2002). The Theory of Planned Behavior and Theory of Reasoned Action have been

adopted to explore consumers' perceived attitudes, beliefs, and behavioral intentions for certain behaviors (Ajzen, 1991; Kwong et al., 2002). The SERVQUAL Model, which is comprised of five dimensions including service reliability, responsiveness, assurance, empathy and tangibles, has also been frequently use in hospitality research to evaluate consumers' perceptions toward service quality (Johns & Pine, 2002; Parasuraman, Zeithaml, & Berry, 1988).

As majority of the theories are to identify consumers' perceptions, attitudes, or behavioral intentions, whether these perceptions would be adequate in reflecting consumers' actual behaviors may be questioned (Webb & Sheeran, 2006). Because hospitality research is closely related to the practical world, and should serve the pragmatic needs of the industry, innovative methods that can detect and identify consumers' actual behaviors may yield tremendous values in the study of consumer behavior in the hospitality industry (Robson & Noone, 2014).

Online Consumer Behavior and Information Search

Internet and Online Purchase

The first Millennium Technology Prize was awarded to Tim Berners-Lee in 2004 for his achievements in creating the World Wide Web (Blackwell et al., 2006). Since the first introduction of the Internet in 1990, this giant web has revolutionized how people live and communicate (Blackwell et al., 2006; Sheth & Mittal, 2004). One study examined consumers' usage of electronic devices and found that adult consumers spent more than 25 hours weekly on their devices including smartphones, laptops, and tablets surfing the Internet (Nielsen, 2017). As indicated in Table 2.1, the number of Internet users has increased 10 times between 2000 and 2017, reaching 3.8 billion in June 2017, which was more than 50% of the world population (Internet World Stats, 2017).

The Internet has also brought dramatic changes in the way a company does business (Chan & Ngai, 2011; Sun, Fong, Law, & He, 2016; Tantrabundit, 2015). According to a report in Statista (2017), the revenue of retail E-commerce in the U.S. is projected to be over $485 billion in 2021, compared to $322 billion in 2016. Amazon, one of most successful online companies who started the online business by selling books, had the revenue of $135 billion in 2016, compared to $147 million in 1997 (Market Watch, 2017; Sheth & Mittal, 2004). As with the booming of E-commerce, companies have also transformed their distribution, marketing, and communication channels from traditional to online platforms (Litvin, Goldsmith, & Pan, 2008).

Table 2.1 World Internet usage and population statistics

World Regions	Population (2017 Est.)	Population % of World	Internet Users 30-Jun-17	Penetration Rate (% Pop.)	Growth 2000-2017	Internet Users %
Africa	1,246,504,865	16.6%	388,104,452	31.1%	8497.0%	10.1%
Asia	4,148,177,672	55.2%	1,909,408,707	46.0%	1570.5%	49.8%
Europe	822,710,362	10.9%	650,558,113	79.1%	519.0%	17.0%
Latin America / Caribbean	647,604,645	8.6%	392,215,155	60.6%	2070.7%	10.2%
Middle East	250,327,574	3.3%	146,972,123	58.7%	4374.3%	3.8%
North America	363,224,006	4.8%	320,059,368	88.1%	196.1%	8.3%
Oceania / Australia	40,479,846	0.5%	28,180,356	69.6%	269.8%	0.7%
World Total	7,519,028,970	100.0%	3,835,498,274	51.0%	962.5%	100.0%

Note. Adapted from http://www.internetworldstats.com/stats.htm

With the development of Web 2.0 and social media, online shopping sites (e.g., Amazon, eBay), social networking sites (e.g., Facebook, Twitter), and consumer review websites (e.g., Yelp, TripAdvisor) have also reshaped the traditional consumer behavior and decision-making processes (Cantallops & Salvi, 2014). Nearly 90% of consumers reported that the Internet had changed their purchase decisions in various aspects of their life such as travel, banking, auto, food, and beverage purchases (DoubleClick, 2004). It has also been identified that consumers

placed more trust in the online information created by people whom they did not know than the company advertisements (Bazaar Voice, 2012).

Online Consumer Behavior in Hospitality Industry

The hospitality industry is significantly affected by the advancement of the Internet and information technology (Kwok, Xie, & Richards, 2017; Mattila, 2004). Because hospitality products are mostly intangible, and consumers cannot evaluate the products and services before purchase, they tend to conduct an extensive information search to make better decisions and reduce risks (Litvin et al., 2008). Online information sources such as consumer reviews and user-generated-content play an increasingly vital role in affecting consumers' purchase decisions for hospitality products (Kwok et al., 2017). It has been reported that 77% of consumers prefer to seek for online information sources before booking a hotel (Xie, Zhang, & Zhang, 2014).

The research in online consume behavior has attracted much attention from hospitality researchers (Law, Leung, Au, & Lee, 2013; Leung, Law, van Hoof, & Buhalis, 2013; Litvin et al., 2008; Lu & Stepchenkova, 2015; Schuckert, Liu, & Law, 2015). Numerous studies have explored various aspects of consumers' online decision-making processes in hospitality industry (Kwok et al., 2017). In order to have a better understanding of the previous literature related to online consumer behavior in the hospitality industry, a detailed summary of previous studies has been created and presented in Table 2.2. These articles have been organized based on the topics and their relevance with the Consumer Decision Process (CDP) model in terms the specific steps in decision-making process.

In terms of the pre-purchase behaviors, as shown in Table 2.2, the majority of the previous research has focused on the effects of the features of online reviews (e.g., volume, valence, variety) on consumers' purchase intentions (Casalo, Flavian, Guinaliu, & Ekinci, 2015;

Ladhari & Michaud, 2015; Vermeulen & Seegers, 2009; Zhao, Wang, Guo, & Law, 2015). For example, the valence and volume of online reviews were significantly related to consumer purchase intentions (Mauri & Minazzi, 2013). Furthermore, the perceived usefulness of online reviews was positively related to the valence of reviews (Park & Nicolau, 2015); and positively framed reviews were significantly related to the increased booking intentions and consumer trust (Sparks & Browning, 2011).

Online reviews play dual roles in consumer decision-making process because reviews act as both pre-purchase information sources and post-consumption information sharing (Chen & Law, 2016). As presented in Table 2.2, a number of studies have also explored the antecedents of information sharing behaviors and effects of online reviews on business performance (Anderson & Magruder, 2012; Duverger, 2013; Kim, Lim, & Brymer, 2015; Öğüt, & Tas, 2012). For example, one study used the regression discontinuity design and found that an increase of an extra half-star rating can bring up to 19% more business to restaurants (Anderson & Magruder). Similar findings also revealed that a one-point increase in consumer ratings may lead to 2.6% increase in online sales of hotel rooms (Öğüt, & Tas, 2012). Consumer ratings were also related to higher market share (Duverger, 2013) and higher hotel room sales (Kim et al., 2015).

In addition to the main stream research conducted by hospitality researchers, an increasing number of researchers in the computer science field have also explored online reviews with different perspectives. A recent study used topic modeling method to compare the information quality of online reviews in three websites and found considerable differences among these websites including linguistic characteristics, semantic features, sentiment, rating, and usefulness (Xiang, Du, Ma, & Fan, 2017). Similar approaches were also used in other studies to identify the hidden topics of restaurant reviews in Yelp and found the predictive power of

Table 2.2 Summary of literature on online consumer behavior in hospitality industry

Relations with Consumer Behavior	Research Topics	Articles	Key Findings
Information search, Pre-purchase evaluation of alternatives	1. Effects of review features (e.g., volume, valence, variety), rating, and reviewer features (e.g., experience and expertise) on purchase intention 2. Cultural differences, motivational factors to use UGC 3. Effects of management's responses to online reviews on purchase intention	Arsal, Woosnam, Balwin, & Kelly, 2010; Frias, Rodriguez, Alerto Castaneda, Savuite, & Buhalis, 2012; Liu & Park, 2015; Mauri & Minazzi, 2013; Schuckert, Liu, & Law, 2015; Vermeulen & Seegers, 2009; Jordan, Norman, & Vogt, 2013; Kastner & Stangl, 2012; Kim & Mattila, 2011; Tham, Croy, & Mair, 2013	1. The volume and valence of reviews significantly influence purchase intention. Valence positively influences service expectations. 2. Star ratings have positive effects on the perceived usefulness of reviews. 3. More experienced reviewers are perceived to be more trustworthy and helpful, Thus, more influential in consumers' purchase decision. 4. Different information search behavior between consumers from Belgium and U.S. Belgium tourists tend to spend more time and compare more options in different websites than U.S. travelers. 5. Formation of a tourist destination image via information sources is often affected by the effect of culture. 6. Factors that motivate consumers to use UGC: enthusiasts, mavericks, tips and price optimizers, safety players, non-commercials, avoiders; convenience and quality, risk reduction, social reassurance; perceived enjoyment and ease of use of UGC 7. Responses to online reviews from hotel management have negative impact on purchase intention.
Post-consumption evaluation	1. Factors that determine the review posting behavior, antecedents of e-WOM	Anderson & Magruder, 2011; Duan, Yu, Cao, & Levy, 2016; Kang &	1. Consumers' perceptions and satisfaction status toward certain products or service influence the review posting behavior

	2. Influence of online reviews or ratings on business performance 3. Effects of management's responses to online reviews on customer satisfaction 4. Application of big data analytics to social media data (e.g., sentiment analysis, geo-visualization, text mining, word frequency analysis, topic modeling, etc.)	Schuett, 2013; Levy, Duan, & Boo, 2013; Linshi, 2014; Lo, McKercher, Lo, Cheung, & Law, 2011; Ogut & Onus Tas, 2012; Pantelidis, 2010; Park & Allen, 2013; Park, Ok, & Chae, 2016; Zhang, Ye, Law, & Li, 2010	2. Young and better educated consumers tend to share travel photos in more than one types of social networking tools. 3. Identification and internalization are the most important factors affecting travel experience sharing behavior 4. Perceived utility and trust are positively correlated with commitment. 5. An increase of half star rating in Yelp can bring up to 19% more business to restaurants. 6. A 1% increase of ratings may increase up to 2.6% for online sales per hotel room. 7. Managers' responses can positively influence customer satisfaction and loyalty 8. Responses are usually created to either good or bad reviews; for bad reviews, apologies are found in responses without mentioning about the compensation plans. 9. Management's perceptions of online reviews determine their response frequency and communication status 10. Negative reviews have greater impact on product sales than positive reviews (sentiment analysis). 11. Words such as server, time, food appear frequently in restaurant consumer reviews (word frequency analysis) 12. Unique topics such as good food, bad food service,

			good price are identified in reviews (topic modeling, thematic analysis) 13. Pattern and characteristics of reviews are found through visualization methods (geo-visualization)
Need recognition Pre-consumption evaluation	1. Effects of social media marketing on consumer behavior	Kwok & Yu, 2013; Leung, Schukert, & Yeung, 2013	1. Conversational messages are preferred by consumers over company promotions through social media marketing. 2. Companies use Facebook the most for information dissemination and consumer engagement.
Purchase decision	1. Impact of psychological factors on intention to make online travel bookings 2. determinants of repeat purchase in the online setting, factors of loyalty in online booking	San Martin & Herrero, 2012; Kim, Farrish, & Schrier, 2013; Llach, Marimon, Alonso-Almeida, & Bernardo, 2013	1. Intentions are positively related to the ease of the transaction process and user innovativeness. 2. Transaction security, navigation functionality, and cost-effectiveness positively impact trust and repurchase intention in the online setting. 3. Efficiency, high functionality, and hedonic quality are linked to loyalty in online booking of airline tickets.

topic modeling for star ratings (Linshi, 2014). Huang et al. (2013) found that in the restaurant context, service was the most important element included in the review content, followed by value, take-out, and décor. In another study using sentiment analysis techniques, it was identified that hotel consumers' sentiments in online reviews were affected by their experiences and perceptions toward service quality and performance (Duan et al., 2016).

Although the findings of previous studies have provided valuable insights into the understanding of online consumer behavior in the hospitality industry, most of the findings were fragmented and lacked a holistic view of the how consumers actually make online decisions or search online information (Kwok et al., 2017; Kwong et al., 2002). Further, the studies using big data analytics have focused more on the technical aspects or characteristics of online reviews, rather than consumers' information search behaviors (Duan et al., 2016; Huang, Rogers, & Joo, 2013; Linshi, 2014; McAuley & Leskovec, 2013; Wang, Zhao, Guo, & North, 2013; Xiang et al., 2017). In addition, most of the existing literature explored consumers' perceptions, attitudes, or behavioral intentions, rather than the actual behaviors (Chen & Law, 2016). Therefore, identifying actual consumer behavior and obtaining a holistic view of consumers' online information search behaviors and decision-making processes was essential in the exploration of online consumer behavior for hospitality researchers (Kwok et al., 2017).

Decision Making in Online Restaurant Selection

Influential Factors for Traditional Restaurant Choices

Dining out is an important part of people's life as 90% of consumers express that they enjoy going to the restaurants (National Restaurant Association [NRA], 2017). According to a recent report by NRA (2017), the sales of the restaurant industry were projected to be $799 billion in 2017, accounting for approximately 4% of the U.S. GDP. In addition, the restaurant

industry employed 14.7 million workers, which was 10% of the U.S. workforce in 2017 (NRA, 2017). Therefore, the impact of the restaurant industry in the U.S. economy is significant. Despite its strong contribution to the overall economy, individual restaurateurs have faced challenges with the increasing competition and changing needs of consumers (Pantelidis, 2010). Thus, understanding consumers' needs and how they make dining decisions is critical for the restaurateurs (Clemes, Gan, & Sriwongrat, 2013).

Factors affecting consumers' restaurant choices have been explored throughout decades (Duarte Alonso, O'neill, Liu, & O'shea, 2013; Peng, Bilgihan, & Kandampully, 2015; Pettijohn, Pettijohn, & Luke, 1997). Johns and Pine (2002) identified food quality, service quality, price, value, atmosphere, location, and convenience were factors that influenced consumers' restaurant experience. In addition, quality, cleanliness, and value were the most important factors for fast food restaurants, while atmosphere and menu variety were less important (Pettijohn et al., 1997). Alonso et al. (2013) explored the factors that affect consumers' restaurant choices and identified food quality, prior positive experience, clean environment, and service quality were influential factors, and the use of local food and produce were not significant factors that affected consumers' restaurant choices.

Factors affecting consumers' choices for ethnic restaurants were also explored and found that food quality, service quality, overall dining experience, social status, and value for money had significant effects on consumers' choices (Clemes et al., 2013). Peng et al. (2015) identified five decision-making styles when college students chose casual dining restaurants and they were: hedonic, habitual, price conscious, confused by overchoice, and brand conscious. Of these five styles, hedonic style was most typical among the students as the enjoyment of eating out was the main purpose for them in casual dining decisions (Peng et al., 2015).

Restaurant Selections in the Online Setting

When it comes to the selection of restaurants, searching online information through various platforms is becoming popular among consumers along with the rapid development of the Internet and mobile technology (Wang et al., 2013). Consumers tend to search information through various online sources to assist in their restaurant choices (Wang et al., 2013). Consumer review websites (CRWs) such as Yelp and TripAdvisor are popular platforms where valuable information is presented to consumers to help them choose restaurants (Xiang, Magnini, & Fesenmaier, 2015). In Yelp, there have been 74 million unique visitors by the third quarter of 2017 (Yelp, 2018). The influence of such a large number of consumers is significant as a total of 570 million online reviews are written on TripAdvisor and the number of its monthly average unique visitors has reached 455 million (TripAdvisor, 2018).

While the study of online consumer behavior has attracted much attention from hospitality researchers, the majority have been focused on the hotel industry (Johns & Pine, 2002). Although there may be similarities between hotel and restaurant products, their differences and the uniqueness of the restaurant industry should not be neglected (Johns & Pine, 2002). In addition, consumer behavior for booking a hotel and making a restaurant choice may also differ in terms of the scale of purchases and pertinent factors that may affect consumers' decision-making processes.

In terms of the online consumer behavior related research for the restaurant industry, a number of studies have been conducted (Huang et al., 2013; Kwok & Yu, 2013; Lu, Ba, Huang, & Feng, 2013; Pantelidis, 2010; Zhang et al., 2010). Pantelidis (2010) explored the influential factors for consumers' dining experiences through the content analysis of 2,471 online reviews for 300 restaurants. The most popular word used in these reviews was food, followed by service,

atmosphere, price, menu, and décor. Specific food items were also mentioned, and "fish" appeared most frequently in online reviews than any other food-related words (Pantelidis, 2010). Another study that evaluated the Business-to-Consumer communications in Facebook revealed that conversational messages were preferred over the marketing and promotional messages (Kwok & Yu, 2013). Similarly, consumers regarded UGC as more reliable sources than editorials, and UGC had significant positive effects on restaurant popularity (Zhang et al., 2010). Lu et al. (2013) found that both online marketing and e-WOM affected product sales significantly; and service was the most important element included in the review content, followed by value, take-out, and décor (Huang et al., 2013).

Compared to the studies exploring online consumer behavior in the hotel industry, the literature in the restaurant industry is much fewer with limited dimensions. For example, in a recent study, it was revealed that merely 12% of published articles in hospitality journals between 2000 and 2015 were related to the online consumer behavior in the restaurant industry (Kwok et al., 2017). Foci of most studies have been feature and effects of online reviews, and consumer perceptions or attitudes toward social media and online reviews (Schuckert et al., 2015). Little attention has been paid to the study of the actual information search behaviors of consumers for restaurant choices through consumer review websites. Therefore, this study is intended to identify consumers' actual information search behaviors and decision-making processes for online restaurant selections.

Information Search and Decision Making for Online Restaurant Selection

As illustrated in the Consumer Decision Process (CDP) model, once consumers recognize a need for certain purchase, they would further conduct the information search and evaluate alternatives before they make the final decisions (Blackwell et al., 2006). In terms of the online

decision-making process, consumers may search through various online information sources, compare different options, and make decisions (Noone & Robson, 2014). The Two-Stage Disaggregate Choice Model (Figure 2.2) has been proposed and utilized to explore online consumer behavior in the hospitality industry (Gensch, 1987; Noone & Robson, 2014).

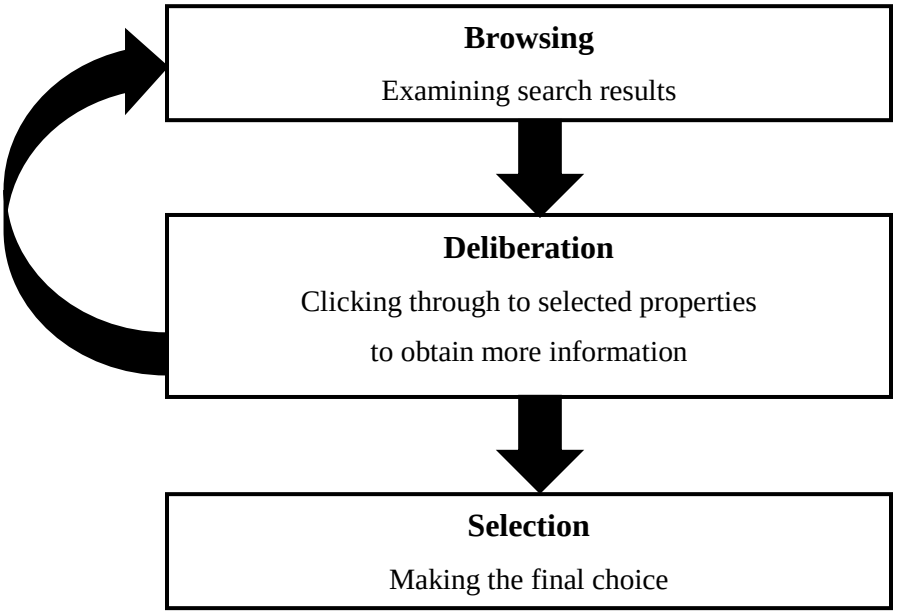


Figure 2.2 Two-Stage Disaggregate Choice Model. Adapted from Marketing Science, 6, D. H. Gensch, 1987, p. 227.

As shown in Figure 2.2, this model posits that consumers' information search behaviors consist of two specific stages: browsing and deliberation, before the final decision is made (Gensch, 1987; Noone & Robson, 2014). Specifically, consumers may first browse overall information with a variety of choices. In the deliberation stage, they would narrow down to a smaller set of choices and look into more detailed information for each option. The group of choices that have been explored in the deliberation stage is also called the "consideration set" (Gensch, 1987). It is also important to note that consumers may go back and forth between the deliberation and browsing steps before they arrive at their final choice (Noone & Robson, 2014). Noone and Robson have used this model in a study of online consumer behavior for hotel

choices and identified different information search behaviors of consumers in these two stages. This model is mostly consistent with the CDP model as they share the similarities of information search behaviors and evaluations of alternatives before purchase decisions. Nevertheless, the Two-Stage Disaggregate Choice Model is more appropriate in the demonstration of the information search behaviors in the online decision-making processes (Noone & Robson, 2014). Therefore, this model was adopted in this study to explore consumers' actual online information search behaviors and decision-making processes.

Eye Tracking Methodology

Attention Patterns and Decision Making

According to the Bounded Rational Theory, consumers would not be able to review all information available due to their limited cognitive capacity and time constraints (Simon, 1972). Visual attention is also regarded as a selective process with the allocation of limited mental resources to certain information (Carrasco, 2011). When it comes to the online decision making and information search experience, attention plays a vital and active role in contributing to consumers' purchase decisions (Orquin & Loose, 2013). Different types of attention patterns may affect the decision-making process in different ways. Bottom up and top down controls of attention are the two widely accepted attention patterns (Corbetta & Shulman, 2002; Laan, Hooge, Ridder, & Viergever, 2015; Orquin & Loose, 2013; Wang, Li, Ye, & Law, 2016). The bottom up, or the stimulus-driven attention pattern assumes that visually salient objects primarily attract consumers' attention, whereas the top down, or goal-driven attention pattern explains that consumers' attention is mainly determined by their goals or specific tasks (Djamasbi, Siegel, & Tullis, 2010; Orquin & Loose, 2013).

Numerous studies have explored and identified the effect of bottom up attention on consumer decisions. Specifically, Orquin and Loose (2013) have conducted a review study related to the relationship between attention and decision making and identified four stimulus factors: saliency, surface size, visual clutter, and position. People also tended to pay special attention to the online reviews located in salient positions, and there was significant effect of consumers' increased attention for the salient information on the purchase decisions (Wang et al., 2016). Djamasbi et al. (2010) have identified that Millennials preferred to look at a website with the following elements: celebrity images, a main large image, little text, and search feature. Online content located at the center and top of the website was also found to capture people's early attention when they are exposed to the commercial website page (Djamasbi et al., 2010). Similar results were also revealed in a study related to nutrition labels of food products (Graham, Orquin, & Visschers, 2012). Specifically, nutrition labels that were centrally located, color-coded, and with less visual clutter were found to be more salient and attractive to consumers' attention (Graham et al., 2012).

Researchers have also explored important factors related to the top down control of attention. Task instructions, utility effects, heuristics, attention phases, and learning effects were the five influential factors that affect consumers' decision-making processes through the influence on attention (Orquin & Loose, 2013). In most consumer decision-making related studies, participants would be provided with different instructions or goals with certain tasks, and different goals were the main drivers to form different attention patterns (Cutrell & Guan, 2007; Day, Lin, Huang, & Chuang, 2009; Huang & Kuo, 2011; Hsee & Rottenstreich, 2004). Compared with the emotion-oriented decision makers, accuracy-oriented decision makers focused more on the objective conditions and information, rather than subjective feelings and

judgement (Hsee & Rottensteich, 2004). One study concerning consumers' web search behaviors also revealed that participants performed better in informational tasks with longer snippets than in navigational tasks (Cutrell & Guan, 2007).

Although the bottom up and top down attention patterns have been individually examined in previous studies, in the context of online purchase where consumers spend considerable time and effort to obtain valuable information, the decision-making processes can be quite complicated (Häubl & Trifts, 2000). It is crucial to note that consumers may not follow a clearly defined attention pattern, but instead, they may combine and use different patterns together, or switch between patterns when needed (Huang & Kuo, 2011). Gaze Cascade Model is a well-established model concerning the combination of different attention patterns. In this model, preferential looking and mere exposure effect play interactive role in affecting consumers' decision-making processes (Glaholt & Reingold, 2011; Shimojo, Simion, Shimojo, & Scheier, 2003). Preferential looking refers to the status that people pay their attention on the items based on their original preferences, whereas mere exposure effect assumes that the visually salient objects attract people's attention the most. The interactions between these two effects indicate that consumers' attention may be determined both by the pre-existing preference and the salient visual content (Glaholt & Reingold, 2011).

Eye Tracking, Attention, and Cognitive Process

In the cognitive psychology field, an eye movement is considered to be a good reflection of people's attention and cognitive process, which is also called the Eye-Mind assumption (Day et al., 2009). This assumption demonstrates that people's eye movements and thinking processes may occur at the same time (Just & Carpenter, 1976; Rayner, 1998). For example, in the reading context, when people's eyes fixate on the words and sentences, the mind processes the content at

the same moment (Rayner, 1998). Just and Carpenter (1976) found that eye movements could properly reflect the direction of a person's attention. The research in neurophysiological field also posits that eye movements and attention are tightly combined during the decision-making processes when participants are allowed to naturally view information (Glaholt & Reingold, 2011).

As people's attention and decision making can vary in different conditions, understanding how consumers make online decision choices is challenging. The eye-tracking technology, which has been widely utilized in psychology and neuroscience fields, has evolved into an effective technique to capture people's eye movements and further predict human behavior (McCarley, Mounts, & Kramer, 2007). The most basic and essential feature of eye tracking is that it enables researchers to see deeply through the eyes of people and know where and how long their eye movements occur (Granka, Joachims, & Gay, 2004).

Eye Tracking and Consumer Behavior

With the advancement of recent technologies, current eye trackers can not only capture consumers' natural behaviors, but are able to do so without any invasiveness (Mitterer-Daltoé, Queiroz, Fiszman, & Varela, 2014). Although self-reported research methods have dominated the majority of consumer behavior research, the results have been challenged because subjective perceptions, attitudes, and behavioral intentions may not be adequate to reflect consumers' actual behaviors (Webb & Sheeran, 2006). Overcoming these limitations, eye-tracking technology allows researchers to obtain more objective results of consumer behavior (Russell, 2005). The objectivity is also justified as people report that they often forget that their eyes being tracked during eye-tracking experiments (Maughan, Gutnikov, & Stevens, 2007). Therefore, the eye-

tracking technology can capture the real behavior of consumers and provide tremendous insights and value for consumer behavior researchers (Robson & Noone, 2014).

Although eye-tracking technology has been mostly used in psychology and neurosciences to explore people's visual behaviors and cognitive process, the approach has also been used in marketing and consumer behavior related disciplines (Wedel & Pieters, 2008). For example, some studies have been conducted to explore the effectiveness of advertisements (Rayner, Rotello, Stewart, Keir, & Duffy, 2001), health and nutrition food labeling (Graham et al., 2012), and brand choices (Chandon, Hutchinson, & Yong, 2002; Pieters & Warlop, 1999). In terms of the examination of online consumer behavior, eye-tracking technology has been adopted to explore the online web searching behaviors (Cutrell & Guan, 2007; Rele & Duchowski, 2005), human-computer interaction and website usability analysis (Jacob & Karn, 2003; Wedel & Pieters, 2008).

In the evaluation of online information search behaviors, clickstream analysis is also an important method which can yield helpful results with the number and sequence of mouse clicks when consumers are conducting the web browsing activities (Bucklin & Sismeiro, 2009). However, as the mouse clicks and consumers' attention are not always consistent, the utilization of clickstream analysis may not be adequate to uncover results such as what specific information consumers have been attracted to and the time duration of eye fixations, as well as how consumers select among different options (Noone & Robson, 2014).

In order to explore consumers' actual behaviors, eye-tracking technology is an effective tool as it can precisely and objectively capture people's eye movements (Schiessl, Duda, Thölke, & Fischer, 2003). However, compared to other disciplines, the application of eye-tracking technology in the hospitality research is still in its infancy in terms of the popularity and depth of

the studies (Robson & Noone, 2014). While several studies have explored different aspects of online consumer behavior in the hospitality industry, most of them are focused on the hotel industry (Noone & Robson, 2014; Pan, Zhang, & Law, 2013). Pan et al. （2013）used eye-tracking technology to explore consumers' preferences in online hotel choice and identified that consumers focused more on the web pages with smaller number of hotels, and images are influential in attracting people's attention. Noone and Robson (2014) also tracked the eye movements of participants under the natural hotel choice scenarios and found that consumers quickly browsed the hotels in the first stage and used more personal heuristics when making further choices.

While several studies have explored different aspects of online consumer behavior in the hospitality industry, most of them are focused on the hotel industry and the application of eye-tracking technology has been scarce in the restaurant related research (Yang, 2012; Mitterer-Daltoé et al., 2014; Zhang & Seo, 2015). Specifically, consumers' menu viewing patterns (Yang, 2012), perceived healthiness of fish products (Mitterer-Daltoé et al., 2014), and visual saliency to food items (Zhang & Seo, 2015) were explored in these restaurant related studies using eye-tracking technology. However, little attention has been paid to the exploration of online restaurant choices in consumer review websites.

Because eye tracking equipment is powerful to precisely record the fixation duration that each participant looks at a specific position, it is useful to record and analyze the actual consumer web searching behaviors (Jacob & Karn, 2003). In addition, eye-tracking technology can provide more detailed and vivid descriptions of consumers' actual decision-making processes using the visualized heat maps and gaze plots (Huang & Kuo, 2011). It is conceivable that exploring the restaurant decision-making processes and online information search behaviors

would provide values for both hospitality researchers and practitioners. Therefore, this study aimed to identify the online information search behaviors when making online restaurant choices in consumer review websites through the utilization of eye-tracking technology.

Retrospective Think-aloud Interviews

Although eye-tracking technology enables researchers to capture the accurate eye movements of consumers during the information search behaviors, eye-tracking data only uncovers what, how long, and how often consumers' attention has been attracted to specific information. The reasoning of consumer behavior and their cognitive thinking processes behind the eye movements are still unknown (Robson & Noone, 2014). The retrospective think-aloud interviews, a method that allows people to verbalize the cognitive thinking process of a certain behavior, is an effective qualitative method that can complement to the eye-tracking (Alshammari, Alhadreti, & Mayhew, 2015; Elbabour, Alhadreti, & Mayhew, 2017; Peute, Keizer, & Jaspers, 2015; Salmerón, Naumann, García, & Fajardo, 2016).

This method was initially used in the psychological field to study people's cognitive processes and further become a popular in the human-computer interactions usability studies (Elbabour et al., 2017). It is regarded that verbal protocols are important process-tracing methods in identifying the information search behaviors of consumers (Glaholt & Reingold, 2011). Originally, the verbal protocols consist of both the concurrent think-aloud and retrospective think-aloud protocols. While the concurrent think-aloud protocol indicates the verbalization process that occur at the same of people's behaviors, the retrospective think-aloud protocol occur after the behaviors (Glaholt & Reingold, 2011). Although these protocols have their own advantages, when it comes to the application in the online information search behaviors, it is argued that the retrospective think-aloud protocol is more effective than the concurrent protocol

(Alshammari et al., 2015). As the goal of this research was to identify consumers' online information search behaviors and decision-making process for restaurant selections, applying the retrospective think-aloud interviews is appropriate to obtain a better understanding of consumers' thinking and decision-making processes for online restaurant search behaviors.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Alshammari, T., Alhadreti, O., & Mayhew, P. (2015). When to ask participants to think aloud: A comparative study of concurrent and retrospective think-aloud methods. *International Journal of Human Computer Interaction, 6*(3), 48-64.

Anderson, M., & Magruder, J. (2012). Learning from the crowd: Regression discontinuity estimates of the effects of an online review database. *The Economic Journal, 122*, 957-989.

Bartels, D. M., & Johnson, E. J. (2015). Connecting cognition and consumer choice. *Cognition, 135*, 47-51.

Bazaar Voice. (2012). *Talking to Strangers: Millennials Trust People over Brand.* Retrieved from http://media2.bazaarvoice.com/documents/Bazaarvoice_WP_Talking-to-Strangers.pdf

Blackwell, R. D., Miniard, P., & Engel, J. (2006). *Consumer behavior* (10th ed.). Mason, OH: Thomson Higher Education.

Bray, J. P. (2008). *Consumer behaviour theory: approaches and models.* Retrieved from http://eprints.bournemouth.ac.uk/10107/1/Consumer_Behaviour_Theory_-_Approaches_&_Models.pdf

Buchanan, L., & O Connell, A. (2006). A brief history of decision making. *Harvard Business Review, 84*, 32-46.

Bucklin, R. E., & Sismeiro, C. (2009). Click here for Internet insight: Advances in clickstream data analysis in marketing. *Journal of Interactive Marketing, 23*, 35-48.

Cantallops, A. S., & Salvi, F. (2014). New consumer behavior: A review of research on eWOM and hotels. *International Journal of Hospitality Management, 36*, 41-51.

Carrasco, M. (2011). Visual attention: The past 25 years. *Vision research, 51*, 1484-1525.

Casalo, L. V., Flavian, C., Guinaliu, M., & Ekinci, Y. (2015). Do online hotel rating schemes influence booking behaviors? *International Journal of Hospitality Management, 49*, 28-36.

Chan, Y. Y., & Ngai, E. W. (2011). Conceptualising electronic word of mouth activity: An input-process-output perspective. *Marketing Intelligence & Planning, 29*, 488-516.

Chandon, P., Hutchinson, W., & Young, S. (2002). *Do We Know what We Look At?: An Eye-tracking Study of Visual Attention and Memory for Brands at the Point of Purchase*. Retrieved from https://s3.amazonaws.com/academia.edu.documents/

Chen, Y. F., & Law, R. (2016). A review of research on electronic word-of-mouth in hospitality and tourism management. *International Journal of Hospitality & Tourism Administration, 17*, 347-372.

Clemes, M. D., Gan, C., & Sriwongrat, C. (2013). Consumers' choice factors of an upscale ethnic restaurant. *Journal of Food Products Marketing, 19*, 413-438.

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature reviews. Neuroscience, 3*, 201-215.

Cutrell, E., & Guan, Z. (2007, April). What are you looking for?: an eye-tracking study of information usage in web search. *Proceedings of the SIGCHI conference on Human factors in computing systems*, 407-416. Retrieved from https://dl.acm.org/citation.cfm?id=1240690

Day, R. F., Lin, C. H., Huang, W. H., & Chuang, S. H. (2009). Effects of music tempo and task difficulty on multi-attribute decision-making: An eye-tracking approach. *Computers in Human Behavior*, *25*, 130-143.

Dimanche, F., & Havitz, M. E. (1995). Consumer behavior and tourism: Review and extension of four study areas. *Journal of Travel & Tourism Marketing*, *3*(3), 37-57.

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. *International journal of human-computer studies*, *68*, 307-323.

DoubleClick. (2004). *DoubleClick QI 2004 E-commerce Site Trend Report*. Retrieved from http://www.spunlogic.comlmedialpdflDoubleClickQI2004ECommerceTrendReport.pdf

Duan, W., Yu, Y., Cao, Q., & Levy, S. (2016). Exploring the impact of social media on hotel service performance: A sentimental analysis approach. *Cornell Hospitality Quarterly*, *57*, 282-296.

Duarte Alonso, A., O'neill, M., Liu, Y., & O'shea, M. (2013). Factors driving consumer restaurant choice: An exploratory study from the Southeastern United States. *Journal of Hospitality Marketing & Management*, *22*, 547-567.

Duverger, P. (2013). Curvilinear effects of user-generated content on hotels' market share: a dynamic panel-data analysis. *Journal of Travel Research*, *52*, 465-478.

Elbabour, F., Alhadreti, O., & Mayhew, P. (2017). Eye Tracking in Retrospective Think-Aloud Usability Testing: Is There Added Value?. *Journal of Usability Studies*, *12*(3), 95-110.

Erasmus, A. C., Boshoff, E., & Rousseau, G. G. (2001). Consumer decision-making models within the discipline of consumer science: a critical approach. *Journal of Consumer Sciences, 29*, 82-90.

Fonteyn, M. E., Kuipers, B., & Grobe, S. J. (1993). A description of think aloud method and protocol analysis. *Qualitative health research, 3*, 430-441.

Gensch, D. H. (1987). A two-stage disaggregate attribute choice model. *Marketing Science, 6*, 223-239.

Glaholt, M. G., & Reingold, E. M. (2011). Eye movement monitoring as a process tracing methodology in decision making research. *Journal of Neuroscience, Psychology, and Economics, 4*(2), 125-146.

Graham, D. J., Orquin, J. L., & Visschers, V. H. (2012). Eye tracking and nutrition label use: A review of the literature and recommendations for label enhancement. *Food Policy, 37*, 378-382.

Granka, L. A., Joachims, T., & Gay, G. (2004, July). Eye-tracking analysis of user behavior in WWW search. *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval*. Retrieved from https://dl.acm.org/citation.cfm?id=1009079

Häubl, G., & Trifts, V. (2000). Consumer decision making in online shopping environments: The effects of interactive decision aids. *Marketing science, 19*, 4-21.

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: on the affective psychology of value. *Journal of Experimental Psychology: General, 133*, 23-30.

Huang, J., Rogers, S. and Joo, E. (2013). *Improving restaurants by extracting subtopics from yelp reviews*. Retrieved from https://www.yelp.com/html/pdf/YelpDataset ChallengeWinner_ImprovingRestaurants.pdf

Huang, Y. F., & Kuo, F. Y. (2011). An eye-tracking investigation of internet consumers' decision deliberateness. *Internet Research, 21*, 541-561.

Internet World Stats. (2017). *World Internet Users and 2017 Population Stats*. Retrieved from http://www.internetworldstats.com/stats.htm

Jacob, R. J., & Karn, K. S. (2003). Eye tracking in human-computer interaction and usability research: Ready to deliver the promises. *Mind, 2*, 573-605.

Johns, N., & Pine, R. (2002). Consumer behavior in the food service industry: a review. *International Journal of Hospitality Management*, *21*(2), 119-134.

Just, M. A., & Carpenter, P. A. (1976). Eye fixations and cognitive processes. *Cognitive Psychology, 8*, 441-480.

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American Psychologist*, *58*, 697-720.

Kang, M., & Schuett, M. A. (2013). Determinants of sharing travel experiences in social media. *Journal of Travel & Tourism Marketing, 30*, 93-107.

Kim, J. S., Farrish, J., & Schrier, T. (2013). Hotel information technology security: do hoteliers understand the risks? *International Journal of Hospitality & Tourism Administration, 14*, 282-304.

Kim, W. G., Lim, H., & Brymer, R. A. (2015). The effectiveness of managing social media on hotel performance. *International Journal of Hospitality Management*, *44*, 165-171.

Kontek, K. (2010). Decision utility theory: back to von Neumann, Morgenstern, and Markowitz.

Kwok, L., & Yu, B. (2013). Spreading social media messages on Facebook: An analysis of restaurant business-to-consumer communications. *Cornell Hospitality Quarterly, 54*, 84-94.

Kwok, L., Xie, K. L., & Richards, T. (2017). Thematic framework of online review research: A systematic analysis of contemporary literature on seven major hospitality and tourism journals. *International Journal of Contemporary Hospitality Management, 29*, 307-354.

Kwong, T., Cheung, C., Zhu, L., Limayem, M., & Viehland, D. (2002). Online consumer behavior: an overview and analysis of the literature. *Proceedings of the Pacific Asia Conference of Information Systems, Tokyo, Japan*. Retrieved from http://www.pacis-net.org/file/2002/166.pdf

Ladhari, R., & Michaud, M. (2015). eWOM effects on hotel booking intentions, attitudes, trust, and website perceptions. *International Journal of Hospitality Management*, *46*, 36-45.

Law, R., Leung, D., Au, N., & Lee, H. A. (2013). Progress and development of information technology in the hospitality industry: Evidence from Cornell Hospitality Quarterly. *Cornell Hospitality Quarterly*, *54*, 10-24.

Llach, J., Marimon, F., del Mar Alonso-Almeida, M., & Bernardo, M. (2013). Determinants of online booking loyalties for the purchasing of airline tickets. *Tourism Management, 35*, 23-31.

Leung, D., Law, R., Van Hoof, H., & Buhalis, D. (2013). Social media in tourism and hospitality: A literature review. *Journal of Travel & Tourism Marketing, 30*, 3-22.

Levy, S. E., Duan, W., & Boo, S. (2013). An analysis of one-star online reviews and responses in the Washington, DC, lodging market. *Cornell Hospitality Quarterly, 54*, 49-63.

Leung, R., Schuckert, M., & Yeung, E. (2013). Attracting user social media engagement: A study of three budget airlines Facebook pages. *Proceedings of Information and communication technologies in tourism 2013*, Springer, Berlin, Heidelberg.

Linshi, J. (2014). *Personalizing yelp star ratings: a semantic topic modeling approach*. Retrieved from https://www.yelp.com/html/pdf/YelpDatasetChallenge Winner_Personalizing Ratings.pdf

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2008). Electronic word-of-mouth in hospitality and tourism management. *Tourism management*, *29*, 458-468.

Lo, I. S., McKercher, B., Lo, A., Cheung, C., & Law, R. (2011). Tourism and online photography. *Tourism management, 32*, 725-731.

Lu, X., Ba, S., Huang, L., & Feng, Y. (2013). Promotional marketing or word-of-mouth? Evidence from online restaurant reviews. *Information Systems Research, 24*, 596-612.

Lu, W., & Stepchenkova, S. (2015). User-generated content as a research mode in tourism and hospitality applications: Topics, methods, and software. *Journal of Hospitality Marketing & Management*, *24*(2), 119-154.

Marketwatch. (2017). *Amazon income statement*. Retrieved from http://www.marketwatch.com/investing/stock/amzn

Mattila, A. S. (2004). Consumer behavior research in hospitality and tourism journals. *International Journal of Hospitality Management*, *23*, 449-457.

Maughan, L., Gutnikov, S., & Stevens, R. (2007). Like more, look more. Look more, like more: The evidence from eye-tracking. *Journal of Brand Management, 14*, 335-342.

Mauri, A. G., & Minazzi, R. (2013). Web reviews influence on expectations and purchasing intentions of hotel potential customers. *International Journal of Hospitality Management*, *34*, 99-107.

McAuley, J. and Leskovec, J. (2013). *Hidden factors and hidden topics: understanding rating dimensions with review text*. Retrieved from https://www.yelp.com/html/pdf/YelpDatasetChallengeWinner_HiddenFactors.pdf

McCarley, J. S., Mounts, J. R., & Kramer, A. F. (2007). Spatially mediated capacity limits in attentive visual perception. *Acta Psychologica*, *126*(2), 98-119.

Milner, T., & Rosenstreich, D. (2013). A review of consumer decision-making models and development of a new model for financial services. *Journal of Financial Services Marketing*, *18*(2), 106-120.

Mitterer-Daltoé, M. L., Queiroz, M. I., Fiszman, S., & Varela, P. (2014). Are fish products healthy? Eye tracking as a new food technology tool for a better understanding of consumer perception. *LWT-Food Science and Technology*, *55*, 459-465.

National Restaurant Association (NRA). (2017). *2017 Restaurant industry pocket factbook*. Retrieved from http://www.restaurant.org/Downloads/PDFs/News-Research/Pocket_Factbook_FEB_2017-FINAL.pdf

Nielsen (2017). *Millennials on millennials – Digital music and communication*. Retrieved from http://www.nielsen.com/us/en/insights/reports/2017/millennials-on-millennials-digital-music-and-communication.html

Noone, B., & Robson, S. K. (2014). Using eye tracking to obtain a deeper understanding of what drives online hotel choice. *Cornell Hospitality Report*, *14*(18), 6-16.

Öğüt, H., & Taş, B. K. O. (2012). The influence of Internet customer reviews on the online sales and prices in hotel industry. *The Service Industries Journal, 32*, 197–214.

Orquin, J. L., & Loose, S. M. (2013). Attention and choice: A review on eye movements in decision making. *Acta Psychologica*, *144*, 190-206.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly, 54*, 74-83.

Pantelidis, I. S. (2010). Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quarterly, 51*, 483-491.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). Servqual: A multiple-item scale for measuring consumer perc. *Journal of retailing, 64*(1), 12-40.

Park, S. Y., & Allen, J. P. (2013). Responding to online reviews: Problem solving and engagement in hotels. *Cornell Hospitality Quarterly, 54*, 64-73.

Park, S., & Nicolau, J. L. (2015). Asymmetric effects of online consumer reviews. *Annals of Tourism Research, 50*, 67-83.

Park, S. B., Ok, C. M., & Chae, B. K. (2016). Using twitter data for cruise tourism marketing and research. *Journal of Travel & Tourism Marketing, 33*, 885-898.

Peng, C., Bilgihan, A., & Kandampully, J. (2015). How do diners make decisions among casual dining restaurants? An exploratory study of college students. *International Journal of Hospitality & Tourism Administration, 16*, 1-15.

Pettijohn, L. S., Pettijohn, C. E., & Luke, R. H. (1997). An evaluation of fast food restaurant satisfaction: determinants, competitive comparisons and impact on future patronage. *Journal of Restaurant & Foodservice Marketing, 2*(3), 3-20.

Peute, L. W., de Keizer, N. F., & Jaspers, M. W. (2015). The value of Retrospective and Concurrent Think Aloud in formative usability testing of a physician data query tool. *Journal of Biomedical Informatics, 55,* 1-10.

Pieters, R., & Warlop, L. (1999). Visual attention during brand choice: The impact of time pressure and task motivation. *International Journal of Research in Marketing, 16,* 1-16.

Rayner, K. (1998). Eye movements in reading and information processing: 20 years of research. *Psychological bulletin*, *124,* 372-422.

Rayner, K., Rotello, C. M., Stewart, A. J., Keir, J., & Duffy, S. A. (2001). Integrating text and pictorial information: eye movements when looking at print advertisements. *Journal of Experimental Psychology: Applied, 7,* 219-226.

Reisinger, Y. (2001). *Unique characteristics of tourism, hospitality, and leisure services. Service quality management in hospitality, tourism and leisure*. New York, NY: Haworth Press.

Rele, R. S., & Duchowski, A. T. (2005). Using eye tracking to evaluate alternative search results interfaces. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting.* Los Angeles, CA: SAGE Publications.

Richarme, M. (2005). *Consumer Decision-Making Models, Strategies, and Theories, Oh My!.* Retrieved from https://www.decisionanalyst.com/media/downloads/ConsumerDecisionMaking.pdf

Robson, S. K. A, & Noone, B. (2014). Show me what you see, tell me what you think: Using eye tracking for hospitality research. *Cornell Hospitality Report, 14*(17), 6-12.

Russell, M. C. (2005). Hotspots and hyperlinks: Using eye-tracking to supplement usability testing. *Usability News, 7*(2), 1-11.

Salmerón, L., Naumann, J., García, V., & Fajardo, I. (2017). Scanning and deep processing of information in hypertext: an eye tracking and cued retrospective think-aloud study. *Journal of Computer Assisted Learning*, *33*, 222-233.

San Martín, H., & Herrero, Á. (2012). Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework. *Tourism Management*, *33*, 341-350.

Schiessl, M., Duda, S., Thölke, A., & Fischer, R. (2003). Eye tracking and its application in usability and media research. *MMI-interaktiv Journal*, *6*, 41-50.

Schuckert, M., Liu, X., & Law, R. (2015). Hospitality and tourism online reviews: Recent trends and future directions. *Journal of Travel & Tourism Marketing*, *32*, 608-621.

Schwartz, H. (2002). Herbert Simon and behavioral economics. *The Journal of Socio-Economics*, *31*, 181-189.

Sheth, J. N., Mittal, B., Newman, B. I., & Sheth, J. N. (2004). *Customer behavior: A managerial perspective.* Mason, OH: Thomson/South-Western.

Shimojo, S., Simion, C., Shimojo, E., & Scheier, C. (2003). Gaze bias both reflects and influences preference. *Nature neuroscience*, *6*, 1317-1322.

Simon, H. A. (1955). A behavioral model of rational choice. *The quarterly journal of economics*, *69*, 99-118.

Simon, H. A. (1959). Theories of decision-making in economics and behavioral science. *The American economic review*, *49*, 253-283.

Simon, H. A. (1972). Theories of bounded rationality. *Decision and organization*, *1*(1), 161-176.

Sparks, B. A., & Browning, V. (2011). The impact of online reviews on hotel booking intentions and perception of trust. *Tourism management*, *32*, 1310-1323.

Statists. (2017). *E-commerce in the United States - Statistics & facts*. Retrieved from https://www.statista.com/topics/2443/us-ecommerce/

Sun, S., Fong, D. K. C., Law, R., & He, S. (2017). An updated comprehensive review of website evaluation studies in hospitality and tourism. *International Journal of Contemporary Hospitality Management, 29,* 355-373.

