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# Integrating Decision Aids to Enhance the Sensemaking Process of Online Information Consumers in Social Media

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INTEGRATING DECISION AIDS TO ENHANCE THE SENSEMAKING PROCESS  
OF ONLINE INFORMATION CONSUMERS IN SOCIAL MEDIA

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A Thesis  
Presented to  
the Graduate School of  
Clemson University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science  
Industrial Engineering

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by  
Amal Pradeep Ponathil  
December 2017

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## ABSTRACT

With the increase in the number of online review websites, electronic word-of-mouth (eWOM) has become a vital information source for consumers. People share their views on the Internet in different forms from blogs to reviews on various websites. At the same time, people prefer to remain anonymous or use fake virtual identities for reasons extending from privacy to enjoyment. This freedom afforded by anonymity has led people to write posts without fully considering the potential consequences of their actions. Moreover, there is increasing concern about the trustworthiness of such posts as there is typically no editorial process for verification of their authenticity and has the potential to be unreliable and false.

The initial study investigated the effects of decision aids in the form of reaction to a post and the nature of the posts on how people make sense of information and then make decisions based on anonymous posts. The study used a scenario of a user looking at reviews of a café and a fall concert and employed a 3 (reaction to a post-- no reaction, thumbs up and thumbs down) \* 2 (nature of the posts-- supporting and non-supporting) between subjects experimental design. This study primarily investigated the level of trust, the likelihood of completing a particular scenario and the confidence level in the decision using 189 participants. The results indicated that a thumbs up reaction exhibited some effect, improving the decision making slightly; however, it was not significantly different compared to no reaction. On the other hand, the thumbs down reaction made the decision making more difficult as well as created uncertainty about the decision made.

The second study investigated the effect of incorporating historical data of the user in conjunction with the reaction to a post on the sensemaking process of a user. This study used a similar scenario of a user looking at restaurant reviews and developed a 3 (reaction to a review-- thumbs up, no reaction, thumbs down) \* 2 (reputation score-- high and low) \* 2 (number of previous reviews-- high and low) \* 2 (nature of the reviews-- supporting and non-supporting) \* 2 (level of anonymity-- anonymous and non-anonymous reviews, the latter including personal details of the user) mixed experimental design. This study primarily investigated the response to the choice question about whether or not to go to the restaurant, the level of trust in the information, the likelihood of going to the restaurant and the confidence level in the decision using 200 participants. The results found that reputation scores complemented the reaction to a review, improving the trust in the information and confidence in the decision made. Users presented with a supporting review with thumbs up reaction and a high reputation had the highest scores on the dependent variables (DV), while supporting reviews with a thumbs down reaction and low reputation had the lowest. When the participants read a non-supporting review with a thumbs down reaction, they decided to go the restaurant although they were not confident in their decisions. Based on the results from the studies, we believe incorporating a user rating scale such as reputation scores could help in controlling the authenticity of the posted information and could also reduce false or biased reviews.

## DEDICATION

The thesis is dedicated to my parents, Pradeep Ponathil and Hena Ponathil, my brother, Abhishek Ponathil, and my best friend and lifelong companion, Tejaswita Patil.

## ACKNOWLEDGMENTS

I would like to express my sincere gratitude to my advisor, Dr. Kapil Chalil Madathil, for giving me this research opportunity and for his continuous support, guidance, and patience. In spite of his numerous obligations, he made sure that he helped me whenever I knocked on his door or sent him an email. I could not have imagined having a better advisor for my thesis research.

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I would like to express my appreciation to all my colleagues in my research group, especially Sruthy Orozhiyathumana Agnisarman, Shraddhaa Narasimha and Amro Khasawneh. I would like to especially thank Sruthy, who has helped me at different stages and was an ever-present partner in the lab no matter the time of day.

This work would not have been possible without the constant support of my lifelong companion, Tejaswita Patil. Through the thick and thin, you have been there for me (although, right now, you are 1104 miles away from me). Through the rollercoaster of emotions of being away from home and the stress of work, you have given me the support to cross the hurdles.

Finally, I must acknowledge the never-ending support of my family. I am so grateful for my parents; my father, who worked tirelessly for 39 long years so that my studies would not be affected at any stage, gave me this opportunity to study in the USA

and provided financial and emotional support whenever needed. I am forever indebted to them for everything.

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## CHAPTER ONE

### INTRODUCTION

Because of the Internet, online review portals have become a key source for consumers to obtain detailed information from people sharing their past experiences (Gretzel & Yoo, 2008). Consumers today rely more on electronic word-of-mouth (eWOM) for valuable information about products than consulting with friends and relatives especially for the hospitality, e-commerce and tourism industries (Litvin, Goldsmith, & Pan, 2008; Pantelidis, 2010), meaning their decision making has become influenced by this eWOM information (Goldenberg, Libai, & Muller, 2001). eWOM is defined as “any positive or negative statement made by potential, actual, or former customers about a product or company made available to a large audience of both people and institutions via the Internet” (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004). According to Bilgihan, Peng, & Kandampully (2014), 81 percent of the people using the Internet obtained advice from their followers on a purchase through social networking sites, with 74 percent of them indicating it influenced their decisions. People share this information in the form of blogs (e.g. tumblr.com), reviews on consumer review websites (e.g. yelp.com, google reviews), e-commerce websites (e.g. amazon.com, alibaba.com), or the official product website (e.g. nike.com, marriot.com).

Although there has been an increase in the number of people accessing these online reviews, they are considered an imperfect source since the information posted generally is not subject to an editorial process for verification (Johnson & Kaye, 2002). In addition, these reviews are difficult to judge since they may be biased towards a product or a service such as a

restaurant (Houser & Wooders, 2006), and the content posted on the Internet containing opinion spam, inappropriate or fake reviews written to sound authentic, can easily deceive the information consumer. Such opinion spam can range from posting negative reviews about competitors to damage their reputation to positive reviews to offset the negative reviews as in the case of the Belkin employee who hired people to write positive reviews about its products (“Belkin Caught Paying For Positive Reviews,” 2009).

As this analysis suggests, trustworthiness is a critical factor in the online review system. Trust, a fundamental element in society involving predicting the behavior, integrity, honesty, and moral character of others, is an interaction based on the evaluation of another’s motivations. A trustworthy review is one “that is perceived by the reader as the honest, sincere, truthful, and non-commercial opinion of a customer who has experienced a product or a service” (Filieri, 2016). This trust in another leaves a person vulnerable and dependent on the one who is trusted, resulting in giving up some degree of control or power (Fetchenhauer & Dunning, 2009; Tanis & Postmes, 2005). For example, one trusts another to follow traffic rules and not cause an accident, a doctor to give the correct medications or the product information or a review on a website to be accurate. This trust involves being able to predict the behavior, integrity, honesty and moral character of the other person. According to Tanis and Postmes (2005), the number of cues to personal identity, either physical or such virtual cues as pictorial or textual, impacts the level of trust. The study conducted by Thielmann, Heck, Data, Code, & Others (2016) using a trust game demonstrated that the level of trust among the participants changed based on the level of anonymity, with trust decreasing as anonymity increased. These two studies are particularly

significant today given the increasing use of the Internet and the choice of anonymity in particular.

Anonymous online forums like 4chan and 2channel, websites where users both post messages as well as read and respond to other forum members anonymously, have experienced increased use recently as people seek anonymity on social media (Stutzman, Gross, & Acquisti, 2013). People choose to remain anonymous on the Internet for several reasons, one of which is vanity (Hu, Zhao, & Huang, 2015). Users concerned about their appearance and/or personal achievements often construct a fake virtual identity to present themselves as successful. A second reason is the freedom that anonymity affords, meaning people lose their inhibitions and feel free to express themselves without worrying about the consequences. Others choose to remain anonymous for enjoyment, constructing a virtual identity that allows them to be anyone they chose (Hu, Zhao, & Huang, 2015). Concern for privacy has also led users to look for new networking websites beyond mainstream social media like Facebook and Twitter (Black, Mezzina, & Thompson, 2016).

This issue of people preferring to remain anonymous by either choosing not to include their personal information, using anonymous social media or providing fake identity with their reviews creates doubt in the minds of the readers regarding the reliability of the information since the source is not included (Rains & Scott, 2007). However, these reviews are important as they offer one avenue a consumer can use to judge a product's quality and value before buying it. For this reason, consumers tend to use eWOM to obtain information to reduce their level of uncertainty about a product (Ye, Law, Gu, & Chen, 2011).



With online reviews, the peripheral cues like physical or virtual cues are limited and may not be credible (Kusumasondjaja, Shanka, & Marchegiani, 2012). To assist the consumers in making more informed decision, many websites like yelp.com and tripadvisor.com have established supplementary decision aid systems, which include a rating score of the product, users voting in the form of thumbs up or down to a review, linked Facebook profiles of the reviewers, personal profiles on the website, photos and the number of previous reviews (e.g., yelp.com and tripadvisor.com). eBay has moved one step further to include one of the simplest and best known online reputation scoring systems, providing the reputation score of the user posting a product (Resnick & Zeckhauser, 2002). On this site, after each transaction, the buyer and seller are given the option to leave comments about each other in addition to providing a positive, negative or neutral rating based on their experiences. The person receiving the rating gains a +1 point for a positive rating, 0 for a neutral rating or a -1 for a negative rating, which is then added to the user's feedback score ("Feedback scores, stars, and your reputation," n.d.).



Although websites have implemented various decision aids to provide additional added cues for its consumers, there is limited research investigating the decision making process of online consumers when provided with eWOM and other decision aids like the reputation score of a user, reactions to a review and the number of previous reviews. To address this limitation, this thesis focuses on the sensemaking process of consumers and the subsequent decision making in a restaurant evaluation system. Specifically, this study focuses on:

1. Investigating the effectiveness of decision aids in the form of reaction to a post on the sensemaking process when online information consumers experiences anonymous information.



2. Investigating the effectiveness of integrating the historical data of a user (reputation score and number of previous reviews) with the reaction to a post on the sensemaking process of online information consumers based on online review portals.

In order to understand the user behavior, the initial study examined the effectiveness of decision aids in the form of reaction to a post in supporting the sensemaking process on anonymous social media. Responses of users to posts on an anonymous social media application named Yik Yak was used in this study because of its popularity among the college students in the U.S. (Black et al., 2016). It is a geo-location based platform launched in 2013 with approximately 3.6 million users (Smith, 2015). To facilitate the decision making process, this study used the reaction to a post as  (3) to indicate the cumulative number of users supporting a post and  (4) to show the cumulative number of users not supporting it.

The follow-up study, based on online restaurant reviews, incorporated the reputation score and number of previous reviews reviewed by the user in conjunction with the reaction to a review. Reputation scores were in the form of ratings, with  indicating that the user has been rated 5 out of 5 and  that he has been rated 1 out of 5. These scores are calculated based on the historical data the user received in the form of the number of thumbs up, the number of thumbs down and the number of flagged posts. In addition, anonymous and non-anonymous reviews were observed in this study to understand the effects of anonymity on a user's decision when different decision aids are integrated. Klein's Data/Frame Theory of Sensemaking (2006b) was used to characterize the human behavior involved in interpreting data from online review portals.

This thesis is structured as follows: Chapter 1 is the introduction followed by chapter 2 explaining Klein's Data/Frame Theory of Sensemaking (2006b). Chapter 3 investigates the effect of decision aids in the form of reaction to a post on the sensemaking process based on the posts on anonymous social media. Chapter 4 investigates the effect of integrating reputation score and number of previous reviews of a user along with the reaction to a review on the sensemaking process of online information consumers when presented with anonymous and non-anonymous reviews.

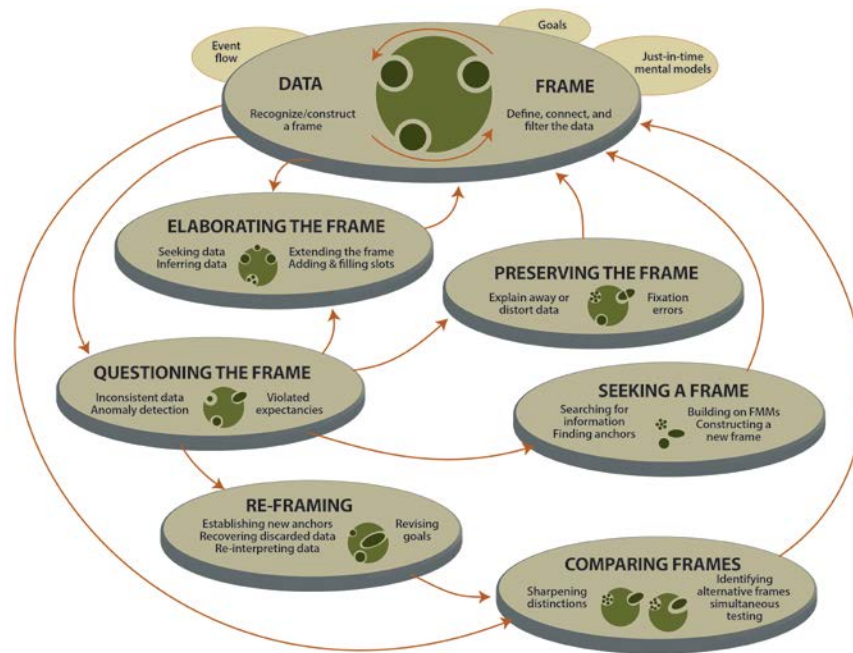
## CHAPTER TWO

### DATA FRAME THEORY OF SENSEMAKING

The sensemaking process, which is initiated in response to an inadequate understanding of a situation, consists of developing meanings, arranging events into a framework and then questioning the initial perception. Asking questions about the prior perception of a problem or situation increases our understanding of the perceived information, followed by further attempts to obtain and integrate additional information, thus leading to a fuller understanding of the situation. The ultimate goal of sensemaking is to develop an understanding that includes adequate information about the current state of the situation to support informed decision making (Battles, Dixon, Borotkanics, Rabin-Fastmen, & Kaplan, 2006). Sensemaking is, thus, the process of creating situation awareness (Adams, Tenney, & Pew, 1995; Endsley, 1995) in uncertain situations.

The macrocognitive model proposed by Klein et al. (2006a, 2006b) provides an understanding of the cognitive phenomena found in real-world scenarios. This framework consists of 6 elements: planning, problem detection, sensemaking, adaptation, coordination and naturalistic decision making. Sensemaking, which is a key function in this model, is based on the Data Frame Theory of Knowledge Representation proposed by Minsky (1975), who suggested that when people identify a new situation requiring a substantial change in their current viewpoints, they select a structure from memory, called a frame, which is then adapted to fit the new context.

According to Klein et al. (2007), humans try to make sense of a situation by starting from an explanatory framework, which organizes relationships as causal, spatial, temporal or functional. Specifically, a frame facilitates defining the elements in the scenario and identifying their significance within a context. An important characteristic of this model is the closed loop process introduced through the Data Frame Theory, which suggests that data are used to identify this frame, which, in turn, determines what data are considered next as shown at the top of Figure 2.1 (Klein et al., 2006b).



*Figure 2.1. The Data/Frame Theory of Sensemaking (adapted from Klein et al., 2006b)*

According to this model, sensemaking includes the seven activities of mapping the data to the frame, elaborating a frame, questioning a frame, preserving a frame, comparing frames, reframing, and constructing or finding a frame, any one of which can be the starting point for the process. As this analysis of the data/frame model suggests, sensemaking is a complex cognitive

activity triggered by a need to find more information and involving finding data based on an initial framework, organizing information into representations, and refining and modifying these representations based on the new information.

## CHAPTER THREE

### AN EMPIRICAL STUDY INVESTIGATING THE EFFECTIVENESS OF DECISION AIDS IN SUPPORTING THE SENSEMAKING PROCESS ON ANONYMOUS SOCIAL MEDIA

This study examined the effect of decision aids in the form of reaction to a post and the nature of the posts on the level of trust, the likelihood rating of completing a particular scenario and the confidence level of the participants in the decision made. It investigated the responses of users to anonymous posts on Yik Yak, chosen as the platform for this study because of its wide-spread use.

This chapter specifically investigates the following research questions (RQ's):

*RQ1:* What is the effect of reaction to a post and the nature of the posts on the level of trust in the posts on anonymous social media?

*RQ2:* What is the effect of reaction to a post and the nature of the posts on the likelihood of completing the scenario based on the posts on anonymous social media?

*RQ3:* What is the effect of reaction to a post and the nature of the posts on the confidence level in the decision made based on the posts on anonymous social media?

### **Hypotheses**

To study the effects of reaction to a post and the nature of the posts on the sensemaking process, the following research hypotheses were developed:

*Hypothesis 1:* When the reaction to a post changes from thumbs down to thumbs up, there will be a significant positive effect on the level of trust based on the information about the scenarios.

*Hypothesis 2:* A person is more likely to go to a cafe/fall concert when the reaction to a post changes from thumbs down to thumbs up.

*Hypothesis 3:* When the reaction to a post changes from thumbs down to thumbs up, there will be a significant positive effect on the confidence level in the decision made.

### **Participants**

A total of 196 participants with a mean age of 31 (SD=10.21) completed the experimental study, with seven responses being deleted because they were incomplete. Each participant completed one randomly assigned condition from the six explained in the experimental design section. The demographic data of the participants in the study are provided in Table 3.1:

*Table 3.1.* Demographic data (N=189)

Variable	Number	%
Gender		
Male	75	39.7
Female	114	60.3
Education		
High School	18	9.5
Some college	68	36.0
Associate's degree	13	6.9
Bachelor's degree	68	36.0
Graduate degree	22	11.6
Use of smart phone		
Yes	181	95.8

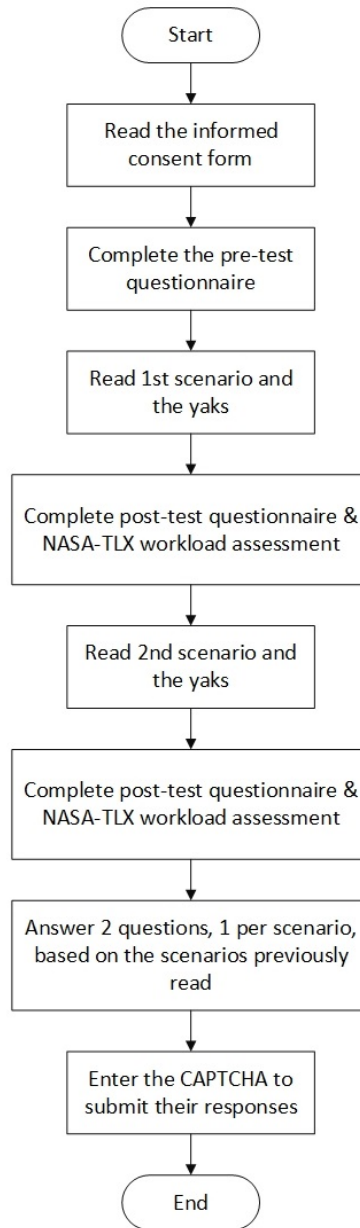
No	8	4.2
Use of social networking sites like Facebook, LinkedIn or Twitter		
Yes	182	96.3
No	7	3.7
Frequency of social network site visit		
Less often	3	1.6
1 to 2 days a week	7	3.7
3 to 5 days a week	18	9.5
About once a day	32	16.9
Several times a day	126	66.7
Missing	3	1.6

---

### **Scenarios**

The study was created using the Qualtrics research suite, which was also used to record the experimental data. Participants accessed the study and completed it through Amazon Mechanical Turk. As shown in Figure 3.1, the experimental study was divided into 4 parts: Initial pre-test demographic questionnaire, 2 experimental scenarios and a final set of questions based on the scenarios. Since almost half of the content on Yik Yak is based on campus life and announcements, we chose two scenarios, one based on a cafe and the second on an annual fall concert on campus (Black et al., 2016). The two scenarios were followed by either 10 supporting posts or 10 non-supporting posts.





