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# The Addition of Images to eWOM in the Travel Industry: An Examination of Hotels, Cruise Ships and Fast Food Reviews

Robert Zinko <sup>1,\*</sup>, Christopher P. Furner <sup>2</sup>, Helene de Burgh-Woodman <sup>3</sup>, Patricia Johnson <sup>4</sup> and Anne Sluhan <sup>1</sup>

- College of Business, Texas A&M University—Central Texas, Killeen, TX 76549, USA; asluhan@tamuct.edu
- College of Business, East Carolina University, Greenville, NC 27834, USA; furnerc@ecu.edu
- <sup>3</sup> Institut Mines Telecom Business School, 91000 Évry-Courcouronnes, France; helene.deburgh@imt-bs.eu
- Faculty of Business and Law, University of Newcastle, Callaghan, NSW 2308, USA; Patricia.Johnson@newcastle.edu.au
- \* Correspondence: robert.zinko@tamuct.edu

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**Abstract:** Extensive research has examined the influence of online product reviews on consumer behavior. However, few have investigated the influence of reviewer submitted images on consumer attitudes. This research examines consumer perceptions of trust, information quality and valence disparity using three simulated online reviews appearing on TripAdvisor.com: one for a hotel, one for a cruise ship and one for a fast food restaurant. Findings reveal that reviews with images are seen as more trustworthy, and that consumers perceive reviews with images as possessing higher information quality than reviews containing text only. Likewise, the findings showed that effective images should be consistent with review text (e.g., reviewers do not respond positively to negative reviews linked with positive images, or vice versa).

Keywords: electronic word of mouth; online reviews; images; consumer generated content

### 1. Introduction

The influence of interactive, electronic commerce sites on purchases has attracted substantial research attention for over a decade. For example, electronic word of mouth (eWOM), in the form of user-generated content (UGC), is now the most influential form of media in tourism and hospitality, shaping consumer perceptions and decision making [1]. The significance of online review platforms to e-commerce success is well recognized by researchers and consumers alike [2]. As with traditional word of mouth, consumers engaging in eWOM are not only receivers of, but also generators of information. In both forms, information is often perceived to be trustworthy because it passes directly from one consumer to another, rather than through an industry intermediary such as a salesperson or advertisement [3]. Because uncertainty regarding the ability of a product or service to meet the needs of an individual can erode purchase intention [4], online reviews in the form of eWOM can serve to mitigate consumer doubts regarding the purchase [5]. In addition, since online transactions are often anonymous and impersonal, involve a wait period (i.e., for the product to arrive, or—in the case of hotel room purchases—until the time of check-in) and may involve a slower and less convenient return policy than for brick and mortar purchases, online transactions tend to be perceived as higher risk.

In addition to benefiting consumers by reducing uncertainty, online review sites function as virtual social communities themselves [6], encouraging consumers to enjoy leisure time participating in conversations about products and services and, thereby, increase product exposure. Not surprisingly, many review platforms have been built by retailers or manufacturers (i.e., who have a stake in the

success of the product or service being sold). It is in the interest of these platform providers to not only increase sales, but also to reduce the costs associated with returned products. Tripadvisor.com (the platform examined in this study) is the largest travel-related UGC platform provider, and one which many hospitality and tourism businesses integrate into their own business strategies [7]. Likewise, it is a common platform for study [8].

As more and more consumers turn to the internet to research products and services, websites are further developing their UGC platforms to host reviews comprised of multiple information formats. In such platforms, reviewers can not only write about an experience, they can also post photographs and videos that illustrate their experience with a product or service. As reviews from other consumers are often seen as more trustworthy than advertisements from companies [9], research has shown that the addition of images to these reviews are favorably received by readers compared to text-only reviews [10]. This is not surprising, given that images serve as a source of additional information, and in fact have been shown to be quite persuasive both on their own and when used as a supplemental source of information [11].

What is not known is how consumers react when the images in a review do not reflect the sentiment of the text they are presented with. A focal question of the present study is how consumers will respond when there is inconsistency between image and text. For example, what if the text of the review is negative, but the accompanying images present a positive impression (e.g., giving a negative review of a hotel, stating that the room was dirty, but showing very nice images of a beautiful hotel lobby)? Will consumers disregard the text review in its entirety? Or, as existing research suggests [12], will they only believe the negative aspects of the review? Finally, how large does the disparity between the text and image have to be before the images negatively influence the reader's perception of the review (e.g., if that same negative review had neutral images attached)? Will it exacerbate existing information asymmetry in online commerce [13]? Is a positive review with a neutral image seen in the same light as a positive review with a negative image (e.g., a positive review of a hotel restaurant, with a neutral image of that restaurant; vs a positive review of that restaurant with images of dirty tables and undercooked food)? This study empirically explores these questions through a simulation-based experiment where subjects are presented with reviews of hotels, cruise ships and fast food—some with images, some without, and some which are discrepant to the tone (positive/negative) of the review.