Tantrabundit, P. (2015). *How Online Review and Rating Systems Affect Online Consumer Buying Behavior in the Hotel Industry* (Doctoral dissertation, Alliant International University, San Diego).

TripAdvisor (2018). *About TripAdvisor*. Retrieved from https://tripadvisor.mediaroom.com/us-about-us

van der Laan, L. N., Hooge, I. T., De Ridder, D. T., Viergever, M. A., & Smeets, P. A. (2015). Do you like what you see? The role of first fixation and total fixation duration in consumer choice. *Food Quality and Preference*, *39*, 46-55.

Vermeulen, I. E., & Seegers, D. (2009). Tried and tested: The impact of online hotel reviews on consumer consideration. *Tourism management*, *30*(1), 123-127.

Von Neumann, J., & Morgenstern, O. (1947). *Theory of games and economic behavior*. Retrieved from http://hdl.handle.net/2042/28548

Wang, J., Zhao, J., Guo, S. and North, C. (2013). *Clustered layout word cloud for user generated review.* Retrieved from http://www.yelp.com/dataset_challenge

Wang, Z., Li, H., Ye, Q., & Law, R. (2016). Saliency effects of online reviews embedded in the description on sales: Moderating role of reputation. *Decision Support Systems*, *87*, 50-58.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological bulletin, 132*, 249-268

Wedel, M., & Pieters, R. (2008). A review of eye-tracking research in marketing. In *Review of marketing research, 4*, 123-147.

Xiang, Z., Du, Q., Ma, Y., & Fan, W. (2017). A comparative analysis of major online review platforms: Implications for social media analytics in hospitality and tourism. *Tourism Management, 58*, 51-65.

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of Retailing and Consumer Services, 22*, 244-249.

Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management, 43*, 1-12.

Yelp. (2018). *10 things you should know about Yelp.* Retrieved from http://www.yelp.com/about

Yang, S. S. (2012). Eye movements on restaurant menus: A revisitation on gaze motion and consumer scanpaths. *International Journal of Hospitality Management, 31*, 1021-1029.

Yen, C. L. A., & Tang, C. H. H. (2015). Hotel attribute performance, eWOM motivations, and media choice. *International Journal of Hospitality Management, 46*, 79-88.

Zhang, B., & Seo, H. S. (2015). Visual attention toward food-item images can vary as a function of background saliency and culture: An eye-tracking study. *Food Quality and Preference, 41*, 172-179.

Zhang, Z., Ye, Q., Law, R., & Li, Y. (2010). The impact of e-word-of-mouth on the online popularity of restaurants: A comparison of consumer reviews and editor reviews. *International Journal of Hospitality Management*, *29*, 694-700.

Zhao, X., Wang, L., Guo, X., & Law, R. (2015). The influence of online reviews to online hotel booking intentions. *International Journal of Contemporary Hospitality Management*, *27*, 1343-1364

Chapter 3 - Methodology

This research was aimed to explore the actual information search behaviors and thinking process of consumers when making restaurant selections online through consumer review websites (CRWs). The specific objectives were: (a) to accurately capture and evaluate the eye movements and attention patterns of consumers when they search online information on CRWs for restaurant choices; (b) to explore consumers' thinking process and reasoning for online restaurant selections and information search behaviors; and (c) to verify consumers' visual preferences and online information search behaviors identified from eye-tracking experiments and interviews.

In order to achieve these objectives, eye-tracking experiments, retrospective think-aloud interviews, and a nationwide online survey were conducted. The target population was consumers who used CRWs as information sources for making restaurant selections. This chapter describes the research design and methods in three phases, including the research participants, pilot study, apparatus and procedure, and data analysis for eye-tracking experiments (Phase I); the participants, data collection and procedure, and data analysis for retrospective think-aloud interviews (Phase II); as well as the participants, survey development, data collection, and data analysis for online survey (Phase III). Approval to use human subjects (Approval number: 9118 and 9306) for this research was obtained from the Institutional Review Board of Kansas State University (K-State) prior to data collection (Appendix A).

Phase I. Eye-tracking Experiment

Participants

The study sample was 30 consumers who had used CRWs (i.e., Yelp, TripAdvisor) for making restaurant choices during the past six months. A small sample size is common for eye-

tracking experiments because representative data is not the primary goal of eye-tracking research (Mitterer-Daltoé, Queiroz, Fiszman, & Varela, 2014; Pan, Zhang, & Law 2013; Wedel & Pieters, 2008). Participants were briefed about the study and asked to complete two restaurant search tasks using CRWs.

Recruitment Procedure

To recruit a wide variety of consumers, a maximum variation (heterogeneity) sampling approach was adopted. Maximum variation (heterogeneity) sampling is a purposeful sampling strategy aiming at, "capturing and describing the central themes that cut across a great deal of variation" (Patton, 2015, p. 283). It has also been argued that the maximum variation sampling strategy is especially useful for a small sample size in identifying the common patterns and shared characteristics with the maximization of sample variation (Patton). Considering the small sample size in the eye-tracking study, it was suitable to apply this sampling strategy to the current study. During the recruitment procedure of participants, a short survey was distributed in order to recruit individuals with a variety of demographic characteristics (e.g., gender, age, and user experience on CRWs for restaurant selections) (Appendix B).

The posters with relevant information about the research were posted on bulletin boards on campus in a Midwestern university and a public library in the city. Based on the survey responses, an appropriate number of potential participants with distinctive characteristics were identified and contacted to participate in the eye-tracking experiments. As shown in the following matrix in Figure 3.1, participants' variation was maximized by recruiting participants in various categories.

MJL	MJM	MSL	MSM	M Male F Female J Age 18-29 S Age 30 and over L Less experienced user M More experienced user
FJL	FJM	FSL	FSM	

Figure 3.1 Maximum variation matrix of phase I and II participants

Apparatus and Procedure

A Tobii TX300 screen-type eye tracker with the recording speed up to 300Hz was used in the eye-tracking study. Before the eye-tracking experiment, a research consent form (Appendix C) was distributed to each participant with procedure and instructions related to the experiment. Each participant filled out an informed consent form and was seated in front of the eye tracker at a distance and height that they felt comfortable. A calibration test was conducted utilizing five calibration points to ensure the quality and precision of eye-tracking data. To assess the accuracy and quality of the eye-tracking data in the experiments, the acceptable percentage of the eye movements captured by the eye tracker was determined at 75%.

After the participants passed the calibration tests, the researcher provided them with written instructions to make online restaurant selections on two CRWs, TripAdvisor and Yelp. These websites were utilized because they had been considered as the top two websites with millions of regular users searching and sharing consumer reviews (TripAdvisor, 2018; Yelp, 2018). Previous eye-tracking studies in hospitality research had mostly used the manipulated web pages, pictures, or menus. However, the data may be biased by the manipulations and it was unsure whether it could objectively reflect consumers' actual behaviors in the natural environment. In this case, the two live websites were decided to be used in this study and participants' information search behaviors were captured in the natural online environment.

Participants were given scenarios to imagine that they were traveling in a metropolitan city in the U.S. and needed to make dining decisions using CRWs. Specifically, one task for each website was provided for the participants to complete and search information. The rationale for creating tasks instead of free-viewing activities was to actively engage individuals to perform certain tasks or to accomplish goals (Glaholt & Reingold, 2011; Orquin & Loose, 2013). Participants completed one task at a time and indicated the final choice of a restaurant at the end of each task. A total of 30 participants participated in the eye-tracking experiments, and a payment of $20 was provided to each individual after they completed the restaurants selection tasks and follow-up RTA interviews.

As consumers usually use certain criteria such as price, location, and type of restaurants when making dining choices, three choice criteria including price (e.g., medium and low), location (e.g., San Francisco and New York), and restaurant type (e.g., Seafood and Chinese) were included to form two scenarios of choice tasks. While other factors might also affect the dining decisions such as personal preferences, familiarity, and word-of-mouth (WOM); these three criteria were used in this study because they were the common criteria found in the two websites. The questions regarding other factors were included in the follow-up interviews. As illustrated in Table 3.1, the first scenario was, “Please imagine that you are now traveling in San Francisco with your family members. You are thinking about going to a restaurant for lunch and decide to use the TripAdvisor website to search for some information.” The task followed, “Please find a mid-priced seafood restaurant near the Fisherman’s Wharf.” The other scenario was, “Please imagine that you are now traveling in New York City with your friends. It is dinner time and you are searching the Yelp website to select a restaurant.” The task followed, “Please find an inexpensive Chinese restaurant near Chinatown”. The data collection procedure was

reviewed and approved by experts in hospitality management and eye-tracking research prior to the pilot study.

Table 3.1 Examples of restaurant search tasks

Task	Website	City	Price	Location	Restaurant
Task 1	TripAdvisor	San Francisco	Middle	Fisherman's Wharf	Seafood
Task 2	Yelp	New York	Low	Chinatown	Chinese

Pilot Study

Prior to the data collection of eye-tracking experiments, a pilot study was conducted to test and improve the design of the eye-tracking study. A total of five participants were recruited for the pilot study, and participants were instructed to complete information search tasks in two CRWs and to select a restaurant choice, as described in the section above. A Tobii TX300 screen-type eye tracker was used in the pilot study and the entire eye tracking session was recorded. The results of the pilot study was analyzed and used to enhance the eye-tracking experiment (Phase I).

Data Analysis

Measurement of Interests

In order to identify the attention patterns of participants' eye movements, it was important to identify and designate the Areas of Interest (AOIs), where the different information sections were located in the webpage. As indicated in Figure 3.2, the Yelp website was comprised of different AOIs including the search bar, filtering sections, list of restaurants, map, consumer reviews, star ratings, and advertisements. Because consumers had different habits and preferences in browsing the web pages, the various AOIs might receive different amount of attention from each participant.

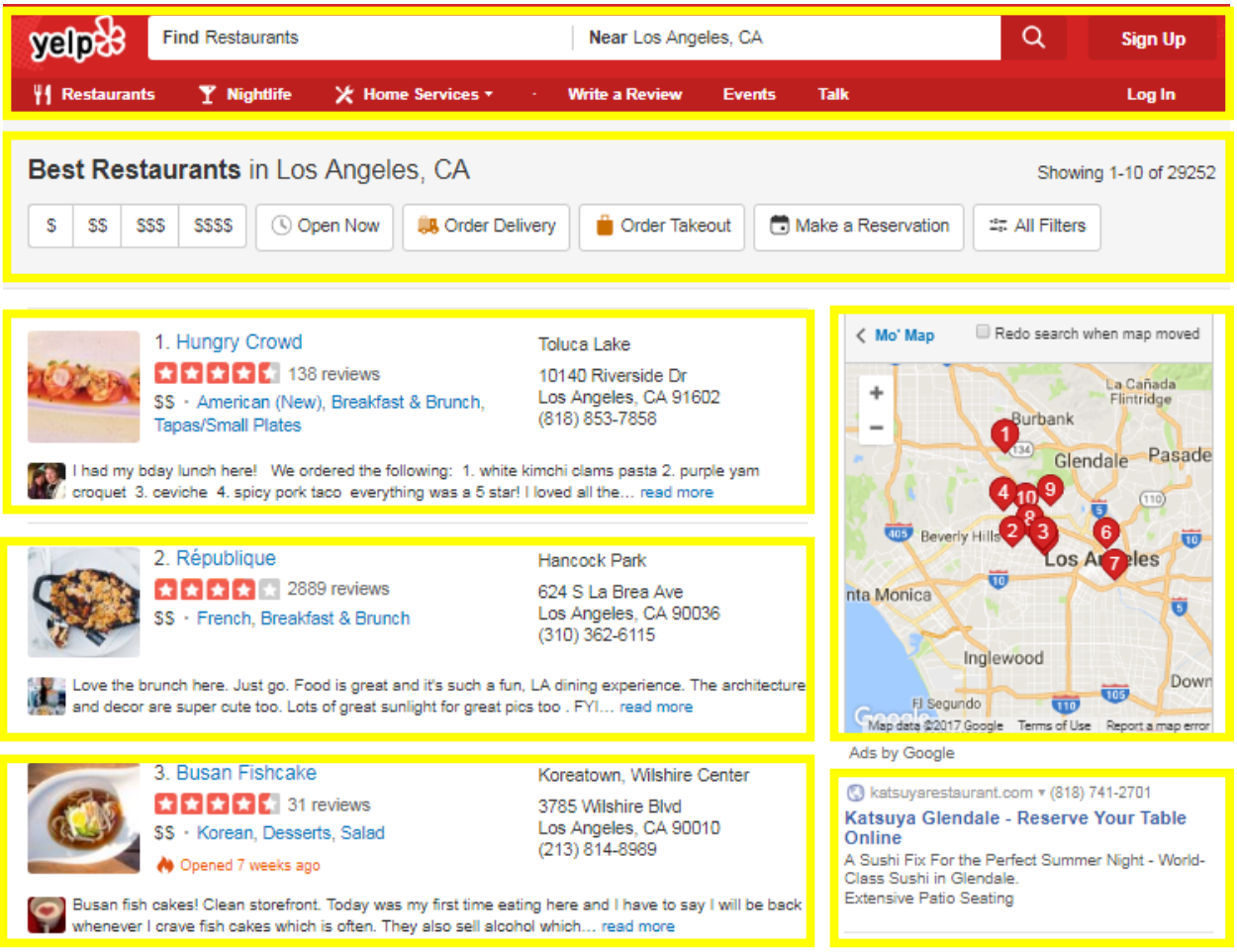


Figure 3.2 Illustration of areas of interests (AOIs) in a webpage

Eye movements mainly consist of both fixations and saccades. Fixations are defined as the spatially stable gaze that lasts for nearly 200-300 milliseconds (Granka, Joachims. & Gay, 2004). One's visual attention was usually focused on a specific area of the subject during a fixation (Granka et al., 2004). Saccades refer to the rapid eye movements between the stable fixations (Pan et al., 2013). According to the participant's eye movement, the camera in the eye tracker reconstructed participants' eye positions through the corneal-reflection method (Granka et al., 2004).

Eye-tracking measures including fixation duration, fixation count, and visit count were identified. The fixation duration refers to the sum of time when participate fixated on an AOI

over the course of a task (van der Laan, Hoode, Ridder, Viergever, & Smeets, 2015; Reisenberg, 2013). Fixation count indicates number of times that a person's visual attention is fixated upon the specific AOI (Reisenberg, 2013). The sequence of fixations was also revealed, indicating order of fixations to each AOI and the allocation and order of consumers' visual attention while conducting information search tasks (Duchowski, 2007).

As illustrated in the Two-Stage Aggregate Choice Model, consumers usually started an information search by first browsing a list of results, followed by the deliberation process when they decided to dig into more details of certain options (Gensch, 1987; Noone & Robson, 2014). It has also been argued that consumers usually used pair-wise comparisons when making the multi-alternative purchases (van der Laan et al., 2015). Descriptive statistics of the above-mentioned eye-tracking measures were performed to reveal participants' eye movements and attention patterns in the browsing and deliberation stages.

Data Visualization

In addition to identifying AOIs and obtaining the quantitative results of the eye-tracking measures, data visualization was also performed to reveal participants' actual attention patterns in a vivid way. Heat maps and gaze plots were included. Heat maps represented the intensity of fixations of participants' eye movements (Mitterer-Daltoé et al., 2014). The areas that received the highest intensity were indicated as the "hottest", and vice versa. In this study, the color-coded heat maps were used as an effective tool in reflecting consumers' eye movements and attention patterns when conducting information search tasks in a vivid way.

Gaze plots, which represented a combination of eye fixations and movement sequence gaze plots, were also revealed and visualized. To illustrate it specifically, the different sized dots in gaze plots indicated the time duration for each AOI, with the lines suggesting the sequence of

eye movements (Robson & Noone, 2014). According to the Gaze Cascade Model, people's attention was affected by both preferential looking and visual stimulus (Glaholt & Reingold, 2011). By analyzing the gaze plots, consumers' visual preferences and the saliency of AOIs were revealed. Further, the gaze plots reflected consumers' thinking process when conducting the information search tasks, which assisted in the understanding of online decision-making process of consumers.

Phase II. Qualitative Study (Retrospective Think-aloud Interviews)

The purpose of this research was to explore information search behaviors and thinking process of consumers for restaurant selections in CRWs. The eye-tracking experiments were first conducted to enable researchers to see through the eyes of consumers and gain a better understanding of consumers' information search behaviors. After the eye-tracking experiments, Retrospective Think-aloud (RTA) interviews were further performed through which participants verbalized their thinking process and uncovered the reasoning of their information search behaviors and decision-making process.

Participants

Participants in the interviews were the same 30 participants who had completed two restaurant search tasks in the eye-tracking experiments. They were informed of the both the eye-tracking experiment and an interview afterwards when they filled out the informed consent prior to the study.

Procedure

Unlike other types of qualitative interviews that encompassed a comprehensive list of interview questions for the participants, the primary focus of the RTA interviews was to let participants verbalize their previous behaviors and specific thinking process in their own words.

In this study, when an eye-tracking experiment was finished, and the researcher confirmed the successful recordings of consumers' eye-tracking data; the recorded videos were played back to each participant as the visual cues accompanying the RTA interviews. While the participants were watching the videos, the researcher asked them to recall their memories and verbalize their thinking process and reasoning of their behaviors. Depending on the participants' speaking speed, the researcher paused and asked further questions to explore the details related to their behaviors (Table 3.2).

As indicated in previous studies utilizing the Retrospective Think-aloud protocol (Elbabour, Alhadreti, & Mayhew, 2017), no specific scripts were needed during the interviews. However, the researcher had natural conversations with each participant. The researcher took notes throughout the interview session and with permission from the participants, the interviews were also recorded for further analysis. As illustrated in Table 3.2, various questions were asked to explore participants' thinking process and reasoning behind their behaviors. Specific questions were developed and asked based on the Two-Stage Disaggregate Choice Model.

Data Analysis

The audio recordings of interviews were transcribed verbatim and organized with the qualitative data organization software, NVivo 12. As the interview session was consistent with the order of the eye-tracking experiment, the transcripts were first compared and coded to match the sequence of the two-stage search process. The grounded-theory model was further utilized to code and analyze the data. The grounded-theory model was a systematic model which had been used to explore the themes and concepts from the qualitative data and compares the concepts with existing ideas (Glaser, 1992).

Table 3.2 Questions for retrospective think-aloud interviews

Stages	Questions
Stage I – Initial browsing of information	1. When you first get this restaurant search task, do you think it is similar to what you usually do by having certain criteria, such as price, location, and restaurant type when you travel in a big city? 2. You started looking at this information, what were you thinking when you were looking here? 3. How many restaurants do you usually browse and how many pages do you check out when you search for restaurants online? 4. What were you thinking when you looked through the number of restaurants on the webpage (e.g., 1, 2, 3, etc.)? 5. What were the most important things of this restaurant that attracted your attention and you may want to know more about it? 6. What are your thoughts on restaurant selection tasks?
Stage II – Comparison of alternatives	1. Why did you click this restaurant first? What were the key things that determined your choice? 2. What were you thinking when you were looking at this information first about this restaurant? 3. Do you think that the information you just reviewed was useful for you to know better about the restaurant? Why or why not? 4. How many restaurants do you usually compare when you search for restaurants online? 5. What were you thinking when you compared these restaurant? What was the important things that helped you make comparisons?
Final restaurant selection	1. What were you thinking when you were viewing the information of this restaurant? 2. Why did you choose this restaurant? 3. When you think back, what were the key information points that influenced your final decision? 4. Generally, what are the important factors that affect your decision making process when you search for restaurants online?
Ending	1. How was your overall experience using this website to information? 2. How do you describe your different experiences in these two websites? 3. How was your overall experience in the eye-tracking experiment? Are you comfortable in the experiment? (Regarding time duration, task designs, environment, and comfort level) 4. Is there anything else you want to share and do you have any questions regarding the study?

Specifically, the transcripts were analyzed through the following steps:

(1) Obtain an overall sense of the data

(2) Assign tentative labels to propositions

(3) Seek for patterns among the propositions

First, an overall sense of the data was gained through an overview of the various data outputs, the eye tracking data, interview transcripts, observations, and interview notes. These sources were compared and combined to form a conclusion regarding information search behaviors for restaurant selections. Then the direct-interpretation approach was used to develop the basic ideas according to the results from interviews (Stake, 1995).

Then, researchers identified clusters of propositions for the transcripts. A propositional cluster referred to an action and an explanation of the action (Glaser, 1992). To illustrate it, a participant clicked a picture of a restaurant and gave an explanation of why he or she clicked the picture, the action and explanation were viewed as a propositional cluster.

Last, as suggested by Merriam (1988), researchers applied the constant comparison analysis approach to identify patterns among multiple transcripts. Specifically, three researchers reviewed the transcripts individually, one by one, adding themes and concepts as they appeared. When each researcher reviewed additional transcripts, common and different patterns were explored. After the patterns of the transcripts were identified, they were compared with the existing theories and concepts which were helpful for the further interpretation of the results.

Phase III. Quantitative Study (Survey)

Because a small number of participants (n=30) was recruited in the eye-tracking experiments and interviews, the generalizability of the data was expected to be limited. In order to overcome this limitation, online survey was further conducted to examine the results identified

in previous phases regarding consumers' online information search behaviors, targeting at a much larger sample size. The findings of the surveys added values to the previous eye-tracking study and extended the knowledge of consumers' information search behaviors and online decision making in the hospitality research.

Sample

The target population of the survey was the cohort of consumers who had used consumer review websites (CRWs) for restaurant selections. As reported from the websites such as Yelp or TripAdvisor, there have been millions of visitors frequently seeking for information about restaurants. Therefore, a sample size of 384 was considered appropriate to represent the target population with a 95% confidence level (Dillman, Smyth, & Christian, 2014). An online survey company (Amazon MTurk) was used for data collection.

Design of Study

The survey was designed based on the results from previous eye-tracking experiments and RTA interviews. The specific survey questionnaires included three sections: information search scenarios in different areas of interests (i.e., online advertisements, number of reviews, images, and review valence), online experience and preferences for consumer review websites, and demographic characteristics (Appendix D).

Information Search Scenarios

Different scenarios were given to the participants to imagine that they were traveling in a major metropolitan city in the U.S. and needed to find a restaurant to dine at. They were to use a CRW as the platform of the information for restaurant choice. Then, participants were presented with the print screens of the web pages and would view the images as their information search results. They were expected to act naturally and click the areas that they were interested in and

would like to explore more details about. In order to mimic the actual online decision environment, each participant was given a suggestion to answer the question in 15 seconds and click on the information areas (Li, 2018). A count-up timer was provided on the survey page, but participants were able to continue even after 15 seconds.

Because the purpose of the online survey was to verify the results of the previous eye-tracking experiments and RTA interviews, the first group of questions was created based on the findings of the previous study in the relevant information elements including online advertisements, number of reviews, images, and review valence. As the majority of the information in CRWs is user-generated-content (UGC) and could not be influenced by individual businesses, online advertisements are the primary information that restaurants could actively influence. However, most of the previous studies were focused on the study of effectiveness of advertisements in the online search engines, rather consumer review websites (Buscher, Dumais, & Cutrell, 2010). In addition, based on the findings of eye-tracking experiments, participants did look at the online advertisements at the beginning of their fixations. Thus, survey questions were designed to examine consumers' interests and visit intentions for restaurants either with or without advertisements.

Based on the interviews, it was also identified that consumers paid considerable attention to the number of reviews of the restaurants. As most of the consumers only checked out the first two pages of the search results, restaurants ranking high received most of the attention and clicks in the eye-tracking experiments. They also explained their thinking process that they were paying particular attention to the number of reviews of the high-ranking restaurants as they believed that the quantity of the reviews indicated the popularity of the restaurants. Thus, questions regarding the number of reviews were included in the survey. Restaurant type, star ratings, similar images

were used as control variables and restaurants with different number of reviews were presented to participants for them to compare and choose in the restaurant selection scenarios.

The effectiveness of images were examined in previous studies and it was found that consumers preferred looking at images when searching for information in consumer review websites (Noone & Robson, 2014; Pan et al., 2013). However, the questions of what types of images would attract consumers' attention and would be helpful for their information search procedure have been unknown. As in this study, the eye-tracking experiments has allowed researchers to identify specific images that consumer looked at and how long consumers spent on different types of images (e.g., food items, ambiance, outside environment, menu, etc.), it is important to verify whether a large population would also have similar preferences for different types of images. Therefore, questions regarding the types of images were also included in the online survey.

Valence was defined as the nature of being positive or negative of certain information (Frijda, 1986). Review valence in online websites refers to the valence of online reviews which are posted by consumers. It has been found that review valence was influential to consumers' decision-making process in existing hospitality research (Kusumasondjaja, Shanka, & Marchegiani, 2012; Quaschning, Pandelaere, & Vermeir, 2015). However, little attention was paid to identify how review valence affected consumers' choices and how consumers thought about the positive or negative reviews. In the first two phases of this study, it was found that consumers usually preferred to pay attention to the negative reviews in the higher-ranking restaurants and they also provided reasoning of their behaviors. Therefore the questions regarding review valence, especially related to negative reviews and positive reviews, were included in the online survey.

Experience in Consumer Review Websites and Demographic Characteristics

As consumers' online experience and familiarity to CRWs may affect their online information search behaviors, questions related to their internet use experience, frequency and preferences of websites, perceived helpfulness of websites, and device usage of online information search were also included in the survey. Finally, to understand profiles of the survey participants, demographic questions such as participants' age, gender, ethnicity, and education background were asked at the end of the survey.

Data Collection

After the survey was developed through an online survey platform, a panel of experts in eye-tracking research and consumer behavior first reviewed the survey questions to ensure the content validity and the clarity of directions. The questionnaires were revised based on the feedback from the panel. The survey was further pilot tested to make sure that survey participants could access the survey through different channels (e.g., web page, smartphone, tablet) with a Uniform Resource Locator (URL) link.

The pilot test was conducted to ensure usability and clarity of directions and to establish internal consistency of measurement items. A link to an online survey was distributed to 40 individuals who belonged to the target population (i.e., CRW users). Participants were asked to answer the questions in the survey and provide suggestions for further improvement of the survey regarding readability, timing, and overall structure. Results and suggestions from the pilot test were used to modify and refine the survey questions.

The final revised survey was sent through the online survey company, Amazon MTurk. The purpose of the online survey was to verify the results from previous studies and to identify generalizable findings to the target population. Screening and attention-check questions were

asked to ensure data quality (Oppenheimer, Meyvis, & Davidenkothe, 2009). Only those who met the qualifications and read questions carefully were able to complete the survey and receive a payment of $1.00 for completion.

Data Analysis

Descriptive statistics was conducted using SAS (Version 9.4) to summarize the general characteristics of the data. In addition, consumers' individual and accumulated clicks in the scenario-based survey were visualized through heat maps, which indicated participants' interests and visit intentions for restaurants.

The one-sample Chi-Square tests were conducted to examine differences of participants' choices and to test hypotheses. The dataset met the two assumptions for Chi-Square analyses: (1) The sample size is large enough; and (2) The sample is independent and not correlated data (Krishnan, 2011). Differences in customers' interests and visit intentions for restaurants (i.e., customers' clicks) based on review quantity, review valence, images, and advertisements were evaluated with statistical significance of $p < 0.05$.

References

Buscher, G., Dumais, S. T., & Cutrell, E. (2010, July). The good, the bad, and the random: an eye-tracking study of ad quality in web search. *Proceedings of the 33rd international ACM SIGIR conference on Research and development in information retrieval*. Retrieved from http://susandumais.com/SIGIR2010-Gaze.pdf

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, mail, and mixed-mode surveys: the tailored design method.* Hoboken, NJ: John Wiley & Sons.

Duchowski, A. T. (2007). *Eye tracking methodology. Theory and practice*. Cham, Switzerland: Springer.

Elbabour, F., Alhadreti, O., & Mayhew, P. (2017). Eye Tracking in Retrospective Think-Aloud Usability Testing: Is There Added Value?. *Journal of Usability Studies, 12*(3), 95-110.

Frijda, N. H. (1986). *The emotions.* Cambridge, United Kingdom: Cambridge University Press.

Gensch, D. H. (1987). A two-stage disaggregate attribute choice model. *Marketing Science*, *6*, 223-239.

Glaholt, M. G., & Reingold, E. M. (2011). Eye movement monitoring as a process tracing methodology in decision making research. *Journal of Neuroscience, Psychology, and Economics, 4*(2), 125-146.

Glaser, B. G. (1992). *Basics of grounded theory analysis: Emergence vs forcing*. Mill Valley, CA: Sociology Press.

Granka, L. A., Joachims, T., & Gay, G. (2004). Eye-tracking analysis of user behavior in WWW search. *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval.* Retrieved from https://dl.acm.org/citation.cfm?id=1009079

Krishnan, S. (2011). *Two key assumptions to be aware of before applying the chi-square test.* Retrieved from www.simafore.com/blog/bid/564802/2-key-assumptions-to-be-aware-of-before-applying-the-chi-square-test

Kusumasondjaja, S., Shanka, T., & Marchegiani, C. (2012). Credibility of online reviews and initial trust: The roles of reviewer's identity and review valence. *Journal of Vacation Marketing, 18,* 185-195.

Merriam, S. B. (1988). *Case study research in education: A qualitative approach.* San Francisco, CA: Jossey-Bass.

Mitterer-Daltoé, M. L., Queiroz, M. I., Fiszman, S., & Varela, P. (2014). Are fish products healthy? Eye tracking as a new food technology tool for a better understanding of consumer perception. *LWT-Food Science and Technology, 55*, 459-465.

Noone B., & Robson, S. K. (2014). Using eye tracking to obtain a deeper understanding of what drives online hotel choice. *Cornell Hospitality Report, 14*(18), 6-16.

Oppenheimer, D. M., Meyvis, T., & Davidenkothe, N. (2009). Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology, 45*, 867-872.

Orquin, J. L., & Loose, S. M. (2013). Attention and choice: A review on eye movements in decision making. *Acta Psychologica*, *144*, 190-206.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly*, *54*, 74-83.

Patton, M. Q. (2015). *Qualitative research and evaluation methods: Integrating theory and practice.* Thousand Oaks, CA: Sage.

Quaschning, S., Pandelaere, M., & Vermeir, I. (2014). When consistency matters: The effect of valence consistency on review helpfulness. *Journal of Computer-Mediated Communication, 20*(2), 136-152.

Robson, S. K. A, & Noone, B. (2014). Show me what you see, tell me what you think: Using eye tracking for hospitality research. *Cornell Hospitality Report, 14*(17), 6-12.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

TripAdvisor. (2018). *About TripAdvisor*. Retrieved from https://tripadvisor.mediaroom.com/us-about-us

van der Laan, L. N., Hooge, I. T., De Ridder, D. T., Viergever, M. A., & Smeets, P. A. (2015). Do you like what you see? The role of first fixation and total fixation duration in consumer choice. *Food Quality and Preference, 39,* 46-55.

Wedel, M., & Pieters, R. (2008). A review of eye-tracking research in marketing. In *Review of Marketing Research, 4,* 123-147.

Yelp. (2018), *10 things you should know about Yelp*. Retrieved from http://www.yelp.com/about

Chapter 4 - Exploring online restaurant selection behaviors using eye-tracking technology and retrospective think-aloud interviews

Abstract

The purpose of this study was to explore consumers' actual information search behaviors and thinking process for online restaurants selections in consumer review websites (CRWs). Mixed methods, including eye-tracking experiments and retrospective think-aloud (RTA) interviews, were conducted to accomplish this purpose. A total of 30 participants completed two restaurant search tasks while their eye movements were recorded using an eye tracker (Tobii TX300) followed by RTA interviews, to identify the thinking process and reasoning of their information search behaviors. The interviews were recorded and transcribed verbatim. Descriptive statistics and eye-tracking measures including fixation duration, fixation count, and visit count were analyzed for the eye-tracking data. In addition, data visualizations including heat maps and gaze plots were also performed. Grounded-theory model was used for interview data analyses. Results revealed areas of interest such as filters, images, advertisements and consumer reviews that attracted consumers' attention during the eye-tracking experiments. While consumers spent time looking at the advertisements in the Yelp websites, no participants selected advertised restaurants as a place to visit. Number of reviews, negative reviews, and images with food items also influenced consumers' decision-making process for online restaurant selections. This study is insightful for both hospitality researchers and practitioners with the identification of actual online consumer behavior and factors affecting their restaurant decisions.

Keywords: Eye-tracking technology, retrospective think-aloud interviews, restaurant selections

Introduction

Consumers have increasingly relied on information from various online sources before making purchase decisions (Lu, Ba, Huang, & Feng, 2013). In the hospitality industry, more than 70% of consumers search abundant online information before making choices because of the intangibility of hospitality products (Xie, Zhang, & Zhang, 2014). When it comes to choosing restaurants, consumers tend to frequently use different online platforms to search information (Xiang, Magnini, & Fesenmaier, 2015). Consumer review websites (CRWs) are among the most popular online sources from which consumers have access to considerable amount of information (Xiang et al., 2015). For example, TripAdvisor has reported 455 million average monthly unique visitors and 570 million total reviews by the third quarter of 2017 (TripAdvisor, 2018). Millions of consumers use these websites as they trust information shared by their peers more than company advertisements (Kwok, Xie, & Richards, 2017). Therefore, it is crucial for hospitality practitioners and researchers to understand how consumers search and use online information for their decision making (Chiang, Dholakia, & Westin, 2005).

A number of studies have explored online consumer behavior in the hospitality industry. However, most studies have explored certain aspects of online information, such as online reviews or e-WOM, rather than capturing the actual information search behaviors and decision-making process (Kwok et al., 2017; Lu & Stepchenkova, 2015; Schuckert, Liu, & Law, 2015). User-generated-content including online reviews has been perceived as useful information by consumers (Park & Nicolau, 2015); and e-WOM has influenced other consumers' purchase intentions (Litvin, Goldsmith, & Pan, 2018). Further, most of the previous studies have used cross-sectional, self-reported surveys in the exploration of consumers' perceptions for characteristics of online information, the results are limited in reflecting the consumers' actual

behaviors or thinking processes (Liu, Law, Rong, & Hall, 2013; Liu & Park, 2015; Mauri & Minazzi, 2013; Tsao, Hsieh, Shih, & Lin, 2015; Yen & Tang, 2015). The research gap exists between the self-reported behaviors versus the actual consumer behavior and a lack of research providing a holistic view of the online information search behaviors (Kwok et al., 2017; Kwong, Cheung, Zhu, Limayem, & Viehland, 2002) warrant needs for a new approach for understanding consumer behavior.

Eye-tracking technology is capable of capturing people's eye movements precisely and revealing actual consumer behavior objectively without intrusiveness (Djamasbi, Siegel, & Tullis, 2010). When it comes the evaluation of online consumer behavior, identifying the visual behaviors or attention patterns is especially important as most consumers need to visually search for information in online platforms (Robson & Noone, 2014). The eye-tracking technology is a useful tool for researchers to study actual consumer behavior in the online setting (Pang, Zhang, & Law, 2013). There have been numerous Human-Computer Interaction (HCI) studies using eye-tracking technology to identify website usability problems (Cutrell & Guan, 2007; Granka, Joachims, & Gay, 2004; Gu, Wang, Bixler, & D'Mello, 2017). In the hospitality and tourism industry, researchers have started to use eye-tracking technology to explore consumers' perceptions for different information formats (e.g., texts, images) (Hellmann, Yeow, De Mello, 2017; Pan, Zhang, & Law, 2013), consumers' preferences for user-generation-content versus company-generated-content in websites for hotel choices (Noone & Robson, 2014). However, few studies have been conducted using eye-tracking technology to explore consumers' actual information search behaviors for restaurant selections in CRWs.

Retrospective think-aloud (RTA) interviews allow participants to verbalize their cognitive thinking process and reasoning after certain behaviors (Fonteyn, Kuipers, & Grobe,

1993). It is based on the assumptions that the verbalization process can reflect the cognitive process of recordable behaviors; and such procedure of information acquisition and processing can be obtained via verbal data (Ericsson & Simon, 1984). The RTA interview has also been regarded as an effective method in combination with the eye-tracking experiments (Elbabour, Alhadreti, & Mayhew, 2017). Thus, by combining the eye-tracking experiments and RTA interviews, researchers are able to obtain more in-depth information of consumers' thinking process and reasoning for their recorded information search behaviors (Fonteyn et al., 1993).

Therefore, the purpose of this research was to identify consumers' actual information search behaviors and thinking process when using CRWs for online restaurant selections. The specific objectives were to:

1. accurately assess the eye movements and areas of interests when consumers search online information in CRWs for making restaurant choices;
2. evaluate attention patterns and eye movement features of consumers during their online information search behavior;
3. explore consumers' thinking process while making online restaurant selections in CRWs;
4. connect the thinking process with online information search behaviors; and
5. establish reasoning behind consumers' online decision-making process.

Literature Review

Consumer Decision Making and Online Information Search

Consumer behavior is defined as, "activities that people undertake when obtaining, consuming, and disposing of products and services" (Blackwell, Miniard, & Engel, 2006, p.8). Understanding consumers' decision-making process is important when exploring consumer

behavior (Bray, 2008). As for the study of consumer decision making, the Bounded Rational Theory has been regarded as one of the most fundamental and robust theories (Bray, 2008; Simon, 1972). This theory assumes that consumers usually search through information when they make decisions, but they do not have an access to all available information; and they have limited cognitive capacity for information processing (Simon, 1972). Therefore, consumers would prioritize relevant information and make decisions to satisfy their needs (Orquin & Loose, 2013; Simon, 1972).

The advancement of the Internet and information technology has brought tremendous changes to the business world (Chan & Ngai, 2011; Sun, Fong, Law, & He, 2016). Compared to the traditional market where consumers have access to limited amount of information, the current technology has empowered consumers with unprecedented power to access a massive amount of information easily through online channels (Cantallops & Salvi, 2014). For instance, in Youtube, approximately 300 hours of videos are shared every minute, and 5 billion videos are watched daily (Fortunelords, 2018). Various online platforms such as social media, social networking sites, and consumer review websites have become important sources of information that are impactful for consumers' purchase decisions (Sparks, Perkins, & Buckley, 2013). Nearly 90% of consumers have demonstrated that the Internet has influenced their life in various aspects including travel, banking, auto, and dining-related purchases (DoubleClick, 2004). Companies have also recognized this trend and transformed their marketing, distribution, and communication channels from traditional to online platforms (Litvin, Goldsmith, & Pan, 2008).

In the hospitality industry, consumers tend to conduct extensive information search before making purchasing decisions because most hospitality products are intangible, and it is difficult to evaluate the products and services until they actually purchase them (Litvin et al.,

2008). Online travel agencies (OTAs) (e.g., Expedia, Kayak), consumer review websites (CRWs) (e.g., Yelp, TripAdvisor), and social networking sites (SNSs) (e.g., Facebook, Instagram) are popular online platforms where consumers seek information to assist in purchase decisions for hospitality and tourism products and services (Cantallops & Salvi, 2014; Xie et al., 2014). User-generated-content (UGC) including online reviews, star ratings, and electronic word-of-mouth (e-WOM) has been influential on consumers' purchase decisions for consumers regard the voluntarily created information as less biased and more trustworthy than company advertisements (Bazaar Voice, 2012). Specifically, review valence (i.e., positive or negative) is significantly related to the perceived usefulness of online reviews (Park & Nicolau, 2015). The number of reviews is also influential on consumer purchase intentions (Mauri & Minazzi, 2013; Noone & McGuire, 2013). Further, the increase in consumer star ratings has been positively associated with company sales and market share (Duverger, 2013; Kim, Lim, & Brymer, 2015). Based on previous findings, understanding how consumers search and use information in online platforms may be considered critical for hospitality companies to achieve business success in the long term (Kwok et al., 2017).

To explain online decision making and information search behaviors, the Two-Stage Disaggregate Choice Model has been proposed and used to demonstrate the decision process (Gensch, 1987; Gensch & Soofi, 1995; Noone & Robson, 2014). As illustrated in Figure 4.1, this model is comprised of two stages regarding the information search process: browsing and deliberation. In the first browsing stage, consumers look through a variety of options and gain an overall idea from the general information. In the following deliberation stage, consumers usually choose potential alternatives to form a smaller set of choices and look into more detailed information about each choice (Gensch & Soofi, 1995). For example, if consumers want to book

a flight ticket, they may go to an OTA website (e.g., Expedia) and look through a list of choices. After the initial browsing of the information, they may use specific criteria (e.g., time, price, airlines, etc.) to narrow down to a smaller number of choices from which they would make the purchase decision. The group of choices that have entered into the deliberation stage is also called the consideration set (Noone & Robson, 2014). It is important to note that this is an iterative process and consumers may go back and forth between the two stages before they reach the final choice (Gensch, 1987).

[INSERT Figure 4.1 HERE]

Although the Two-stage Disaggregate Choice Model (Gensch, 1987) and Bounded Rational Theory (Simon, 1972) were developed in different times, these two models correspond with each other in terms of how consumers make decisions. While the former suggests that before consumers make final purchase decisions, they browse overall information (browsing stage) and form a consideration set to compare alternatives (deliberation stage) (Gensch, 1987); the latter contends that consumers prioritize information when searching information (Simon, 1972). The Two-Stage Disaggregate Choice Model has been used in previous hospitality eye-tracking research in the exploration of consumers' information search behaviors in two stages for the hotel choices (Noone & Robson, 2014), Thus, this study also adopted this model to identify specific information search behaviors of consumers in two stages for restaurant selection tasks using CRWs.

Selecting Restaurants in the Online Setting

The restaurant industry is important as 90% of consumers regard dining out as an enjoyment in their life (National Restaurant Association [NRA], 2017). The industry also plays an essential role in the U.S. economy, generating approximately $799 billion in revenue and

employing 10% of the total workforce in 2017 (NRA, 2017). Nevertheless, restaurateurs are faced with fierce competitions in the market and the challenges of meeting the ever-changing needs of consumers (Pantelidis, 2010). One of the biggest changes that the Internet has brought to the restaurant industry is how consumers search information for their dining choices. Today, when consumers want to find restaurant-related information, they would search through various websites and find relevant information before they actually decide to dine at a restaurant (Zhang, Ye, Law, & Li, 2010).

Consumer review websites (CRWs) such as Yelp and TripAdvisor are among the most frequently used websites which provide consumers with massive amount of information related to restaurants (Wang, Zhao, Guo, & North, 2013; Xiang et al., 2015). For example, a total of 1l.48 million online reviews have been created by consumers since 2004; and there were 77 million monthly unique visitors in Yelp by the end of 2017 (Yelp, 2018). Another global website, TripAdvisor, has attracted 455 million monthly average unique visitors to seek for dining and travel-related information (TripAdvisor, 2018). These websites have been favored by millions of consumers as they trust the online information created by their peers and regard such information as more objective than company-generated promotions (Zhang et al., 2010).

Numerous studies have identified that online information presented in CRWs has impactful effects on consumers' dining decisions and restaurants' financial performance (Anderson & Magruder, 2012; Lu et al.). A half-star increase in Yelp online ratings was found to bring up to 19% more business to restaurants (Anderson & Magruder, 2012). One study also revealed that online marketing and electronic word-of-mouth (eWOM) have significant influence on restaurant sales and profitability (Lu et al., 2013). Therefore, it may be beneficial for

restaurateurs to understand consumers' information search behaviors for restaurant decisions in CRWs.

Although previous studies have indicated that consumers' dining decisions are influenced by online information in these CRWs, research related to the exploration of consumers' actual information search behaviors and decision-making processes for online restaurant selections is limited. While a number of studies have explored online consumer behavior in the hospitality industry, the main focus has been the hotel industry. A recent review study has identified that 72% of the publications pertaining to online consumer behavior were related to the hotel industry, while only 12% for the restaurant industry (Kwok et al., 2017). Further, previous studies have explored consumers' perceptions, attitudes, or behavioral intentions, rather than the actual behaviors (Chen & Law, 2016; Schuckert et al., 2015).

Furthermore, the use of cross-sectional, self-reported surveys has been dominant in previous research, the results of which may be biased and inadequate in revealing consumers' natural behaviors objectively (Liu, Law, Rong, & Hall, 2013; Liu & Park, 2015; Mauri & Minazzi, 2013; Tsao et al., 2015; Yen & Tang, 2015). Therefore, this study was particularly focused on the restaurant industry aiming to identify consumers' actual information search behaviors for online restaurant selections in CRWs. It also calls for the utilization of more efficient and objective ways to achieve this purpose.

Eye-Tracking Methodology

Eye-tracking technology has been developed since the late 1800s and is a way to track people's eye movements and reflect actual human behaviors (Holmqvist et al., 2011; McCarley, Mounts, & Kramer, 2007). According to the eye-mind assumption, eye movement is a good reflection of one's attention and cognitive process (Day, Lin, Huang, & Chuang, 2009). In other

words, people's eye movements and thinking process may occur at the same time (Glaholt & Reingold, 2011; Rayner, 1998). In the context of reading, when people's eyes fixate on certain words or sentences, their brains process the content at the same time (Rayner, 1998). Research in neurophysiology has also identified that eye movements are tightly associated with attention in human decision-making process (Glaholt & Reingold, 2011). Compared to other methods such as self-reported surveys, eye-tracking technology appears to be more objective in revealing the natural behaviors of consumers (Russell, 2005). The objectivity has also been justified in previous research as participants reported that they often forgot their eyes being tracked during the eye-tracking experiments (Maughan, Gutnikov, & Stevens, 2007). Considering these advantages of eye-tracking technology, there is tremendous potential for researchers to apply it in the research fields to explore actual human behaviors.

In the online decision-making context, consumers are currently provided with massive amount of information from multiple sources, but they would not be able to process all information due to the limited cognitive capacity and time constraints (Simon, 1972). Visual attention has also been regarded as a selective process because it entails the allocation of limited mental resources to certain subjects (Carrasco, 2011). When it comes to the evaluation of information search and decision making in the online setting, understanding how consumers allocate their visual attention and search information is especially important (Orquin & Loose, 2013). As eye-tracking technology is an effective tool that enables researchers to "see" deeply into people's eyes and capture their eye movements and attention patterns noninvasively, this method has been utilized in various studies to identify consumers' information search behaviors and decision-making processes in the online setting (Granka et al., 2004; Mitterer-Daltoé, Queiroz, Fiszman, & Varela, 2014).

Eye-tracking technology has been adopted in psychology and neuroscience for several decades (Mitterer-Daltoé at al., 2014). Recently, it has also attracted the attention from researchers in other fields, including marketing, online advertisement, website usability, and human-computer interactions (Jacob & Karn, 2003). Researchers and practitioners have used eye-tracking technology to identify consumers' web searching activities and online experience in order to understand the effectiveness of marketing, online advertisement and website quality (Rayner, Rotello, Stewart, Keir, & Duffy, 2001; Wedel & Pieters, 2008).

In addition, different attention patterns have been found to affect consumers' decision-making processes in the web searching activities (Corbetta & Shulman, 2002; van der Laan, Hooge, De Ridder, Viergever, & Smeets, 2015; Orquin & Loose; Wang, Li, Ye, & Law, 2016). Stimulus-driven and goal-driven attention patterns indicate that consumers' attention can be affected by the visually salient objects or certain goals or tasks (Orquin & Loose, 2013). Other attention patterns such as "golden triangle" or "F shape viewing pattern" have also been found relevant to consumers' web searching behaviors (Hotchkiss, Alston, & Edwards, 2005). Among previous studies, most were focused on specific websites (e.g., travel website, hotel website) or search engine result pages (e.g., google); however, consumers' attention patterns and information search behaviors in CRWs for restaurant choices are rarely explored. Thus, in this study, consumer online information search behaviors were explored using CRWs as pre-determined target websites for exploring consumers' online information search behaviors.

Despite the capability and potential of eye-tracking technology in capturing consumers' actual behaviors (Schiessl, Duda, Thölke, & Fischer, 2003), its application in the hospitality research is still in its infancy in terms of the quantity and depth of research (Robson & Noone, 2014). The majority of the recent studies using eye-tracking technology have focused on hotel or

tourism industry. Pan, Zhang, and Law (2013) explored consumers' online hotel choices using eye-tracking technology and identified that consumers focused longer on the web pages with smaller number of hotels. Furthermore, hotels with images attracted more attention from consumers than texts. Another study was conducted to explore consumers' different information search behaviors in two stages of online hotel choices: browsing and deliberation (Noone & Robson, 2014). This study found that participants allocated their attention less on general information points, viewing quickly in the first browsing stage, whereas they used more personal heuristics and spent longer time on the detailed information about specific hotels in the following deliberation stage (Noone & Robson, 2014).

