ONLINE CONSUMER REVIEWS: A MARKETING TOOL TO IMPROVE THE PERCEIVED INFORMATIVENESS AND PERCEIVED VALUE

A Dissertation by

Hessamedin Vali

Master of Science in Industrial Engineering, Wichita State University, 2012
Master of Business Administration, Carleton University, 2009
Bachelor of Science in Industrial and Manufacturing Engineering, Iran University of Science and Technology, 2003

Submitted to the Department of Industrial and Manufacturing Engineering and the faculty of the Graduate School of Wichita State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

May 2016
ONLINE CONSUMER REVIEWS; A MARKETING TOOL TO MAKE IMPROVE THE SELLERS AND BUYERS PURCHASE EXPERIENCE

The following faculty members have examined the final copy of this dissertation for form and content, and recommend that it be accepted in partial fulfillment of the requirement for the degree of Doctor of Philosophy with a major in Industrial and Manufacturing Engineering.

____________________________
Mehmet Bayram Yildirim, Committee Chair

____________________________
David Xu, Co-Chair

____________________________
Gamal Weheba, Committee Member

____________________________
Krishna Krishnan, Committee Member

____________________________
Don Malzahn, Committee Member

____________________________
Abu Asaduzzaman, Committee Member

Accepted for the College of Engineering

____________________________
Royce Bowden, Dean

Accepted for the Graduate School

____________________________
Dennis Livesay, Dean
ACKNOWLEDGEMENTS

First and foremost, I would like to express my deep gratitude to my dissertation chair, Dr. Mehmet Bayram Yildirim and my dissertation co-chair, Dr. David Xu whom patiently guided me through my dissertation research, never accepting less than my best efforts. Their wisdom, knowledge, and commitment to the highest standards have inspired and motivated me.

I acknowledge my committee members, Dr. Gamal Weheba, Dr. Krishna Krishnan, Dr. Don Malzahn and Dr. Abu Asaduzzaman for agreeing to serve on my dissertation committee.

I also give my heartfelt appreciation to my parents and my wife, Mozhdeh, who have always supported me and encouraged me to study and get an advanced degree.
ABSTRACT

Consumer reviews as an important source of product information are becoming popular in online markets. Due to lack of physical access to the product and variation among buyer preferences, there is always the risk of selecting an inappropriate product that doesn’t meet a customer’s needs. If this happens, not only does the buyer face an uncomfortable situation, but also the seller will be in jeopardy of losing potential customers as well as paying warranty-related costs and expenses.

In the second chapter, the focus is on different types of conflicting information among reviews as factors that affect their informativeness and accuracy of a purchasing decision. Cognitive load theory explains that when a type of review conflict is easy to capture but cannot be related to a product, like a conflicting star rating, the cognitive load is too low, and the product information cannot be captured. Conflicting attributes can be easily related to a product and they are easy to capture; therefore, the cognitive load is medium and the delivered information is high.

In the third chapter, the focus is on the effect of a review’s repeating purchase cues on the overall perceived value of the product. In summary, when a positive review includes repeating purchase cues, positive reviews are perceived more helpful than negative reviews.

Finally, the value of review dimensions and review format on the review’s perceived value is studied. In general, comparison reviews are perceived to be more valuable than non-comparison reviews. However, in the field of consumer reviews, comparing reviews provides too much information and overwhelms the potential buyer. By categorizing information in a table format, the overwhelming issue can be managed so, comparing reviews in a table format is perceived more valuable than existing traditional reviews.
# TABLE OF CONTENTS

## CHAPTER 1

**INTRODUCTION**

1.1. Motivation

1.2. Gap Analysis

1.3. Dissertation Organization

1.4. REFERENCES

## CHAPTER 2

**THE EFFECT OF CONFLICTING CONSUMER REVIEWS ON THE ACCURACY OF A PURCHASE DECISION**

2.1. Introduction

2.2. Literature Review and Theoretical Background

2.3. Research Model and Research Hypotheses Development

2.4. Research Method

2.5. Analysis of Structural Model

2.6. Discussion

2.7. Contributions

2.8. Limitations and Future Research

2.9. Conclusion

2.10. REFERENCES

## CHAPTER 3

**THE EFFECTS OF REPEATING PURCHASE CUES AND MIXED REVIEW ON PRODUCT ATTRIBUTION**

3.1. Introduction

3.2. Theoretical Background and Hypotheses Development

3.3. Research Model

3.4. Analysis of Results

3.5. Discussion

3.6. Limitations and Directions for Future Research

3.7. REFERENCES
# TABLE OF CONTENTS (continued)

CHAPTER 4 ............................................................................................................................................... 71

**TWO-DIMENSIONAL REVIEWS: THE NEW GENERATION OF ONLINE CONSUMER REVIEWS** ............................................................................................................................................... 71

- 4.1. Introduction .................................................................................................................................. 72
- 4.2. Theoretical Background and Hypotheses Development ......................................................... 77
- 4.3. Research Method ...................................................................................................................... 86
- 4.4. Discussion .................................................................................................................................. 96
- 4.5. Contributions ............................................................................................................................ 99
- 4.6. Study Limitations and Possible Future Work ........................................................................... 101
- 4.7. Conclusion ............................................................................................................................... 102
- 4.8. REFERENCES .......................................................................................................................... 104

CHAPTER 5 ............................................................................................................................................. 106

**CONCLUSIONS AND FUTURE RESEARCH** .................................................................................... 106

- 5.1. Conclusions ............................................................................................................................... 106
- 5.2. Future Research ....................................................................................................................... 108
- 5.3. Reference: ............................................................................................................................... 113
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1. Literature Review Summary</td>
<td>15</td>
</tr>
<tr>
<td>2.1. Review of Types of Conflict in the Literature</td>
<td>31</td>
</tr>
<tr>
<td>2.2. Cognitive Load Criteria and Perceived Informativeness</td>
<td>36</td>
</tr>
<tr>
<td>2.3. Research Independent Variables</td>
<td>40</td>
</tr>
<tr>
<td>2.4. Intensity of Disagreement among Reviewers = Low, Conflicting Opinion Regarding Product Attributes = Low, Conflict among Star Ratings = Low</td>
<td>41</td>
</tr>
<tr>
<td>2.5. Measurement Items for Constructs</td>
<td>42</td>
</tr>
<tr>
<td>2.6. Manipulation Checks for Types of Conflict</td>
<td>43</td>
</tr>
<tr>
<td>2.7. Comparison Analysis of Perceived Informativeness among Study Group</td>
<td>44</td>
</tr>
<tr>
<td>2.8. Internal Consistency of Constructs</td>
<td>44</td>
</tr>
<tr>
<td>3.1. Manipulation Check Results for Review Valence</td>
<td>69</td>
</tr>
<tr>
<td>3.2. Manipulation Check Results for Repeating Purchase Cues</td>
<td>69</td>
</tr>
<tr>
<td>3.3. Descriptive Statistics for Hypothesis H1</td>
<td>71</td>
</tr>
<tr>
<td>3.4. Regression Model for H1a</td>
<td>71</td>
</tr>
<tr>
<td>3.5. Regression Model for H1b</td>
<td>71</td>
</tr>
<tr>
<td>3.6. Regression Model for H2</td>
<td>72</td>
</tr>
<tr>
<td>3.7. Regression Model for H3</td>
<td>72</td>
</tr>
<tr>
<td>4.1. Study Websites and Specifics</td>
<td>98</td>
</tr>
<tr>
<td>4.2. Study Measures</td>
<td>99</td>
</tr>
<tr>
<td>4.3. Manipulation Checks for Review Dimensions</td>
<td>100</td>
</tr>
<tr>
<td>4.4. Manipulation Checks for Review Format</td>
<td>101</td>
</tr>
</tbody>
</table>
LIST OF TABLES (continued)

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5. Manipulation Checks for IPhone Valence</td>
<td>101</td>
</tr>
<tr>
<td>4.6. Manipulation Checks for Samsung Valence</td>
<td>101</td>
</tr>
<tr>
<td>4.7. Internal Consistency of Constructs</td>
<td>102</td>
</tr>
<tr>
<td>4.8. Average Review Value for H3a Groups</td>
<td>103</td>
</tr>
<tr>
<td>4.9. Average Review Value for H3a Groups</td>
<td>104</td>
</tr>
<tr>
<td>4.10. Summary of All Tested Hypotheses</td>
<td>106</td>
</tr>
<tr>
<td>Figure</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>2.1. Conflict in reviews of pencil on Google Shopping website</td>
<td>30</td>
</tr>
<tr>
<td>2.2. Model of three types of conflict: Conflicting opinion among opinions, Conflicting star rating, and Disagreement among reviewers (CCD)</td>
<td>34</td>
</tr>
<tr>
<td>2.3. Application of cognitive load theory in online reviews</td>
<td>37</td>
</tr>
<tr>
<td>2.4. Estimated marginal mean of informativeness</td>
<td>46</td>
</tr>
<tr>
<td>3.1. Relationship between valence, value, attribution and repeating purchase</td>
<td>67</td>
</tr>
<tr>
<td>3.2. Estimated Marginal Means causal attribution to product experience (Positive and Negative Reviews)</td>
<td>73</td>
</tr>
<tr>
<td>3.3. Estimated Marginal Means causal attribution to product experience (Positive and Mixed Reviews)</td>
<td>73</td>
</tr>
<tr>
<td>4.1. Sample of Two-Dimensional Review Designed by Author of this dissertation</td>
<td>87</td>
</tr>
<tr>
<td>4.2. Study Framework</td>
<td>97</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

Online reviews as a new source of product information have been introduced when internet gained popularity and online purchasing gained popularity. The literature indicates that customers appreciate online reviews as a great source of product information, even more than information provided by sellers. When buyers are not able to understand the sophisticated seller-created information about products, online reviews are used to compensate for this disconnect. The following statistics help us to understand the value of existing reviews for potentially new customers (Gogoi 2007):

- 47% of shoppers read product reviews prior to their purchase.
- 63% of online shoppers are more likely to buy from websites with online reviews or ratings.

The Internet and information technology are creating a new opportunity for consumers to share their product evaluations online (Avery, Resnick, and Zeckhauser 1999). In 1995, Amazon.com began offering customers a posting their comments relative to products on its website. Currently, Amazon.com has about 10 million consumer reviews of all of its product categories, and these reviews are regarded as one of the most popular and successful features of the company (New York Times, February 24, 2004).

1.1. Motivation

Online reviews are being used as an appreciated product information source. However, this information source is created by other consumers who are not marketing professionals and have different opinions and preferences. As a result, this information can be very helpful or
confusing. On one side, product reviews are very well accepted, but on the other side, they can be misleading. If online reviews do not provide sufficient and valuable information, both sellers and consumers will be affected. A wrong purchase negatively affects a consumer for the following reasons: (a) the purchased product does not satisfy the consumer’s need, and (b) the consumer’s time spent in searching and researching the product is viewed as a waste. Also, sellers try to eliminate wrong purchases because of warranty and product-return costs.

The motivation behind this research topic is the cost of making a wrong purchase decision. Studies show that a wrong purchase, which can happen due to lack of information, negatively affect sellers by imposing warranty costs, return costs, and reputation-damage costs. On the other hand, a customer who buys a wrong product also experiences negative feelings such as loosing time through product search and lack of success in meeting his/her needs.

As a result of this motivation, in this dissertation I introduce structural models to identify variables that moderates relationships between information provided in online reviews as well as review presentation format as dependent variables and review value, informativeness and purchase decision accuracy as independent variables. This information would help both sellers and buyers to improve their experience as far as product sell and purchase.

1.2. Gap Analysis

In the last decade, the value of online reviews for both sellers and customers has been examined by means of several research studies. Most if these studies concern the effect of different features of reviews including overall ratings, review length, valence, etc. and moderating factors such as trust, product diagnosticity, etc. on either sellers’ related measures like profit, sales, and revenue and etc. or customer-related variables such as purchase intention, review helpfulness, etc. However, there are very limited studies on the effect of differences
among people preferences. During the literature review we found a big gap in this area. We believe it’s important to find out how conflicts among reviewers affect the review informativeness or how some specific terms and cues can help buyers to perceive more value by reading a review. Table 1.1 summarizes the research in this field of study.
<table>
<thead>
<tr>
<th>Authors (year)</th>
<th>Dependent Variable/s</th>
<th>Independent Variable/s</th>
<th>Domain</th>
<th>Methodology</th>
<th>Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chen and Xie (2008)</td>
<td>Seller’s profit</td>
<td>Reviews informativeness and price</td>
<td>Marketing</td>
<td>Math modelling and experimentation</td>
<td>Management Science</td>
</tr>
<tr>
<td>Mudambi (2010)</td>
<td>Helpfulness of consumer review</td>
<td>Product type (search/experience), review length, review star/rating</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td>MIS Quarterly</td>
</tr>
<tr>
<td>Park, Lee, and Han (2007)</td>
<td>Consumer purchase decision</td>
<td>Quality and quantity of reviews, reviews informativeness and customer involvement</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td>International Journal of Electronic Commerce</td>
</tr>
<tr>
<td>Authors (year)</td>
<td>Dependent Variable/s</td>
<td>Independent Variable/s</td>
<td>Domain</td>
<td>Methodology</td>
<td>Publication</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------------------------------</td>
<td>-------------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>6 Park, Lee, and Han (2011)</td>
<td>Consumer purchase intension</td>
<td>Trust, credibility of consumer reviews and credibility of seller’s advertisement</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td>Internet Research</td>
</tr>
<tr>
<td>7 Lee, Park, and Han (2008)</td>
<td>Product attitude</td>
<td>Proportion of negative online reviews, quality of negative reviews, level of consumer involvement,</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td>Electronic Commerce Research and Applications</td>
</tr>
<tr>
<td>8 Natour and Benbasat (2010)</td>
<td>Accepting conflicting recommendation s</td>
<td>IDA dominance, IDA decision strategy, domain knowledge</td>
<td>Marketing</td>
<td>Experimentation</td>
<td>Administrative Sciences Association of Canada paper</td>
</tr>
<tr>
<td>Authors (year)</td>
<td>Dependent Variable/s</td>
<td>Independent Variable/s</td>
<td>Domain</td>
<td>Methodology</td>
<td>Publication</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Cui, Lui, and Guo (2012)</td>
<td>Seller’s sale</td>
<td>Quality of reviews/valence, product type (search/experience), quantity/volume, product life cycle</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td><em>International Journal of Electronic Commerce</em></td>
</tr>
<tr>
<td>Smith, Menon, and Sivakumarc (2005)</td>
<td>Consumer purchase decision</td>
<td>Trust, recommendation source, shopping goal</td>
<td>Marketing</td>
<td>Experimentation</td>
<td><em>Journal of Interactive Marketing</em></td>
</tr>
<tr>
<td>Forman, Ghose, and Wiesenfeld (2008)</td>
<td>Consumer purchase decision</td>
<td>Shared geographical location, writer’s personal information, online product sale</td>
<td>Information Systems</td>
<td>Experimentation</td>
<td><em>Information System Research</em></td>
</tr>
<tr>
<td>West and Broniarczyk (1998)</td>
<td>Consumer response to critics</td>
<td>Critics consensus, critics disagreement, consumer aspiration level</td>
<td>Marketing/Consumer Research</td>
<td>Experimentation</td>
<td><em>Journal of Consumer Research</em></td>
</tr>
<tr>
<td>Authors (year)</td>
<td>Dependent Variable/s</td>
<td>Independent Variable/s</td>
<td>Domain</td>
<td>Methodology</td>
<td>Publication</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Park and Han (2008)</td>
<td>Product evaluation</td>
<td>Product types, conflicting and prior brands attitude</td>
<td>System Science</td>
<td>Experimentation</td>
<td>Proceedings of Hawaii International Conference on System Sciences</td>
</tr>
<tr>
<td>Authors (year)</td>
<td>Dependent Variable/s</td>
<td>Independent Variable/s</td>
<td>Domain</td>
<td>Methodology</td>
<td>Publication</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>---------------------------------------------</td>
<td>---------</td>
<td>--------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Yang, Kim, and Amblee (2012)</td>
<td>Sales of less-popular books</td>
<td>Reviews volume, reviews valence</td>
<td>Marketing</td>
<td>Experimentation</td>
<td>European Journal of Marketing</td>
</tr>
<tr>
<td>Lee, Park, and Han (2011)</td>
<td>Consumer purchase intention</td>
<td>Trust in online malls, consumer reviews</td>
<td>E-Commerce</td>
<td>Experimentation</td>
<td>Internet Research</td>
</tr>
</tbody>
</table>
1.3. Dissertation Organization

This dissertation will discuss the value of online consumer reviews from different points of view that have not yet been studied. The following three research topics will be examined:

- How conflicting reviews affect the review informativeness and correct purchase decision made by consumers.
- How specific cues improve the value of posted reviews.
- How review dimension (one-Dimension or non-comparing vs. two-Dimension or comparing) and presentation format (written vs. table) can improve review values.

