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EMOTION AS A SIGNAL OF PRODUCT QUALITY: EXPLORING ITS EFFECTS ON PURCHASE DECISIONS IN ONLINE CUSTOMER REVIEWS

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Abstract

Two critical problems of online customer reviews is the caused information asymmetry and information overload. To reveal consumers' information processing under this circumstance, this paper proposes a model to investigate pleasure versus displeasure embedded in reviews as a potential signal of product quality and the moderating effects of perceived empathy and perceived cognitive effort based on the signaling theory. A laboratory experiment with 120 subjects was used to empirically test the research hypotheses. The results show that pleasure and displeasure embedded in reviews influence perceived product quality, which subsequently affects purchase decisions. Additionally, pleasant online reviews were found to have a greater influence on perceived product quality compared to unpleasant online reviews when the perceived empathy and perceived cognitive effort are higher. The findings demonstrate positive effects of pleasant online customer reviews, and provide important practical implications for both sellers and consumers.

Keywords

Signaling theory, pleasure, displeasure, perceived product quality, perceived empathy, perceived cognitive effort.

1. Introduction

Online customer reviews, which are generated by other purchaser (Mudambi and Schuff, 2010), are used by sellers to convey more product information to consumers as the e-commerce intensifies information asymmetry. Nowadays, online customer reviews have already become a common feature in e-commerce platform, and have been recognized to have tremendous influences on consumers' purchase decisions both practically (BrightLocal, 2017) and academically (Hennig - Thurau et al., 2004). Treat online customer reviews as a way to reduce

information asymmetry, prior studies regarded online customer reviews as a signal to reflect product quality (Aggarwal et al., 2012). However, with the increasing of online customer reviews, the problem of information overload become more and more serious. Prior research demonstrated that information overload in online customer reviews may lead to consumers' decision bias (Liu and Karahanna, 2017). Therefore, the efficiency of the signal of online customer reviews faces with challenge, and needs to go a step further.

According to signaling theory, some signals are more readily detected by the receiver than other signals are (Connelly et al., 2011). Focusing on the content of online reviews, there are two types of content in a review, namely emotional content, which expressed reviewers' emotional responses to products, and non-emotional content, which mainly describes product advantages and disadvantages (Peng et al., 2014). Past research demonstrated that readers can easily perceive and distinguish between emotional words (Barrett et al., 2007), and these words are processed faster and more efficiently than non-emotional words, even automatically (Gendron et al., 2012; Kousta et al., 2009). Accordingly, compared to non-emotional content, emotional content which is more easily recognized by consumers can be regarded as a stronger signal than non-emotional content to reflect product quality.

Previous research related to emotional content in online customer reviews can be divided into three streams. The first stream is to classified reviews as positive or negative based on review ratings (You et al., 2015). The second stream is to design positive or negative reviews by researchers in their experimental design (Purnawirawan et al., 2014)). Both of these studies have mixed the effects of emotional content and non-emotional content, and are more focused on non-emotional content. For instance, scholars argue that the existence of a negativity bias in online reviews is due to negative reviews providing much rarer product-related information than positive reviews (Wu, 2013). In the third stream, text-mining techniques is applied to content analysis of product reviews based on the use of emotional content (Hu et al., 2014). However, studies has suggested that sentiment classification of consumer reviews is still unclear due to the inclusion of non-emotional content as well (Archak et al., 2011). Therefore, in order to further focus our study on the research of emotional content in online reviews, we adopt the concept of pleasure (i.e., the degree to which a person feel happy, relaxed, satisfied, pleased, contented, or hopeful in a situation) from Mehrabian and Russell's PAD model (Mehrabian and Russell, 1974). Therefore, *the first research question is, what are the effects of pleasure and displeasure embedded in reviews on perceived product quality and subsequent effects on purchase decisions?*

According to the signaling theory, signal observability and signal cost are two conditions of a signal that reflect the degree to which the signal are well-received (Connelly et al., 2011). Regarding emotional content in online reviews as a signal of product quality, we adopt perceived empathy, i.e., a person's capacity to feel within or in another persons' emotions (Escalas and Stern, 2003), to represent signal observability, and perceived cognitive effort, i.e., the extent of cognitive resources reviewers put in writing online reviews (Yin et al., 2014), to represent signal cost in this study respectively. Therefore, *the second research question is, what are the moderating effects of perceived empathy and perceived cognitive effort?*

