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Yan Sun

Kyung Hee University, sunyan950414@khu.ac.kr

Sung-Byung Yang

Kyung Hee University, sbyang@khu.ac.kr

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Do Human Faces Matter? Evidence from User-Generated Photos in Online Reviews

Short Paper

Yan Sun

Kyung Hee University
26 Kyungheedaero-ro, Dongdaemun-gu,
Seoul, 02447, Republic of Korea
sunyan950414@khu.ac.kr

Sung-Byung Yang

Kyung Hee University
26 Kyungheedaero-ro, Dongdaemun-gu,
Seoul, 02447, Republic of Korea
sbyang@khu.ac.kr

Abstract

The importance of online reviews in e-commerce cannot be overstated, but few studies have focused on user-generated photos (UGPs) in reviews, especially human faces in UGPs. In this study, using Amazon online review data, we divide online reviews into text with UGPs, UGPs with faces, and UGPs with multiple faces based on the presence and number of faces, and discuss their effects on review helpfulness. Drawing on media richness theory and emotional contagion effects, we argue that faces provide a richness of information that can increase the effectiveness of photos as information mediators. Moreover, we argue that facial expressions and emotional states, as read-in and read-out devices that convey individual emotions, affect other consumers' perceived review helpfulness. This study contributes to the literature on online reviews, media richness theory, and emotional contagion effects, while providing practical insights for e-commerce sites and consumers seeking to write effective online reviews.

Keywords: human face, user-generated photo, online review, review helpfulness, media richness theory, emotional contagion effect, Amazon

Introduction

Online consumer reviews, as an essential form of electronic word-of-mouth (eWOM), influence consumers' information search and purchase decisions (Baek et al. 2012; Lee and Choeh 2016). Consumer evaluation of online reviews, that is, the perceived value of online reviews to their readers, can be shown as review helpfulness (Karimi and Wang 2017). Reviews that are voted more helpful by consumers have a stronger impact on purchase decisions than other reviews (Baek et al. 2012).

An online review usually provides information through star ratings, text, and images. Star ratings are also referred to as review valence and relate to consumers' attention to positive or negative product attributes (Ren and Hong 2019). Due to negativity bias, previous studies have generally reported that negative reviews are more helpful than positive reviews (Li et al. 2021a). Original photos posted by users along with text or individually in online reviews, known as user-generated photos (UGPs), are an important part of user-generated content (Guan et al. 2023). According to media richness theory, images and text engage consumers in different ways (Daft and Lengel 1986). A photo will contain much information such as location, time, human faces, and other objects, where faces are more likely to attract attention than other content and can influence the emotional appeal of the photo to the viewer. Some of the biologically and sociologically critical attributes provided by faces, such as facial expressions, can also provide a wealth of information about intentions, mental states, and emotional states that are critical to social interactions

(Soussignan et al. 2015). In particular, the transmission of emotional signals through the face between individuals, known as emotional contagion, not only has a survival value in a biological sense but is also a major mode of information communication that influences the trajectory of social interactions (Kulczynski et al. 2016). Given the high visual appeal and rich information provided by faces, it can be presumed that faces have an important role in UGPs. However, previous studies have largely ignored the discussion of faces. Prior literature on UGPs in online reviews has focused on the impact of the presence of photos (e.g., Wu et al. 2021), review photo sentiment and text-photo consistency (e.g., Li et al. 2022), and the role of photo type and attributes (e.g., An et al. 2020; Liu et al. 2022; Ren et al. 2021), ignoring the observations of human faces and without consistent findings about the importance of UGPs. For example, while some studies report that the presence of UGPs is important (e.g., Li et al. 2022; Ma et al. 2018; Wu et al. 2021), some studies still argue that UGPs are less critical than professional photos or other sources of information (e.g., Lee 2018; Marder et al. 2021; Yang et al. 2017). Moreover, Chen et al. (2020) discussed the impact of the presence of a person or group of people in a photo, but faces were not the focus of their study. Ren et al. (2021) examined whether there was a significant difference in the popularity of photos with human faces in photos uploaded by hotel managers and photos taken by travelers, only analyzing the presence of faces without discussing the impact of facial expressions and emotions. We argue that the face as a read-in and read-out device for conveying personal feelings, the presence of the face, facial expressions (e.g., smiling), and the emotional state it expresses (e.g., happiness) will have a significant impact on the perceived helpfulness of the review to other consumers. Moreover, when UGPs and the facial cues they contain appear in negative reviews, this effect may be amplified, making the reviews more helpful.