A recent review study has identified that eye-tracking studies in tourism focused on consumers' attention to online advertisement and marketing information (Scott, Zhang, Le, & Moyle, 2017). Specifically, block images in advertisements were more effective in attracting consumers' attention than text information (Scott et al., 2017) Characteristics of images and consumers' cultural background also affected their attention in tourism websites (Wang & Sparks, 2016). Although valuable insights have been provided in previous studies in hotel and tourism industries, the literature related to consumers' information search behavior for restaurant selections was lacking, despite the number of consumers using such a tool continues to increase. Therefore, the study was dedicated to fill the research gap to identify consumers' information search behaviors and decision-making processes for restaurant selections in CRWs.

Retrospective Think-aloud Interviews

Verbal protocols are important process-tracing methods that allow people to verbalize their cognitive thinking process of certain behaviors (Alshammari, Alhadreti, & Mayhew, 2015). The application of verbal protocols is based on the assumptions that the verbalization process can

reflect the cognitive process of recordable behaviors; and the procedure of information acquisition and processing can be obtained via verbal data (Ericsson & Simon, 1984). Concurrent think-aloud (CTA) and retrospective think-aloud (RTA) interviews are the existing two types of verbal protocols (Ericsson & Simon, 1984). The CTA protocol refers to the process that people verbalize their thinking process while performing certain tasks at the same time, whereas for the RTA protocol, the verbalization process occurs after the target behaviors are completed (Fonteyn et al., 1993). While concurrent protocol could provide the real-time thoughts accompanying certain behaviors, the retrospective protocol is useful in revealing the reasoning and complete thinking process following the behaviors (Fonteyn et al., 1993).

Although both verbal protocols are useful in reflecting the thinking process of human behaviors, the RTA interview has been regarded as more appropriate and effective method in combination with the eye-tracking experiments (Elbabour, Alhadreti, & Mayhew, 2017). Eye-tracking technology is capable of capturing people's eye movements and attention patterns, but the thinking process and reasoning behind their visual behaviors is generally unknown (Robson & Noone, 2014). Thus, conducting the RTA interviews is valuable in providing rich and in-depth information of consumers' thinking process and reasoning for their recorded eye-movements and information search behaviors (Fonteyn et al., 1993). Numerous website usability studies have been conducted through the combination of these two methods (Eger, Ball, Stevens, & Dodd, 2007; Elling, Lentz, & DeJong, 2011).

During the normal RTA interviews, participants are usually instructed to verbalize their thinking process with the playback of the recorded eye-tracking videos as the visual cues (Robson & Noone, 2014). The playback videos of eye-tracking session have been proven to be useful in stimulating participants' memories and helping them recall the detailed thinking

processes of their behaviors (Robson & Noone, 2014). A recent usability study has also identified that participants considered the playback videos of the eye movements as interesting and helpful for their following verbalization process (Elbabour et al., 2017). Therefore, in this study, the RTA interviews were conducted following eye-tracking experiments in order to identify the reasoning and thinking process of information search behaviors in CRWs for restaurant selection tasks.

Methodology

The target population of this study was consumers who had used CRWs (e.g., Yelp and TripAdvisor) as information sources to make restaurant selections. The research protocols were reviewed and approved by the Institutional Review Board (IRB) in a Midwestern University prior to data collection (Appendix A).

Sample Selection

The study sample for both eye-tracking experiments and RTA interviews was 30 consumers who had used consumer review websites (e.g., Yelp, TripAdvisor) for restaurant selections in the past six months. A small sample size has been common in eye-tracking studies and RTA interviews because obtaining more in-depth data from individuals is more valuable than collecting representative data from a large population (Mitterer-Daltoé, Queiroz, Fiszman, & Varela, 2014; Pan et al., 2013; Wang & Sparks, 2016; Wedel & Pieters, 2008). A purposeful sampling strategy, maximum variation (heterogeneity) sampling approach, was adopted in order to recruit a wide variety of consumers (Patton, 2015). This sampling procedure was used because it allows researchers to identify the common patterns and shared characteristics within maximized variations for a small sample size (Patton, 2015). In this study, participants' demographic characteristics including gender, age, and user experience in restaurant-related

CRWs were utilized as the criteria to recruit participants, forming the maximum variation sampling matrix (Figure 4.2).

[INSERT Figure 4.2 HERE]

Eye-Tracking Experiment

Apparatus

A Tobii TX300 screen-type eye tracker with the recording speed of 300Hz was used for the eye-tracking experiments. The cameras in the eye tracker use infrared light and sensors to reconstruct participants' eye positions through the corneal-reflection method (Granka et al., 2004). The Tobii Studio software was installed to keep track of consumers' eye movements and analyze eye-tracking data. The eye-tracking lab was set up in a quiet and undisturbed room, located at an independent building on the university campus. Because each eye-tracking experiment session was followed by RTA interviews, only one participant was scheduled and completed at one time.

Procedure

Each participant completed a research consent form when they arrived at the eye-tracking lab with explanations of the eye-tracking experiment procedures. Participants were seated in front of the eye tracker at a distance and adjusted the height for their comfort. A calibration test was conducted by using five calibration points in order to ensure the quality and precision of eye-tracking data. The participants who could not pass the calibration test were excluded from the experiment. Each participant was further provided with written instructions for restaurant selection tasks on two consumer review websites, TripAdvisor and Yelp. These two live websites were chosen as the online information search platforms for this study because they have

been ranked the top websites with millions of users frequently searching and sharing restaurant-related information (TripAdvisor, 2018; Yelp, 2018).

Each participant was instructed to imagine that he/she was traveling in a metropolitan city in the U.S. and needed to use CRWs to find restaurant-related information and make dining decisions. Two restaurant selection tasks were assigned to each participant. They were asked to use the specific criteria (i.e., price, location, and restaurant type) and complete each task within eight minutes. First, participants were asked to "imagine that you are traveling in San Francisco with your family. You want to go to a restaurant for lunch and decide to use the TripAdvisor website to search for some information." Then each participant was asked to "find a mid-priced seafood restaurant near Fisherman's Wharf."

The second scenario was to imagine that "You are traveling in New York City with your friends. It is dinner time and you are using Yelp website to select a restaurant." The task was to "find a lower-priced Chinese restaurant near Chinatown". The data collection procedures were reviewed and approved by experts in hospitality management and eye tracking research prior to the pilot study. To assess the accuracy and quality of the eye-tracking data in the experiments, the acceptable percentage of the eye movements captured by the eye tracker was set at 75%.

Data Collection

Prior to eye-tracking experiments, a pilot study was conducted to enhance the research design. Five participants were instructed to complete the same tasks as described above. All pilot study participants finished their tasks within eight minutes. The time required for the tasks was noted and the results of pilot study was analyzed and used to improve the data collection for the eye-tracking experiments.

The participants were recruited by recruitment posters, which were posted on public bulletin boards in university campus and around the city. Recruitment information was also spread through the social network websites (e.g., Facebook) and personal connections of the researchers. A short survey was developed including screening questions, participants' experience in CRWs, and demographic characteristics (i.e., gender, age, user experience) (Appendix B). Potential participants took the short survey first, and qualified participants were invited to schedule for an eye-tracking experiment and RTA interview.

Eye-tracking experiments were conducted according to the procedure described above. Each participant was instructed to complete the restaurant search tasks within eight minutes, which was determined by the results from the pilot study. A total of 30 participants participated in the eye-tracking experiments, and a payment of $20 was provided to each individual after they completed the restaurants selection tasks and follow-up RTA interviews. Approximately 10 minutes were used to complete two restaurant selection tasks.

Data Analysis

Measurement of Interests

Areas of interest (AOIs), different information sections located at various areas within a web page (Robson & Noone, 2014) were first determined to analyze the eye-tracking data. As indicated in Figure 4.3, different AOIs were included in one web page of Yelp, including the search bar, filtering section, list of restaurants, map, reviews, star ratings, and advertisements, which were located in different areas.

[INSERT Figure 4.3 HERE]

Eye movements consist of saccades and fixations. Saccades refer to the rapid eye movements between the stable eye gaze (Pan et al., 2013). A fixation is defined as the spatially stable eye gaze that lasts for nearly 100-300 milliseconds (Granka et al., 2004). One's visual

attention was usually focused on a certain information points during a fixation period (Granka et al., 2004). A fixation of 100 milliseconds was used as the threshold in this study based on recommendation from previous research and eye tracking experts (Manor & Gordon, 2003; Wang & Sparks, 2016); and fixations with 100 milliseconds or longer were included for data analysis.

Eye-tracking measures including fixation duration, fixation count, and visit count were recorded and analyzed. The fixation duration refers to the period of time when a participant fixated on an AOI (van der Laan, Hoode, Ridder, Viergever, & Smeets, 2015; Reisenberg, 2013). Fixation count indicates number of times a person's visual attention is fixated upon a specific AOI (Reisenberg, 2013). The Two-Stage Aggregate Choice Model has indicated that consumers' decision-making process is comprised of browsing and deliberation before a choice is made (Gensch, 1987; Noone & Robson, 2014). Descriptive statistics of the above-mentioned eye-tracking measures including fixation frequency, fixation duration, fixation count, and visit count were calculated to reveal participants' eye movements and attention patterns in the browsing and deliberation stages.

Data Visualization

Data visualization was performed to reveal participants' actual attention patterns in a vivid way. Heat maps and gaze plots are the common visualization techniques generated by the eye-tracking device. Heat maps represent the intensity of fixations of one or multiple participants to various AOIs, and the areas that received the highest intensity were indicated as the "hottest" (Mitterer-Daltoé et al., 2014). In this study, the color-coded heat maps were used as an effective graphic tool in reflecting consumers' eye movements and attention patterns when they complete information search tasks.

Gaze plots also revealed and visualized groups of fixation durations and movement sequences. Specifically, the different sized dots in gaze plots indicated the time duration for each AOI; and the lines suggesting the sequence of eye movements (Robson & Noone, 2014). According to the Gaze Cascade Model, people's attention was affected by both preferential looking and visual stimulus (Glaholt & Reingold, 2011). By analyzing the gaze plots, consumers' visual preferences and saliency effect of different AOIs were identified. Further, consumers' cognitive processes were represented with the visualized gaze plots for researchers to understand consumers' online decision-making processes.

Retrospective Think-aloud Interviews

Procedure

The researcher prepared questions (Table 4.1) to carry natural conversations with the participants during the RTA interviews. These questions were developed and asked based on the Two-Stage Disaggregate Choice Model and were organized in the order of the various stages. Because the major goal of the RTA interviews was to let the participants verbalize their decision-making process and thoughts by themselves, participants did the most of talking. Depending on the information that was shared by the participants, the researcher paused and asked further questions to explore the details related to their behaviors. The interview were audio-recorded and video-recorded with the permission from the participants for data analysis.

[INSERT Table 4.1 HERE]

Data Collection and Analysis

After the eye-tracking experiments were recorded with the Tobii Studio software, the RTA interviews took place. Participants were asked to verbalize their thinking processes and recall memories while the recorded videos of the eye-tracking sessions were played in front of

them. The data saturation was reached after 20 interviews, but the procedure continued with all 30 participants in the sample. The average duration of the interviews was 18 minutes.

The audio recordings of RTA interviews were transcribed verbatim and organized with the qualitative data organization software, NVivo 12. The researcher conducted the interviews according to the decision-making process of consumers' restaurant selections in the eye-tracking experiments. Thus, the transcripts were first compared and coded to match the sequence of the two-stage search process. The grounded-theory model, a systematic model which explores the themes and concepts from qualitative data and compares with existing concepts and theories, was used for data analysis (Glaser, 1992).

The grounded-theory model allowed researchers to dig into details of the data and to identify important elements that affect consumers' online information search process for restaurant decisions. Specifically, as the first step, an overall pattern of information search behaviors and thinking process of consumers when making restaurant selections using CRWs was identified through an overview of various data outputs including the eye-tracking data, recorded eye movements, interview transcripts, and notes. The direct-interpretation approach was further used to develop basic ideas according to the results from RTA interviews (Stake, 1995). Second, researchers identified clusters of propositions for the transcripts. A propositional cluster referred to a combination of an action and an explanation of the action (Glaser, 1992). For example, a participant clicked a picture of a restaurant and gave an explanation of why he or she clicked the picture, the action and explanation were viewed as a propositional cluster.

Finally, researchers further applied the constant comparison analysis approach to identify patterns among multiple transcripts (Merriam, 1988). Specifically in this study, three researchers reviewed the transcripts individually, one by one, adding themes and concepts as they appeared,

common and different patterns were identified as the researchers reviewed additional transcripts. After the common themes and patterns of the behaviors were identified, they were compared with the existing theories and concepts. Data analysis was completed when consensus among researchers has reached.

Results and Discussion

Participant Profile

According to the maximum variation sampling procedure, eight categories were determined based on the age, gender, and experience in CRWs. As shown in Table 4.2, distribution of participant characteristics showed that maximum variation of the sample was achieved. There were 16 female and 14 male participants, 16 participants considered themselves as more experienced users in CRWs, and 18 participants were younger (18-29 years old).

[INSERT Table 4.2 HERE]

Participants' online experience in CRWs is presented in Table 4.3. The majority of the participants (n=25, 83.3%) regarded that they were learner or expert in the websites, whereas five out of 30 considered themselves novice. Almost all participants (n=28, 93.3%) used CRWs during their recent trips when they traveled, nearly all of the participants (n=28, 93.3%) expressed that they used the websites for restaurant search.

Three websites, Google, TripAdvisor, and Yelp were ranked as the top three websites to search for restaurant related information. While Google is the search engine, the other two are CRWs. Because the focus of this study was consumers' information search behaviors in CRWs, the frequent usage of TripAdvisor and Yelp also confirmed that these two websites were important CRWs for consumers to search for restaurant-related.

[INSERT Table 4.3 HERE]

Areas of Interests in Information Search Stages

Areas of Interests in browsing stage

The researcher first defined the areas of interests (AOIs) of the web pages for two websites. According to the Two-Stage Disaggregate Choice Model, consumers' decision-making process consists of two stages in information search: browsing and deliberation (Gensch, 1987; Noone & Robson, 2014). Therefore, AOIs in browsing stage were identified as the restaurant tab on top and search bar of TripAdvisor and the search bar on Yelp (Figure 4.4).

[INSERT Figure 4.4 HERE]

In terms of the AOIs in the browsing stage, because the website designs and layouts were different in these two websites, the AOIs were defined and named accordingly. As presented in Figure 4.5, there were two web pages in browsing stage in TripAdvisor website and various AOIs were identified including map, side filter bar, restaurant categories, sort, restaurant advertisement, and individual restaurants listed on the page. The information elements for Yelp, AOIs, are illustrated in Figure 4.6 including a map, top filter, restaurant advertisement, and individual restaurant listed.

[INSERT Figure 4.5 HERE]

[INSERT Figure 4.6 HERE]

Areas of interests in deliberation stage

In the deliberation stage, consumers would usually look into more detailed information after the initial browsing stage (Gensch, 1987; Noone & Robson, 2014). In the eye-tracking experiments, participants usually browsed the list of restaurant first and then clicked a specific restaurant to look into more details about it. The AOIs were also defined in order to identify how participants distributed their attention to different information elements. As shown in Figure 4.7, the information elements were defined as various AOIs on TripAdvisor, including top

information, images, review distributions, other business information, map, key word search, reviews, menu, and nearby information. AOIs for Yelp website were defined as follows, top information, images, other business information, map, key word search, reviews, and menu (Figure 4.8).

[INSERT Figure 4.7 HERE]

[INSERT Figure 4.8 HERE]

Descriptive Statistics

This study was conducted in the natural online setting and the participants were able to freely browse and click in two CRWs (i.e., TripAdvisor and Yelp). A total of 1096 web links were opened throughout the restaurant search tasks, an average of 18 links per each participant for completing one task. As indicated in Table 4.6, the majority of the participants (n=26) finished the tasks within eight minutes, and the time durations ranged from 1.27 minutes (1'16") to eight minutes for both websites.

To assess the accuracy and quality of the eye-tracking data in the experiments, the acceptable percentage of the eye movements captured by the eye tracker was set at 75%. As presented in Table 4.4, the percentages captured ranged from 79% to 99% for both websites, suggesting that all participants' eye movements were successfully captured by the eye tracker during the experiments.

[INSERT Table 4.4 HERE]

Eye-tracking Measures

Different characteristics have been revealed related to the overall attention distributions toward various areas of interests (AOIs) for both websites. As illustrated in Table 4.5 and 4.6, images, the filter, and reviews were ranked as the top three areas for TripAdvisor, while advertisements, the filter, and images were the top three areas for Yelp. Of these, images were

also mentioned frequently during the RTA interviews at which participants preferred looking at images before they decided to dine at a particular restaurant. The filter function was regarded as a helpful tool for narrowing down the information, while they were selecting restaurants from numerous options. It is also important to notice that the online advertisements (M=1.8 seconds) have received lots of attention from the participants while they use Yelp, which might be due to the fact that the advertisements were located on top of the restaurant list pages which was easier for participants to recognize (Table 4.6). However, the focused attention to advertisements did not lead to preferences as none of the participants chose the advertised restaurants as their final decision.

[INSERT Table 4.5 HERE]

[INSERT Table 4.6 HERE]

Fixation Duration

Eye-tracking measures including fixation duration, fixation count, and visit count were revealed for different AOIs for the two websites in two stages. The browsing stage refers to the first period of time when consumers started the tasks and used the filter to narrow down a list of restaurants. The deliberation stage refers to the second information search stage when consumers clicked any of the listed restaurants and looked into more details about specific restaurants. In terms of the attention distributions to the restaurants in the browsing stage, participants spent considerable time on the top ranked restaurants, especially the top three restaurants for both websites (Figure 4.9). It is also important to notice that the fixation durations for the top 10 restaurants were significantly longer ($t = -2.37$, $p<.05$) for Yelp (M=6.10 seconds) than TripAdvisor (M= 4.04 seconds). This difference may be due to the different number of restaurant presented in particular websites. There were usually 30 restaurants in the search results in TripAdvisor but 10 in Yelp. This finding elucidates that participants may spend less time on each

restaurant when they were provided with a large number of options, which is consistent with the previous study related to hotel choices (Pan et al., 2013).

[INSERT Figure 4.9 HERE]

In terms of the fixation duration for the AOIs in the deliberation stage, images received the most attention from the participants for both websites, which is consistent with previous findings (Noone & Robson, 2014). Key word search also appeared to be an essential AOI in the deliberation stage. These findings indicated that consumers usually seek to make quick and easy decisions when it came to choosing restaurants, and both images and key word search results provide quick access to relevant information for decision-making processes.

[INSERT Figure 4.10 HERE]

Fixation Count

In the browsing stage, highly-ranked restaurants received the most frequent fixations in both websites, showing similarities with fixation duration results (Figure 4.11). However, in the deliberation stage, consumer reviews received most frequent fixations for both websites, followed by images (Figure 4.12). This finding has indicated that consumers first started their information search by looking through the available information related to each restaurant in the browsing stage. When they started to look into more details of the restaurants, they would frequently shift their eyes between reviews and images in the deliberation stage. The RTA interviews also confirmed this result as participants stated that they might not spend a lot of time reading the whole review content. Rather, they would read some key words in the reviews and prefer to look at the more images along with reading the reviews.

[INSERT Figure 4.11 HERE]

[INSERT Figure 4.12 HERE]

Visit Count

As shown in Figure 4.13, the top two restaurants were most frequently visited, indicating that participants tended to pay more attention to the top-ranked restaurants. It was also consistent with the recordings of the eye-tracking experiments that participants went back and forth between the top restaurants throughout their decision-making process. During RTA interviews, participants also stated that they naturally had better first impressions on the top-ranked restaurants and would spend more time on them. It addition, nearly half of the participants (n=15) selected one of the top two restaurants as their final choice.

[INSERT Figure 4.13 HERE]

[INSERT Figure 4.14 HERE]

Data Visualization

Heat Maps

Heat maps vividly present participants' attention patterns in the color-coded graphical format. As indicated in the Figure 4.15, participants distributed their attention mostly to the side filter bar and the restaurant categories on top of the web page in the browsing stage on TripAdvisor website. When the participants were provided with a list of restaurants, they usually looked through top four or five restaurants, while the lower-ranked restaurants received little attention. Therefore, the restaurant ranking was a very important factor that affected participants' eye movements and restaurant choices. This finding was also confirmed in the following RTA interviews, when participants stated that they usually trusted the ranking in the websites and would go through the restaurants according to their overall ranking and number of reviews.

[INSERT Figure 4.15 HERE]

In the deliberation stage, participants looked through various AOIs in two websites. As illustrated in Figure 4.16, participants viewed images and consumer reviews in the web pages. However, in the Yelp website, while participants were reading some contents in the reviews,

their eyes were often focused on the embedded images within the reviews. This finding was also confirmed in the RTA interviews with participants' statements that they preferred looking at the images, rather than reading the text reviews word by word. They'd rather read some comments that attracted their attention or they were interested in. The consumers had already gained the basic information about the restaurant in terms of its ranking, numbers of reviews, and the restaurant type in the browsing stage. Thus, they were more focused on the specific food items and services through the detailed reviews and images in the deliberation stage.

[INSERT Figure 4.16 HERE]

Gaze Plots

Gaze plots were automatically generated by the Tobii software, and they were not closely related to the defined AOIs. As presented in the following Figure 4.17 and Figure 4.18, there were numerous gaze plots in each web page. Because some plots were located within one AOI, the aggregated plots were further organized and numbered according to the order of the fixation durations. In the browsing stage on TripAdvisor, the first gaze plots (Figure 4.17) have shown that participants started looking at the images on top of the web page and then to the side filter bar to filter information according to the restaurant search tasks. In the second gaze plot, it showed that participants followed the ranking of the restaurants in the list and shifted their eyes between images and the text information of each restaurant.

For the Yelp website, participants put their most attention to the first restaurant, followed by other restaurants in the order of the ranking. As participants moved their eyes to the lower-ranking restaurants, the number of gaze plots decreased. There could be hundreds of gaze plots within one web page, which indicated that participants' eyes were frequently moving, and they skimmed through overall information without spending too much time in the browsing stage.

[INSERT Figure 4.17 HERE]

In the deliberation stage, participants looked at more detailed information related to specific restaurants. As indicated in Figure 4.18, participants looked through the AOIs in the TripAdvisor from top to bottom of the webpage. The large image on the top attracted several fixations at first, followed by the review sections including the overall review distributions, ratings for specific elements (e.g., cleanliness, service, food, etc.), key word search for reviews, and review content. When participants were reading the consumer reviews, they appeared to look at only first or second sentences of the reviews, rather than reading the whole paragraph. This finding was also manifested in the following interviews as participants stated that they would rather read a few sentences in the reviews, especially, some negative comments because reading a few initial sentences was helpful and time-saving when choosing a restaurant.

[INSERT Figure 4.18 HERE]

For the Yelp website, it was identified that participants also reviewed information of a restaurant in the order of the location of the information. Participants were first attracted by the top images of the restaurant, followed by the key-words-embedded consumer reviews located at the upper center area. When participants were reading the consumer reviews, they also paid attention to images which were embedded within the review content.

Overall speaking, consumers' attention sequence followed the locations of the information from top to bottom for both websites. Specifically in the browsing stage, consumers viewed the basic information related to the restaurants according to the ranking of restaurants. They also shifted their attention frequently between text information such as number of reviews and cover images of each restaurant. Compared to the similar patterns of consumers' attention in the browsing stage, their attention patterns in the deliberation stage varied. While consumers were looking at review distributions, keyword search, and little review content on TripAdvisor,

they were looking at the representative consumer reviews, random advertisements, and images embedded in reviews on Yelp.

Retrospective Think-aloud Interviews

After each eye-tracking experiment, a retrospective think-aloud (RTA) interview was conducted as eye-tracking videos were being played. The participants verbalized their thinking processes along with their information search procedures in the videos. The researcher asked participants about the factors that affected their online decision-making processes in CRWs and information search experience in different stages (i.e., browsing and deliberation stages).

Images

Previous eye-tracking studies identified that consumers spent more time reviewing online hotel information with images than the ones with text information only and postulated that consumers' decisions on hotels could be affected by images (Yang et al., 2017; Pan et al., 2013). However, little attention was paid to exploring the types or formats of images that were preferred by consumers for restaurant selections. In this study, images were mentioned by the majority of the participants (n=25) as an important factor in their information search process and online restaurant selections. As presented in Table 4.7, many participants expressed their strong preference for images stating that, "*I think the first thing I want to do is to look at the pictures*" (P03-15-2); and "*Pictures are the best thing I find on Yelp*" (P17-03-1). They also stated that images could provide them reliable information about the restaurants in a quick and easy way, stating that, "*I just feel like it's easier for me, it saves me time to look at the pictures like different people's pictures*" (P12-39-2); and "*Pictures are good. It's a quick way to attract you*" (P24-34-2).

In terms of the specific formats, most participants preferred the images that were created by consumers, rather than by the restaurants or professionals. Interviewees stated that, "*A lot of it's from the customer like the customers upload those. And so, it's not like the perfect, you know, the perfect pictures*" (P06-36-2); and "*I like customer pictures versus the professional restaurant pictures. It has more this is what it actually looks like the day that you get it kind of thin*g" (P22-8-3). Most of the participants mentioned that they preferred the user-generated-images because they felt they were more reliable and trustworthy than the other professional photos. It was also manifested in the quotes that, "*I check the pictures that were taken from the guest. I usually trust the photos*" (P02-13-1); and "*Because those pictures without much editing will be more convincing*" (P08-77-1).

When the participants were asked about content of images that was helpful and could attract their attention, most of them stated that they were looking for food images. One participant stated, "*If I'm choosing a seafood restaurant obviously I want to see some – some crab, the picture of crab or lobster*" (P01-18-2). Others also mentioned that they were expecting to see whether the restaurant was authentic or not from the pictures, as well as the environment or atmosphere. They stated that, "*Because of these pictures, I feel like this place is really authentic maybe many Chinese people really like this place and then that is why they have this decoration*" (P02-61-1); and "*The type of food like whether or not it's authentic, you can kind of tell from the picture, you know, how to prepare it and stuff like that*" (P03-85-1).

[INSERT Table 4.7 HERE]

Advertisements

In the RTA interviews, the participants were asked their thoughts regarding the advertisements. As indicated in Table 4.8, they would usually skip or avoid the advertisements because they thought that the advertisements were paid by the restaurants to be at the top and

they did not trust them. Participants stated that "*I usually skip the ads, sometimes I may click on them, but obviously they're paying to have front or center or good location, so sometimes it may not always be the best*" (P07-30-1); and "*I know they purposefully put them at the top because people kind of think like I do that the top is the best one so it was like I saw that it was an ad and so I went to look for the real best one*" (P25-19-2).

[INSERT Table 4.8 HERE]

Even though the results showed that participants reviewed information of advertised restaurants, none of those advertised restaurants were selected as their final choice. During the RTA interviews, participants were surprised that their eyes were focusing on the advertisements and stated that they unintentionally looked at the advertisements, assuming that those were the highly-ranked restaurants, rather than the paid advertisements. Participants stated that, "*I have no idea they are ad. I didn't pay attention to that. And why during the research, I click the first one and I really like it, but when I see the location, it's totally not the one I'm looking for. So, from that on, I just stop looking for the ad*" (P17-88-1).

Consumer Reviews

Most RTA participants indicated that they liked reading the consumer reviews and were looking for useful information in the reviews. However, they did not spend much time reading all the content. Participants stated "*just wanted to skim over some of the higher reviews and see what everybody is saying about it*" (P04-24-2); "*I tried to click quickly take a look at like what was actually in that review, how recent was it things like that*" (P07-49-2); and "*I'm not really reading the reviews too in depth because they're really long.*" (P23-27-1). Furthermore, participants stated that they would look for the consistency of the reviews, especially more highly-rated reviews, "*I check whether the reviews are consistently good or consistently bad*" (P02-17-3); and "*I would like to see majority people will say good things because I believe if*

they have a negative things, I need to avoid" (P13-17-2). Additional quotes from participants related to consumer reviews are listed in Table 4.9.

[INSERT Table 4.9 HERE]

The number of reviews was regarded as another important aspect when the participants searched through the online information. Many participants emphasized that they preferred to choose a restaurant, which was highly ranked with a large number of reviews. They also explained that they regarded those with higher number of reviews as more popular and better in quality than restaurants with a smaller number of reviews: "*I think the number of review is very important because it's hard to fake with numbers*" (P01-10-2); "*I do like if it has a lot of reviews, that means a lot of people have gone there, so that's a good sign usually if there's a lot of traffic*" (P06-29-1); and "*If it's less than 100, I'm not sold to the restaurant yet. But if it's over like a thousand, definitely! I'm going there for sure*" (P26-11-2).

In addition, participants also stated that they would read negative reviews of the highly-rated restaurants. They stated that, "*I pay more attention to the negative reviews and see what they had to say since I work in the service industry*." (P09-43-1); "*I'm trying to see if there's any negative comments, those are the ones that stood out to me*." (P15-15-1); and "*Definitely the negative stuff because like the positive stuff is cool and it's like okay the food is good, seen that. But when they say negative things it's like very specific. It's probably different from most people. Or, if you see the same negative thing then that might turn you off too.*" (P23-17-1)

Participants also explained that they wanted to know how people complained about the restaurants and whether there were some negative aspects that they cared about. They mentioned that, "*It could be a customer* (who) *is just very difficult or it could be that maybe it was just an off day. But if the negative reviews aren't about the cleanliness of the place or the food itself, then I don't really care because that's just base off everyone's personal*" (P22-11-2), and "*If the*

problem was the food, I'll probably skip this restaurant. But if it's the service or its lots of people they get bad service, I probably can accept that because I normally don't worry about the service part." (P24-8-4).

The topic of consumer reviews has been explored by several previous researchers (Kwok, Xie, & Richards, 2017; Lu & Stepchenkova, 2015; Schuckert, Liu, & Law, 2015). However, the majority of these studies have used self-reported surveys. Combining the eye-tracking experiment and RTA interviews, researchers were able to understand customers' actual behaviors as they verbalized their thinking process and explained their behaviors. In addition, the participants of this study explored live websites in the eye-tracking experiment in a more natural online setting than previous studies. The participants confirmed that they felt the tasks were very similar to their normal behaviors when they used the CRWs to search for restaurants online.

Comparison between Two Websites

In the pre-experiment surveys, TripAdvisor, Yelp, and Google were ranked by 93% of the participants as the top three websites for restaurant selections. However, the RTA interviews, more participants (n=22) indicated that they preferred Yelp websites after they finished the restaurant selection tasks in the eye-tracking experiments. Participants found that Yelp was better when finding restaurant-related information (Table 4.10). Participants stated that "*I think I will go back to Yelp in the future if I'm going to do a restaurant search*" (P12-75-1). They also explained that they preferred Yelp because of the website design and useful functions, stating that, "*Yelp is very specialized at the restaurant that's why their web design is much better*" (P01-45-4); and "*I definitely prefer Yelp over TripAdvisor just because the layout was so much easier*" (P19-05-1).

As for the comments related to TripAdvisor website, participants mentioned they found it more helpful for their travel-related decisions or hotel choices. Specifically, participants stated that

"TripAdvisor is more – for me - more for sightseeing" (P13-53-2); *"I would use TripAdvisor for something like a hotel but not for restaurants"* (P23-4-2); and *"I think TripAdvisor is more when I look for some information about the tourist attractions"* (P30-83-2). In terms of the perceived helpfulness of these websites, the majority of the participants (n=27) regarded these websites as helpful for their restaurant selections.

[INSERT Table 4.10 HERE]

Conclusion and Implications

The purpose of the study was to explore consumers' information search behaviors and decision-making processes when making restaurant selections in consumer review websites. Mixed methods including eye-tracking experiments and RTA interviews were conducted to accomplish this purpose. A total of 30 participants were included and two live consumer review websites were used as the natural setting for the study.

In the eye-tracking experiments, participants paid much attention to the images to assist them in their online restaurant selections. Various areas of interests were identified including consumer reviews, the filter, advertised restaurants, menus, and maps. Although consumer reviews and advertised restaurants were frequently viewed by the participants, the advertised restaurants were viewed in a short duration and not selected as their dining choices.

In the RTA interviews, the participants verbalized their thinking process and explained their thoughts on previous behaviors in the eye-tracking experiments. Factors including images, consumer reviews, number of reviews, negative reviews, and ranking were influential in their decision-making process in the consumer review websites.

Theoretical Implications

First, in this study, eye-tracking experiments were utilized to explore consumers' information search behaviors related to online restaurant selections. As eye-tracking technology was still in its infancy in hospitality research (Scott et al., 2017), and most of the existing eye-tracking studies were focused on either hotel or tourism industry (Wang & Sparks, 2016). This study provides insights for hospitality researchers related to the consumers' decision-making process for restaurant choices in consumer review websites.

Further, most of the previous studies have used self-reported surveys or the manipulated web pages to explore consumer behavior (Li, Huang, & Christianson, 2016). However, this study revealed a holistic view of consumers' actual information search behaviors by using the eye-tracking technology over the live CRWs in the natural online setting. The advanced technology was helpful in providing precise information related to consumers' attention patterns and in vivid data visualizations (Djamasbi et al., 2010).

In addition, the RTA interviews enabled researchers to identify the thinking process and specific reasoning of consumers' actual behaviors in their own words (Elbabour et al., 2017). The questions of how participants thought about the consumer reviews and importance of number of reviews and negative reviews were identified in the interviews. These findings were consistent with some previous studies related to online reviews (Blal & Sturman, 2014; Levy, Duan, & Boo, 2013). It was also insightful as consumers provided their preferences for various information areas such as types of images and image groups, as well as for the advertisements through their detailed explanations in the RTA interviews. For example, even though consumers' eyes were fixated on the advertisements in the eye-tracking experiments, they later explained in the RTA interviews that they did not realize those were advertisements and they were looking

there because of the salient location. The combination of the eye-tracking experiment and RTA interviews contributed to exploring actual consumer behavior along with the explanation and think process accompanying the behaviors.

Managerial Implications

The findings of this research provide valuable implications for both the restaurateurs and the CRWs. As the eye-tracking technology and RTA interviews revealed detailed characteristics of consumers' actual behaviors, specific strategies could be developed to engage consumers and improve consumer experience. First, findings indicated that consumers preferred looking at images in CRWs. Specifically, they liked to see pictures of food, created by consumers. Therefore, instead of spending time and money to develop professional photos for the operations, restaurateurs should pay attention to the visual presentations of their food and establishments and encourage customers to share images online. Specifically, the restaurateurs could develop promotions or events so that consumers would be willing to take pictures when they are dining and post images in CRWs.

Further, consumer reviews have also been found to be an essential factor for consumers' online decision-making process. Specifically, consumers paid attention to the number of reviews and negative reviews when making restaurant choices. Thus, restaurateurs may need to encourage their consumers to create online reviews and manage negative reviews. Previous studies have identified that various factors may affect customer satisfaction when hospitality companies responded to negative reviews (Min, Lim, & Magnini, 2014). Some researchers found that appropriate service recovery through responses to customer complaints actually improve the restaurant images (Pantelidis, 2010). Thus, restaurateurs may need to pay close attention to reviews posted on CRWs and detect and correspond to negative consumer responses timely (Min

et al., 2015; Park & Allen, 2013). More fundamentally, ensuring consistent food and service quality may prevent persistent negative reviews, which may negatively impact consumers' perceptions and their restaurants decisions.

As for the CRWs, this study is also helpful for their marketing strategies. Participants of this study expressed their preference of one CRW over the other. Developers of CRWs should be aware of their target market and the online marketing strategies so that they could attract the right consumers to use their websites. One CRW may focus on enhancing user experience in travel and attractions, while another may concentrate on restaurant information and maintain the leading role for restaurant reviews and ratings.

In terms of the website design, images, consumer reviews, filters, and menus were important elements that consumers preferred. Participants indicated that they would usually avoid the advertisements and would skim through the long paragraphs of reviews when they were looking through the information. The CRWs may not only pay attention to the useful information, but more to those that have been ignored or not useful. They may need to consider and figure out ways to make their website more user-friendly, succinct, and informative for the consumers.

Limitations and Recommendations for Future Research

There are several limitations in this study. First, the number of participants in the eye-tracking experiments is limited due to the limited number of eye tracking devices and extensive time and financial resources required for the research. However, as in other qualitative research methodology, collecting and analyzing representative data are not the primary goal of eye-tracking experiments or RTA interviews even though through the eye-tracking experiments consumers' actual behaviors in the natural setting could be precisely captured (Mitterer-Daltoé et

al., 2014; Wedel & Pieters, 2008). Instead of simply increasing the number of eye-tracking participants, future researchers may need to include a variety of consumers (i.e., maximum variation) to explore more in-depth phenomena of consumer behavior.

Further, the focus of the study was consumers' information search behaviors for restaurant selections in CRWs. The live websites, Yelp and TripAdvisor, were used in the eye-tracking experiments. Therefore, results may be limited to these CRWs and may not be generalizable to online search engines (e.g., Google) or other social networking sites (e.g., Facebook). Thus, future research is recommended to explore consumer information search behaviors in different online channels.

In addition, only the screen-type eye tracker, which is embedded into a desktop computer, was used in the eye-tracking experiments. Because today's consumers use a variety of devices to search CRWs and communicate online, results of this study may not be generalizable to consumer behaviors using other devices (e.g., laptop, smart phone, tablet, etc.) or in other formats (e.g., app). With the technological innovation and development of the devices, future researchers may use different devices to capture consumers' actual behaviors.

Further, this research was conducted in the U.S. and the participants were mostly residents in this country. Therefore, results may not be generalizable to other countries. Future research is recommended to explore the consumers' actual online information search behaviors in other countries and multi-cultural environments outside the U.S.

Acknowledgement

This research was partially funded by the Small Grant Program at Kansas State University for Graduate Students in Arts, Humanities, and Social Sciences, and College of Human Ecology Doctoral Dissertation Award at Kansas State University.

References

Alshammari, T., Alhadreti, O., & Mayhew, P. (2015). When to ask participants to think aloud: A comparative study of concurrent and retrospective think-aloud methods. *International Journal of Human Computer Interaction*, *6*(3), 48-64.

Anderson, M., & Magruder, J. (2012). Learning from the crowd: Regression discontinuity estimates of the effects of an online review database. *The Economic Journal, 122*, 957-989.

Blackwell, R. D., Miniard, P., & Engel, J. (2006). *Consumer behavior* (10th ed.). Mason, OH: Thomson Higher Education.

Blal, I., & Sturman, M. C. (2014). The differential effects of the quality and quantity of online reviews on hotel room sales. *Cornell Hospitality Quarterly, 55*, 365-375.

Bray, J. P. (2008). *Consumer behavior theory: approaches and models.* Retrieved from http://eprints.bournemouth.ac.uk/10107/1/Consumer_Behaviour_Theory_-_Approaches_&_Models.pdf

Cantallops, A. S., & Salvi, F. (2014). New consumer behavior: A review of research on eWOM and hotels. *International Journal of Hospitality Management, 36*, 41-51.

Carrasco, M. (2011). Visual attention: The past 25 years. *Vision Research, 51*, 1484-1525.

Chan, Y. Y., & Ngai, E. W. (2011). Conceptualising electronic word of mouth activity: An input-process-output perspective. *Marketing Intelligence & Planning, 29*, 488-516.

Chen, Y. F., & Law, R. (2016). A review of research on electronic word-of-mouth in hospitality and tourism management. *International Journal of Hospitality & Tourism Administration, 17*, 347-372.

Chiang, K. P., Dholakia, R. R., & Westin, S. (2005). *e-Search: A conceptual framework of online consumer behavior in web systems design and online consumer behavior*. Hershey, PA: IGI Global.

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature reviews neuroscience*, *3*, 201-215.

Cutrell, E., & Guan, Z. (2007). What are you looking for?: an eye-tracking study of information usage in web search. *Proceedings of the SIGCHI conference on Human factors in computing systems*. Retrieved from https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/Whatareyoulookingfor-cutrell-chi07.pdf

Day, R. F., Lin, C. H., Huang, W. H., & Chuang, S. H. (2009). Effects of music tempo and task difficulty on multi-attribute decision-making: An eye-tracking approach. *Computers in Human Behavior*, *25*, 130-143.

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. *International Journal of Human-computer Studies*, *68*, 307-323.

DoubleClick. (2004). *DoubleClick QI 2004 E-commerce Site Trend Report*. Retrieved from http://www.spunlogic.comlmedialpdflDoubleClickQI2004ECommerceTrendReport.pdf

Duverger, P. (2013). Curvilinear effects of user-generated content on hotels' market share: a dynamic panel-data analysis. *Journal of Travel Research*, *52*, 465-478.

Eger, N., Ball, L. J., Stevens, R., & Dodd, J. (2007). *Cueing retrospective verbal reports in usability testing through eye-movement replay*. Retrieved from https://pdfs.semanticscholar.org/fa0b/705f05dddec9210a88fe570164f5f7a8d009.pdf

Elbabour, F., Alhadreti, O., & Mayhew, P. (2017). Eye tracking in retrospective think-aloud usability testing: is there added value?. *Journal of Usability Studies*, *12*(3), 95-110.

Elling, S., Lentz, L., & de Jong, M. (2011). *Retrospective think-aloud method: Using eye movements as an extra cue for participants' verbalizations.* Retrieved from https://dl.acm.org/citation.cfm?id=1979116

Ericsson, K. A., & Simon, H. A. (1998). How to study thinking in everyday life: Contrasting think-aloud protocols with descriptions and explanations of thinking. *Mind, Culture, and Activity, 5*, 178-186.

Fonteyn, M. E., Kuipers, B., & Grobe, S. J. (1993). A description of think aloud method and protocol analysis. *Qualitative health research, 3*, 430-441.

Gensch, D. H. (1987). A two-stage disaggregate attribute choice model. *Marketing Science, 6*, 223-239.

Gensch, D. H., & Soofi, E. S. (1995). Information-theoretic estimation of individual consideration set. *International Journal of Research in Marketing, 12*, 25-38.

Glaholt, M. G., & Reingold, E. M. (2011). Eye movement monitoring as a process tracing methodology in decision making research. *Journal of Neuroscience, Psychology, and Economics, 4*(2), 125-146.

Glaser, B. G. (1992). *Basics of grounded theory analysis: Emergence vs forcing*. Hove, United Kingdom: Sociology Press.

Granka, L. A., Joachims, T., & Gay, G. (2004). Eye-tracking analysis of user behavior in WWW search. *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval*. Retrieved from https://dl.acm.org/citation.cfm?id=1009079

Gu, Y., Wang, C., Bixler, R., & D'Mello, S. (2017). ETGraph: A graph-based approach for visual analytics of eye-tracking data. *Computers & Graphics, 62*, 1-14.

Hellmann, A., Yeow, C., & De Mello, L. (2017). The influence of textual presentation order and graphical presentation on the judgements of non-professional investors. *Accounting and Business Research, 47*, 455–470.

Holmqvist, K., Nyström, M., Andersson, R., Dewhurst, R., Jarodzka, H., & Van de Weijer, J. (2011). *Eye tracking: A comprehensive guide to methods and measures*. Oxford, United Kingdom: OUP Oxford.

Jacob, R. J., & Karn, K. S. (2003). Eye tracking in human-computer interaction and usability research: Ready to deliver the promises. *In The mind's eye*. Oxford, United Kingdom: Elsevier Science.

Kim, W. G., Lim, H., & Brymer, R. A. (2015). The effectiveness of managing social media on hotel performance. *International Journal of Hospitality Management, 44*, 165-171.

Kwok, L., Xie, K. L., & Richards, T. (2017). Thematic framework of online review research: A systematic analysis of contemporary literature on seven major hospitality and tourism journals. *International Journal of Contemporary Hospitality Management, 29*, 307-354.

Kwong, T., Cheung, C., Zhu, L., Limayem, M., & Viehland, D. (2002). Online consumer behavior: an overview and analysis of the literature. *Proceedings of the Pacific Asia Conference of Information Systems.* Retrieved from http://www.pacis-net.org/file/2002/166.pdf

Levy, S. E., Duan, W., & Boo, S. (2013). An analysis of one-star online reviews and responses in the Washington, DC, lodging market. *Cornell Hospitality Quarterly*, *54*, 49-63.

Li, Q., Huang, Z. J., & Christianson, K. (2016). Visual attention toward tourism photographs with text: An eye-tracking study. *Tourism Management, 54*, 243-258.

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2008). Electronic word-of-mouth in hospitality and tourism management. *Tourism Management, 29*, 458-468.

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2018). A retrospective view of electronic word-of-mouth in hospitality and tourism management. *International Journal of Contemporary Hospitality Management, 30*, 313-325.

Liu, S., Law, R., Rong, J., Li, G., & Hall, J. (2013). Analyzing changes in hotel customers' expectations by trip mode. *International Journal of Hospitality Management, 34*, 359-371.

Liu, Z., & Park, S. (2015). What makes a useful online review? Implication for travel product websites. *Tourism Management, 47*, 140-151.

Lu, W., & Stepchenkova, S. (2015). User-generated content as a research mode in tourism and hospitality applications: Topics, methods, and software. *Journal of Hospitality Marketing & Management*, *24*(2), 119-154.

Lu, X., Ba, S., Huang, L., & Feng, Y. (2013). Promotional marketing or word-of-mouth? Evidence from online restaurant reviews. *Information Systems Research, 24*, 596-612.

Manor, B. R., & Gordon, E. (2003). Defining the temporal threshold for ocular fixation in free-viewing visuocognitive tasks. *Journal of neuroscience methods, 128*, 85-93.

Maughan, L., Gutnikov, S., & Stevens, R. (2007). Like more, look more. Look more, like more: The evidence from eye-tracking. *Journal of Brand Management, 14*, 335-342.

Mauri, A. G., & Minazzi, R. (2013). Web reviews influence on expectations and purchasing intentions of hotel potential customers. *International Journal of Hospitality Management, 34*, 99-107.

McCarley, J. S., Mounts, J. R., & Kramer, A. F. (2007). Spatially mediated capacity limits in attentive visual perception. *Acta Psychologica*, *126*(2), 98-119.

MerchDope (2018). *Youtube statistics*. Retrieved from https://merchdope.com/youtube-statistics/

Merriam, S. B. (1988). *Case study research in education: A qualitative approach*. San Francisco, CA: Jossey-Bass.

Min, H., Lim, Y., & Magnini, V. P. (2015). Factors affecting customer satisfaction in responses to negative online hotel reviews: The impact of empathy, paraphrasing, and speed. *Cornell Hospitality Quarterly*, *56*, 223-231.

Mitterer-Daltoé, M. L., Queiroz, M. I., Fiszman, S., & Varela, P. (2014). Are fish products healthy? Eye tracking as a new food technology tool for a better understanding of consumer perception. *LWT-Food Science and Technology*, *55*, 459-465.

National Restaurant Association (2017). *2017 Restaurant industry pocket factbook*. Retrieved from http://www.restaurant.org/Downloads/PDFs/News-Research/Pocket_Factbook_FEB_2017-FINAL.pdf

Noone B. M., & Robson, S. K. (2014). Using eye tracking to obtain a deeper understanding of what drives online hotel choice. *Cornell Hospitality Report*, *14*(17), 6-12.

Noone, B. M., & McGuire, K. A. (2013). Pricing in a social world: The influence of non-price information on hotel choice. *Journal of Revenue and Pricing Management*, *12*, 385-401.

Orquin, J. L., & Loose, S. M. (2013). Attention and choice: A review on eye movements in decision making. *Acta Psychologica*, *144*, 190-206.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly*, *54*, 74-83.

Pantelidis, I. S. (2010). Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quarterly, 51*, 483-491.

Park, S. Y., & Allen, J. P. (2013). Responding to online reviews: Problem solving and engagement in hotels. *Cornell Hospitality Quarterly, 54*(1), 64-73.

Park, S., & Nicolau, J. L. (2015). Asymmetric effects of online consumer reviews. *Annals of Tourism Research, 50*, 67-83.

Patton, M. Q. (2015). *Qualitative research and methods: Integrating theory and practice*. London, United Kingdom: Sage.

Rayner, K. (1998). Eye movements in reading and information processing: 20 years of research. *Psychological bulletin, 124*, 372-344.

Rayner, K., Rotello, C. M., Stewart, A. J., Keir, J., & Duffy, S. A. (2001). Integrating text and pictorial information: Eye movements when looking at print advertisements. *Journal of Experimental Psychology: Applied, 7*, 219-226.

Reisenberg, D. (2013). *The Oxford handbook of cognitive psychology*. Oxford, United Kingdom: Oxford University Press.

Robson, S. K. A, & Noone, B. (2014). Show me what you see, tell me what you think: Using eye tracking for hospitality research. *Cornell Hospitality Report, 14*(17), 6-12.