This paper proceeds by reviewing relevant literature while building a model of purchase intention and trust based on online product reviews. Next, a model is presented, and then tested. This testing consisted of asking participants to read a short review about a service or product from either a cruise ship, a fast food restaurant or a hotel. They were then asked to respond to questions regarding trust and purchase intention. The data were analyzed via a series of ANOVAS. Finally, a discussion of the findings, implications and limitations is presented.

# 2. Literature Review and Theory Development

The acronym eWOM refers to the web-mediated exchange of information which occurs when one person tells another about their experience with a service or product. Traditional WOM exchanges occurred conversationally among friends and family, and typically involved a two-person interaction in which individuals imparted their experiences in conversations that often included both feedback and follow up questions. Trusting beliefs (i.e., whether positive or negative) were strong, as there was typically a history between the individuals exchanging the information. In addition, this interpersonal history between the parties typically meant that the potential consumer had a reasonable sense of the congruence between their own needs and preferences and those of the person sharing their experience with the product or service.

The knowledge garnered via this form of information exchange by consumers has been viewed as higher quality and more trustworthy then the information provided by companies about their own products [14]. According to Furner and Zinko [15], WOM is particularly useful for consumers who are evaluating products or services which do not allow the opportunity to 'try before you buy.' WOM

research in the last 50 years has covered a wide array of consumer decisions, including the choice of physicians [16], auto mechanics [17] and hotels [18]. As such, the importance of WOM to both consumers and companies is well established [19].

With the emergence of online review platforms, consumer behavior researchers have adopted the traditional WOM paradigm to study eWOM. While WOM and eWOM have been considered in similar terms, only varying by the communication channel, emerging studies have evidenced that there are significant differences between the two forms of exchange [20]. For example, online, the parties rarely know each other [21], and thus the consumer must operate with an element of uncertainty about the trustworthiness of the reviewer, as well as the extent to which the reviewer's needs are consistent with those of the (potential) consumer [15]. Consumers also have to contend with fake reviews, which can be attributed to any party with an interest in the success or failure of a particular product (i.e., including the manufacturers of those products, or their competitors).

With many purchases, customers are often forced to make decisions based on limited direct information regarding the products and services because of their characteristics of variability, inseparability, perishability and intangibility [22]. Unlike purchasing a tangible product, there is rarely an opportunity to 'try before you buy' when considering products such as a meal, a hotel room, a cruise, and so on. Arguably, the nature of the product is a strong driver behind the increasing interest in UGC in the form of online reviews. For these reasons, eWOM has been shown to affect consumer decision-making in restaurant choice [23], online retail purchases [24], hotel selection [25] and a variety of other products.

As eWOM is increasing in its relevance, recent work has examined factors such as fake reviews [26], assessments of contradictory reviews [27] and purchasing patterns of online consumers [28]. These works hold the common theme of customers attempting to assess levels of trust and information quality in the reviews that they consider. As such, consumers are evaluating product reviews not based on an existing association (i.e., as was the case with traditional WOM) but rather on other aspects, because they rarely have a relationship established with the person posting the review. One potential way to reduce uncertainty and increase trust in the information given in eWOM is to add images [10].

In addition to providing evidence supporting the importance of images in the development of trust and purchase intention based on online product reviews, this study also explores the concept of valence disparity, or the level of incongruence between different communication modes in a single setting. In an effort to understand the effects of valence disparity in this research, individuals are presented with text reviews coupled with images which may or may not reflect the message communicated in the text. For example, a positive text review attached to a positive image, a positive text review with a negative image, and a neutral review with a corresponding image, and so on.

# 2.1. Images as Visual Cues

Research into the influence of images has repeatedly shown that they serve as important and relevant visual cues. Indeed, text alone in eWOM can sometimes be misinterpreted [29]. Images make the intangible (particularly experiential) tangible, and are a powerful trigger for recollection and memory. Wade et al. [11] performed a psychological experiment where participants were shown images from their past. Along with the series of real images, the researchers also added in several altered photographs for the participant to view. One of the altered photographs depicted the subject on a hot air balloon ride with his/her family. After viewing these images, 50% of the subjects were able to recollect some aspects of the hot air balloon ride that they never took. Similarly, Loftus [30] showed subjects advertising material for Disneyland that depicted a visitor shaking hands with Bugs Bunny. After reading the story, over 30% of the subjects said they remembered meeting and shaking the hand of Bugs Bunny when they themselves had visited Disneyland (i.e., Bugs Bunny is a Warner Bros. character and cannot be found at Disneyland). Nevertheless, the visual cue of the altered picture prompted a false memory in the subject's recollection of their experience.

As far back as the early 1970s, Tversky and Kahneman [31] conducted studies that evidenced that individuals tended to anchor responses according to visual information received. Perhaps the most widely discussed experiment from their study was one in which the researchers spun a wheel of fortune showing various numbers to a group of people, before asking them what percentage of African continent countries are members of the United Nations. The results revealed that when people saw a low number on the wheel their answer to the question was more likely to be lower, whereas when they saw a high number their answer was likely to be higher. Logically, the audience knew that there was no relationship between the number and the answer to the African countries question, however they did inadvertently make such a connection. This, as well as several other studies [32,33], have demonstrated how human information processing is influenced by visual stimuli, even when one knows that the stimuli is flawed or irrelevant.