With these research gaps and unaddressed issues in the current literature, drawing on media richness theory and the emotional contagion effect, we propose the following three research questions:

- Does the presence of UGPs, the presence of faces, and the number of faces affect the review helpfulness?
- Does the presence of UGPs, the presence of faces, and the number of faces affect the review helpfulness differently depending on the review valence (positive and negative)?
- Do facial expressions (smiling vs. non-smiling) and facial emotions (positive vs. negative) affect the review helpfulness?

Our study will contribute to the literature. First, we will discuss new cues not previously mentioned in the literature, that is, facial cues, extending the literature on UGPs and online reviews. By drawing on media richness theory and the emotional contagion effect, we will validate the impact of faces, including not only the presence of faces, but also the number of faces, facial expressions, and emotional states expressed. Second, we will extend media richness theory by validating the impact of rich facial cues in photos on the review helpfulness. We will also validate the impact of facial expressions and emotions in non-face-to-face situations, extending the application of the emotional contagion effect to online contexts. Our work will also contribute to practice. Our findings may provide new ideas on how online review sites can guide users in writing reviews, for example, by encouraging users to upload full-body photos or photos of multiple people. Our results may also provide suggestions for consumers interested in writing or viewing reviews, for example, uploading or filtering reviews that include photos to improve the efficiency of writing or reading reviews.

Theory and Hypotheses Development

Literature Review on Review Helpfulness

Review helpfulness is defined as the extent to which potential consumers perceive peer-generated reviews as useful and valuable in their decision-making process regarding a product or service (Baek et al. 2012), measuring consumers' evaluation of reviews. Previous studies have discussed the factors that affect the review helpfulness from three perspectives: review content, reviewer, and product or service. Review content includes factors such as review depth or length (Cheng and Ho 2015; Hlee et al. 2019), review readability (An et al. 2020), review extremity or rating (Mudambi and Schuff, 2010), review sentiment (Li et al. 2021a; Ren and Hong 2019), review conflict (Qiu et al. 2012), presence and number of UGPs (Ma et al. 2018; Yang et al. 2017), and number of days since the review was posted (Li et al. 2021b). Reviewer includes factors such as profile photo (Karimi and Wang, 2017), reputation or status of the reviewer (Lee 2018; Lee and Choeh 2016), disclosure of the reviewer's identity (Baek et al. 2012; Lee and Choeh 2016),

and location of the reviewer (Yang et al. 2017). Products or services include factors such as price (Li et al. 2021b), number of reviews (Wu et al. 2021), average review rating (Lee and Choeh 2016), and industry (An et al. 2020; Ren et al. 2021). There are also studies that categorize product types into experience and search goods (e.g., Baek et al. 2012; Mudambi and Schuff 2010; Ren and Hong 2019), or high versus low price products (e.g., Baek et al. 2012), to discuss the effect of the interaction of product type with other factors.

Literature Review on User-Generated Photos and Human Faces in Online Reviews

UGPs are a type of original static visual content posted by users, which in the context of online reviews refers to photos uploaded by consumers along with the text or individually to reflect a certain point of view of the reviewer (Li et al. 2023). A review with photos contains much more information and looks more visual than a text-only review, making it a crucial online information source (An et al. 2020). However, the impact of UGPs has not been studied in depth due to insufficient image analysis techniques (Li et al. 2023), and the findings are inconsistent. For example, while some studies have reported the importance of UGPs (Bigne et al. 2020; Cheng and Ho 2015), others have found that UGPs have limited appeal when compared to photos with professional aesthetics (Marder et al. 2021) and do not have a significant impact on the helpfulness of reviews (Hlee et al. 2019; Lee 2018; Yang et al. 2017). To gain insight into the role of UGPs, some literature discusses the impact of specific information contained in UGPs on the review helpfulness (see Table 1), such as the objects displayed (Li et al. 2021a), the number of people (Chen et al. 2020), the emotion of the photo (Li et al. 2022), and the topic of the photo (An et al. 2020). There is also some literature that discusses the boundary conditions under which UGPs are helpful, such as text-image congruence or discrepancy (An et al. 2020; Li et al. 2022), as well as the interactions between UGPs and other influences (Chen et al. 2020; Wu et al. 2021).