Russell, M. C. (2005). Hotspots and hyperlinks: Using eye-tracking to supplement usability testing. *Usability News, 7*(2), 1-11.

Schiessl, M., Duda, S., Thölke, A., & Fischer, R. (2003). Eye tracking and its application in usability and media research. *MMI-interaktiv Journal, 6*, 41-50.

Schuckert, M., Liu, X., & Law, R. (2015). Hospitality and tourism online reviews: Recent trends and future directions. *Journal of Travel & Tourism Marketing, 32*, 608-621.

Scott, N., Zhang, R., Le, D., & Moyle, B. (2017). A review of eye-tracking research in tourism. *Current Issues in Tourism, 2,* 1-18.

Simon, H. A. (1972). Theories of bounded rationality. *Decision and organization, 1,* 161-176.

Sparks, B. A., Perkins, H. E., & Buckley, R. (2013). Online travel reviews as persuasive communication: The effects of content type, source, and certification logos on consumer behavior. *Tourism Management, 39,* 1-9.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Sun, S., Fong, D. K. C., Law, R., & He, S. (2017). An updated comprehensive review of website evaluation studies in hospitality and tourism. *International Journal of Contemporary Hospitality Management, 29,* 355-373.

TripAdvisor (2018). *About TripAdvisor*. Retrieved from https://tripadvisor.mediaroom.com/us-about-us

Tsao, W. C., Hsieh, M. T., Shih, L. W., & Lin, T. M. (2015). Compliance with eWOM: The influence of hotel reviews on booking intention from the perspective of consumer conformity. *International Journal of Hospitality Management, 46,* 99-111.

van der Laan, L. N., Hooge, I. T., De Ridder, D. T., Viergever, M. A., & Smeets, P. A. (2015). Do you like what you see? The role of first fixation and total fixation duration in consumer choice. *Food Quality and Preference, 39,* 46-55.

Wang, J., Zhao, J., Guo, S. and North, C. (2013). *Clustered layout word cloud for user generated review.* Retrieved from http://www.yelp.com/dataset_challenge

Wang, Y., & Sparks, B. A. (2016). An eye-tracking study of tourism photo stimuli: image characteristics and ethnicity. *Journal of Travel Research, 55,* 588-602.

Wang, Z., Li, H., Ye, Q., & Law, R. (2016). Saliency effects of online reviews embedded in the description on sales: Moderating role of reputation. *Decision Support Systems*, *87*, 50-58.

Wedel, M., & Pieters, R. (2008). *A review of eye-tracking research in marketing*. Howard House, United Kingdom: Emerald Group Publishing Limited.

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of Retailing and Consumer Services*, *22*, 244-249.

Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management*, *43*, 1-12.

Yang, S. B., Hlee, S., Lee, J., & Koo, C. (2017). An empirical examination of online restaurant reviews on Yelp. com: A dual coding theory perspective. *International Journal of Contemporary Hospitality Management*, *29*, 817-839.

Yelp. (2018). *About Yelp*. Retrieved from https://www.yelp.com/about

Yen, C. L. A., & Tang, C. H. H. (2015). Hotel attribute performance, eWOM motivations, and media choice. *International Journal of Hospitality Management*, *46*, 79-88.

Zhang, Z., Ye, Q., Law, R., & Li, Y. (2010). The impact of e-word-of-mouth on the online popularity of restaurants: A comparison of consumer reviews and editor reviews. *International Journal of Hospitality Management*, *29*, 694-700.

Table 4.1 Questions for retrospective think-aloud interviews

Stages	Questions
Stage I – Initial browsing of information	1. When you first get this restaurant search task, do you think it is similar to what you usually do by having certain criteria, such as price, location, and restaurant type when you travel in a big city? 2. You started looking at this information, what were you thinking when you were looking here? 3. How many restaurants do you usually browse and how many pages do you check out when you search for restaurants online? 4. What were you thinking when you looked through the number of restaurants on the webpage (e.g., 1, 2, 3, etc.)? 5. What were the most important things of this restaurant that attracted your attention and you may want to know more about it? 6. What are your thoughts on restaurant selection tasks?
Stage II – Comparison of alternatives	1. Why did you click this restaurant first? What were the key things that determined your choice? 2. What were you thinking when you were looking at this information first about this restaurant? 3. Do you think that the information you just reviewed was useful for you to know better about the restaurant? Why or why not? 4. How many restaurants do you usually compare when you search for restaurants online? 5. What were you thinking when you compared these restaurant? What was the important things that helped you make comparisons?
Final restaurant decision	1. What were you thinking when you were viewing the information of this restaurant? 2. Why did you choose this restaurant? 3. When you think back, what were the key information points that influenced your final decision? 4. Generally, what are the important factors that affect your decision making process when you search for restaurants online?
Ending	1. How was your overall experience using this website to information? 2. How do you describe your different experiences in these two websites? 3. How was your overall experience in the eye-tracking experiment? Are you comfortable in the experiment? (Regarding time duration, task designs, environment, and comfort level) 4. Is there anything else you want to share and do you have any questions regarding the study?

Table 4.2 Maximum variation sampling illustration

No. of participants	Gender	Age	Experience	Category
1	M	35	L	MSL
2	F	30	M	FSM
3	F	28	L	FJL
4	F	37	M	FSM
5	M	32	M	MSM
6	F	20	L	FJL
7	M	31	L	MSL
8	M	24	M	MJM
9	F	31	L	FSL
10	F	30	L	FSL
11	F	29	L	FJL
12	M	19	L	MJL
13	F	27	M	FJM
14	F	31	M	FSM
15	M	27	L	MJL
16	F	21	L	FJL
17	F	60	L	FSL
18	F	20	M	FJM
19	M	21	L	MJL
20	F	22	M	FJM
21	M	32	M	MSM
22	F	31	L	FSL
23	F	24	M	FJM
24	M	19	M	MJM
25	M	25	M	MJM
26	F	21	L	FJL
27	M	23	M	MJM
28	M	33	M	MSM
29	M	27	M	MJM
30	M	28	M	MJM

Table 4.3 Characteristics of participants (n=30)

Characteristics	n	%
Self-reported experience in consumer review websites		
Novice	5	16.7
Learner	20	66.6
Expert	5	16.7
Frequency of regular usage in CRWs		
Frequently	2	6.7
Occasionally	8	26.7
Seldom	10	33.3
Never	10	33.3
Frequency of usage in CRWs in recent trips		
Frequently	15	50.0
Occasionally	13	43.3
Seldom	2	6.7
Top three websites for restaurant information search		
Google	30	
TripAdvisor	28	
Yelp	26	

Table 4.4 Descriptive statistics of eye-tracking experiments

No. of participants	TripAdvisor			Yelp		
	Task time	Web links	Eye movement capture (%)	Task time	Web links	Eye movement capture (%)
1	3'30"	11	81	2'18"	14	92
2	5'37"	22	93	4'26"	20	89
3	7'50"	27	96	7'03"	26	99
4	7'22"	14	80	5'37"	28	94
5	6'30"	15	94	4'46"	12	84
6	4'50"	28	90	2'24"	13	97
7	8'00'	25	93	8'00"	22	94
8	4'45"	15	94	6'20"	23	96
9	2'30"	9	96	1'58"	5	96
10	5'26"	24	94	6'28"	28	93
11	8'00"	14	96	8'00"	21	94
12	4'15"	11	87	2'02"	4	84
13	5'22"	7	89	6'42"	17	87
14	7'10"	27	90	5'45"	34	79
15	4'28"	16	92	7'28"	43	95
16	4'20"	15	92	2'07"	2	88
17	6'38"	43	92	3'14"	11	91
18	5'42"	15	83	3'45"	16	93
19	8'00"	13	94	8'00"	29	97
20	4'26"	9	95	4'08"	13	97
21	8'00"	14	80	5'42"	14	86
22	6'07"	35	96	3'56"	25	98
23	3'22"	8	92	7'33"	21	93
24	6'24"	15	89	4'56"	31	91
25	2'30"	9	97	3'42"	17	97
26	3'42"	39	89	3'47"	33	92
27	4'30"	9	95	4'58"	23	98
28	6'51"	10	98	4'54"	16	98
29	2'54"	7	81	1'16"	4	94
30	6'35"	8	89	6'52"	17	95
Total	163'36"	514		148'07"	582	
Mean	5'27"	17	91	4'56"	19	93

Table 4.5 Ranking of areas of interests on TripAdvisor

AOI	FC Mean	Rank	VC Mean	Rank	FD Mean	Rank
Reviews	102.1	1	11.8	4	0.8	4
Filter	57.1	2	17.6	2	1.4	1
Images	52.5	3	21.9	1	1.1	2
Search	35.1	4	14.7	3	0.6	6
Menu	32.3	5	9.0	5	0.2	13
Restaurant groups	21.7	6	6.1	7	0.3	12
Biz info	17.2	7	5.5	8	0.6	7
Nearby	14.7	8	4.2	10	0.3	9
Keyword	12.1	9	6.8	6	0.8	3
Review filter	11.8	10	5.5	9	0.7	5
Awards	8.3	11	2.4	13	0.2	14
Review distributions	5.7	12	3.7	11	0.5	8
Sort	5.6	13	3.4	12	0.3	11
Advertisement	4.0	14	1.3	15	0.0	16
Ratings	2.4	15	2.2	14	0.3	10
Restaurant tab	1.8	16	1.1	16	0.2	15

Note. AOI=area of interest; FC=fixation count; VC=visit count; FD=fixation duration

Table 4.6 Ranking of areas of interests on Yelp

AOI	FC Mean	Rank	VC Mean	Rank	FD Mean	Rank
Reviews	136.0	1	12.5	4	0.5	8
Advertisement	63.6	2	19.7	1	1.8	1
Filter	43.8	3	13.2	3	1.4	2
Images	41.7	4	14.5	2	1.3	3
Map2	30.3	5	12.1	5	0.9	4
Biz info	29.4	6	7.8	7	0.7	6
Image groups	23.3	7	4.1	10	0.5	9
Keyword	20.9	8	8.5	6	0.7	5
Search	15.3	9	6.4	8	0.5	10
Menu	13.3	10	2.8	12	0.1	12
Map1	11.8	11	5.5	9	0.6	7
Top info	7.1	12	4.0	11	0.4	11

Note. AOI=area of interest; FC=fixation count; VC=visit count; FD=fixation duration

Table 4.7 Perceptions and attitudes toward images

Images	Selected Quotes
Importance in decision making	"I look at pictures. Probably the first thing I do whenever I look through reviews is looking at pictures." (P15-20-1) "I'm very visual so I saw the picture and the picture looked very appealing to me and so I went and clicked it." (P23-8-4)
Format/presentation	"I don't want to choose the picture that looks too nice and I truly want to see real people taking some real photos." (P01-10-6)
Content/Characteristics	"All the pictures that were on there seem to be really good. It enhanced the way that the food looked." (P04-85-2) "I would say nice looking food pictures or even the scenery, if it like shows me the front of a restaurant and that looks clean and interesting location, I might be more attractive to it." (P16-22-1)

Table 4.8 Perceptions and attitudes toward advertisements

Advertisements	Selected Quotes
Attitudes toward advertisements	"I don't use the – the first top two things because – because the first top two things are the advertisement." (P05-64-1) "I did notice I did click on this first one, but it was I had noticed later that it was an ad versus the actual first rated one which kind of tricked me in a way I guess to thinking it was the first one." (P11-71-2) "I didn't realize these were ads. Usually when it has the word ad on it, I don't tend to click on it." (P15-81-1) "I seldom click the advertisement because it feels like why it's on the top because they pay for it. So I usually go for the first one instead of the advertisement cause I have a bad experience before." (P29-11-2)

Table 4.9 Perceptions and attitudes toward consumer reviews

Consumer reviews	Selected Quotes
Role in decision making	"Occasionally I will use it to look at reviews just to kind of skim through them and see like who has the most maybe like why they have the most". (P06-54-1) "Actually, I didn't pay attention too much to the content." (P08-39-1)
Importance of number of reviews	Especially when you have more than thousand reviewers – two thousand reviewers, I trust that overall." (P20-38-1) "I usually looked for ones with the highest reviews and I also think it's important to look at the number of reviews. So if they have a lot of really good reviews I usually think those are the best ones." (P25-5-3)
Perceptions toward negative reviews	"I look at a lot of the disappointing ones. If there is a lot of good ones, I may be skim them, but I wouldn't see what everything they had to say if they were very satisfied." (P11-23-2)

Table 4.10 Comparison and comments for two websites

Website comparisons	Selected Quotes
Comments for Yelp	"I think for restaurants it's probably Yelp I think I used more. I've used TripAdvisor a lot but I usually used that for like hotels or activities to do in a place." (P25-33-1) "Yelp is really easy because once you pick the restaurant like the food type you can just click on filter which was on the right top corner then you just filter out everything you wanted." (P26-12-3)
Comments for TripAdvisor	"If we do like travel like my husband usually books the travel and so, TripAdvisor to me just trip going somewhere and like, yeah, like trip-related and not checking restaurants." (P04-89-1) "So for TripAdvisor, for me my personal experience is I'm not always using that for the food. So, in my opinion TripAdvisor will be the one that – that for me I'm using that for looking for the things to go, I mean the place to go." (P17-23-3)

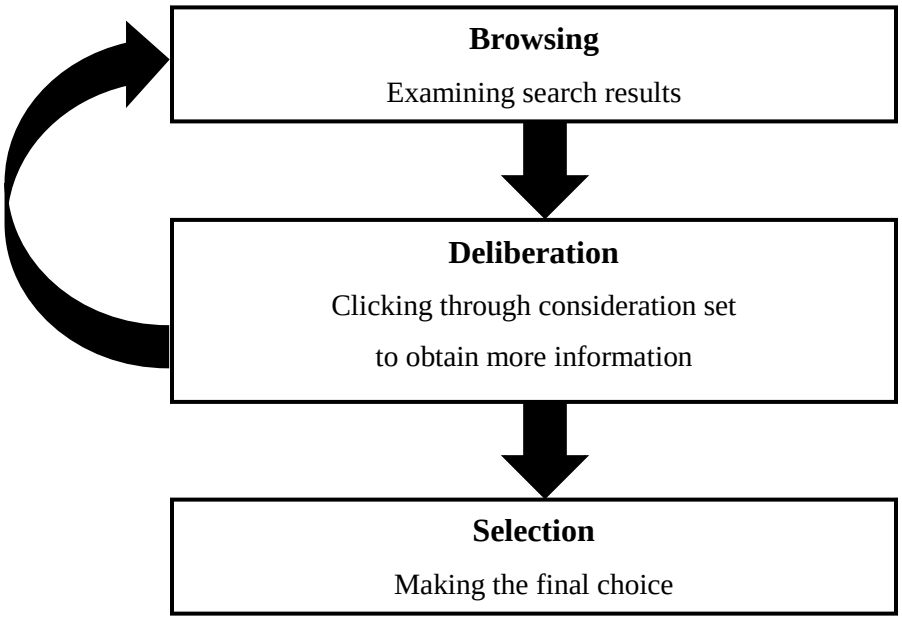


Figure 4.1 Two-Stage Disaggregate Choice Model

MJL	MJM	MSL	MSM
FJL	FJM	FSL	FSM

M Male
F Female
J Age 18-29
S Age 30 and over
L Less experienced user
M More experienced user

Figure 4.2 Maximum variation sampling matrix

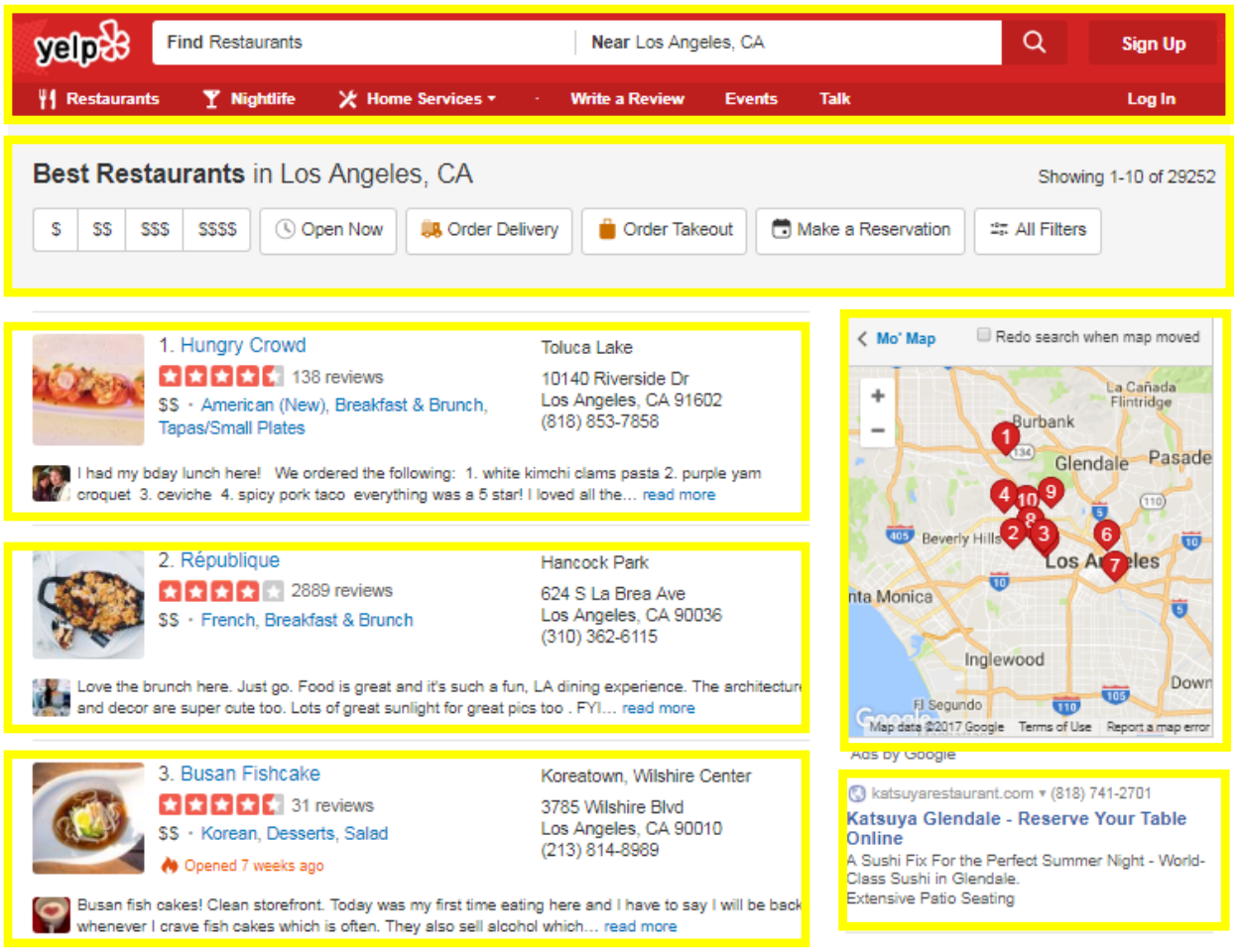


Figure 4.3 Illustration of areas of interests (AOIs) on Yelp website

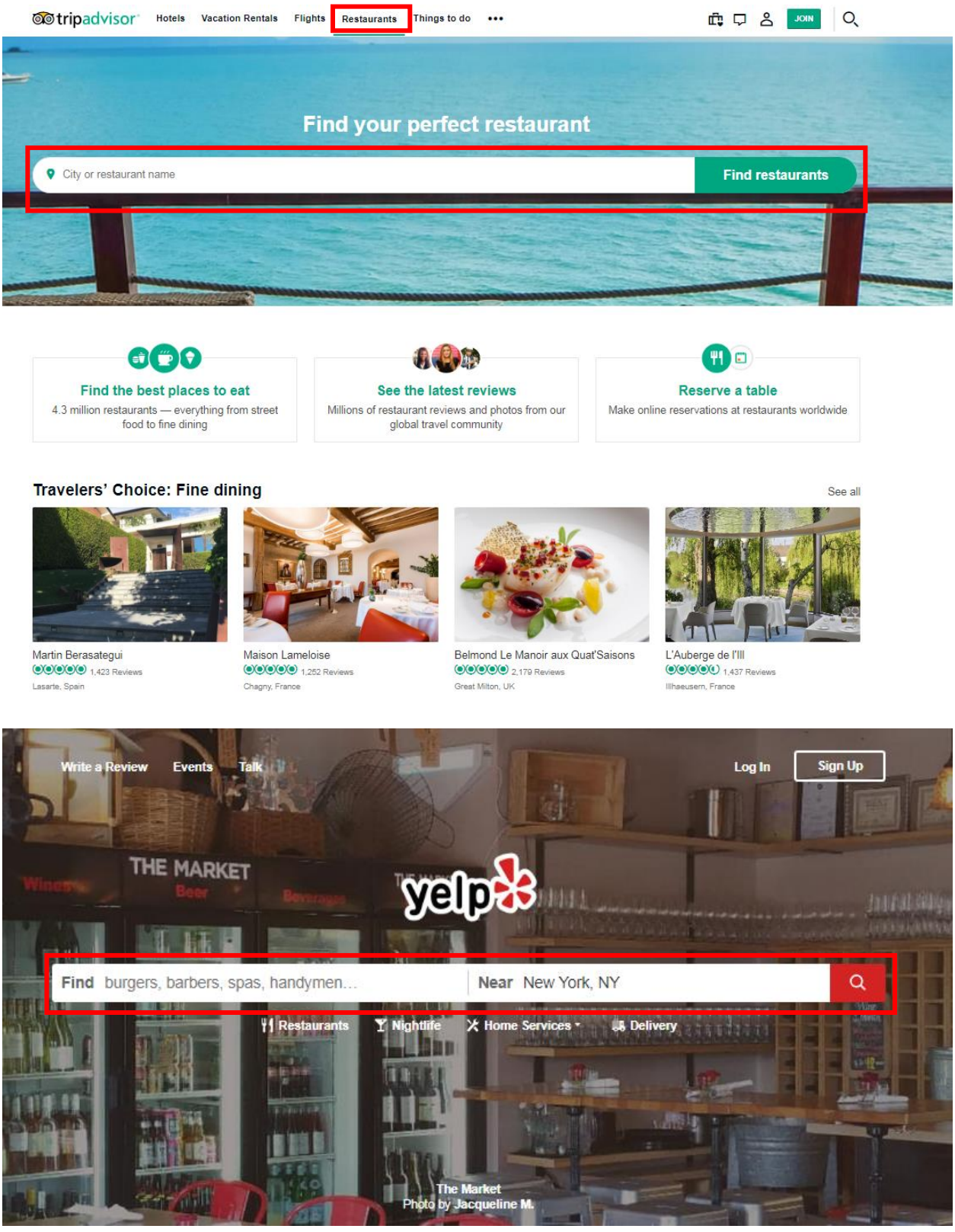


Figure 4.4 Areas of interests during browsing stage on TripAdvisor and Yelp homepages

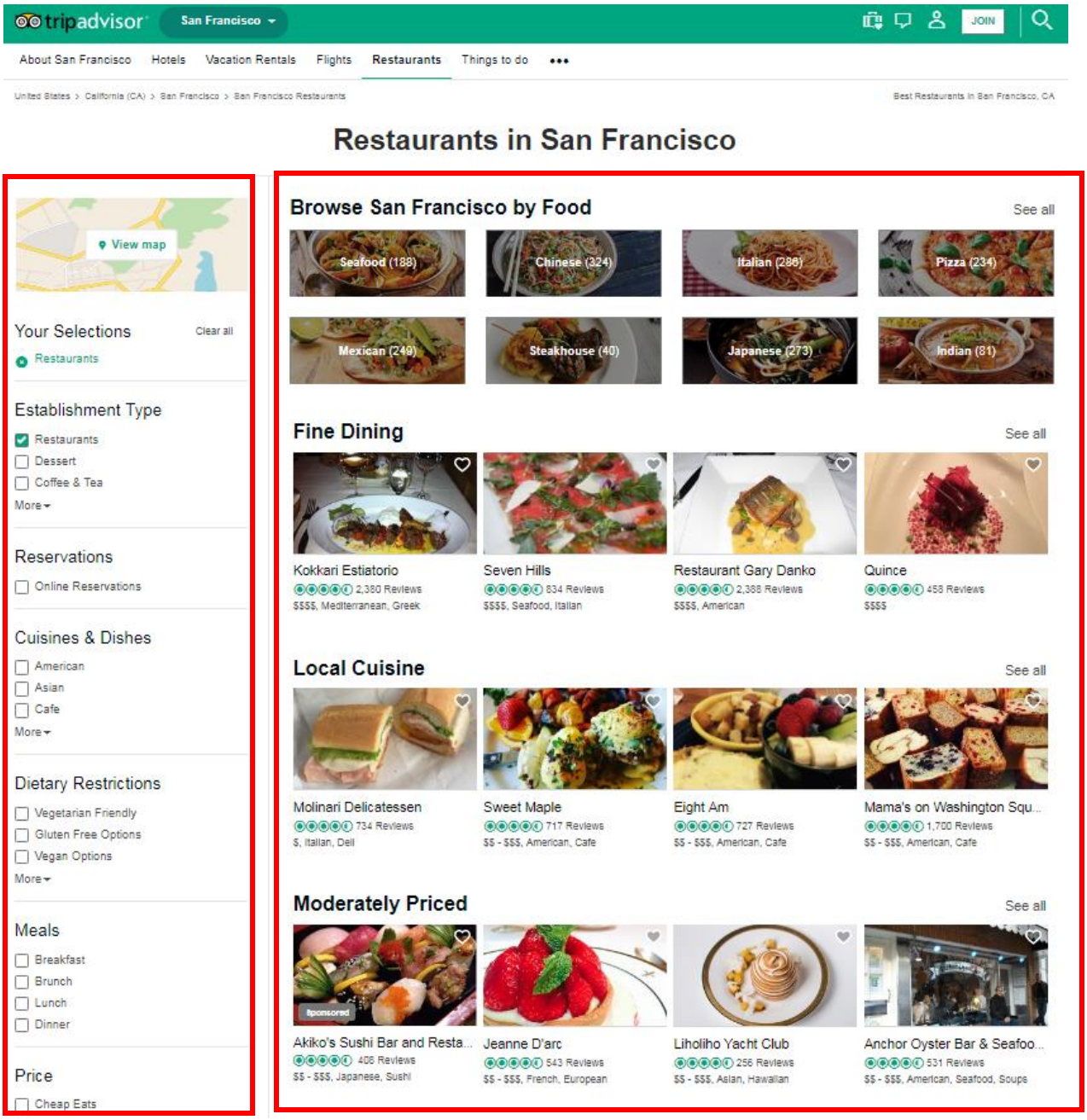


Figure 4.5 Areas of interests during browsing stage on TripAdvisor

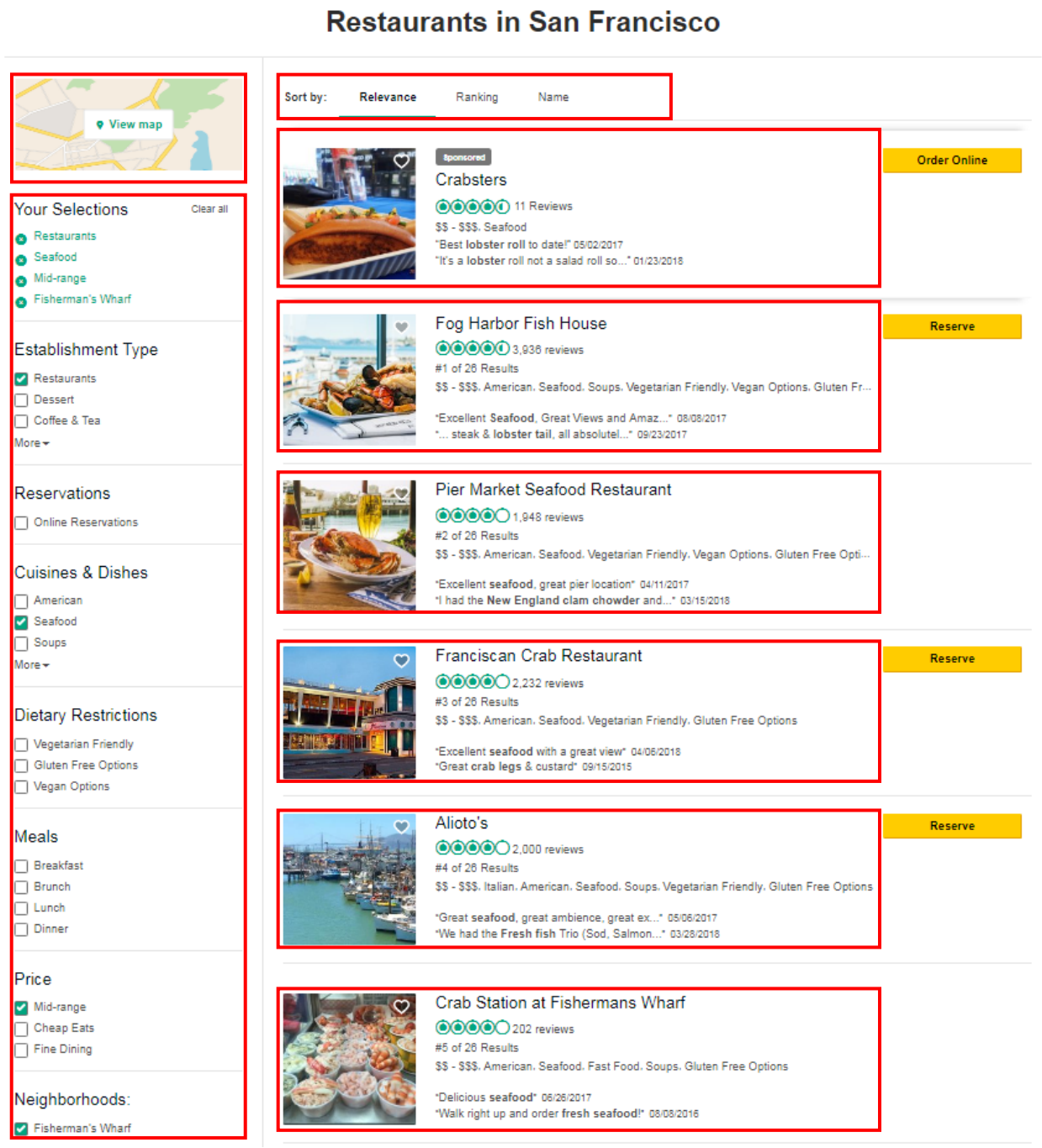


Figure 4.5 (Continued) Areas of interests during browsing stage on TripAdvisor

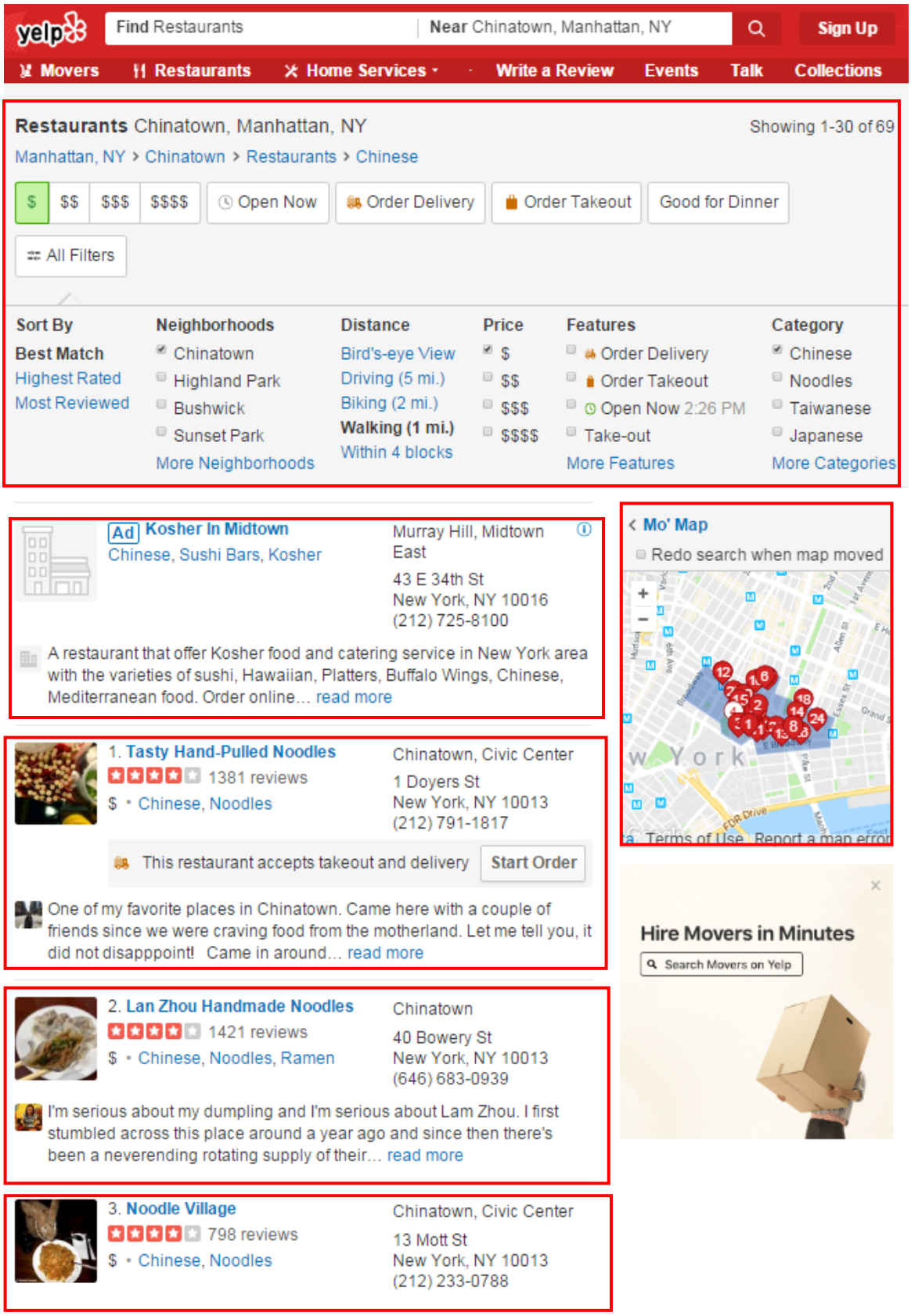


Figure 4.6 Areas of interests during browsing stage on Yelp

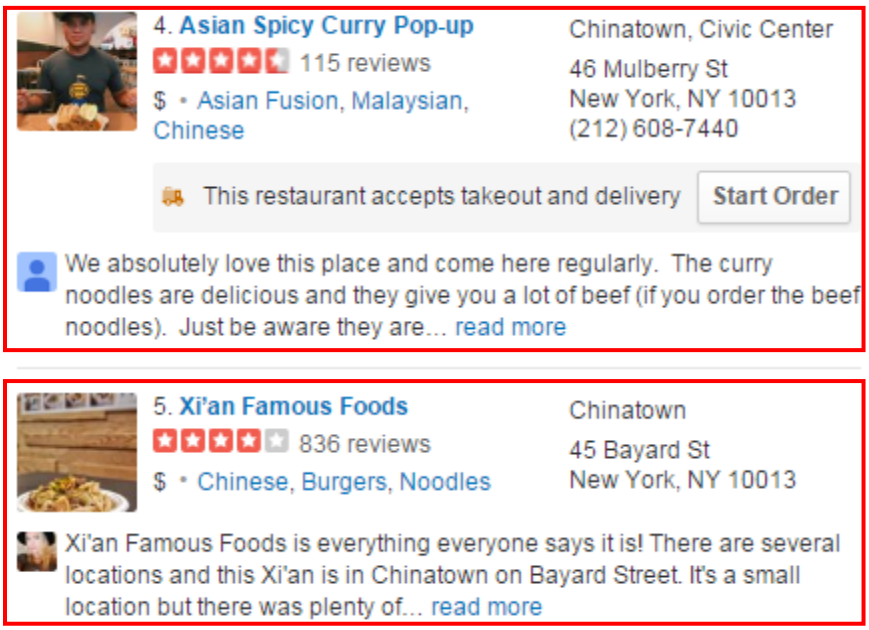


Figure 4.6 (Continued) Areas of interests during browsing stage on Yelp

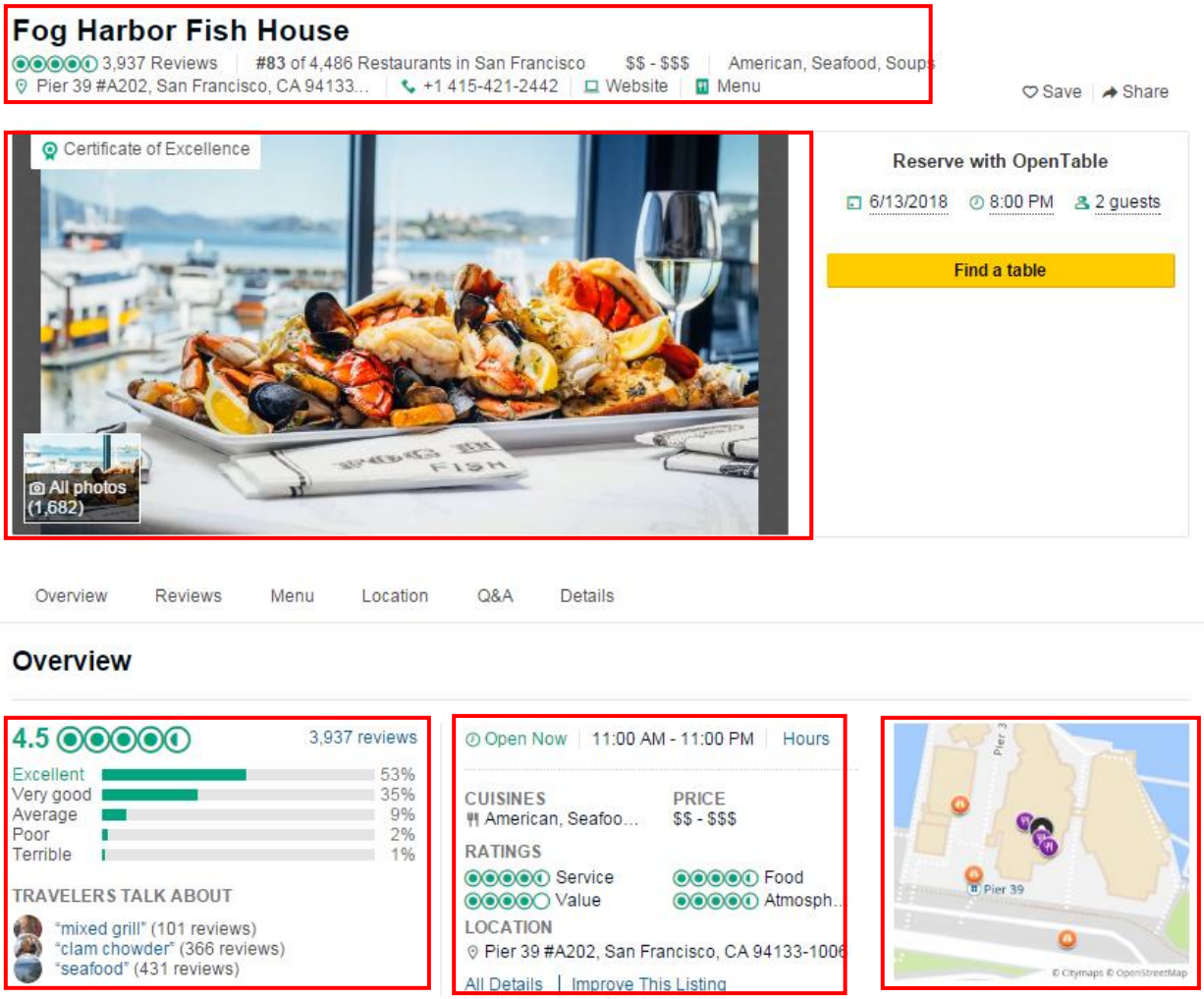


Figure 4.7 Areas of interests during deliberation stage on TripAdvisor

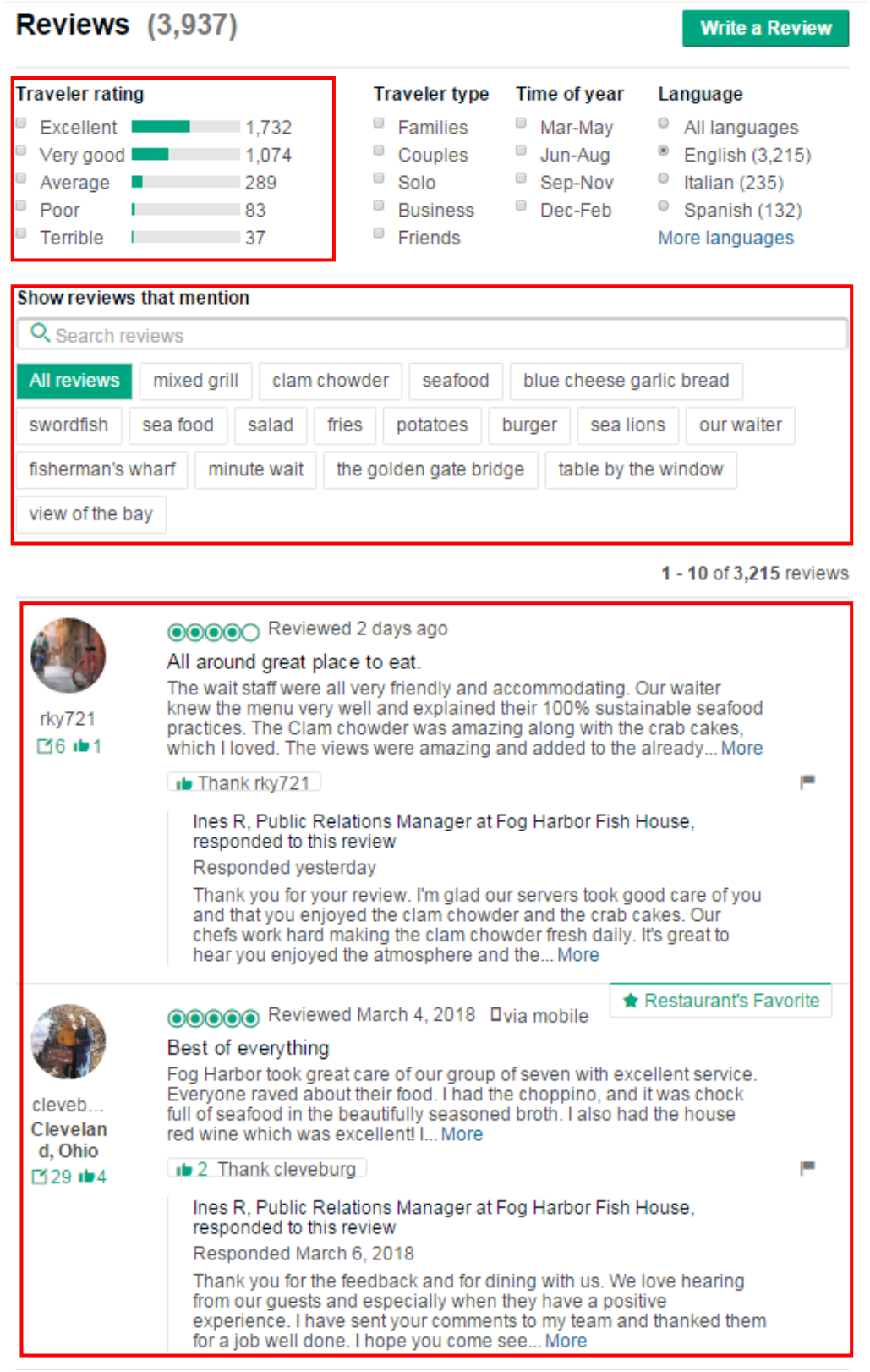
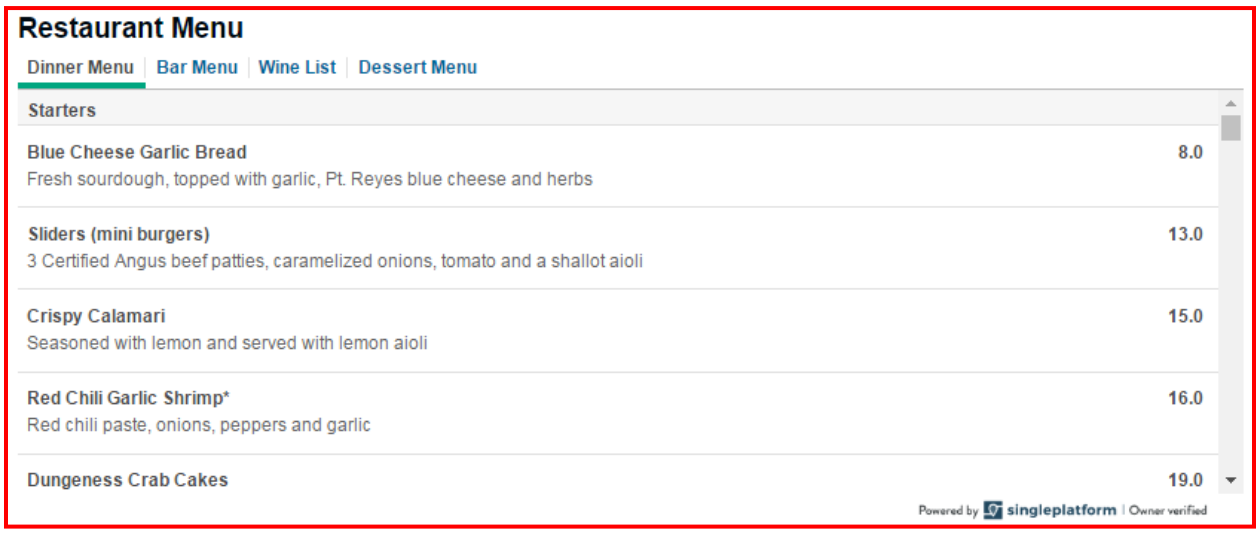


Figure 4.7 (Continued) Areas of interests during deliberation stage on TripAdvisor



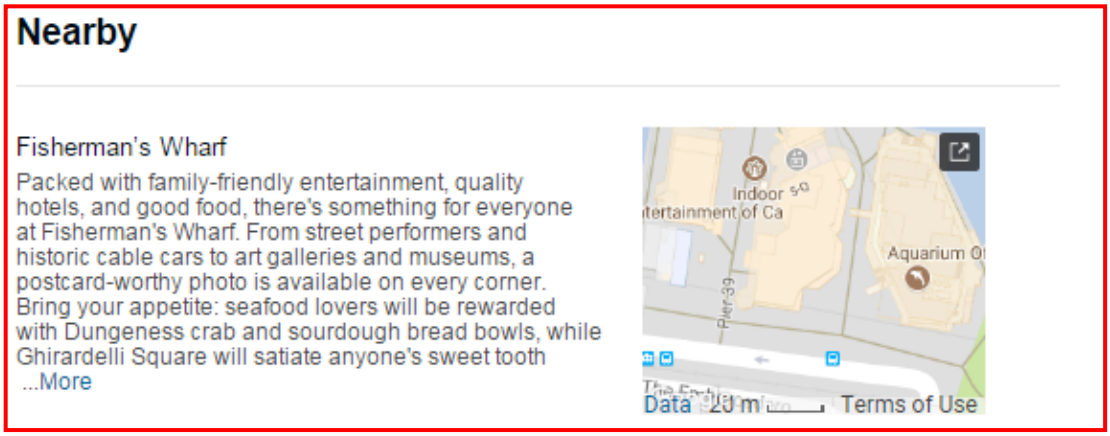


Figure 4.7 (Continued) Areas of interests during deliberation stage on TripAdvisor