### 2.2. Images in eWOM

The majority of research regarding images and UGC study social media (e.g., [1,34]), and an interest is emerging on the influence of UGC in the form of photography as it relates to Instagram, Twitter and Facebook (e.g., [35]). A recurring theme of these studies is to echo past research regarding the significant role that images (photographs) play in consumer choice; like traditional WOM, they are largely based on the notion that consumers have some level of relationship with the person writing the review through mediums such as blogs [36] or Pinterest [34]. The importance of increased personalization is well understood [37]. As such, there has been a significant amount of work that examines how social media (and other online media) affect perceptions of an image [1]. Likewise, Lee and Tussyadiah [38] examined a sample of Korean nationals, asking them what form of information was best for learning about a possible vacation location, and found photographic images to be preferred over video and text. Nevertheless, despite these inroads, research on images and eWOM in the context of online reviews remains sparse. The little work that has been done is generally limited to acknowledging that text which includes images inspire a higher level of trust and purchase intent than text alone [39].

Beyond such foundational works, little is known about the effects that images have on the readers of online reviews.

# 2.3. Trust and Perceived Information Quality

Defined as a party's willingness to accept vulnerability, but with an expectation of confidence that the other party can be relied upon [40], trust has been examined across a variety of disciplinary fields including economics [41], marketing [42] management [43], mobile banking [44] and management information systems [45]. Commonly, there are three different types of trust: calculative-based, knowledge-based and identification-based [46]. Calculative-based trust was developed from transaction cost economics, and suggests that a party will act in an opportunistic manner when profitable and feasible. This type of trust explains why consumers tend to trust eWOM over company advertising, as companies have a motivation to act in an opportunistic manner and mislead consumers (i.e., whereas fellow consumers lack this incentive). Likewise, calculative-based trust is formed by an individual reading an online review when they determine that the likelihood of the reviewer behaving opportunistic is unlikely [41].

Identification-based trust is developed when individuals feel that others care about them and have their best interests in mind. Research suggests that because online reviews are anonymous, persons posting them are able to be more honest [47]. Likewise, identity theory has also suggested when one individual demonstrates similarities with another, the other may identify with them [48]. When a reviewer adds images to a review, they are not only able to provide more information, but also increase the level of personalization and create a sense of closeness in the reader, since the reviewer is often the one who took those photos. As such, the potential to develop identification-based trust increases when a reviewer posts images.

Finally, knowledge-based (i.e., or cognition-based trust) is a process where consumers will root their level of trust based on existing evidence of trustworthiness [49]. In the case of eWOM, the addition of images should increase knowledge-based trust, as images provide more information for the reader. Furthermore, since images posted by a reviewer are typically taken by that reviewer, the images not only deliver information about the product or service, but also provide information about the reviewer (i.e., as the images are suggestive of what the reviewer feels is important).

**Hypothesis 1a:** Reviews which contain images will be trusted more than text-only reviews.

Reviews of products and services can be generated by almost any user on the Internet. As such, the assessment and evaluation of information quality has become an issue of concern [50]. Research into information quality has shown it to be linked to purchase intention and adoption of information [51]. Indeed, since the goal of reading reviews is to mitigate uncertainty about the ability of a product or service to meet a specific need, and since reviews vary in terms of information quality, the ability of a review to reduce uncertainty varies. A number of studies have demonstrated that there is a relationship between the information quality of a review and both trust and purchase intention [29]. Information quality has been described in a variety of contexts, many predating online product reviews [52], however in the eWOM context, Chen and Tseng [53] describe information quality as a multi-dimensional construct comprised of individual review elements, each relevant to the product or service being reviewed. For example, the drivers of information quality in a hotel review would differ from those of an automobile review. However, in either case, the number of qualities of the product reviewed, along with the thoroughness of the discussion of those qualities, drives the consumer's perception of information quality [3]. We argue that since words are inadequate to describe many aspects of products and services, and that images are often more effective, the presence of images in online reviews will serve as an extra dimension of evaluation of the product review (and a high quality one, relative to what can be communicated via text) and, serve to increase consumers' perceptions of information quality.

**Hypothesis 1b:** Reviews which contain images will be perceived as having higher information quality.

# 2.4. Assessing Incongruence between Text and Images

Although fundamental psychology research suggests that images are more effective at facilitating cognitive activity than text, there are additional reasons for consumers to rely more heavily on images for cognitive processing. Research shows that consumer behavior is guided by a desire to satisfy personal needs [54]; when evaluating a product, the consumer attempts to mesh the product information with their personal needs in a cognitive manner. This finding is consistent with schema congruity theory, where a match between the schema that is already held by the consumer, coupled with the information presented in the review, allows the consumer to formulate a consistent representation of the product [55]. When reading eWOM, information seekers must first consider whether the review includes experiences or descriptions relevant to their needs. After determining this, a consumer will attempt to evaluate the "expertise" of the individual who placed the review [56]. If there is an incongruence between the text and the images, and the readers themselves are the ones evaluating the pictures (i.e., as opposed to the individual writing the review which is a subjective evaluation), then the reader will accept their own interpretation over that of the individual who wrote the incongruent review.