Reviewing the literature on UGPs, we found that an important piece of information included in UGPs, namely human faces, is overlooked. When faces are included in non-professional photos, they are often the primary intent (Li et al. 2010). The ability to “read” faces is critical for social interaction (Hutton and Nolte 2011). Previous research has shown that faces are more eye-catching than other stimuli, especially key parts of the face such as the eyes and mouth (Hutton and Nolte 2011). This visual attraction from faces is important for UGPs because a picture must first attract the viewer's attention in order to elicit perceptions and diagnoses of reviews (Bigne et al. 2020), such as perceived helpfulness. Unlike other information contained in UGPs, faces can provide a rich set of facial visual cues (Tsao and Livingstone 2008), such as facial expression and emotion (Kulczynski et al. 2016), facial posture (Hinsz and Tomhave 1991), and gaze direction (Adams Jr and Kleck 2003). These visual cues not only describe an individual's face, but also provide a wealth of dynamic information about people's interests, preferences, intentions, and mental states (Soussignan et al. 2015). When this information is present in a photo, it affects the viewer's judgment (Dimberg and Karlsson 1997) and the emotional appeal of the photo (Lau-Gesk and Meyers-Levy 2009). Currently, only a few studies have discussed the impact of faces in UGPs in an online review context. For example, Ren et al. (2021) discuss the popularity of photos with faces, and Guan et al. (2023) examine the moderating role of facial disclosure in the relationship between UGPs and product ratings. There are also studies that discuss faces in profile photos, suggesting that avatars influence consumers' perceptions of reviews and purchase decisions (Chen et al. 2020). However, to the best of our knowledge, no study has systematically discussed the effect of faces in UGPs on review helpfulness. In this study, drawing on media richness theory and the emotional contagion effect, we will explore the effects of the presence of UGPs, the presence of faces, the number of faces, facial expressions, and the interaction between faces and review valence on review helpfulness, adding to the literature on UGPs and online reviews.

Authors (Year)	Field	Method(s)	Dependent Variable(s)	Independent Variable(s)	Moderating Variables
An et al. (2020)	Hospitality	Descriptive analysis & Regression	Review helpfulness	Photo topics (o), Text-image congruence (+)	Review sentiment (o)
Bigne et al. (2020)	Restaurants	fsQCA	Review helpfulness	Presence of UGPs (+)	-
Chen et al. (2020)	Restaurants	Experiment	Review helpfulness	A group of people (+)	Happy-looking avatar (+)

Cheng and Ho (2015)	Restaurants	Content analysis	Review helpfulness	Number of UGPs (+)	-
Hlee et al. (2019)	Restaurants	Regression	Review helpfulness & Funniness	Number of UGPs (-)	Casual restaurant (+)
Lee (2018)	Social shopping	Regression	Review helpfulness & Funniness & Coolness	Presence of UGPs (o)	-
Ma et al. (2018)	Hospitality	Deep learning	Review helpfulness	Text combined with UGPs (+)	-
Wu et al. (2021)	Online shopping	Experiment	Review helpfulness	Text combined with UGPs (+)	Viewing tasks (+), Review extremity (-), Number of reviews (-)
Yang et al. (2017)	Hospitality	Conjoint analyses	Review helpfulness	Presence of UGPs (o)	-
Table 1. Literature Review on User-Generated Photos					

Note: In this table, “+” means positive impact, “-” means negative impact, and “o” means no impact or little significance.

Media Richness Theory

Media richness theory refers to the efficiency of communication between individuals affected by media appropriateness (Daft and Lengel 1986). According to this theory, text and photos represent two different information media with different abilities to present information (Daft and Lengel 1986). Richness refers to the different abilities of different media to facilitate understanding, and the key function of media richness relies on the ability to carry multiple information cues from one medium (Li et al. 2021a). As a visual cue, photos are richer in information, require less cognitive effort to process than text, and are more engaging and salient (Liu et al. 2022). In online reviews, richer information can result in two outcomes. First, richer information can elicit higher perceived helpfulness (Cheng and Ho 2015). Wu et al. (2021) show that pictures are information and that perceived informativeness explains why reviews with photos are more helpful. Second, the literature on media richness reports that richer information inspires higher credibility (Jean Kensicki 2003). This is especially true for photos, whose very presence can increase the credibility of the information (Park et al. 2021). And research on review helpfulness shows that perceived source credibility is one of the three dimensions of product review helpfulness (Lee and Choeh 2016), and that word-of-mouth credibility increases word-of-mouth helpfulness (Cheng and Ho 2015; Chong et al. 2018; Sussman and Siegal 2003). In summary, we propose the following hypothesis:

Hypothesis 1: Online reviews with user-generated photos (vs. without user-generated photos) will have higher review helpfulness.