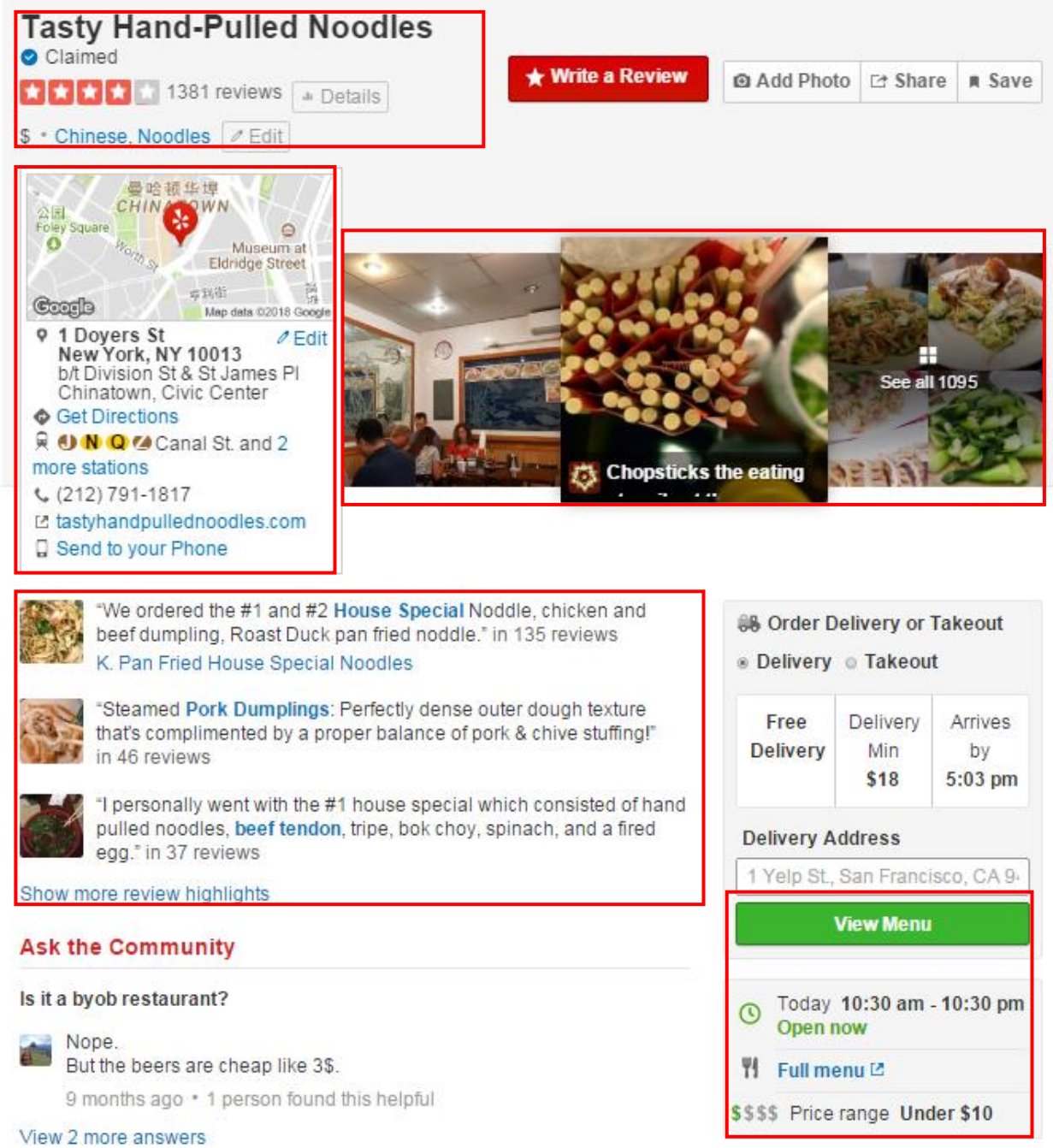


Figure 4.8 Areas of interests during deliberation stage on Yelp

Figure 4.8 (Continued) Areas of interests during deliberation stage on Yelp

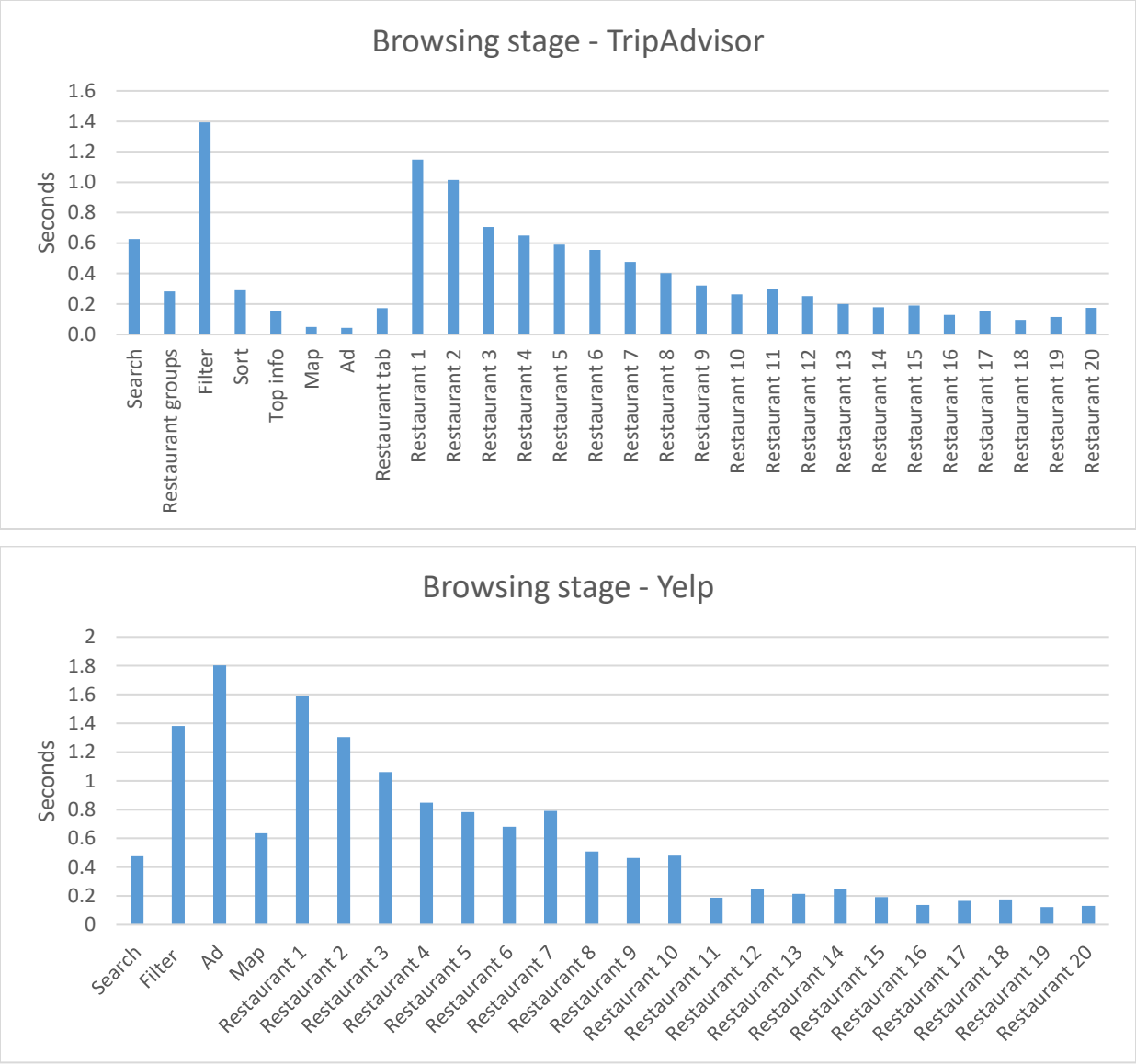


Figure 4.9 Fixation duration by information type in browsing stage

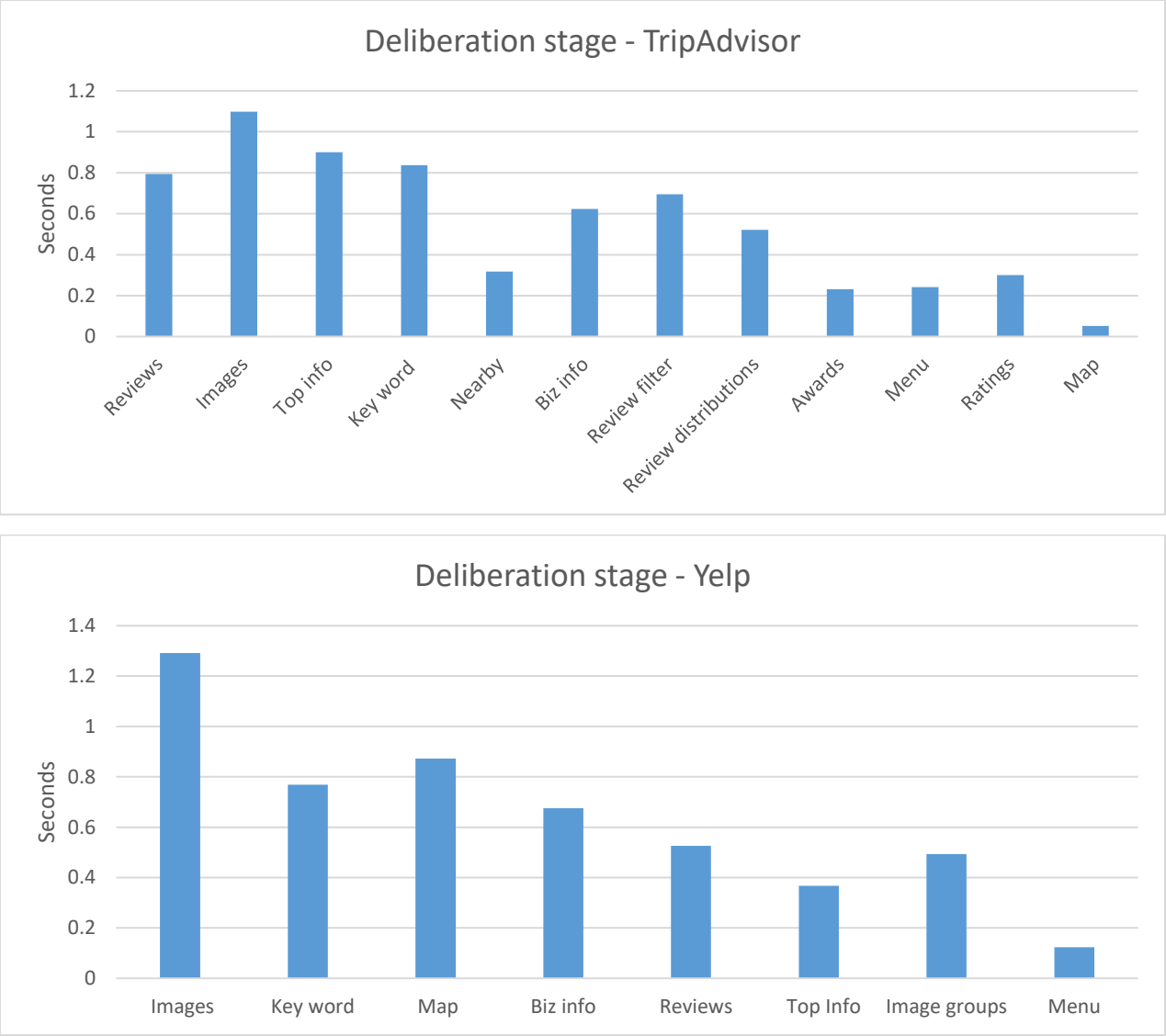


Figure 4.10 Fixation duration by information type in deliberation stage

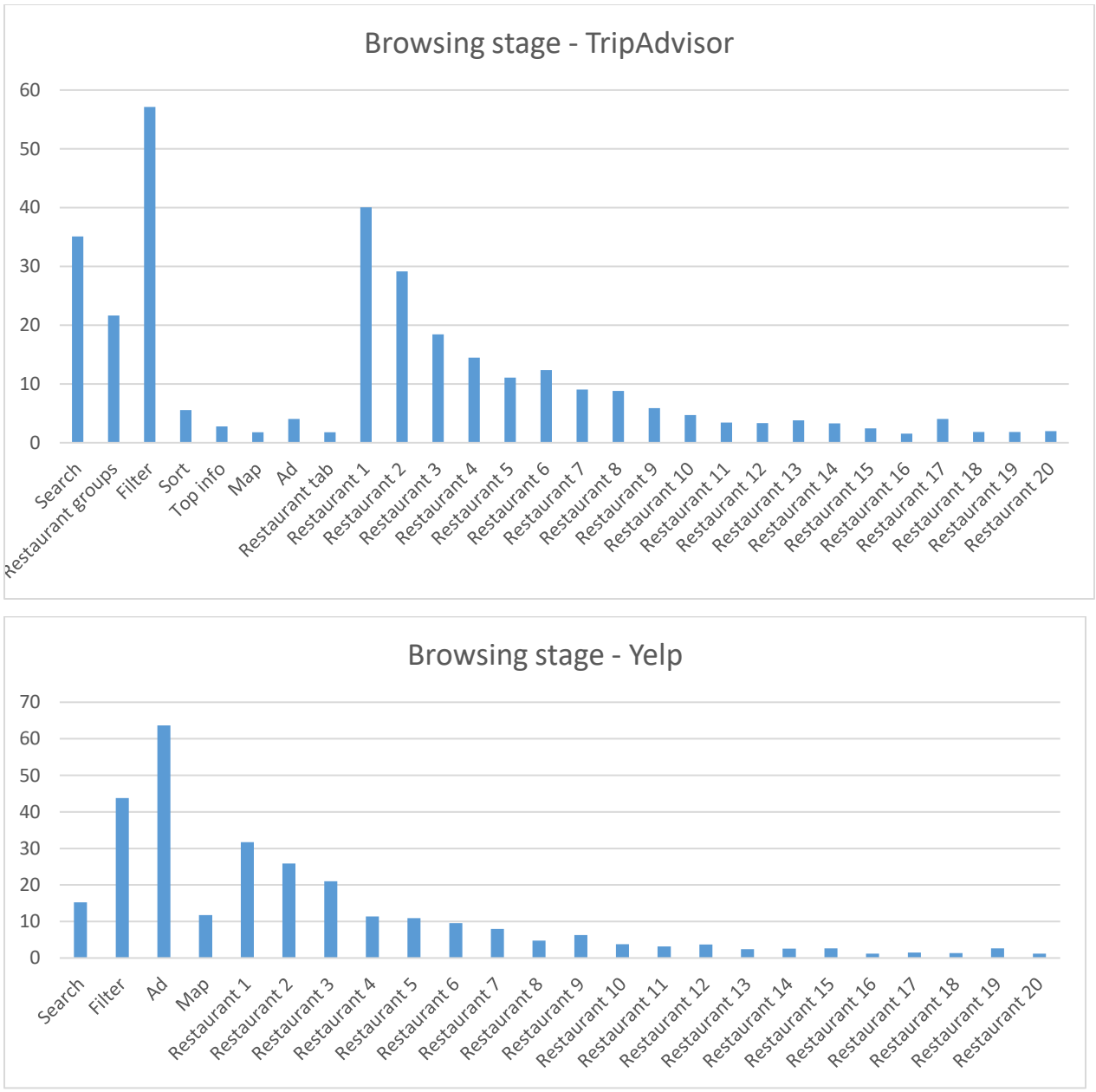
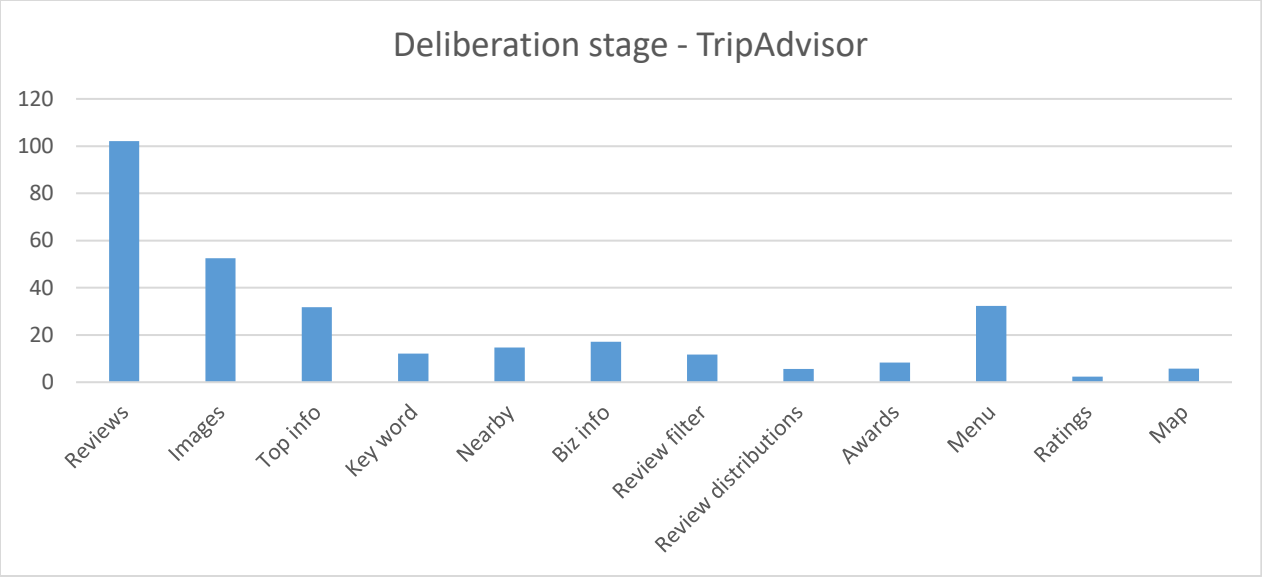


Figure 4.11 Fixation count by information type in browsing stage



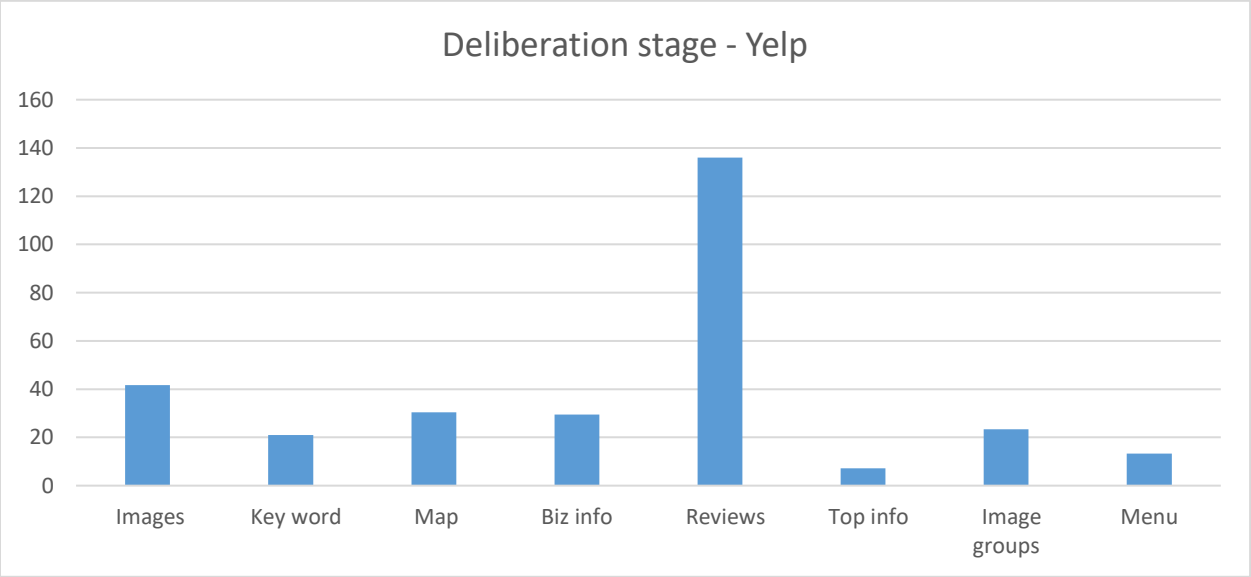
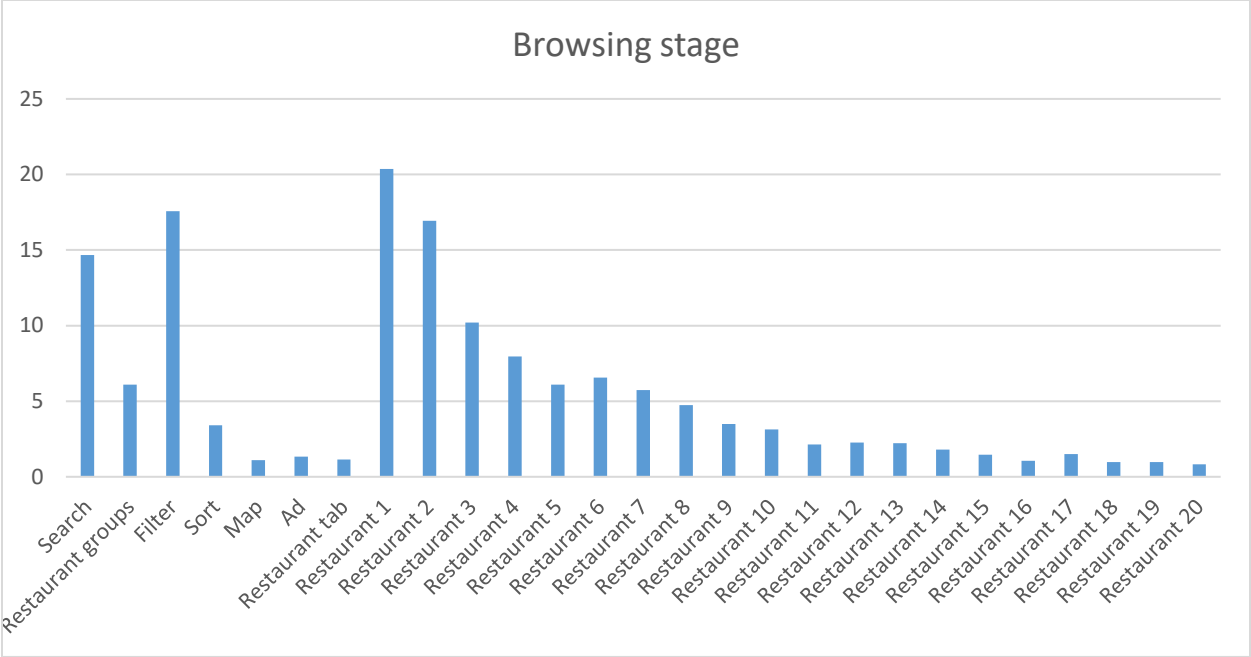


Figure 4.12 Fixation count by information type in deliberation stage



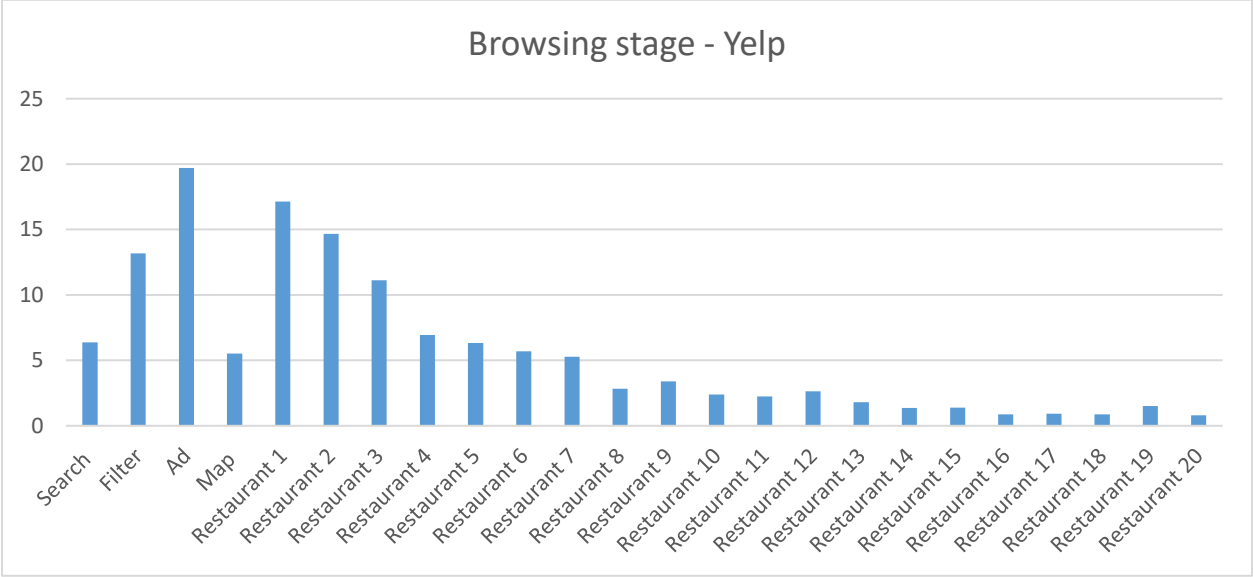
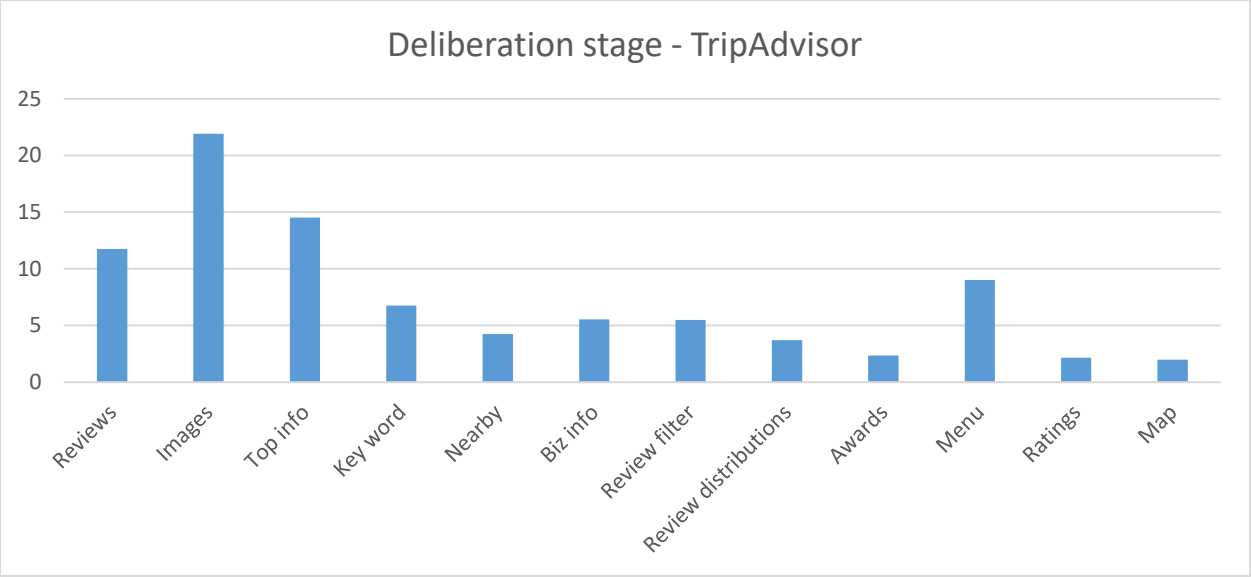


