



Emotions Embedded in Online Reviews and Social Influence: an Abstract

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Abstract:

Consumers are increasingly relying on the aggregate opinion of others to make purchasing decisions by reading online reviews. Existing research has shown that previously posted ratings cause significant social influence bias in individual rating behavior, but there has been little research into how social influence impact on subsequent ratings varies with emotions embedded in reviews, product, and reviewer characteristics. The authors used a huge dataset—over 150 thousand online reviews from TripAdvisor to extract emotions embedded in reviews using the newest text mining technique, including multiple machine learning algorithms, to examine the moderators of social influence impact on subsequent ratings. The results show that social influence have a stronger influence on subsequent ratings when the customer has a negative experience and the emotion expressed in reviews is anger, whereas the influence is weaker when the customer has an extreme positive experience and the emotion expressed in a review is joy.

Keywords: social influence, emotions, text sentiment

Track: Tourism Marketing

1. Introduction

Despite the fact that online consumer reviews and ratings are supposed to be an unbiased source of information for consumers, a growing body of research suggests that ratings are not free of biases, particularly when consumers are exposed to other people's reviews (Ho, Tan, & Wu, 2017; Lee, Hosanagar, & Tan, 2015; Li & Hitt, 2008; Moe & Schweidel, 2012). Previous research has shown that reviewers are influenced by previous customer reviews, and that they even change their own rating judgments in response (Moe & Schweidel, 2012). Reviewers may use a previous average rating as an anchor and then change their own rating for a variety of reasons, including self-presentation concerns, social conformity, or a desire to reduce cognitive work. In an online environment, consumers rely on other people's ratings to help them decide which products or services to buy; however, it's important to know what factors strengthen or weaken social influence effects, and whether the impact of social influence on rating decisions varies depending on reviewers' emotions. While there is growing interest in the effects of emotions on consumer judgment and decisions, there is surprisingly little research on social influence and individual rating behaviour in the hospitality literature (Tanford & Montgomery 2015). According to previous explanations for the valence asymmetry, negative information causes interference within the cognitive system, using cognitive capacity and time. Taylor (1991) proposed the Mobilization-minimization hypothesis, which states that when stimuli are viewed as emotionally negative, there are substantial physiological and cognitive responses in the first (mobilization) phase of stimulus processing. The pattern is reversed in the second (minimization) phase, with long-term minimization replacing short-term mobilization to reduce the consequences of negative stimuli or events.

We fill this gap in our research by digging deeper into the phenomenon of social influence following post-product/service usage opinion reporting, taking emotions stated in a review text into account as moderating factors of this social influence bias. As a result, understanding the relationship between emotions embedded in review texts and rating biases is an under-researched research topic to investigate. In our study, social influence happens when new reviewers are influenced by previously disclosed ratings, and consumers change their subsequent rating after reading other people's opinions. Therefore, we anticipate that social influence will reduce the impact of emotional responses in a review text on subsequent rating in different ways. Yin, Bond, and Zhang (2014) found that review content suggesting anxiety was more strongly associated with helpfulness ratings than review content indicating anger. When reviewers are angry, they may raise their ratings above the previously disclosed

average, but when they are sad or fearful, they may lower them. As a result, emotions in a review text may explain social influence bias in addition to providing information about a product's customer experience. We employ a unique set of data to explore rating biases: over 150 thousand consumers' online ratings and reviews of 213 hotels in New York City, which were posted between 2004 and 2011 on TripAdvisor. We applied sentiment analysis to extract emotions and other features from review text using lexicon-based sentiment tools. To the best of the author's knowledge, this was the first study to look at the effect of earlier ratings on subsequent rating behaviour using moderators, specifically emotions embedded in reviews. Furthermore, this research contributes to a better understanding of how emotions in a review text may drive reviewers to have high or low social influence biases when they post a review. Hotel managers can get a better picture about inconsistency between review content and individual rating with this study. Reputation platform owners can understand better how exposing reviewers to prior average ratings on their platforms influence subsequent ratings and which factors strengthen or weaken social influence bias.