*Figure 3.1* Flow chart outlining the procedure for initial pilot study

The posts were downloaded from the Yik Yak application and were chosen by analyzing their emotional tone using Linguistic Inquiry and Word Count (LIWC) text analysis technology (Pennebaker, Francis, & Booth, 2001). The emotional tone score ranges from 0 to 100, with a

high score (towards 100) being associated with a positive tone, i.e. being supportive, and a low score (towards 0) with a negative tone, i.e. being non-supportive. For this study, we consistently chose the supportive posts with emotional tone scores of 99 and non-supportive posts with scores of 1.

## Experimental Design

The study used a between subject experimental design. The independent variables in this study included the nature of the posts and the reaction to a post provided.

Nature of the posts: Nature of the posts was examined at two levels-- supporting posts and non-supporting posts.

Reaction to a post: Reaction to a post was examined at three levels-- no reaction, thumbs up and thumbs down.

Table 3.2 lists the nature of the posts and the reaction to a post for each study condition.

Table 3.2. Examples of posts provided in each condition

Study Condition	Nature	Reaction to a post	Example
1	Supporting posts	No reaction	My calamari pizza from the new cafe is amazing.
2	Non-supporting posts	No reaction	If you're looking for some revenge, just get them a slice of pizza from the new pizza place and call it even.
3	Supporting posts	Thumbs up (👍)	This new cafe is easily one of the best places I've gone downtown. 👍 (3) 👎 (0)

4	Non-supporting posts	Thumbs down (👎)	This new pizza place's ratings are going down faster than my GPA. 👍 (0) 👎 (-4)
5	Supporting posts	Thumbs down (👎)	Hit the jackpot! Came home with free leftovers from the delicious new pizza place. 👍 (0) 👎 (-1)
6	Non-supporting posts	Thumbs up (👍)	Just fed an entire pizza to my dog because I couldn't make myself eat it. 👍 (5) 👎 (0)

### Procedure

On the day of the study, the participants first read the informed consent form and agreed to participate. Subsequently, the participants completed a pre-test questionnaire asking for demographic information as well as information regarding their experiences using the Internet and social networking websites. Next, they read the scenarios and the respective posts. To minimize order effects, the posts after the scenario were presented in a randomized order. Each scenario set was followed by a post-test questionnaire and the NASA-TLX workload assessment. The participants were then asked to answer 2 questions, 1 per scenario, based on the scenarios that they viewed. Upon completing the experimental study, the participants entered a CAPTCHA to submit their responses and to qualify for the monetary gift of \$1 offered on completion.

### Dependent Variables

Five variables were analyzed to determine the effect of the between-subject factors: Level of trust in the information (measured on a scale from 0-7, 0 being lowest and 7 being highest),

likelihood of going to cafe/fall concert (measured on a 7-point Likert scale, ranging from extremely unlikely to extremely likely), confidence level in the decision (measured on a scale from 0-7, 0 being lowest and 7 being highest), the NASA-TLX workload (measured on a scale from 0-100) and the final scenario-based questions (measured on a 7-point Likert scale, ranging from strongly disagree to strongly agree).

## Results

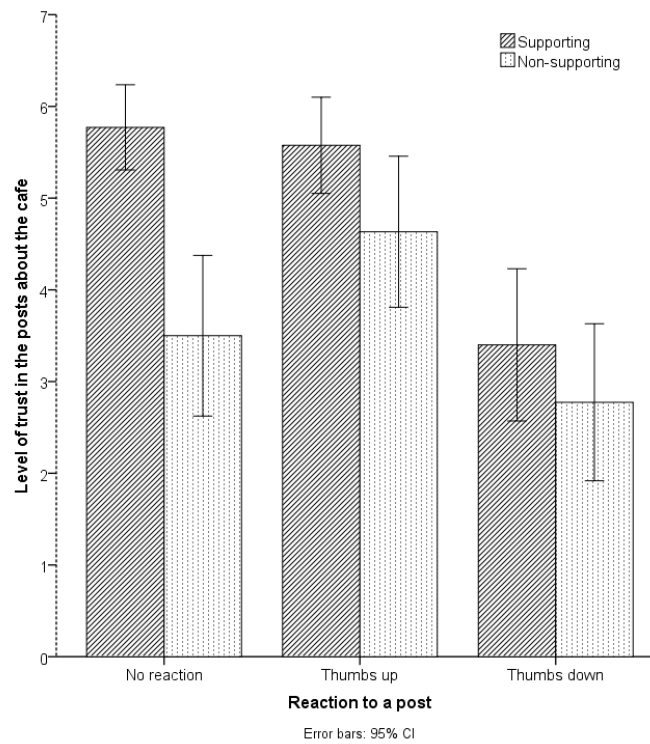
IBM SPSS Statistics 23 was used to analyze the data. To determine the presence of significant differences between nature of the posts and reaction to a post, a two-way ANOVA was used with a 95% confidence interval. Statistical significance of a two-way interaction, a simple main effect and all pairwise comparisons were accepted at an LSD-adjusted alpha level ( $\alpha=0.05$ ).

### *Level of trust in the posts about the cafe:*

There was a statistically significant interaction between nature of the posts and reaction to a post for the level of trust,  $F(2, 183) = 18.254$ ,  $p < 0.001$ ,  $\eta^2 = 0.166$ . Based on the nature of the posts, there was a statistically significant difference in the mean level of trust scores for the reaction to a post with supporting posts,  $F(2, 183) = 13.432$ ,  $p < 0.001$ ,  $\eta^2 = 0.128$  and with non-supporting posts,  $F(2, 183) = 6.610$ ,  $p = 0.002$ ,  $\eta^2 = 0.067$ .

The mean level of trust scores for supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 5.77 (SD = 1.35), 5.58 (SD = 1.48) and 3.40 (SD = 2.22), respectively. As shown in Figure 3.2, supporting posts with no reaction had a statistically significant higher mean level of trust score than thumbs down reaction, 2.371, 95% CI [1.385,

3.358],  $p < 0.001$ . Supporting posts with thumbs up reaction had a statistically significant higher mean level of trust score than thumbs down reaction, 2.176, 95% CI [1.175, 3.176],  $p < 0.001$ .



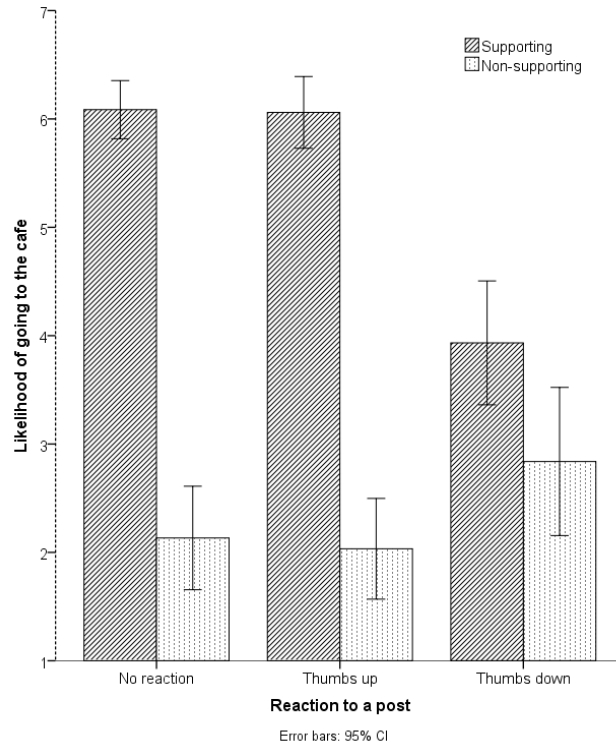
*Figure 3.2.* Effect of reaction to a post on level of trust in the posts about going to the cafe

The mean level of trust scores for non-supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 3.50 (SD = 2.35), 4.63 (SD = 2.21) and 2.77 (SD = 2.33), respectively. Non-supporting posts with thumbs up reaction had a statistically significant higher mean level of trust score than no reaction, 1.133, 95% CI [0.109, 2.157],  $p = 0.030$ , and thumbs down reaction, 1.859, 95% CI [0.843, 2.875],  $p < 0.001$ .

#### *Likelihood of going to the cafe:*

There was a statistically significant interaction between nature of the posts and reaction to a post for the likelihood of going to the cafe,  $F(2, 183) = 9.779$ ,  $p < 0.001$ ,  $\eta^2 = .097$ . Based

on nature of the posts, there was a statistically significant difference in mean likelihood of going to the cafe scores for reaction to a post with supporting posts,  $F(2,183) = 27.866$ ,  $p < 0.001$ ,  $\eta^2 = 0.233$  and with non-supporting posts,  $F(2,183) = 3.452$ ,  $p = 0.034$ ,  $\eta^2 = 0.036$ .



*Figure 3.3.* Effect of reaction to a post on likelihood of going to the cafe

The mean scores for likelihood of going to the cafe for supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 6.09 (SD = 0.781), 6.06 (SD = 0.933) and 3.93 (SD = 1.53), respectively. As shown in Figure 3.3, supporting posts with no reaction had a statistically significant higher mean likelihood of going to the cafe score than thumbs down reaction, 2.152, 95% CI [1.510, 2.795],  $p < 0.001$ . Supporting posts with thumbs up reaction had a statistically significant higher mean likelihood of going to the cafe score than thumbs down reaction, 2.127, 95% CI [1.476, 2.778],  $p < 0.001$ .

The mean likelihood of going to the cafe scores for non-supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 2.13 (SD = 1.279), 2.03 (SD = 1.245) and 2.84 (SD = 1.864), respectively. Non-supporting posts with thumbs down reaction had a statistically significant higher mean likelihood of going to the cafe score than no reaction, 0.705, 95% CI [0.044, 1.366],  $p = 0.037$  and thumbs up reaction, 0.805, 95% CI [0.144, 1.466],  $p = 0.017$ .

*Confidence level in the decision about the cafe:*

There was a statistically significant interaction between nature of the posts and reaction to a post on level of confidence,  $F(2, 183) = 4.902$ ,  $p = 0.008$ ,  $\eta^2 = .051$ . Based on the nature of the posts, there was a statistically significant difference in mean level of confidence scores for the reaction to a post with supporting posts,  $F(2,183) = 6.511$ ,  $p = 0.002$ ,  $\eta^2 = 0.066$ .

The mean level of confidence scores for supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 6.06 (SD = 0.82), 5.83 (SD = 1.18) and 4.87 (SD = 1.48), respectively. As shown in Figure 3.4, supporting posts with no reaction had a statistically significant higher mean level of confidence score than thumbs down reaction, 1.195, 95% CI [0.511, 1.879],  $p = 0.001$ . Supporting posts with thumbs up reaction had a statistically significant higher mean level of confidence score than thumbs down reaction, 0.962, 95% CI [0.268, 1.656],  $p = 0.007$ .

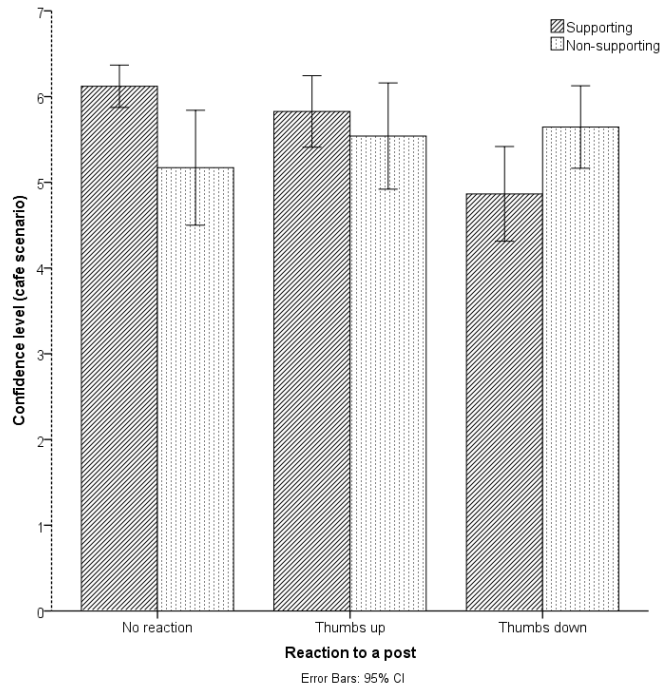


Figure 3.4. Effect of reaction to a post on confidence level when making a decision on the cafe

#### *Level of trust in the posts about the fall concert:*

There was a statistically significant interaction between nature of the posts and reaction to a post for the level of trust,  $F(2, 183) = 6.855$ ,  $p = 0.001$ ,  $\eta^2 = 0.070$ . Based on the nature of the posts, there was a statistically significant difference in the mean level of trust scores for the reaction to a post with supporting posts,  $F(2, 183) = 10.815$ ,  $p < 0.001$ ,  $\eta^2 = 0.106$ .

The mean level of trust scores for supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 4.97 (SD = 1.64), 5.42 (SD = 1.54) and 3.37 (SD = 2.04), respectively. As shown in Figure 3.5, supporting posts with no reaction had a statistically significant higher mean level of trust score than thumbs down reaction, 1.605, 95% CI [0.704, 2.505],  $p = 0.001$ . Supporting posts with thumbs up reaction had a statistically significant higher mean level of trust score than thumbs down reaction, 2.058, 95% CI [1.145, 2.971],  $p < 0.001$ .



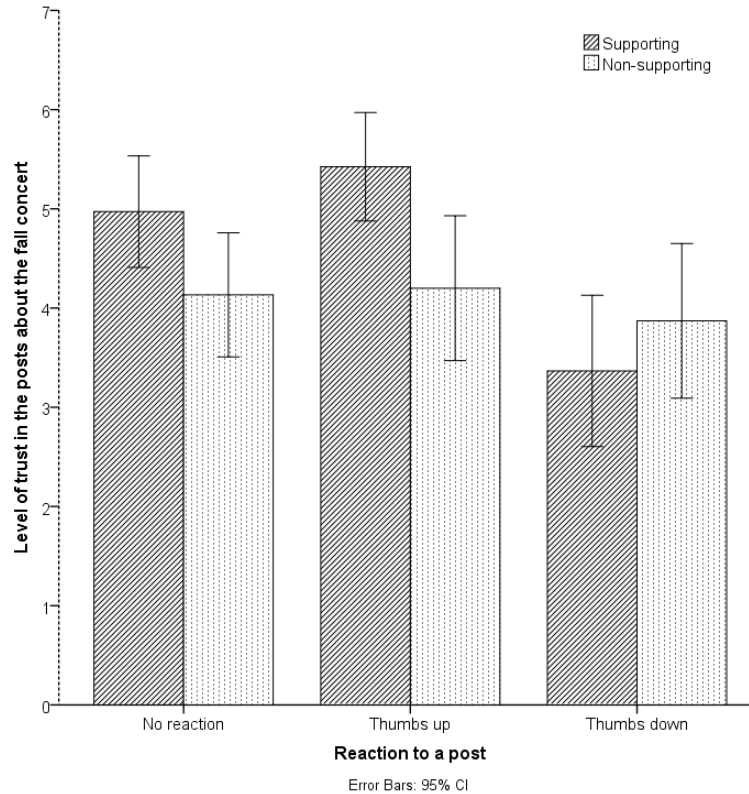


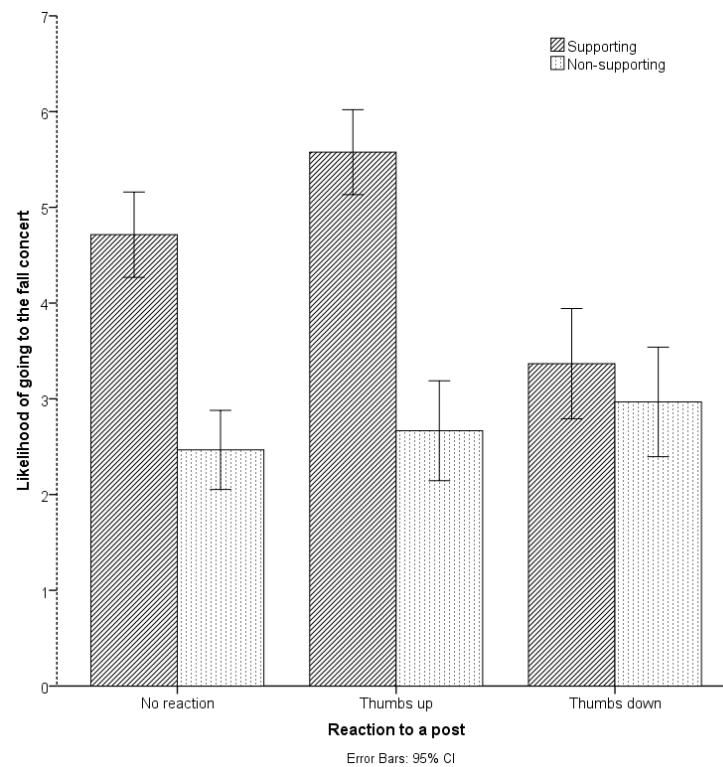
Figure 3.5. Effect of reaction to a post on level of trust in the posts about the fall concert

#### *Likelihood of going to the fall concert:*

There was a statistically significant interaction between nature of the posts and reaction to a post for the likelihood of going to the fall concert,  $F(2, 183) = 8.457$ ,  $p < 0.001$ ,  $\eta^2 = 0.085$ . Based on the nature of the posts, there was a statistically significant difference in the mean likelihood scores for the reaction to a post with supporting posts,  $F(2, 183) = 20.780$ ,  $p < 0.001$ ,  $\eta^2 = 0.185$ .