According to media richness theory, the impact of UGPs depends on how many information cues they carry (Li et al. 2021). Faces in UGPs can provide more additional cues. The face of a given individual carries with it many biologically and sociologically important attributes, such as identity, species, gender, and age (Soussignan et al. 2015). Because of the need for social interaction, the human brain has specific, highly specialized modules for recognizing and processing faces, making it easier for humans to "read" faces than other stimuli (Hutton and Nolte 2011). Even a single glance at a face can perceive dynamic information such as the other person's intention, attention, and mental and emotional state (Soussignan et al. 2015). This means that in an online review context, faces in UGP can be more intuitive in providing cues such as a user's attitude towards a product, even without reading the text. While providing richer information, facial cues can also add credibility. Faces can provide a visually based trust that is more effective than other visual attributes (Ert et al. 2016). In the context of online reviews, faces imply disclosure of the reviewer's identity and will increase the perceived trustworthiness of the review (Guan et al. 2023; Karimi and Wang 2017). A study by Lee and Choeh (2016) found that disclosure of the reviewer's identity contributes to the perceived trustworthiness of the review and positively affects the perceived review helpfulness. In addition to the

presence of faces, the number of faces may also affect the amount of information provided by UGPs. Reviewers may upload individual personal photos of themselves or photos of a group of people, such as a family or friend gathering (Ren et al. 2021). For products or services that can be shared by multiple people, such as restaurants, hotels, or sightseeing places, multiple faces can provide clues to the overall ambiance of the space, or to multiple people's attitudes toward the service. Previous research has reported that consumers may perceive higher helpfulness to images showing a group of people in a restaurant when they are exposed to a happy-looking avatar (Chen et al. 2020). Additionally, multiple faces can also provide some social contextual cues, such as inferring the relationship and status of the people in the photo, which further influences the viewer's emotional appeal to the photo (Gallagher and Chen 2009). In summary, we propose the following hypotheses:

Hypothesis 2a: User-generated photos with faces (vs. without faces) in online reviews will have higher review helpfulness.

Hypothesis 2b: User-generated photos with multiple faces (vs. with a single face) in online reviews will have higher review helpfulness.

Review Valence

Review valence, also known as the star rating (Baek et al. 2012) or the review extremity (Mudambi and Schuff 2010; Ren and Hong 2019), reflects in an intuitive way the positive, negative, or neutral valence of reviews (Karimi and Wang 2017). Previous research has discussed the difference in the degree of helpfulness between negative and positive reviews, with the more widespread perception comes from negativity bias. Negativity bias refers to the tendency to over-value negative messages, leading to a greater impact of negative messages, which manifests itself in online reviews, as negative reviews are usually more helpful than positive ones (An et al. 2020; Li et al. 2022; Qiu et al. 2012).

Negativity bias causes consumers to have different perceptions and attitudes toward positive and negative reviews. Negative information is perceived as more important. For example, a study by An et al. (2020) found that hotel guests were more concerned about bad experiences than good ones, and they took criticism more seriously than praise. In contrast to negative information, positive reviews received less attention due to the fear that positive reviews were nothing more than pressurized by social norms (Mizerski 1982; Qiu et al. 2012), and readers tended to quickly skim through these reviews without fully understanding the information contained in them (Karimi and Wang 2017). This means that although the presence of UGPs, the presence of faces, and multiple faces would provide richer cues, in positive reviews, the viewer may glance over them and not draw attention to them. In contrast, in negative reviews, viewers may carefully analyze the information provided in the review, such as the facial cues in the UGP, leading to an amplification of the importance of the UGP and the information it contains, resulting in an increase in the helpfulness of the review. In summary, we propose the following hypothesis:

Hypothesis 3: In negative reviews (vs. positive reviews), (1) online reviews with user-generated photos (vs. without user-generated photos), (2) user-generated photos with faces (vs. without faces), and (3) user-generated photos with multiple faces (vs. with a single face) will have higher review helpfulness.