Figure 4.13 Visit count by information type in browsing stage



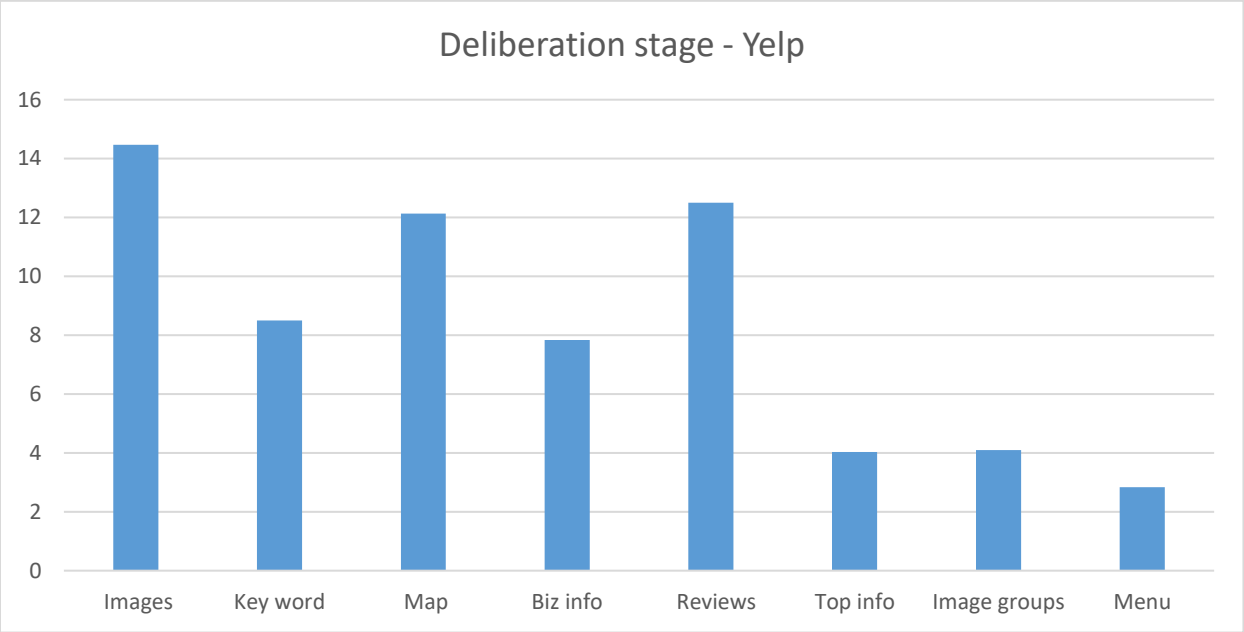


Figure 4.14 Visit count by information type in deliberation stage

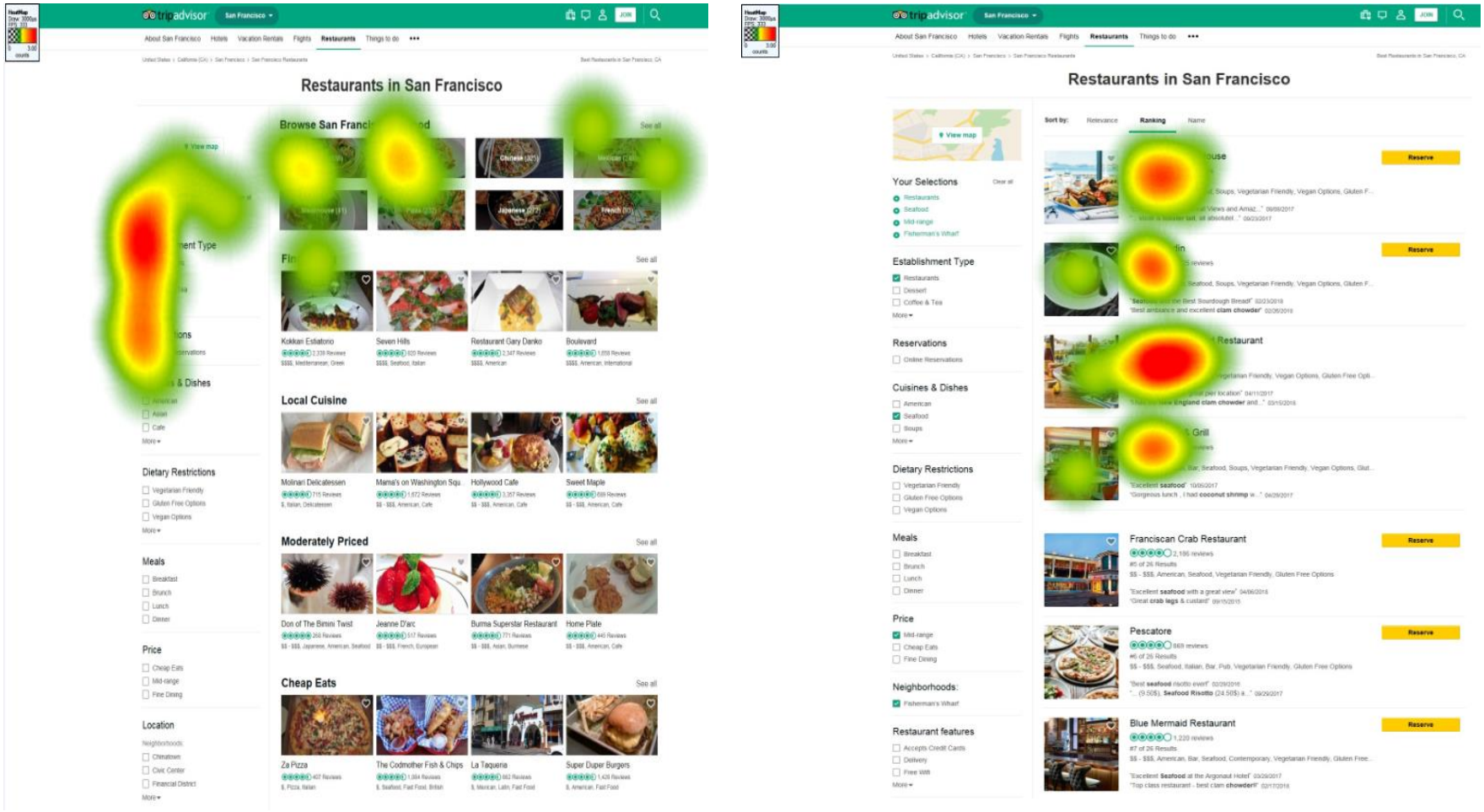


Figure 4.15 Heat maps for websites in browsing stage

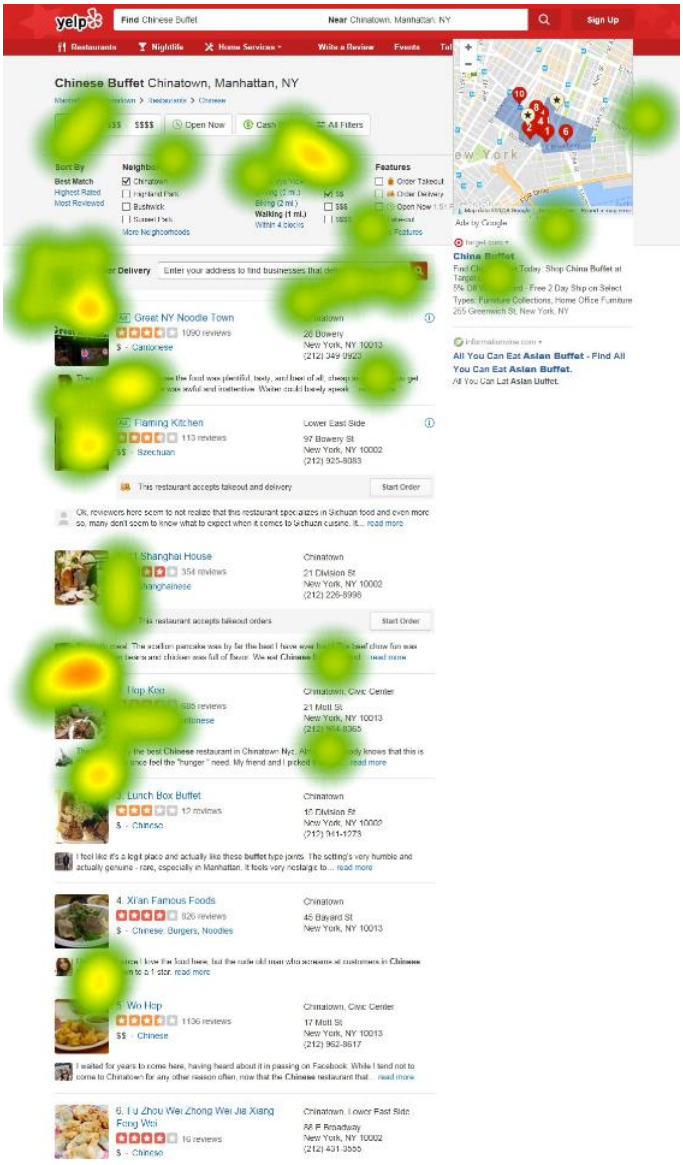


Figure 4.15 (Continued) Heat maps for websites in browsing stage

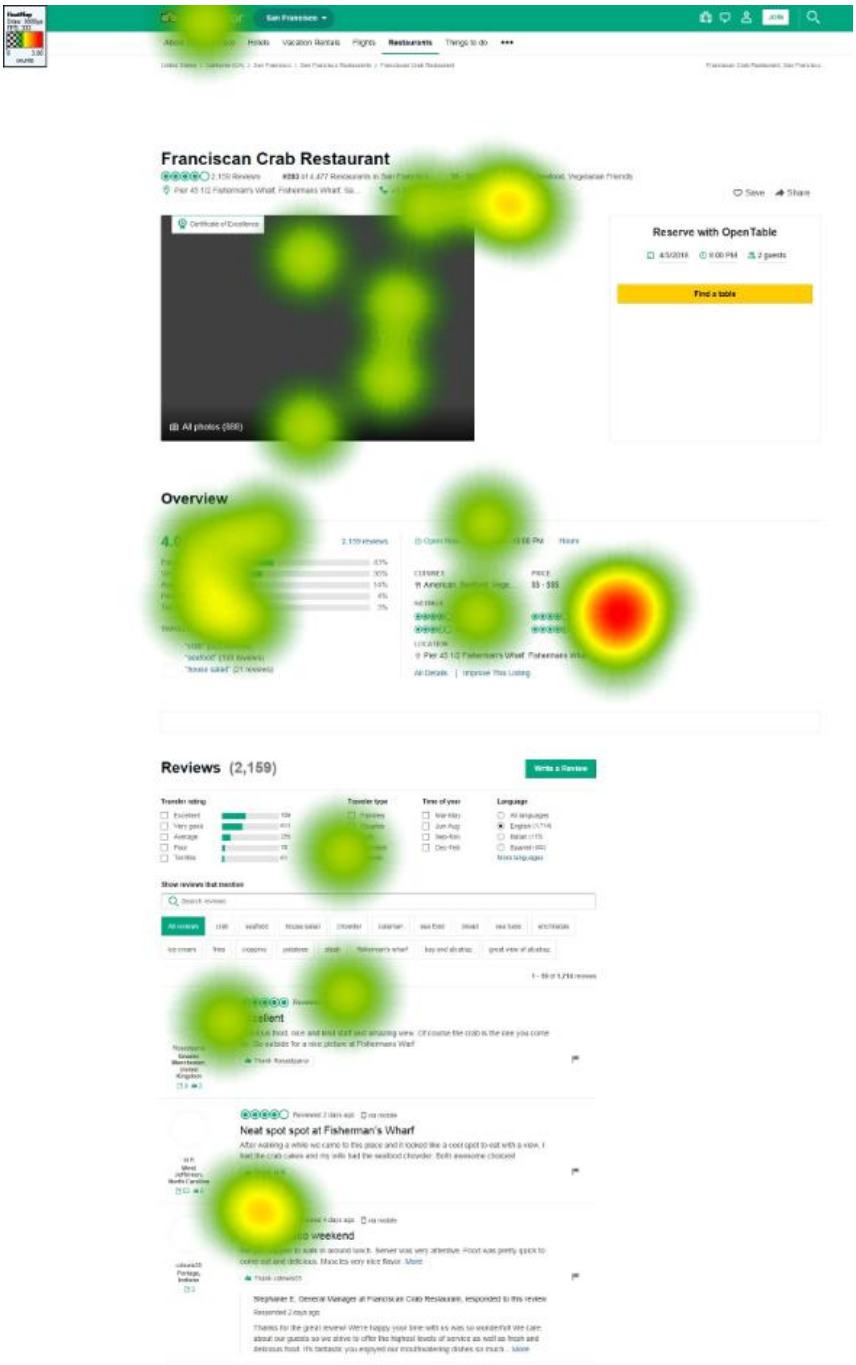


Figure 4.16 Heat maps for websites in deliberation stage

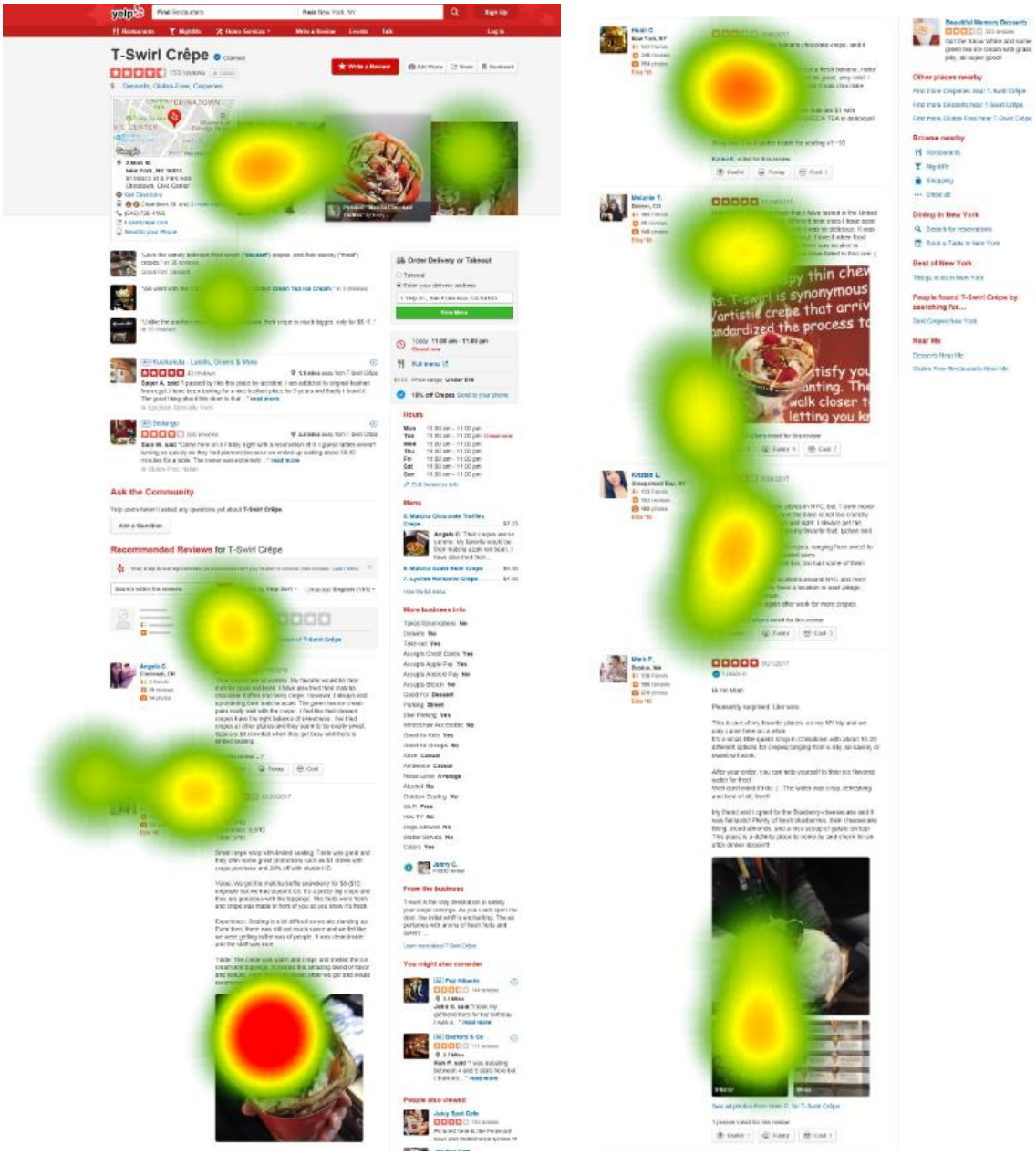


Figure 4.16 (Continued) Heat maps for websites in deliberation stage

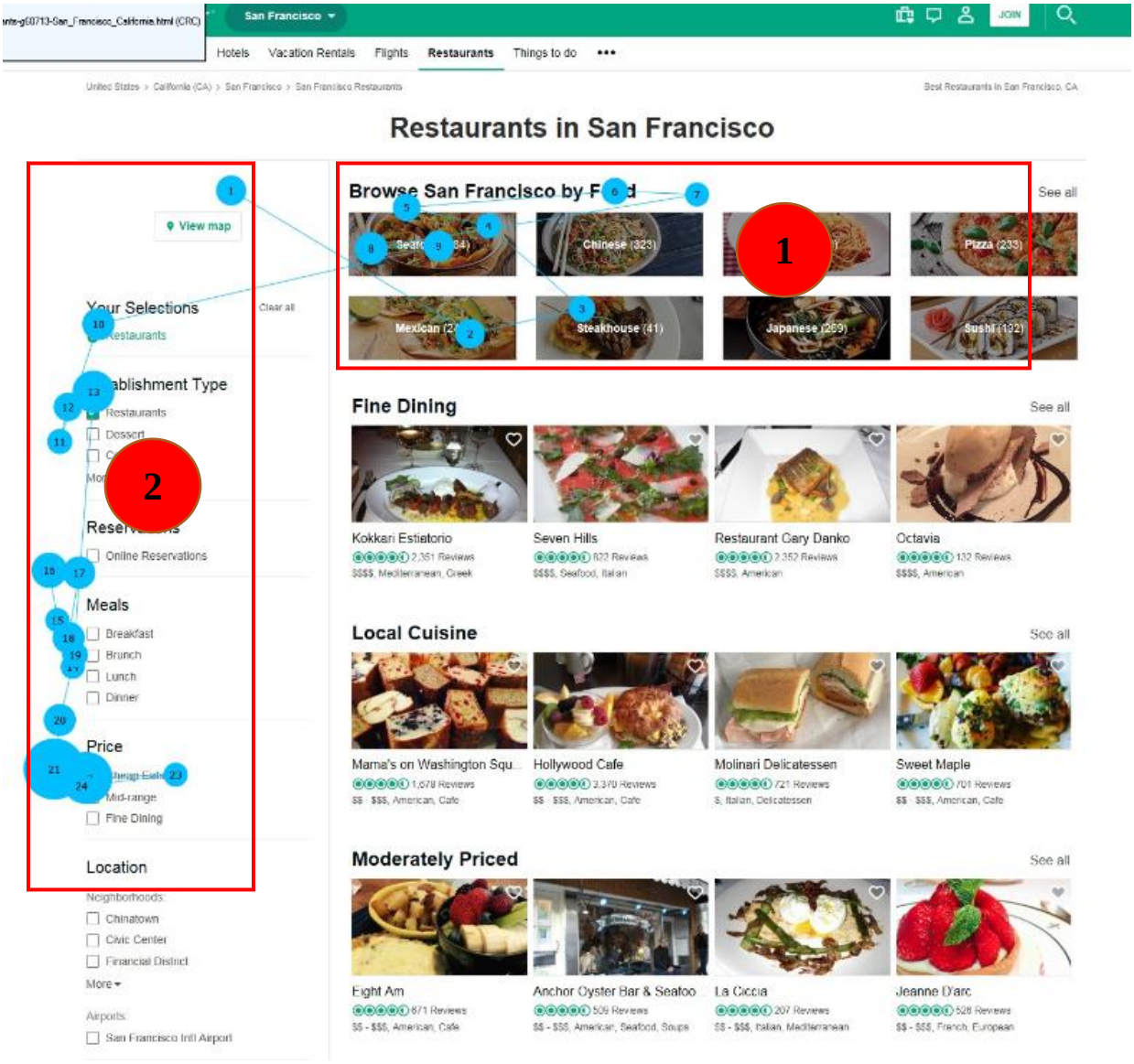


Figure 4.17 Gaze plots for websites in browsing stage

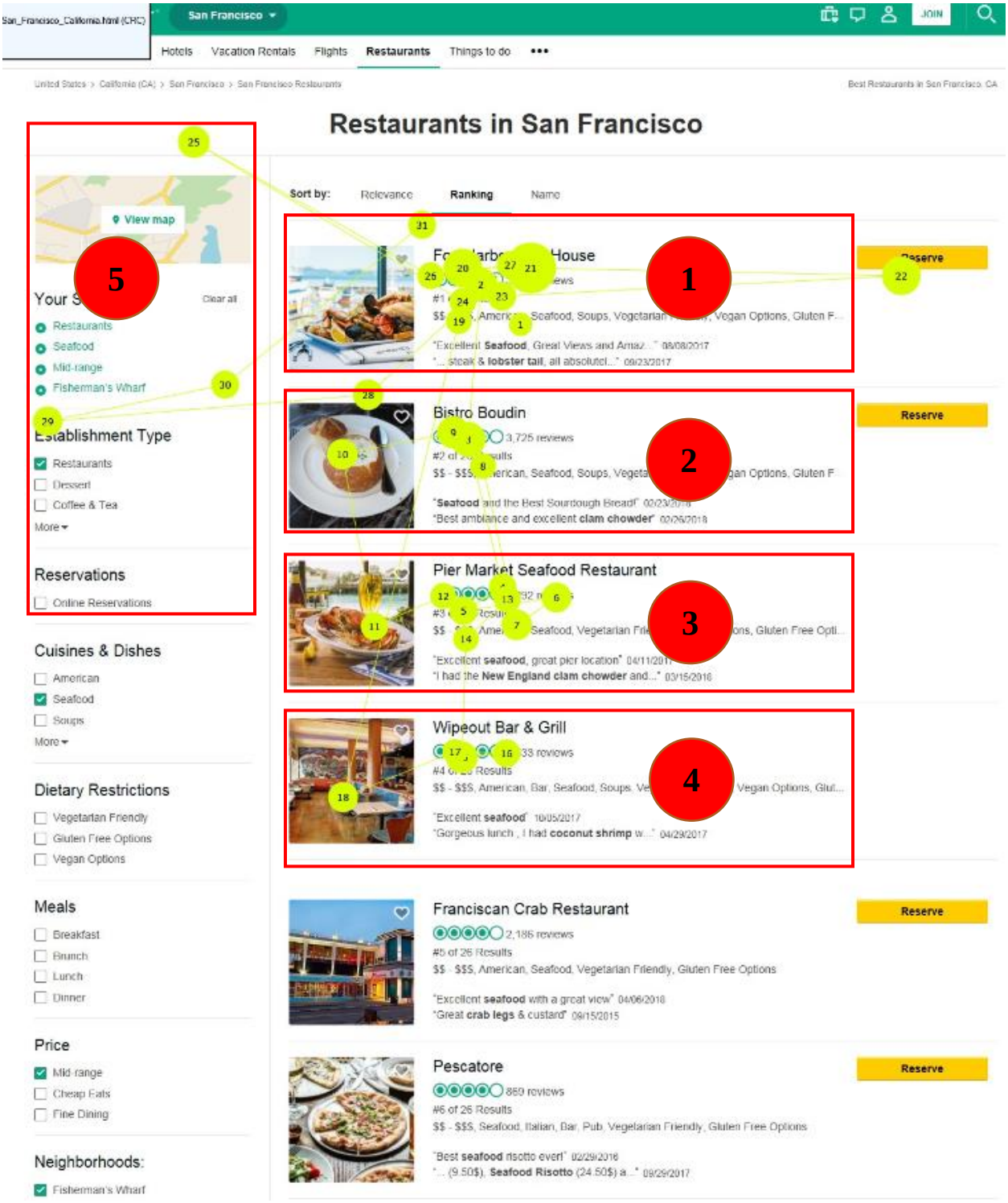


Figure 4.17 (Continued) Gaze plots for websites in browsing stage

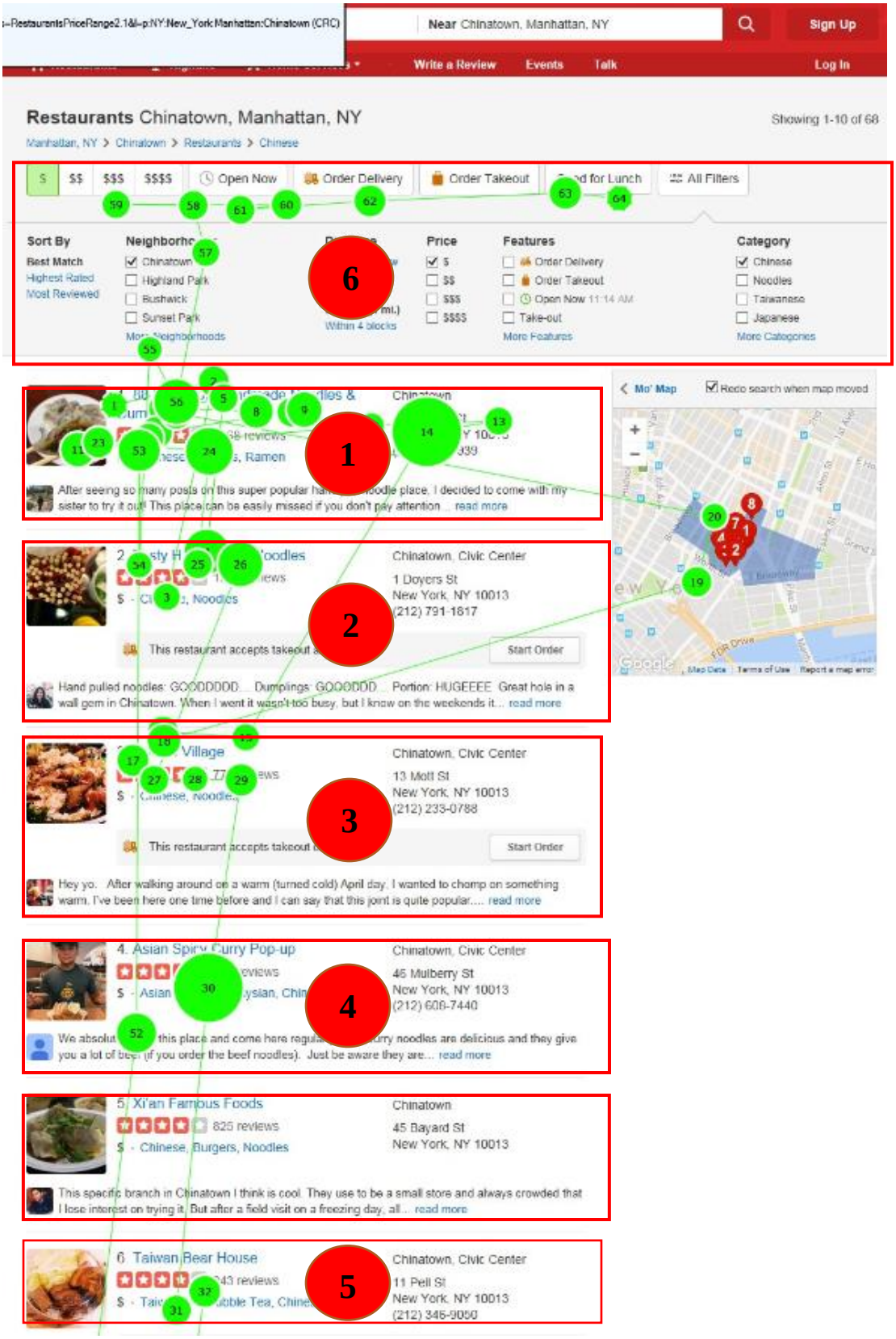


Figure 4.17 (Continued) Gaze plots for websites in browsing stage

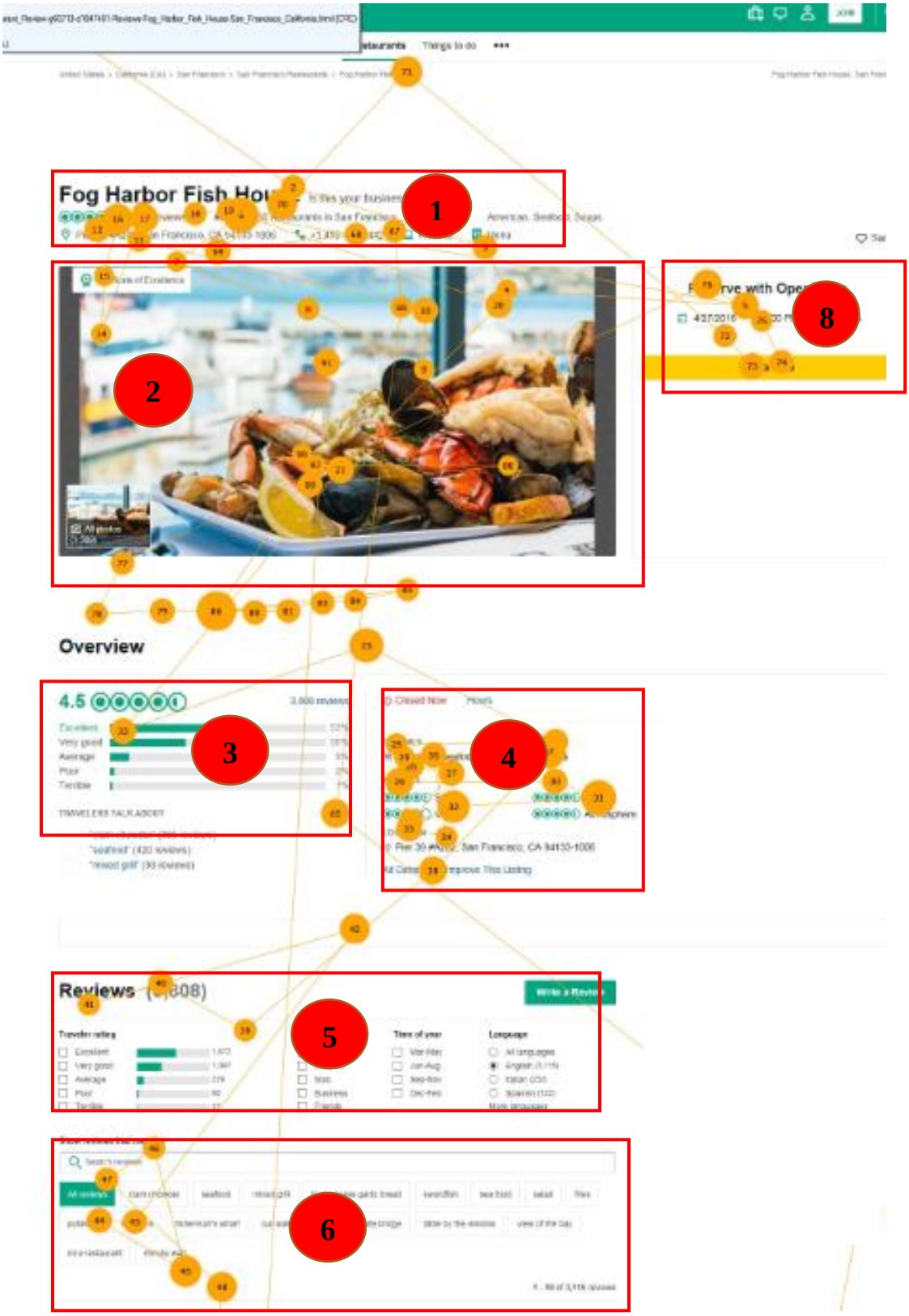


Figure 4.18 Gaze plots for websites in deliberation stage

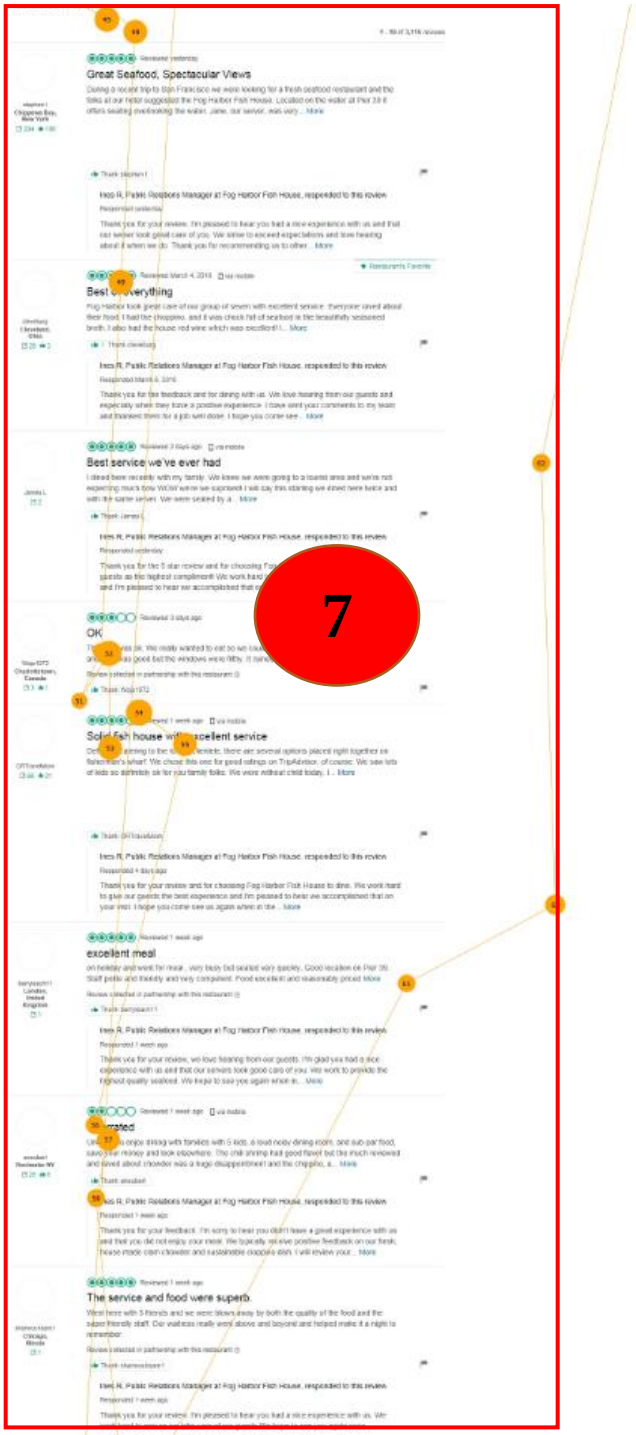


Figure 4.18 (Continued) Gaze plots for websites in deliberation stage

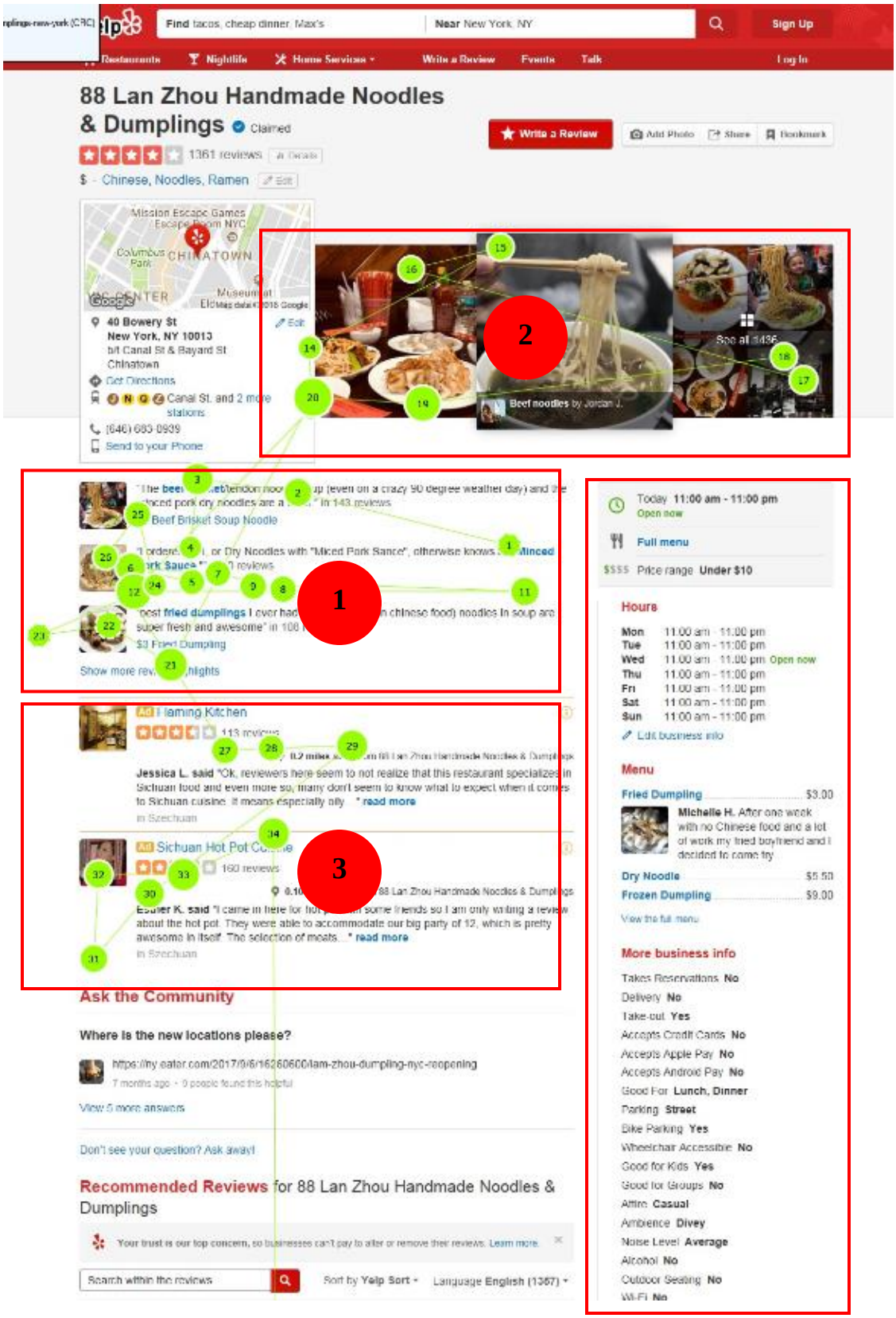


Figure 4.18 (Continued) Gaze plots for websites in deliberation stage

Figure 4.18 (Continued) Gaze plots for websites in deliberation stage

Chapter 5 - Exploring the effects of online reviews, images, and advertisements on consumers' online restaurant choice

Abstract

The purpose of this study was to explore the effects of key information elements in consumer review websites (CRWs) on consumers' interests and visit intentions for restaurants. A scenario-based survey was developed to evaluate consumers' interactive clicks for information elements including online reviews, images, and advertisements with seven hypotheses. Consumers who had used CRWs for restaurant selections in the past six months were recruited from an online panel, and 406 usable responses were collected. One-sample Chi-Square tests were conducted for data analyses. The results indicated that consumers had higher interest and visit intentions for the restaurants with higher number of reviews than lower number of reviews ($\chi^2_{interests}$ (1, N=368) = 92.00, p<.001; $\chi^2_{intentions}$ (1, N=401) = 124.01, p<.001). No differences in consumers' interests were found between negative and positive reviews (χ^2 (1, N=402) = 1.95, p>.05). In addition, consumers had higher interests for images with food than those without food (χ^2 (1, N=406) = 6.16, p<.05) and for the image group with evenly-distributed images than one large image with small thumbnail images (χ^2 (1, N=403) = 92.43, p<.001). While consumers' interests were not different between advertised and unadvertised restaurants ($\chi^2_{interests}$ (1, N=363) = 0.07, p>.05), the visit intentions were higher for the unadvertised restaurants than advertised restaurants ($\chi^2_{intentions}$ (1, N=388) = 21.81, p<.001). This study provides valuable insights for both restaurateurs and consumer review websites in their marketing strategies and web designs respectively.

Keywords: online consumer behavior, online reviews, restaurant search, consumer review websites

Introduction

Dining out is an essential part for most consumers' lives as the majority people today eat outside their homes. Specifically, Americans spend nearly one half of their food budget for eating out (National Restaurant Association [NRA], 2017). The revenue of the restaurant industry in the U.S. has reached $799 billion in 2017, employing 10% of the workforce (NRA, 2017). Despite the significant impact of the restaurant industry in the U.S. economy and the workforce, the restaurant industry has met with the challenges of the changing needs and wants of consumers as well as the competitive market condition with 73% turnover rates (Bureau of Labor Statistics [BLS], 2018; NRA, 2017). Therefore, understanding how consumers make decisions about restaurant choices is beneficial for restaurateurs (Clemes, Gan, & Sriwongrat, 2013).

According to the Consumer Decision Process (CDP) model, information search is a critical step for consumers before making purchase decisions (Blackwell, Miniard, & Engel, 2006). In the hospitality industry, as most of the products are intangible in nature and cannot be experienced until customers actually make the purchase, consumers tend to conduct an extensive information search before they make decisions (Litvin, Goldsmith, & Pan, 2018). Approximately 77% of consumers stated that they prefer to search online reviews before making hospitality decisions (Xie, Miao, Kuo, & Lee, 2011).

In recent years, consumer review websites (CRWs) such as Yelp and TripAdvisor have become important platforms where consumers share their dining experience and search for restaurant information before making their restaurant choices (Ghose & Ipeirotis, 2011; Xiang,

Magnini, & Fesenmaier, 2015). These websites are popular among millions of consumers as they believe that online reviews and information that are generated by peer consumers are trustworthy and helpful in their decision-making process (Zhang, Ye, Law, & Li, 2010). Consumers are heavily reliant upon online reviews and they regard searching online information as a way to gain evaluations of the intangible hospitality products before purchase (Ghose & Ipeirotis, 2011).

While many researchers have focused on online reviews, little attention has been paid to specific components of CRWs such as images and advertisements (Litvin et al., 2018; Yang, Hlee, Lee, & Koo, 2017). In addition, existing studies have mostly utilized surveys with established scales to explore consumers' perceptions. However, few studies have utilized scenario-based surveys to mimic the online environment to obtain consumers' actual reactions toward various elements. Thus, the purpose of this study was to explore the effects of online reviews, images, and advertisements on consumers' interests and visit intentions for restaurants using a scenario-based interactive survey. The specific objectives were:

1. To examine the consumers' interests for different information elements in CRWs, and
2. To assess impact of different information elements on customers' visit intentions for restaurants

Literature Review

Online Information Search and Restaurant Selections

Information search is important for making any sound decisions (Zhang et al., 2010), and it is especially important for restaurant customers to engage in more extensive information search than other manufacturing industries due to the intangibility of hospitality products and services (Litvin et al., 2018). In addition, as consumers would not be able to evaluate hospitality products until they actually purchase them, pre-purchase information search is critical to

minimize the risks of making wrong decisions (Zhang et al., 2010). According to the Consumer Decision Process (CDP) model, consumers rely on both internal information sources based on their memories and personal experience as well as external search through word-of-mouth from family, friends, and company advertisements (Blackwell et al., 2006).

In the current era, online platforms such as CRWs have become important external information sources for consumers when seeking restaurant information (Xiang et al., 2015). Approximately 155 million reviews have been created on Yelp since 2004, with an average of 70 million unique monthly visitors using the mobile website by the first quarter of 2018 (Yelp, 2018). TripAdvisor has also been regarded as one of the largest travel CRWs in the world, with 630 million reviews related to restaurants, hotels and attractions and an average 455 million unique monthly users by the end of 2017 (TripAdvisor, 2018). These websites are popular as consumers believe that the online information generated by their peers is reliable and helpful for their restaurant decisions (Zhang et al., 2010).

Numerous studies have been conducted to explore the effects of online information in CRWs on consumers' dining decisions and business performance for restaurants (Anderson & Magruder, 2012; Lu, Ba, Huang, & Feng, 2013). The profitability of restaurants was significantly affected by online marketing and electronic word-of-mouth (e-WOM) (Lu et al., 2013). In fact, one study found that an increase of a half star rating on Yelp may bring up to 19% more businesses (Anderson & Magruder, 2012). Understanding consumers' online information search and decision making behaviors on CRWs may be beneficial for restaurateurs for their operations and success in these websites (Zhang, Zhao, Cheung, & Lee, 2014). Thus, this study was focused on the effects of online information of CRWs on consumers' online restaurant selection behaviors.

Features of Online Information and Hypotheses

There are various types of online information in CRWs (Yang et al., 2017). Online reviews, images, and advertisements are among the important information elements appearing in the websites. Many hospitality researchers have explored characteristics and effects of online reviews on consumers' perceptions and purchase intentions (Kwok, Xie, & Richards, 2017; Litvin et al., 2018). For example, the perceived informativeness and persuasiveness of online reviews had significant effects on consumers' purchase intentions (Zhang et al., 2014). Star ratings were also influential on consumers' perceived usefulness of online reviews (Liu & Park, 2015). Researchers have also identified that management's responses to online reviews may positively affect customer satisfaction (Pantelidis, 2010). However, few studies have examined consumers' preferences for and effectiveness of images and advertisements on CRWs (Yang et al., 2017). In addition, the majority of published studies related to online reviews for the hospitality industry were focused on the hotel industry (72%), compared to 12% for restaurants (Kwok et al., 2017). Thus, this study aimed to explore effectiveness of online reviews, images, and advertisements in CRWs for attracting consumers' interests and visit intentions.

Further, most of previous studies have utilized surveys to assess consumers' perceptions and attitudes using established scales (Lu & Stepchenkova, 2015). While the surveys could efficiently obtain consumers' responses and perceptions, it may not be consistent with their actual behaviors and reactions due to the social desirability and other biases (Bellman, Lohse, & Johnson, 1999). When it comes to the analysis of online consumer behavior, most of the studies in computer science especially the usability studies related to Human-Computer Interaction (HCI) have used scenario-based designs to identify the consumers' real-time responses and behaviors in order to identify usability problems for website interface or functionality (Ricard,

2015). In addition, one study related to the online buying behavior of consumers also used the virtual scenarios called the Wharton Virtual Test Market (WVTM) to explore consumers' online behaviors (Bellman et al., 1999). Although scenario-based designs have been used in numerous usability studies, the application of scenario-based surveys in hospitality research is scarce. In order to mimic the online information search process to examine consumers' real-time interests and visit intentions for restaurants, this study explored effects of online reviews, images, and advertisement in CRWs using a scenario-based survey.

Online Reviews

The topics related to online reviews have received much attention from hospitality researchers (Gursoy, 2018). Review quantity and valence are important features of online reviews. Specifically, it has been identified that the review quantity or number of reviews impacted consumers' online purchase intentions (Mauri & Minazzi, 2013; Noone, & McGuire, 2013). A recent review study on e-WOM has also indicated that the higher number of reviews of a hospitality company was related to better business success (Litvin et al., 2018). It has also revealed that the review quantity was positively related to perceived restaurant performance (Kim, Jang, & Adler, 2015). The perceived review quantity was found to be impactful for consumers' purchase intentions in a Chinese review website (Zhang et al., 2010). In this study, in order to examine the relationships between review quantity and consumers' preference for restaurant in CRWs, the following hypotheses were established:

H1a. Consumers' interests would be higher for the restaurants with higher number of reviews than those with lower number of reviews.

H1b. Consumers' visit intentions would be higher for the restaurants with higher number of reviews than those with lower number of reviews.

Review valence refers to the nature of reviews whether positive or negative (Frijda, 1986), and it had significant relationship with consumers' perceived usefulness of the reviews (Park & Nicolau, 2015). Specifically, negative reviews were more influential to consumers than positive ones (Chen, Nguyen, Klaus, & Wu, 2015), and reviews with lower star ratings were regarded as more helpful for consumers' information search than those with higher ratings (Yang et al., 2017). As consumers are usually risk-averse when it comes to dining decisions, negative reviews would enable them to know more details of the restaurants, especially things of which they need to be aware (Yang et al., 2017). Therefore, the following hypothesis was developed:

H2. Consumers' interests would higher for negative reviews than positive reviews.

Images

As the popular saying puts it, "A picture is worth a thousand words". In the online setting, an increasing number of visual information such as images or videos are shared through online platforms (Yelp, 2018). For example, there have been approximately 100,000 images being uploaded every day in Yelp, and the growth rate of images uploaded to Yelp daily outpaces the increase in written comments (Yelp, 2018). Images play an essential role in influencing consumers' information search because they are regarded as more effective and credible information than texts (Cyr, Head, Larios, & Pan, 2009) as posited by the Theory of Visual Rhetoric (Scott, 1994).

In the hospitality industry, researchers have also explored consumers' perceptions for images and the effects on decision making (Leung, Tanford, & Jiang, 2017; Noone & Robson, 2014; Pan, Zhang, & Law, 2013; Yang et al., 2017). Noone and Robson (2014) have identified that images of hotels attracted most attention from consumers when choosing hotels. Consumers spent more time on each hotel when they were presented with images of the hotels along with the

texts than when they were only shown the text information (Pan et al., 2013). Furthermore, images were most effective for brand promotion of hotels in Facebook (Leung et al., 2017). However, few studies have explored effectiveness of images in CRWs in terms of restaurant choices.

Despite the usefulness of images, a question still remains unanswered in terms of what type of images consumers prefer when choosing restaurants in CRWs (Yang et al., 2017). Food quality has also been regarded as most influential on consumers' satisfaction status and purchase intentions (Jin, Lee, & Huffman, 2012; Namkung & Jang, 2007). In addition, the images with food and beverages were found to be influential on review usefulness and enjoyment (Yang et al., 2017). Based on these previous research findings, the following hypothesis was proposed:

H3a. Consumers' interests would be higher for restaurants with images of food items than images without food items.

Furthermore, the layout and presentation format of groups of images are also different in top two CRWs, Yelp and TripAdvisor. As presented in Figure 5.1, the first format shows one large picture in the main web page with thumbnails of other images below; while the second format shows all same-sized images located evenly on the web page. Studies related to website design have indicated that a large main picture was more visually appealing to consumers in the hotel websites (Djamasbi, Siegel, & Tullis, 2010; Hao, Tang, Yu, Li, & Law, 2015). Conversely, other researchers found that consumers prefer making quick decisions, and the evenly located group of images tended to be more efficient in providing various information within one web page (Noone & Robson, 2014). Because there are two opposing findings in previous studies, the following hypothesis was proposed:

H3b. Consumers' interests differ between the group of images with a large main image and the group of images that would be evenly located within one web page.

[INSERT Figure 5.1 HERE]

Advertisements

While majority of the information in CRWs is generated by consumers, advertisements are the special types of information that is usually paid by the companies for promotional purposes (Luca, 2016; Kamerer, 2014). Advertising is an important online marketing strategy for the newly opened restaurants as they may have lower ranking and fewer reviews, as well as providing websites with revenue (Luca, 2016). Thus, understanding the effectiveness of the online advertisements in attracting consumers' attention and further affecting their decision making is critical for both the restaurateurs and the websites.

Many hospitality researchers have focused on online reviews and user-generated contents (UGC) in online channels, and little attention has been paid to advertisements in social media and CRWs (Litvin et al., 2018). As online advertisements usually appear on top of a web page, advertisements could be useful in attracting consumers' attention (Orquin & Loose, 2013). However, in terms of the effectiveness, researchers have suggested that consumers regarded online advertisements as less trustworthy than online reviews, indicating an unfavorable attitude toward advertisements (Goldsmith & Horowitz, 2006). Additionally, consumers' purchase decisions were not influenced by the online advertisements in social media (Maurer & Wiegmann, 2011). In order to examine the effects of advertisements on consumers' initial interests and visit intentions for restaurants in CRWs, the following hypotheses were proposed:

H4a. Consumers' interests for advertised restaurants would be higher than the unadvertised restaurants.

H4b. Consumers' visit intentions for advertised restaurants would be lower than the unadvertised restaurants.

Methodology

Target Population and the Study Sample

In order to examine the effects of online reviews, images, and advertisements on consumers' interests and visit intentions for restaurants in CRWs, a scenario-based online survey was conducted. The target population was consumers who had used CRWs for restaurant selections in the past six months. A sample size of 384 was considered appropriate to represent the target population with a 95% confidence level (Dillman, Smyth, & Christian, 2014). An online survey company, Amazon Mechanical Turk (MTurk), was used to recruit participants from the target population. A payment of $1 was provided to each participant after they completed the survey.

Design of Research Instrument

The research protocols were reviewed and approved by the Institutional Review Board (IRB) in a Midwestern University prior to data collection (Appendix A). The online survey questionnaire included three sections: information search scenarios with different areas of interests (i.e., online reviews, images, and advertisements), experience with the Internet and CRWs, and demographic characteristics (Appendix D).

Information Search Scenarios

Various scenarios were developed based on previous eye-tracking experiments and retrospective think-aloud (RTA) interviews (Li, 2018). Instructions were given to participants to imagine that they were traveling in a major metropolitan area in the U.S. and were looking for information related to restaurants on CRWs. Then, participants were presented with screenshots

of web pages in order to mimic the online search environments for restaurants. Different screenshots with varying review quantities, review valences, images, and advertisements were developed and presented in the survey, as fully explained below. Participants were asked to click information areas that they were interested in and had intentions to visit in each scenario. In order to mimic the actual online decision environment, each participant was given a suggestion to answer the question in 15 seconds and click on the information areas (Li, 2018). A count-up timer was provided on the survey page, but participants were able to continue even after 15 seconds. Participants were also asked to rank the importance of various factors on the website that may have affected their restaurant decisions.

Variances in Online Reviews

In terms of online reviews, two scenarios and questions reflecting different review quantities and review valences were used. Participants were presented a screenshot with three restaurants with different number of reviews, while the images, star ratings and prices were similar among the restaurants. Participants were asked to indicate their interests and visit intentions from the list provided. In addition, participants were provided with consumer reviews showing negative and positive reviews and were asked to click on the restaurant reviews that they were interested in exploring further. Participants were also asked to indicate the likelihood of reading negative reviews when they search for online restaurant information.

Images

In order to examine the effects of different types and lists of images, two scenarios were provided with a variety of screenshots showing different images from CRWs. Four images with food items and the other four images without food items (i.e., environment) were used as the representative images of the eight restaurants. Participants were instructed to choose one image

indicating their visit intentions for the restaurant. Furthermore, screenshots of the two formats of image groups were presented and participants were instructed to click on one of them that they were more interested in. Open-ended questions were also asked so that participants could explain the reasons for their preferences.

Advertisements

To explore consumers' interests and visit intentions for advertised and unadvertised restaurants, two scenarios were presented for participants to make selections. Specifically, two scenarios were presented so that effects of advertisements could be explored and consumers' choices for list of restaurants could be compared with or without advertisements.

After scenario-based questions, participants were asked to indicate their perceived importance of various factors of CRWs for their online restaurant decisions. Participants ranked important factors among consumer reviews, percentage of negative/positive reviews, food dishes, star ratings, menu, review quantity, restaurant type, images, price, ranking, location, authenticity, and advertisements.

Experience in Consumer Review Websites and Demographic Characteristics

Consumers' online experience in CRWs were also asked as it may affect their restaurant search and preferences for various information elements. Participants were asked about their frequency of CRW usage in general and also during their recent trips using 5-point Likert scale: very frequently (5 points), frequently (4 points), occasionally (3 points), seldom (2 points), and never (1 point). The questions also included the perceived helpfulness of CRWs for restaurant decisions using 5-point Likert scale: very helpful (5 points), somewhat helpful (4 points), undecided/neutral (3 points), somewhat unhelpful (2 points), and not helpful at all (1 points). Participants also ranked their device usage frequency for restaurant choices among smartphone,

desktop computer, laptop, and tablet. Participants also ranked their preferred CRWs and search web sites (i.e., Google, Yelp, TripAdvisor, Opentable, Zomato, Zagat, Gayot, Dine, Foursquare, and Citysearch). Finally, demographic questions such as participants' age, gender, ethnicity, and education background were asked at the end of the survey.

Data Collection

Prior to data collection, a panel of experts in eye-tracking research and consumer behavior reviewed the survey questions to ensure the content validity and the clarity of directions. Mainly, the panel reviewed (a) if all areas of interests (AOI) identified in eye-tracking experiments were appropriately reflected in the survey, (b) if each scenario included one variation, and (c) the directions were clearly stated. In addition, the panel reviewed the screening and attention-check questions to make sure appropriate measures were placed to get the valid responses. The questionnaires were revised based on the feedback from the panel and pilot-tested to make sure that survey participants could access the survey through different platforms (e.g., webpage, smartphone, tablet) with a Uniform Resource Locator (URL) link.

For the pilot study, the survey URL was distributed to the Amazon MTurk consumer panel until 40 usable responses were received from CRW users. Pilot study participants completed questionnaires and also provided suggestions for further improvement of the survey regarding readability, timing, and overall structure. Results and suggestions from the pilot study were used to modify and refine the survey questions.

The final revised questionnaires were sent through Amazon MTurk. Screening and attention-check questions were asked to ensure data quality. Only those who met the qualifications and read questions carefully were able to complete the survey and receive

incentives for completion. The data collection continued until the desired number of responses (n=400) was reached.

Data Analysis

Descriptive statistics was conducted using SAS (Version 9.4) to summarize the general characteristics of the data. In addition, consumers' individual and accumulated clicks in the scenario-based survey were visualized through heat maps, which indicated participants' interests and visit intentions for restaurants.

The one-sample Chi-Square tests were conducted to examine differences of participants' choices and to test hypotheses. The dataset met the two assumptions for Chi-Square analyses: (1) The sample size is large enough; and (2) The sample is independent and not correlated data (Krishnan, 2011). Differences in customers' interests and visit intentions for restaurants (i.e., customers' clicks) based on review quantity, review valence, images, and advertisements were evaluated with statistical significance of $p < 0.05$.

Results and Discussion

A total of 562 members of the online survey panel accessed the survey. Of those, 156 were screened out because they did not meet the requirements (i.e., 18 years old or older; recent experience in CRWs) (n=34) or failed to pass the attention-check questions (n=122). A total of 406 usable survey responses (72.2%) were included in further data analysis.

Sample Profile

The demographic characteristics of participants are summarized in Table 5.1. The majority of participants were young adults (20-29 years old, 63.5%), and only 2.9% were 50 years or older. The participants of the online survey appeared to be younger than usual CRW users as Yelp reported that 72.4% of their customers were between 18-54 years old (Yelp, 2018).

This difference may be due to many young consumers are interested in joining online survey panels than older consumers. In addition, the majority of participants were Asian (n=214, 52.7%) followed by Caucasian (n=157, 38.7%). Considering that 61% of U.S. population is Caucasian (U.S. Census Bureau, 2017), the study sample over-represented the Asian population. In addition, the majority of them had Bachelor's Degree (n=232, 57.2%), followed by Master's Degree or higher (n=99, 24.4%), and High School Diploma or GED (n=33, 8.1%). The education background was slightly higher for this study sample (84.3% holding college degrees or higher) than what was reported by Yelp, having 77.1% of their users had college degrees or higher.

[INSERT Table 5.1 HERE]

Most of the participants regarded themselves as either proficient (n=194, 47.8%) or experts (n=109, 26.9%) users of CRWs and used CRWs frequently or very frequently (n=293, 72.2%) searching for restaurants during their recent trips. CRWs were considered as helpful information sources for restaurant search by almost all participants (n=372, 91.6%). Google, Yelp, and TripAdvisor were ranked as the top three websites for consumers in their search for restaurants, and the most participants used smartphones (n=144, 35.5%) or laptop computers (n=143, 35.2%) for online restaurant search.

[INSERT Table 5.2 HERE]

Hypotheses Testing

Online Reviews

To test H1a and H1b, the one-sample Chi-Square tests were conducted in SAS (version 9.4). For this scenario, three restaurants were on the screenshot with two restaurants with significantly higher number of reviews than the others. The number of reviews on the scenario were 142 (Restaurant A), 1613 (Restaurant B), and 1973 (Restaurant C) (Table 5.3). The results

revealed that consumers were not equally interested in the restaurants with different numbers of reviews (χ^2 (1, N=368) = 92.00, p<.001) (Table 5.3). Specifically, consumers were more likely to be interested in restaurants with higher number of reviews than those with lower number of reviews. Thus, H1a was supported. This finding was consistent with previous studies that number of reviews indicated the overall popularity of the company, and therefore, the number of reviews impacted consumers' purchase intentions (Tsao, Hsieh, Shih, & Lin, 2015; Xie, Zhang, & Zhang, 2014) and consumers' preferences would be greater for companies with higher number of reviews (Viglia, Furlan, & Ladron-de-Guevara, 2014).

[INSERT Table 5.3 HERE]

In terms of consumers' visit intentions for restaurants with different number of reviews, it was found that consumers did not have equal visit intentions for the restaurants with different numbers of reviews (χ^2 (1, N=401) = 124.01, p<.001) (Table 5.4). Specifically, they were more likely to have intentions to visit restaurants with higher number of reviews than those with lower number of reviews. Thus, H1b was supported.

[INSERT Table 5.4 HERE]

The one-sample Chi-Square test was conducted to test H2 and it was identified that there was no difference in consumers' interests in consumer reviews with different review valence, whether reviews have high-star (5 or 4 stars) or low-star (1 or 2 stars) ratings (χ^2 (1, N=402) = 1.95, *p*>.05) (Table 5.5). Therefore, H2 was not supported.

When comparing the number of clicks for all the reviews with different star ratings, consumers had more interests to read reviews with two (n = 133) or five star (n = 141) than those with three (n = 82) or four stars (n = 46). This finding was consistent with previous research that consumers tend to be more interested in extremely rated consumer reviews than the moderated rated ones (Park & Nicolau, 2015). In addition, the majority of the participants (n=319, 78.6%)

expressed that they are likely or very likely to read negative reviews when they searched information in CRWs for restaurants.

[INSERT Table 5.5 HERE]

Images

To test H3a and H3b, the one-sample Chi-Square tests were performed. Consumers had unequal interests for the images with food items or without food (χ^2 (1, N=406) = 6.16, p<.05) (Table 5.6). Specifically, consumers were more likely to be interested in images with food items than those without food items. Therefore, H3a was supported. It was consistent with previous research (Yang et al., 2017).

[INSERT Table 5.6 HERE]

In addition, it was revealed that consumers did not have equal interests for different image groups (χ^2 (1, N=403) = 92.43, p<.001) (Table 5.7). Specifically, consumers were more likely to be interested in image groups with evenly-distributed images than those with one large image and thumbnail images. This finding is consistent with findings from Noone and Robson (2014) but different from Djamasbi et al. (2010) and Hao et al. (2015). Therefore, H3b was supported.

[INSERT Table 5.7 HERE]

Advertisements

The one-sample Chi-Square tests were conducted to examine consumers' interests and visit intentions for the advertised and unadvertised restaurants. First, consumers' interests were not significantly different between the advertised and unadvertised restaurants (χ^2 (1, N=363) = 0.07, p>.05) (Table 5.8). Thus, H4a was not supported. This finding was not consistent with the previous research related to social media marketing with the findings that firm-generated content

was impactful for consumer behavior (Kumar, Bezawada, Rishika, Janakiraman, & Kannan, 2016).

[INSERT Table 5.8 HERE]

In terms of the visit intentions for the restaurants, consumers' visit intentions were unequal between advertised and unadvertised restaurants (χ^2 (1, N=388) = 21.81, p<.001) (Table 5.9), and the visit intentions were more likely to be higher for the unadvertised restaurants than advertised restaurants. Thus, H4b was supported. It was consistent with previous research that consumers regarded online advertisements as less trustworthy than user-generated, indicating an unfavorable attitude toward advertisements (Goldsmith & Horowitz, 2006).

[INSERT Table 5.9 HERE]

Data Visualization

To visually display the consumers' responses, heat maps were generated, in which consumers' clicks were vividly presented in changing colors. While the higher number of clicks were shown with more red color at the center, the lower number of clicks were shown in green or blue color at the edge. As presented in Figure 5.2, the restaurants with highest number of reviews received the most clicks as participants were more interested in the restaurants with the large numbers of reviews. When participants were asked to indicate what factors affected their previous restaurant choice in the follow-up question, they confirmed that the number of reviews and star ratings were top two factors affecting their restaurant choices. Further, consumer reviews located in the middle with five and two star ratings appeared to receive more interests from the participants than those with three or four stars (Figure 5.3).

[INSERT Figure 5.2 HERE]

[INSERT Figure 5.3 HERE]

In addition, as indicated from the heat maps, images were also another information element that drew consumers' interests, which was consistent with previous researchers who contended that images were essential in consumers' information search process (Noone & Robson, 2014; Pan et al., 2013). In the meantime, other information areas such as price and representative consumer reviews seemed to be less "heated" areas than images and number of reviews.

As depicted in Figure 5.4, the images with food items (i.e., restaurant 1, 3, 6, and 8) drew consistently more interests, while the images with external or outside environment did less. This finding is consistent with previous study as participants of this study preferred to viewing food images (Yang et al., 2017). In the follow-up open-ended question, participants also confirmed that they preferred to see food images because, "I can see favorite food in the images" (P28, P316), "the food looked attractive/appealing" (P85, P186, P354), "it attracted my attention" (P74, P192), and "the photos shows how the food actually looks like if ordered" (P246).

[INSERT Figure 5.4 HERE]

Further, the heat map in Figure 5.5 showed clear preference and interest with evenly distributed images than with one main large image in the middle with thumbnail images, suggesting that consumers preferred seeing more variety of images and in a more efficient way, rather than a big image with limited visual content. In the follow-up open-ended question, participants also explained that they preferred evenly-distributed images because, "You can easily see all of the images at once without having to manually scroll through all of them" (P4, P6, P116), "it looks more balanced" (P21, P219), "it is more visually appealing to me" (P43, P57), and "it shows a variety of food" (P49, P124)

[INSERT Figure 5.5 HERE]

The heat map with impact of advertisements are presented in Figure 5.6. The two restaurants located on top were the advertised restaurants, while the rest of them were unadvertised, ranked restaurants presented in the order of overall ranking. The first advertised restaurant seemed to be attractive to consumers as appeared to be the "heated" area with lots of clicks (n=148) from participants. However, it is interesting to notice that the second advertised restaurant did not receive much interests (n=36) as reflected from the heat map. Further, in the follow-up question, participants ranked the overall ranking and review quantity as the top factors that affected their choices, rather than advertisements. One inference from these results is that consumers' interests for advertisements may be due to its salient position, but not the advertisement itself.

[INSERT Figure 5.6 HERE]

Perceived Importance of Factors for Making Restaurant Choices

Participants were asked to rate the importance of each factor for making restaurant choices in CRWs using a 5-point Likert scale with 13 factors including images, consumer reviews, review quantity, percentage of negative/positive reviews, advertisements, star ratings, ranking, price, menu, restaurant type, location, food items/dishes, and authenticity. As indicated in Table 5.10, consumer reviews (4.37±0.85), percentage of negative/positive reviews (4.25±0.84), and food items/dishes were rated the highest among the factors (4.22±0.79), while advertisements were ranked as the least influential factor for consumers' online restaurant choices in CRWs (3.20±1.32).

[INSERT Table 5.10 HERE]

Conclusion and Implications

The purpose of this study was to explore the effects of key online information elements (i.e., online reviews, images, and advertisements) on consumers' interests and visit intentions for restaurants in CRWs. A scenario-based survey with interactive clicks was used to accomplish this purpose. A total of 406 participants provided data through the online survey company Amazon MTurk.

Seven hypotheses were developed to examine the effects of review quantity, review valence, images, and advertisements on consumers' interests and visit intentions. Of those, five hypotheses were supported, indicating that restaurants with higher number of reviews, images with food items, evenly-distributed images groups, and unadvertised restaurants were positively related to consumers' interests and visit intentions for restaurants.

Theoretical Implications

This study yielded valuable theoretical implications for hospitality researchers. First, this study used a scenario-based survey through interactive clicks that mimic actual online search process on CRWs. Most of the existing studies have examined consumers' perceptions or attitudes toward online reviews using written surveys, and consumers' actual search behaviors were seldom explored (Lu & Stepchenkova, 2015). In addition, scenarios and areas of interests were developed based on eye-tracking experiments and retrospective think-aloud interviews to provide participants with realistic options and defined sections of CRWs (Li, 2018). Although scenario-based surveys have been used in website usability studies related to Human-Computer Interactions (Ricard, 2015), it is not widely used in hospitality research. Therefore, this study provides relevant findings and guidance for data collection tools and methodology for studying online consumer behavior in hospitality industry.

Second, this study focused on the restaurant industry, which has not been extensively studied as the majority of the existing research has been related to hotel and tourism industries (Kwok et al., 2017). Because customers in different hospitality and tourism industries do not necessarily behave in the same way, this study contributes to understanding of consumer behavior on CRWs for restaurant decisions through the identification of key information elements and their effects on consumer behavior.

Lastly, unlike previous studies that have explored information on CRWs focusing on online reviews, this study explored more deeply into other aspects of online information, such as types of images, image groups, and online advertisements. As these online information areas were important for consumers' decision-making process, yet rarely studied (Litvin et al., 2018), this study was meaningful in providing useful findings related to images and advertisements.

Managerial Implications

This study also provided several implications for restaurateurs and CRWs. First, for restaurateurs, it was found that the review quantity is important as a high number of reviews tend to be preferred by the consumers. Similar findings were also indicated in previous studies related to hotels that when the number of reviews increased, consumers' review comments were more favorable for the hotels (Melián-González, Bulchand-Gidumal, & López-Valcárcel, 2013). Thus, restaurateurs may encourage consumers to share their experience and write reviews in CRWs. Previous studies have also suggested that the companies can train their service staff to talk with consumers at the beginning or the end of the service that they would appreciate consumers' reviews to their establishments after their experience (Melián-González et al., 2013). Additionally, having mobile devices and Wi-Fi available for consumers so that consumers could share their opinions instantly during or after the service (Viglia et al., 2014).

Further, consumers were interested in reading extremely positive and negative reviews. Consumers were especially interested in negative reviews in order to reduce the risks of making wrong decision. Thus, restaurateurs may need to be aware of the negative reviews in the websites and follow up with consumers who shared such negative reviews so that they could use specific strategies for service recovery (Xie et al., 2014). Proper management responses to negative reviews may also improve consumer experience and further enhance good reputation of the restaurants (Pantelidis, 2010). Sincere conversations and promise to solve the problems from the restaurateurs may benefit for them to maintain existing consumers and attract new ones (Sparks, So, & Bradley, 2016).

In addition, images with food items were also found to be influential to consumers, suggesting that restaurateurs need to pay attention to the food quality and visual presentation of the food items. Furthermore, in the previous eye-tracking study, participants preferred images shared on CRWs by consumers not by restaurateurs (Li, 2018). Because the majority of today's consumers carry devices with high quality cameras, maintaining the aesthetic and food qualities at all time will be essential to have positive impression on their food items.