The mean likelihood scores for supporting posts with no reaction, thumbs up reaction and thumbs down reaction were 4.71 (SD = 1.296), 5.58 (SD = 1.25) and 3.37 (SD = 1.542), respectively. As shown in Figure 3.6, supporting posts with no reaction had a statistically

significant higher mean likelihood score than thumbs down reaction, 1.348, 95% CI [0.677, 2.018],  $p < 0.001$ . Supporting posts with thumbs up reaction had a statistically significant higher mean likelihood score than no reaction, 0.861, 95% CI [0.208, 1.515],  $p = 0.010$  and thumbs down reaction, 2.209, 95% CI [1.529, 2.889],  $p < 0.001$ .



*Figure 3.6.* Effect of reaction to a post on likelihood of going to the fall concert

Since NASA-TLX workload and the final scenario-based questions were not significant, they are not included in the results and discussion.

## Discussion

This study focused on identifying the effect of decision aids in the form of reaction to a post, nature of the posts, or both on the sensemaking process. The results for the level of trust for

the supporting posts and thumbs up reaction suggest that these participants continued to obtain more details, thus elaborating their sensemaking frame (Klein et al., 2006b). Since thumbs up reaction for supporting posts are logical, the participants did not seem to question the frame. Thus, as the participants read the posts, their initial data-frame was confirmed, a conclusion supported by the fact that this condition scored a high level of trust. A thumbs down reaction for supporting posts appears illogical and contradictory, an inconsistency that led the participants to question the information, suggesting they doubted its credibility. They read the posts, searching for new information to serve as anchors. However, since this situation was inconsistent, the level of trust was, as expected, the lowest compared to thumbs up reaction and no reaction. With no reaction, initially the participants tried to estimate the quality of the data presented. They elaborated their frames by searching for more data by reading more posts. In this situation, it appears logical that posts supporting a frame would gain a higher trust level than posts that did not support it, a hypothesis confirmed by the high level of trust for supporting posts with no reaction.

Thumbs up reaction for non-supporting posts was again an illogical situation. The participants initially questioned the information to judge its plausibility. Since the data were associated with a thumbs up reaction, the participants seemed to preserve their frame, concluding that a thumbs up reaction for non-supporting posts meant that the frame was indeed negative. This conclusion resulted in a high trust level for the participants. With a thumbs down reaction for non-supporting posts, the participants elaborated their frames as they read through the posts. As expected this situation received the lowest trust level compared to thumbs up reaction and no

reaction. Non-supporting posts with no reaction had a trust level in between the thumbs up reaction and thumbs down reaction scores. However, compared to no reaction for supporting posts, it earned a lower trust level, perhaps due to the negative impact of their lack of support on the participants.

For the condition of supporting posts and a thumbs up reaction, similar to level of trust, the participants sought additional data to elaborate the frame for the likelihood rating. Because this situation was logical, data were not questioned and received a high likelihood rating. Analogous to the level of trust variable, the thumbs down reaction for supporting posts seemed illogical to the participants. As they read the posts, they looked for more information to serve as anchors. Because of the inconsistency, the likelihood rating was the lowest compared to thumbs up reaction and no reaction. With no reaction, participants surmised the data quality and then elaborated the frame by inferring additional information. As with the level of trust, the posts supporting a frame received a higher likelihood rating than those that did not support it, resulting in a high likelihood rating for supporting posts with no reaction.

Non-supporting posts for the likelihood rating was significant only for the cafe scenario. For a thumbs down reaction with non-supporting posts, the participants seemed to elaborate the frame with additional posts. Since a thumbs down reaction with non-supporting posts for the likelihood rating actually meant that the cafe was not bad, the participants did not question the frame. Thus, the likelihood rating received was the highest as the thumbs down reaction for non-supporting posts meant that the frame was indeed positive. A thumbs up reaction with non-supporting posts meant that the cafe was not good enough and, hence, the likelihood of going to

the cafe had a low rating. Non-supporting posts with no reaction also received a low likelihood rating, again perhaps because of the negative impact of the non-supporting posts.

The confidence level in the decision made for supporting posts and the different reaction to a post also exhibited a pattern similar to these two dependent variables.

### **Conclusion and Future Work**

The study found that reaction to a post and the nature of the posts have a significant interaction effect. Thumbs up reaction for supporting posts resulted in slight improvement in the overall decision making process, while thumbs down reaction for supporting posts made it difficult to make a decision. The thumbs down reaction for supporting posts caused a loss of trust, a lower likelihood rating and a loss of confidence in the decision. This study found that the mean values (scores) of the dependent variables were highest for supporting posts and lowest for non-supporting posts, suggesting that it was easier for the participants to accept positivity than negativity. The results indicated that only the values for the likelihood rating for the fall concert with thumbs up reaction for supporting posts were significantly higher than the no reaction condition, suggesting they had a limited positive effect compared to no reaction. An illogical situation (thumbs down reaction for supporting posts) resulted in lower decision making and mean values. In conclusion, we can say that thumbs up reaction make decision making slightly better than the no reaction condition. However, thumbs down reaction result in a more difficult decision making process and a lack of certainty in the decision made. To improve decision making, an alternate decision support system such as reputation scores could be incorporated to increase the level of trust in the information found on anonymous social media.

## CHAPTER FOUR

### DECISION AIDS IN ONLINE REVIEW PORTALS: AN EMPIRICAL STUDY INVESTIGATING THEIR EFFECTIVENESS IN THE SENSEMAKING PROCESS OF ONLINE INFORMATION CONSUMERS

The initial pilot study showed that reaction to a post can affect the decision making process, in particular highlighting the negative posts as their trust and likelihood rating scores were low. However, reaction to a post alone did not necessarily lead to an appropriate decision as they did not exhibit a significant effective positive impact compared to the no reaction condition. With a focus on improving the overall decision making, this study will incorporate historical data of the user along with reaction to a post.

Different websites have incorporated decision aids to provide additional cues for the users to make an informed decision. But there has been limited research on the decision making process of online consumers when decision aids like reputation score of a user and reaction to a review are included with eWOM especially related to restaurant evaluation. Specifically, this study will examine the effect of reaction to a review, the reputation score of the user and the number of previous reviews posted by the user on the response to the choice question about whether or not to go to the restaurant, the confidence level in the decision, the level of trust in the information and the likelihood of going to the restaurant. To understand how anonymity affects the decision making of a user, both anonymous and non-anonymous reviews were observed in the study along with different decision aids.

This chapter investigates the following research questions (RQ's):

*RQ1:* What is the effect of decision aids and level of anonymity on the level of trust in the reviews?

*RQ2:* What is the effect of decision aids and level of anonymity on the likelihood of completing the scenario based on the reviews?

*RQ3:* What is the effect of decision aids and level of anonymity on the level of confidence in the decision based on the reviews?

### **Hypotheses**

To study the effects of decision aids and the level of anonymity on the decision-making process, the following research hypotheses were developed:

*Hypothesis 1:* The number of previous reviews moderates the relationship between the reputation score and the level of trust. Specifically, the level of trust for a review increases as the number of previous reviews and the reputation score increase.

*Hypothesis 2:* The relationship between the likelihood of going to a restaurant and the reputation score is moderated by the number of previous reviews. Specifically, the likelihood to visit a restaurant increases as the number of previous reviews and the reputation score increase.

*Hypothesis 3:* The reputation score moderates the relationship between the reaction to a review and the level of trust. Specifically, the participants will have an increased level of trust in the review as the reputation score increases and the reaction to a review changes from people disapproving it (thumbs down) to approving it (thumbs up).

*Hypothesis 4:* The relationship between the likelihood of going to a restaurant and the reaction to a review is moderated by the reputation score. Specifically, the likelihood of going to a restaurant increases as the reputation score increases and the reaction to a review changes from people disapproving it (thumbs down) to approving it (thumbs up).

## Participants

A total of 200 participants with a mean age of 36.8 (SD=9.54) completed the experimental study. These participants, recruited from Amazon Mechanical Turk, a crowdsourcing marketplace, were Mechanical Turk Masters, members of the elite group of participants who have historically completed HITs (Human Intelligence Tasks) with a high accuracy rate with 99.0% approval (Amazon Mechanical Turk, 2012). Each participant completed one randomly assigned condition. The demographic data of the participants in the study are provided in Table 4.1:

*Table 4.1.* Demographic data (N=200)

Variable	Number	%
Gender		
Male	107	53.5
Female	93	46.5
Education		
High School	26	13.0
Some college	49	24.5
Associate's degree	26	13.0
Bachelor's degree	85	42.5
Graduate degree	14	7.0
Use of smart phone		



Yes	197	98.5
No	3	1.5
Use of social networking sites like Facebook, LinkedIn or Twitter		
Yes	197	98.5
No	3	1.5
Frequency of social network site visit		
Less often	4	2.0
1 to 2 days a week	17	8.5
3 to 5 days a week	24	12.0
About once a day	53	26.5
Several times a day	99	49.5
Missing	3	1.5

---

### **Apparatus**

The study was created and the data collected using the Qualtrics Research Suite, and the participants accessed and completed it through Amazon Mechanical Turk. It was divided into three sections: an initial pre-test demographic questionnaire; a set of 12 single restaurant reviews and related questions including on whether or not to go to the restaurant, the level of trust in the information, the likelihood of going to the restaurant and the level of confidence in the decision made; and the NASA-TLX workload assessment questionnaire (Hart & Staveland, 1988). Since past research has shown that individuals frequently use yelp.com, a crowd sourcing review

platform for information seeking purposes (Hicks et al., 2012), we downloaded the reviews related to the food and the service of the restaurant from this website.

The reviews were selected based on an analysis of their emotional tone using Linguistic Inquiry and Word Count (LIWC) text analysis technology (Pennebaker, Francis, & Booth, 2001). The emotional tone scores range from 0 to 100, with a score near 100 suggesting a positive tone, i.e, a supportive review, and a score near 0 suggesting a negative tone, i.e, a non-supportive review. In this study, we consistently chose reviews with emotional tone scores of 99 for the supporting reviews and 1 for the non-supporting ones. In addition, to understand the valence of the experimental stimuli, pilot studies were conducted with 10 participants, where each participant was provided with the review and was asked to categorize it as a supporting or non-supporting review. An interrater reliability analysis using the Fleiss' Kappa statistic was performed to determine consistency among raters for the responses. The raters were in complete agreement on the valence of the review stimuli used for the study.

### **Experimental Design**

The study used a mixed experimental design with the reaction to a review, the reputation score and the number of previous reviews being the within-subject variables and the nature of the reviews and the level of anonymity being the between-subjects variables.

- Reaction to a review: Reaction to a review was examined at three levels: no reaction, thumbs up and thumbs down.
- Reputation Score: Reputation score was examined at two levels: high reputation (5 star) and low reputation (1 star).

- Number of Previous Reviews: Number of previous reviews was examined at two levels: high number of previous reviews and low number of previous reviews.
- Nature of Reviews: Nature of reviews was examined at two levels: supporting reviews and non-supporting reviews.
- Level of Anonymity: Level of anonymity was examined at two levels: completely anonymous reviews (no personal information was provided) and non-anonymous reviews (personal information such as name, age and location was provided).

Examples of the reviews used in this study can be seen in Figures 4.1 through 4.3 below.

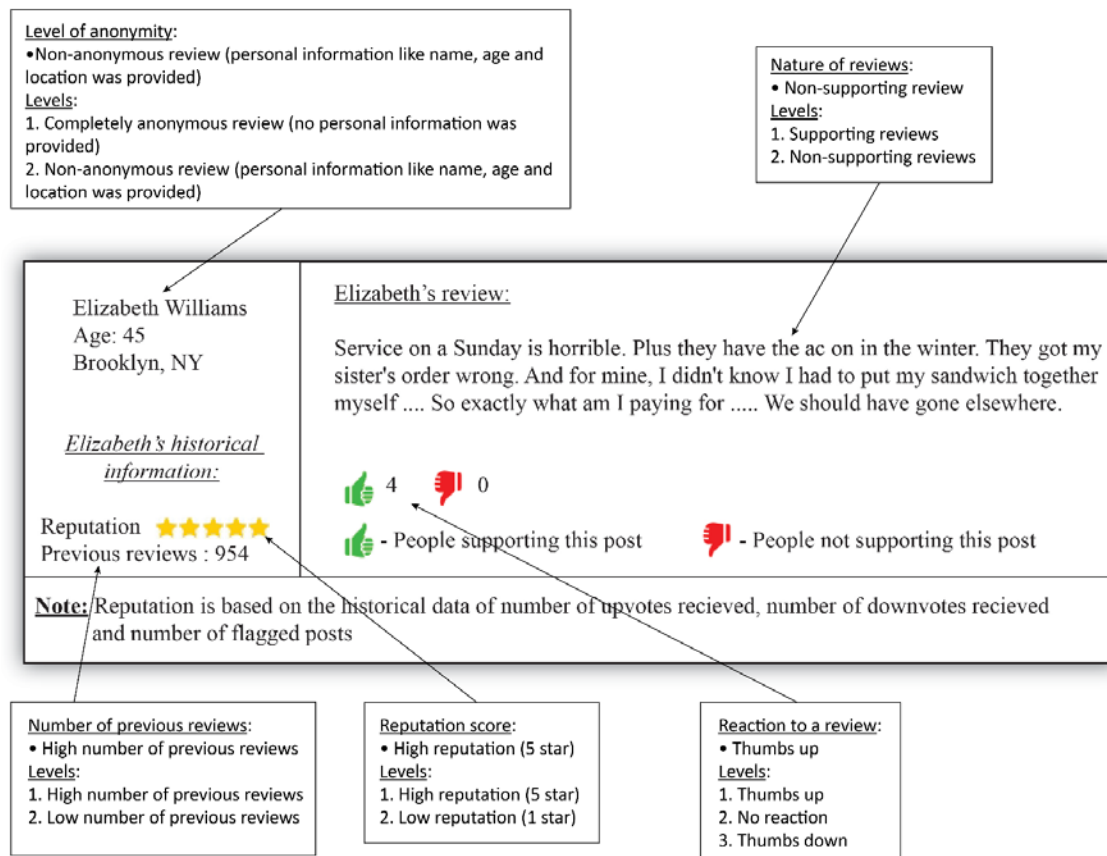


Figure 4.1. Non-anonymous and non-supporting review of a restaurant with thumbs up, high reputation and high number of previous reviews

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**


 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 950</p>	<p><u>User review:</u></p> <p>Amazing food! Great place for brunch. Came here with a my friends for my birth-day brunch and ordered the upland cheeseburger. DELICIOUS. Definitely filling and service is super great. Would definitely recommend coming here as a cute brunch or dinner with a few friends!</p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments</p>	

Figure 4.2. Anonymous and supporting user review of a restaurant with no reaction, high reputation and high number of previous reviews





<p>Sarah Jones Age: 37 Astoria,NY</p> <p><u>Sarah's historical information:</u></p> <p>Reputation ★☆☆☆☆</p> <p>Previous reviews : 13</p>	<p><u>Sarah's review:</u></p> <p>This place has the worst service I have ever had... I went back a second time thinking it was just an off-night. BIG MISTAKE. Both times the wait was endless. Finding a server nearly impossible. And the food??--mine literally came out 40 min AFTER my date had FINISHED theirs. CLOSE THIS PLACE NOW!</p> <div>  0  4 </div> <div>  - People supporting this post  - People not supporting this post </div>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Figure 4.3. Non-anonymous and non-supporting user review of a restaurant with thumbs down, low reputation and low number of previous reviews

### **Dependent Variables**

Five variables were analyzed to determine the effect of the independent variables: the response to the choice question about whether or not to go to the restaurant (measured on a binary scale as yes/no), the confidence level in the decision (measured on a 7-point Likert scale with 1 being the lowest and 7 being the highest), the level of trust in the information (measured on a 7-point Likert scale with 1 being the lowest and 7 being the highest), the likelihood of going to the restaurant (measured on a 7-point Likert scale ranging from extremely unlikely to extremely likely), and the NASA-TLX workload (measured on a scale from 0 to 100).

### **Procedure**

On the day of the study, participants first read the informed consent form and agreed to participate. They were then randomly assigned to one of the four study conditions shown in Figure 4.4, after which they completed a pre-test questionnaire asking for demographic information as well as information regarding their experiences using the Internet and social networks. Next, they read a review of a restaurant. To minimize order effects, the restaurant reviews were presented in a randomized order. Each review was followed by a set of questions including a question about whether or not to go to the restaurant, the level of trust in the information, the likelihood of going to the restaurant and the level of confidence in the decision made.

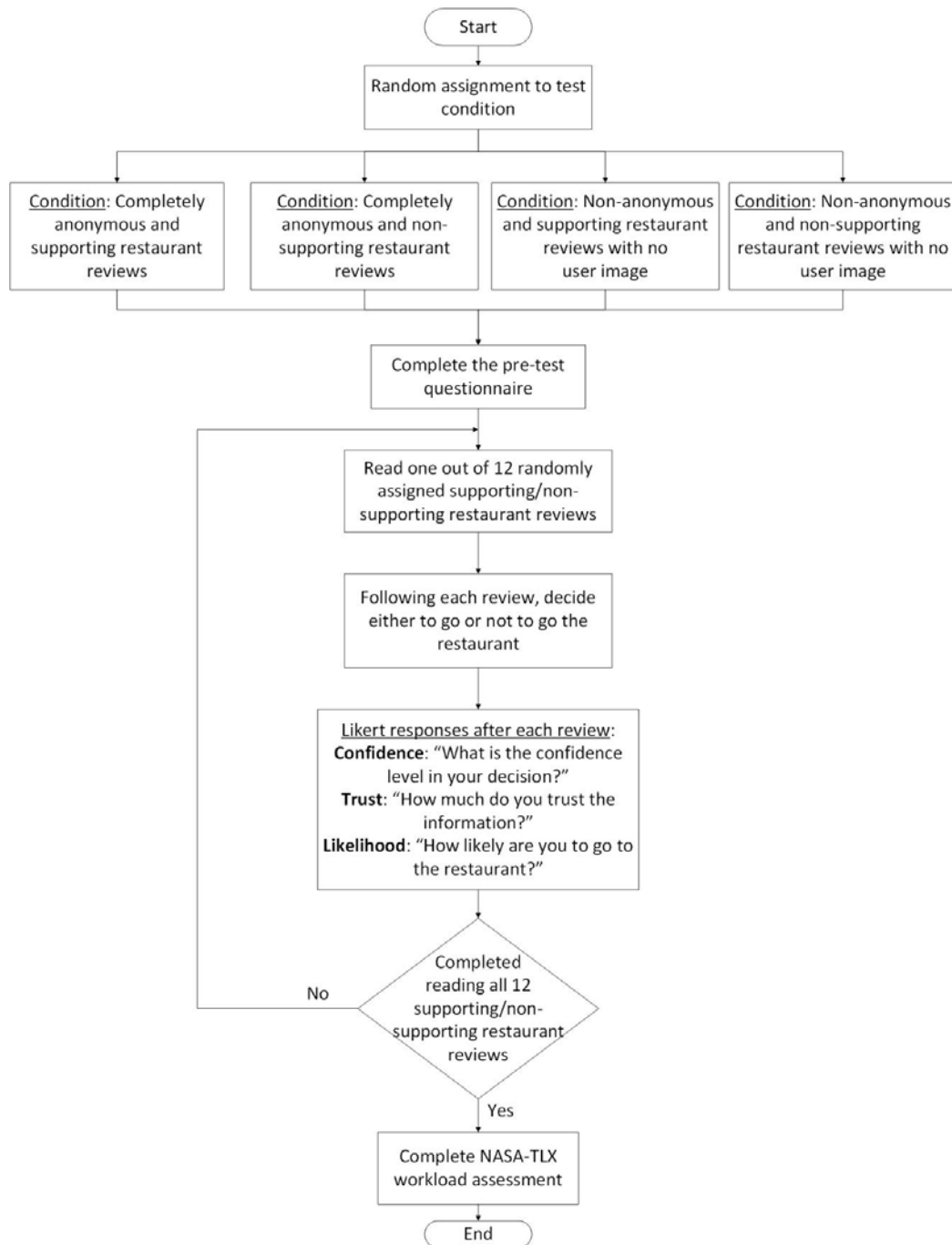


Figure 4.4. Flow chart outlining the procedure for follow-up study

After the participants went through all 12 randomly assigned restaurant reviews, they were asked to complete the NASA-TLX workload assessment. Upon completing the experimental study, the participants entered a CAPTCHA to submit their responses and to qualify for a monetary gift of \$3.00.