Although consumer reviews are being used as one of the appreciated sources of product information, there are conditions in which reviews can be harmful for both sellers and buyers. One of those conditions could be when online reviews are not consistent, and disagreement between review writers confuses the potential buyer.

In Chapter 2, different types of conflict that can be captured by reading a group of reviews are identified. These different types are classified as conflicting opinions regarding a product attributes, conflicting star ratings, and overall disagreement among reviewers. According to this first study, and consistent with cognitive load theory as the study backbone, conflicting star ratings and overall disagreement among reviews result in lower review value and a less-accurate purchase decision; however, conflicting attributes improve the review value perceived by a buyer and accuracy of the purchase decision. We then studied the interaction of conflict types and then the effect of these interactions on review value and probability of making a correct purchase decisions.

It has been argued that, review valence is an effective factor in sellers and buyers performance measures. According to negativity bias, negative reviews are perceived to be more
valuable. This phenomenon is consistent with the accepted J-shape distribution toward positive reviews and low quantity of negative reviews. On the other hand, positive reviews, which are more frequent and express positive aspects of a product, are not being perceived as valuable from a buyer’s standpoint. The study in Chapter 3 focuses on some variables that can change this relationship among review valence, causal attribution, and review value. A few researchers have studied different factors that can change this relationship. Chen and Lurie (2013) proposed a temporal contiguity cue as a parameter that can improve the value of positive reviews.

In Chapter 3 it is observed that repeating purchase cues is a variable that shifts a buyer’s attention from reviewers to product features. Based on causal attribution theory, the presence of cues showing multiple uses over time is an indicator of a product’s quality and durability. This can help buyers to perceive the attribution as the product and not the review writer.

Another contribution of the second chapter is a study of the behavior of review readers when they are exposed to mixed reviews containing positive and negative opinions about a product. In most studies in the area of consumer reviews, valence has been defined as either positive or negative; however, statistical analyses of online reviews of a sample product shows a good portion of reviews include both positive and negative information. Based on negativity bias, it is hypothesized that the characteristics of mixed reviews are more similar to negative reviews than positive ones.

The focus in Chapter 4 in this dissertation is on two-dimensional online reviews which are proposed here for the first time. Two-dimension reviews are those that include comparing information about the same attributes of two alternative and competing products. Despite traditional online reviews that mainly discuss only a single product, comparing online reviews not been investigated and commercialized yet. In this research, the effect of two-dimensional
reviews and the effect of review presentation format on the review’s perceived value have been studied. Whether the review dimension manipulates the relationship between review valence and perceived attitude toward reviews is also determined.
REFERENCES


CHAPTER 2
THE EFFECT OF CONFLICTING CONSUMER REVIEWS ON THE ACCURACY OF A PURCHASE DECISION

Abstract

Online consumer review plays an important role in customers’ purchase decisions. However, conflicting online reviews can confuse potential customers. As a result, he/she will take a risk of either selecting a product that is not able to satisfy their needs or not select an appropriate product. This error in purchasing can impose significant tangible and intangible costs on the supply chain. In this chapter, a conceptual framework will be proposed to model the effect of three types of conflict among online consumer reviews: including Conflicting opinions among product attributes, Conflicting star ratings and the Disagreement intensity among reviewers (CCD model) on the perceived informativeness and accuracy of a purchase decision. Result of this study may help sellers to analyze and categorize online reviews and publish reviews that would improve the accuracy of a purchase decision, thereby decreasing the overall cost of a wrong purchase.

Keywords: Conflicting opinions about product attributes, conflicting star ratings, disagreement intensity among reviewers, informativeness, accuracy of a purchase decision

2.1. Introduction

Online shopping has become a routine behavior for many consumers (Zhang et al. 2010). During the initial years of the Internet age in business-to-consumer (B2C) commerce, there was an asymmetric relationship between sellers and customers, i.e., customers used only the information created by sellers or limited online word of mouth (WOM) to make a purchase decision. This asymmetric channel caused a significant reduction in the accuracy of a purchase decision, which is defined as purchasing a product that meets a buyer’s preferences and
requirements. This reduction is due to lack of information and thus imposes significant costs to the supply chain, which is called the cost of a wrong purchase (Chen et al. 2008). Online consumer reviews have been introduced to address this information asymmetry. Thus, not only are consumers able to use data provided by the sellers, but previous consumer experience could be used in the decision-making process as another source of product information.

However, the differences among users’ preferences may lead to conflicting opinions about the target product, which could confuse a potential customer when online reviews are one of the main sources of product information. Conflicting information in online reviews could result from three sources: (1) conflicting opinions of product attributes, when two or more reviewers disagree about a product at least in one attribute (Park and Han 2008); (2) conflicting star ratings, when two or more reviewers rate a single product with different star ratings; for instance, reviewer 1 assigns three stars to a product with an overall positive opinion in the content of the reviews, while the second reviewer with a similar opinion in the review assigns five stars to the same product (Guillet and Law 2010); and (3) disagreement intensity among reviewers (Chatterjee and Basuroy 2006, Yao et al. 2009). For example, when five reviews out of ten are similar in terms of writers’ opinions but different from five other reviews, the disagreement intensity is different from the situation in which nine reviews are similar but the tenth review is different.

Studies have been conducted to investigate the effect of online review properties, such as volume, valence, length, date of submission, etc., on the sellers’ sale (Chevalier and Mayzlin 2003), buyers’ purchase intention (Park et al. 2011), and buyers’ purchasing decision (Smith et al. 2005, Forman et al. 2008). However, the effect of conflicting reviews on perceived informativeness and the accuracy of a purchase decision have not been investigated. Note that
any wrong purchasing decision due to conflicting reviews may impose a tremendous cost to the entire supply chain. Warranty, reshipment, and buyer dissatisfaction are samples of the tangible and intangible costs of making a wrong purchasing decision. By increasing the accuracy of a purchase and thus minimizing the cost of a wrong purchase, the entire supply chain starting from the manufacturer all the way down to dealers and final users can be positively improved (Christozov et al. 2008).

In this chapter, we study the effect of three types of conflicting information among online reviews (i.e. conflicting opinions about product attributes, conflicting star ratings and disagreement intensity among reviewers) on the accuracy of a purchase decision. As a result of this work, we will understand which types of conflicting information would have a significant effect on the accuracy of a purchase decision. Knowing the most significant factors relative to such accuracy will help sellers take action to release and manipulate appropriate reviews on websites and thereby reduce the corresponding costs of a wrong purchase or increase the sales profit (Chen and Xie 2008; CBC 2014; McGlaum 2009; Shaffer 2013). All prior studies in this area have focused on only one of the conflict types at a time, but here we focus on multiple types of conflict at the same time in order to assess the interrelationship among conflict types as well.

To see the actual effect of conflict among reviews, we evaluate customers’ perception before and after making a decision. Based on our best knowledge, there has been no research to study these two measures and evaluate the effect of conflicting information on the accuracy of a purchase decision. In this study, we define two terms: correct purchase before (perceived correct purchase) and correct purchase after (actual correct purchase). The first term measures the extent to which a potential customer thinks the product is able to satisfy her/his needs before actually
using it and the second term measures the actual ability of the product to fulfill a customer’s needs after actually using it.

2.2. Literature Review and Theoretical Background

Effect of Online Consumer Review and Review Informativeness

Few research studies have been conducted to examine the value of online consumer reviews on a potential buyer’s purchase decision (Senecal and Nantel 2004, Smith et al. 2005, and Lee et al. 2011). Although a positive relationship could exist between a customer’s purchase intention and a seller’s sale, high sales do not mean that customers always purchase the right products. Thus, we depart from prior studies by looking at the effect of online consumer reviews on the accuracy of a purchase decision.

We assume that online consumer review is one of the main sources to collect product information to decide if s/he would purchase a product (or not). Therefore, review informativeness is an important variable that significantly affects the quality of a purchase (Chen et. al 2008). Review informativeness refers to the overall information that can be captured by reading a text. Some variables to measure the informativeness of a single text are the sentence length, number of used brands, and referred attributes (Liu et al. 2007, Chen and Xie 2008, Jiang and Wang 2007, Park et al. 2011).

Studies have shown that potential customers read more than one review during the product search phase. Thus, any conflicting information among product reviews will affect the overall informativeness of the reviews read online (Park et al. 2011). Although very few scholars have studied the effect of conflict on online market performance in several directions (Park and Han 2008, Guillet and Law 2010, Ding et al. 2008, Smith et al. 2005, Wang 2008, West and Broniarczyk 1998, Qiu et al. 2012, Al-Natour and Benbasat 2010), considerable work is needed.
to answer numerous research questions, including the following: What are the potential types of conflict among consumer reviews? Do all types of conflict have the same effect on a potential customer’s purchase decision? How do the different types of conflicting information influence review informativeness? The answers to these questions will help both customers and sellers improve the accuracy of a purchase decision, which eventually will reduce the overall imposed cost of a wrong purchase.

**Conflicting Opinion Regarding Product Attributes**

People have different tastes. As a result, an attribute that is important to one person might not be interesting to another person. Reviewers write their opinions about a product’s attributes. Due to different preferences, it is common to see reviews commenting on the same attributes but in different ways. The following example from a Google Shopping website about a mechanical pencil shows conflicting opinions about the same attributes.

. . . The lead doesn't break like other mechanical pencils, and the eraser works perfectly as well . . .

. . . The lead breaks immediately, and the erasers on these pencils are totally worthless . . .

Conflict among product attributes has been studied previously. However, in all these studies, scholars tried to accumulate the opinions regarding product attributes to determine the aggregated star ratings or desired features of the product (Park et al. 2008, Decker and Trusov 2010). According to Zhang et al. (2010), studies on the influence of both positive and negative information presented in the same context are rare in the literature. To our best knowledge, there is no study in the literature that evaluates the effect of conflicting opinions regarding attributes on perceived informativeness.
Conflict among Star Ratings

Conflicting star ratings are the second type of conflict (Guillet and Law 2010, Mudambi and Schuff 2010, Park and Han 2008) that will be examined in this study. Although this type of conflict has been studied by several scholars, to date there has not been a study to analyze the effect of this conflict information in the presence of other types of dissonance, since according to cognitive dissonance theory, different types of conflict could have different effects in the presence of other conflict types (Festinger 1962). Conflict among review ratings occurs when different reviewers rate a product in a contradictory manner. Figure 2.1, from Google Shopping website, shows an example of this type of conflict.

FIGURE 2.1. Conflict in reviews of pencil on Google Shopping website

Disagreement Intensity among Reviewers

Additionally, we propose a third type of conflict in this study: “disagreement intensity among reviewers’ opinions.” For instance, among five different reviews, two of them are similar in terms of writers’ opinion regarding the product attributes, and the remaining reviews are still
similar but different from the first two. This set of reviews is more conflicting than a situation when four reviews are similar but different from only one single review (Yao et al. 2009, Chatterjee and Basuoy 2006). This type of conflict has been also identified as disagreement vs. consensus. Matz and Wood (2005) conducted some empirical studies and showed that disagreement generates discomfort because it presents an informational challenge by threatening the validity of people’s attitudes or a social challenge by threatening social acceptance from the group and the shared social identity. Research in decision making suggests that a lack of consensus in opinions can create uncertainty for the consumer (Hogarth 1989; Meyer 1981). Prior research has shown that consumers respond negatively to such uncertainty (Jaccard and Wood 1988).

As Table 2.1 shows, these three types of conflict have been identified in the literature and analyzed separately, but no study considers the effects of these three conflict types together or examines their effects from a customer’s correct-purchase perspective. The need for such a study is raised when a buyer reads a group of reviews and captures conflicting information (star rating, content, and reviewers’ overall perceptions). This phenomenon somehow intensifies the created cognitive dissonance, which directly affects the customer’s decision quality (Festinger 1962).
TABLE 2.1. Review of Types of Conflict in the Literature

<table>
<thead>
<tr>
<th>Conflicting Attributes</th>
<th>Conflicting Star Ratings</th>
<th>Disagreement Intensity</th>
<th>Dependent Variables</th>
<th>Consistency with Results in This Study (Effect on Buyers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park and Han 2008</td>
<td>X</td>
<td></td>
<td>Product evaluation, perceived product attitude</td>
<td>Both consistent and inconsistent, depending on causal attribution as a moderator (Negative)</td>
</tr>
<tr>
<td>Guillet and Law 2010</td>
<td>X</td>
<td></td>
<td>Hotel business</td>
<td>Consistent (Negative)</td>
</tr>
<tr>
<td>Matz and Wood 2005</td>
<td>X</td>
<td></td>
<td>Discomfort level</td>
<td>Consistent (Negative)</td>
</tr>
<tr>
<td>West and Broniarczyk 1998</td>
<td>X</td>
<td></td>
<td>Consumer response to critics</td>
<td>Consistent (Negative)</td>
</tr>
<tr>
<td>This research</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Informativeness and correct purchase</td>
</tr>
</tbody>
</table>

*Cognitive Load Theory*

When a potential buyer reads a group of reviews, the initial goal is to learn about the target product as much as possible. It has been argued that multiple factors in place can affect the learning process as well as the perceived informativeness. Cognitive load is one of the dominant theories that study the effective factors on the learning process (Sweller 1994).

Based on this theory, the difficulties that people face in learning new intellectual tasks vary significantly. The learning task could fluctuate from vary easy to very hard. Similarly, the amount of information perceived could be very small to significantly high. In this study, we will
employ this theory to study the effect of two variables—information relevance and context complexity—on the overall perceived informativeness and accuracy of a made decision.

2.3. Research Model and Research Hypotheses Development

In this research, three types of conflict among reviews (conflicting opinions about attributes, conflicting ratings, and disagreement intensity among reviewers) are considered as independent variables. Dependent variables are overall informativeness, correct purchase and accuracy of a made purchase decision. Figure 2.2 shows this CCD research model.

Although, it has been shown that more informative reviews positively affect a customer’s purchase intention (Park et al. 2011), no study has been done to evaluate the effect of informativeness on the accuracy of a purchase decision, which is defined as buying the correct product or not buying the wrong product (Chen and Xie 2008). It has also been argued that review informativeness will increase a potential customer’s purchase decision accuracy as well as purchase intention (Chen and Xie 2008; Park et al. 2011). Chen and Xie (2008) introduced a mathematical model and assumed a positive relationship between the informativeness ratio and the accuracy of a purchase decision; however, there is no empirical study investigating this relationship. More information provided by other consumers about a product’s features will help a potential customer to analyze the strengths and weaknesses of a sample product and therefore can increase the accuracy of making a purchase decision.
FIGURE 2.2. Model of three types of conflict: Conflicting opinion among opinions, Conflicting star rating, and Disagreement among reviewers (CCD)

H1a: More informativeness will increase the perceived correct purchase.
H1b: More informativeness will increase the actual correct purchase.
H1c: More informativeness will increase the accuracy of a made purchase decision

There are two opposite opinions about the effect of presence of conflicting information in online reviews on the overall informativeness perceived by a potential customer: (1) products with more inconsistent information provided in online reviews are less likely to be selected than those with less conflicting information (Park and Han 2008). Also, the positive relationship between overall rating and potential customers’ purchase intention will be stronger for products with a lower rating conflict (Yao et al. 2009); (2) products with conflicting information provided by online reviewers can lead to high informativeness, as marketing literature shows that two-sided information is more trustworthy and provides more information than one-sided reviews (Zhang et al. 2010).
According to cognitive load theory, potential buyers’ difficulties to learn about a product would be different in different situations, meaning that in some situations, a buyer will easily capture needed information while in other situations, this is could be a very difficult task. People have limited working memory to process incoming information. Thus, if somebody’s working memory is overloaded, then the learning process in negatively affected (Xu et al. 2013). Task complexity is one of the main key factors in cognitive theory (Xu et al. 2013). It has been argued that there is a curvilinear relationship between task complexity and productivity (Wood 1986). Increasing levels of complexity could be more challenging and positively affect performance (Locke et al. 1981). However, passing a certain level of complexity can cause an overloading condition and therefore reduce the effectiveness (Xu et al. 2013). By relying on cognitive load theory, Kamis et al. (2008) found that as the number of alternatives increases (complexity), usefulness followed an inverted U-shape curve.