Regarding the impact of advertisements, this study has identified that advertised restaurants did attract consumers' interests to some extent, but their visit intentions were also lower for the advertised restaurants than the unadvertised one. Therefore, restaurateurs who are interested in having online advertisements need to be cautious in using the advertisements. Advertisements may be effective in attracting consumers' attention but may not increase the amount of business.

For CRWs, there are also important insights regarding information and the design of the web pages. First, based on the results illustrated in heat maps, it is critical for the CRWs to know

that number of reviews, ranking, star ratings, and images were the most important information elements that consumers are interested, therefore, they may need to enhance these types of information and improve the interface of the websites so that it could be more user-friendly and efficient for consumers' information search process. In addition, restaurant consumers in this study preferred the group of images with evenly-distributed pictures and the images with food items. Therefore, CRWs may be recommended to consider improving the design and layout of their webpages.

Further, CRWs are also suggested to improve the management of online advertisements as online advertisements may not be as effective as they should be. CRWs are recommended to conduct more communications with the advertised restaurants regarding the effectiveness of advertisements and make changes when needed.

Limitations and Future Research

There are several limitations in this study. The online survey protocol may have excluded the population who use CRWs but do not participate in online surveys. However, because the target population of this study was specifically people who have used the consumer review websites for restaurant selections in the past six months, this qualification criteria fit the user in the online survey platform as most of them need to have the previous online experience.

In addition, this study have examined the self-reported surveys and may have the social desirability bias. However, because this study incorporated scenarios to mimic actual responses with no obvious "right" or "desirable" answers, social desirability bias may not have been a major issue. Future research may combine mixed-methods such as eye-tracking experiments and scenario-based surveys to identify consumers' actual behaviors.

The sample in this study was not representative of the U.S. population but over-represented Asian (n=214, 52.7%) population. Furthermore, the results may be limited due to the single source bias. Future research may explore ways to recruit more balanced and representative sample from different sources of participants.

Further, this study has focused on three information elements including online reviews, images, and advertisements and the results may be limited as there are other factors affecting consumers' online restaurant selections. Therefore, future studies are recommended to include more information elements and factors to gain a better understanding of consumers' online decision making processes for restaurant selection.

Lastly, the main purpose of this study was to examine consumers CRW search and decision making behaviors for making restaurant choices. Therefore, the findings may be limited as such and not generalizable to other industries or settings. Researchers are suggested to explore how online information affects consumers' purchase experience and decision making in other hospitality industries.

Acknowledgement

This research was partially funded by the Small Grant Program at Kansas State University for Graduate Students in Arts, Humanities, and Social Sciences, and College of Human Ecology Doctoral Dissertation Award at Kansas State University.

References

Anderson, M., & Magruder, J. (2012). Learning from the crowd: Regression discontinuity estimates of the effects of an online review database. *The Economic Journal, 122*, 957-989.

Bellman, S., Lohse, G. L., & Johnson, E. J. (1999). Predictors of online buying behavior. *Communications of the ACM, 42*(12), 32-38.

Blackwell, R. D., Miniard, P., & Engel, J. (2006). *Consumer behavior* (10th ed.). Mason, OH: Thomson Higher Education.

Chen, C. H., Nguyen, B., Klaus, P. P., & Wu, M. S. (2015). Exploring electronic word-of-mouth (eWOM) in the consumer purchase decision-making process: the case of online holidays–evidence from United Kingdom (UK) consumers. *Journal of Travel & Tourism Marketing*, *32*, 953-970.

Clemes, M. D., Gan, C., & Sriwongrat, C. (2013). Consumers' choice factors of an upscale ethnic restaurant. *Journal of Food Products Marketing*, *19*, 413-438.

Cyr, D., Head, M., Larios, H., & Pan, B. (2009). Exploring human images in website design: a multi-method approach. *MIS quarterly*, *33*, 539-566.

Dai, D., & Luca, M. (2016). Effectiveness of paid search advertising: Experimental evidence. *Harvard Business School NOM Unit Working Paper.* Retrieved from https://dash.harvard.edu/bitstream/handle/1/30013618/17-025.pdf?sequence=1

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, Phone, Mail, and Mixed-Method Surveys: The Tailored Design Method.* Hoboken, NJ: John Wiley & Sons.

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. *International Journal of Human-computer Studies*, *68*, 307-323.

Frijda, N. H. (1986). *The emotions.* New York, NY: Cambridge University Press.

Ghose, A., & Ipeirotis, P. G. (2011). Estimating the helpfulness and economic impact of product reviews: Mining text and reviewer characteristics. *IEEE Transactions on Knowledge and Data Engineering*, *23*, 1498-1512.

Goldsmith, R. E., & Horowitz, D. (2006). Measuring motivations for online opinion seeking. *Journal of Interactive Advertising, 6*(2), 2-14.

Gursoy, D. (2018). A critical review of determinants of information search behavior and utilization of online reviews in decision making process. *International Journal of Hospitality Management*. Advance online publication. Retrieved from https://doi.org/10.1016/j.ijhm.2018.06.003

Hao, J. X., Tang, R., Yu, Y., Li, N., & Law, R. (2015). Visual appeal of hotel websites: An exploratory eye tracking study on Chinese generation Y. *Proceedings of Information and Communication Technologies in Tourism 2015*. Retrieved from https://link.springer.com/chapter/10.1007/978-3-319-14343-9_44

Jin, N., Lee, S., & Huffman, L. (2012). Impact of restaurant experience on brand image and customer loyalty: Moderating role of dining motivation. *Journal of Travel & Tourism Marketing, 29*, 532-551.

Kamerer, D. (2014). Understanding the Yelp review filter: An exploratory study. *First Monday*, Retrieved from http://dx.doi.org/10.5210/fm.v19i9.5436

Kim, D., Jang, S., & Adler, H. (2015). What drives café customers to spread eWOM? Examining self-relevant value, quality value, and opinion leadership. *International Journal of Contemporary Hospitality Management, 27*, 261-282.

Krishnan, S. (2011). *Two key assumptions to be aware of before applying the chi-square test*. Retrieved from www.simafore.com/blog/bid/564802/2-key-assumptions-to-be-aware-of-before-applying-the-chi-square-test

Kumar, A., Bezawada, R., Rishika, R., Janakiraman, R., & Kannan, P. K. (2016). From social to sale: The effects of firm-generated content in social media on customer behavior. *Journal of Marketing*, *80*, 7-25.

Kwok, L., Xie, K. L., & Richards, T. (2017). Thematic framework of online review research: A systematic analysis of contemporary literature on seven major hospitality and tourism journals. *International Journal of Contemporary Hospitality Management*, *29*, 307-354.

Leung, X., Tanford, S., & Jiang, L. (2017). Is a picture really worth a thousand words? An experiment on hotel Facebook message effectiveness. *Journal of Hospitality and Tourism Technology*, *8*, 19-38.

Li, X. (2018). "*Seeing through consumers' eyes": Exploring online restaurant selection behaviors using eye-tracking technology* (Unpublished doctoral dissertation). Kansas State University, Manhattan, KS.

Litvin, S. W., Goldsmith, R. E., & Pan, B. (2018). A retrospective view of electronic word-of-mouth in hospitality and tourism management. *International Journal of Contemporary Hospitality Management*, *30*, 313-325.

Liu, Z., & Park, S. (2015). What makes a useful online review? Implication for travel product websites. *Tourism Management*, *47*, 140-151.

Lu, W., & Stepchenkova, S. (2015). User-generated content as a research mode in tourism and hospitality applications: Topics, methods, and software. *Journal of Hospitality Marketing & Management*, *24*, 119-154.

Lu, X., Ba, S., Huang, L., & Feng, Y. (2013). Promotional marketing or word-of-mouth? Evidence from online restaurant reviews. *Information Systems Research, 24*, 596-612.

Luca, M. (2016). Reviews, reputation, and revenue: The case of Yelp. com. *Harvard Business School NOM Unit Working Paper*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1928601

Maurer, C., & Wiegmann, R. (2011). Effectiveness of advertising on social network sites: a case study on Facebook. Proceeding from *ENTER Conference*, Austria, 485-498. Retrieved from https://www.researchgate.net/profile/Christian_Maurer3/publication/221357477_Effectiveness_of_Advertising_on_Social_Network_Sites_A_Case_Study_on_Facebook/links/55ea917e08ae21d099c45757.pdf

Mauri, A. G., & Minazzi, R. (2013). Web reviews influence on expectations and purchasing intentions of hotel potential customers. *International Journal of Hospitality Management*, *34*, 99-107.

Melián-González, S., Bulchand-Gidumal, J., & González López-Valcárcel, B. (2013). Online customer reviews of hotels: As participation increases, better evaluation is obtained. *Cornell Hospitality Quarterly*, *54*, 274-283.

Namkung, Y., & Jang, S. (2007). Does food quality really matter in restaurants? Its impact on customer satisfaction and behavioral intentions. *Journal of Hospitality & Tourism Research*, *31*, 387-409.

National Restaurant Association. (2017). *2017 Restaurant industry pocket factbook.* Retrieved from http://www.restaurant.org/Downloads/PDFs/News-Research/Pocket_Factbook_FEB_2017-FINAL.pdf

Noone, B., & Robson, S. K. (2014). Using eye tracking to obtain a deeper understanding of what drives online hotel choice. *Cornell Hospitality Report*, *14*(17), 6-12.

Noone, B. M., & McGuire, K. A. (2013). Pricing in a social world: The influence of non-price information on hotel choice. *Journal of Revenue and Pricing Management*, *12*, 385-401.

Orquin, J. L., & Loose, S. M. (2013). Attention and choice: A review on eye movements in decision making. *Acta psychologica*, *144*, 190-206.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly*, *54*, 74-83.

Pantelidis, I. S. (2010). Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quarterly*, *51*, 483-491.

Park, S., & Nicolau, J. L. (2015). Asymmetric effects of online consumer reviews. *Annals of Tourism Research*, *50*, 67-83.

Ricard, S. L. (2015). *A Usability and Eyetracking Study Over the Effectiveness of the Layouts of Three Video-Based Websites: YouTube, Hulu, and Vimeo* (Doctoral dissertation, Angelo State University). Retrieved from https://asu-ir.tdl.org/asu-ir/handle/2346.1/30383

Scott, L. M. (1994). Images in advertising: The need for a theory of visual rhetoric. *Journal of consumer research*, *21*, 252-273.

Sparks, B. A., So, K. K. F., & Bradley, G. L. (2016). Responding to negative online reviews: The effects of hotel responses on customer inferences of trust and concern. *Tourism Management*, *53*, 74-85.

TripAdvisor (2018). *About TripAdvisor*. Retrieved from https://tripadvisor.mediaroom.com/us-about-us

Tsao, W. C., Hsieh, M. T., Shih, L. W., & Lin, T. M. (2015). Compliance with eWOM: The influence of hotel reviews on booking intention from the perspective of consumer conformity. *International Journal of Hospitality Management*, *46*, 99-111.

U.S. Department of Labor, Bureau of Labor Statistics. (2018). *Job openings and labor turnover survey.* Retrieved from https://www.bls.gov/jlt/

Viglia, G., Furlan, R., & Ladron-de-Guevara, A. (2014). Please, talk about it! When hotel popularity boosts preferences. *International Journal of Hospitality Management*, *42*, 155-164.

Xiang, Z., Magnini, V. P., & Fesenmaier, D. R. (2015). Information technology and consumer behavior in travel and tourism: Insights from travel planning using the internet. *Journal of Retailing and Consumer Services*, *22*, 244-249.

Xie, H. J., Miao, L., Kuo, P. J., & Lee, B. Y. (2011). Consumers' responses to ambivalent online hotel reviews: The role of perceived source credibility and pre-decisional disposition. *International Journal of Hospitality Management*, *30*, 178-183.

Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management*, *43*, 1-12.

Yang, S. B., Hlee, S., Lee, J., & Koo, C. (2017). An empirical examination of online restaurant reviews on Yelp. com: A dual coding theory perspective. *International Journal of Contemporary Hospitality Management*, *29*, 817-839.

Yelp. (2018). *About Yelp*. Retrieved from https://www.yelp.com/about

Zhang, K. Z., Zhao, S. J., Cheung, C. M., & Lee, M. K. (2014). Examining the influence of online reviews on consumers' decision-making: A heuristic–systematic model. *Decision Support Systems*, *67*, 78-89.

Zhang, Z., Ye, Q., Law, R., & Li, Y. (2010). The impact of e-word-of-mouth on the online popularity of restaurants: A comparison of consumer reviews and editor reviews. *International Journal of Hospitality Management*, *29*, 694-700.

Table 5.1 Demographic characteristics of participants (n = 406)

Characteristics	n	%
Age		
20 – 29	258	63.5
30 – 39	114	28.1
40 – 49	22	5.4
50 – 59	8	2.0
60 years or older	4	0.9
Gender		
Male	268	66.1
Female	137	33.6
Prefer not to answer	1	0.3
Race[a]		
Asian	214	52.7
White/Caucasian	157	38.7
African American	31	7.6
American Indian or Alaska Native	17	4.2
Native Hawaiian or Pacific Islander	7	1.7
Education		
High School Diploma or GED	33	8.1
Associate's Degree	31	7.6
Bachelor's Degree	232	57.2
Some graduate credits	11	2.7
Master's Degree or higher (i.e., MD, JD, PhD)	99	24.4

Note. [a] The total number of responses exceeds 406 due to multiple responses.

Table 5.2 Characteristics of participants (n = 406)

Characteristics	n	%
Self-reported experience in CRWs		
Novice	2	0.5
Advanced Beginner	16	3.9
Competent	85	20.9
Proficient	194	47.8
Expert	109	26.9
Frequency of usage in CRWs		
Very Frequently	33	8.1
Frequently	173	42.6
Occasionally	130	32.0
Seldom	62	15.3
Never	8	2.0
Frequency of usage in CRWs in recent trips		
Very Frequently	80	19.7
Frequently	213	52.5
Occasionally	101	24.9
Seldom	7	1.7
Never	5	1.2
Perceived helpfulness of CRWs		
Very helpful	174	42.8
Somewhat helpful	198	48.8
Neutral/undecided	32	7.9
Somewhat not helpful	2	0.5
Top websites for restaurant information search		
Google	151	37.2
Yelp	127	31.3
TripAdvisor	79	19.5
Other (e.g., Opentable, Zomato, Zaget, Gayot, etc.)	49	12.0
Top devices for restaurant information search		
Smartphone	144	35.5
Laptop	143	35.2
Desktop	108	26.6
Tablet	7	1.7
Other (e.g., Google home, radio, etc.)	4	1.0

Table 5.3 Results of one-sample Chi-Square test for consumers' interests among restaurants with different review quantity (n = 368[a])

Chi-Square Test for Equal Proportions		Review Quantity	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	92.0000	**High**	276	75.00	276	75.00
DF	1	**Low**	92	25.00	368	100.00
Pr > ChiSq	<.001					

Note. [a] The total number of responses is less than 406 due to missing values.

Table 5.4 Results of one-sample Chi-Square test for consumers' visit intentions among restaurants with different review quantity (n = 401[a])

Chi-Square Test for Equal Proportions		Review Quantity	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	124.0125	**High**	312	77.81	312	77.81
DF	1	**Low**	89	22.19	401	100.00
Pr > ChiSq	<.001					

Note. [a] The total number of responses is less than 406 due to missing values.

Table 5.5 Results of one-sample Chi-Square test for consumers' interests among restaurants with different review valence (n = 402[a])

Chi-Square Test for Equal Proportions		Review Valence	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	1.9502	**Negative**	215	53.48	215	53.48
DF	1	**Positive**	187	46.52	402	100.00
Pr > ChiSq	0.1626					

Note. [a] The total number of responses is less than 406 due to missing values.

Table 5.6 Results of one-sample Chi-Square test for consumers' interests for images (n = 406)

Chi-Square Test for Equal Proportions		Images	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	6.1576	**With food**	228	56.16	228	56.16
DF	1	**Without food**	178	43.84	406	100.00
Pr > ChiSq	0.0131					

Table 5.7 Results of one-sample Chi-Square test for consumers' interests for image groups (n = 403[a])

Chi-Square Test for Equal Proportions		Image groups	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	92.4293	**Evenly-distributed images**	298	73.95	298	73.95
DF	1	**One large image with thumbnail small photos**	105	26.05	403	100.00
Pr > ChiSq	<.001					

Note. [a] The total number of responses is less than 406 due to missing values.

Table 5.8 Results of one-sample Chi-Square test for consumers' interests for advertisements (n = 363[a])

Chi-Square Test for Equal Proportions		Advertisement	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	0.0689	**Unadvertised restaurants**	179	49.31	179	49.31
DF	1	**Advertised restaurants**	184	50.69	363	100.00
Pr > ChiSq	0.7930					

Note. [a] The total number of responses is less than 406 due to missing values.

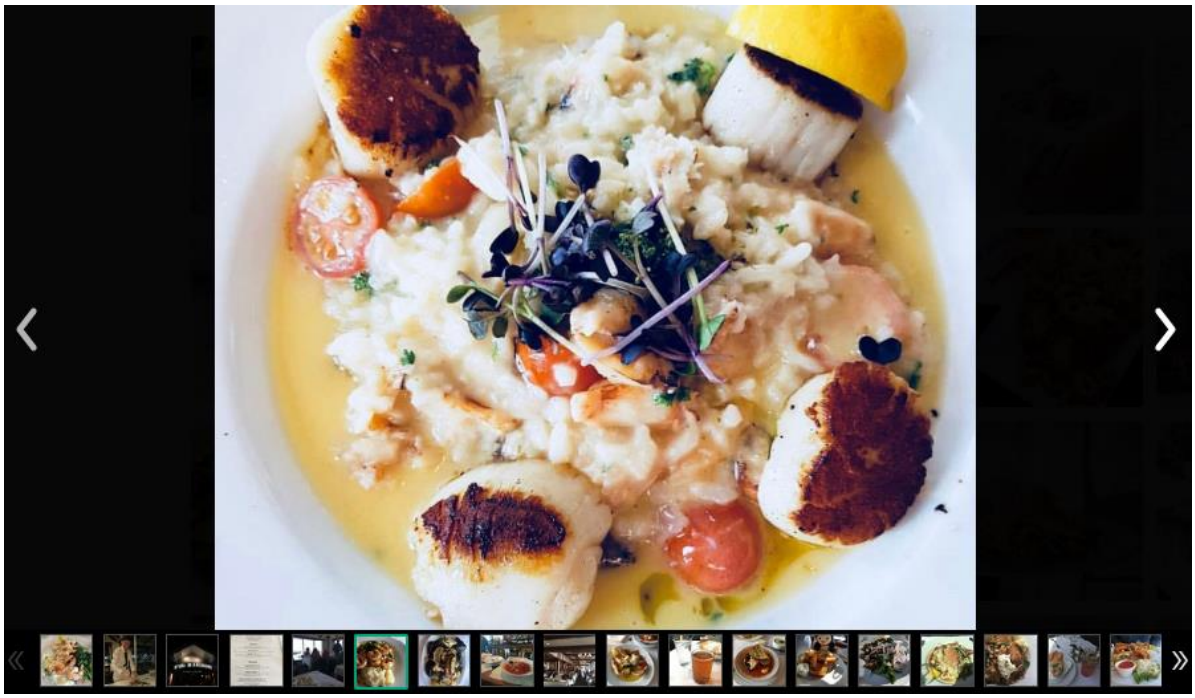
Table 5.9 Results of one-sample Chi-Square test for consumers' visit intentions for advertisements (n = 388)

Chi-Square Test for Equal Proportions		Advertisement	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Chi-Square	21.8144	**Unadvertised restaurants**	240	61.86	240	61.86
DF	1	**Advertised restaurants**	148	38.14	388	100.00
Pr > ChiSq	<.001					

Note. [a] The total number of responses is less than 406 due to missing values.

Table 5.10 Descriptive statistics of factors influencing online restaurant search (n = 406)

Variable	Mean	Std Dev	Ranking
Consumer reviews	4.36	0.85	1
Percentage of negative/positive reviews	4.25	0.84	2
Food items	4.22	0.79	3
Star ratings	4.18	0.79	4
Menu	4.14	0.84	5
Review quantity	4.13	0.85	6
Restaurant type	4.12	0.90	7
Images	4.02	0.92	8
Price	4.00	0.98	9
Ranking	3.96	0.93	10
Location	3.96	0.91	11
Authenticity	3.87	1.00	12
Advertisement	3.20	1.32	13



Format 1

Format 2

Figure 5.1 Format of groups of images

Figure 5.2 Heat maps of clicks for restaurants with different numbers of reviews

Figure 5.3 Heat maps of clicks for online reviews with different start ratings

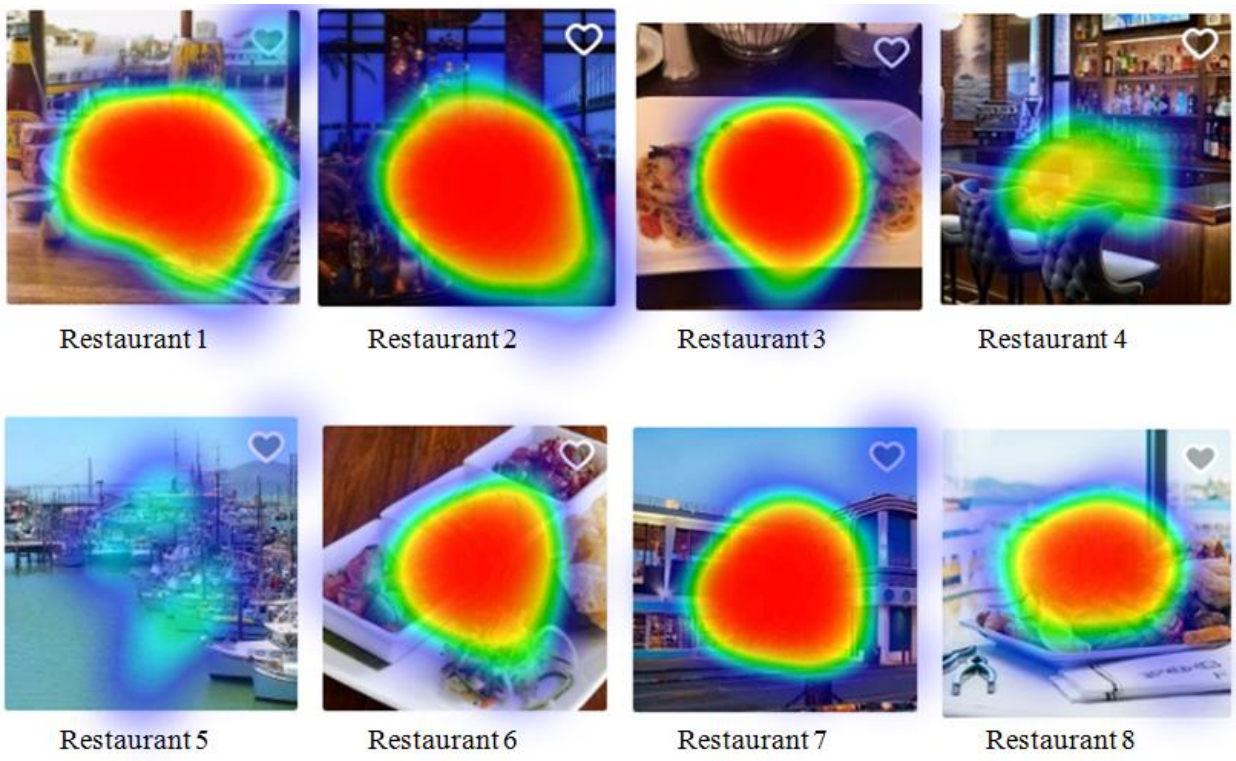


Figure 5.4 Heat map of clicks for restaurant images

Figure 5.5 Heat maps of clicks for image groups

Figure 5.6 Heat map of clicks for advertisements

Chapter 6 - Summary and Conclusions

The purpose of this dissertation was to explore consumers' actual information search behaviors and decision-making process when searching for restaurants in consumer review websites (CRWs). A mixed methods research design was applied including three phases: eye-tracking experiments, retrospective think-aloud (RTA) interviews, and a scenario-based survey. The eye-tracking experiments were first conducted to explore consumers' actual information search behaviors when searching for restaurants in CRWs. The qualitative RTA interviews were performed immediately after the eye-tracking experiments to identify the thinking-process and reasoning for consumers' information search behaviors. The scenario-based survey was further conducted to verify the results from first two phases with a large sample.

Summary of Research

CRWs play an important role in assisting consumers in finding useful information for hospitality purchases, such as booking a hotel or selecting a restaurant (Bilgilan, Peng, & Kandampully, 2014). It is important for the hospitality practitioners and researchers to understand consumers' information search behaviors and decision-making process in the online setting (Lu & Stepchenkova, 2015). Numerous studies have explored online reviews and e-WOM in the hospitality industry (Kwok, Xie, & Richards, 2017). However, most of the existing literature have explored consumers' perceptions, attitudes, or behavioral intentions, rather than the actual behaviors (Kwok et al., 2017). As consumers' perceptions and actual behaviors may not always be consistent with self-reported data, it is essential to identify the actual behaviors without biases (Bellman, Lohse, & Johnson, 1999).

Previous studies have mostly utilized traditional quantitative self-reported surveys or qualitative interviews to study consumer behavior or behavioral intentions (Schuckert, Liu, &

Law, 2015). However, these methods might not be able to accurately reflect the actual consumer behavior (Robson & Noone, 2014). Further, the existing studies have explored some aspects of online reviews or e-WOM and it is lacking a holistic view of consumers' online information search behaviors, Thus, it calls for more advanced ways to obtain a holistic view of consumers' actual information search in consumer review websites. The eye-tracking technology is a method which enables researchers to objectively capture human behaviors without intrusiveness (Pan, Zhang, & Law, 2013).

In addition, previous hospitality studies related to online reviews have focused on the hotels or tourism and little attention has been paid to online consumer behavior in the restaurant industry (Kwok et al., 2017). As the restaurant industry plays an important role in the US economy both in terms of revenue and workforce, it is critical to explore consumer behavior for the restaurant industry. Therefore, the purpose of this study was to explore consumers' actual information search behaviors and decision-making process in consumer review websites for restaurant selections.

The specific objectives of the eye tracking study (Phase I) were to (a) accurately assess the overall eye movements of consumers when they search online information in consumer review websites when making restaurant choices; (b) evaluate attention patterns and eye movement features of consumers during their online restaurant search. The specific objectives of the retrospective think-aloud interviews (Phase II) were to (a) identify consumers' thinking process and reasoning of their eye movements and information search behaviors; (b) connect the thinking process with online information search behaviors; (c) establish a holistic view of consumers' decision-making process. The specific objectives of the online survey (Phase III) were to (a) verify the findings that were identified in previous phases in terms of consumers'

online information search behavior in consumer review websites; (b) explore the effects of key information elements on consumers' interests and visit intentions for restaurants when searching for restaurants in CRWs.

Phase I. Eye Tracking Study

Eye-tracking experiments were conducted with 30 participants who had used consumer review websites (e.g., TripAdvisor, Yelp) for restaurant selections in the past six months. The experiments took place in an eye-tracking lab in the university between March to May in 2018. Each participant was instructed to complete two restaurant search tasks to choose restaurants with specific criteria while their eye movements were recorded with Tobii TX300 eye tracker. The following section summarizes the major findings to answer research questions.

Research Question 1: What is the overall decision-making process of consumers when they search for restaurants in consumer review websites?

Based on the eye-tracking data and the recordings of consumers' eye movements in Phase I, participants usually spent an average of five minutes to make a restaurant selection in a website. Their decision-making process was consistent with the Two-Stage Disaggregate Choice Model as they first started browsing the overall information in the websites, followed by the deliberation stage when they dug into more details of each option (Gensch, 1987). In the browsing stage, the first two pages were mostly viewed with the top-ranking restaurants and they tend to look through the number of reviews, overall rating and ranking of the restaurants. In the deliberation stage, participants were attracted to the images, and reviews comments, especially negative reviews. Participants tend to look back and forth between several restaurants before they made the final decision. While in the deliberation stage, the top-ranking restaurants attracted

consumers' attention frequently, majority of the participants (n=25) chose the restaurant from the top five restaurants as their final decision.

Research Question 2: What is the overall distribution of consumers' attention to various information areas?

Research Question 3: What information elements attract consumers' majority amount of attention?

Research Question 4: What information elements receive most frequent attention from consumers?

As illustrated in Table 6.1 and 6.2, consumers have focused on various types of information through their information search process. Fixation duration, fixation count, and visit count were revealed. The filter function and images appeared to be the main information areas that consumers distributed their attention to. Overall speaking, images, filter, and consumer reviews were ranked the top three areas in TripAdvisor, while advertisements, filter, and images were the top three areas for Yelp. While the filter function was a helpful tool for them to narrow down the information from a list of options in the browsing stage, images seemed to be the major area that consumers would pay more attention to. Advertisements also attracted considerable amount of attention from consumers as in Yelp. Meanwhile, there were also some information areas that did not attract much attention from the consumers, such as star ratings, and advertisements in TripAdvisor; and menu and map in Yelp.

In terms of the frequency of consumers' attention to various information elements, it was also found reviews, filter and images; and advertisement, filter, and images were the top three most frequently viewed information areas for TripAdvisor and Yelp respectively. It is important to notice that although consumer reviews were frequently viewed by the consumers, the time

duration was short for both websites. In addition, even though the online advertisements have received much attention from the participants in Yelp, it did not mean that consumers had higher preferences for the advertised restaurants as none of the advertised restaurants was chosen as the final restaurant choice.

Table 6.1 Ranking of areas of interests on TripAdvisor

AOI	FC Mean	Rank	FD Mean	Rank	VC Mean	Rank
Reviews	102.1	1	0.8	5	11.8	5
Filter	57.1	2	1.4	1	17.6	2
Images	52.5	3	1.1	2	21.9	1
Search	35.1	4	0.6	7	14.7	3
Menu	32.3	5	0.2	14	9.0	6
Top info	31.8	6	0.9	3	14.5	4
Restaurant groups	21.7	7	0.3	13	6.1	8
Biz info	17.2	8	0.6	8	5.5	9
Nearby	14.7	9	0.3	10	4.2	11
Keyword	12.1	10	0.8	4	6.8	7
Review filter	11.8	11	0.7	6	5.5	10
Awards	8.3	12	0.2	15	2.4	14
Review distributions	5.7	13	0.5	9	3.7	12
Sort	5.6	14	0.3	12	3.4	13
Ad	4.0	15	0.0	17	1.3	16
Ratings	2.4	16	0.3	11	2.2	15
Restaurant tab	1.8	17	0.2	16	1.1	17

Note. AOI=area of interest; FC=fixation count; FD=fixation duration; VC=visit count

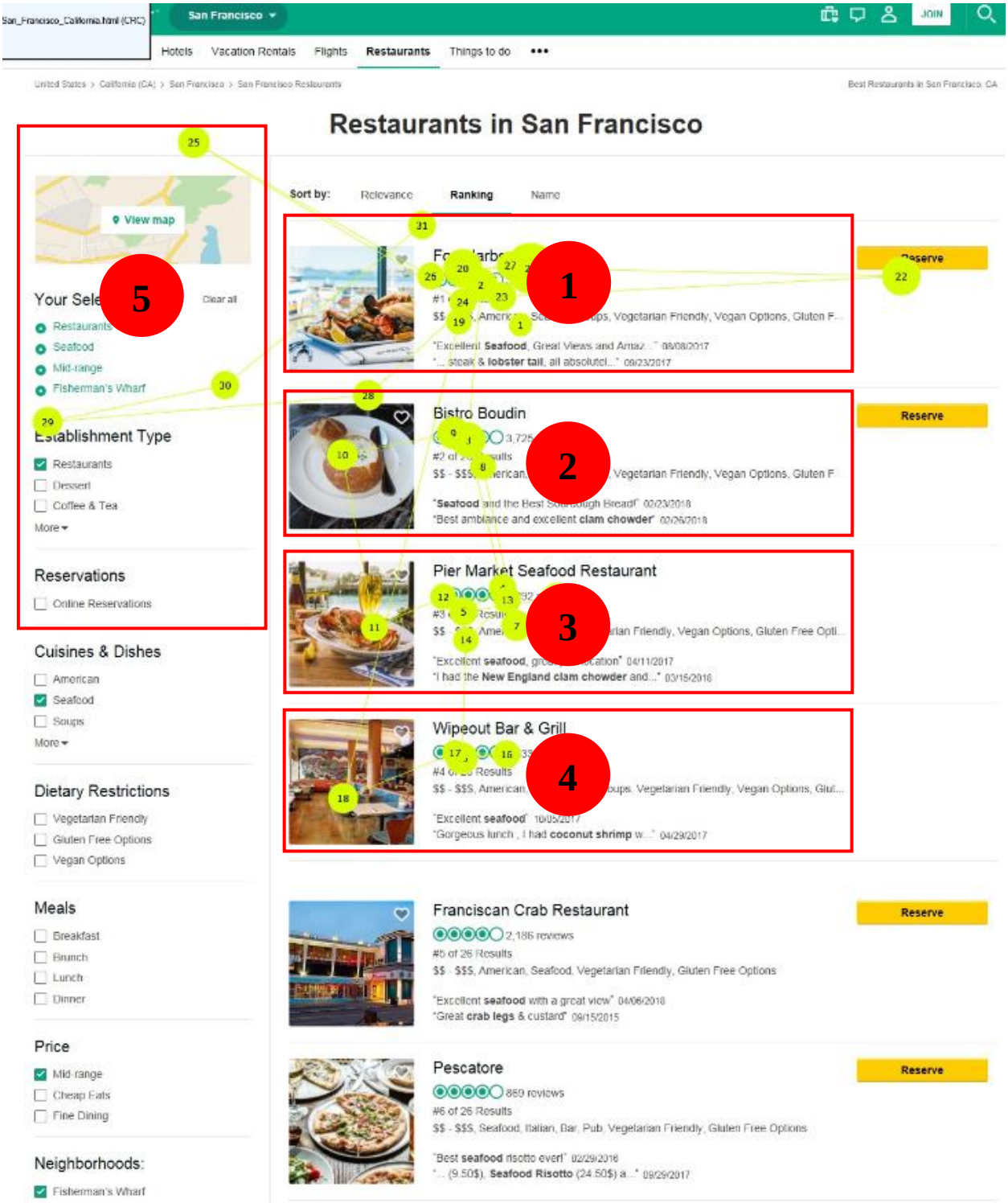
Table 6.2 Ranking of areas of interests on Yelp

AOI	FC Mean	Rank	FD Mean	Rank	VC Mean	Rank
Reviews	136.0	1	0.5	8	12.5	4
Ad	63.6	2	1.8	1	19.7	1
Filter	43.8	3	1.4	2	13.2	3
Images	41.7	4	1.3	3	14.5	2
Map2	30.3	5	0.9	4	12.1	5
Biz info	29.4	6	0.7	6	7.8	7
Image groups	23.3	7	0.5	9	4.1	10
Keyword	20.9	8	0.7	5	8.5	6
Search	15.3	9	0.5	10	6.4	8
Menu	13.3	10	0.1	12	2.8	12
Map1	11.8	11	0.6	7	5.5	9
Top info	7.1	12	0.4	11	4.0	11

Note. AOI=area of interest; FC=fixation count; FD=fixation duration; VC=visit count

Research Question 5: What is the sequence of consumers' attention when they search for restaurants in consumer review websites?

The sequence of consumers' attention is presented in Figure 6.1 with visualized gaze plots. In the browsing stage, consumers started their eye movements from the top-ranking restaurant when they were provided with a list of restaurants and further looked through the rest of the restaurants according to the order of the rankings. They also shifted their eyes between the text information and images while they were browsing the information of restaurants. As participants moved their eyes to the lower-ranking restaurants, the number of gaze plots also decreased. In the deliberation stage, participants looked at more detailed information related to specific restaurants. They looked at some key words embedded in the reviews, followed by images, advertisements, and detailed review comments. When they read through consumer reviews, their attention was especially attracted to the images with food items.


San Francisco
JOIN
Hotels
Vacation Rentals
Flights
Restaurants
Things to do
Restaurants in San Francisco
Sort by:
Relevance
Ranking
Name
View map
Your Sele
Clear all
Restaurants
Seafood
Mid-range
Fisherman's Wharf
Establishment Type
Restaurants
Dessert
Coffee & Tea
More
Reservations
Online Reservations
Cuisines & Dishes
American
Seafood
Soups
More
Dietary Restrictions
Vegetarian Friendly
Gluten Free Options
Vegan Options
Meals
Breakfast
Brunch
Lunch
Dinner
Price
Mid-range
Cheap Eats
Fine Dining
Neighborhoods:
Fisherman's Wharf
Reserve
Bistro Boudin
Pier Market Seafood Restaurant
Wipeout Bar & Grill
Franciscan Crab Restaurant
2,186 reviews
#6 of 26 Results
$$ - $$$, American, Seafood, Vegetarian Friendly, Gluten Free Options
"Excellent seafood with a great view" 04/06/2016
"Great crab legs & custard" 09/15/2015
Pescatore
869 reviews
#6 of 26 Results
$$ - $$$, Seafood, Italian, Bar, Pub, Vegetarian Friendly, Gluten Free Options
"Best seafood risotto ever!" 02/29/2016
1
2
3
4
5

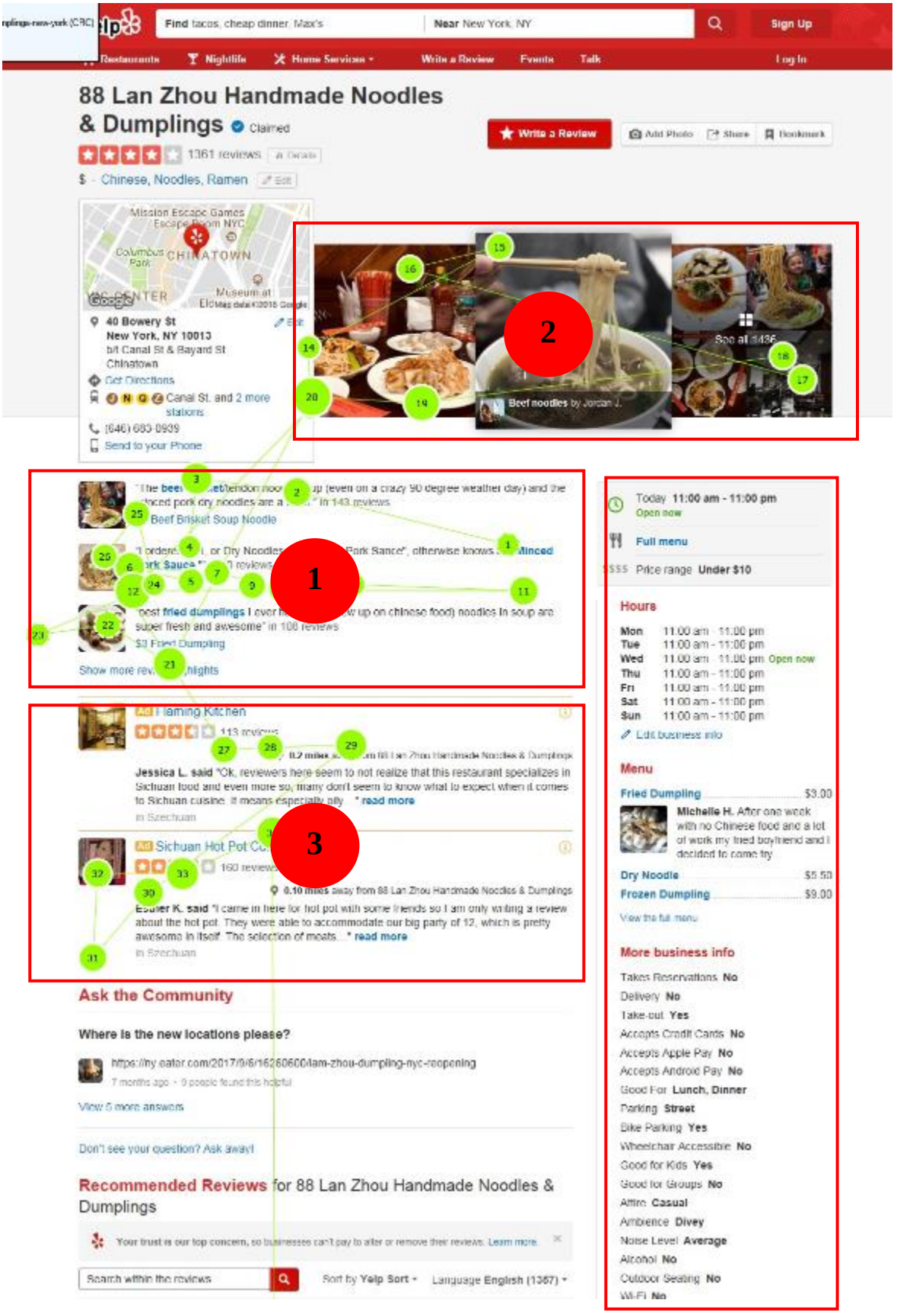

Find tacos, cheap dinner, Max's
Near New York, NY
Sign Up
Restaurants
Nightlife
Home Services
Write a Review
Events
Talk
Log In
88 Lan Zhou Handmade Noodles & Dumplings
Claimed
1361 reviews
$ · Chinese, Noodles, Ramen
Write a Review
Add Photo
Share
Bookmark
Mission Escape Games Escape from NYC
Columbus Park
CHINATOWN
Museum at FDNY
Google
40 Bowery St
New York, NY 10013
bet Canal St & Bayard St
Chinatown
Get Directions
Canal St. and 2 more stations
(646) 683-0939
Send to your Phone
Beef noodles by Jordan J.
Beef Brisket Soup Noodle
Minced
Fried Dumpling
Show more reviews
Flaming Kitchen
113 reviews
Jessica L. said "Ok, reviewers here seem to not realize that this restaurant specializes in Sichuan food and even more so, many don't seem to know what to expect when it comes to Sichuan cuisine. It means especially oily..." read more
in Szechuan
Sichuan Hot Pot Co...
160 reviews
0.10 miles away from 88 Lan Zhou Handmade Noodles & Dumplings
Esther K. said "I came in here for hot pot with some friends so I am only writing a review about the hot pot. They were able to accommodate our big party of 12, which is pretty awesome in itself. The selection of meats..." read more
in Szechuan
Today 11:00 am - 11:00 pm
Open now
Full menu
$$$$ Price range Under $10
Hours
Mon 11:00 am - 11:00 pm
Tue 11:00 am - 11:00 pm
Wed 11:00 am - 11:00 pm Open now
Thu 11:00 am - 11:00 pm
Fri 11:00 am - 11:00 pm
Sat 11:00 am - 11:00 pm
Sun 11:00 am - 11:00 pm
Edit business info
Menu
Fried Dumpling $3.00
Michelle H. After one week with no Chinese food and a lot of work my fried boyfriend and I decided to come try
Dry Noodle $5.50
Frozen Dumpling $9.00
View the full menu
More business info
Takes Reservations No
Delivery No
Take-out Yes
Accepts Credit Cards No
Accepts Apple Pay No
Accepts Android Pay No
Good For Lunch, Dinner
Parking Street
Bike Parking Yes
Wheelchair Accessible No
Good for Kids Yes
Good for Groups No
Attire Casual
Ambience Divey
Noise Level Average
Alcohol No
Outdoor Seating No
Wi-Fi No
Ask the Community
Where is the new locations please?
https://ny.eater.com/2017/9/6/16260600/lam-zhou-dumpling-nyc-reopening
7 months ago · 9 people found this helpful
View 5 more answers
Don't see your question? Ask away!
Recommended Reviews for 88 Lan Zhou Handmade Noodles & Dumplings
Your trust is our top concern, so businesses can't pay to alter or remove their reviews. Learn more.
Search within the reviews
Sort by Yelp Sort
Language English (1367)
1
2
3

Figure 6.1 Gaze plots representing consumers' attention sequence

Phase II. Retrospective Think-aloud Interviews

Retrospective think-aloud interviews were conducted immediately after the eye-tracking experiments in order to understand the thinking process and reasoning of consumers' information search behaviors. Individual participants were interviewed by the researchers and they were instructed to verbalize their thinking process and recall the memories of how they searched the information while they were shown a playback video of their eye-tracking session. The

interviews were video and audio recorded for data analyses. The following section summarizes the major findings to answer research questions.

Research Question 6: What are the most influential information elements that affect consumers' online decision making for restaurant selections?

Images and consumer reviews were regarded as the most influential factors that were impactful for their online decision making. Specifically, participants expressed the importance of images stating that, "*I think the first thing I want to do is to look at the pictures*" (P03-15-2); and "*I look at pictures just like I really like probably the first thing I do whenever I look through reviews just looking at pictures*" (P15-20-1); They also stated that images could provide them vivid message about the restaurants in a quick and easy way by saying that, "*I'm very visual so I saw the picture and the picture looked very appealing to me and so I went and click it*" (P23-8-4).

In addition, most participants preferred the images that were created by the consumers, rather than the restaurants. It was justified from the following quotes that, "*I like customer pictures versus the professional restaurant pictures. It has more this is what it actually looks like the day that you get it kind of thing*" (P22-8-3). When the participants were asked what visual content in the images could attract their attention and be helpful, most of them stated that they were mainly looking for food in the images. They were stating, "*I like to see what the plates actually look like and see what kind of food they're serving*" (P09-20-2). Some people also mentioned that from the pictures they were expecting to see whether the restaurant was authentic or not, as well as the environment or atmosphere.

In terms of consumer reviews, most participants also indicated that they liked reading the consumer reviews while searching for restaurants online. However, they would only skim

through the review content without spending much time reading all the content. They stated that, "*I just kind of wanted to go over skim over some of the higher reviews and see kind of what everybody is saying about it*" (P04-24-2). When participants were asked how they read reviews and what information were they looking for, they mentioned that they cared about the consistency of the reviews. They were stating that, "*I check whether the reviews are consistently good or consistently bad*" (P02-17-3).

Review quantity or number of reviews was regarded as a key factor for their information search as many participants preferred restaurants with higher number of reviews mentioning that, "*I think the number of review is very important because it's hard to fake with numbers. So, I click on this one. Again, this one has thirty seven hundred reviews*" (P01-10-2). Another critical aspect of consumer reviews is the review valence and consumers expressed their special attention on the negative review over the positive ones. They stated that, "*I pay probably more attention to the negative reviews and see what they had to say about the negative reviews since I work in the service industry*." (P09-43-1). They also explained that they focused more on the negative reviews in order to reduce the risks of not meeting their needs, "*If the problem was the food, I'll probably skip this restaurant. But if it's the service or its lots of people they get bad service, I'll probably can accept that cause I normally don't worry about the service part*" (P24-8-4).

Research Question 7: What are consumers' perceptions and attitudes toward online advertisements?

When the participants were asked their thoughts on the online advertisements, they stated that they usually tried to skip or avoid the ads because did not trust the advertisements. They stated that, "*I think I usually skip the ads, sometimes I may click on them, but usually obviously*

they're paying to have front or center or good location, so sometimes it may not always be the best" (P07-30-1). Although the advertised restaurants in Yelp received considerable amount of participants' attention in the eye-tracking experiments, they stated that they were unconsciously looking at the ads. The mentioned that, "*I did notice I did click on this first one, but it was I had noticed later that it was an ad versus the actual first rated one which kind of tricked me in a way I guess to thinking it was the first one*" (P11-71-2).

Research Question 8: What differences do consumers think between TripAdvisor and Yelp for their restaurant search?

In the pre-experiment surveys, TripAdvisor and Yelp were ranked among the top three websites for restaurant selections, along with Google search engine. When the participants were asked their preference of websites in the interviews, most of them (n=22, 73.3%) indicated that they preferred Yelp website. They regarded Yelp as more specialized in restaurant, whereas TripAdvisor more related to travel. They mentioned that, "*I think for restaurants it's probably Yelp I think I used more. I've used TripAdvisor a lot but I usually used that for like hotels or activities to do in a place*" (P25-33-1), and "I think TripAdvisor is more – when I look – looking for some information about the tourist attractions, I use the website" (P30-83-2). They also explained that they preferred the layout and design of Yelp websites in finding information for restaurants stating that, "*I definitely prefer Yelp over TripAdvisor just because the layout was so much easier*" (P19-05-1)".

Phase III. Scenario-based Online Survey

The quantitative online survey was conducted to verify the findings from eye-tracking experiments and retrospective think-aloud interviews. As the first two phases of the study were performed with a small sample size (n=30), the generalizability may be limited. Thus, the survey

was targeting at a large sample (n=400). An online survey company, Amazon MTurk, was used to distribute surveys to consumers who had used the consumer review websites for restaurant selections in the past six months. A total of 406 usable survey responses out of 562 total responses (72.2%) were included in data analysis. Seven hypotheses between review quantity, review valence, images, advertisements and consumers' interests and visit intentions were developed respectively, as shown below.