## **Results**

IBM SPSS Statistics 24 was used to analyze the data. An LSD adjustment was applied to the four-way interactions, three-way interactions, simple three-way interactions, simple two-way interactions and simple main effects, with statistical significance being accepted at the  $p < 0.05$  level. All simple pairwise comparisons were accepted at an LSD-adjusted alpha level of 0.05 ( $\alpha=0.05$ ).

### *Level of trust in the information:*

A five-way mixed ANOVA was conducted to determine the effects of the reaction to a review, the reputation score, the number of previous reviews, the nature of the reviews and the level of anonymity on trust. The four-way and five-way interactions were not statistically significant. For the three-way interaction effect, Mauchly's test of sphericity indicated that the assumption of sphericity was violated,  $\chi^2(2) = 10.612$ ,  $p = 0.005$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.95$ ). There was a statistically significant three-way

interaction among reaction to a review, reputation score and nature of the reviews,  $F(1.899, 372.282) = 7.472, p = 0.001$ .

The assumption of sphericity was violated for both simple two-way interaction effects based on the Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 11.183, p = 0.004$  and  $\chi^2(2) = 8.125, p = 0.017$ . As a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.902$  and  $\epsilon = 0.927$  respectively). There was a statistically significant simple two-way interaction effect between reaction to a review and reputation score for supporting reviews,  $F(1.804, 176.754) = 28.434, p < 0.001$ , but not for non-supporting reviews,  $F(1.854, 185.392) = 1.668, p = 0.193$ . The assumption of sphericity was violated for the simple main effect of reaction to a review for high reputation score and supporting reviews based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 25.691, p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.811$ ). There was a statistically significant simple main effect of reaction to a review for high reputation score and supporting reviews,  $F(1.622, 159.002) = 80.808, p < 0.001$ . The mean level of trust was 5.684 (SD = 1.18) for a thumbs up reaction, 5.658 (SD = 1.11) for no reaction and 4.498 (SD = 1.46) for a thumbs down reaction. As shown in Figure 4.5, there was a statistically significant mean difference between the thumbs up reactions and thumbs down reactions of 1.186, 95% CI [0.940, 1.431],  $p < 0.001$  and the no reaction and thumbs down reactions of 1.159, 95% CI [0.937, 1.38],  $p < 0.001$ .



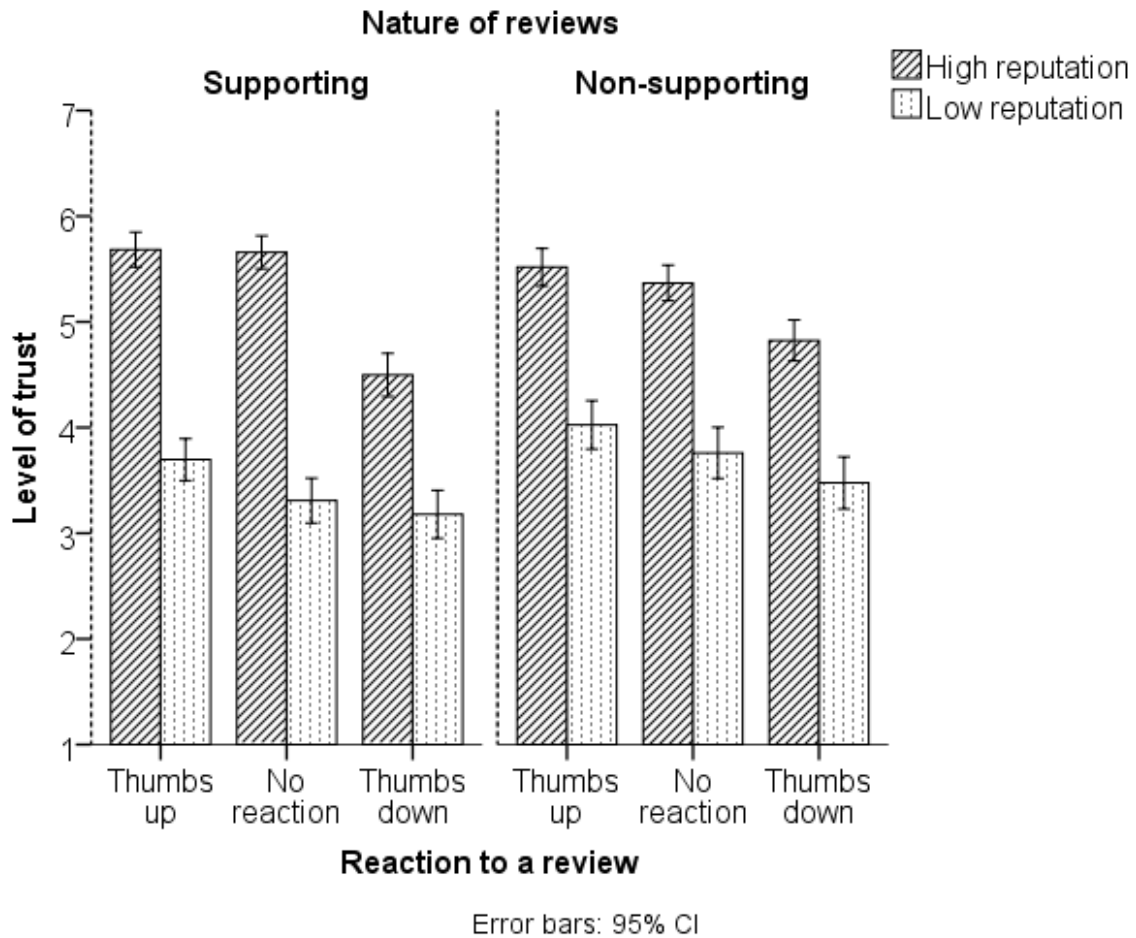


Figure 4.5. Effect of reaction to a review, reputation score and nature of reviews on level of trust

The assumption of sphericity was violated for the simple main effect of reaction to a review with a low reputation score and a supporting review based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 15.281$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.873$ ). There was a statistically significant simple main effect of reaction to a review with a low reputation

score and a supporting review,  $F(1.746, 171.067) = 8.389$ ,  $p = 0.001$ . The mean level of trust was 3.696 (SD = 1.41) for a thumbs up reaction, 3.309 (SD = 1.52) for no reaction and 3.180 (SD = 1.62) for a thumbs down reaction. There was a statistically significant mean difference between a thumbs up reaction and no reaction of 0.388, 95% CI [0.146, 0.630],  $p = 0.002$ ; and a thumbs up reaction and thumbs down reaction of 0.516, 95% CI [0.211, 0.822],  $p = 0.001$ .

Based on the mean values, the users had a higher level of trust when the reputation score of an author of a review was high compared to a low reputation score. A supporting review with a high reputation and a thumbs up or no reaction resulted in a higher level of trust compared to a thumbs down reaction. However, with a high reputation, the level of trust was similar to a thumbs up reaction but different from no reaction. For a low reputation score and a supporting review, the level of trust was significantly higher for a thumbs up reaction than for no reaction and a thumbs down reaction. This result suggests that with a low reputation score, additional cues in the form of reactions to a review increase trust among the users. When the reviews are non-supporting, there seems to be no difference in the trust among the users irrespective of having a reaction to a review or a reputation score.

*Likelihood of going to the restaurant:*

A five-way mixed ANOVA was conducted to determine the effects of reaction to a review, reputation score, number of previous reviews, nature of the reviews and level of anonymity on the likelihood of going to the restaurant. For the four-way interaction effect, Mauchly's test of sphericity indicated that the assumption of sphericity was met,  $\chi^2(2) = 4.222$ ,  $p = 0.121$ . There was a statistically significant four-way interaction among reaction to a review, reputation score, number of previous reviews and nature of the reviews,  $F(2, 392) = 9.522$ ,  $p < 0.001$ .

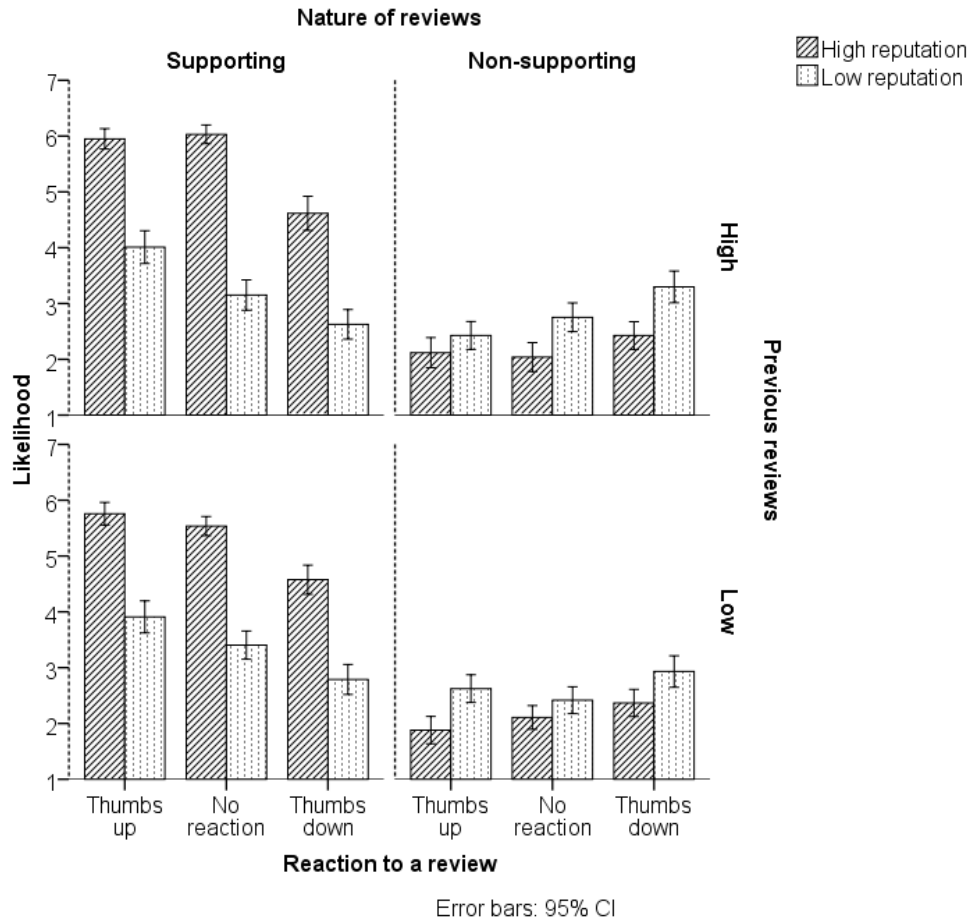
The assumption of sphericity was met for both simple three-way interaction effects based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 2.402$ ,  $p = 0.301$  and  $\chi^2(2) = 3.256$ ,  $p = 0.196$ . There was a statistically significant simple three-way interaction effect among reaction to a review, reputation score and number of previous reviews for supporting reviews,  $F(2, 196) = 4.765$ ,  $p < 0.010$ , and for non-supporting reviews,  $F(2, 200) = 7.132$ ,  $p = 0.001$ . The assumption of sphericity was met for the simple two-way interaction effects of reaction to a review and reputation with supporting reviews and a high number of previous reviews based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 0.209$ ,  $p = 0.901$  and violated for non-supporting reviews and high number of previous reviews  $\chi^2(2) = 8.547$ ,  $p = 0.014$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.924$ ). There was a statistically significant simple two-way interaction effect between reaction to a review and reputation

score with supporting reviews and a high number of previous reviews,  $F(2, 196) = 16.153$ ,  $p < 0.001$ , and for non-supporting reviews,  $F(1.847, 184.721) = 5.494$ ,  $p = 0.006$ .

The assumption of sphericity was violated for the simple main effect of reaction to a review for supporting reviews with a high number of previous reviews and a high reputation score based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 38.084$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.755$ ). In addition it was also violated for non-supporting reviews with a high number of previous reviews and high reputation score  $\chi^2(2) = 6.745$ ,  $p = 0.034$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.938$ ). There was a statistically significant simple main effect of reaction to a review for supporting reviews with a high number of previous reviews and high reputation score,  $F(1.510, 147.957) = 66.345$ ,  $p < 0.001$ . The mean likelihood rating was 5.949 (SD = 0.919) for a thumbs up reaction, 6.030 (SD = 0.839) for no reaction and 4.616 (SD = 1.530) for a thumbs down reaction. As shown in Figure 4.6, there was a statistically significant mean difference between the thumbs up reaction and thumbs down reaction of 1.333, 95% CI [1.024, 1.643],  $p < 0.001$ , and the no reaction and thumbs down reaction of 1.414, 95% CI [1.103, 1.725],  $p < 0.001$ .

There was a statistically significant simple main effect of reaction to a review for non-supporting reviews with a high number of previous reviews and a high reputation score,  $F(1.876, 187.642) = 4.154$ ,  $p = 0.019$ . The mean likelihood rating was 2.119 (SD =

1.37) for a thumbs up reaction, 2.040 (SD = 1.32) for no reaction and 2.426 (SD = 1.26) for a thumbs down reaction. There was a statistically significant mean difference between the thumbs down reaction and no reaction of 0.386, 95% CI [0.118, 0.654],  $p = 0.005$ .



*Figure 4.6.* Effect of reaction to a review, reputation score, number of previous reviews and nature of reviews on likelihood score

The assumption of sphericity was violated for the simple main effect of reaction to a review for supporting reviews with a high number of previous reviews and low

reputation score based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 20.839$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.838$ ). In addition it was also violated for non-supporting reviews with a high number of previous reviews and a low reputation score  $\chi^2(2) = 9.193$ ,  $p = 0.010$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.919$ ). There was a statistically significant simple main effect of reaction to a review for supporting reviews with a high number of previous reviews and a low reputation score,  $F(1.676, 164.247) = 42.519$ ,  $p < 0.001$ . The mean likelihood rating was 4.010 (SD = 1.47) for a thumbs up reaction, 3.152 (SD = 1.37) for a no reaction and 2.626 (SD = 1.33) for a thumbs down reaction. There was a statistically significant mean difference between the thumbs up reaction and no reaction of 0.859, 95% CI [0.543, 1.175],  $p < 0.001$ ; the thumbs up reaction and thumbs down reaction of 1.384, 95% CI [1.039, 1.729],  $p < 0.001$ ; and the no reaction and thumbs down reaction of 0.525, 95% CI [0.297, 0.754],  $p < 0.001$ .

There was a statistically significant simple main effect of reaction to a review for non-supporting reviews with a high number of previous reviews and a low reputation score,  $F(1.837, 183.709) = 25.827$ ,  $p < 0.001$ . The mean likelihood rating was 2.426 (SD = 1.27) for a thumbs up reaction, 2.752 (SD = 1.31) for no reaction and 3.297 (SD = 1.44) for a thumbs down reaction. There was a statistically significant mean difference between the thumbs down reaction and no reaction of 0.545, 95% CI [0.312, 0.777],  $p < 0.001$ .

0.001; the thumbs down reaction and thumbs up reaction of 0.871, 95% CI [0.595, 1.147],  $p < 0.001$ ; and the no reaction and thumbs up reaction of 0.327, 95% CI [0.110, 0.543],  $p = 0.003$ .

The assumption of sphericity was met for the simple two-way interaction effects of reaction to a review and reputation score with supporting reviews and low number of previous reviews based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 5.731$ ,  $p = 0.057$  and for non-supporting reviews and low number of previous reviews  $\chi^2(2) = 0.759$ ,  $p = 0.684$ . There was no statistically significant simple two-way interaction effect between reaction to a review and reputation score with supporting reviews and low number of previous reviews,  $F(2, 196) = 1.617$ ,  $p = 0.201$ , and for non-supporting reviews,  $F(2, 200) = 2.820$ ,  $p = 0.062$ .

Based on the mean values, the users were more likely to go to the restaurant when they saw a supporting review with a high reputation and a high number of previous reviews. Having a thumbs up reaction or no reaction did not affect their decisions, but they were more likely to go to the restaurant when they saw a thumbs down reaction. A non-supporting review with a thumbs down reaction indicated that the previous users disagreed with the review and their assessment of its poor quality. Thus, users were more likely to go the restaurant based on reviews with no reaction, although this decision had a low likelihood score.

As expected, the users were less likely to go to the restaurant after reading a supporting review with a low reputation score compared to a high reputation. A supporting review with a low reputation score and a high number of previous reviews with a thumbs up reaction had a higher likelihood score compared to no reaction and a thumbs down reaction. As seen in the high reputation condition, a non-supporting review with a thumbs down reaction indicated that previous users disagreed with it and the quality assessment while a thumbs up reaction suggested that the previous users supported the reviews and poor quality of the restaurant. Hence, users were more likely to go the restaurant with a thumbs down reaction compared to no reaction and a thumbs up reaction, and go to a restaurant with a no reaction than a thumbs up reaction.