One important factor discussed in cognitive load theory is the structure of information provided by content. Based on the schema mechanism in learning, if provided information is relevant to an object and is captured easily, and then the difficulty level of learning would be low. In contrast, if the information structure is not relevant to the topic and it is difficult to capture, then the learning task would be difficult (Sweller 1994). Table 2.2 shows the proposed relationship between two criterial, information sources and perceived informativeness.
TABLE 2.2. Cognitive Load Criteria and Perceived Informativeness

<table>
<thead>
<tr>
<th>Proposed Criteria</th>
<th>Ease of Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Presence</td>
</tr>
<tr>
<td><strong>Product</strong></td>
<td>Expected high informativeness (conflicting classified</td>
</tr>
<tr>
<td><strong>Diagnosticity</strong></td>
<td>attributes)</td>
</tr>
<tr>
<td>Presence</td>
<td>Expected low informativeness (conflicting star ratings)</td>
</tr>
<tr>
<td>Absence</td>
<td>Expected low informativeness (combination of disagreement intensity and conflicting star rating)</td>
</tr>
</tbody>
</table>

By adapting the cognitive theory to our application, we argue that learning difficulties, and as a result the total perceived information, are affected by the structure of information. In other words, the structure of information exposed to a potential buyer and difficulty of capturing the provided information will affect the informativeness.

In summary, we propose that provided information could be categorized based on two criteria: product diagnosticity (Qiu et al 2012; Merrienboer et al 2005; Sweller 1988) and difficulty to capture or information complexity (Sweller 1988; Sweller 1994; Xu et al, 2013). According to cognitive load theory, if the product diagnosticity of a review is high and the information provided is easy to capture, then the product information can be easily learned, even if that information is not consistent. In contrast, if information is either irrelevant or difficult to capture, then the learning task would be difficult, and inconsistency would be even more harmful. Figure 2.3 shows the application of cognitive load theory in the context of different types of conflict present in online reviews.
FIGURE 2.3. Application of cognitive load theory in online reviews

When a potential buyer reads reviews with categorized pros and cons, the product diagnosticity of the review is high. For example, in the case of the pencil, the review shows good lead capacity and ergonomics but unsatisfactory eraser. Also, capturing information is an easy task due to clear classifications of good vs. bad attributes, in other words complexity is not either too high or too low compared to written and unclassified reviews or start ratings. In this situation, the learning task is not difficult. As a result, the information provided can be easily learned and captured.

Settle and Golden (1974) studied the effect of inconsistencies present in advertisement on a potential buyer’s responses to this inconsistency. Based on their findings, consistency does not necessarily improve certainty. In other words, conflicting information among advertisements can increase the buyer’s perceived certainty regarding the product and as a result, the release information can be attributed to the target product instead of the seller’s desire to sell the product.
Settle and Golden’s findings could be adopted into our research when a potential buyer has been exposed to conflicting attributes. Based on this argument, we hypothesize the following:

**H2a:** More conflict among attributes explained in reviews contents will increase the perceived informativeness by customers.

Another type of information considered in this study is the star rating. Star ratings could be assumed to be a less-relevant source of information since these are purely numbers and do not provide detailed information about a product’s features, such as star ratings of 1, 3, 5, and 2 for the study product. However, these are easy to be captured with a minimum level of complexity. In this situation, we hypothesize that more conflicting information among the star ratings would be perceived as less informativeness.

**H2b:** More conflict among star ratings will reduce the perceived informativeness by customers.

At this point, we discuss the last type of conflict, which is the disagreement intensity among reviewers. In this situation, information provided in reviews is relevant, but capturing information requires a detailed reading of reviews since the information provided is not categorized. As a result, data processing can be an extremely complicated task. Since one of the criteria is not in place and capturing information is a difficult task, conflicting information will increase the level of confusion. As a result, we propose the following hypothesis:

**H2c:** Higher disagreement intensity among reviewers’ overall opinions will reduce the perceived informativeness of customers.

Finally, we study the effect of different types of conflicts at the same time. Based on the proposed hypotheses, we expect to see similar behavior in the presence of intensive disagreement among reviewers and conflicting star ratings but different behavior in the presence of conflicting attributes. When conflicting attributes along with other conflict types are present, the focus will
be on attributes more than anything else because of the higher diagnosticity and ease of capture at the same time. However, when intensive disagreement and conflicting ratings are present at the same time, the perceived informativeness will be reduced even more than the presence of each type by its own.

As mentioned earlier, according to Negativity Bias, in presence of negative and positive events at the same time, the overall perception would be negative. By adapting the negativity dominance theory (Baumeister et al. 2001; Rozin and Royzman 2001) (which explains why negative factors are more effective than positive) in this study, we expect to see that the combination of being irrelevance (a negative specification of star rating) and capture difficulty (a negative specification of disagreement intensity among reviewers) plays a more bigger negative role than the positive effect arising from the two types of conflicts, i.e., conflicting star rating and disagreement intensity among reviewers. As a result, when these two types of conflicts are present as the same time, less informativeness is expected, or the following hypothesis:

**H3:** In the presence of higher conflicting ratings (higher disagreement between reviewers), the higher disagreement among reviewers (higher conflicting ratings) has a greater negative effect on the perceived informativeness.

### 2.4. Research Method

**Study Setting**

To test the proposed hypotheses, we employed a $2 \times 2 \times 2$ factorial design where each conflict type is one of the study factors in two levels. Table 2.3 shows these three factors as well as their designed levels.
TABLE 2.3. Research Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagreement intensity among reviewers</td>
<td>Low</td>
<td>In ten online reviews, five writers think exactly the same but differ from the other five writers. Disagreement intensity is 5/10 = 50%.1</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>In ten online reviews, nine writers think exactly the same but differ from the one other writer. Disagreement intensity is 9/10 or 1/10.</td>
</tr>
<tr>
<td>Conflicting opinions about attributes</td>
<td>Low</td>
<td>In ten online reviews explaining four different attributes, one writer has a contradictory opinion about one attribute compared to the others.</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>In ten online reviews explaining four different attributes, one writer thinks differently about three attributes compared to the other writers.</td>
</tr>
<tr>
<td>Conflicting star ratings</td>
<td>Low</td>
<td>In ten online reviews, one writer gives a star rating of 4 to the product while the other writers give a star rating of 5.</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>In ten online reviews, one writer gives a star rating of 1 to the product, while the other writers give a star rating of 5.</td>
</tr>
</tbody>
</table>

Subjects were asked to decide if they wanted to buy a pencil or not, based on five reviews on a website. We provided all subjects with four pencil attributes2: ease of use, eraser, refillability, and grip handling. Prior to the study, subjects were informed that they would receive a 1% extra point as a reward for participation. In addition, as in many other experimental studies, we offered one $50 Best Buy gift card through a drawing. To ensure that the results of this study are reliable and can be generalized, we ensured that reviews follow the J-distribution (Aral 2004). A website builder was utilized to design eight different websites, each containing five reviews. The differences between these websites were in the low and high levels of three conflict types. Each subject was assigned randomly to one of eight websites. As a example, Table 2.4 represents one group of manipulated reviews, which shows the condition where all three factors are at a low level.

1 The level “low” for the “ratio of conflicting reviews” cannot be less than 50%. In the lowest level, half of the reviews are different from the other half. In other words, when a small numbers of reviews are different from others (for example 2 out of 10), then the other portion (8 out of 10) could be interpreted as a high level.

2 These four attributes were selected after reading 50 online reviews in Amazon.com and Google Shopping.
**TABLE 2.4. Intensity of Disagreement among Reviewers = Low, Conflicting Opinion**  
**Regarding Product Attributes = Low, Conflict among Star Ratings = Low**

<table>
<thead>
<tr>
<th>Ease of Use</th>
<th>Eraser</th>
<th>Refill</th>
<th>Grip</th>
<th>Overall Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Just a quick twist and it is ready to go</td>
<td>I love the eraser</td>
<td>No need to refill the pencil</td>
<td>Correct size to feel comfortable</td>
<td>5</td>
</tr>
<tr>
<td>Very simple to operate</td>
<td>Erases completely without black mark</td>
<td>No need for lead replacement</td>
<td>This pencil grip is uncomfortable</td>
<td>4</td>
</tr>
<tr>
<td>Retracting allows you to get just the right amount of lead</td>
<td>The best eraser ever</td>
<td>Don't have to worry about refilling</td>
<td>Comfortable to write with</td>
<td>5</td>
</tr>
<tr>
<td>Twist lead advancement versus clicking is a giant plus</td>
<td>The erasers work very well</td>
<td>The lead doesn’t break, no need to refill it</td>
<td>Comfortable grip</td>
<td>5</td>
</tr>
<tr>
<td>I find them easy to use</td>
<td>Effective erasers</td>
<td>The economical pencil, so no need for refilling</td>
<td>The pencil is comfortable to hold</td>
<td>5</td>
</tr>
</tbody>
</table>

The experimentation session proceeded as follows: all subjects were first provided with seller-provided data about the product and four selected attributes. Then they were asked to answer general questions regarding their attitude toward online reviews, product knowledge, personal relevance, etc. Following that, subjects were asked to read the provided reviews, answer questions about those reviews, and decide if the study product could be a correct purchase or not. Regardless of the subject’s decision, participants were provided a pencil and asked to experience the pencil for few minutes. At the end of this time period, the subjects were asked to evaluate their initial purchase decision and answer some additional questions.
Manipulation and Measurement

We measured the different types of conflicts by adopting measures from the literature. Table 2.5 shows the adopted measures and corresponding literature. As a manipulation check for each type, we asked subjects to determine the conflict level using a 7-point scale. As Table 2.6 shows, subjects were successful in distinguishing between low and high levels for each type of conflict.

**TABLE 2.5. Measurement Items for Constructs**

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagreement intensity among reviewers</td>
<td>Reviews tended to disagree over all attributes (similarity among reviews).</td>
<td>Shaila and Bostrom, (1994)</td>
</tr>
<tr>
<td></td>
<td>Reviews advocated different points of view.</td>
<td>Authors of this research</td>
</tr>
<tr>
<td></td>
<td>The difference among writers’ opinions is significantly high.</td>
<td></td>
</tr>
<tr>
<td>Conflicting opinions about product attributes</td>
<td>Online consumer reviews provide inconsistent information regarding attributes.</td>
<td>Lee and Ma (2012)</td>
</tr>
<tr>
<td></td>
<td>Online consumer reviews provide different opinions about the product attributes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Online consumer reviews provide too many different opinions regarding the product attributes.</td>
<td></td>
</tr>
<tr>
<td>Conflicting star ratings</td>
<td>Online consumer reviews provide inconsistent star ratings.</td>
<td>Lee and Ma (2012)</td>
</tr>
<tr>
<td></td>
<td>Online consumer reviews provide different opinions due to inconsistent star ratings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Online consumer reviews provide too many different opinions regarding the overall star ratings.</td>
<td></td>
</tr>
<tr>
<td>Informativeness</td>
<td>Overall, I would give the information from these online reviews high marks for the pencil selection task.</td>
<td>Xu et al. (2013)</td>
</tr>
<tr>
<td></td>
<td>In general, these online reviews provided me with high-quality information for the pencil selection task.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The reviews provide useful information about the product.</td>
<td>Park et al. (2011)</td>
</tr>
</tbody>
</table>
TABLE 2.5. (continued)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct purchase</td>
<td>This product will be the correct pencil for me.</td>
<td>Balabanis and Craven (1997)</td>
</tr>
<tr>
<td></td>
<td>This pencil will be the best buy.</td>
<td>Jacoby et al. (1974)</td>
</tr>
<tr>
<td></td>
<td>The selected pen is the closest product to my ideal choice.</td>
<td>Malhotra (1982)</td>
</tr>
</tbody>
</table>

TABLE 2.6. Manipulation Checks for Types of Conflict

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflicting Opinion about Attributes</td>
<td>4.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Conflicting Ratings</td>
<td>4.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Disagreement Intensity among Reviewers</td>
<td>4.3</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Data Analysis

In this study, we recruited 206 student subjects from a public university, including three colleges and ten majors, representing diverse backgrounds. According to a power analysis for the between-subject design, a minimum of 11 subjects for 8 groups (hence 88 subjects) can assure enough statistical power of 0.8 for a medium-size effect (Cohen, 1992). Among the subjects, 161 were males and 45 were females. 35 were graduate students, and the rest undergraduates. The average age was 24.2. In general, the subjects were familiar with online shopping (4.67/7). We also compared all groups in terms of the average perceived informativeness when informativeness was measured using a 7-point scale. Table 2.7 shows the average informativeness for different combinations of the three types of conflict.
TABLE 2.7. Comparison Analysis of Perceived Informativeness among Study Groups

<table>
<thead>
<tr>
<th>Conflict Types and Levels</th>
<th>Conflicting Attribute</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>high</td>
<td></td>
</tr>
<tr>
<td>Conflicting Rating</td>
<td>Low</td>
<td>5.74</td>
<td>5.42</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>4.99</td>
<td>4.88</td>
</tr>
<tr>
<td>Disagreement Intensity</td>
<td>Low</td>
<td>5.67</td>
<td>5.42</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>5.57</td>
<td>5.14</td>
</tr>
</tbody>
</table>

We analyzed our proposed research model using multiple statistical models including ANOVA and regression. To support individual item reliability, we examined the loadings of the individual measurement items on their intended constructs and compared these to recommended tolerances of 0.60, or, ideally, 0.70 (Barclay et al. 1995, Chin 1998). To support the internal consistency of the constructs, we calculated Cronbach’s alpha for each construct. All met suggested tolerances (>0.70, Fornell and Larcker 1981) with results reported in Table 2.8. Factor analysis demonstrated that all items load higher on their constructs than they load on any other constructs measured at the same time, indicating good discriminant validity.

TABLE 2.8. Internal Consistency of Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflicting Attributes</td>
<td>0.711</td>
</tr>
<tr>
<td>Conflicting Ratings</td>
<td>0.802</td>
</tr>
<tr>
<td>Disagreement Intensity among Reviewers</td>
<td>0.765</td>
</tr>
<tr>
<td>Perceived Informativeness</td>
<td>0.845</td>
</tr>
<tr>
<td>Correct Purchase Before Use</td>
<td>0.853</td>
</tr>
<tr>
<td>Correct Purchase After Use</td>
<td>0.939</td>
</tr>
</tbody>
</table>
2.5. Analysis of Structural Model

Next we analyzed the structural model to examine the significance and strength of the relationships of each of the hypothesized effects. All seven hypotheses are statistically significant.

We employed a one-way ANOVA model to study H1a and H1b, and one regression model for H1c. The results of these analysis show significant relationship between informativeness and correct purchase measures before and after actual use (H1a and H1b p-value < 0.001).

H1c is also consistent with the theory, with a p-value of 0.015. To be able to study H1c, we needed to define an algorithm to calculate the accuracy of a made purchase decision. During the empirical study, we asked subject twice to decide if the target product was a correct purchase or not, once before actual use and once after using the target product. Therefore, accuracy of a made decision can be captured by comparing these two measures. We defined a new variable that was a relatively correct purchase by dividing the correct purchase after use by the correct purchase before use. Obviously this measure can be anywhere less than one or higher than one. If these two measures are close, then the value of the ratio would be closer to one; otherwise, the ratio will be higher or less than one. Therefore, we coded the ratio columns in which any number was between 0.95 to 1.05 as “1” for accurate decisions; otherwise “0” for inaccurate decisions.

We also conducted one regression model to study H2a, H2b, and H2c. The regression models show a significant relationship between different types of conflicts and informativeness with the p-value less than 0.05 for all three paths. Also the ANOVA analysis for H3 shows a significant interaction between conflicting rating and disagreement intensity for a p-value of 0.007. Figure 2.4 shows these results.
2.6. Discussion

Overall, we found support for all hypothesized relationships in our proposed model. Our results support the idea that different types of conflict in online reviews have different effects on the overall perceived informativeness. The significant effect of informativeness on correct purchase both before and after actual use indicates that the overall information captured through reviews is a valid measure to predict the accuracy of a purchase decision, especially since the correlation before and after actual use is significant at the 99% confidence level. Chen and Xie (2008) assumed a linear relationship between the probability of a correct purchase and informativeness; however, they never validated this assumption. Attaining a positive relationship between informativeness and accuracy of making a purchase decision is one of the main contributions of this work since, to the best of our knowledge, no one has studied this relationship by measuring the subject’s opinion regarding a product before and after actual use.
Relative to a significant relationship among conflicting attributes and informativeness, H2a is consistent with the cognitive load theory and Settle and Golden’s findings (1974). Conflicting attributes positively affect the perceived informativeness since this information is relevant to the product and can be easily captured by looking at pros and cons. In other words, two criteria in cognitive load are present to positively improve the learning process. In addition, along the same line as Settle and Golden’s results, inconsistent information when is easily captured will provide more information or in other words, such a review is perceived more informative.