The above scenario reflects the consumer's notions of trust. If a reader feels that the information presented in text and image don't match (i.e., high valence disparity), they are less likely to trust the review. As such, the reader is less likely to relate to the reviewer (because in the mind of the reader, the reviewer is giving inconsistent information). It can be argued that this perceived incongruence between the text and image in a review may result in either (1) the reader suspecting the motives of the reviewer (i.e., calculative-based and identification-based trust) or, (2) the reader believing that

the reviewer does not hold the same values, beliefs or needs as the reader (knowledge-based or cognitive-based trust). Based on this, the relationship between review-image consistency and the consumer's trust in the review is hypothesized below.

**Hypothesis 2a:** *Valence disparity will have an inverse relationship with trust.* 

**Hypothesis 2b:** *Valence disparity will have an inverse relationship with perceived information quality.* 

Having outlined our research model, which is presented in Figure 1, this paper now describes the methodology by which our model was tested.

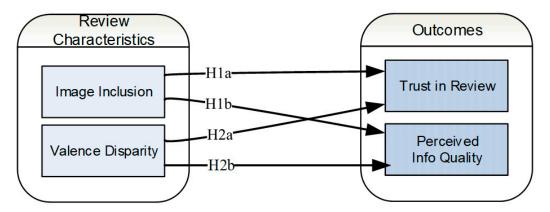


Figure 1. Research Model.

### 3. Methods

The model was tested using web-based simulations. This approach has been shown to be effective because scenario-based research controls for dissimilarities in the environments by enabling a standard setting across all groups. The protocol developed by Potts [57] was applied, and we conducted a scenario-based simulation experiment which required participants to interact with a mock-up of a web page which presented the user with a product review.

### 3.1. Design of the Studies

All studies asked participants to read a short review about a service or product, and then asked to respond to questions regarding trust and purchase intention. The products presented for review were (1) a cruise ship (Study 1), (2) a fast food restaurant (Study 2) and (3) a hotel (Study 3). We conducted this experiment using the three different product categories (i.e., cruise ship, fast food and hotel) in order to minimize the product specific effects which might bias our results. Additionally, the three different product categories provided a variety of price points, as well as a diversity of products. Finally, a manipulation check was performed to determine if the manipulations were effective (e.g., did consumers view the negative review as negative).

Each of the three experiments yields a  $3 \times 4$  factorial design in which reviews consist of a (1) positive text (i.e., that showed the product or service in a positive light), (2) neutral text (i.e., that showed the product or service in a neutral light) and (3) negative text (i.e., that showed the product or service in a negative light). Each of texts were paired with (1) positive images (i.e., that showed the product or service in a positive light), (2) neutral images (i.e., that showed the product or service in a neutral light), (3) negative images (i.e., that showed the product or service in a negative light) and finally 4) no image (i.e., just text).

As such, Study 1 presents the same positive images of a cruise ship experience, with (1) a positive text, then (2) a neutral text and then (3) a negative text. It then presents the same texts with neutral and negative images. Finally, it presents the positive, neutral and negative texts without any images.

A sample of the scenarios from Study 1 (cruise ship), is presented in Appendix A (due to space constraints, all samples are not provided here, as there were positive neutral and negative images, positive neutral and negative text, and three product categories (cruise ship, fast food and hotel); combined, there were 27 scenarios.

### 3.2. Measurement Instrument Development

Consistent with academic norms with regard to measurement instrument development [58], a panel of three academics with research expertise were shown the scenarios and images and were asked to sort the scenarios and images into categories. All experts were able to do this with 100% accuracy. The panel members agreed that the items consistently and comprehensively reflected the theoretical underpinnings of the constructs, thus establishing the face validity of the measurement tools.

The scenarios were followed by a series of questions that were adapted from Furner and Zinko [15], which were used to measure trust (i.e., please indicate the extent to which you trust this reviewer) and information quality (i.e., How do you rate the quality of information presented in this review). All survey items were measured using a 7-point Likert-styles scale. Additionally, demographics were collected.

# 3.3. Research Participants

Responses from subjects were collected via Amazon's Mechanical Turk (MTurk), with approximately 60 respondents for each review. As each study had positive, neutral, negative and no images, and positive, neutral and negative text for each, which resulted a  $4 \times 3$  factorial design, thus there were 12 reviews for each study (for a total of 36 reviews for all three studies). With approximately 60 respondents per review at 12 reviews, each study had approximately 720 subjects (for a total of approximately 2160 subjects for all three studies). The exact number of participants was 2284. The reason for the inexact number is that Mturk does not stop its collections until it has the required number (i.e., in this case 60), and then still collects the subjects that were in the process of completing the study when the number goal was met. This often results in a few extra responses, and there was no theoretical or empirical justification for removing them. The average age of the participant was 32.6, and 56.2% of the subjects were female. The average income reported was \$38.72 K.