Using a laboratory experiment to address the above research questions, this study offers important theoretical contributions. First, this research demonstrates that reviewers' emotional content in online reviews can function as a signal of product quality, and can subsequently influence consumers' purchase decisions. Second, this research demonstrates the moderating effects of perceived empathy and perceived cognitive effort from the perspective of signaling theory. Finally, this research extends the application of signaling theory to the emotional content research. In practice, on the one hand, managerial suggestions are provided to online merchants on the importance of emotions embedded in online reviews. On the other hand, online consumers are offered with insights on how to make a rational judgment when reading online customer reviews.

2. Literature review

2.1. Signaling theory

Prior studies have revealed that consumers are motivated to help other consumers when posting online reviews (Hennig - Thurau et al., 2004). However, technology-mediated communication mechanism inevitably leads to information asymmetry. The signaling theory is widely used to reduce information asymmetry caused by adverse selection. In the signaling theory, there are two necessary and sufficient components of efficacious signals (Connelly et al., 2011). One is signal observability, which refers to the degree to which recipients of a signal are able to notice the signal, the other is signal cost, which indicates the cost of senders to transmit the signal (Connelly et al., 2011).

2.2. Role of emotions in marketing

Emotions are ubiquitous throughout marketing (Bagozzi et al., 1999). In the wake of e-commerce, consumers are accustomed to sharing their experiences via online customer reviews (Ahmad and Laroche, 2015). Previous literature revealed that consumption emotions tend to influence consumers' eWOM behavior (Ladhari, 2007). There are also evidences that review sentiments impact product sales (Hu et al., 2014). Accordingly, emotional content in reviews is treated as an extrinsic signal which transmits inherent product quality information from reviewers to potential consumers. In this study, we adopt the dimension of pleasure-displeasure from Mehrabian and Russell's PAD model to define emotional content in reviews.

2.3. Perceived empathy

Perceived empathy refers to a person's capacity to feel within or in another person's emotions (Escalas and Stern, 2003). On the one hand, prior literature has revealed that consumers obtained homogenous emotions from spokespersons (Hasford et al., 2015), service providers (Barger and Grandey, 2006), and other consumers (Howard and Gengler, 2001) during their purchase process in offline consumption situations. On the other hand, with the widespread use of the Internet to communicate and transmit information between people, past studies have also found that emotional states can be transferred between people via computer-mediated communication systems (Kramer et al., 2014). In this study, we adopted the term of perceived

empathy to represent signal observability to reflect the extent to which emotional content is transmitted between reviewers and potential consumers.

2.4. Perceived cognitive effort

Perceived cognitive effort refers to the total usage of cognitive resources needed to accomplish a task (Payne et al., 1990). It has been considered as an important theoretical construct in the study of psychology, decision theory, and economics (Garbarino and Edell, 1997). Information processing theories generally agree that people have limited cognitive resources and allocate them judiciously (Chaiken and Ledgerwood, 2011). Therefore, perceived cognitive effort, which refers to the extent of cognitive resources reviewers spent in writing online reviews (Yin et al., 2014), are adopted to represent signal cost.

3. Research model and hypotheses development

3.1. Emotional content as a signal of product quality

Previous studies have shown that extrinsic cues such as store environment and website quality can be seen as a signal of product quality (Baker et al., 1994; Wells et al., 2011). Accordingly, emotional content in online reviews can serve as a signal of product quality if it is extrinsic to the product quality and consumers have a high ability to assess it. On the one hand, product quality cannot decide the emotional content due to consumers' emotional responses are different, even toward the same product. On the other hand, as we have discussed above, emotions have been widely used by consumers to assist purchase decisions. Therefore, emotional content in reviews can serve as a signal of product quality. Moreover, emotional content as a heuristic cues are more accessible for consumers (Gendron et al., 2012), and pleasure has shown to have positive effects on purchase behaviors in marketing research (Hasford et al., 2015; Mummalaneni, 2005). Thus, we posit that

H1: Compared to an unpleasant online customer review, a pleasant online customer review leads to a higher level of perceived product quality.