The significant effect of conflicting ratings and disagreement intensity among reviewers can also be explained by cognitive load theory when customers are exposed to either less-relevant information or highly complex information. In either case, one of the effective factors in cognitive load theory is missing, and as a result, conflicting information will be more confusing and negatively affect the overall perceived informativeness.

Finally, the result of analysis on H3 is also consistent with our arguments. When a potential customer is exposed to a combination of information, a portion of which is not relevant and the other portion is not easily captured, the learning process is negatively affected, and the overall information captured by reading reviews would be declined.

2.7. Contributions

Theoretical Contribution

This study makes several theoretical contributions. It is the first study to evaluate the effect of different types of conflicting information among reviews on the overall perceived informativeness and accuracy of a purchase decision. Second, the accuracy of a purchase decision is introduced and measured by considering both pre-purchase and post-purchase phases.
All studies in this area have focused on either phase but not both together. The result of this work will also provide managerial insight for online sellers into consumer reviews to increase the accuracy of purchase decisions. Improvement in this area will help the supply chain in both tangible and intangible ways. The warranty and guarantee costs, reshipment and return expenses, customer satisfaction, and seller reputation are some supply chain measurements that can be improved by applying the results of this study.

In this chapter, we proposed a model to evaluate the effect of different types of conflict (conflicting attributes, conflicting ratings, and disagreement intensity among reviewers) as well as their interactions on the perceived informativeness and correct purchase as the ultimate dependent variable. Although previous marketing research studies have investigated the effect of conflicting ratings and conflicting review content on sellers’ profit or purchase intention, we extended this stream of research by including disagreement intensity among reviewers to predict the perceived informativeness as well as actual correct purchase by examining customers’ opinions regarding the target product before and after actual use. To do this, we simulated a purchase condition by providing an actual product and actual money for customers and asked them to compare their purchase decision before and after using the product. In other words, not only did we look at the purchase intention based on the provided information, but all subjects were asked to validate their decision (either to purchase or not to purchase) by using the target product. This new pre/post-purchase algorithm helped us to validate the idea that higher review informativeness increases the accuracy of a purchase decision, and this informativeness can be captured by reviews, even if they are not consistent.
Practical Contribution

For some time, it has been a topic of discussion to evaluate when and what reviews should be released to improve sellers’ sales (Chevalier and Mayzlin 2003, Jiang and Wang 2007, Chen and Xie 2008). In all of these studies, the focus was on improving immediate sales without considering the future costs of a wrong purchase, which can impose an enormous expense to the supply chain. The results of this study have important implications for online sellers’ firms, especially within the context of managing online reviews. Firms often invest tens of thousands of dollars in websites with the goal of generating a profit and retaining returning customers by providing correct offers. Online sellers can benefit from knowing what group of online reviews should be released so customers can perceive the maximum amount of information by reading the correct group of reviews. The results of this study can be used to develop a business model in which buyers can be exposed to the most appropriate reviews, which are categorized by sellers based on customer preferences and personal relevance.

2.8. Limitations and Future Research

The limitations of this research and possible future research suggestions are as follows: First, the parsimony of our proposed model suggests that some additional variables might help explain key variables and moderate the strength of relationships within the model. For example, product type, product knowledge (Xu et al. 2009), and personal relevance might also moderate the impact of conflicting information on informativeness. Second, we selected an inexpensive product. Selecting a more expensive product may elicit different customer behaviors. Further research is necessary to test the model with different types of products at different price ranges to determine the effect of product value as well as product type.
Third, to simulate a real purchasing situation, all subjects were provided with actual money from the research team. Since that money became their own money, there is a concern that subjects did not seriously consider buying the product but simply wanted to take the money; however, the 50% purchase rate increased our confidence that subjects would actually consider purchasing the study product. Finally, we provided five reviews to each subject, which is usually the minimum number of reviews that customers consider (Park et al. 2011). We might see different results by increasing the group size of reviews.

2.9. Conclusion

This research proposed the CCD model by considering conflicting ratings, conflicting attributes, and disagreement intensity among review writers on the quality of a product. We highlight the importance of the effect of informativeness on making a correct purchase before and after actual use. Based on cognitive load theory, we posit that conflicting star ratings and disagreement intensity among reviewers negatively affect perceived informativeness, while conflicting opinions regarding product attributes are positive in terms of capturing information. We also observe that in one particular case, one type of conflict can moderate the effect of another. In other words, when conflicting ratings and intensive disagreement among reviewers are present, the perceived informativeness is negatively affected, while the presence of conflicting ratings and conflicting attributes, or conflicting ratings and intensive disagreement among reviewers together do not affect perceived informativeness.
2.10. REFERENCES


*Yale School of Management. Working Papers Number YSM 413, Yale School of Management.*


CHAPTER 3
THE EFFECTS OF REPEATING PURCHASE CUES AND MIXED REVIEW ON PRODUCT ATTRIBUTION

Abstract

Prior research has shown that negative online reviews are more valuable than positive reviews due to differences in casual attribution for positive versus negative information, such that negative reviews tend to be attributed relatively more to the product (vs. reviewer) than positive reviews. We propose that the presence of repeating purchase cues, which indicates using a product for a reasonable period of time, reduces the relative extent to which positive reviews are attributed to the reviewer and mitigates any negativity bias. We also evaluate the behavior of customers when online reviews include positive and negative information at the same time, and propose that characteristics of mixed reviews are closer to negative reviews than positive reviews. An experiment involving 109 subjects shows that causal attribution to a product is negatively related to review valence but that this relationship is less for reviews that contain repeated purchase information.

Keywords: Repeating Purchase Cue, Causal Attribution, Review Valence, Value

3.1. Introduction

Online product reviews are one of the most important sources of information for customers (Chevalier and Mayzlin 2003). In online shopping, people highly trust electronic word of mouth (WOM), and about 70% of customers use online reviews before making a purchase decision (Jiang and Wang 2008). Prior research has also shown the importance of online consumer reviews on sellers’ performance (Chevalier and Mayzlin 2003, Godes and Mayzlin 2004, Liu 2006) as well as customers’ intention to purchase products (Ba and Pavlou 2002, Houser and Wooders 2006). Review valence is a factor that affects a potential customer’s
purchase behavior (Lee et al. 2008, Park et al. 2011, Qiu et al. 2012), but not all reviews have a similar value to customers. Although positive reviews about products are more common than negative reviews (Fowler and Avila 2009), potential customers trust negative reviews more during the online purchase process (Basuroy et al. 2003, Chevalier and Mayzlin 2003).

Negativity bias is the dominant theory that explains why negative reviews provide more value to potential customers (Baumeister et al. 2001, Rozin and Royzman 2001). Although several scholars have worked on this theory, studies explaining the moderators, which can increase the value of positive reviews, are limited. One of the most recent studies in this area indicates that the presence of words and phrases indicating temporal proximity between product consumption and review writing, which has been referred to as temporal contiguity cues, can moderate negativity bias and increase the perceived value of positive reviews (Chen and Lurie 2013).

Along this line of research, we first propose that the presence of cues showing a repeating purchase, which we refer to as a sign of multiple observation/purchase over time, mitigates negativity bias by increasing the perceived value of positive reviews. We define perceived value as the perceived helpfulness of information provided by online reviews for learning or making a purchase decision (Weiss et al. 2008). Because receivers of information may have more reason to attribute positive (vs. negative) WOM to factors other than the product experience (Mizerski 1982), we propose that the presence of repeating purchase information may mitigate the effect of negativity bias by reducing the extent to which customers attribute positive WOM to the reviewer rather than to the product experience.

Customer loyalty and attribution theory are two theories that helped us to select the repeating purchase cue as an important moderator to change the effects of negativity bias.
Customer loyalty expresses an intended behavior related to the service or the company (Andreassen and Lindestad 1998; Xu et al. 2009, 2011). Continuing to purchase from a company, increasing business with it in the future, and providing positive WOM are key indicators of customer loyalty (Andreassen and Lindestad 1998, Selnes and Hansen 2001, Zeithaml et al. 1996). Also, according to the inference rule postulated by attribution theory, multiple observations of the same cause-effect couplet over time help customers attribute more to products than to the advertiser (Hansen and Scott 1976).

In the same way that multiple observations over time lead to the inference of causality for physical events (Hansen and Scott 1976), phrases in online reviews that indicate multiple/continuous product experience over time should strengthen reader attributions that the product experience is the main cause of a review. However, this effect should be more significant for positive than for negative reviews since there might be few reasons other than the product experience to communicate negative information (Mizerski 1982). In other words, the presence of repeating purchase cues may mitigate negativity bias by changing reader beliefs about the cause of positive reviews.

A closer look at online reviews from well-known websites such as Google Shopping, Amazon.com, eBay.com, etc. shows that many reviews are a combination of pros and cons. Although the focus of most studies is on review valence as being positive or negative, limited studies have been done on the effect of mixed reviews that contain positive and negative information about a product on causal attribution and perceived values, particularly those with repeating purchase cues. Due to the frequency of these types of reviews at online sellers’ websites, we will examine the behavior of potential customers when reading a group of reviews,
including purely negative, purely positive, and mixed feedback. Results of this study can help marketers understand the physics of mixed reviews vs. positive or negative ones.

In summary, this article provides multiple contributions. First, we will introduce repetitive purchase cues as another important and unexplored factor moderating the effect of negativity bias. We show that even in an environment in which negative information is less frequent and more diagnostic, repeating purchase cues reduce the effects of negative bias. We then look at the third type of valence in online reviews, which is called mixed valence in this study, due to the inclusion of both positive and negative information about a product. In existing studies in this area, scholars have mainly focused on review valence being positive or negative, and several insights have been provided. However, based on the theory of negativity dominance as well as the accepted theory of J-shaped distribution of online reviews, the third type of valence should be investigated as well. We will show that a mixed review can reduce the attribution that reviewers tend to brag about themselves in the case of a purely positive review. Finally, the effect of a repeating purchase will be investigated, not only on purely positive and negative reviews but also on mixed reviews, which simultaneously provide positive and negative information.

3.2. Theoretical Background and Hypotheses Development

Negativity Bias and Attribution

Negativity bias is defined as valuing negative information more than positive information (Baumeister et al. 2001, Rozin and Royzman 2001). The applicability of negativity bias in different contexts has been studied well: positive traits are less weighted compared to negative traits (Fiske 1980), positive product attributes are perceived as less diagnostic of product quality (Herr et al. 1991, Mizerski 1982, Wright 1974), and positive online reviews have less value compared to negative reviews at the moment of purchase (Chevalier and Mayzlin 2003).
Some theoretical backgrounds which may be used to explain the negativity bias phenomenon are as follows: expectancy-contrast theory, frequency-weight theory, range theory (Skowronski and Carlston 1989), and attribution theory (Jones et al. 1963, Kanouse and Hanson 1972). In expectancy-contrast theory, the effect of each event is based on the subject’s expectation level, and the negativity biases are due to contrast effects in judgment. A contrast effect occurs when a stimulus is expected to be more extreme than it would be otherwise as a result of comparison with some internal standards or references (Skowronski and Carlston 1989). In frequency-weight theory, one of the major factors influencing the effectiveness of an event would be its discrepancy from expectancy. In other words, unexpected cues are perceived to be more informative compared to more frequent events (Skowronski and Carlston 1989, Kanouse and Hanson 1972, Chen and Lurie 2013). Range theory introduces important factors to model impression formation processes by emphasizing the range of possible judgments implied by individual cues (Skowronski and Carlston 1989). Attribution theory (Jones et al. 1963, Kanouse and Hanson 1972) suggests that relatively rarer events are more influential. As a result, since negative reviews are relatively less frequent, they are more influential.

Frequency-weight theory can explain negativity bias in online markets (Skowronski and Carlston 1989), whereby negative information is attributed more to the fundamental stimulus, which is the target product and therefore more persuasive because social norms make negative information less prevalent. Specifically, social norms and tendency toward social competence lead people to provide more positive information about products (Kanouse and Hanson 1972, Mizerski 1982).

**Review Valence; Mixed Reviews**

Review valence and its effect on sellers’ profit and sales or customers’ purchase decision and intention has been well studied (Chevalier and Mayzlin 2003, Chen and Xie 2008, Park et al.
The focus of all these studies has been on either positive or negative reviews. However, potential buyers read a combination of positive and negative reviews before making a decision (Park et al. 2011). In this study, we are evaluating the effect of mixed reviews on a potential buyer’s purchase decision.

We employ the negativity dominance phenomenon, supported by the frequency-weight theory, to study the effect of mixed reviews on purchase decisions. According to the principles of negativity dominance, the overall perception and evaluation of a combination of positive and negative information (or events, individuals, personality traits, etc.) is more negative than the algebraic summation of the subjective values of those entities (Baumeister et al. 2001, Rozin and Royzman 2001). The overall appraisal of individual entities is the stimuli, not the algebraic sum of them; therefore, negativity dominance occurs after considering any potential effect of negative potency and is, in principle, independent of the negative phenomenon by itself. Negativity dominance is considered the most robust and most common exemplification of negativity bias. In the case of purely positive and purely negative events, negativity dominance holds that the combination of events of equal but opposite subjective valence (positive and negative) will be negative (Rozin and Royzman, 2001). Along the same line of reasoning, since mixed reviews are considered more negative than positive, we do not expect any statistical difference in buyers’ behavior in the presence of negative or mixed reviews.

According to Jones’s attribution theory, negative reviews are more attributed to fundamental stimuli, which are a product experience (Kanouse and Hanson 1972, Gilbert and Malone 1995). Mixed reviews are perceived to be more negative than positive, according to negativity bias (Skowronsks and Carlston 1989). As a result, we hypothesize the following:

**H1a:** Negative reviews, which express negative opinions, are attributed more to product experience than positive reviews.
H1b: Mixed reviews, which express both positive and negative opinions, are attributed more to product experience than positive reviews.

Reviews have different values for different customers. Customers try to understand reviewers’ reasons behind sharing opinions and then provide judgment about the value of reviews based on their understanding (Friestad and Wright 1994). In the evaluation of persuasive communication, consumers assess if reviews are attributed to reviewers or product experience (Folkes 1988). For example, a consumer could attribute a positive review to either the product being satisfactory or the tendency of a reviewer to be positive (Mizerski 1982). Customers agree that reviews attributed to product experience are more informative and persuasive than reviews attributed to professional review writers (Chen and Lurie 2013).

Online purchasing is a voluntary task, meaning that typically, people are free to select a product among all alternatives based on their preferences. As a result, after making a final decision, consumers try to show others their abilities to select the most appropriate product by writing positive reviews. In other words, positive reviews help reviewers appear more successful in the decision-making process (Angelis et al. 2012, Wojnicki and Godes 2011). According to this argument, people might have more personal reasons to provide positive rather than negative reviews about a sample product (Epley et al. 2004, Nickerson 1999). Thus, positive reviews are attributed more to the review writer (vs. the product experience) than negative WOM. It has also been accepted that WOM values decrease as they become attributed more to non-product causes (Mizerski 1982), since potential customers would like to obtain more information about the product and not the reviewer at the point of purchase. By combining these two arguments, we propose the following:

H2: The more a customer attributes consumer reviews to product experience, the greater the perceived value of consumer reviewers.
Repeating Purchase and Causal Attributions

According to the psychological literature, although attribution theories can be separated into different paradigms, all are concerned with how an individual ascribes or attributes property X to object Y (Settle and Golden 1974, Hansen and Scott 1976). In other words, all developed paradigms in attribution theory focus on how individual attributes (e.g., reaction to a product, behavior of another person, or one’s own behavior) affect the perceived intrinsic or dispositional properties of the stimulus (product, other person, or oneself) or to variable conditions in the context or situation (Hansen and Scott 1976).

Settle and Golden (1974) have stated that an advertising message can be attributed either to the characteristics of the product or to the advertiser’s desire to sell the product. They have also theorized that the audience of an advertisement would be more confident or certain of the advertiser’s claim about the product if the advertiser’s claim remains consistent over time, in different situations, and to different people. In other words, in the presence of multiple observations over time, advertisement will be attributed to the product, not the sellers.

In our research, WOM is the advertisement media, and multiple observations in advertisement are the same as repeating purchase cues in online reviews. Therefore, by adapting Settle and Golden’s theory into our context, their initial statement will change to saying that an online review can be attributed to either the characteristics of the product or the review writer’s desire to look positive, which is consistent with other scholars’ understandings (Mizerski 1982, Chen and Lurie 2013). Thus, a potential customer would be more confident or certain of the review writer’s claim about the product if the writer expresses consistent use of the target product over time.