*Probability of choosing whether to go to the restaurant:*

A multilevel binary logistic regression was conducted to predict the probability of choosing whether or not to go to the restaurant. The NO category (not to go to the restaurant) was taken as the initial reference category. There was a statistically significant three-way interaction among reaction to a review, reputation score and nature of review,  $F(2, 2363) = 3.676, p = 0.025$ . There was a statistically significant simple main effect of reaction for supporting reviews with high reputation scores,  $F(2, 2363) = 19.961, p < 0.001$ . As seen in Table 4.2, the mean probability of going to the restaurant was 0.985 for no reaction, 0.977 for a thumbs up reaction, and 0.732 for a thumbs down reaction. There



was a statistically significant mean difference between the no reaction and thumbs down reaction of 0.254, 95% CI [0.175, 0.332],  $p < 0.001$  and the thumbs up reaction and thumbs down reaction of 0.245, 95% CI [0.166, 0.324],  $p < 0.001$ .

*Table 4.2.* Mean probability of going to the restaurant (interaction between reaction to a review, nature of reviews and reputation score)

		Reaction to a review		
Nature of reviews:	Reputation	No reaction	Thumbs up	Thumbs down
			reaction	reaction
Supporting				
	High	0.985	0.977	0.732
	Low	0.249	0.585	0.11
Nature of reviews:	Reputation	No reaction	Thumbs up	Thumbs down
			reaction	reaction
Non-supporting				
	High	0.04	0.051	0.077
	Low	0.097	0.086	0.251

There was a statistically significant simple main effect of reaction for supporting reviews with low reputation scores  $F(2, 2363) = 49.08$ ,  $p < 0.001$ . The mean probability

of going to the restaurant was 0.249 for no reaction, 0.585 for a thumbs up reaction, and 0.11 for a thumbs down reaction. As shown in Figure 4.7, there was a statistically significant mean difference between a thumbs up reaction and no reaction of 0.337, 95% CI [0.236, 0.437],  $p < 0.001$ ; a thumbs up reaction and a thumbs down reaction of 0.476, 95% CI [0.381, 0.57],  $p < 0.001$ ; and no reaction and a thumbs down reaction of 0.139, 95% CI [0.058, 0.22],  $p = 0.001$ .

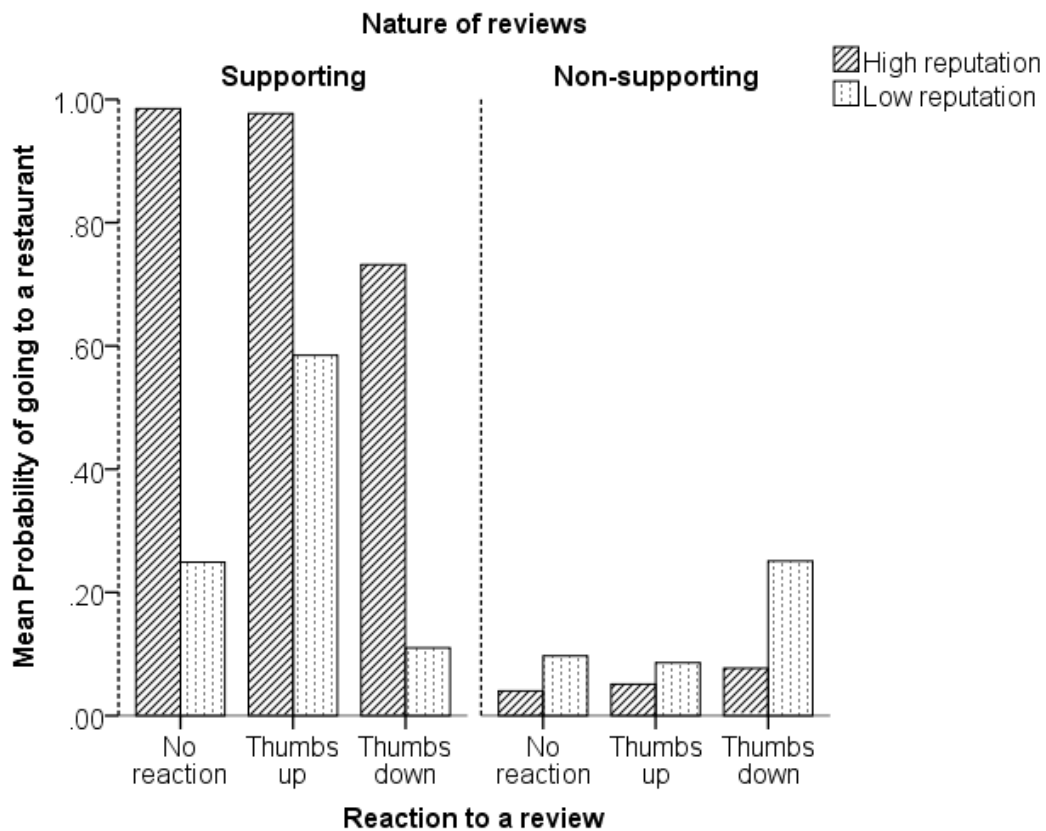


Figure 4.7. Effect of reaction to a review, reputation score and nature of reviews on mean probability of going to the restaurant

There was a statistically significant simple main effect of reaction to a review for non-supporting reviews with low reputation scores,  $F(2, 2363) = 8.948$ ,  $p < 0.001$ , but not for high reputation ones,  $F(2, 2363) = 1.51$ ,  $p = 0.221$ . The mean probability of going to the restaurant was 0.097 for no reaction, 0.086 for a thumbs up reaction, and 0.251 for a thumbs down reaction. As shown in Figure 4.7, there was a statistically significant mean difference between a thumbs down reaction and no reaction of 0.155, 95% CI [0.075, 0.234],  $p < 0.001$  and a thumbs down reaction and a thumbs up reaction of 0.165, 95% CI [0.086, 0.244],  $p < 0.001$ .

Similar to the trend found for the likelihood of going to the restaurant, users reading a supporting review with a high reputation and a thumbs up reaction or no reaction showed a higher probability of going to the restaurant compared to a thumbs down reaction, whereas with supporting reviews with a low reputation score, a thumbs up reaction indicated a higher probability compared to no reaction and a thumbs down reaction. Similar to the level of trust, reaction to a review with a low reputation score increased the probability of going to the restaurant and improved the decision making. Also similar to the trend found with other results, a thumbs down with a non-supporting review indicated users had a higher probability of going to the restaurant compared to no reaction and a thumbs up reaction.

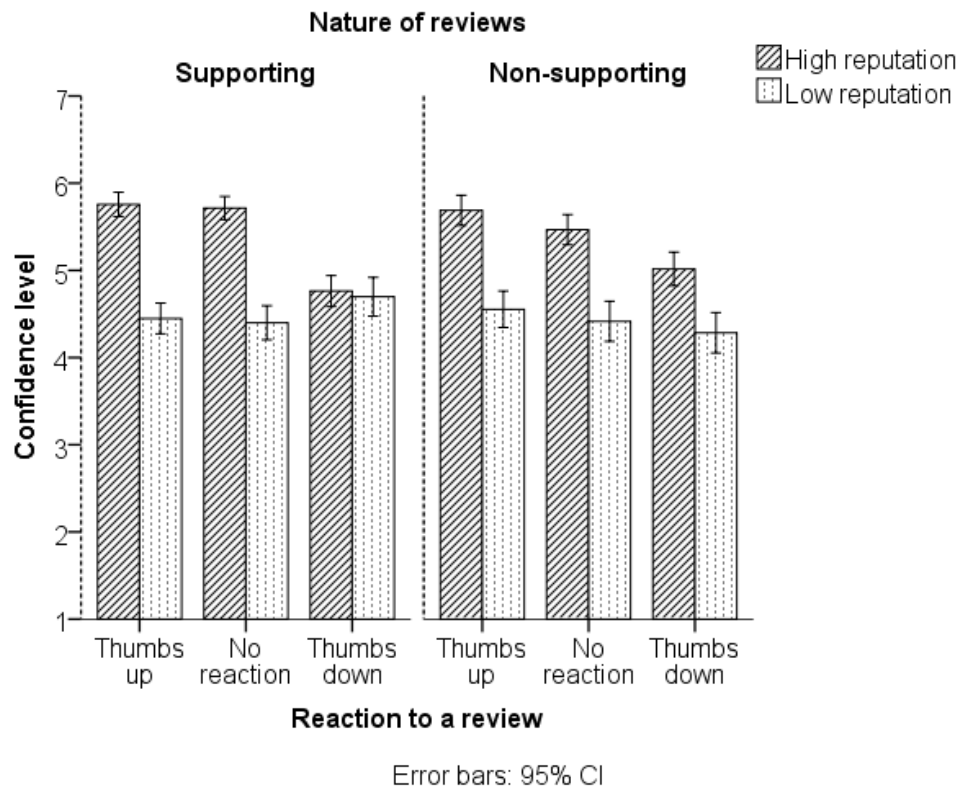
*Confidence level in the decision:*

A five-way mixed ANOVA was conducted to determine the effects of reaction to a review, reputation score, number of previous reviews, nature of the reviews and level of anonymity on the confidence level. For the three-way interaction effect, the Mauchly's test of sphericity indicated that the assumption of sphericity was violated,  $\chi^2(2) = 26.501$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.887$ ). There was a statistically significant three-way interaction among reaction to a review, reputation score and nature of the reviews,  $F(1.775, 347.803) = 9.653$ ,  $p < 0.001$ .

The assumption of sphericity was violated for both simple two-way interactions effects based on the Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 22.693$ ,  $p < 0.001$  and  $\chi^2(2) = 6.105$ ,  $p = 0.047$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.827$  and  $\epsilon = 0.944$  respectively). There was a statistically significant simple two-way interaction effect between reaction to a review and reputation score for supporting reviews,  $F(1.655, 162.171) = 34.886$ ,  $p < 0.001$ , and for non-supporting reviews,  $F(1.887, 188.714) = 4.159$ ,  $p = 0.019$ . The assumption of sphericity was violated for the simple main effect of reaction to a review with a high reputation score and supporting reviews based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 28.189$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.799$ ). In addition it was also

violated and for non-supporting reviews  $\chi^2(2) = 12.813$ ,  $p = 0.002$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.892$ ). There was a statistically significant simple main effect of reaction to a review with a high reputation score and supporting reviews,  $F(1.597, 156.526) = 58.146$ ,  $p < 0.001$ . The mean confidence level was 5.756 (SD = 1.00) for a thumbs up reaction, 5.715 (SD = 0.95) for no reaction and 4.764 (SD = 1.26) for a thumbs down reaction. As shown in Figure 4.8, there was a statistically significant mean difference between the thumbs up reaction and thumbs down reaction of 0.993, 95% CI [0.752, 1.234],  $p < 0.001$ ; and the no reaction and thumbs down reaction of 0.951, 95% CI [0.732, 1.17],  $p < 0.001$ .

There was a statistically significant simple main effect of reaction to a review with a high reputation score and non-supporting reviews,  $F(1.783, 178.348) = 19.249$ ,  $p < 0.001$ . The mean confidence level was 5.688 (SD = 1.25) for a thumbs up reaction, 5.467 (SD = 1.25) for no reaction and 5.017 (SD = 1.40) for a thumbs down reaction. There was a statistically significant mean difference between the thumbs up reaction and no reaction of 0.221, 95% CI [0.033, 0.409],  $p = 0.022$ ; the thumbs up reaction and thumbs down reaction of 0.672, 95% CI [0.419, 0.924],  $p < 0.001$ ; and the no reaction and thumbs down reaction of 0.451, 95% CI [0.239, 0.662],  $p < 0.001$ .



*Figure 4.8.* Effect of reaction to a review, reputation score and nature of reviews on confidence level

The assumption of sphericity was violated for the simple main effect of reaction to a review with a low reputation score and supporting reviews based on Mauchly's test of sphericity ( $p < .05$ ),  $\chi^2(2) = 36.808$ ,  $p < 0.001$ ; as a result, the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ( $\epsilon = 0.760$ ) but not for non-supporting reviews  $\chi^2(2) = 0.387$ ,  $p = 0.824$ . There was no statistically significant simple main effect of reaction for a review with a low reputation score and supporting reviews,

$F(1.520, 148.962) = 2.773, p = 0.080$  and non-supporting reviews,  $F(2, 200) = 3.014, p = 0.051$ .

The users felt more confident after reading a supporting review with a thumbs up reaction or no reaction compared to a thumbs down reaction. However, when the review was non-supporting, a thumbs up reaction made the users more confident compared to no reaction and a thumbs down reaction. Although a thumbs up reaction for a non-supporting review resulted in the users choosing not to go to the restaurant, they were more confident in their decisions. On the other hand, a thumbs down reaction for a non-supporting review led to a higher likelihood of a user going to the restaurant but with reduced confidence in the decision.

An additional set of analysis was conducted to determine if a user's previous experience in looking for restaurant reviews on applications like Zomato or Yelp would influence their sensemaking process. A six-way mixed ANCOVA was conducted to determine the effects of reaction to a review, reputation score, number of previous reviews, nature of the reviews and level of anonymity with a covariate binary variable of experience in using restaurant review applications on the level of trust in the information, the likelihood of going to the restaurant and the confidence level in the decision. The results of the analysis showed that adding this covariate variable when compared to the model with no covariate variable was essentially unchanged. For example, for the likelihood of going to the restaurant based on the information, the four-way interaction

effect among reaction to a review, reputation score, number of previous reviews and nature of the reviews, changed from  $F(2, 392) = 9.522, p < 0.001$  to  $F(2, 390) = 9.378, p < 0.001$  which is almost insignificant and the change in the effect size of the four-way interaction was from 0.0455 to 0.0446 which is negligible. It shows that having previous experience in looking for restaurant reviews on applications did not make a significant difference in their sensemaking process.

### **Discussion**

The purpose of this study was to examine the effects of such decision aids as reputation score, reaction to a review and number of previous reviews on the decision making process of users reading an online consumer review. Klein's Data/Frame Theory of Sensemaking (2006a, 2006b) informed the users' interpretation of the data. According to this theory, the initial few stimuli act as the anchors for the initial understanding of the situation, forming what is referred to as the initial frame. When the participants were presented with a supporting review, they may develop an initial frame in their mental model to go to the restaurant. After establishing this initial frame, the participants focused on the cues in the form of the decision aids to support or contradict their initial frames. The data-frame theory suggests that when consumers are presented with information that is straightforward without any contradiction, they elaborate their frames, i.e., seek additional data to confirm their initial frames (Klein et al., 2007). In this study, when the participants were presented supporting review with a thumbs up reaction and a high



reputation, they appeared to recognize that the additional cues (decision aids) supported their initial frames. The straightforward nature of the review explains the high scores on the likelihood and probability of going to the restaurant. The participants also showed a high level of trust in the information and confidence in their decisions. A similar sensemaking pattern was observed when the participants were shown supporting reviews with no reaction and a high reputation, the high reputation score serving as data confirming their initial frames.

According to the data-frame theory, when participants are presented with information that contradicts their expectancy, they doubt their initial frame, questioning it (Klein et al., 2007; Madathil, K.C, 2015). In this study, when the participants were shown supporting reviews with thumbs up reactions but low reputation scores, they appeared to realize that the cues did not support their initial frames, beginning to examine whether their previous understanding (initial frame) was misguided. This questioning of the accuracy of the frame leads to either preserving the frame by explaining away the inconsistency or seeking a new frame by finding new anchors. Based on the results of this study, the participants seemed to explain away the inconsistency, making the decision to go the restaurant as they appeared to place significant emphasis on the supporting review and the thumbs up reaction. However, due to this inconsistency, they had an average level of trust and confidence in their final decisions. When the participants were presented supporting reviews with thumbs down reactions and high reputation scores, a

similar pattern of questioning the frame was found because of the contradicting nature of the data elements. As observed in the previous case, the participants appeared to decide to follow their initial frames and go to the restaurant, a conclusion supported by the high likelihood and probability scores, both which perhaps due to the supporting nature of the review. However, due to the contradicting nature of the data, the participants again showed an average level of trust and confidence in their decisions.

When the participants were presented with supporting reviews with thumbs down reactions and low reputation scores, the data elements were not consistent with their initial frames. According to the Data Frame Theory, when the people realize that the cues do not match their initial frames, they begin to question its accuracy, either keeping the original or replacing it with a new one (Klein et al., 2007). In this study since these cues contradicted the initial frame, the participants may have replaced their initial frame with a new one, i.e., not to go the restaurant. This decision supports their low likelihood and probability scores, suggesting participants chose not to go to the restaurant. The mean level of trust measured across the condition was also low, indicating that the participants did not trust this information. On presenting a supporting review with a low reputation score and no reaction, the participants again seemed to question their frames because of the contradictory cues, replacing it since they did not have sufficient cues to trust the review. This conclusion was supported by their low likelihood and probability scores,

indicating that the participants to have developed a new frame. The participants again did not trust the information.

When the participants were presented with a non-supporting review, it appears to have had a significant impact as their initial stimulus resulted in the development of their initial frames not to go to the restaurant. After the development of this initial frame, the decision aids provided the participants with data elements either agreeing with or challenging their initial mental models. When presented with a non-supporting review with a thumbs up reaction and a high reputation score, participants may have been initially surprised because of the contradiction in the data elements. However, these two cues indicate that previous responses to the reviews suggested that the quality of the restaurant was as bad as the non-supporting review suggested, perhaps causing the participants to believe that the restaurant is not a good choice. This conclusion was supported by the low likelihood and probability scores and the relatively high level of trust and confidence in their decisions. Participants may have had a similar response when they read a non-supporting review with a thumbs up reaction and low reputation, i.e., to question their initial frame. Since the review had a thumbs up reaction, the participants may have retained their initial frames of not going to the restaurant. The data suggest that they indeed preserved their initial frames but had a lower level of confidence in their decision since the reputation of the reviewer was low.

When the participants were presented with a non-supporting review with a thumbs down reaction and a high reputation, they may have again questioned their initial frames since the user had a high reputation yet the review had been downvoted, indicating that others disagreed with its negative review. While the participants could have replaced their initial frames and decided to go to the restaurant, the data show that they preserved them, perhaps because of the negative nature of the review. The participants appear to have little trust in the information, perhaps the reason for their unwillingness to replace their initial frames. When the participants were shown non-supporting review with a thumbs down reaction and a low reputation score, they appear to realize that the cues and their initial frames did not agree, these additional cues causing them to rethink their initial mental models. A thumbs down reaction to a non-supporting review indicates that the users suggest the restaurant is not bad. While the participants may have decided to develop a new frame to go to the restaurant based on the data elements, the results from this study found that they preserved their initial frames, perhaps because the additional cues did not convince them to replace their initial mental models.