The use of Mturk has been shown to be more accurate and (often) indistinguishable from many other sources of survey collection [59,60], and more representative of the U.S. population than typical samples of convenience [61]. Furthermore, data gathered from MTurk has been published in leading scholarly journals in marketing, such as *Journal of Marketing* (e.g., [62,63]) and *Journal of Marketing (e.g.,* [64,65]); tourism, such as *Tourism Management* (e.g., [66,67]) and *Journal of Travel Research* (e.g., [68,69]). Likewise, top management journals such as *Academy of Management Journal* (e.g., [70,71] and *Journal of Management* (e.g., [72]) have also reported MTurk data.

# 3.4. Analysis Tools

Because we are testing differences in means of DVs across groups in a  $4 \times 3$  factorial design without covariates or nested observations, ANOVA was conducted using IBM SPSS Statistics version 23. As the number of participants varied between groups, it was necessary to evaluate Box's M to test the covariance matrices equality, across groups. For Studies 1 (cruise ship), 2 (fast food) and 3 (hotel), Box's M was shown to be significant, so Pillai's Trace was interpreted (F = 3424.858, Hdf = 2, Edf = 734, p = 0.000; F = 3192.283, Hdf = 2, Edf = 715, p = 0.000; F = 3665.591, Hdf = 2, Edf = 778, p = 0.000, respectively).

### 4. Results

# 4.1. Hypotheses 1

In order to address H1 and H1a (i.e., reviews which contain images will be trusted more and be seen as having a higher information quality than text-only reviews), reviews were presented to the participants both with and without images. The images were reflective of the text (e.g., negative text had negative images). The results show the effects that the inclusion of images had on positive, neutral and negative reviews. A series of ANOVAs was run to evaluate the hypotheses.

# 4.2. Hypotheses

To test H2a and H2b (i.e., valence disparity will have an inverse relationship with trust and perceived information quality), both negative and positive reviews text reviews (i.e., with positive, neutral, and negative images) were presented in each study. Neutral text reviews were not reported. As the image differed further from the text, the disparity increased (i.e., so the positive image resulted in no disparity, the neutral in moderate disparity and the negative in high disparity). It was for this reason that we excluded reporting the neutral text, as the study could only offer moderate disparity (i.e., placing a positive or negative image with the neutral text), but could not offer a high disparity (i.e., as there we no 'very positive' or 'very negative' images). Like the testing for H1, a series of ANOVAs was run to evaluate the data.

This study examined the effects that images have on consumer outcomes associated with eWOM. We began by testing H1 and H1a, that stated that reviews which contain images will be trusted more, and perceived as having higher information quality than text-only reviews. We ensured that the text and the images had similar themes (e.g., the positive text had positive images). This held across all three product categories. In all cases, H1 and H1a were confirmed.

Our results suggest that when considering the type of valence of a review (i.e., positive, neutral, or negative), the addition of images was more beneficial when the review was positive or negative, rather than neutral specifically, with the exception of perceived information quality for positive reviews of a cruise ship (i.e., which can be found in Table 1), the addition of neutral images to neutral reviews did not have as large a significant impact on consumer perception. On the other hand, the addition of images did influence consumer outcomes when positive images were added to positive reviews and when negative images were added to negative reviews. This is logical, since presenting a strong positive or negative image has been shown to have more of an impact on such outcomes as trust and purchase intention (as opposed to neutral reviews) in previous studies [73]. Given our finding that positive and negative reviews have a stronger impact on consumer perception than neutral reviews, it stands to reason that more information (i.e., in the form of images) would likely have a stronger positive effect on those outcomes.

Our findings support H2a and H2b (i.e., valence disparity will have an inverse relationship with trust and perceived information quality). Across all product categories (cruise ships, fast food and hotels), our data indicate that when the valence disparity was high (i.e., positive text was presented with negative images, or vice versa), the results indicated a large decrease in trust and perceived information quality. This is not surprising as schema congruity theory dictates that when presented with a disparity between information (i.e., images and text not matching), negative outcomes (e.g., reduced trust) will occur [74]. This is of particular significance in industries such as travel and food, as the customer does not get the benefit of trying the product before buying (i.e., such as one might when test driving a car). As such, consistency of reviews is vital for such products [10].

Interestingly, the outcome related to the pairing of negative text and positive images for fast food resulted in the largest gap between high and low valence disparity. This may be because tastes are quite subjective, likely more so than the other product categories that we studied. Indeed, there is an entire area of research in the medical field that explores the idiosyncratic nature of taste [75].

Although the high valence disparity gaps supported H2a and H2b, when moderate valence disparity was presented (i.e., neutral image with either positive or negative text), the pair-wise comparisons resulted in nonsignificant outcomes. The only exception being, again, fast food trust (i.e., see Table 2). This suggests that, generally speaking, there does not need to be perfect congruence between text and images, and that only when large valence disparity exists, do issues regarding trust and perceived information quality arise.