Facial Expressions and Emotional Contagion Effects

Human faces typically express emotional states and influence the trajectory of social interactions (Dimberg and Karlsson 1997; Kulczynski et al. 2016). As a powerful read-in and read-out device, facial expressions can also unconsciously alter the viewer's response (Kulczynski et al. 2016). The transmission of emotions between individuals is known as emotional contagion. It is defined as a tendency to automatically imitate and synchronize another person's actions, expressions, postures, and vocalizations and, therefore, converge emotionally (Hatfield et al. 1993). The processes and consequences of the contagion of positive and negative emotions may differ. For example, some studies on approach-avoidance behavior have shown that positive emotions are associated with approach behavior, while negative emotions lead to avoidance behavior (Marsh et al. 2005). Among expressions of positive emotions, smiling is a powerfully attractive facial expression that elicits a strong emotional response (Jones et al. 2006). People prefer smiling to unsmiling expressions because looking at a happy face makes people happy (Lau 1982). People prefer target objects with a happy expression to those with a disgusted expression (Bayliss et al. 2007). An experiment by Hinz and Tomhave (1991) showed that smiling caused smiling, but frowning did not cause frowning. Howard

and Gengler (2001) showed that emotional contagion affects product attitudes. Recipients capture happy emotions through the sender's smile, which leads to positive attitudes toward the product. Another study showed that consumers felt more pleasure when spokespeople appeared in advertisements with smiling facial expressions, and this positive emotional contagion also influenced attitudes towards the brand and purchase intentions (Kulczynski et al. 2016). Although this may be a misattribution arising from the halo effect (Otta et al. 1996), much research has shown that smiling or positive emotions lead to higher evaluations (Bayliss et al. 2007; Soussignan et al. 2015). In summary, we propose the hypothesis that:

Hypothesis 4a: User-generated photos with smiling (vs. non-smiling) facial expressions will have higher review helpfulness.

Hypothesis 4b: User-generated photos with positive (vs. negative) facial emotions will have higher review helpfulness.

Research Methods

Variables and Sample

Table 2 shows the definitions and types of all variables used in this study. Our sample was taken from online reviews of Amazon in the United States region. We chose the “dresses” subcategory of the women's clothing department and collected product information (product name, overall rating, number of reviews, price) and all online review information (review title, review content, verified purchase, review valence, number of helpful votes, number of photos, photo URL, author, author avatar URL, country of posting, date of posting) for a total of 192 products on the first four pages on May 14, 2023, based on Amazon's default sorting. The sample includes reviews posted from November 28, 2016, to May 14, 2023. Due to the wide time range of the dataset, we will include the control variable "No. days", defined as the number of days since the reviews were posted (see Table 2), in our analysis to control for the effect of posting time on the helpfulness of reviews. We chose the clothing department because of the experiential nature of the clothing. According to previous research, consumers rely more on online reviews for their purchase decisions for experience goods than for search goods (Qiu et al. 2012). And the women's clothing department was chosen because previous research has shown that women tend to make richer facial expressions, such as smiling (Hinsz and Tomhave 1991; Kulczynski et al. 2016), than men (Dimberg and Karlsson 1997), and that women's expressions are more easily recognized (Marsh et al. 2005).

Variables		Measurements	Type
<i>Panel A: Dependent variable</i>			
Review helpfulness		The number of “helpful” votes per review given by Amazon.	Continuous
<i>Panel B: Independent variables</i>			
Text with UGPs		Equal 1 for Text with UGPs (equal 0 for text only).	Indicator
UGPs with faces		Equal 1 for UGPs with faces (equal 0 for UGPs without faces).	Indicator
UGPs with multiple faces		Equal 1 for UGPs with multiple faces (equal 0 for a single face).	Indicator
Facial expressions		Equal 1 for UGPs with smiling faces (equal 0 for UGPs with non-smiling faces) based on the Microsoft Azure Face API.	Indicator
Facial emotions		Equal 1 for UGPs with positive (happiness and surprise) facial emotions (equal 0 for negative facial emotions, i.e. sadness, anger, contempt, disgust and fear) based on the Microsoft Azure Face API.	Indicator
<i>Panel C: Moderating variable</i>			
Review valence		Equal 1 for positive (4-star to 5-star) reviews (equal 0 for negative, i.e., 1-star to 3-star reviews).	Indicator
<i>Panel D: Control variables</i>			
Review-related attributes	Avatar	Equal 1 for user-defined avatar (equal 0 for system default avatar).	Indicator
	No. days	The number of days the review was posted as of the data collection date.	Discrete