H3: Online reviews, which consist of repeating purchase cues, are attributed more to the product than the reviewers.
Social competence (not actual product experience) is one of the main reasons behind positive reviews; thus, less value would be perceived by a potential customer by reading positive reviews (Mizerski 1982). In contrast, we theorize that in the presence of information about repeating purchase cues related to duration of use, there should be less social competence reasoning connected to the product properties. Therefore, in the presence of the repeating purchase cues, attributions of reviews to the product experience are stronger for positive rather than negative and mixed reviews (Chen and Lurie 2013).

According to the relationship between multiple observations and causal attribution proposed by Hansen and Scott (1976) in the marketing domain, when an advertisement provides consistent information about a target product over time and in different situations, the perceived credibility of the message and trustworthiness of the advertiser would increase, and as a result, a potential buyer would attribute the message to the target product and not the advertiser. By adopting Hansen and Scott’s findings to our study, we hypothesize that the presence of repeating purchase cues will causally connect the product experience to the review, facilitating perceptions that the review is driven by the product experience. According to negativity bias, readers are more likely to attribute positive reviews to the reviewer in the absence of repeating purchase cues; therefore, the presence of repeating purchase cues can help a customer attribute a positive review to the product experience to a greater extent than a negative and mixed review. As mentioned earlier, we do not expect to see a significant difference between negative and mixed reviews since mixed reviews are perceived as negative reviews. This discussion is used to develop the following hypotheses:

*H4a: The presence of repeating purchase cues increases the attribution of positive reviews to the product experience to a greater extent than negative reviews.*

*H4b: The presence of repeating purchase cues increases the attribution of positive reviews to the product experience to a greater extent than mixed reviews.*
3.3. Research Model

Study Setting

To test the proposed hypotheses, we have employed a 2*3 factorial design: (repeating purchase: present vs. absent)*(review valence: mixed, negative, and positive).

We provided all subjects with five reviews about four pencil attributes: ease of use, eraser, refillability, and grip handling (Park et al. 2011). To select the most appropriate product attributes for this study, 30 reviews with 1 to 5 star ratings were randomly selected from Amazon.com and Google Shopping. Then, based on the relative frequency of the discussed attributes in those reviews, we selected the four identified attributes. Prior to this study, subjects were informed that they would receive a 1% extra point of the final grade as a reward for participation. In addition, as in many other experimental studies (e.g., Xu et al. 2012), we offered one $50 Best Buy gift card through a drawing. To ensure that the results of this study were reliable and could be generalized, we ensured that reviews followed the J-distribution (Aral 2014). A website builder was utilized to design six different websites for the 2*3 design, each containing five reviews.

---

3 These four attributes were selected after reading 50 online reviews in Amazon.com and Google Shopping.
Manipulation and Measurements

We adopted the measures for review valence, repeating purchase cues, causal attribution to products, and perceived value from scales that had been validated in prior studies.

Review valence was measured by conducting an analysis to categorize the subjects into three valence groups: negative, positive, and mixed. To do so, we looked at each subject’s five responses to the perceived valence questions individually. These questions were asked in a way that captured the perceived valences after reading the contents of the reviews. Each subject was asked to specify his/her perception about each single review valance by using a 9-point Likert scale, where 9 was extremely positive and 1 was extremely negative. Therefore, all subjects who rated all five reviews with a score of 7 or greater were placed in positive groups with the label “+1.” Those who rated the reviews with a score of 3 or less were placed in negative groups with the label “–1.” All others were placed in mixed groups with the label “0” (Chen and Lurie 2013). For example, a subject who scored the five reviews as 1, 1, 1, 9, and 9 were placed in the mixed group. Table 3.1 shows these results.

<table>
<thead>
<tr>
<th>Designed Valence</th>
<th>Mean of Perceived Valence by Subjects</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>8.14</td>
<td>2.15</td>
</tr>
<tr>
<td>Mixed</td>
<td>6.01</td>
<td>2.14</td>
</tr>
<tr>
<td>Negative</td>
<td>3.18</td>
<td>2.04</td>
</tr>
</tbody>
</table>

To manipulate the repeating purchase cues, all reviews were designed in a manner so that only half of the reviews contained repeating purchase cues with words such as “again,” “several times,” “repetitive purchase,” “during the last few years,” etc. In addition, a modified measure
was employed from the work of Chen and Lurie (2013) for purposes of checking manipulation. Results of the manipulation checks indicate that subjects were able to distinguish reviews with repeating purchase cues from reviews without repeating purchase statements (the conducted t-test to compare two populations’ means validated the argument with p < 0.05). Table 3.2 shows the manipulation check results.

<table>
<thead>
<tr>
<th>Designed Repeating Purchase</th>
<th>Mean of Perceived Repeating Purchase Cues by Subjects</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of Cues</td>
<td>7.39</td>
<td>1.98</td>
</tr>
<tr>
<td>Absence of Cues</td>
<td>6.64</td>
<td>2.02</td>
</tr>
</tbody>
</table>

To measure values, a 9-point scale created by Sen and Lerman (2007) was used, where 9 shows valuable reviews and 1 shows reviews with no value.

Finally, we assessed causal attribution using a measure adapted by Frank and Gilovich (1989). We measured product experience attribution by asking subjects to indicate how large a role the product-using experience played in the decision to write the review using a 9-point scale, with 9 indicating a large role of product experience and 1 indicating a small role of product experience.

The primary independent variables of designed valence and repeating purchase measures were used in all corresponding analyses. However, we measured the perceived value and causal attribution to products that are intermediate or ultimately dependent variables.

**Data Analysis**

We recruited 109 student subjects from three colleges and ten majors at a public university, all representing diverse backgrounds. According to a power analysis for the between-subject design, a minimum of 18 subjects for six groups (108 subjects) can assure enough
statistical power of 0.8 for a medium-size effect (Cohen, 1992). Therefore, the number of recruited subjects is enough to conduct a 2*3 study to compare the effect of positive reviews vs. negative and mixed reviews.

Among the 109 subjects, 82 were males and 27 were females. All were students: 26 graduate students and the rest undergraduate. The subjects were fairly familiar with online shopping (5.17/7).

3.4. Analysis of Results

To examine the first two hypotheses, we employed linear regression models. Due to the potential effect of the repeating purchase cues, we selected subjects who were exposed to positive, negative, and mixed reviews with no repeating purchase cues. Table 3.3 shows the causal attribution to product means and standard deviations for the three groups. Based on the results of these regression models, mixed reviews are being attributed more to product experience than to positive reviews (model coefficient: –0.343 and t-value: –2.192 with a p-value of 0.035). Also, the regression model shows that negative reviews are more attributed to product compared to positive reviews, with a coefficient of –0.600 and p-value of 0.011. Tables 3.4 and 3.5 show the full regression models for H1a and H1b respectively.

<table>
<thead>
<tr>
<th>TABLE 3.4. Regression Model for H1a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Causal Attribution to Product
To examine the effect of the casual attribution to the product on overall perceived value by a potential customer, as proposed in hypothesis H2, we deployed another linear regression model. Based on this model and the results presented in Table 3.6, the regression coefficient for attribution to the product is positive (0.271), with a t-value of 4.026 and a p-value of < 0.001. Thus, when reviews are attributed more to products, the overall perceived value increases, thus supporting hypothesis H2.

### TABLE 3.5. Regression Model for H1b

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>6.594</td>
<td>0.333</td>
<td>19.809</td>
</tr>
<tr>
<td></td>
<td>Valence Actual</td>
<td>-0.966</td>
<td>0.333</td>
<td>-0.6</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Causal Attribution Product Average

### TABLE 3.6. Regression Model for H2

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>4.438</td>
<td>.594</td>
<td>7.472</td>
</tr>
<tr>
<td></td>
<td>Causal Attribution Product Experience</td>
<td>.323</td>
<td>.080</td>
<td>.271</td>
</tr>
</tbody>
</table>

Dependent Variable: Perceived Value

The next hypothesis, H3, explains the relationship between presence of repeating purchase cues and attribution to the product. The employed linear regression model to study this hypothesis shows a positive relationship between presence of repeating purchase cues and causal attribution to the product, with a positive coefficient of 0.299 and p-value of 0.002. Table 3.7 is a full regression model for H3.
TABLE 3.7. Regression Model for H3

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>6.908</td>
<td>0.19</td>
<td>36.393</td>
<td>0</td>
</tr>
<tr>
<td>Designed Repeating Purchase</td>
<td>0.822</td>
<td>0.255</td>
<td>0.299</td>
<td>3.226</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Causal Attribution to Product

Hypotheses 4a and 4b were examined by employing two univariate ANOVA models. Here, the moderating effect of repeating purchase cues was studied when two types of valence—negative and positive in H4a and mixed and positive in H4b—are present. Figures 3.2 and 3.3 show results of the univariate ANOVA analysis on these two hypotheses. The p-values of these models are 0.018 and 0.021 for H4a and H4b, respectively.

FIGURE 3.2. Estimated Marginal Means causal attribution to product experience (Positive and Negative Reviews)
3.5. Discussion

This research shows that a group of mixed reviews consisting of both positive and negative opinions regarding a product are acting more as negative reviews rather than positive reviews. The negativity bias phenomenon, supported by frequency weight theories that emphasize the power of negative arguments vs. positive arguments in convincing people, supports the findings of hypotheses H1a and H1b (Fiske 1980, Skowronski and Carlston 1989, Jones et al. 1963). According to these theories, negative events are more influencing than positive events due to the rarer occurrence in online markets. Negativity bias has been examined in the case of purely positive vs. purely negative reviews. However, it has been accepted that online reviews follow a J-shaped distribution, and a good portion of online reviews are a mixture of positive and negative information about a product. Therefore, it is important to assess customers’ behavior in the presence of mixed reviews.

We have also validated the hypothesis 2, which proposes a positive connection between attribution to product experience and perceived value. As Chen and Lurie (2013) proposed, when a customer captures more information about a product by reading reviews, the perceived value will be higher. Our findings are consistent with this argument as well.
In H3, we examined the effect of the repeating purchase cues in review content on the attribution to product. Results of this study are consistent with Hansen and Scott’s (1976) applied attribution theory in advertisement, where they proved a positive relationship between attribution to product and consistency of the delivered advertisement over time.

This research also shows that repeating purchase cues mitigate the negativity bias in online reviews, which is proposed in H4a and H4b. Repeating purchase cues increase the extent to which potential customers attribute positive reviews to the product experience. In the presence of repeating purchase cues, customers are more likely to attribute positive reviews to the product experience than negative or mixed and negative reviews. By making a connection between reviews and product experience, consumers perceive more value by reading positive reviews. In other words, repeating purchase cues reduce negativity bias by shifting consumers’ beliefs about the cause of positive reviews. However, the presence of repeating purchase cues in negative or mixed reviews has limited influence on causal attribution and perception of values.

3.6. Conclusion and Contributions

This study makes several theoretical and practical contributions. First, we propose an application for negativity dominance backed by frequency-weight theories in online WOM. To the best of our knowledge, prior work is based on either positive or negative reviews. We have found that not only are negative reviews more influential than positive reviews, but mixed reviews are also perceived to be more negative than positive reviews and act similarly to negative reviews. It has been suggested that marketers analyze available evaluations and release the most appropriate combination of positive and negative reviews to influence potential buyers’ purchase decisions (Chen and Xie 2008). The application of this theoretical finding will help online sellers to group reviews and release an appropriate combination of not only purely
positive and purely negative reviews but also mixed reviews. In addition, knowing the effect of mixed reviews is extremely important since it is a fact that potential buyers usually look at more than one review, and the likelihood of reading purely negative or positive reviews is low (Park et al. 2011).

Second, despite early suggestions that repeating purchase cues matter to human behavior (Weiss et al. 2008), little research has been done on this idea. The research here shows that repeating purchase cues affects causal attribution in social as well as physical domains. Although repeating purchase cues are a small portion of online reviews, their effect on the decision-making process is significant. Marketers who are worried about the intensive impact of negative or mixed reviews can benefit from the findings of this work. Business owners can respond to negative reviews optimistically by reducing their impact, but such maneuvers may exacerbate the situation (Wehrum 2009). However, with knowledge that repeating purchase cues increase the usefulness of positive reviews to a greater extent than negative and mixed reviews, marketers can encourage consumers to talk about their experiences if they are using a product for a considerable period of time.

Finally, this work helps to understand customers’ behavior better in the presence of repeating purchase cues as a moderating factor. Although research has shown that word of mouth affects firm and product performance (Godes and Mayzlin 2004, Tirunillai and Tellis 2012), little work has been done to understand why certain types of WOM communication carry more impact than others. This article adds to recent work exploring the psychological foundations of WOM communication such as causal attribution (Berger and Schwartz 2011, Cheema and Kaikati 2010) by examining how customers assess a review value in the presence of moderating cues like repeating purchase.
3.7. Limitations and Directions for Future Research

Although our approach is consistent with prior research exploring the effect of temporal contiguity of causal attribution (Chen and Lurie 2013), we have not conducted a study using available online reviews of sellers’ websites. Our findings are based on an experimental laboratory condition. Therefore, it may be beneficial to collect data from websites such as Yelp to validate observations reported in this chapter.

The parsimony of our proposed model in some relationships suggests that additional variables might help to explain key variables and moderate the strength of relationships within the model. For example, product type (experience vs. search) and product knowledge might also moderate the impact of the review valence on causal attribution. In addition, we selected an inexpensive product to conduct this study, which imposes a low risk to customers; at the same time, our subjects are familiar with a pencil and can easily capture review value. Customer behavior may be different if a more expensive product is selected. Further research is necessary to test the model with different types of products in different price ranges to ascertain the effect of product value as well as product type.
3.8. REFERENCES


CHAPTER 4
TWO-DIMENSIONAL REVIEWS: THE NEW GENERATION OF ONLINE CONSUMER REVIEWS

Abstract:

A traditional online review provides a buyer’s opinion regarding a product, but the majority of these reviews usually do not include information about alternative products. As a result, a potential buyer may read other reviews about alternative products if online reviews are being used as a source of product information. Since reviews are written by different review writers with different preferences and perspectives, reading multiple reviews provided by different writers about alternative products may confuse a potential buyer. In this research, we evaluate the consumer’s behavior in the presence of a two-dimensional review, which is defined as a review with comparing information about alternative products written by one single consumer, one-dimensional review about one product, one-dimensional reviews about alternative products written by different consumers and finally combined reviews containing two-dimensional and one-dimensional reviews.

Our study indicated that when reviews are presented in written format, two-dimensional reviews are perceived to be less valuable than one-dimensional reviews about either one product or two products. However, when presented in table format, two-dimensional reviews are perceived more valuable than one-dimensional reviews. Also, this study showed that combined reviews including two-dimensional reviews in table format and one-dimensional written reviews are more valuable than two-dimensional written reviews and one-dimensional reviews presented in either written or table formats.
We also showed that although positive reviews result in higher product attitude, this effect will be less strong in two-dimensional reviews when one product has a positive valence and the alternative product expresses a negative opinion.

4.1. Introduction

Online shopping has become a routine behavior for many consumers (Zhang et al. 2010). During the initial years of the Internet age in business-to-consumer (B2C) commerce, there was an asymmetric relationship between sellers and customers, i.e., customers used only the information created by sellers or limited online word of mouth (WOM) to make a purchase decision. This asymmetric channel caused a significant reduction in the accuracy of a purchase decision, which is defined as purchasing a product that meets a buyer’s preferences and requirements. This reduction is due to lack of information and thus imposes significant costs to the supply chain, which is called the cost of a wrong purchase (Chen et al. 2008). Online consumer reviews have been introduced to address this information asymmetry. Thus, not only are consumers able to use data provided by the sellers, but previous consumer experience could be used in the decision-making process as another source of product information.

Traditional online reviews written by a consumer usually provide information about a single product. In a competitive market where alternative products have been introduced to satisfy customer requirements, potential buyers try to extensively research alternative products and select the one that provides the maximum value for the allocated budget. As a result, multiple reviews should be read (Park et al. 2011). However, the differences among users’ preferences may lead a potential buyer to an inappropriate conclusion. For example, a consumer who is a professional photographer rates brand A camera with features above average as weak, while from an amateur photographer’s point of view, camera B with fewer features than camera
A is attractive. Therefore, if these two reviews are the source of product information, a potential buyer would likely pick camera B with fewer features due to inconsistent consumer preferences and perhaps make a wrong purchase.

According to Decker et al. (2010), the number of discussed products in a consumer review increases the overall informativeness, but there is a very limited literature about those situations where more than one product affects the review value. Contrast theory (Anderson 1973) is one of the dominant theories used to study the features of reviews when multiple products are involved.