Participants reading a non-supporting review with no reaction and a high reputation probably concluded that the cues for making a judgment were limited; they may have focused on the reputation score, choosing not to go to the restaurant based on the reviewer's opinion because of his high reputation. This conclusion was supported by

the results from this study as the participants placed high trust in the review and were confident in their decisions. For a non-supporting review with no reaction and a low reputation score, the participants again had limited data elements for making a decision. Since the reputation of the reviewer was low and the review suggested the restaurant to be bad, the participants may have placed significant emphasis on the non-supporting review element, developing a mental model that the restaurant is not good. The results confirm this conclusion though the participants were not confident in their decisions, possibly due to lack of cues to support their decision making.

The findings from this study indicate that supporting reviews result in a higher likelihood and probability of going to the restaurant when compared to non-supporting reviews. This result supports prior studies on the impact of eWOM on the likelihood of completing a scenario (Sparks & Browning, 2011). As explained by Fiske (1993), people tend to pay more attention to negative information than positive, believing that it indicates a cautious approach. The results from this study agree with this explanation because when the participants read a non-supporting review, they did not replace their initial mental model (i.e., not to go to the restaurant), choosing to be cautious. In addition, this study found that the use of heuristics like reputation scores as cues function as indicators for informed and efficient decision making (Sparks & Browning, 2011).

Previous work conducted by Ponathil et al. (2017) found that a reaction to a review alone did not result in a significant difference in the trust, confidence and

likelihood scores among the users when they read a review with thumbs up reaction compared to no reaction, meaning that reactions in the form of thumbs up does not making a significant contribution towards the decision making process. In this study, when reputation score was included with the reactions to a review, supporting reviews with a low reputation resulted in a significant difference in the dependent variables among the users on a review with thumbs up reaction compared to no reaction, and for non-supporting reviews there was significant difference between a review with thumbs down reaction compared to no reaction, demonstrating the contribution of both the reaction to a review and reputation score in the decision making process.

We expected that the non-anonymous reviews would enhance the sensemaking process by providing additional cues for decision making (Thielmann, Heck, & Hilbig, 2016). However, we found that the trust in the information, the likelihood and the probability of going to the restaurant and confidence in the decision were not significantly different between non-anonymous and anonymous reviews. One potential reason for this finding may be because the user's personal information included in the non-anonymous review was not sufficient for increasing the trust in the system. Additional data elements other than name, age and location like a photo of the user and/or links to social media accounts may enhance the sensemaking process. Another potential reason could be the participants predominantly focused on the data elements like reaction to a review and the reputation score of a user while making a decision; if this is the case,

then providing other data would not add insight into the primary reason for reading the review, i.e., to decide whether to go to the restaurant.

## CHAPTER FIVE

### CONCLUSION

One of the main concerns about social media is the users are afforded the freedom to post information online which has a potential to be unreliable and false since there is typically no editorial process for verification of their authenticity. In addition, the option to use anonymous social media or being anonymous by using fake virtual identities has increased concerns regarding the trustworthiness of such information. This thesis first analyzed the effect of decision aids in the form of reaction to a post (thumbs up and thumbs down) and nature of the posts on how people make sense of the anonymous information and make decisions based on them. The results showed that a thumbs up reaction exhibited some effect, improving the decision making slightly; however, it was not significantly different compared to no reaction. On the other hand, the thumbs down reaction made the decision making more difficult as well as created uncertainty about the decision made.

The follow up study investigated the effect of incorporating additional cues in the form of historical data of the user in conjunction with the reaction to a post on the sensemaking process of a user when provided with anonymous and non-anonymous reviews. The historical data consisted of the number of previous reviews of a user and his reputation score that was based on the number of thumbs up, the number of thumbs down and the number of flagged posts. As expected, users presented with a supporting review



with thumbs up reaction and a high reputation score had the highest scores on the dependent variables (level of trust, probability of going to the restaurant, likelihood score and confidence level in the decision), while supporting reviews with a thumbs down reaction and low reputation had the lowest. When the participants read a non-supporting review with a thumbs down reaction, they decided to go the restaurant although they were not confident in their decision. We found that in the online environment where consumers have limited resources for making an educated decision about a product, information about a reviewer's historical data in the form of decision aids improved the trust and usefulness of a review (Liu & Park, 2015). Additionally, we believe incorporating a user rating scale such as reputation scores could help in controlling the authenticity of the posted information and could also reduce false or biased reviews. This research contributes to the literature by outlining specific aspects of eWOM that the consumers prefer for making a decision.

### **Limitations and future work**

Our expectation that the participants would have significantly more trust in the information, the likelihood and probability of going to the restaurant and confidence in their decision when they were presented with non-anonymous reviews compared to anonymous reviews was not met in this study. Future studies could include supplementary personal information which could aid the sensemaking process. In

addition, collecting qualitative data could help enhance our understanding of the reasoning behind the decisions made as well as providing user feedback on ways to improve trust in the system.

## APPENDICES

## Appendix A

### Consent Form for the initial study

#### Description of the Study and Your Part in It

Amal Ponathil and Sruthy Orozhiyathumana Agnisaarman, under the direction of Dr. Kapil Chalil Madathil, are inviting you to take part in a research study. Amal Ponathil is a graduate student in the Department of Industrial Engineering and Sruthy Orozhiyathumana Agnisaarman is a graduate student in the Department of Civil Engineering at Clemson University. Dr. Kapil Chalil Madathil is an Assistant Professor also in the Department of Industrial Engineering at Clemson University. The purpose of this research is to investigate the human decision making process when presented with numerous anonymous opinions in the form of online posts.

Your participation will include reading this consent form, partaking in the study itself, and completing pre-test and post-test questionnaires. During the study, you will be presented with three scenarios. You will see many anonymous user posts about each scenario and asked to make a decision based on what you've read. For example, you may be presented with reviews of an event and asked whether or not you will attend. The anonymous posts are meant to facilitate your decision making process. Additionally, you will be asked to identify your level of confidence in your decision for each scenario. You are also going to complete two questionnaires: one demographic and the other asking

how difficult you found the task of making the decisions. It should take you about 20 minutes to complete this study.

#### Risks and Discomforts

We do not know of any risks or discomforts to you in this research study.

#### Possible Benefits

This study could help us determine the human behavior of making a decision based on the numerous posts seen online about a particular event or on any trending posts. The findings from this research study may help us model human behavior and develop a better way to stop cyberbullying and the posting of false posts online.

#### Incentives

You will be awarded \$1.00 upon completion of this study.

#### Protection of Privacy and Confidentiality

We will do everything we can to protect your privacy. Collected data will be stored securely with access limited to the investigators. Your identity will not be revealed in any publication that might result from this study. Limited demographic data will be collected. Participants will not be identifiable either by name or demographic data.

We might be required to share the information we collect from you with the Clemson University Office of Research Compliance or the Federal Office for Human Research Protections. If this happens, the information would only be used to find out if we ran this study properly and protected your rights in the study.

### Choosing to be in the Study

You do not have to be in this study. You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide not to be in the study or to stop taking part in the study. If you choose to stop taking part in this study, the information you have already provided will be used in a confidential manner.

### Contact Information

If you have any questions or concerns about this study, please contact Dr. Kapil Chalil Madathil at [kmadath@clermson.edu](mailto:kmadath@clermson.edu) or 864-656-0856.

If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-6460 or [irb@clermson.edu](mailto:irb@clermson.edu). If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071.

## Appendix B

### Study Condition for the initial study

Q1 I have read and understood the information letter and agree to participate in this study.

- Yes, I understand the above information and agree to participate in this study
- No, I do not wish to participate in this study

Q2 Are you a male or female?

- Male
- Female

Q3 What year were you born?

- 1920 - 2000

Q4 What is the highest level of school you have completed or the highest degree you have received?

- Less than a high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate's degree
- Bachelor's degree
- Graduate degree

Q5 Which of the following categories best describes your employment status?

- Employed, working 1-39 hours per week
- Employed, working 40 or more hours per week
- Not employed, looking for work
- Not employed, NOT looking for work
- Retired
- Disabled, not able to work

Q6 Are you White, Black or African-American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific islander, or some other race?

- White
- Black or African-American
- American Indian or Alaskan Native

- Asian
- Native Hawaiian or other Pacific Islander
- From multiple races
- Some other race (please specify) \_\_\_\_\_

Q7 Do you ever use the internet to -- Use an online search engine to help you find information on the web?

- Yes
- No

Q8 Do you ever use the internet to -- Use a social networking site like Facebook, LinkedIn or Twitter?

- Yes
- No

Q9 Do you ever use the internet to -- Look for information on Wikipedia?

- Yes
- No

Q10 A smart phone is a mobile phone with more advanced computing capability and connectivity than basic feature phones. Is your phone a smartphone?

- Yes
- No
- Not sure

Q11 Do you ever use the internet on your mobile device to -- Look up information using a search engine such as Google, Yahoo or Bing?

- Yes
- No

Q12 Do you ever use the internet to -- Use anonymous social media app like Yik Yak?

- Yes
- No

Q13 On which social networking site or sites do you currently have an account?

- Facebook
- LinkedIn
- MySpace
- Vine



- Twitter
- YouTube
- Tumblr
- Flickr
- Google Plus
- Instagram
- Other (please specify) \_\_\_\_\_
- Don't have an account on a social networking site

Q14 About how often do you visit social networking site with the profile or account you have?

- Several times a day
- About once a day
- 3 to 5 days a week
- 1 to 2 days a week
- Less often

Q15 How important are social networking sites to you personally when it comes to -- Keeping up with news?

- Not at all important
- Not too important
- Somewhat important
- Very important

Q16 How important are social networking sites to you personally when it comes to -- Debating or discussing issues with others?

- Not at all important
- Not too important
- Somewhat important
- Very important

Q17 How important are social networking sites to you personally when it comes to -- Finding other people who share your views about important issues?

- Not at all important
- Not too important
- Somewhat important
- Very important

Q18 How important are social networking sites to you personally when it comes to -- Recruiting people to get involved with issues that matter to you?

- Not at all important
- Not too important
- Somewhat important
- Very important

Q19 When someone posts something about current event on a social networking site that you disagree with, how do you usually respond?

















- Ignore the post you disagree with
- Respond to it by posting a post or posting something of your own

Q20 Have you ever learned that someone's beliefs were different than you thought they were, based on something they posted on a social networking website?

- Yes
- No

Q21 The data that you provide is really important for our analysis. Please read and understand all the instructions carefully before giving your response.

A new pizza restaurant called XYZ cafe has opened up in your city. You will be presented with numerous anonymous, online posts about the restaurant's quality. Based on the user reviews provided, you will be asked to answer a few questions.

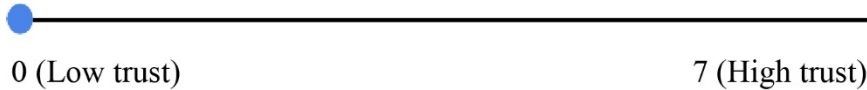
- Think the FDA would shut down the disgusting new pizza place if I claimed I found a cockroach in my pizza?  (5)  (0)
- I would rather do every Calculus problem in the book then eat another slice of pizza from the new restaurant downtown  (2)  (0)
- If you're looking for some revenge, just get them a slice of pizza from the new pizza place and call it even  (4)  (0)
- The new pizza place should give out "I Survived This Pizza" t-shirts to all who are able to exit the building without getting sick  (2)  (0)
- I may have to transfer if we get one more terrible pizza place  (3)  (0)
- I hate to say it but I would choose dining hall pizza over the pizza from the new place downtown any day  (5)  (0)
- At 11:11, I wished they would shut the new pizza place down so that we don't have to live in fear any longer  (5)  (0)
- I've seen employees of the new pizza place sneaking over to Pizza Hut to grab lunch... Tells you how awful their pizza is  (2)  (0)

ix. Just fed an entire pizza to my dog because I couldn't make myself eat it 👍 (5) 👎 (0)

x. This new pizza place's ratings are going down faster than my GPA 👍 (4) 👎 (0)

👍 - People supporting this post    👎 - People not supporting this post

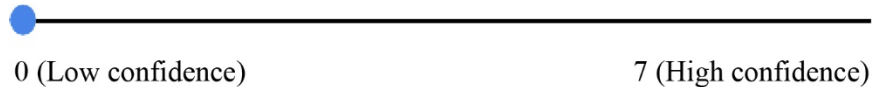
Q22 Rate your level of trust with the information you gathered about XYZ cafe?



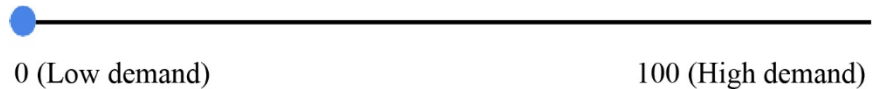
Q23 Based on all the anonymous posts you have seen, how likely are you to go to XYZ cafe?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

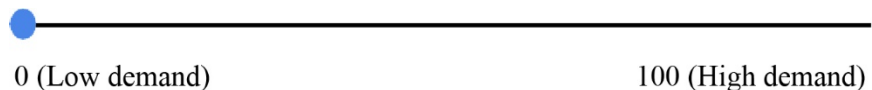
Q24 What is the confidence level in your decision?



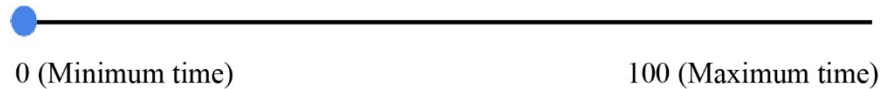
Q25 How MENTALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



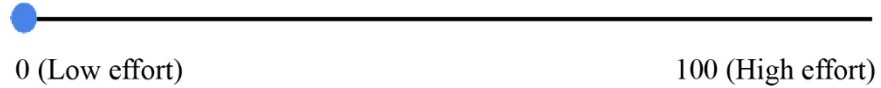
Q26 How PHYSICALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



Q27 How TIME DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



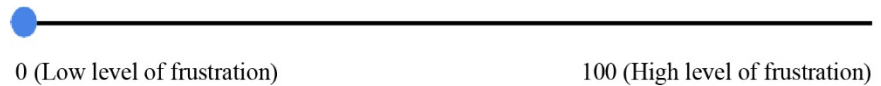
Q28 How much EFFORT did you put in the task of making a decision -- To go or not to go to the restaurant?

















Q29 How well did you PERFORM in making the decision -- To go or not to go to the restaurant?









Q30 How FRUSTRATED were you in the process of making a decision -- To go or no to go to the restaurant?



Q31 The annual Fall Concert is two days away at your college. There have been mixed reviews over last year's event. You will be presented with numerous anonymous posts about the quality of the Fall concert and will be asked to answer a few questions.

- i. Worst concert ever- I left within 10 minutes because of terrible music. This year its going to be even worse  (2)  (0)
- ii. Wish I listened to my parents advice on spending my time productively, just realized their golden words in this boring fall concert  (4)  (0)
- iii. I was more bored at last year's fall concert than in physics class. And I hate physics  (2)  (0)
- iv. Last year, I walked right past the fall concert and couldn't even tell that it was a concert. It was that bad. Avoid at all costs  (3)  (0)
- v. I have heard people protesting in college unions for not having a concert but this is so opposite. Is it that bad?  (2)  (0)
- vi. I would rather study than be at this concert. It is that bad  (4)  (0)
- vii. I don't think I could sit through a mediocre, boring fall concert like last year's. Not making that mistake again  (4)  (0)

- viii. Seriously the band last year needs some music class, it was so amateurish. At that rate they will bring in beginners to play this year  (4)  (0)
- ix. At last year's fall concert, I checked my watch every five minutes because I just wanted it to end  (2)  (0)
- x. I would pay more for my parking pass than the concert ticket as it is not even worth a single penny  (5)  (0)

 - People supporting this post  - People not supporting this post

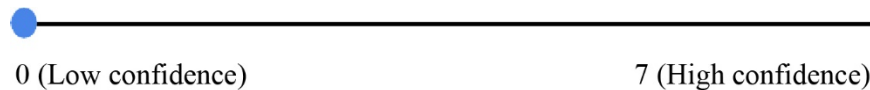
Q32 Rate your level of trust with the information you gathered about the Fall concert?



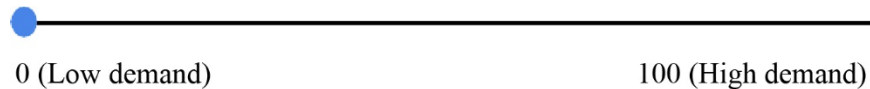
Q33 Based on all the anonymous posts you have seen, how likely are you to go the Fall concert?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

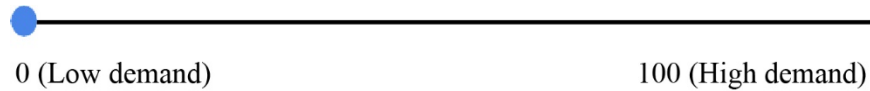
Q34 What is the confidence level in your decision?



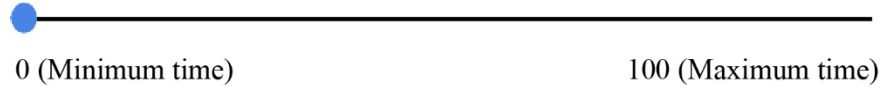
Q35 How MENTALLY DEMANDING was the task of making a decision -- To go or not to go to the Fall Concert?



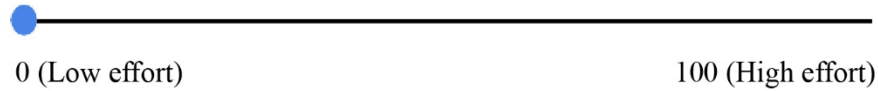
Q36 How PHYSICALLY DEMANDING was the task of making a decision -- To go or not to go to the Fall Concert?



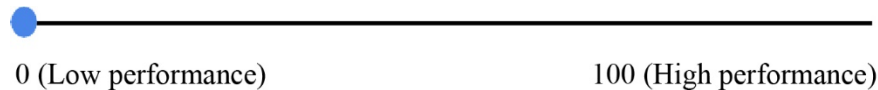
Q37 How TIME DEMANDING was the task of making a decision -- To go or not to go to the Fall Concert?



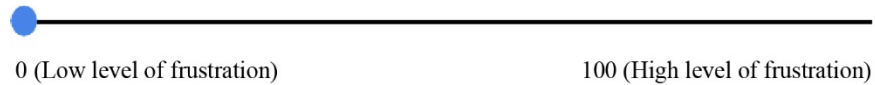
Q38 How much EFFORT did you put in the task of making a decision -- To go or not to go to the Fall Concert?



Q39 How well did you PERFORM in making the decision -- To go or not to go to the Fall Concert?



Q40 How FRUSTRATED were you in the process of making a decision -- To go or no to go to the Fall Concert?



Q41 Based on the two scenarios that you have viewed, you will be answering few questions.