3.2. Moderating effects of perceived empathy and perceived cognitive effort

Perceived empathy expresses the extent of emotional contagion between reviewers and potential consumers. Previous research showed that people who are experience empathy share the emotions of others (Escalas and Stern, 2003). Therefore, potential consumers' emotions are consistent with reviewers'. Moreover, there is evidence that people tend to trust recommendations from individuals who are consistent with themselves (Pitta, 2011). Therefore, when the perceived empathy is higher, the effect of emotional content in online reviews on perceived product quality is greater. Thus, we posit that

H2: When the perceived empathy is higher, the pleasant online customer reviews will have a greater effect on perceived product quality compared to the unpleasant online customer reviews.

Perceived cognitive effort indicates the amount of effort that reviewers devoted to the online

customer reviews. There is evidence that higher cognitive effort has been related to greater comprehension processes (Vachon et al., 2011). Moreover, previous research not only revealed that people can get better accuracy by applying more effort to the task (Song et al., 2005), but also demonstrated that perceived cognitive effort has a positive influence on perceived usefulness (Vachon et al., 2011). Therefore, when the perceived cognitive effort is higher, the emotional content in reviews will be considered as more accurate and useful, and the effect of emotional content in online reviews on perceived product quality is greater. Thus, we posit that

H3: When the perceived cognitive effort is higher, the pleasant online customer reviews will have a greater effect on perceived product quality compared to the unpleasant online customer reviews.

3.3. Effect of perceived product quality on purchase

According to the theory of reasoned action, individuals behave based on their pre-existing attitudes (e.g., perceived product quality) and behavior intention (Ajzen and Fishbein, 1980). In prior literature, perceived product quality has been found to have a positive influence on purchase intention (Wells et al., 2011), meanwhile, purchase intention has been found to have a positive impact on purchase (Cheung and Thadani, 2012). Thus, we posit that

H4: Perceived product quality increases the likelihood of purchase.

The theoretical model in this paper is presented in Figure 1.