In advertisement literature, it has been argued and accepted that comparing advertisements will deliver more information to a potential buyer by providing information about alternative products. Due to the amount of delivered information in comparative ads, Grewal et al. (1997) found that this type of advertisement is perceived to be more helpful than non-comparative ads. Their meta-analysis concluded that comparative ads generally elicit more attention to the advertisement, result in greater message and brand awareness, increase information processing, provide more favorable product attitudes, increase purchase intentions, and increase purchase behaviors. Moreover, comparative ads evoke lower source believability and less positive attitudes toward the ad. However, no differences were found for informativeness and believability of the advertised message (Grewal et al. 1997).

Although, online consumer reviews have been accepted as one of the main sources for product information, the reports on product-return costs, warranty costs, low-star-rating reviews posted on websites, etc. indicate the necessity of improving review values and informativeness. By combing Decker’s work (2010) on the value of number of discussed products in reviews and Grewal’s study (1997) on the value of competing advertisement, we propose a new generation of
online reviews: two-dimensional online reviews. By definition, in this study, a two-dimensional review is a single review that compares two products for the same attributes.

Studies have been conducted to investigate the effect of online review properties, such as volume, valence, length, and date of submission, on the sellers’ sale (Chevalier and Mayzlin 2003), buyers’ purchase intention (Park et al. 2011), and buyers’ purchasing decision (Smith et al. 2005, Forman et al. 2008). However, to our best knowledge, the review dimension and its effect on either the seller’s performance or the buyer’s intention have not been investigated.

Here are two samples of one-dimensional and two-dimensional reviews found at Amazon.com.

Two-Dimensional Review:

Photographer, blogger, foodie: iPhone 6 still has the best selection of apps and arguably the best camera. Samsung's camera is great, but the company is known to really bog down their stellar devices with bloatware that ruins or significantly slows down your phone after 1 year of use.

One-Dimensional Review:

Medical and Science community: iPhone. Unfortunately, most of the med and science people rely on Apple products, and a lot of new apps still come to iOS first or are better updated and designed on iOS.

Recreational, use a phone as a communication device and for fun: iPhone. The camera and social apps are fun to use on the iPhone.

Other than two-dimensional and regular one-dimensional reviews, buyers have access to another type of review, which are multiple one-dimensional reviews about alternative products. This is the same as the one-dimensional review with only one product. However, a potential buyer will review alternative products. On the other hand, and different from two-dimensional reviews written by one consumer, one-dimensional reviews about two products are written by two consumers with different preferences, which could result in potential buyer confusion. The
reason that we include this type of reviews in our study is that when a buyer is in the product-search phase, one-dimensional reviews about alternative products are being used as product information sources.

In this study, we evaluate the effect of review dimension on the review value perceived by consumers. Regarding review dimension, we introduce four major review types:

1. One-dimensional reviews about one product: this common type of review is mainly posted on a seller’s website. Here, the review writers present their opinions regarding the one product under consideration.

2. One-dimensional reviews involving two products: This is similar to the first type of review, but here, a potential buyer reads two separate reviews, and each review is about an alternative product.

3. Two-dimensional reviews: This type of review is proposed by the authors of this chapter. Here, one review is written by one review writer presenting opinions about two competing products. The main difference between this type of review and the one-dimensional review involving two products is in consistency of the review writer’s preferences. In two-dimensional reviews, the opinions regarding two products are consistent since they are written by the same person. However, in one-dimensional reviews about two products, two different review writers with different preferences present their opinions regarding the competing products.

4. Combination of two-dimensional and one-dimensional reviews: This last type of review is a combination of number 2 and number 3. Here, the buyer would have access to both those reviews written by one consumer and the two separate reviews written by different consumers.
We also study other factors that could moderate the effect of review dimension on the review value. The main factor that we found to be significant was the review presentation format: written vs. table format. According to a study by Segel and Heer (2010), categorizing and organizing information about a phenomenon can increase the amount of delivered information. In our study and based on the literature comparing ads and information visualization, we propose that a two-dimensional review comparing two competing products in a table format can be more informative than two-dimensional reviews in written format, which does not categorize the differences. Figure 4.1 shows an example of a review in table format.

**FIGURE 4.1. Sample of Two-Dimensional Review Designed by Authors of This Chapter**

<table>
<thead>
<tr>
<th></th>
<th>iPhone</th>
<th>Galaxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera Software</td>
<td>The behind the scene software for digitally capturing an image is definitely the strongest sell for the iPhone. This was one of the reasons for me to switch over from Galaxy S6 since I've started to dabble with photography and wanted a really good camera in my smartphone.</td>
<td>Although Galaxy S6 camera is amazing, the overall quality of pictures from iPhone is higher.</td>
</tr>
<tr>
<td>Processor</td>
<td>I believe iPhone is more reliable than Galaxy.</td>
<td>I used a S6 for the same amount of time and</td>
</tr>
</tbody>
</table>

Finally, we introduce review valence as the third moderating factor in this study. Review valence is a term used to indicate the theme of an online review—whether it conveys the generally negative or positive sentiment of the reviewer towards the product or service. In addition, valence contains descriptions (either desirable or undesirable) of a product or service (Vermeulen and Seegers 2009). It has been argued and accepted that a positive review results in a higher product attitude (Burnkrant and Consineau 1975, Lee et al. 2008). In this research, we evaluate the effect of review valence on product attitude when a two-dimensional review is read as product information source vs. one-dimensional reviews.
4.2. Theoretical Background and Hypotheses Development

Comparative vs. non comparative consumer review

Long before the introduction of consumer reviews, sellers used advertisements to promote their products. However, advertisers were not allowed to compare the sponsored product with other alternatives in the advertisement content. In the 1970s, comparative advertising was introduced and became popular. The increased popularity may be partly due to the Federal Trade Commission's informal encouragement of explicit comparisons (Tannenbaum 1974, Wilkie and Farris 1975). After this introduction, various research was conducted to study the effect of comparative advertising on generating attention, message and brand awareness, levels of message processing, favorable sponsored brand attitudes, and increased purchase intentions and purchase behaviors, source believability, and attitude toward the ad. These studies have shown that in many cases, comparative ads are more effective than non-comparative ads. However, source believability and attitude toward the ad is negatively affected when advertisement is comparative.

Although traditional advertisements in both comparative and non-comparative formats are still being used by sellers, Internet technology has changed the customer-to-business relationship considerably. In a traditional advertisement, the seller-customer relationship is asymmetric, meaning the information is transferred from sellers to buyers and not vise-versa. This asymmetric channel caused a significant reduction in the accuracy of a purchase decision, which is defined as purchasing a product that meets a buyer’s preferences and requirements. This reduction is due to lack of information and thus imposes significant costs to the supply chain, which is called the cost of a wrong purchase (Chen et al. 2008). Online consumer reviews have been introduced to address this information asymmetry. Thus, not only are consumers able to use
data provided by the sellers, but previous consumer experience could be used in the decision-
making process as another source of product information. Although, there is extensive literature
to evaluate the performance of comparative advertisements, no study focusing on the value of the
comparative consumer reviews was found. In this study, we study the value of comparative
reviews vs. non-comparative ones. To do so, we use the basics developed by Grewal et al. (1977)
to study comparative advertisements. Previous research has defined comparative ads (Grewal et
al. 1997). We refer to the same definition and define a two-dimensional or comparative review
by using two criteria: First, comparative reviews explicitly (e.g., Wilkie and Farris 1975) or
implicitly (e.g., Jackson et al. 1979) compare at least two brands in the same generic product or
service class. Second, comparative reviews compare the brands on specific product/service
attributes (Wilkie and Farris 1975).

Lavidge and Steiner (1961) separate the objectives of advertising into cognitive,
affective, and conative functions. Advertising's cognitive function provides information and facts
for the purpose of making consumers aware and knowledgeable about the sponsored brand, and
attention, awareness, information processing, informativeness, positioning and believability are
used to measure this function. Advertising's affective function creates liking, and preference for
the sponsored brand-preference presumably refers to more favorable attitudes. This function
could be evaluated by measuring the attitude to the advertisement (value) and attitude to the
product. Advertising's affective function, therefore, is to persuade. Finally, advertising's conative
function is to stimulate desire and cause consumers to buy the sponsored brand, and consumer’s
attention to purchase was used to measure this function.

Generally speaking, online reviews are being used by buyers as a tool to form an attitude
toward a product under consideration. On the other hand, online sellers try to post the most
valuable reviews so potential buyer can select the most appropriate products by reading previous consumers’ opinions. By adopting Lavidge’s proposed functions into the consumer review content, we select attitude toward reviews and attitude toward product as this study’s dependent variables.

Reviews have different values for different customers. Customers try to understand reviewers’ reasons behind sharing opinions and then provide judgment about the value of reviews based on their understanding (Friestad and Wright 1994).

In the advertisement application, attitude toward a product denotes a consumer's feelings and overall attitude toward the target goods. In this study, we focus on this variable to analyze the effect of comparing reviews on the perceived product attitude. When the product information source is a seller advertisement, the extant research has shown that comparative ads generate fewer favorable attitudinal responses toward the product than non-comparative ads (Belch 1981, Gorn and Weinberg 1984, Swinyard 1981). In this context, the explanation would be that users of the comparing see the comparison as an attack from the seller on the alternative brand, causing them to derogate the advertisement source of the message (Wilkie and Farris 1975). Although we expected the same consumer reaction toward two-dimensional reviews, a different root cause is assumed, since online reviews are not posted by the seller.

**Cognitive Load Theory**

When a potential buyer reads a group of reviews, the initial goal is to learn about a product/s as much as possible. It has been argued that multiple factors can affect the learning process as well as the perceived value of the message. Cognitive load is one of the dominant theories that studies the effective factors on the learning process (Sweller 1994).
According to cognitive load theory, potential buyers’ difficulties to learn about a product would not be the same in different situations, meaning that, sometimes, a buyer will easily capture the product information while in other situations, it could be a very difficult task to capture the product information by reading a review. Similarly, the amount of information perceived could be very small to significantly high. In this study, we will employ this theory to study the effect of two variables—information relevance and difficulty of learning the products attitude by reading reviews—on the overall message believability and attitude toward reviews.

People have limited working memory to process incoming information. Thus, if somebody’s working memory is overloaded, then the learning process in negatively affected (Xu et al. 2013). Task complexity is one of the main key factors in cognitive theory (Xu et al. 2013). It has been argued that there is a curvilinear relationship between task complexity and productivity (Wood 1986). Increasing levels of complexity could be more challenging and positively affect performance (Locke et al. 1981). However, passing a certain level of complexity can cause an overloading condition and therefore reduce the effectiveness (Xu et al. 2013). By relying on cognitive load theory, Kamis et al. (2008) found that as the number of alternatives increases (complexity), usefulness followed an inverted U-shape curve.

Cognitive load can explain why written two-dimensional reviews are perceived to be less valuable. When a buyer is reading a two-dimensional review, too much information is presented in an unorganized format. As a result, a buyer reads too many words and sentences and then analyzes the presented information and decides which product is more favorable. However, in a one-dimensional review with only one product, all information is about the target merchandize, and working memory would not be involved at a very detailed level. Therefore, a one-dimensional review about one product can be easily analyzed, and information can be easily
captured. This leads a potential buyer to rank a one-dimensional review of one product as more valuable than a two-dimensional review. Therefore, we hypothesize the following:

*Hypothesis 1a: Written two-dimensional (comparing) reviews are perceived less valuable than traditional written one-dimensional reviews about one product.*

Even when one-dimensional reviews are presented for a couple of alternative products, the information is categorized since each review is purely about one of the alternative products. As will be discussed in more detail, categorized information can be analyzed easier than non-categorized data (Segel and Heer 2010). We can argue that it would be easier for a potential reader to read two separate one-dimensional reviews about two different products and get the same amount of information, in comparison to reading one two-dimensional review about two alternatives in a written format. Since in the former case information is categorized, less memory will be involved and more value can be perceived by a potential buyer. Therefore, we hypothesize the following:

*Hypothesis 1b: Written two-dimensional (comparing) reviews are perceived to be less valuable than traditional written one-dimensional reviews about two alternative products.*

**Data Visualization**

Although it has been proposed that a written two-dimensional review is perceived to be less valuable than a one-dimensional review, as part of this research, we look for any moderating factor that could change the proposed relationship.

Data visualization is regularly promoted for its ability to reveal stories within data. According to visualization, visually making an event bold using any visualization tools could positively affect the overall information delivered by that event and make it easier for a reader to
capture more information with less effort. Visualization has long been used to support the delivered information, usually in the form of diagrams, tables, and charts inserted in a larger body of text. In this format, graphics typically provide supporting evidence or related details (Segel and Heer 2010).

Currently, visualization tools are used primarily for data exploration and analysis. Applications such as spreadsheets support an array of analysis routines and visual encodings, but beyond these applications, they typically provide little support for a text with expected objectives and analysis results. As such, they are powerful vehicles for discovering “stories” (Segel and Heer 2010).

By adopting data visualization proposed by Seget and Heer (2010) into online consumer reviews, we expect that visualization of information provided in online reviews would help a potential buyer to read through the online reviews faster and get information more effectively. After considering different ways to visualize a written document, we found that categorizing product attributes and corresponding differences in a table format where all product attributes are separated could possibly help a potential buyer to capture information faster, compared to the case of reading information through a text with no visual categorization. Therefore, we hypothesize the following:

Hypothesis 2: Online reviews in table format are perceived to be more valuable than a traditional review in written format.

As discussed earlier and according to cognitive load theory (Sweller 1994), we assume that one-dimensional reviews are more valuable than two-dimensional reviews since they are less complex and consume less memory. However, based on the benefits gained by visualization (Segel and Heer, 2010) in terms of receiving required information, we expect that reviews
presented in table format would be perceived to be more valuable than written reviews, since they provide information in an organized manner which helps the buyer to capture information more effectively with less memory involved. By combining the benefits of comparing reviews adopted from comparing the ad literature, as discussed in the introduction, and data visualization, we propose that two-dimensional reviews in table format will be perceived to be more valuable than one-dimensional reviews, either in written or table format since two-dimensional reviews provide more information by comparing two alternative products, and information is provided in an organized format, which helps buyers learn about products easier. Therefore we propose the following hypothesis:

Hypothesis 3a: When the review is presented in a table format, a two-dimensional review is more valuable than a one-dimensional review about one product. However, when the review is presented in a written format, a two-dimensional review is less valuable than a one-dimensional review about one product.

Not only are two-dimensional reviews in table format more valuable than one-dimensional review about one product, but also they are more valuable than one-dimensional reviews about two products. A two-dimensional review is written by one person; therefore, inconsistent consumer preferences, as may exist between two one-dimensional reviews about two alternative products written by two consumers, and as may result in confusion, will not be the case in two-dimensional reviews. This confusion among one-dimensional reviews could result in lower perceived value. Therefore we propose the following hypothesis:

Hypothesis 3b: When the review is presented in a table format, a two-dimensional review is more valuable than a one-dimensional review about two products. However, when the review is
presented in a written format, a two-dimensional review is less valuable than a one-dimensional review about two products.

We also propose the fourth type of review, which is a combination of both one-dimensional and two-dimensional reviews, when the two-dimensional review is in a table format and the one-dimensional review is written. By referring to cognitive load theory and visualization as the study backbone, we expect subjects to perceive the combination reviews to be more valuable than the written two-dimensional reviews because the combination reviews present their two-dimensional reviews in table format, which are easier to analyze than written two-dimensional reviews, which are difficult to deliver product information efficiently. In combination reviews, buyers have access to comparing reviews in a table format, but this opportunity is not available in written two-dimensional reviews. Therefore, learning about a product would be an easier task when combination reviews are the information source. We propose the following hypotheses:

Hypothesis 4a: Combination reviews that contain two-dimensional reviews in table format and written one-dimensional reviews are perceived to be more valuable than written two-dimensional reviews.

Hypothesis 4b: Combination reviews that contain two-dimensional reviews in table format and written one-dimensional reviews are perceived to be more valuable than one-dimensional reviews about one product.

Hypothesis 4c: Combination reviews that contain two-dimensional reviews in table format and written one-dimensional reviews are perceived to be more valuable than one-dimensional reviews about two products.
Product Attitude

Consumers form beliefs towards product attitude based on the information they receive. In the product attitude literature, it has been argued that positive information provided by advertisement results in a positive product attitude, while negative product information degrades the perceived product attitude. Conformity is defined as the tendency of opinions to establish a group norm and the tendency of individuals to comply with the group norm. In light of this definition, when an online review provides negative information about a sample product, a potential buyer will form a negative attitude toward the product, simply to comply with the existing information (Burnkrant and Consineau 1975, Lee et al. 2008).