- i. The pizza variety at XYZ cafe is impressive
  - ii. The bands at the fall concert are always great
- Strongly disagree
  - Disagree
  - Somewhat disagree
  - Neither agree nor disagree
  - Somewhat agree
  - Agree
  - Strongly agree

Q42 Please enter the following text in the text box

Q43 Please enter the completion code shown below on Amazon Mechanical Turk (Step 4) and click on the submit button to indicate that you have participated and completed the study so you can be paid. Your Study Completion Code is: \${e://Field/mTurkCode}

## Appendix C

### Consent Form for the follow-up study

#### Description of the Study and Your Part in It

Amal Ponathil, under the direction of Dr. Kapil Chalil Madathil, is inviting you to take part in a research study. Amal Ponathil is a Graduate Student in the Department of Industrial Engineering at Clemson University. Dr. Kapil Chalil Madathil is an Assistant Professor also in the Department of Industrial Engineering at Clemson University. The purpose of this research is to investigate the human decision making process when presented with anonymous and non-anonymous opinions in the form of online comments.

Your participation will include reading this consent form, partaking in the study itself, and completing pre-test and post-test questionnaires. During the study, you will be presented with reviews about different restaurants. You will either see an anonymous or a non-anonymous user review on each restaurant and asked to make a decision based on what you've read. For example, you may be presented with review of a restaurant and asked how likely are you to go to the restaurant. The reviews are meant to facilitate your decision making process. Additionally, you will be asked to identify your level of trust and confidence in your decision for each restaurant. You are also going to complete two questionnaires: one demographic and the other asking how difficult you found the task of making the decisions. It should take you about 10 minutes to complete this study.

#### Risks and Discomforts



We do not know of any risks or discomforts to you in this research study.

#### Possible Benefits

This study could help us determine the human behavior of making a decision based on the numerous comments seen online about a particular event or on any trending posts. The findings from this research study may help us model human behavior and develop a better way to stop cyberbullying and the posting of false comments online.

#### Incentives

You will be awarded \$3.00 upon completion of this study.

#### Protection of Privacy and Confidentiality

We will do everything we can to protect your privacy. Collected data will be stored securely with access limited to the investigators. Your identity will not be revealed in any publication that might result from this study. Limited demographic data will be collected. Participants will not be identifiable either by name or demographic data.

We might be required to share the information we collect from you with the Clemson University Office of Research Compliance or the Federal Office for Human Research Protections. If this happens, the information would only be used to find out if we ran this study properly and protected your rights in the study.

#### Choosing to be in the Study

You do not have to be in this study. You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide

not to be in the study or to stop taking part in the study. If you choose to stop taking part in this study, the information you have already provided will be used in a confidential manner.

#### Contact Information

If you have any questions or concerns about this study, please contact Dr. Kapil Chalil Madathil at [kmadath@clermson.edu](mailto:kmadath@clermson.edu) or 864-656-0856.

If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-6460 or [irb@clermson.edu](mailto:irb@clermson.edu). If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071.

## Appendix D

### Study Condition for the follow-up study (non-supporting reviews)

Q1 I have read and understood the information letter and agree to participate in this study.

- Yes, I understand the above information and agree to participate in this study
- No, I do not wish to participate in this study

Q2 Are you a male or female?

- Male
- Female

Q3 Are you a vegetarian or non-vegetarian?

- Vegetarian
- Non-vegetarian
- Other

Q4 What year were you born?

▼ 1920 ... 2000

Q5 What is the highest level of school you have completed or the highest degree you have received?

- Less than a high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate's degree
- Bachelor's degree
- Graduate degree

Q6 Which of the following categories best describes your employment status?

- Employed, working 1-39 hours per week
- Employed, working 40 or more hours per week
- Not employed, looking for work
- Not employed, NOT looking for work
- Retired
- Disabled, not able to work

Q7 Are you White, Black or African-American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific islander, or some other race?

- White
- Black or African-American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- From multiple races
- Some other race (please specify) \_\_\_\_\_

Q8 Do you ever use the Internet to -- **Use an online search engine to help you find information on the web?**

- Yes
- No

Q9 Do you ever use the Internet to -- **Use a social networking site like Facebook, LinkedIn or Twitter?**

- Yes
- No

Q10 Do you ever use the Internet to -- **Use social networking sites to get restaurant reviews and other information?**

- Yes
- No

Q11 A smart phone is a mobile phone with more advanced computing capability and connectivity than basic feature phones.

**Is your phone a smartphone?**

- Yes
- No
- Not sure

Q12 Do you ever use the Internet on your mobile device to -- **Look up restaurant reviews using applications like Zomato and Yelp?**

- Yes
- No

Q13 Do you ever use the Internet to -- **Use anonymous social media app like Yik Yak?**

- Yes
- No

Q14 On which social networking site or sites do you currently have an account?

- Facebook
- LinkedIn
- MySpace
- Vine
- Twitter
- YouTube
- Tumblr
- Flickr
- Google Plus
- Instagram
- Other (please specify) \_\_\_\_\_
- Don't have an account on a social networking site

Q15 About how often do you visit social networking site with the profile or account you have?

- Several times a day
- About once a day
- 3 to 5 days a week
- 1 to 2 days a week
- Less often

Q16 How important are social networking sites to you personally when it comes to --  
**Keeping up with news?**

- Not at all important
- Not too important
- Somewhat important
- Very important

Q17 How important are social networking sites to you personally when it comes to --  
**Debating or discussing issues with others?**

- Not at all important
- Not too important

- Somewhat important
- Very important

Q18 How important are social networking sites to you personally when it comes to --

**Finding other people who share your views about important issues?**

- Not at all important
- Not too important
- Somewhat important
- Very important

Q19 How important are social networking sites to you personally when it comes to --

**Recruiting people to get involved with issues that matter to you?**

- Not at all important
- Not too important
- Somewhat important
- Very important






Q20 When someone posts something about current event on a social networking site that you disagree with, how do you usually respond?

- Ignore the post you disagree with
- Respond to it by posting a comment or posting something of your own

Q21 Have you ever learned that someone's beliefs were different than you thought they were, based on something they posted on a social networking website?

- Yes
- No

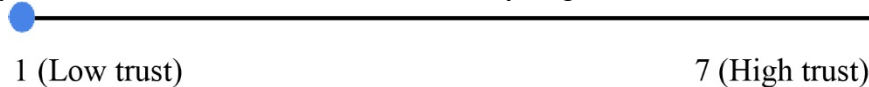
Q22 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 954</p>	<p><u>User review:</u></p> <p>Service on a Sunday is horrible. Plus they have the ac on in the winter. They got my sister's order wrong. And for mine, I didn't know I had to put my sandwich together myself .... So exactly what am I paying for ..... We should have gone elsewhere.</p> <p>  4     0 </p> <p>  - People supporting this post       - People not supporting this post </p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q23 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q24 Rate your level of trust with the information you gathered about the restaurant?








Q25 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q26 What is the confidence level in your decision?

1 (Low confidence) 7 (High confidence)

Q27 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant’s quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 12</p>	<p><u>User review:</u></p> <p>Had the worst experience of my life here tonight. Brought 6 people here to celebrate a key milestone in life. The service, the food was horrendous. Spoke to the manager Aidan about it and he said if you don't like it leave. Really poor customer service and absolutely appalling! Avoid this at all cost!</p> <p>  4               0         </p> <p>  - People supporting this post               - People not supporting this post         </p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q28 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q29 Rate your level of trust with the information you gathered about the restaurant?

1 (Low trust) 7 (High trust)

Q30 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely








Q31 What is the confidence level in your decision?



1 (Low confidence)

7 (High confidence)

Q32 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <u>User's historical information:</u> Reputation ★★★★★ Previous reviews : 952	<u>User review:</u>  Menu is sad. Service is trash. Drinks are weak. Music blows. All around dump. Came to kill time grab a drink and they were all weak. Food options were basic (mc Donald's better selections). Did I mention the drinks are watered down??   4  0   - People supporting this post  - People not supporting this post
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q33 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q34 Rate your level of trust with the information you gathered about the restaurant?



1 (Low trust)

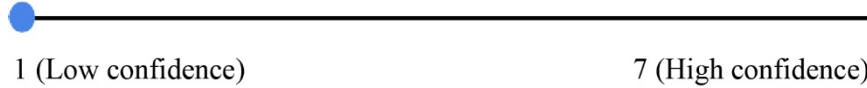
7 (High trust)

Q35 Based on the user review you have seen, how likely are you to go to the restaurant?






- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely

- Extremely likely

Q36 What is the confidence level in your decision?



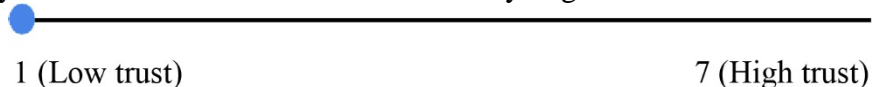
Q37 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 14</p>	<p><u>User review:</u></p> <p>Nothing special, mediocre, bad service, confusing menu, too many waiters, it seems that the quality has gone low because before was very hard to get a table. The quality of the food was bad, plastic, the wrong temperatures. It didn't work.</p> <p>  4             0         </p> <p>  - People supporting this post             - People not supporting this post         </p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q38 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q39 Rate your level of trust with the information you gathered about the restaurant?

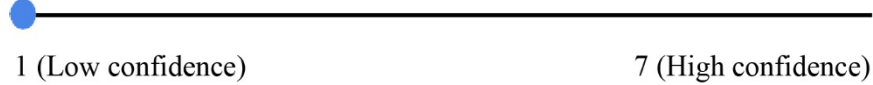


Q40 Based on the user review you have seen, how likely are you to go to the restaurant?


- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely

- Very likely
- Extremely likely

Q41 What is the confidence level in your decision?



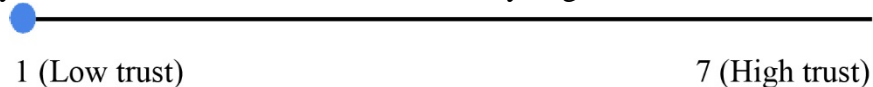
Q42 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 950</p>	<p><u>User review:</u></p> <p>Both entrées we ordered were plain bad, the scallops were actually inedible. The drinks were very weak and very overpriced. Everything was over priced and the service was real slow. The meal was so expensive and so crappy.</p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q43 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q44 Rate your level of trust with the information you gathered about the restaurant?

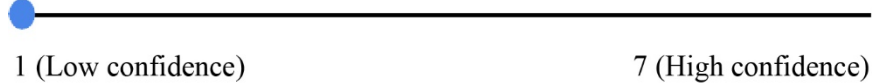


Q45 Based on the user review you have seen, how likely are you to go to the restaurant?


- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely

- Very likely
- Extremely likely

Q46 What is the confidence level in your decision?



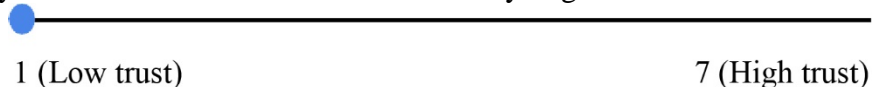
Q47 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <u>User's historical information:</u>  Reputation ★★★★★ Previous reviews : 11	<u>User review:</u>  Terrible. Terrible. Terrible. My wife's eggs were precooked. No jam or jelly for toast. There was some liquid, hopefully water all over my plate that my food was sitting in. Yuck. Never going back. This is not the place you want to go.
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q48 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q49 Rate your level of trust with the information you gathered about the restaurant?

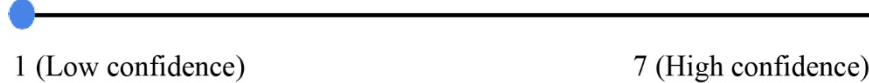


Q50 Based on the user review you have seen, how likely are you to go to the restaurant?


- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely

- Very likely
- Extremely likely

Q51 What is the confidence level in your decision?



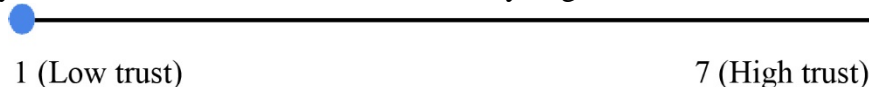
Q52 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 956</p>	<p><u>User review:</u></p> <p>Terrible. expensive. small. nuggets. We got 1 order of southern belle, 1 of bacon nuggets, and 1 of the cheese Louise. all of which were terrible. Dry, tiny, and flavorless pieces of (what seemed like) frozen chicken. Without sauce, I wouldn't even have finished</p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q53 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q54 Rate your level of trust with the information you gathered about the restaurant?



Q55 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely

- Extremely likely


Q56 What is the confidence level in your decision?



1 (Low confidence)

7 (High confidence)

Q57 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <p><u>User's historical information:</u></p> <p>Reputation ★★★★★</p> <p>Previous reviews : 15</p>	<p><u>User review:</u></p> <p>Food took more than an hour to get here. The salmon was already cold. The beans were watery and got really sick after eating. If you want to get food poisoning with mediocre food, this is your place.</p>
<p><b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts</p>	

Q58 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q59 Rate your level of trust with the information you gathered about the restaurant?



1 (Low trust)

7 (High trust)






Q60 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q61 What is the confidence level in your decision?

1 (Low confidence) 7 (High confidence)

Q62 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <u>User's historical information:</u> Reputation ★★★★★ Previous reviews : 953	<u>User review:</u>  Very dissatisfied with meal. Horrible Niçoise salad. Tuna fish was very hard, lacked taste and seemed from can, missing anchovies on the salad. Steak tartare had gristle. Paying for this meal is an insult.   0  4   - People supporting this post  - People not supporting this post
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q63 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q64 Rate your level of trust with the information you gathered about the restaurant?

1 (Low trust) 7 (High trust)






Q65 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q66 What is the confidence level in your decision?

1 (Low confidence) 7 (High confidence)

Q67 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

  <u>User's historical information:</u>  Reputation ★★★★★ Previous reviews : 11	<u>User review:</u>  The Service is horrible.....The food was delivered late and cold. After a mistake made with the order, the guy taking phone orders was rude. The chicken was undercooked and red inside, someone could have really become sick.   0  4   - People supporting this post  - People not supporting this post
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q68 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q69 Rate your level of trust with the information you gathered about the restaurant?

1 (Low trust) 7 (High trust)

Q70 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely








Q71 What is the confidence level in your decision?



1 (Low confidence)

7 (High confidence)

Q72 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

  <u>User's historical information:</u>  Reputation ★★★★★ Previous reviews : 957	<u>User review:</u>  The food was overprice and bland, trying to be creative but failed miserably (at least that night).. The service was somewhat annoying trying too many times to collect our dishes before we were done.   0  4   - People supporting this post  - People not supporting this post
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q73 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q74 Rate your level of trust with the information you gathered about the restaurant?



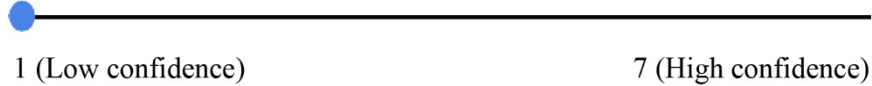
1 (Low trust)

7 (High trust)






Q75 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q76 What is the confidence level in your decision?



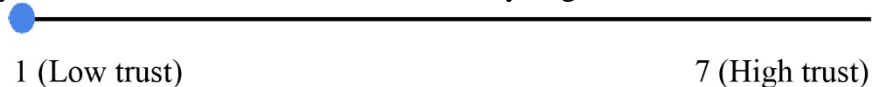
Q77 A new restaurant with American Cuisine has opened up in your city. You will be presented with an -online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.

 <u>User's historical information:</u> Reputation ★★★★★ Previous reviews : 13	<u>User review:</u> This place has the worst service I have ever had... I went back a second time thinking it was just an off-night. BIG MISTAKE. Both times the wait was endless. Finding a server nearly impossible. And the food??--mine literally came out 40 min AFTER my date had FINISHED theirs. CLOSE THIS PLACE NOW!  0  4  - People supporting this post  - People not supporting this post
<b>Note:</b> Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged posts	

Q78 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

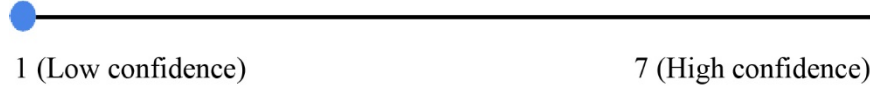
Q79 Rate your level of trust with the information you gathered about the restaurant?



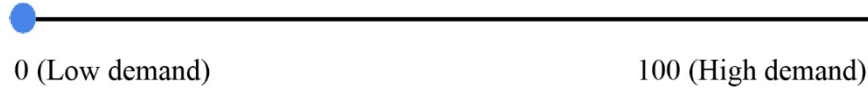
Q80 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q81 What is the confidence level in your decision?



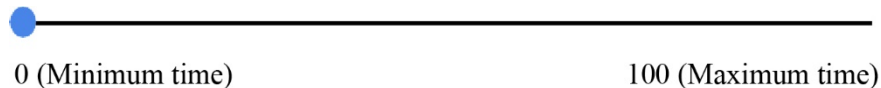
Q82 How MENTALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



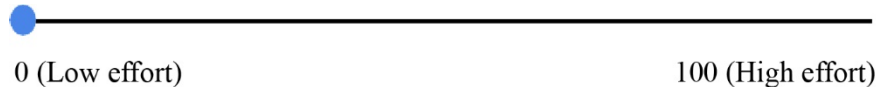
Q83 How PHYSICALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



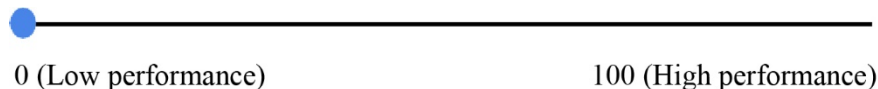
Q84 How TIME DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



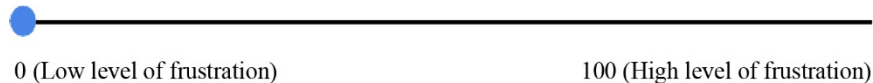
Q85 How much EFFORT did you put in the task of making a decision -- To go or not to go to the restaurant?



Q86 How well did you PERFORM in making the decision -- To go or not to go to the restaurant?



Q87 How FRUSTRATED were you in the process of making a decision -- To go or no to go to the restaurant?



Q88 Please enter the following text in the text box

Q89 Please enter the completion code shown below on Amazon Mechanical Turk (Step 4) and click on the submit button to indicate that you have participated and completed the study so you can be paid. Your Study Completion Code is: \${e://Field/mTurkCode}

## Appendix E

### Study Condition for the follow-up study (supporting reviews)

Q1 I have read and understood the information letter and agree to participate in this study.

- Yes, I understand the above information and agree to participate in this study
- No, I do not wish to participate in this study

Q2 Are you a male or female?