There does not seem to be a large difference between trust and perceived information quality based upon the review being negative or positive. In both cases, the disparity was similar. That is to say, that having negative text, combined with positive images is just as diminutive as having positive text paired with negative images. Although interesting, this finding is not surprising, as both situations result in cognitive dissonance, since the consumer is presented with both a positive message and a negative message in the same review.

### 4.3. Contributions to Theory

Our findings augment emerging eWOM literature in a variety of ways. First, by exploring the subject with multiple different products and services, this study has a broader generalizability than single product studies, because the effects of product specific factors are mitigated. Next, the study provides fundamental, foundational evidence that images do increase consumer outcomes when added to text reviews. While anecdotal evidence has suggested this relationship for some time, empirical evidence was lacking. Having outlined the influence of images on consumer outcomes in online reviews, researchers may now design and conduct more advanced eWOM studies that include images (see below future research section for an expansion of this topic).

Hypotheses 2a & b (i.e., where non-congruent images were added to the same text) provide insight into the range of variance that is acceptable by consumers with regard to the text/image relationship. They indicate that consumers are able to accept a certain level of disparity between text and images. This finding suggests that eWOM researchers might consider the influence of other types of disparity within the review on consumer outcomes. For example, when a review covers multiple facets of a product, and the reviews of some facets are positive and others are negative, how do consumers process this disparity? Do they tend to trust the reviewer more, viewing them as more objective? If so, this finding would suggest that review platform operators who are interested in increasing purchase intention should develop algorithms which are capable of identifying the valence of several product characteristics, and prioritize those reviews which have at least some level of disparity, with the goal of winning consumer trust. Other potential practical implications are discussed in the following subsection.

**Table 1.** Presents the results of ANOVAs run on those data for all three studies (i.e., cruise ship, fast food and hotel). The outcomes for the studies are consistent in that adding an image increases both trust and perceived information quality. It is interesting to note that, typically, the largest increase of trust and information quality were when images were added to negative reviews (i.e., as opposed to neutral or positive reviews). Therefore, the data support both H1 and H1a in that adding images to reviews (for positive, neutral and negative reviews, increases trust and perceived information quality).

| Descriptive Statistics and ANOVA Results of Studies 1, 2 & 3 |                                  |                       |              |                |          |          |              |                |          |                 |              |                |          |  |
|--|----------------------------------|-----------------------|--------------|----------------|----------|----------|--------------|----------------|----------|-----------------|--------------|----------------|----------|--|
|  |                                  | Study 1 (Cruise Ship) |              |                |          |          | Stud         | ly 2 (Fast Foo | d)       | Study 3 (Hotel) |              |                |          |  |
|  |                                  | N                     | Mean         | Std. Dev.      | F        | N        | Mean         | Std. Dev.      | F        | N               | Mean         | Std. Dev.      | F        |  |
| Trust  |                                  |                       |              |                |          |          |              |                |          |                 |              |                |          |  |
| Positive<br>Review   | Image<br>No Image                | 61<br>60              | 5.52<br>4.08 | 1.219<br>1.266 | 34.054 * | 53<br>61 | 4.92<br>4.23 | 1.662<br>1.431 | 5.758 *  | 71<br>64        | 4.46<br>3.33 | 1.706<br>1.604 | 15.813 * |  |
| Neutral<br>Review  | Image<br>No Image                | 53<br>61              | 4.94<br>3.72 | 1.231<br>1.368 | 24.824 * | 84<br>63 | 5.24<br>4.24 | 1.219<br>1.146 | 25.505 * | 61<br>64        | 5.3<br>4.33  | 1.006<br>1.07  | 27.048 * |  |
| Negative<br>Review   | Image<br>No Image<br>Information | 64<br>73              | 5.34<br>3.81 | 1.439<br>1.478 | 37.724 * | 61<br>57 | 5.38<br>3.77 | 1.019<br>1.18  | 62.74 *  | 63<br>68        | 5.46<br>4.21 | 0.981<br>1.311 | 37.984 * |  |
| Quality  |                                  |                       |              |                |          |          |              |                |          |                 |              |                |          |  |
| Positive<br>Review   | Image<br>No Image                | 61<br>60              | 4.92<br>4.12 | 1.394<br>1.236 | 11.179 * | 53<br>61 | 5.04<br>4.26 | 1.775<br>1.29  | 7.242 *  | 71<br>64        | 4.55<br>3.38 | 1.575<br>1.638 | 18.02 *  |  |
| Neutral<br>Review  | Image<br>No Image                | 53<br>61              | 3.85<br>2.52 | 1.669<br>1.49  | 20.042 * | 84<br>63 | 4.35<br>3.59 | 1.654<br>1.265 | 9.191 *  | 61<br>64        |              |                | 16.428 * |  |
| Negative<br>Review   | Image<br>No Image                | 64<br>73              | 5.22<br>3.55 | 1.386<br>1.491 | 45.733 * | 61<br>57 | 5.03<br>3.61 | 1.402<br>1.206 | 34.496 * | 63<br>68        | 5.14<br>3.93 | 1.281<br>1.449 | 25.756 * |  |

<sup>\* =</sup> p < 0.05.