2. Conceptual background

2.1. Emotions embedded in review text

Emotions are commonly used to describe a customer's purchasing experience, and consumption emotion refers to the emotional responses generated during product usage or consumption experiences (Westbrook & Oliver, 1991). The impact of social influence can be positive or negative depending on the motivation. According to the social influence theory, people in a social group are sensitive to conformity pressures (Deutsch & Gerard, 1955; Sherif, 1936), uniqueness needs (Fromkin, 1970), and normative conflict (Packer, 2008). When they perceive a significant deviation from the social norm and believe the group's opinion is harmful, people may demonstrate a greater tendency toward normative conflict (Hornsey, Oppes, & Svensson, 2002). As a result, conformity and normative conflict may have a positive social influence effect (i.e., people tend to rate higher when they see high prior ratings and lower when they see low prior ratings), whereas the need to be unique may have a negative social influence effect (i.e., they give ratings in the opposite direction of the average rating of others). Emotions have been shown to influence judgment and decisions, such as customer satisfaction (Westbrook & Olivier, 1991), perceived usefulness of a review (Martin, Sintsova, Pu 2014; Yin, Bond, and Zhang (2014); Ullah, Zeb, & Kim, 2015), virality (Berger & Milkman, 2012), and individual choice to buy (Achar et al., 2016), but their role in social influence effect and individual rating behavior has yet to be investigated. Emotions expressed in a review text following a product experience may have a different social influence effect.

Emotions influence both the content of thought (Lerner & Keltner, 2000, 2001) and depth of thought (Lerner & Tiedens 2006). Therefore, we argued that when customers write a review, they are exposed to social cues such as prior average rating, dispersion in ratings (i.e., variance in ratings), and the number of prior reviews (i.e., volume or popularity), and that as a result, information processing of others' influence changes differently depending on the emotions expressed in the review text.

Several emotion theories have been proposed in the literature to investigate the effects of emotions on various consumer behaviors. In literature, the two most commonly used variables to classify emotions were valence and arousal (Mehrabian and Russell, 1974; Olney et al., 1991). Arousal indicates the intensity of emotions, whereas valence represents the degree of positive and negative emotions. Following previous literature, we decided to analyze two opposite emotions based on valence-arousal dimensions: anger and joy. Plutchik (1980) defines anger as a high-arousal, high-certainty emotion that indicates an imminent attack, and angry people are more aggressive (Bodenhausen, Sheppard, & Kramer, 1994). Joy is a positive high-arousal emotion that reveals how people are satisfied and pleased with the product/service. Unfavourable consumption experiences result in anger-embedded reviews and low subsequent ratings, favourable consumption experiences lead to joy-embedded reviews and high subsequent ratings. Taylor (1991) proposed the Mobilization-Minimization hypothesis, which was based on extensive study. The concept of the Mobilization-Minimization hypothesis proposed that after being exposed to a stimulus, people tend to respond differently to different kinds of stimuli. For instance, if a person is asked to respond to a word, their physiological response to the stimuli would be different if the stimuli are perceived as emotionally negative. The hypothesis also states that the concept of Mobilization- Minimization is not a single process, but a series of interrelated processes (Unkelbach et al., 2008). Negative events or information, which refers to harmful or threatening stimuli, trigger strong physiological, emotional, and cognitive responses (Unkelbach et al., 2008). Negative service experience at first might evoke strong, and rapid physiological, cognitive, emotional, and social responses; however, after mobilization of feelings through review writing might follow by physiological, cognitive, and behavioural responses that minimize, and even wipe away the negative product experience especially when they see high prior ratings relying on the Mobilization-Minimization theory. Therefore, the authors argued that negative stimuli produced a higher cognitive load, which could make them more complex representations than the positive ones. Anger makes people more aggressive and hostile toward the target (Frijda et al., 1989; Hutcherson & Gross, 2011).

Since averaged prior rate judgments are heuristic for high arousal emotions (e.g., anger), the influence of anger on the individual rating could be strong when the average prior ratings increase. We hypothesized that:

H1: The positive influence of prior average review rating on subsequent ratings is moderated by the embedded emotions; the influence is stronger with anger emotion.