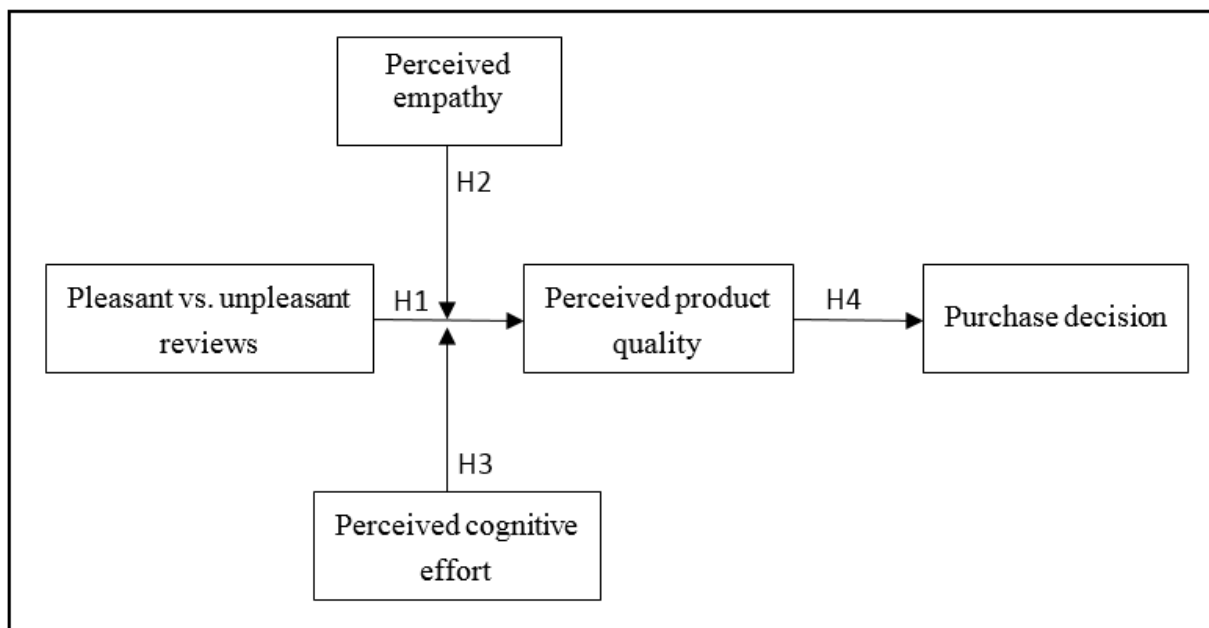


Fig 1: Theoretical Model

4. Research method

4.1. Experimental design

We designed a two factorial experiment to examine the proposed hypotheses. A pleasant review

and an unpleasant review are the two treatment groups. To stimulate an online shopping environment and avoid the influence of irrelevant website information, we presented a mock-up online shopping website which included the product information presentation webpage and online customer review presentation webpage to the subjects. The experimental product is a toy. To establish a common task context and involve the subjects in the experiment, all subjects were given a scenario involving the product. They were told that they would go to a welfare house over the following weekend. Therefore, they needed to choose some toys as gifts for the children there. They were further required to browse the webpage we provided and make a purchase decision based on the information on the webpage.

When designing the experiment, we created an arbitrary brand to rule out brand effect (Li et al., 2013). Meanwhile, the amount of non-emotional content was maintained at a manageable level and the product information presentation webpages were the same for the two groups. Except for the different emotional content in the online customer reviews, the non-emotional content was the same for the two groups. Additionally, the content on the product and online customer review presentation webpages were adopted from *Tmall.com*. Further, we controlled the total number of entire words, relative location of the emotional content, and level of emotional intensity in the online customer reviews to be similar for the two groups. The details of the pleasant and unpleasant online customer reviews are presented in Appendix A and Appendix B, respectively.

4.2. Experimental procedure

When subjects entered the website, they were first given basic information on the experiment. Next, they were presented with the experimental scenario, after which they started the experiment by browsing the mock-up website. When the subjects finished reading all information, they decided whether to buy the product. After making their decisions, they clicked corresponding button (“buy” or “don’t buy”) to jump to corresponding webpages to answer a follow-up questionnaire. Finally, to ensure experimental validity, the subjects were monetarily thanked with incentives of RMB 20 (approximately USD 3).

4.3. Measurements

120 subjects were recruited from a famous Chinese university, and were randomly assigned to two treatment groups with 60 subjects in each. An online questionnaire was used to collect data. The measurements of constructs are shown in Table 1. The subjects indicated their opinions using a seven-point scale, ranging from strongly disagree (1) to strongly agree (7).

5. Data analysis

5.1. Manipulation check

An independent sample t-test was used to examine the manipulation. The test results revealed a significant difference in the independent variable ($t = 29.494$, $p < 0.001$). On a seven-point scale, subjects perceived the pleasant scale as higher in the pleasant online customer review group than the unpleasant online customer review group ($5.92_{\text{pleasant group}} > 3.05_{\text{unpleasant group}}$). The results are shown in Table 2.

5.2. ANOVA analysis

We used ANOVA analysis to test H1. It is widely used in experimental studies due to that it can effectively handle category predictor variables. In addition, because of balances in the two groups, we used the most commonly used Turkey test in ANOVA analysis. The ANOVA results of perceived product quality demonstrated that the main effect of reviewers' emotions (pleasure and displeasure) is significant, showed in Table 3. The result of ANOVA analysis is $F(1, 118) = 66.643$, $p < 0.001$ for perceived product quality. Therefore, H1 is supported.