**Table 2.** Presents the pairwise comparisons for the positive and negative text reviews for all studies. For both negative and positive texts, the results for Study 1 show significant findings for a difference between no disparity and high disparity, but no significant difference at the 0.05 level for moderate disparity. The results for Study 2 show significant findings for a difference between no disparity and high disparity, and like Study 1, the positive reviews also showed no significant difference at the 0.05 level for moderate disparity; however, the negative reviews showed significance for both moderate and high disparity. The results for study 3 reflect Study 1, in that for both negative and positive reviews, the results show significant findings for a difference between no disparity and high disparity, but no significant difference at the 0.05 level for moderate disparity.

| Pairwise Comparisons (Mean Difference and Std Error) |                    |                       |      |               |      |                     |      |               |      |                 |      |               |      |
|--|--------------------|-----------------------|------|---------------|------|---------------------|------|---------------|------|-----------------|------|---------------|------|
|  |                    | Study 1 (Cruise Ship) |      |               |      | Study 2 (Fast Food) |      |               |      | Study 3 (Hotel) |      |               |      |
|  |                    | Positive Text         |      | Negative Text |      | Positive Text       |      | Negative Text |      | Positive Text   |      | Negative Text |      |
|  |                    | MD                    | SE   | MD            | SE   | MD                  | SE   | MD            | SE   | MD              | SE   | MD            | SE   |
| Trust  |                    |                       |      |               |      |                     |      |               |      |                 |      |               |      |
| Positive   | Neutral Image      | 0.293                 | 0.27 | 0.765 *       | 0.27 | 0.293               | 0.27 | 1.122 *       | 0.28 | 0.135           | 0.3  | -0.01         | 0.21 |
| Image  | Negative Image     | 1.086 *               | 0.28 | 1.071 *       | 0.26 | 1.086 *             | 0.28 | 2.111 *       | 0.27 | 1.086 *         | 0.31 | 0.760 *       | 0.22 |
| Neutral<br>Image                                     | Positive Image     | -0.29                 | 0.27 | -0.765<br>*   | 0.27 | -0.29               | 0.27 | -1.122<br>*   | 0.28 | -0.135          | 0.3  | 0.011         | 0.21 |
|  | Negative Image     | 0.793 *               | 0.27 | 0.306         | 0.26 | 0.793 *             | 0.27 | 0.989 *       | 0.28 | 0.950 *         | 0.32 | 0.771 *       | 0.22 |
| Perceived I  | nformation Quality |                       |      |               |      |                     |      |               |      |                 |      |               |      |
| Positive<br>Image                                    | Neutral Image      | 0.15                  | 0.3  | 1.061 *       | 0.29 | 0.15                | 0.3  | 0.837 *       | 0.32 | 0.206           | 0.29 | -0.26         | 0.25 |
|  | Negative Image     | 1.006 *               | 0.31 | 1.082 *       | 0.28 | 1.006 *             | 0.31 | 1.095 *       | 0.31 | 1.340 *         | 0.3  | 0.693 *       | 0.26 |
| Neutral<br>Image                                     | Positive Image     | -0.15                 | 0.3  | -1.061<br>*   | 0.29 | -0.15               | 0.3  | -0.837<br>*   | 0.32 | -0.206          | 0.29 | 0.257         | 0.25 |
|  | Negative Image     | 0.856 *               | 0.3  | 0.022         | 0.28 | 0.856 *             | 0.3  | 0.259         | 0.32 | 1.133 *         | 0.3  | 0.950 *       | 0.26 |

MD = Mean Difference; SE= Standard Error; \* = p < 0.05.

# 5. Discussion

Our findings carry multiple implications for review platform operators who are interested in maximizing purchase intention and minimizing returns by reducing consumer uncertainty about the extent to which a product or service will meet their needs. Platform operators recognize that consumers

respond differently to reviews, and develop algorithms that prioritize reviews based on what is known about the purchase behavior of the consumer and which reviews they read. Our finding that reviews which contain images are more effective at fostering trust and information quality than text-based reviews indicates that platform operators should both prioritize reviews with images in their review order algorithm, and encourage reviewers to add images to their reviews.

Further, we found that images are most effective at influencing consumer outcomes when the valence of the review matches the valence of the image. To capitalize on this, review platform operators need to be able to assess the valence of images. While the valence of the review can be inferred from the associated star rating, as well as by using sentiment-based text-mining techniques, determining the valence of images may require human intervention, however, by prioritizing reviews in which the valence of the text component of the review matches that the of the associated image(s), platform operators may be able to reduce consumer cognitive dissonance, increase trust, perceived information quality and ultimately purchase intention.

Our findings also carry implications for reviewers who seek to write more effective reviews. Our findings for H2a and H2b suggest that reviews may be able to use images to not only support and emphasize the messages that they send in the text portion of their reviews, but also convey information which was not discussed in the text of their review, effectively expanding the facets of the product that is reviewed. This can be particularly beneficial when the ability of the product to meet a need is subjective (i.e., when the product is experiential or hedonistic in nature), as the facts presented to the consumer by the image can be interpreted by the consumer, rather than processed through the lens of the reviewer.