When making judgments, people in a positive mood tend to depend on heuristics and broad knowledge structures in the absence of explicit goals that need more comprehensive information processing (Forgas, 1995; Schwarz, 1998). Happy moods, for example, increase reliance on stereotypes (Bless, Schwarz, & Kemmelmeier, 1996; Bodenhausen, Kramer, & Susser, 1994), scripts (Bless, Clore, et al., 1996), persuasion heuristics like source credibility (e.g., Mackie & Worth, 1989), and other fundamental judgment methods such as the availability heuristic (Isen & Means, 1983). Positive affect, according to Estrada et al. (1997), enabled systematic processing of relevant or interesting data, resulting in more comprehensive and efficient problem resolution, reducing the magnitude of anchoring effects, which was consistent with anchoring and adjustment theories. In line with literature, we are expecting that joy emotion will make the relationship between social influence and subsequent rating weaker. Thus,

H2: The positive influence of prior average review rating on subsequent ratings is moderated by the embedded emotions; the influence is weaker for joy

3. Methodology

3.1. Data

Hotel reviews data were collected from Tripadvisor, one of the most prominent online sources of hotel reviews (comScore, Inc, 2016), with over five million registered users who visit the site an average of 30 million times every month and covering over a quarter million hotel ratings from all over the world (O'Connor, 2008). All reviews posted between 2004 and 2011 were scrapped and study sample was constructed by selecting 213 hotels matched between TripAdvisor and Expedia and selected sample cover the period 2004-2011.

Final study sample covers 65215 Tripadvisor hotel reviews from 213 hotels in New York City. We chose hotels in New York City, a leading tourism city that accommodates many domestic and international tourists annually, to ensure a sufficient number of reviews per hotel and to include hotels with various price scales.

3.2. Sentiment Analysis of review text

Sentiment analysis is the technique of employing text analysis to discover and categorize customer attitudes, thoughts, and emotions to determine whether they are positive, negative, or neutral. Each review is analysed in this study to ascertain the sentiment polarity. The percentages of positive (polarity score 0.5), neutral (–0.5 polarity score 0.5), and negative (polarity score –0.5). This is accomplished using VADER (Valence Aware Dictionary and Sentiment Reasoner) (Hutto & Gilbert, 2014), a sentiment analysis lexicon and simple rule-based model.

3.3. Variable Operations

The dependent variable is the reviewer’s online rating of the hotel (Y_{ijt}) on a scale of one to five. The remaining variables are:

- Prior average review rating: Review rating provided in review i for hotel j at time t .
- Each hotel review was time-ordered per hotel. Then we calculated prior average rating per hotel (j) at time t by summing previous reviews’ rating ($Y_{i-1}, Y_{i-2}, \dots Y_{i-(t-1)}$) and dividing the total number of reviews.
- Anger emotion embedded in a review with NRC Emotion Lexicon: The number of emotional words associated with anger.
- Joy emotion embedded in a review with lexicon NRC Emotion Lexicon: The number of words associated with joy.
- Control variables: Review length - Total number of words in each review.
- Control variables: Review text polarity - The degree of sentiment.

3.3. Econometric model

Multilevel ordered regression model was used to estimate s because there are multiple reviews per hotel and dependent variable is an ordinal in nature. Standardized values of continuous variables were used in model estimation to be able to compare magnitude of effects easily. The unit of observation is the review per hotel and time ordered.

$$\begin{aligned}
 Y_{ijt}^* = & \beta_0 + \beta_1 \text{PriorRating}_{ijt} + \beta_2 \text{PriorVar(Rating)}_{ijt} + \beta_3 \text{Anger}_{ijt} + \beta_4 \text{Joy}_{ijt} \\
 & + \beta_5 \text{Price1}_{jt} + \beta_6 \text{Price2}_{jt} + \beta_7 \text{Price3}_{jt} + \beta_8 \text{Price4}_{jt} + \beta_9 \text{Price5}_{jt} \\
 & + \beta_{10} \text{Chain}_{jt} + \beta_{11} \text{Independent}_{jt} + \beta_{12} \text{PriorRating}_{ijt} \\
 & * \text{Anger}_{ijt} + \beta_{13} \text{PriorRating}_{ijt} * \text{Joy}_{ijt} + \beta_{14} \text{PriorRating}_{ijt} * \text{Price1}_{jt} \\
 & + \beta_{15} \text{PriorRating}_{ijt} * \text{Price2}_{jt} + \beta_{16} \text{PriorRating}_{ijt} * \text{Independent}_{jt} \\
 & + \beta_{17} \text{Neighbour}_{jt} + \beta_{18} \text{Anonymous}_{ijt} + \beta_{19} \text{RepeatReviewer}_{ijt} \\
 & + \beta_{20} \text{Polarity}_{ijt} + \varepsilon_{ijt}
 \end{aligned}$$

Table 1 shows the outcomes of the proposed research model. Hotel and reviewer characteristics were also control variables but we did not report in Table 1. Model 1 is the base model, which includes the main effects and control variables. Model 2 examined the interaction effect of anger on subsequent review rating while controlling for all control variables included in the first model. Model 3 investigated the interaction effect of joy on subsequent review rating. Model 4 was the comprehensive model, including models 1, 2, and 3, and tested the moderating effects of emotion embedded in reviews. Model 4 was thus utilized in the following sections to describe the final estimation results. We use Model 4 as our final estimation results.