Perceived reviewers' emotion (Mehrabian and Russell, 1974)	
PRE1	The reviewer feel happy to the product
PRE2	The reviewer feel bored to the product
PRE3	The reviewer feel unsatisfied to the product
PRE4	The reviewer feel pleased to the product
PRE5	The reviewer feel contented to the product
PRE6	The reviewer feel despairing to the product
Perceived product quality (Wells et al., 2011)	
PPQ1	I perceive this product is durable.
PPQ2	I perceive this product is well crafted.
PPQ3	I perceive this product is of high quality.
Perceived empathy (Yin et al., 2014)	
PE1	When reading this review, I feel like I were experiencing the same emotions as the reviewer.
PE2	When reading this review, I feel concerned for the reviewer.
PE3	When reading this review, I feel moved by the review.
Perceived cognitive effort (Yin et al., 2014)	
PCE1	In my opinion, the reviewer had put a lot of effort into writing this review.
PCE2	In my opinion, the reviewer had given a lot of thought to this review when he/she wrote it.
PCE3	In my opinion, the reviewer had spent a lot of time writing this review.

Table 1: Measurements of Constructs

Manipulation variable	group	Independent sample t-test		Mean
		T Statistics	P Values	
Reviewer's emotion	Pleasant	23.199	0.000	6.09
	Unpleasant			3.13

Table 2: Results of Manipulation Check

	F value	Significance	Hypotheses supported
Perceived product quality	66.643***	0.000	H1 is supported

Table 3: The ANOVA analysis

5.3. Linear Regression

Because the moderators (i.e., perceived empathy and perceived cognitive effort) and dependent variable (i.e., purchase decisions) are both continuous variables, and the independent variable (i.e., pleasant and unpleasant online customer reviews) is category variable, we used linear regression to test H2 and H3. The results are shown in Table 4. Model 1 and Model 2 test the moderating effect of perceived empathy, Model 3 and Model 4 test the moderating effect of perceived cognitive effort, and the Model 5 and Model 6 test the combined moderating effects of perceived empathy and perceived cognitive effort. Therefore, H2 ($\beta = 0.390$, $p < 0.001$) and H3 ($\beta = 0.360$, $p < 0.001$) are supported.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
PRE	1.273***	-0.549	1.260***	-0.590	1.268***	-1.638
PE	-0.002	-0.159	/	/	0.066	-0.097
PCE	/	/	0.062	-0.140	-0.018	-0.138
PRE * PE	/	0.390***	/	/	/	0.277**
PRE * PCE	/	/	/	0.360***	/	0.317**
Model F	33.039	26.356	33.660	25.927	22.284	11.542
R ²	0.601***	0.637***	0.604***	0.634***	0.605***	0.655***
ΔR^2	/	0.044***	/	0.036***	/	0.063***

(PRE: perceived reviewers' emotions; PE: perceived empathy; PCE: perceived cognitive effort)

Table 4: Moderating Effects of Perceived Empathy and Perceived Cognitive Effort

5.4. Binary Logistic Regression

A binary logistic regression was conducted to test the effects of perceived product quality on purchase decisions, since dependent variable (i.e., purchase decisions) is a category variable. The results demonstrated that perceived product quality ($\beta = 1.153$, Wald = 20.914) has significant impact on purchase decisions, showed in Table 5, suggesting that H4 is supported.

	β	Wald	P Values	Hypotheses supported	R Square Adjusted
PPQ-> PD	1.153	20.914	0.000	H4 is supported	0.296

(PPQ: perceived product quality; PD: purchase decision)

Table 5: Binary Logistic Regression analysis

6. Discussion and conclusion

In this study, we attempt to understand the effects of emotional content in online reviews from the perspective of the signaling theory. Treating emotional content as a signal of product quality, our study finds significant positive impacts of emotional content on perceived product quality, and subsequent effect on purchase decisions. Moreover, we adopt perceived empathy and perceived cognitive effort as the conditional mechanisms of signal observability and signal cost from the signaling theory, and their significant positive moderating effects on perceived product quality have been verified empirically.

There are theoretical contributions of this study. First, we are one of the first few to explore the

essential effects of emotional content and classify the emotional content into pleasure versus displeasure. Second, although perceived empathy and perceived cognitive effort are widely used in IS and marketing literature, based on the signal transmission process, we demonstrate their positive moderating effects and justify the conditional mechanisms of a signal. Third, we not only extend the application of the signaling theory in the area of online customer reviews, but also combine the research of signaling theory and emotions in marketing. Practically, we reveal the important role of emotional content in online reviews for online merchants, and provide customers with shopping insights on avoiding emotional trap.