### 5.1. Future Research & Limitations

Our model of the influence of images on common consumer outcomes in eWOM advances and connects several areas of consumer behavior and e-commerce research, however, since those areas are emerging, dynamic and complex, there is still much to understand about online consumer behavior in the age of Web 2.0. First, our finding that there are differential results across product categories suggests that researchers should select their research settings carefully, and either control for product specific effects, or conduct their experiments across multiple product categories. In our study, results were largely consistent across all three product categories, suggesting a reasonable degree of generalizability, however, our product categories were not exhaustive; they were intentionally selected from the hospitality industry because hospitality services and products are experiential and enjoyment of their consumption is subjective. This was done to simulate a high-risk purchase decision for the consumer, and highlight the importance of uncertainty reduction via online reviews. Future studies may evaluate the effects of images on eWOM in more utilitarian product categories.

Also, the images used in this study were carefully chosen as to not be personalized. Indeed, would personalization of the text or images make a difference in the findings? Furner, et al. [4] found that consumers trust reviewers more when they include personalized information in the review (i.e., include a profile photo and indicate their name). Would images which are less professional and more personal increase perceptions of trust, and thus increase purchase intention?

eWOM has traditionally focused on e-commerce-based review platforms. However, many retailers and manufactures maintain social media presences, in which consumers can also review products, services and companies. Do the relationships identified by eWOM studies (this study as well as previous studies) hold in the social media review context? This is an area with substantial potential for further exploration.

We found that a small level of disparity between text and images does not substantially reduce consumer outcomes. Besides positive, neutral and negative, are other levels of disparity still effective? For example, can a review be used to disparage a product, while a photo comparing results to a different product is effective, a form hidden comparative marketing? This approach could also be used

for co-branding, perhaps a review of a hotel room could include a well-placed, complimentary photo of a luxury suitcase in the hotel room.

All studies suffer from sampling limitations. While the use of Mturk data is well established in marketing research (e.g., [59,60]) and several authors have noted that data gleaned from Mturk is more representative of the U.S. population than samples of convenience [61], the sample of approximately 2200 does represent a limitation to the interpretation of our findings. As such, additional research may be necessary. Likewise, the study focuses primarily on the tourism industry (i.e., although fast food data is included). When considering other, more tangible goods (e.g., automobiles), additional research will likely be required. Likewise, this study uses an experimental approach. The subjects are asked about purchase intent, but are not required to actually put forth any sort of financial commitment. An additional study that views actual purchase may provide convergent validity.

Finally, can this model be applied to reviews that have both text and video (i.e., as opposed to images)? Video is capable of presenting even more rich information that images, and more review platforms support video reviews now. Experiments testing the efficacy of video for uncertainty reduction represents another domain of future research. Having discussed our results, implications and the potential for future research, the summarizing remarks conclude our study.

### 5.2. Conclusions

Electronic word-of-mouth (eWOM) has been a primary area of e-commerce research since the early days of the paradigm. A variety of reviewer, review and consumer characteristics have been tied to several relevant consumer outcomes, including trust, perceptions of information quality and purchase intention. Until now, few studies have considered the potential influence that images may have on these outcomes. We designed an experiment which explored the influence of images, and found that images improve perceptions of information quality and trust in online reviews, and that the discrepancy between the valence of the text and image in a review inversely influences trust and information quality. Further, we show that perceived discrepancies between the impression the text gives and what the image shows significant significantly influences consumer outcomes. This suggests that review platform operators who seek to maximize sales should prioritize those reviews which are positive with positive images. Since consumers seek out negative reviews, platform developers should prioritize negative reviews with a positive picture (higher valence discrepancy), to mitigate the trust and perceptions of information quality in the negative review. Finally, to minimize the risk of returns, platform operators should prioritize those reviews which best reduce uncertainty and best facilitate perceptions of information quality, i.e., those reviews in which the valence of the review and the associated photo match.

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# Appendix A



Figure A1. Cruise Ship, Positive Review, Positive Image.

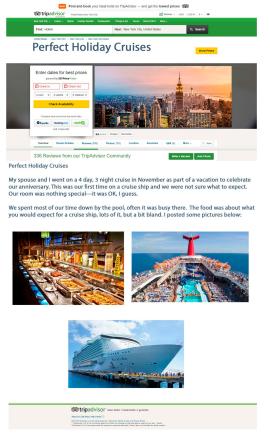


Figure A2. Cruise Ship, Neutral Review, Neutral Images.

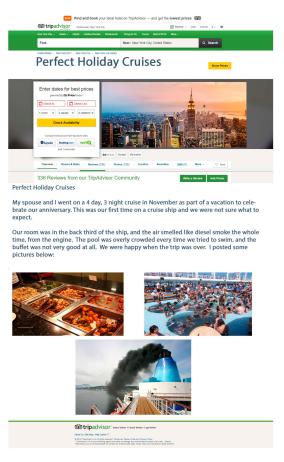


Figure A3. Cruise Ship, Negative Review, Negative Images.

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