On the other hand when an online review delivers positivity about the target product, formation of a positive attitude by a review reader is expected. We propose the following hypothesis:

Hypothesis 5: Positive online reviews result in higher product attitude.

Although according to Burnkrant and Consineau (1975) and Lee et al. (2008), positive information forms higher product favorability, when positive information about the target product is posted along with negative opinions regarding competing products, the favorability level could be affected. In traditional advertising, it has been argued that comparing ads would not necessarily improve the attitude toward the target product. In other words, negative information about an alternative product provided in an advertisement could be interpreted as an attack from the seller against the competing product. This could cause lack of trust toward the advertisement and therefore less target product favorability (Belch 1981, Gor and Weinberg 1984, Swinyard 1981). By adopting this argument into online review context, we propose the following:
Hypothesis 6: Positive online reviews result in a higher product attitude when reviews are not comparing; however, in the case of comparing reviews, the effect of positive information regarding the target product (IPhone) on product attitude is less.

Figure 4.2 shows the study variables and interactions.

4.3. Research Method

Study Setting

To test the proposed hypotheses, we employed a factorial design. To test all different combinations, we designed 14 websites. Table 4.1 shows different scenarios as well as their specifications.
### TABLE 4.1. Study Websites and Specifics

<table>
<thead>
<tr>
<th>Website</th>
<th>Review Type</th>
<th>Products</th>
<th>IPhone Valence</th>
<th>Samsung Valence</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1</td>
<td>2D Written</td>
<td>IPhone and Samsung</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W2</td>
<td>2D Tabular</td>
<td>IPhone and Samsung</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W3</td>
<td>2D Written</td>
<td>IPhone and Samsung</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>W4</td>
<td>2D Table</td>
<td>IPhone and Samsung</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>W5</td>
<td>1D Written</td>
<td>IPhone and Samsung</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>W6</td>
<td>1D Written</td>
<td>IPhone and Samsung</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W7</td>
<td>1D Written</td>
<td>IPhone only</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>W8</td>
<td>1D Written</td>
<td>IPhone only</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W9</td>
<td>1D Written and 2D Tabular</td>
<td>IPhone and Samsung</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W10</td>
<td>1D Written and 2D Tabular</td>
<td>IPhone and Samsung</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>W11</td>
<td>1D Tabular</td>
<td>IPhone and Samsung</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>W12</td>
<td>1D Tabular</td>
<td>IPhone and Samsung</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>W13</td>
<td>1D Tabular</td>
<td>IPhone only</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>W14</td>
<td>1D Tabular</td>
<td>IPhone only</td>
<td>Positive</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Each subject was randomly assigned to a website and asked to read the presented reviews and answer various questions about his/her perception regarding the value of the presented reviews. Prior to the study, subjects were informed that they would receive extra credit for their participation. In addition, as in many other experimental studies, we offered one $50 Best Buy gift card through a drawing. A website builder was utilized to design twelve different websites, each containing either 1 or 2 reviews. The differences between these websites were in the review presentation format and number of presented products.

The experimentation session using a Qualitrics survey proceeded as follows: All subjects were first asked to answer general questions regarding their attitude toward online reviews,
product knowledge, personal relevance, etc. Following that, subjects were asked to read the provided reviews, answer questions about those reviews, and finally rank the provided reviews in terms of value.

**Manipulation Checks and Measurement**

We measured the study variables by adopting measures from the literature. Table 4.2 shows the adopted measures and corresponding literature.

**TABLE 4.2. Study Measures**

<table>
<thead>
<tr>
<th>Valence</th>
<th>Do the provided reviews deliver positive information about the iPhone 6?</th>
<th>Chen, Z., and Lurie, N.H. (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How positive or negative did you perceive the review to be about the iPhone 6?</td>
<td></td>
</tr>
<tr>
<td>Review Value/Helpfulness</td>
<td>Assuming that you were thinking about purchasing a pencil, how likely would you be to use this online review in your decision making?</td>
<td>Chen, Z., and Lurie, N.H. (2013)</td>
</tr>
<tr>
<td></td>
<td>How helpful was this review?</td>
<td>Connors, L., Mudambi, S.M., and Schuff, D. (2011)</td>
</tr>
<tr>
<td></td>
<td>Do you think the provided review is helpful to making a purchase decision?</td>
<td></td>
</tr>
<tr>
<td>Review Dimension</td>
<td>Comparative reviews are those that compare two different products at the same time written by the same user. According to this definition, do you think that the website has any comparative reviews?</td>
<td>Developed for This Study</td>
</tr>
<tr>
<td></td>
<td>The consumer review commented on one cellphone only.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The consumer review commented on one cellphone relative to the other cellphone.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The consumer review commented on two cellphones separately.</td>
<td></td>
</tr>
<tr>
<td>Review Format</td>
<td>The website presented the consumer review in a tabular form.</td>
<td>Developed for This Study</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td>The consumer review was represented in the form of a table containing the review.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The consumer review was represented in the form of several short paragraphs containing the relevant review.</td>
<td></td>
</tr>
<tr>
<td>Product Attitude</td>
<td>I like iPhone 6 more after reading the review.</td>
<td>Jiang and Benbasat (2007)</td>
</tr>
<tr>
<td></td>
<td>After reading the review, I have formed a favorable impression towards iPhone 6.</td>
<td>Jiang and Benbasat (2007)</td>
</tr>
<tr>
<td></td>
<td>IPhone 6 would be a good choice based on the review I just read.</td>
<td>Munch, J. M., Boller, G. W., &amp; Swasy, J. L. (1993)</td>
</tr>
</tbody>
</table>

As a manipulation check for review dimension, we asked subjects to determine if the assigned reviews are comparative on a 7-point scale. We asked them to choose 7 if the review is very comparative and 1 if it is not comparative at all. We also asked subjects to specify if they are able to distinguish between reviews in table format and written reviews: 7 for table and 1 for written formt. As expected, the results were consistent with the study design. Finally, we checked the study by asking questions about reviews valence regarding the study products, where very positive reviews would get 7 points, and very negative reviews would get 1 point. Tables 4.3 to 4.6 shows the manipulation checks for these main independent variables.
TABLE 4.3. Manipulation Checks for Review Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1D with 1 Product</td>
<td>2.9</td>
</tr>
<tr>
<td>1D with 2 Products</td>
<td>4.06</td>
</tr>
<tr>
<td>2D Combinations</td>
<td>6.19</td>
</tr>
<tr>
<td></td>
<td>4.64</td>
</tr>
</tbody>
</table>

TABLE 4.4. Manipulation Checks for Review Format

<table>
<thead>
<tr>
<th>Format</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
<td>5.8</td>
</tr>
<tr>
<td>Written</td>
<td>2.47</td>
</tr>
</tbody>
</table>

TABLE 4.5. Manipulation Checks for IPhone Valence

<table>
<thead>
<tr>
<th>IPhone</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>6.02</td>
</tr>
<tr>
<td>Negative</td>
<td>2.87</td>
</tr>
</tbody>
</table>

TABLE 4.6. Manipulation Checks for Samsung Valence

<table>
<thead>
<tr>
<th>Samsung</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>5.67</td>
</tr>
<tr>
<td>Negative</td>
<td>2.53</td>
</tr>
</tbody>
</table>

Data Analysis

In this study, we recruited 243 student subjects from a public university, including three colleges and ten majors, representing diverse backgrounds. According to a power analysis for the between-subject design, a minimum of 11 subjects for 14 groups (hence at least 154 subjects) can assure enough statistical power of 0.8 for a medium-size effect (Cohen 1992). Among the subjects, 191 were males and 52 were females. The average age was 24.3 In general, the subjects
were familiar with online shopping and cellphone attributes, with an average of 5.4 and 5.3, respectively, on a 7-point scale.

We analyzed the proposed research model using statistical models including ANOVA, ACNOVA, and Post Hoc. To support the reliability of individual items and the internal consistency of the constructs, we calculated Cronbach’s alpha for each construct. All met the suggested tolerances (>0.70, Fornell and Larcker 1981) with results reported in Table 4.7 Factor analysis demonstrated that all items load higher on their constructs than they load on any other constructs measured at the same time, indicating good discriminant validity.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPhone Valence</td>
<td>0.926</td>
</tr>
<tr>
<td>Samsung Valence</td>
<td>0.933</td>
</tr>
<tr>
<td>Review Value/Informativeness</td>
<td>0.980</td>
</tr>
<tr>
<td>Review Dimension</td>
<td>0.761</td>
</tr>
<tr>
<td>Review Format</td>
<td>0.776</td>
</tr>
<tr>
<td>Product Attitude</td>
<td>0.922</td>
</tr>
</tbody>
</table>

**Analysis of Structural Model**

Next we analyzed the structural model to examine the significance and strength of the relationships of each of the hypothesized effects. All seven hypotheses were found to be statistically significant.

We employed two ACNOVA models to study H1a and H1b. The first analysis shows a significant negative relationship between review dimension in written format and value when one-dimensional reviews provide information about one product only (value mean of 3.41 for
two-dimensional reviews and 4.39 for one-dimensional reviews and P-value = 0.024) meaning that two-dimensional reviews in written format are less valuable than one-dimensional written reviews about one product only. The second ACNOVA model supports H1b as well. According to this model, written two-dimensional reviews are perceived to be less valuable than written one-dimensional reviews providing information about two alternative products separately (value mean of 3.56 for two-dimensional reviews and 4.84 for one-dimensional reviews and P-value = 0.003)

To assess the effect of review format, we utilized a one-way ANOVA model when the review perceived value was the dependent variable and the review format was the independent one. This model shows that reviews provided in table format are perceived to be more valuable than written format. The review value average for written reviews is 5.04 and for reviews in table format is 4.21 (P-value < 0.001).

To study the next set of hypotheses, we conducted two post hoc tests, the results of which support both H3a and H3b.

According to the first set of analyses for H3a, two-dimensional review presented in table format is more valuable than one-dimensional review. Table 4.8 shows the value average for each group.

<table>
<thead>
<tr>
<th>Group Specific</th>
<th>Average Review Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D Written</td>
<td>3.5</td>
</tr>
<tr>
<td>2D Table</td>
<td>5.3</td>
</tr>
<tr>
<td>1D Written</td>
<td>4.3</td>
</tr>
<tr>
<td>1D Table</td>
<td>4.9</td>
</tr>
</tbody>
</table>

TABLE 4.8. Average Review Value for H3a Groups
Based on post hoc results, the following apply:

- Written two-dimensional reviews are perceived to be less valuable than two-dimensional reviews in table format with p-value $< 0.001$.
- Written two-dimensional reviews are perceived to be less valuable than written one-dimensional reviews with p-value $= 0.024$.
- Written two-dimensional reviews are perceived to be less valuable than one-dimensional reviews in table format with p-value $< 0.001$.
- Two-dimensional reviews in table format are not statistically different from one-dimensional reviews in table format.
- Two-dimensional reviews in table format are perceived to be more valuable than written one-dimensional reviews with p-value $= 0.013$.
- Written one-dimensional reviews are not statistically different from one-dimensional reviews in table format.

To study H3b, another post hoc ANOVA was conducted. Table 4.9 shows the means for each group.

<table>
<thead>
<tr>
<th>Group Specific</th>
<th>Average Review Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D written</td>
<td>3.6</td>
</tr>
<tr>
<td>2D table</td>
<td>5.3</td>
</tr>
<tr>
<td>1D written</td>
<td>4.9</td>
</tr>
<tr>
<td>1D table</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Based on post hoc results, the following apply:
• Written two-dimensional reviews are perceived to be less valuable than two-dimensional reviews in table format with p-value < 0.001.

• Written two-dimensional reviews are perceived to be less valuable than written one-dimensional reviews with p-value = 0.003.

• Written two-dimensional reviews are perceived to be less valuable than one-dimensional reviews in table format with p-value < 0.001.

• Two-dimensional reviews in table format are not statistically different from one-dimensional reviews in table format.

• Two-dimensional reviews in table format are not statistically different from written one-dimensional reviews.

• Written one-dimensional reviews are not statistically different from one-dimensional reviews in table format.

To check Hypothesis 4a, we employed a one way ANOVA model, and the results were found to be consistent with the proposed H4a. In other words, combined reviews consisting of two-dimensional and one-dimensional reviews are perceived more valuable than two-dimensional reviews in written format with P-value < 0.01. The average review value was 3.6 for written two-dimensional reviews and 5.1 for combined reviews.

Next, another one-way ANOVA was used to compare the combined reviews vs. one-dimensional reviews about one product as far as perceived value. ANOVA results support the hypotheses with average values of 4.45 and 5.07 for one-dimensional and combined reviews, respectively. The model p-value is 0.043.
To compare the combined reviews and one-dimensional reviews about two products as far as value, we employed another one-way ANOVA model, the results of which did not support our proposed hypothesis due to the p-value being over 0.05.

We also studied the effect of review valence and review dimension on product attitude. In H5, we showed that, in general, positive reviews result in a more positive attitude toward products using a one-way ANOVA model with a P-value < 0.001. According to this model, the average attitude toward the iPhone in the presence of negative reviews was 2.84, while this measure was 5.11 when subjects were exposed to positive reviews about the iPhone.

Finally, in H6, when dimension is taken into the account, it was observed that attitude toward a product is negatively affected in two-dimensional reviews; in other words, when negative information is provided regarding the target product vs. negative opinion about the alternative product, the attitude toward the target product decreased significantly (P-value = 0.029).

Table 4.10 shows a summary of all hypotheses.

**TABLE 4.10. Summary of All Tested Hypotheses**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Model</th>
<th>P-Value</th>
<th>Conclusion</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>Review Dimension</td>
<td>Review Value</td>
<td>ANOVA</td>
<td>0.024</td>
<td>Significant</td>
<td>One review with one product</td>
</tr>
<tr>
<td>H1b</td>
<td>Review Dimension</td>
<td>Review Value</td>
<td>ANOVA</td>
<td>0.003</td>
<td>Significant</td>
<td>One review with two products</td>
</tr>
<tr>
<td>H2</td>
<td>Review Format</td>
<td>Review value</td>
<td>ANOVA</td>
<td>&lt;0.01</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H3a</td>
<td>Review Dimension and Review Format</td>
<td>Review Value</td>
<td>Post Hoc</td>
<td>Significant</td>
<td>One review about one product</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 4.10. (continued)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Independent Variables</th>
<th>Dependent Variables</th>
<th>Model</th>
<th>P-Value</th>
<th>Conclusion</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4a</td>
<td>Review Format</td>
<td>Review Value</td>
<td>One-Way ANOVA</td>
<td>&lt;0.01</td>
<td>Significant</td>
<td>Comparison of combined review and two-dimensional review in written format</td>
</tr>
<tr>
<td>H4b</td>
<td>Review Format</td>
<td>Review Value</td>
<td>One-Way ANOVA</td>
<td>0.043</td>
<td>Significant</td>
<td>Comparison of combined review and one-dimensional review about one product</td>
</tr>
<tr>
<td>H4c</td>
<td>Review Format</td>
<td>Review Value</td>
<td>One-Way ANOVA</td>
<td>Insignificant</td>
<td>Comparison of combined review and one-dimensional review about two products</td>
<td></td>
</tr>
<tr>
<td>H5</td>
<td>Review Valence</td>
<td>Product Attitude</td>
<td>ANOVA</td>
<td>&lt;0.01</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H6</td>
<td>Review Valence and Review Dimension</td>
<td>Product Attitude</td>
<td>ANOVA</td>
<td>0.04</td>
<td>Significant</td>
<td></td>
</tr>
</tbody>
</table>

4.4. Discussion

Overall, we found support for the majority of the hypothesized relationships in our proposed model. Our results support the idea of a relationship between review dimension and review presentation format and perceived value by a potential buyer. Our results also supported the fact that review presentation format moderates the effect of review dimension on perceived value.

The significant effect of review dimension on perceived value when reviews are presented in a traditional written format—that is, the review format is controlled—is consistent
with cognitive load theory (Sweller 1994). According to this theory, information complexity affects the learning process. When information is presented in a complex configuration, which is difficult for the brain to analyze and understand, then it is also difficult for the brain memory system to extract the required information, and as a result, the delivered information is not perceived as valuable (Sweller 1994). This supports our hypotheses H1a and H1b, which propose a higher value to written one-dimensional reviews either about one or two products vs. written two-dimensional reviews.

We also studied the effect of review presentation format on perceived value when review dimension is controlled. Results of this study were consistent with visualization effects developed and presented by Segel and Heer (2010). According to their study, when reviews are presented in a graphical format, it is easier for the brain to analyze and extract the aimed information. By employing this study with ours, we hypothesized that categorizing two-dimensional reviews in a table format will help subjects capture more information effectively, and therefore, two-dimensional reviews in a table format are perceived to be more valuable than two-dimensional reviews in a written format.