There are some limitations of this study that may provide opportunities for future research. First, when investigating emotional content in online customer reviews, this study simply categorized emotions into pleasure and displeasure. Future studies can use other variables to investigate the effects of emotional content. Second, we only discussed the emotional content as an extrinsic cue of product quality, future study can consider the combined effects of emotional and non-emotional content.

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Appendix A. Pleasant online customer review

I'm very satisfied with this product and have had a pleasant usage experience.

When I opened the package, the snowflake and smart sticks were stored in a plastic storage box. It's convenient for children to manage and store the toys. It deserves a thumbs up! In addition, it has a handle and two bayonets. The construction of the plastic storage box is safe. Therefore, you can allow your children to manage their toys by themselves. Children are very happy to do this kind of work. It is very nice!

There are 352 pieces of snowflake bricks, being separately arranged by 12 different colors. 80 smart sticks are also enough. Looking at a box full of multicolored snowflake bricks makes us feel happy, and it's definitely to the child's taste. Although there are several damaged pieces of snowflakes, it does not affect the fun of playing.

I have chosen it carefully and I'm very satisfied with my decision. The material of this snowflake is good. In addition, the smell is healthy, the thickness is even, the surface is smooth, and the colors are gorgeous. The center of the snowflake is not a regular circle, but 26 different letters and 10 different Numbers. This kind of design is helpful to teach children letters and numbers when your children enjoy playing with the toy. The smart sticks could also be used with snowflakes, which can help improve your child's intelligence. I'm very happy and satisfied with these beneficial effects.

There is an introduction in the box. It introduces several patterns to build. These patterns range from easy to complex, they can help stimulate children's imagination and creativity. When I played with my child, I felt really happy.

Nothing can be absolutely perfect. I still found two disadvantages to this good toy. First,

it's laborious for me to combine two snowflake pieces due to the material of snowflakes being hard. However, it didn't affect my child's enthusiasm. He loved it. Second, the smart sticks weren't produced seriously. The outstanding burr may hurt a child's hands. I hope the smart sticks which are gifted by retailers could be as good as snowflakes. It will be more perfect!

In sum, this snowflake is good, and I recommend it to you based on my child's reference for it.

Appendix B. Unpleasant online customer review

I'm very unsatisfied with this product and have had an unpleasant usage experience.

This product is just specious. When I opened the package, snowflake bricks and smart sticks were stored in a plastic storage box. It's convenient for children to manage and store the toys. In addition, it has a handle and two bayonets. The construction of this plastic storage box is safe. Therefore, you can allow your children to manage their toys by themselves. However, I felt disappointed after the following usage!

There are 352 pieces of snowflake bricks, being separately arranged by 12 different colors. 80 smart sticks are also enough. I felt unhappy due to that the snowflakes have been found to have several damaged pieces. I think the manufacturer should check for this and promise the yield rate to avoid consumers' unhappy experience.

I haven't chosen it carefully and I'm very unsatisfied with my decision. The material of this snowflake is good. In addition, the smell is healthy, the thickness is even, the surface is smooth, and the colors are gorgeous. The center of the snowflake is not a regular circle, but 26 different letters and 10 different Numbers. This kind of design is helpful to teach children letters and numbers. The smart sticks could also be used with snowflakes, which can help improve your child's intelligence. However, I don't want to let my child play with them again due to my dissatisfaction with this toy.

There is an introduction in the box. It introduces several patterns to build. These patterns range from easy to complex, and can help stimulate children's imagination and creativity. I admit this type of toys are available but not this one.

However, the usage of this toy disappointed me. There are two problems. First, it's laborious for me to combine two snowflake pieces due to the material of snowflakes being hard. Therefore, it's very uncomfortable to use them and I worry about my child's hands. Second, the smart sticks weren't produced seriously. The outstanding burr may hurt a child's hands. It is very dangerous for children to use this kind of product. I'm upset with it.

In sum, this snowflake is bad, and I don't recommend it to you because I have abandoned it.