H1a. Consumers' interests would be higher for the restaurants with higher number of reviews than those with lower number of reviews.

H1b. Consumers' visit intentions would be higher for the restaurants with higher number of reviews than those with lower number of reviews.

H2. Consumers' interests would be higher for negative reviews than positive reviews.

H3a. Consumers' visit intentions would be higher for restaurants with images of food items than images without food items.

H3b. Consumers' interests differ between the group of images with a large main image and the group of images that would be evenly located within one web page.

H4a. Consumers' interests for advertised restaurants would be higher than the unadvertised restaurants.

H4b. Consumers' visit intentions for the advertised restaurants would be lower than the unadvertised restaurants.

Online Reviews

Based on the one-sample Chi-Square tests results, it was indicated that consumers had higher interest and visit intentions for the restaurants with higher number of reviews than lower number of reviews ($\chi^2_{interests}$ (1, N=368) = 92.00, p<.001; $\chi^2_{intentions}$ (1, N=401) = 124.01, p<.001).

Thus, H1a and H1b were supported. These findings were consistent with previous studies that number of reviews indicated the overall popularity of the company, Thus, would be impactful for consumers' purchase intentions (Tsao, Hsieh, Shih, Lin, 2015; Xie, Zhang, & Zhang, 2014) and consumers' preferences would be greater for companies with higher number of reviews (Viglia, Furlan, & Ladron-de-Guevara, 2014).

The independent sample one-sample Chi-Square test was conducted to test H2. It was indicated that participants had equal interests for negative reviews (i.e., two and three star) (n = 215) and positive reviews (i.e., four and five stars) (n = 187) (χ^2 (1, N=402) = 1.95, p>.05). Thus, H2 was not supported. However, the vast majority of the participants (n=319, 78.6%) expressed that they were likely or very likely to read negative reviews when they searched for restaurants online.

Images

The one-sample Chi-Square tests were performed and it was revealed that consumers had significant higher interests for restaurant images with food items (n = 228) than those without food (i.e., physical environment) (n = 178) (χ^2 (2, N=406) = 6.16, p<.05). Thus, H3a was supported. In addition, it was indicated that consumers preferred the evenly distributed images (n = 298) over one large image with much smaller images (n = 105) (χ^2 (1, N=403) = 92.43, p<.001). Therefore, H3b was supported. These findings were consistent with previous research as consumers preferred to see images with food when searching for restaurants online (Yang, Hlee, Lee, & Koo, 2017). However, it was different from previous research which indicated that Generation Y consumers preferred to see one large image on a webpage (Djamasbi, Siegel, & Tullis, 2010).

Advertisements

The one-sample Chi-Square tests were conducted to examine consumers' interests and visit intentions for the advertised and unadvertised restaurants. First, consumers' interests were equal for the advertised restaurants (n = 184) and unadvertised restaurants (n = 179) (χ^2 (1, N=363) = 0.07, p>.05). Thus, H4a was not supported. In addition, it was identified that consumers' visit intentions were likely to be higher for the unadvertised restaurants (n = 240) than advertised restaurants (n = 148) (χ^2 (1, N=388) = 21.81, p<.001). Thus, H4b was supported. These findings were consistent with previous studies that marketing messages on Facebook were less favored by consumers than conversational messages (Kwok & Yu. 2013). Whereas it was different from previous research related to social media marketing with the findings that firm-generated content was impactful for consumer behavior (Kumar, Bezawada, Rishika, Janakiraman, & Kannan, 2016).

Implications

Theoretical Implications

This study yields valuable insights for hospitality researchers. First, in this study, eye-tracking experiments were first utilized to explore consumers' actual information search behaviors. As eye-tracking technology was still in the infancy in hospitality research (Noone & Robson, 2014), this study is especially valuable for hospitality researchers in terms of the methodology so that they could utilize eye-tracking experiments in the exploration of actual consumer behavior.

In addition, retrospective think-aloud interviews were conducted and researchers were able to identify the thinking process and explanations of consumers' actual behaviors. Specific aspects of images such as what types of images were attractive and important to consumers, as

well as the question of how consumers usually read online reviews and their thoughts were revealed in the interviews. As most of the previous studies have used self-reported surveys to explore consumer behavior, this study is also unique in providing not only what but why for consumers' information search behaviors.

In phase III, the scenario-based interactive online survey was conducted to verify the findings from previous two phases. Most of the existing studies have merely examined consumers' perceptions and attitudes toward online reviews or e-WOM, however consumers' real-time reactions for the web pages were seldom explored in the hospitality industry (Kwok et al., 2017). It is especially meaningful as researchers were able to mimic the online environment and collect the real-time data through interactive clicks from the consumers.

The combination of the eye-tracking experiments, retrospective think-aloud interviews, and scenario-based survey has provided a comprehensive and innovative method for researchers to obtain a holistic view of the actual consumer behavior, the explanations of their behaviors, and justification of online consumer behavior with large sample.

Practical Implications

The finding of this research is valuable for both the restaurateurs and the CRWs. First, images are important. Specifically, consumers prefer to see the food items in the images and those created by the other consumers. Therefore, restaurateurs should pay special attention to the visual presentations of their food items so that consumers would be attracted by their food and more likely to share the images online (Yang et al., 2017). Second, review quantity and negative reviews are also essential information elements that consumers usually look for. Restaurateurs may develop specific marketing strategies and train their employees to encourage consumers to

write online reviews so that they may gain better popularity among the potential consumers (Melián-González, Bulchand-Gidumal, & López-Valcárcel, 2013).

In terms of the importance of review valence, restaurateurs may need to first get an idea of consistency of their negative reviews and positive reviews. In addition, they need to read and manage some of the negative reviews as their businesses may be affected these reviews. Management responses to negative reviews may also improve consumer experience and further enhance good reputation of the restaurants (Pantelidis, 2010).

Regarding the advertisements, consumers seemed to have similar interests for both the advertised and unadvertised restaurants, however, their visit intentions were lower for the advertised restaurants than the unadvertised ones. Therefore, restaurateurs may need to be cautious in using online advertisements for their restaurants as advertisements may or may not be effective in attracting consumers' attention or getting more businesses because consumers may intentionally avoid advertisements during online search (Jung, 2017).

As for the CRWs, most of the consumers prefer Yelp over TripAdvisor when searching for restaurants. They also regarded TripAdvisor as more professional website for travels and hotels. These impressions are important for website developers as consumers' purchase behaviors may be affected. Therefore, they may need to think about their target market and make appropriate marketing strategies to attract and maintain different consumers.

In addition, CRWs may need to know that number of reviews, ranking, star ratings, and images are the important information elements, therefore, they are recommended to enhance these types of information and improve the interface of the websites so that it could be more user-friendly and efficient for consumers' information search process. Further, consumers have also mentioned they usually avoid the advertisements and would only skim through the review

content when searching for a restaurant. The CRWs may need to think about the effectiveness of advertisements and to improve the management of online advertisements.

Limitations and Recommendations for Future Research

There are several limitations in this study. First, the number of participants in the eye-tracking experiments is limited due to the limited number of eye tracking device and time constraints. However, this limitation has been overcome with the online survey in Phase III. Future research is suggested to include a higher number of participants so that more generalizable data of actual consumer behavior would be obtained.

Further, as the focus of the study was consumers' information search behaviors in consumer review websites for restaurant selections. The results may be limited to only the consumer review websites and may not be generalizable to other online platforms. Thus, future research is recommended to explore consumers' information search behavior in various online channels such as online search engines (e.g., Google) or social networking sites (e.g., Facebook)

In addition, the screen-type eye tracker was used in this study and the results may not be applicable for the other devices (e.g., laptop, smart phone, tablet, etc.). Future researchers are suggested to use different devices to capture consumers' actual behaviors with the technological innovation and development.

In the meantime, the online survey protocol may be a limitation as it may have excluded the population who are not online users. However, because the target population of this study was specifically people who have used the consumer review websites to choose restaurants in the past six months, this qualification criteria actually require the participants to have previous online experience. The sample in this study was also over-represented with Asian (n=214, 52.7%) and the results may be limited due to the single source bias. It is recommended that

future research should consider use more balanced and representative sample so that the results can be more generalizable.

Further, this study has focused on three information elements including online reviews, images, and advertisements and the effects on consumers' interests and visit intentions. The results may be limited as there may be other factors affecting consumers' online restaurant selections. Therefore, future studies are recommended to include more information elements and factors to gain a more comprehensive idea of consumers' online decision-making process.

Lastly, as restaurant industry and CRWs for restaurant decisions were the target setting of this study, the findings may be limited and not generalizable to other industries. Researchers are suggested to explore how online information affects consumers' purchase experience and decision making in other industries.

References

Bellman, S., Lohse, G. L., & Johnson, E. J. (1999). Predictors of online buying behavior. *Communications of the ACM, 42*(12), 32-38. Retrieved from https://dl.acm.org/citation.cfm?id=322805

Bilgihan, A., Peng, C., & Kandampully, J. (2014). Generation Y's dining information seeking and sharing behavior on social networking sites: An exploratory study. *International Journal of Contemporary Hospitality Management*, *26*, 349-366.

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. *International Journal of Human-computer Studies*, *68*, 307-323.

Gensch, D. H. (1987). A two-stage disaggregate attribute choice model. *Marketing Science*, *6*, 223-239.

Jung, A. R. (2017). The influence of perceived ad relevance on social media advertising: An empirical examination of a mediating role of privacy concern. *Computers in Human Behavior*, *70*, 303-309.

Kumar, A., Bezawada, R., Rishika, R., Janakiraman, R., & Kannan, P. K. (2016). From social to sale: The effects of firm-generated content in social media on customer behavior. *Journal of Marketing*, *80*, 7-25.

Kwok, L., & Yu, B. (2013). Spreading social media messages on Facebook: An analysis of restaurant business-to-consumer communications. *Cornell Hospitality Quarterly*, *54*, 84-94.

Kwok, L., Xie, K. L., & Richards, T. (2017). Thematic framework of online review research: A systematic analysis of contemporary literature on seven major hospitality and tourism journals. *International Journal of Contemporary Hospitality Management*, *29*, 307-354.

Lu, W., & Stepchenkova, S. (2015). User-generated content as a research mode in tourism and hospitality applications: Topics, methods, and software. *Journal of Hospitality Marketing & Management*, *24*, 119-154.

Melián-González, S., Bulchand-Gidumal, J., & González López-Valcárcel, B. (2013). Online customer reviews of hotels: As participation increases, better evaluation is obtained. *Cornell Hospitality Quarterly*, *54*, 274-283.

Noone, B., & Robson, S. K. (2014). Using eye tracking to obtain a deeper understanding of what drives online hotel choice. *Cornell Hospitality Report*, *14*(17), 6-12.

Pan, B., Zhang, L., & Law, R. (2013). The complex matter of online hotel choice. *Cornell Hospitality Quarterly*, *54*, 74-83.

Pantelidis, I. S. (2010). Electronic meal experience: A content analysis of online restaurant comments. *Cornell Hospitality Quarterly, 51*, 483-491.

Robson, S. K. A, & Noone, B. (2014). Show me what you see, tell me what you think: Using eye tracking for hospitality research. *Cornell Hospitality Report, 14*(17), 6-12.

Schuckert, M., Liu, X., & Law, R. (2015). Hospitality and tourism online reviews: Recent trends and future directions. *Journal of Travel & Tourism Marketing, 32*, 608-621.

Tsao, W. C., Hsieh, M. T., Shih, L. W., & Lin, T. M. (2015). Compliance with eWOM: The influence of hotel reviews on booking intention from the perspective of consumer conformity. *International Journal of Hospitality Management, 46*, 99-111.

Viglia, G., Furlan, R., & Ladron-de-Guevara, A. (2014). Please, talk about it! When hotel popularity boosts preferences. *International Journal of Hospitality Management, 42*, 155-164.

Xie, K. L., Zhang, Z., & Zhang, Z. (2014). The business value of online consumer reviews and management response to hotel performance. *International Journal of Hospitality Management, 43*, 1-12.

Yang, S. B., Hlee, S., Lee, J., & Koo, C. (2017). An empirical examination of online restaurant reviews on Yelp. com: A dual coding theory perspective. *International Journal of Contemporary Hospitality Management, 29*, 817-839.

Appendix A - Kansas State University IRB Approval

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: Dr. Junehee Kwon
Hospitality Management
108 Justin Hall

Proposal Number: 9118

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 01/29/2018

RE: Approval of Proposal Entitled, ""Seeing through consumers' eyes": Exploring online restaurant selection behaviors using eye-tracking technology."

The Committee on Research Involving Human Subjects has reviewed your proposal and has granted full approval. This proposal is **approved for one year from the date of this correspondence, pending "continuing review."**

APPROVAL DATE: 01/29/2018

EXPIRATION DATE: 01/29/2019

Several months prior to the expiration date listed, the IRB will solicit information from you for federally mandated **"continuing review" of the research**. Based on the review, the IRB may approve the activity for another year. **If continuing IRB approval is not granted, or the IRB fails to perform the continuing review before the expiration date noted above, the project will expire and the activity involving human subjects must be terminated on that date. Consequently, it is critical that you are responsive to the IRB request for information for continuing review if you want your project to continue.**

In giving its approval, the Committee has determined that:

☒ There is no more than minimal risk to the subjects.
☐ There is greater than minimal risk to the subjects.

This approval applies only to the proposal currently on file as written. Any change or modification affecting human subjects must be approved by the IRB prior to implementation. All approved proposals are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced post-approval monitoring may be performed during the course of this approval period by URCO staff. Injuries, unanticipated problems or adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB and / or the URCO.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier St., Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278
comply@k-state.edu | k-state.edu/research/comply

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: Dr. Junehee Kwon
Hospitality Management
108 Justin Hall

Proposal Number: 9306

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 05/15/2018

RE: Proposal Entitled, ""Seeing through consumers' eyes": Exploring online restaurant selection behaviors using eye-tracking technology - Phase III"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier St., Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278
comply@k-state.edu | k-state.edu/research/comply

Appendix B - Participant Recruitment Survey (Phase I and II)

Cover letter

Thank you for your interest in the eye tracking study for online restaurant selections. My name is Xiaoye Li, a Ph.D. Candidate in the Department of Hospitality Management at Kansas State University. I am seeking for potential participants for my dissertation study entitled, "Seeing through consumers' eyes": Exploring online restaurant selection behaviors using eye tracking technology. The purpose of this study is to investigate consumers' web searching experience when making restaurant selections using consumer review websites. The expected results of the study will benefit the restaurant industry and website developers to enhance the consumers' online information search experience.

The research protocol has been approved by the University Research Compliance Office (IRB # 9118) at Kansas State University on January 29, 2018, and the expiration date of the project is January 29, 2019. Your participation is completely voluntary, and if you have any questions about the rights of individuals in this study, please contact Dr. Rick Scheidt, Chair of the Committee on Research Involving Human Subjects, (785) 532-3224, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506.

If you are interested in this study, please complete the quick survey to see if you are qualified. Should you have any questions regarding this study, please contact Xiaoye Li at 785-770-6078 (email: xiaoye@ksu.edu) or Dr. Junehee Kwon at 785-532-5369 (email: jkwon@ksu.edu). Thank you for your attention and potential assistance for this study.

For compliance purposes we would like to confirm your willingness to participate in this important survey. If you agree to participate in this survey, please select I willingly agree to participate under the terms described above and click Continue.

By this selection, you are providing your implied consent to participate in this survey. If you wish to obtain a hard copy of the consent form, please print this page for your own records. You may stop taking this survey at any time.

If you do not agree to participate in this survey, select I prefer not to participate and click Continue.

- o I willingly agree to participate under the terms described above.
- o I prefer not to participate

Section I: User Experience on Consumer Review Websites

1. Have you used consumer review websites such as Yelp or TripAdvisor to select restaurants during the past six months?
   - o Yes
   - o No

2. Please describe your frequency in the use of consumer review websites such as Yelp or TripAdvisor when you need to get restaurant-related information?
   - o Very frequently. 7 times or more per week.
   - o Frequently. 5-6 times per week
   - o Occasionally 3-4 times per week
   - o Seldom 1-2 per week
   - o Never <1 time per week

3. Please recall your recent travel experience in the past six months. During the trip, how frequently have you used consumer review websites (CRWs) to search for restaurants?
   - o Frequently (used CRW for most of restaurant choices)
   - o Occasionally (used CRW for some of the restaurant choices)
   - o Rarely (used CRW for only a few of restaurant choices)
   - o Never (did not use CRW for restaurant choices)

4. How would you describe yourself in terms of the experience in using consumer review websites?
   - o A novice with a little experience
   - o A learner with some experience
   - o An expert with extensive experience

5. What is the status of your eye vision?
   - o I have normal vision and do not wear glasses
   - o I have corrected to normal vision and usually wear contact lenses
   - o I have corrected to normal vision and usually wear glasses

   Others, please explain: _____

6. Based on your experience, what are your favorite websites you usually use to get restaurant-related information? Please rank the following websites by moving them in the order of your preference, 1 being your most favorite one, 2 being the second, and 3 being the third, etc. Please fill in the blank for an "other" choice.

Yelp	TripAdvisor	Google	Opentable	Zomato
Zagat	Gayot	Dine	Foursquare	Citysearch

   Other, please specify: _____

7. How helpful do you think these consumer review websites are in assisting you making restaurant selections? Please indicate your response using a five-point scale, 1 being not helpful at all, 3 being neutral or undecided, and 5 being very helpful.
   Not helpful at all Neutral/Undecided Very helpful
   1 ----------2----------3----------4----------5

8. Please rank the following devices according to the frequency of usage in your information search process for restaurant selections. Please move the following device in the order of your preference. Please fill in the blank for an "other" choice.
   - Desktop computer
   - Laptop computer
   - Smartphone
   - Tablet

   Other, please specify: _____

Section IV: Demographic Characteristics

1. Please indicate your current age: _____
2. Please indicate your gender
   - Male
   - Female
   - Prefer not to answer

3. Please indicate the highest level of education you have completed
   - Less than High School Degree
   - High School Diploma or GED
   - Some college credits
   - Associate's Degree
   - Bachelor's Degree
   - Some graduate credits
   - Master's Degree or higher including professional degrees (i.e., MD, JD)

4. Are you a Hispanic or Latino?
   - Yes
   - No

5. What is your race? Please check all that apply.
   - White
   - Black/African American
   - American Indian/Alaska Native
   - Asian
   - Native Hawaiian/Pacific Islander
   - Prefer not to answer
   - Other, please specify: _____

6. Your email address: _____

Appendix C - Informed Consent Form (Phase I and II)

PROJECT TITLE:

"Seeing through consumers' eyes": Exploring online restaurant selection behaviors using eye-tracking technology

PROJECT APPROVAL DATE: 1/29/2018 **PROJECT EXPIRATION DATE:** 1/29/2019 **LENGTH OF STUDY:**

PRINCIPAL INVESTIGATOR: Dr. Junehee Kwon

CO-INVESTIGATOR(S): Xiaoye Li

CONTACT DETAILS FOR PROBLEMS/QUESTIONS: Junehee Kwon, (785)532-5369, jkwon@ksu.edu

IRB CHAIR CONTACT NFORMATION:

Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.

Cheryl Doerr, Associate Vice President for Research Compliance and University Veterinarian, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.

PROJECT SPONSOR: 2018 Arts, Humanities & Social Sciences Small Grant Program, Graduate School, Kansas State University

PURPOSE OF THE RESEARCH:

The purpose of the research is to identify the actual information search behaviors and decision-making process of consumers when making restaurant selections through consumer review websites.

PROCEDURES OR METHODS TO BE USED:

Phase I: Eye-tracking experiment will be conducted to identify the actual information search behaviors of consumers when selecting restaurants through consumer review websites. The researcher will recruit 30 participants with convenience sampling for the eye-tracking experiment. Consumers who have used consumer review websites (e.g., Yelp and TripAdvisor) to select restaurants in the past 6 months will be recruited. The remote screen-type eye tracker will be used to track and record the eye movements of participants while they complete the online restaurant selection tasks individually. The eye-tracking data will be used for further analyses and as the visual cues for the Phase II study.

Phase II: Retrospective think-aloud interviews will be conducted with the same 30 participants after they finish the eye-tracking experiment. Participants will verbalize their thinking process while a playback video of the eye-tracking session being used as the visual cues for the interviews. The interviews will be audio recorded and used for data analyses.

The total estimated time duration for both the individual eye-tracking and interview sessions is 45 minutes to one hour. The aggregated data from eye-tracking experiment and interviews will be combined and analyzed through data visualization techniques, content analysis, and grounded theory model. A summary of results will be available at K-state Research Exchange (http://krex.k-state.edu/dspace/) when the study is finalized.

ALTERNATIVE PROCEDURES OR TREATMENTS, IF ANY, THAT MIGHT BE ADVANTAGEOUS TO SUBJECT:

None.

RISKS OR DISCOMFORTS ANTICIPATED:

Risks - time, efforts, fatigue, uneasiness of revealing their behaviors. Participants will need to provide the accounting department their social security numbers to get paid for their participation. Although the researchers will not keep the number, there may be slight potential for their identification number can be revealed.

Eye-tracking technology: the Phase I study will be conducted with the Tobii TX300 eye tracker. This system uses infrared light to produce reflections on the eyes and researchers will be able to see where participants look when viewing the websites. This special type of light can be found in other scenarios including the natural environment, in candle lights, fires, and in the sun.
Risks associated with the eye tracker: exposure to the infrared lights and the possibility of seizures. Many studies have been conducted using eye-tracking and no harmful effects have been noted.

BENEFITS ANTICIPATED:

With the expected results of consumers' actual information search behaviors and decision-making processes for their online restaurant selections, the restaurant industry will benefit by identifying the key information points that impact consumers' decision-making process so that they can change their business strategies to achieve customer satisfaction.

EXTENT OF CONFIDENTIALITY:

1. Each participant will receive a $20 cash payment and be required to provide their social security numbers for accounting purposes. They will be assured the confidentiality of this information. Researchers will not keep their personal information, social security number, but collect them securely and forward the information directly to the accounting department.
2. Participants will be assured that their individual information will not be revealed but only summary of the results will be published in academic journals.
3. Participants will be assured that their personal information will not be tied to the data.
4. Participants will be assured that they can withdraw from the study at any time without penalty.
5. Participants will never be referred by their names during the recorded interview sessions.
6. Demographic information will be reported in summarized forms only.

IS COMPENSATION OR MEDICAL TREATMENT AVAILABLE IF INJURY OCCURS? ☐ Yes ☑ No

PARENTAL APPROVAL FOR MINORS:

PARENT/GUARDIAN APPROVAL SIGNATURE: Date:

Terms of participation: I understand this project is research, and that my participation is voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

(Remember that it is a requirement for the P.I. to maintain a signed and dated copy of the same consent form signed and kept by the participant).

PARTICIPANT NAME:

PARTICIPANT SIGNATURE: Date:

WITNESS TO SIGNATURE: (PROJECT STAFF) Date:

Appendix D - Online Survey (Phase III)

Cover letter

Dear Participant:

Thank you for your interest and willingness to participate in our research titled, “Seeing through the eyes of consumers’ eyes: Exploring online restaurant selection behaviors using eye tracking technology”.

We are investigating the perceptions and preferences of consumers when searching online consumer review websites for restaurant selections. You participation will allow website developers and restaurant operators to obtain a better understanding of how online information is viewed and selected by the customers. Submission of a completed questionnaire serves as your informed consent. This survey should take only 8-10 minutes to complete.

This study has been approved by the University Research Compliance Office (IRB # 9306) at Kansas State University. Should you have any questions about the study, please contact Xiaoye Li at 785-770-6078 (email: xiaoye@ksu.edu) or Dr. Junehee Kwon at 785-532-5369 (email: jkwon@ksu.edu). Your participation is voluntary, and if you have any questions about the rights of individuals in this study, please contact Dr. Rick Scheidt, Chair of the Committee on Research Involving Human Subjects, (785) 532-3224, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506.

You participation is essential to this study’s success. Thank you, in advance, for your assistance.

For compliance purposes we would like you to confirm your willingness to participate in this survey. If you agree to participate in this survey, please select "I willingly agree to participate under the terms described above" and click Continue. By this selection, you are providing your implied consent to participate in this survey.

If you wish to obtain a hard copy of the consent form, please print this page for your own record. You may stop completing this survey at any time.

If you do not agree to participate in this survey, select "I prefer not to participate" and click Continue.

- o I willingly agree to participate under the terms described above.
- o I prefer not to participate

Filtering Questions

1. Are you 18 years old or older?

- Yes
- No

2. Have you used Yelp or TripAdvisor to search for restaurants during the past six months?

- Yes
- No

Note. The sample of this research is consumers who have used the consumer review websites in their restaurant selections during the past six months. Potential participants who do not belong to this group will be excluded from the survey.

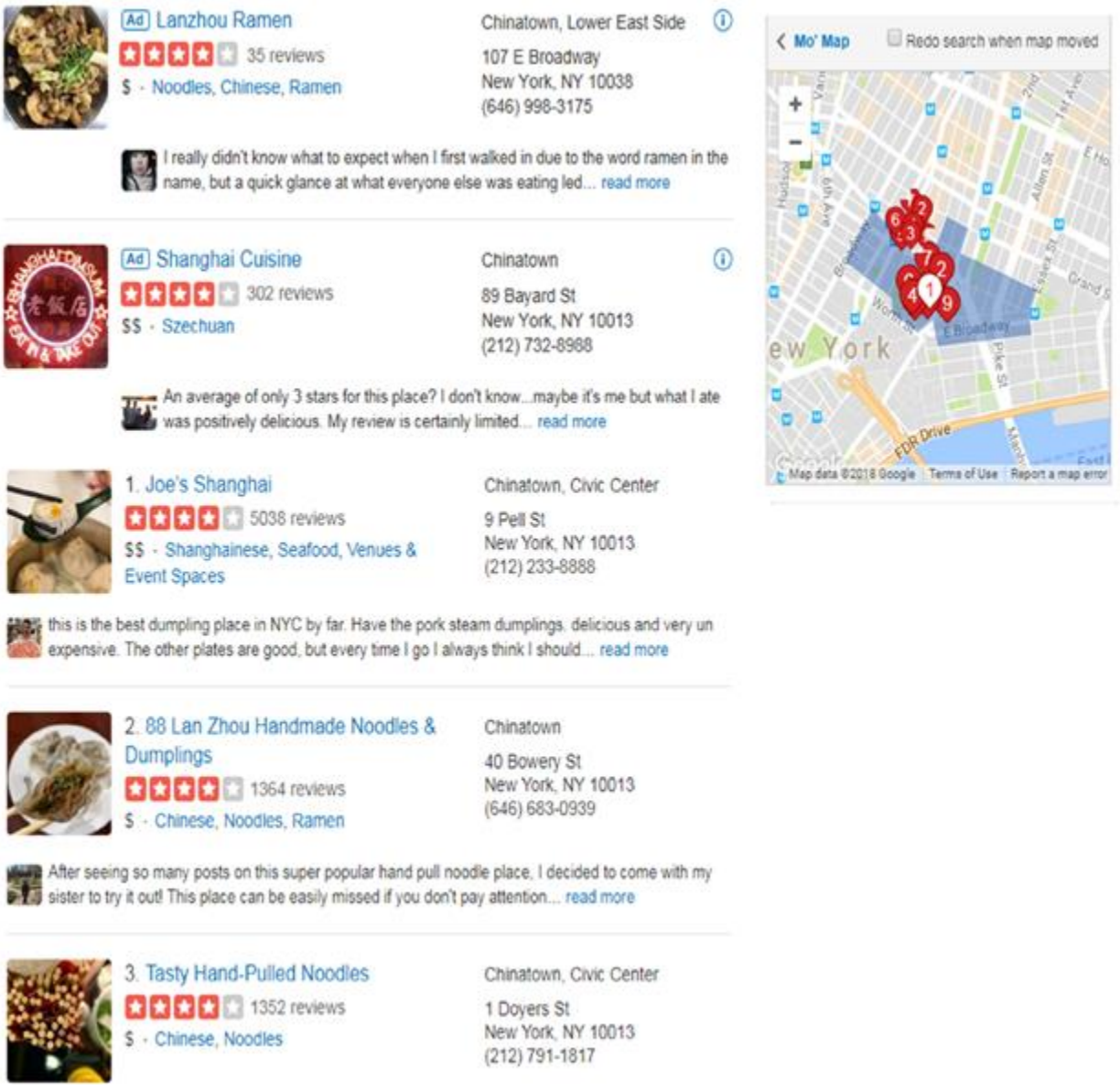
Section I: Online Information Search - Advertisement

Scenario and Instructions:

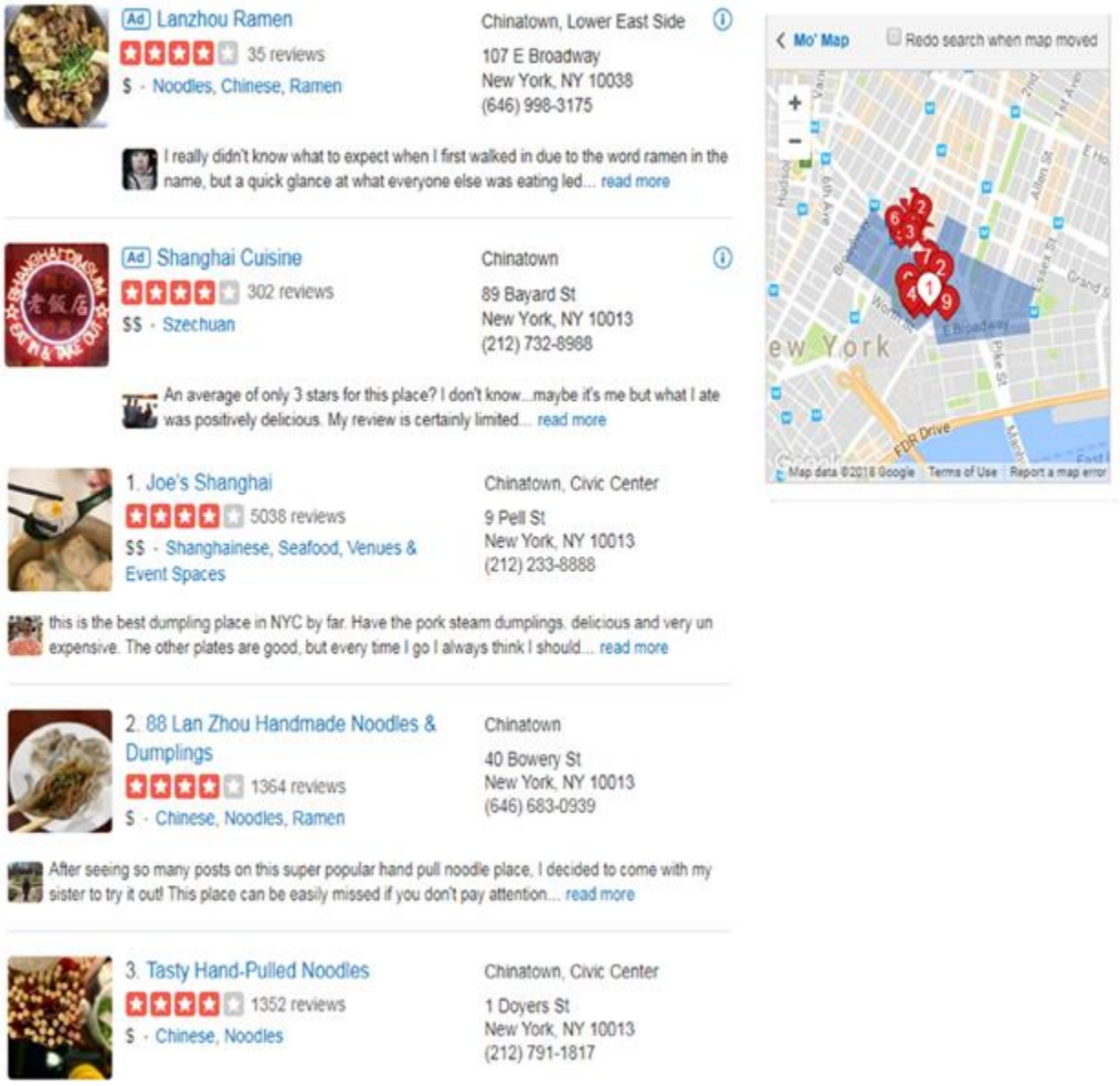
Imagine that you are traveling in a metropolitan city in the U.S. and planning to dine at a Chinese restaurant. You decide to use a consumer review website to search for the restaurant information. Initial search results re provided in the following pictures. Answer the following question after reviewing the instructions.

Note. To mimic people's actual quick decision making process online, you will be given 15 seconds to answer each question. You can answer the questions even after the time is up, so please take your time.

1. Please click the information that is interesting to you and you want to explore more from the following web page.



2. Please click the restaurant you are most likely to choose in the following list.



3. Why did you choose this restaurant? Please select five top factors you considered when you select the restaurant of choice. Rank them in the order of the importance. Please fill in the blank for an "other" choice.
   - o Advertisement
   - o Ranking
   - o Number of Reviews
   - o Price
   - o Star Ratings
   - o Types of food items served
   - o Restaurant Name
   - o Restaurant/Cuisine Type
   - o Location
   - o Image
   - o Consumer Reviews
   - o Other, please specify: _____

Section I: Online Information Search - Number of Reviews

Scenario and Instructions:

Imagine that you are traveling in a metropolitan city in the U.S. and planning to dine at a Seafood restaurant. You decide to use a consumer review website to search for the restaurant information. Initial search results re provided in the following pictures. Answer the following question after reviewing the instructions.

Note. To mimic people's actual quick decision making process online, you will be given 15 seconds to answer each question. You can answer the questions even after the time is up, so please take your time.

1. Please click the information that is interesting to you and you want to explore more from the following web page.

Bar Crudo

142 reviews

$$ - $$$

"Delicious **seafood** in the middle of town" 01/05/2018
"We split the **lobster salad**, again, very..." 04/15/2018

Cliff House

1,613 reviews

$$ - $$$

"Awesome **Seafood** and View" 07/09/2015
"... and the **Crab Cakes** were all delight..." 04/10/2017

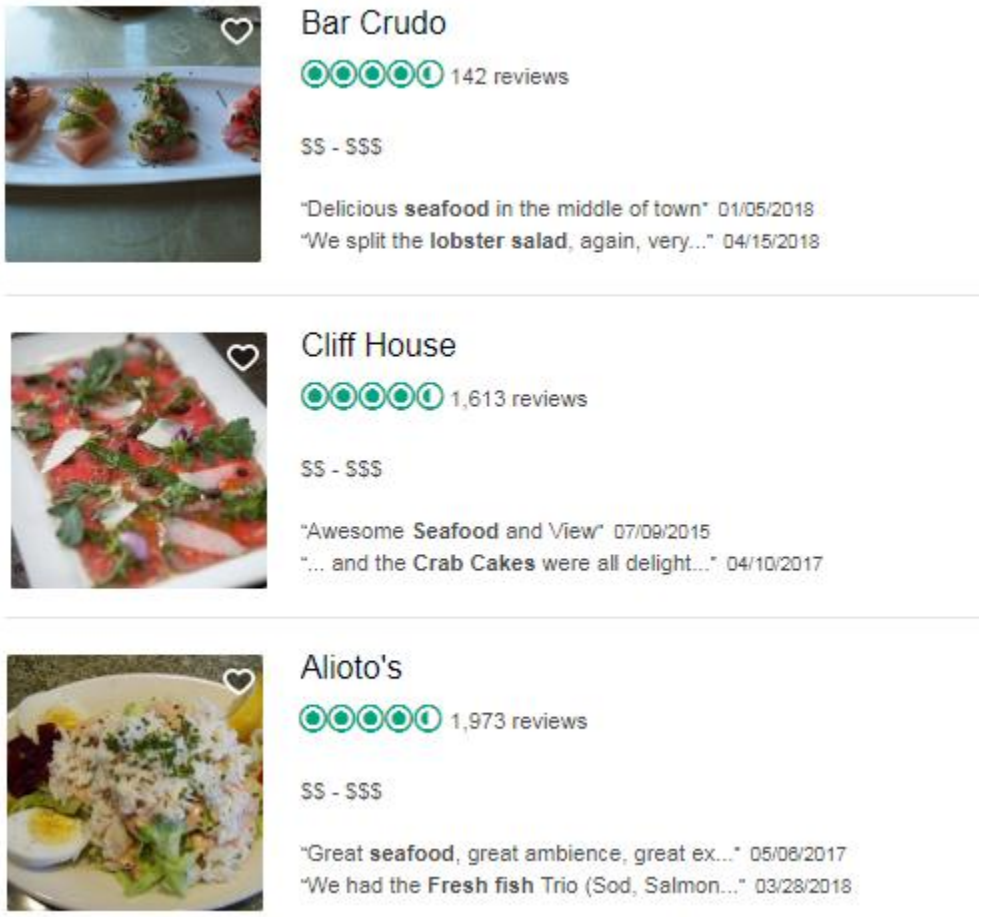
Alioto's

1,973 reviews

$$ - $$$

"Great **seafood**, great ambience, great ex..." 05/06/2017
"We had the **Fresh fish** Trio (Sod, Salmon..." 03/28/2018

2. Please click the restaurant you are most likely to dine in if you are provided with the following list of restaurants.



3. Why did you choose this restaurant? Please rank the following factors in the order of the importance to your choice. Please fill in the blank for an "other" choice.

- o Advertisement
- o Ranking
- o Number of Reviews
- o Price
- o Star Ratings
- o Types of food items served
- o Restaurant Name
- o Restaurant/Cuisine Type
- o Location
- o Image
- o Consumer Reviews
- o Other, please specify:

- **Section I: Online Information Search - Image**

Scenario and Instructions:

Imagine that you are traveling in a metropolitan city in the U.S. and planning to dine at a Seafood restaurant. You decide to use a consumer review website to search for the restaurant information. Initial search results re provided in the following pictures. Answer the following question after reviewing the instructions.

Note. To mimic people's actual quick decision making process online, you will be given 15 seconds to answer each question. You can answer the questions even after the time is up, so please take your time.

1. Please click the restaurant you are most likely to choose after viewing the following pictures.


Restaurant 1

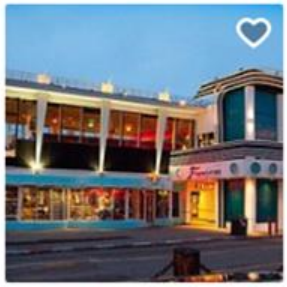

Restaurant 2


Restaurant 3


Restaurant 4


Restaurant 5

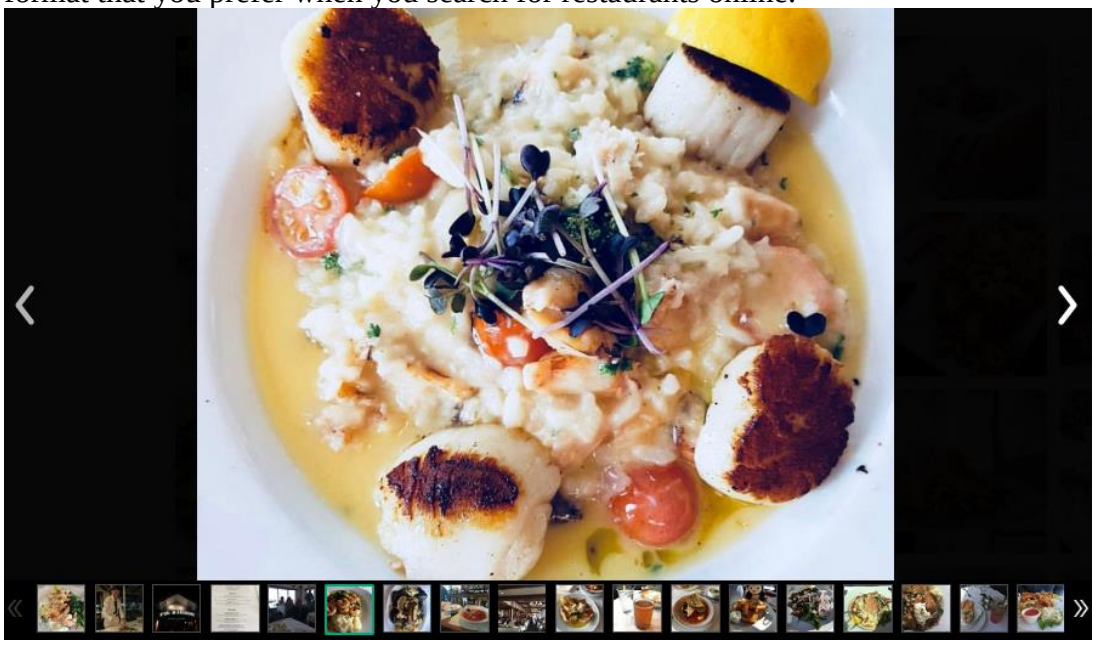

Restaurant 6


Restaurant 7


Restaurant 8

2. Why did you choose this restaurant? Please rank the following factors according to the influence on your choice.
   The food items in the picture look attractive
   The outside environment in the picture looks attractive
   The interior ambiance in the picture looks attractive
   Other, please briefly explain why:

3. If you are provided with the following two groups of images, please click the presentation format that you prefer when you search for restaurants online.



Group 1

Group 2

4. You preferred this group of images because (Please explain briefly): _____

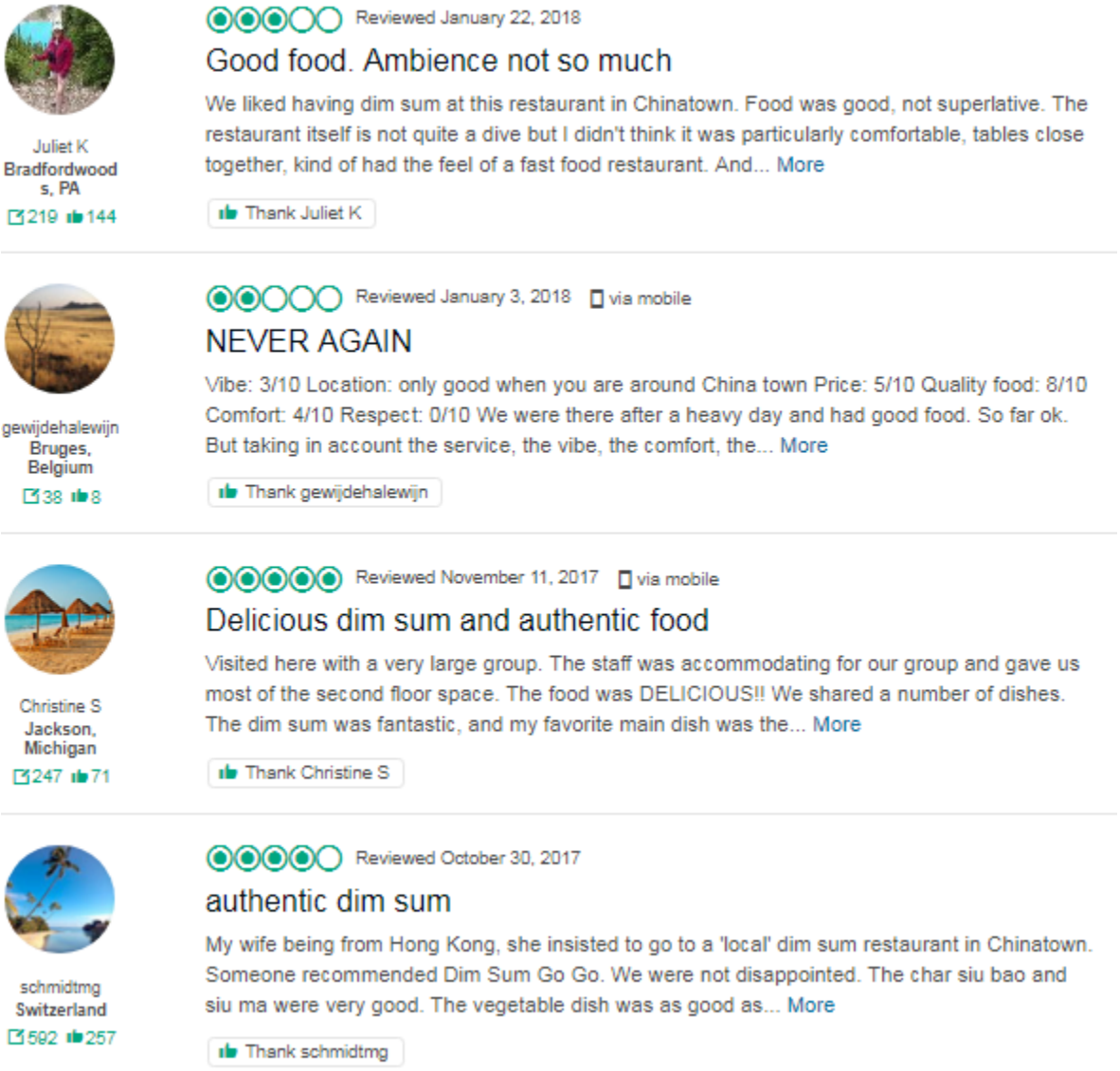
Section I: Online Information Search – Review Valence

Scenario and Instructions:

Imagine that you are traveling in a metropolitan city in the U.S. and planning to dine at a Seafood restaurant. You decide to use a consumer review website to search for the restaurant information. Initial search results re provided in the following pictures. Answer the following question after reviewing the instructions.

Note. To mimic people's actual quick decision making process online, you will be given 15 seconds to answer each question. You can answer the questions even after the time is up, so please take your time.

1. Assuming that you are provided with these consumer reviews related to a restaurant, please click the review you may want to know more details about.



2. You wanted to know more details about this consumer review because (Please briefly explain the reason): _____.

3. You are provided with a list of restaurant reviews and the three top restaurants have 4.5 stars or higher with more than 1,000 consumer reviews. In this case, how likely would you read the one or two star consumer reviews of these restaurants?
    - Very likely
    - Likely
    - Neutral/undecided
    - Unlikely
    - Very unlikely

Please briefly explain why you would likely to review them: _____.

Section II: Experience in Consumer Review Websites

1. Based on the experience with the consumer review websites such as Yelp and TripAdvisor, you consider yourself a(n)_____ for using these consumer review websites.
    - o Expert
    - o Proficient
    - o Competent
    - o Advanced beginner
    - o Novice

2. How frequently do you use consumer review websites such as Yelp or TripAdvisor for searching restaurant-related information?
    - o Very frequently (7 times or more per week)
    - o Frequently (5-6 times per week)
    - o Occasionally (3-4 times per week)
    - o Seldom (1-2 times per week)
    - o Never or very rarely (<1 time per week)

3. Please recall your recent travel experience. During the trip, how frequently have you used consumer review websites (CRWs) to search for restaurants?
    - o Very frequently (7 times or more per week)
    - o Frequently (5-6 times per week)
    - o Occasionally (3-4 times per week)
    - o Seldom (1-2 times per week)
    - o Never or very rarely (<1 time per week)

4. Please rank the following websites by moving them in the order of your preference when you search for restaurant-related information, 1 being your most favorite one, 2 being the second, and 3 being the third most favorite, etc. Please fill in the blank for an "other" choice, if applicable.

Yelp	TripAdvisor	Google	Opentable	Zomato
Zagat	Gayot	Dine	Foursquare	Citysearch

Other, please specify: _____

5. How helpful are these CRWs in assisting you making restaurant selections? Please indicate your response using a 5 point scale, 1 being not helpful at all, 3 being neutral or undecided, and 5 being very helpful.

1 – 2 – 3 – 4 – 5

6. Please rank the following devices according to the frequency of usage in your information search process for restaurant selections. Please move the following device in the order of your preference. If you do not use a specific device, please do not rank them (in other words, leave them on the left side of column). Please fill in the blank for an "other" choice.
    - o Desktop computer
    - o Laptop computer
    - o Smartphone
    - o Tablet
    - o Other, please specify: _____

Section III: Demographic Characteristics

Please tell us about yourself.

1. What is your age? Answer your age in years. _____years

2. Please indicate your gender:
    - o Male
    - o Female
    - o Prefer not to answer

3. Please indicate the highest level of education you have completed:
    - o Less than High School Degree
    - o High School Diploma or GED
    - o Associate's Degree
    - o Bachelor's Degree
    - o Some graduate credits
    - o Master's Degree or higher including professional degrees (i.e., MD, JD, PhD)
    - o Other, please specify: _____

4. What is your race? Check all that apply.
    - o White or Caucasian
    - o Black or African American
    - o American Indian or Alaska Native
    - o Asian
    - o Native Hawaiian/Pacific Islander
    - o Prefer not to answer
    - o Other, please specify: _____

5. Are you Hispanic or Latino?
    - o Yes
    - o No

(If No) What is your ethnicity? Please fill in the blank: _____.