Table 1: Results of multilevel ordered logit regression.

	(1)	(2)	(3)	(4)
	Rating	Rating	Rating	Rating
ReviewLength	-0.252*** (-28.84)	-0.273*** (-32.18)	-0.274*** (-31.68)	-0.252*** (-28.88)
ReviewPolarity	0.722*** (76.99)	0.756*** (86.29)	0.728*** (77.31)	0.718*** (76.44)
PriorAverageRating (Social influence)	0.542*** (24.53)	0.542*** (24.54)	0.532*** (23.83)	0.534*** (24.20)
Anger	-0.201*** (-22.31)	-0.225*** (-25.89)		-0.199*** (-22.06)
Joy	0.101*** (10.65)		0.159*** (17.29)	0.0979*** (10.30)
Anger#PriorAverageRating		0.0420*** (4.80)		0.0243** (2.61)
Joy#PriorAverageRating			-0.0602*** (-6.96)	-0.0493*** (-5.37)
/				
cut1	-3.557*** (-105.04)	-3.566*** (-104.98)	-3.549*** (-102.60)	-3.575*** (-104.50)
cut2	-2.483*** (-81.51)	-2.485*** (-81.49)	-2.477*** (-79.33)	-2.493*** (-81.12)
cut3	-1.402*** (-48.67)	-1.402*** (-48.62)	-1.401*** (-47.31)	-1.408*** (-48.45)
cut4	0.500*** (17.76)	0.498*** (17.67)	0.490*** (16.92)	0.495*** (17.44)
var(_cons[Hotelid])	0.106*** (6.17)	0.106*** (6.19)	0.113*** (6.24)	0.108*** (6.24)
N	62119	62119	62119	62119

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4. Conclusion

The objective of this study is to better understand under what conditions the impact of social influence through prior average rating on subsequent ratings weakened or strengthened for hotel reviews. Emotions embedded in a review text indicating customer experience were considered as a moderator of social influence. The findings show that when a consumer has a negative experience and the emotion represented in reviews is anger, prior average review ratings have a stronger influence on subsequent ratings, however when the customer has an extreme positive experience such as joy, the influence is weaker. Thus, after a joyful consumer experience when consumers see high prior average ratings, their adjustment to disclosed prior average ratings is smaller which might cause decrease trend over time for a hotel. However, reviews with anger emotions might adjust and increase their subsequent rating due to reduce their negative feelings to and to feel better. While the main objective of reputation platforms is to persuade potential customers to buy a product or service based on previous customer reviews, social influence, specifically through prior aggregated average ratings, is not always beneficial to a company; because customer's experience emotions or product characteristics may cause some customers to alter their rating and not give an honest rating after being exposed to aggregated prior ratings. To ensure accurate product evaluations, the industry would benefit from a better understanding of the factors that can reduce social influence. As a result, this research examined the role of embedded emotions as a proxy for guest experience indicators in consumers' hotel online reviews.

5. Implications

This research contributes to the existing body of literature in different ways. This study is one of the few studies in hospitality and tourism that show how social influence affects rating behaviors for experience-oriented products in hotel context. Consumers' online reviews and ratings are neither autonomous or based simply on their consuming experiences, as marketers and online review websites should be aware; rather, the effect of social influence on subsequent rating change with emotions expressed and hotel characteristics. To the best of the author's knowledge, this is the first study to use a text mining approach to assess the moderating influence of emotions embedded in review texts. Emotions embedded in reviews was used mostly to explain review helpfulness (Yin, Bond, and Zhang, 2014) but not individual subsequent rating. The current study also adds to a study by Ma et al. (2013) that investigated the moderating variable of review length. Our findings have substantial management implications for marketers and designers of online rating systems. Rating sites

should not expose consumers to prior aggregated ratings when consumers write a review to prevent social influence. Alternative summary data from previous reviews should be created instead. Consumers may not use mean average rating as an anchor if they may use graphical ways to show prior opinions (emojis).

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