The next studied hypothesis, which focuses on interactions between review dimension and review presentation format, was consistent with consolidation of visualization effects (Segel and Heer 2010) and cognitive load (Sweller 1994). As one of the main objectives in this study, we introduced a new method of recording and presenting online reviews which could increase the review value. As discussed earlier, a two-dimensional review in a written format does not seem as valuable as a written one-dimensional review since it requires too much analysis, and therefore, cognitive load would be high. On the other hand, it has been agreed that categorizing information into a table format would help a text reader to capture more information with less
memory load. Therefore, by combining these two theories, we would expect to deliver valuable information to a potential buyer by providing a two-dimensional review in table format compared to a one-dimensional review in either table or written format, regardless of the number of products presented in the one-dimensional review. The results of analysis on collected information found this to be consistent with the argument.

Results of the hypothesis 4a analysis are consistent with cognitive load theory and visualization. In combined reviews, a potential buyer has access to both categorized information as well as comparing data regarding two different products, while these two benefits are not present at the same time when information is captured by already-written two-dimensional reviews. As a result, combined reviews would be perceived more valuable than written two-dimensional reviews.

Along the same line, the results of hypothesis H4b were also expected and consistent with the advertisement literature, since in combined reviews, more information is delivered to a potential buyer compared to one-dimensional reviews about one product.

Inconsistent with hypothesis H4c, combined reviews were not perceived to be more valuable than one-dimensional reviews about two products. Despite hypothesis H4b, one-dimensional reviews about two products could provide information about alternative products. Also, buyers have the flexibility to be exposed or not to be exposed to alternative products, which is similar in combined reviews. Therefore, combined reviews do not provide a great advantage to buyers comparing to one-dimensional reviews about two products.

As expected and based on existing literature on product attitude, we proposed that positive reviews result in higher product attitude than negative reviews. Consistent with this
argument, H5 analysis showed that subjects who read positive reviews about the IPhone found this model to be more favorable compared to those who read negative reviews.

In hypothesis 6, we showed that regardless of review dimension, positivity in online reviews results in higher product favorability; however in two-dimensional reviews, negative information about the alternative product makes a potential buyer feel that the review is biased regarding the target product, and therefore, product favorability will still increase but not as much as in case of one-dimensional reviews. The results and arguments are consistent with the findings of Belch (1981), Gor and Weinberg (1984), and Swinyard (1981).

4.5. Contributions

Theoretical Contributions

This study makes several theoretical contributions. It is the first study to evaluate the effect of three different theories about consumer psychology at the same time as consumer behavior, visualization theory (Segel and Heer 2010), and cognitive load theory (Sweller 1994).

When reviews are presented in written format, one-dimension reviews about either one product or two products are perceived more valuable than two-dimension reviews. Along the same line, we showed that combined reviews are better than two-dimensional reviews or one-dimensional reviews about one product. The first section contradicts the finding in the advertisement literature that says that comparing advertisements in general are found more valuable. In online review content, comparison reviews are not necessarily more valuable than non-comparison reviews (Grewal et al. 1997).

Review presentation format is an effective factor on the perceived value of the review in which reviews presented in table format with categorized information about product attributes are perceived more valuable than written reviews containing information about product attribute
in an unorganized format. This finding is consistent with literature supporting the value of visualization (Segel and Heer 2010). For the first time, we tried visualization and product attribute categorizing as a tool to improve the value of online reviews.

By combining the above two statements, we concluded and statistically supported the proposed interaction of review dimension and review format. Although one-dimensional reviews are perceived to be more valuable than written two-dimensional reviews, changing the review presentation format to a table will statistically improve the value of two-dimensional reviews. Although, cognitive load theory had been studied in marketing science, to the best of our knowledge, neither visualization nor interaction of these two in the same content has been studied previously. For the first time, we used this interaction in marketing science and showed that comparing reviews presented in a table format could help potential buyers extract more information compared to the existing traditional online reviews. The findings of this study are consistent with visualization theory, and more importantly, for the first time, we showed that visualization in terms of product attribute categorizing moderates the effect of complex information on learning memory as presented in cognitive load theory.

As studied previously by other researchers and consistent with their findings, positive valence in reviews results in a higher product attitude (Burnkrant and Consineau 1975, Lee et al. 2008). However, and in contradiction to this finding, in two-dimensional reviews, the negative information posted about one of the alternative products reduces the positive affect of the review valence of the other product with a positive opinion about product attitude.

**Practical Contributions**

For a long time, comparative advertisement was used in the media to convince buyers to choose the supported product, and the majority of studies in academia and business sectors have
shown the effectiveness of this type of advertisement. After introducing consumer reviews as a new and well-accepted marketing tool, the necessity of such a study to determine the value of comparing consumer reviews was felt by the scholars of this research. The findings of this study can be used by business model developers to create a new online infrastructure to convince consumers to share their opinions regarding alternative products in two-dimensional reviews in a table format. According to our study results, two-dimensional reviews in table format or a combination of two-dimensional reviews and one-dimensional reviews about two products will provide the most value.

As supported by the data, the presence of a negative opinion about one alternative product will negatively affect the product attitude of the competing product that has a positive valence. In other words, negative information about one product in two-dimensional reviews is not helping the product attitude of the competing product that has a positive valence. This finding would help marketing experts decide when two-dimensional reviews are more appropriate. When a consumer has opinions about alternative products on two sides of the satisfaction spectrum, one-dimensional reviews about either one or two products would be more appropriate as far as product attitude, although they are not perceived as valuable as two-dimensional reviews. However, when consumer’s opinions about alternative products are not very different and cannot be distinguished, then two-dimensional reviews are more valuable and at the same time create more product attitude.

4.6. Study Limitations and Possible Future Work

The limitations of this research and possible future research suggestions are as follows: First, the parsimony of our proposed model suggests that some additional variables might help explain key variables and moderate the strength of relationships within the model. For example,
product type, product knowledge (Xu et al. 2009), and personal relevance might also moderate the impact of both review dimension and review format. Second, we did not study the effect of the perceived review value on the accuracy of a made purchase decision when the value is affected by review dimension and review format (Vali et al. 2015). Such a study could be a step further toward the recognition of the value of review dimension and review format in online marketing. Therefore, we encourage future researchers to study the effect of value on the accuracy of a purchase decision. Another suggestion would be to study the correlation of review value and review informativeness when two-dimensional reviews in a table format are presented vs. other formats.

Another important limitation in this study was the lack of a proposed review format at existing sellers’ websites. Although our new format is the main contribution of this study and this gap was appreciated by the authors of this chapter, this shortage kept us from validating our research by looking at existing real online reviews, and we had to create study reviews and websites.

4.7. Conclusion

This research proposed a new method for collecting and presenting online consumer reviews: two-dimensional (comparing) online reviews in a table format. We proposed four hypotheses to study the effect of review dimension and review presentation format on the perceived value of reviews. By recruiting 252 participants for this study, we were able to reach the required reliability. We developed 14 websites containing different types of reviews and analyzed the collected datasets. Through this analysis, we studied the effect of review dimension and review format on the perceived review value separately and simultaneously. Two-dimensional reviews, which are presented in a written format, do not create any advantages over
existing traditional one-dimensional written reviews; however, when a two-dimensional review is presented in a table format, a potential buyer assumes more value when comparing it to the two-dimensional written review, one-dimensional written review, or even one-dimensional review in a table format. To rationalize our hypotheses, we employed visualization effects and cognitive load theory. As another contribution, we illustrated that although review positivity results in higher product attitude, this effect will be less strong in two-dimensional reviews when one product has a positive valence and the alternative product has a negative valance.
4.8. REFERENCES


Tannenbaum, S. 1974, Policy Statement and Guidelines for Comparative Advertising, American Advertising Agencies, April


CHAPTER 5
CONCLUSIONS AND FUTURE RESEARCH

5.1. Conclusions

Consumer reviews as an important source of product information in online markets are becoming popular these days. As published statistics indicate, average buyers usually read at least five reviews before making any purchase decision. On the other hand, due to lack of physical access to the product and variation among buyer preferences, there is always a risk of purchasing a product that does not meet the requirements, if online reviews are being used as a source of product information. When a wrong purchase decision is made, not only does a buyer face an uncomfortable situation but also the seller will be in jeopardy of losing future customers as well as paying excessive warranty costs. Therefore, increasing the accuracy of online reviews as a marketing tool that can minimize the risk of a wrong purchase is becoming important.

In Chapter 2 of this dissertation, the focus was on different types of conflicting information among reviews as factors affecting review informativeness and accuracy of a purchase decision. It was found that conflicting information about product attributes will increase the review informativeness. However, conflicting ratings and general disagreements among reviews reduce the perceived informativeness. Also, when both conflicting star ratings and overall disagreement among reviews are present in a group of reviews at the same time, the overall negative effect is even worse than the presence of each type of conflict individually. All of these findings are consistent with cognitive load theory.

In Chapter 3 the focus was on determination of the value of reviews that contain repeating purchase cues vs. reviews without such statements. According to casual attribution theory and negativity bias theory, there should be a positive relationship between repeating review valence and review value if repeating purchase cues are present. In Chapter 3 a
laboratory experiment with 109 subjects was conducted, and the results were found to be consistent with the proposed hypotheses. As the first contribution, generally speaking, it was found that negative reviews are more attributed to the product because of negativity bias and repeating purchase cues, which indicate that consumption of a product for a longer period of time would manipulate the negativity bias and result in a higher perceived value of positive reviews. Another finding was that mixed reviews including both positive and negative opinions about a sample product are perceived and treated more like negative reviews than positive reviews. This finding is consistent with negativity dominance theory.

In Chapter 4 a new method was proposed for collecting and presenting online consumer reviews: two-dimensional (comparing) online reviews in a table format. Four hypotheses were proposed to study the effect of review dimension and review presentation format on the perceived value of reviews. By recruiting 252 participants for this study, it was possible to reach the required reliability. Fourteen websites containing different types of reviews were developed, and the collected datasets were analyzed. Through this analysis, it was possible to study the effect of review dimension and review format on the perceived review value, both separately and simultaneously. It was found that two-dimensional reviews, which are presented in a written format, do not create any advantages over existing, traditional one-dimensional written reviews; however, when a two-dimensional review is presented in a table format, a potential buyer considers it more valuable than a two-dimensional written review, one-dimensional written review, or even one-dimensional review in a table format. To rationalize the hypotheses, visualization effects and cognitive load theory were employed. As another contribution, this study illustrated that although review positivity results in higher product attitude, this effect will
be less strong in two-dimensional reviews when one product has a positive valence and the alternative product has a negative valence.

5.2. Future Research

This dissertation addressed three main research questions:

- How do conflicting reviews affect the review informativeness and correct purchase decision made by consumers?
- How do specific cues improve the value of posted reviews?
- How can the review dimension (one-dimension or non-comparing vs. two-dimension or comparing) and the presentation format (written vs. table) improve the review values?

Each chapter of this study focused on one of the above questions from different points of view, but many more questions could be addressed in future studies.

The first study assessed the effect of different types of conflict among reviews on review informativeness and probability of making a purchase decision. This study focused on the direct relationship between dependent and independent variables. According to the literature in this area, there might be other important moderating factors that could be taken into the account, such as product type, product knowledge, and product relevance. According to the literature in this field, other variables such as product type, product knowledge (Xu et al 2009), product relevance (Kim and Benbasat 2006) and etc. could moderate the effect of different types of conflict on informativeness and probability of correct purchase.

In this chapter, pencil which is an inexpensive product was selected to collect the required information. Selecting a more expensive product may elicit different customer behaviors. Further research is necessary to test the model with different types of products at different price ranges to determine the effect of product value as well as product type.
To simulate a real purchasing situation, all subjects were provided with actual money from the research team. Since that money became their own money, there is a concern that subjects did not seriously consider buying the product but simply wanted to take the money; however, the 50% purchase rate increased our confidence that subjects would actually consider purchasing the study product.

Next, each subject was provided with five reviews, which is the minimum number of reviews that customers consider before making a purchase decision (Park et al. 2011). Different results might be seen by increasing the number of reviews exposed to subjects.

It has always been a topic of discussion to evaluate when and what reviews should be released to improve sellers’ sales (Chevalier and Mayzlin 2003, Jiang and Wang 2007, Chen and Xie 2008). In all of these studies, the focus was on improving immediate sales without considering the future costs of a wrong purchase, which can impose an enormous expense to the supply chain. The marketing scholars and practitioners can develop business models to identify the most effective set of reviews to release to provide the most effective product information while helping potential buyers to purchase the right product.

To study the proposed hypotheses in the first chapter, we recruited student subjects from a public university. Although this method is well accepted in academia, it’s strongly recommended to verify this study results and findings by analyzing the reviews posted on online seller websites such as Yelp, Amazon.com or eBay. However, defining a correct purchase measure is not easy to capture in real reviews posted on online seller websites because accurately defining this measure requires knowing a buyer’s opinions about a product before and after purchasing a merchandize.
In chapter 3, the focus was on repeating purchase cues as a factor that moderates the effect of review valence on product attitude and review value.

So far, Chen and Lurie (2013) have identified the temporal contiguity cues as a variable affecting the value of the positive reviews and repeating purchase cues found was providing the same effect. There might be more statement and cues that can improve the value of the positive reviews as far as attitude toward products.

Although this approach was consistent with prior research exploring the effect of temporal contiguity of causal attribution (Chen and Lurie 2013), no study has been conducted using available online reviews of sellers’ websites. The findings in this chapter are based on an laboratory experiment conditions. Therefore, it may be beneficial to collect data from websites such as Yelp or Amazon.com to validate observations reported in this chapter.

The study method was consistent with prior research demarcating person versus nonperson causes of actions (Frank and Gilovich 1989), and eliminated several alternative mediators were eliminated; additional research could further explore the mechanisms behind these effects. For example, readers may attribute positive reviews to the writers' self-enhancement or social desirability motives, but the presence of repeating purchase cues may change these attributions. Repeating purchase cues may also convey greater excitement on the part of the reviewer, signaling readers to pay more attention to positive information. A more detailed exploration of the mechanism through which these effects occur is likely to enrich understanding of the psychological processes that affect the impact of WOM. More generally, there is an opportunity to examine how cues to repeating purchase affect causal reasoning in social settings.
The parsimony of the proposed model in some relationships suggests that additional variables might help to explain key variables and moderate the strength of relationships within the model. For example, product type (experience vs. search) and product knowledge might also moderate the impact of the review valence on causal attribution (Xu et al. 2009). In addition, an inexpensive product was selected to conduct this study, which imposes a low risk to customers; at the same time, our subjects are familiar with a pencil and can easily capture review value. Customer’s behavior may be different if a more expensive product is selected. Further research is necessary to test the model with different types of products in different price ranges to ascertain the effect of product value as well as product type.

In the last chapter, a new method of recording and presenting online reviews was presented. In this study, a new type of online reviews that is two-dimensional (comparing) and presented in table format was presented. Collected data supported that this type of review provides the most review value.

The limitations of this research and possible future research suggestions are as follows: First, the parsimony of our proposed model suggests that some additional variables might help explain key variables and moderate the strength of relationships within the model. For example, product type, product knowledge (Xu et al. 2009), and personal relevance (Kim and Benbasat 2006) might also moderate the impact both review dimension and review format. Second, the effect of the perceived review value on the accuracy of a made purchase decision when value is affected by review dimension and review format (Vali et al 2015) have not been studied. Such a study could be a step further toward the recognition of the value of review dimension and review format in online marketing. So, future researchers are encouraged to study the effect of value on the accuracy of purchase decision. Also that would be a beneficial to study the correlation of
review value and review informativeness when two-dimension reviews in a table format are presented vs. other formats.

Another important limitation in this student was the lack of proposed review format in existing sellers’ website. Although the new format is the main contribution of this study and this gap was appreciated by this dissertation author, this shortage kept the author away from validating the study by looking at existing real online reviews and study reviews and websites had to be created by this dissertation author.

It is also recommended to use the findings of this study to model the effect of review dimension and format on the overall supply chain measures as far as the size of the effects. This study illustrates the effects however, developing models to optimize the supply chain measures such as sellers’ profit (Chevalier and Mayzlin 2003), warranty costs (Christozov et al. 2008), consumers’ purchase intention (Park et al. 2011), and buyers’ purchasing decision (Smith et al. 2005, Forman et al. 2008) can be the next big step.
5.3. REFERENCES


Tannenbaum, S. 1974, Policy Statement and Guidelines for Comparative Advertising, American Advertising Agencies, April