	Review length	The number of words (calculated by “stringr” package in R).	Discrete
	Review readability	Flesch's Reading Ease Score (calculated by “quanteda.textstats” package in R).	Continuous
	Review rating	Star ratings given in each review range from one to five stars.	Discrete
	Text sentiment	Equal 1 for reviews with positive text (equal 0 for reviews with neutral text and equal -1 for reviews with negative text) based on Valence Aware Dictionary and sEntiment Reasoner (VADER, calculated by “vader” package in R).	Indicator
	No. photos	The number of photos in the review.	Discrete
Product-related attributes	Product rating	Overall rating of the product.	Continuous
	No. reviews	The number of reviews of the product.	Discrete
	Product price	The price of the product.	Continuous

Table 2. Definition of variables

Descriptive Statistics of Dataset

Table 3 gives the descriptive statistics for our dataset. The final sample consisted of 126,099 reviews for 192 products. The average overall rating for each product was 4.1, with a price of \$38, and it received 2101 reviews. 16% of the reviews in the sample contained UGPs, and 15% of reviewers set user-defined avatars. Based on the review valence, 75% of the reviews were positive, and 25% were negative. Based on the sentiment analysis of the review text provided by VADER, 83% of the reviews were positive, and 9% were negative (the remaining 8 % were neutral). On average, each review was given a 4-star rating, accompanied by 32 words and 0.24 photos, and received 1.9 helpfulness votes.

Panel A: Descriptive statistics for continuous variables									
	Review helpfulness	Review rating	No. photos	No. days	Review length	Review readability	Product rating	No. reviews	Product price
Min	0	1	0	0	0	-470.98	2.9	9	18.99
Max	3121	5	16	2358	795	121.22	4.5	5000	328
Median	0	5	0	383	23	82.539	4.1	1592	36.99
Mean	1.884	4.097	0.236	511.700	31.945	80.295	4.115	2100.783	38.008
Panel B: Descriptive statistics for categorical variables									
	Text with UGPs		Avatar			Review valence		Text sentiment	
Yes	20106	16%	19325	15%	Positive	94072	75%	104619	83%
No	105993	84%	106774	85%	Negative	32027	25%	11180	9%
Total	126099	100%	126099	100%	Total	126099	100%	115799	92%

Table 3. Descriptive Statistics of Dataset

Expected Contributions and Limitations

Our study will contribute to the existing literature. First, while faces are visually appealing and provide a wealth of visual information, prior literature has not adequately discussed the impact of faces in UGPs. We discuss the presence of faces, the number of faces, and facial expressions and emotions, enriching the literature on UGPs and online reviews. Second, we argue that the richness of visual cues provided by faces will enhance the richness of photos as information carriers, which consequently affects the helpfulness of reviews. By introducing the role of facial cues into the discussion, we will extend the literature on media richness theory. Finally, whereas most emotional contagion effects have been applied in face-to-face studies, we will discuss the application of emotional contagion effects in an online setting, that is, where facial

expressions and expressed emotional states act as read-in and read-out devices for conveying an individual's emotions and will significantly influence other consumers' perceptions of the helpfulness of a review. Our work will also contribute to practice. Our findings could potentially offer fresh insights for online review platforms, suggesting ways to guide users in crafting more effective reviews. For instance, encouraging users to include full-body photos or images featuring multiple individuals may enhance the quality of their reviews. These insights can also benefit consumers interested in writing or perusing reviews, such as uploading a photo to increase the helpfulness of a review, or quickly filtering out the reviews that are most helpful to other readers to streamline the review writing or reading process. One of the limitations of this study is that only women's clothing was included in the dataset, resulting in potentially limited generalizability of the findings. Future research could consider including more product types in the dataset, or categorizing products into experience and search goods and exploring the different roles that faces play in different product types. Additionally, as we chose online shopping, future research could consider different online review contexts, such as restaurants, hotels, or tourist destinations.

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