- Male
- Female

Q3 Are you a vegetarian or non-vegetarian?

- Vegetarian
- Non-vegetarian
- Other

Q4 What year were you born?

▼ 1920 ... 2000

Q5 What is the highest level of school you have completed or the highest degree you have received?

- Less than a high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate's degree
- Bachelor's degree
- Graduate degree

Q6 Which of the following categories best describes your employment status?

- Employed, working 1-39 hours per week
- Employed, working 40 or more hours per week
- Not employed, looking for work
- Not employed, NOT looking for work
- Retired
- Disabled, not able to work

Q7 Are you White, Black or African-American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific islander, or some other race?

- White
- Black or African-American
- American Indian or Alaskan Native
- Asian
- Native Hawaiian or other Pacific Islander
- From multiple races
- Some other race (please specify) \_\_\_\_\_

Q8 Do you ever use the Internet to -- **Use an online search engine to help you find information on the web?**

- Yes
- No

Q9 Do you ever use the Internet to -- **Use a social networking site like Facebook, LinkedIn or Twitter?**

- Yes
- No

Q10 Do you ever use the Internet to -- **Use social networking sites to get restaurant reviews and other information?**

- Yes
- No

Q11 A smart phone is a mobile phone with more advanced computing capability and connectivity than basic feature phones.

**Is your phone a smartphone?**

- Yes
- No
- Not sure

Q12 Do you ever use the Internet on your mobile device to -- **Look up restaurant reviews using applications like Zomato and Yelp?**

- Yes
- No

Q13 Do you ever use the Internet to -- **Use anonymous social media app like Yik Yak?**

- Yes
- No

Q14 On which social networking site or sites do you currently have an account?

- Facebook
- LinkedIn
- MySpace
- Vine
- Twitter
- YouTube
- Tumblr
- Flickr
- Google Plus
- Instagram
- Other (please specify) \_\_\_\_\_
- Don't have an account on a social networking site

Q15 About how often do you visit social networking site with the profile or account you have?

- Several times a day
- About once a day
- 3 to 5 days a week
- 1 to 2 days a week
- Less often

Q16 How important are social networking sites to you personally when it comes to --  
**Keeping up with news?**

- Not at all important
- Not too important
- Somewhat important
- Very important

Q17 How important are social networking sites to you personally when it comes to --  
**Debating or discussing issues with others?**

- Not at all important
- Not too important

- Somewhat important
- Very important

Q18 How important are social networking sites to you personally when it comes to --

**Finding other people who share your views about important issues?**

- Not at all important
- Not too important
- Somewhat important
- Very important

Q19 How important are social networking sites to you personally when it comes to --

**Recruiting people to get involved with issues that matter to you?**

- Not at all important
- Not too important
- Somewhat important
- Very important

Q20 When someone posts something about current event on a social networking site that you disagree with, how do you usually respond?

- Ignore the post you disagree with
- Respond to it by posting a comment or posting something of your own





Q21 Have you ever learned that someone's beliefs were different than you thought they were, based on something they posted on a social networking website?

- Yes
- No



Q22

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

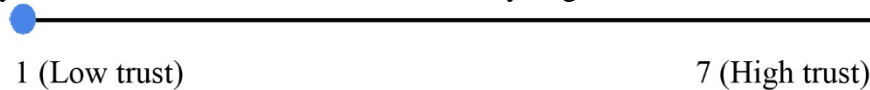
<p>Elizabeth Williams Age: 45 Brooklyn, NY</p> <p><u>Elizabeth's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 954</p>	<p><u>Elizabeth's review:</u></p> <p>Amazing lobster risotto dish! Very filling and very delicious!! Our waiter was very nice and professional and I would definitely go back there! Wine choice is also great!!</p> <p> 4  0</p> <p> - People supporting this comment  - People not supporting this comment</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q23 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

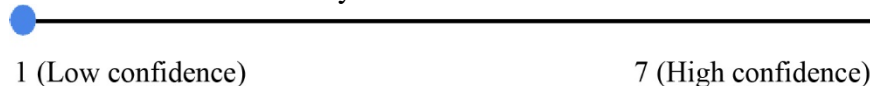
Q24 Rate your level of trust with the information you gathered about the restaurant?



Q25 Based on the user review you have seen, how likely are you to go to the restaurant?





- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q26 What is the confidence level in your decision?



Q27

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

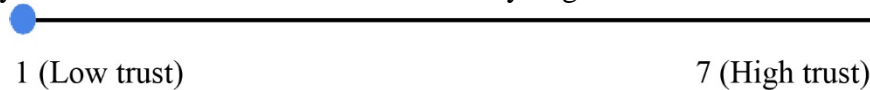
<p>Sharon Johnson Age: 41 Queens, NY</p> <p><u>Sharon's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 12</p>	<p><u>Sharon's review:</u></p> <p>OMG, the fried chicken sandwich was amazing. Came in for lunch with friends and had the fried chicken sandwich and a couple of glasses of wine, the food was yummy and wine was the perfect pairing with my sandwich.</p> <p> 4  0</p> <p> - People supporting this comment  - People not supporting this comment</p>
---	--

**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q28 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

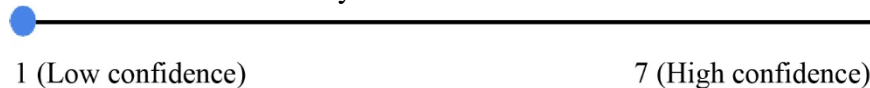
Q29 Rate your level of trust with the information you gathered about the restaurant?



Q30 Based on the user review you have seen, how likely are you to go to the restaurant?





- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q31 What is the confidence level in your decision?



Q32

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

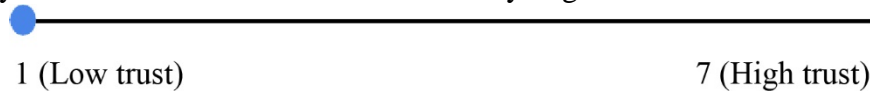
<p>Nancy Taylor Age: 44 Manhattan, NY</p> <p><u>Nancy's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 952</p>	<p><u>Nancy's review:</u></p> <p>Food was delicious, our waitress was very attentive and helpful. Had the Tuna tartare guac, pork dumplings, a small pizza, green pasta, and english muffin burger. All were delicious, ambiance was great. Will return!</p> <p> 4  0</p> <p> - People supporting this comment  - People not supporting this comment</p>
--	---

**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q33 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

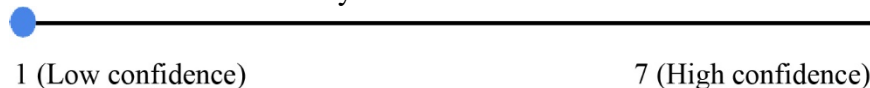
Q34 Rate your level of trust with the information you gathered about the restaurant?



Q35 Based on the user review you have seen, how likely are you to go to the restaurant?





- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q36 What is the confidence level in your decision?



Q37

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

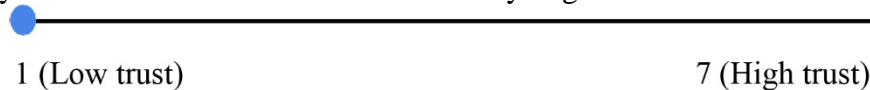
<p>Susan Davis Age: 48 Hicksville, NY</p> <p><u>Susan's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 14</p>	<p><u>Susan's review:</u></p> <p>Fantastic restaurant. Beautiful ambience, great food, consistently the best produce I've seen anywhere. Duck, beef tartare, octopus, can't go wrong.</p> <p> 4  0</p> <p> - People supporting this comment  - People not supporting this comment</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q38 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

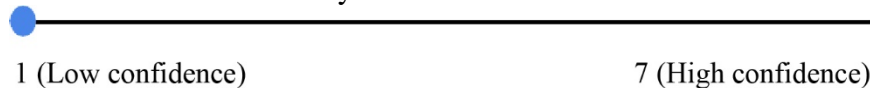
Q39 Rate your level of trust with the information you gathered about the restaurant?



Q40 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q41 What is the confidence level in your decision?



Q42

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

Angela Lee  
Age: 37  
Manhattan, NY

Angela's historical  
information:

Reputation ★★★★★  
Previous reviews : 950

Angela's review:

Amazing food! Great place for brunch. Came here with a my friends for my birthday brunch and ordered the upland cheeseburger. DELICIOUS. Definitely filling and service is super great. Would definitely recommend coming here as a cute brunch or dinner with a few friends!

**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q43 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q44 Rate your level of trust with the information you gathered about the restaurant?



1 (Low trust)

7 (High trust)

Q45 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q46 What is the confidence level in your decision?



1 (Low confidence)

7 (High confidence)

Q47

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

<p>Barbara White Age: 51 Merrick, NY</p> <p><u>Barbara's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 11</p>	<p><u>Barbara's review:</u></p> <p>Really good service. Better food. Crab cakes eggs benedict was probably the best I've had. Steak and Eggs also amazing. I don't ever do reviews but have to give this place props.</p>
--	---

**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q48 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q49 Rate your level of trust with the information you gathered about the restaurant?



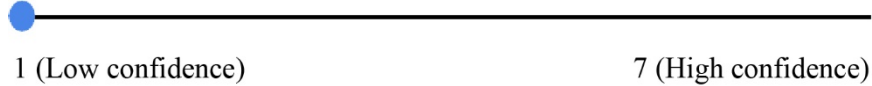
1 (Low trust)

7 (High trust)

Q50 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q51 What is the confidence level in your decision?



Q52

***A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.***

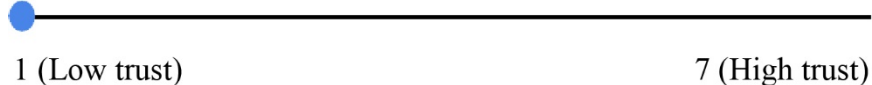
<p>Betty Smith Age: 35 Brooklyn, NY</p> <p><u>Betty's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 956</p>	<p><u>Betty's review:</u></p> <p>Great food and fun and lively atmosphere. Our waiter Terry was fantastic! We had the fresh ricotta appetizer, duck turnover and hamburger and Shepherd pie entree. All super yummy. Lemon tart was delish!</p>
--	---

**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q53 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q54 Rate your level of trust with the information you gathered about the restaurant?

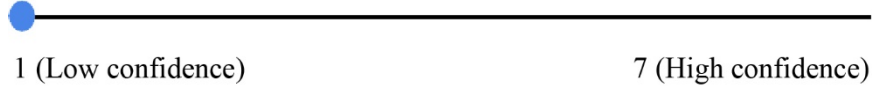


Q55 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely



Q56 What is the confidence level in your decision?



Q57

***A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.***

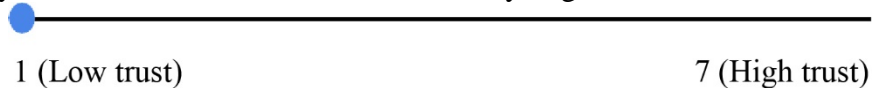
<p>Karen Miller Age: 48 Montauk, NY</p> <p><u>Karen's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 15</p>	<p><u>Karen's review:</u></p> <p>What a delightful experience all around- great food, attentive service and atmosphere to boot. We enjoyed the appetizer (sweet potato kale) and salad and both the chicken and fish entrees were superb.</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q58 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q59 Rate your level of trust with the information you gathered about the restaurant?

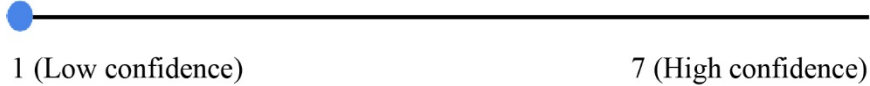


Q60 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely



Q61 What is the confidence level in your decision?



Q62

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

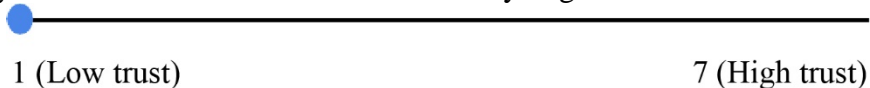
<p>Laura Moore Age: 43 Locust Valley, NY</p> <p><u>Laura's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 953</p>	<p><u>Laura's review:</u></p> <p>Very friendly staff and had a really nice conversation with the owner. Get the apple micro green salad and the goat cheese stuffed chicken breast. I'll definitely be coming back.</p> <p> 0  4</p> <p> - People supporting this comment  - People not supporting this comment</p>
---	---

**Note:** Reputation is based on the historical data of number of upvotes received, number of downvotes received and number of flagged comments

Q63 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

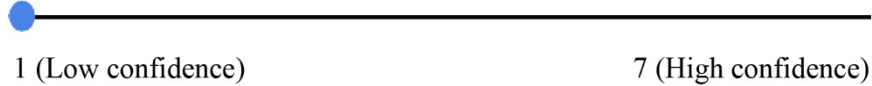
Q64 Rate your level of trust with the information you gathered about the restaurant?



Q65 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q66 What is the confidence level in your decision?



Q67

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

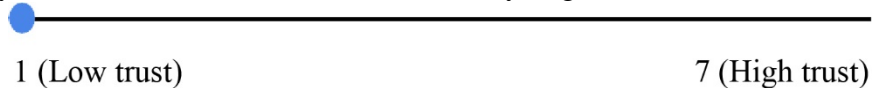
<p>Rebecca Adams Age: 49 Queens, NY</p> <p><u>Rebecca's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 11</p>	<p><u>Rebecca's review:</u></p> <p>Had the pork chop, juicy and flavorful. Steak cooked a perfect medium rare. Mac and cheese with bacon outstanding. The service was great, chevelly was sweet and charming. Great addition to the neighborhood. Good value .We will be back soon.</p> <p> 0  4</p> <p> - People supporting this comment  - People not supporting this comment</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q68 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

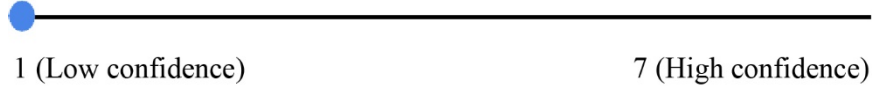
Q69 Rate your level of trust with the information you gathered about the restaurant?



Q70 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q71 What is the confidence level in your decision?



Q72

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

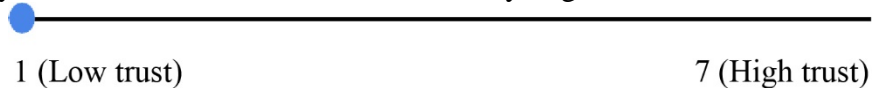
<p>Ruth Jackson Age: 42 Forest Hills, NY</p> <p><u>Ruth's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 957</p>	<p><u>Ruth's review:</u></p> <p>The service is always amazing and the food is even better! The steak and eggs is out of this world and the coffee is the best around! This place is a must go!</p> <p> 0  4</p> <p> - People supporting this comment  - People not supporting this comment</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q73 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

Q74 Rate your level of trust with the information you gathered about the restaurant?



Q75 Based on the user review you have seen, how likely are you to go to the restaurant?





- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q76 What is the confidence level in your decision?

1 (Low confidence) 7 (High confidence)

Q77

**A new restaurant with American Cuisine has opened up in your city. You will be presented with an online post about the restaurant's quality. Based on the user review provided, you will be asked to answer a few questions.**

<p>Sarah Jones Age: 37 Astoria, NY</p> <p><u>Sarah's historical information:</u></p> <p>Reputation ★★★★★ Previous reviews : 13</p>	<p><u>Sarah's review:</u></p> <p>Incredible service and an even better meal. Had the soft shell crab special as an appetizer and the Atlantic char as a main. Both tasted incredibly fresh!</p> <p> 0  4</p> <p> - People supporting this comment  - People not supporting this comment</p>
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**Note:** Reputation is based on the historical data of number of upvotes recieved, number of downvotes recieved and number of flagged comments

Q78 Based on the user review you have seen, would you go to this restaurant?

- Yes
- No

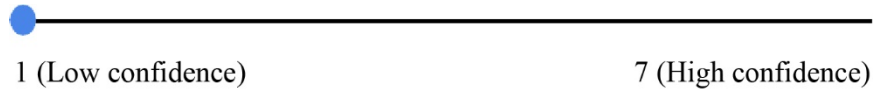
Q79 Rate your level of trust with the information you gathered about the restaurant?

1 (Low trust) 7 (High trust)

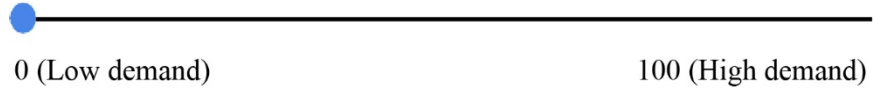
Q80 Based on the user review you have seen, how likely are you to go to the restaurant?

- Extremely unlikely
- Very unlikely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely
- Extremely likely

Q81 What is the confidence level in your decision?



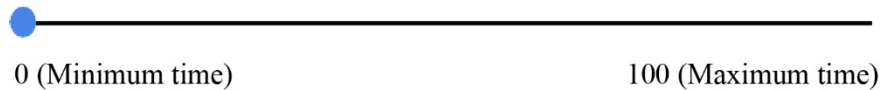
Q82 How MENTALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



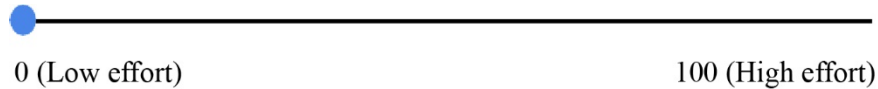
Q83 How PHYSICALLY DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



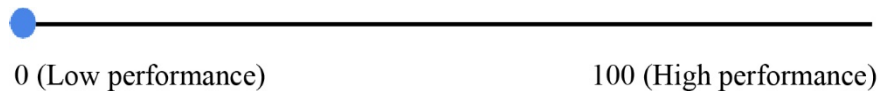
Q84 How TIME DEMANDING was the task of making a decision -- To go or not to go to the restaurant?



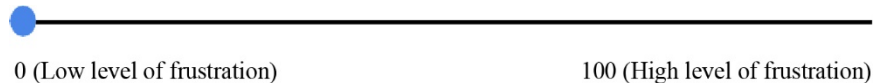
Q85 How much EFFORT did you put in the task of making a decision -- To go or not to go to the restaurant?



Q86 How well did you PERFORM in making the decision -- To go or not to go to the restaurant?



Q87 How FRUSTRATED were you in the process of making a decision -- To go or no to go to the restaurant?



Q88 Please enter the following text in the text box

Q89 Please enter the completion code shown below on Amazon Mechanical Turk (Step 4) and click on the submit button to indicate that you have participated and completed the study so you can be paid. Your Study Completion Code is: \${e://Field/mTurkCode}

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