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The impact of online product and service picture characteristics on consumers' perceptions and intentions

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Abstract

This thesis paper aims to better understand which informational cues found in pictures online lead to positive consumer emotions, perceptions, and favorable purchase intentions. More specifically, how social presence, level of staging, and the source of the picture (consumer or brand) predict these outcomes. Results confirm that higher forms of social presence and staging have a more positive impact on arousal and valence. In turn, these emotions are proven to impact perceived diagnosticity which impacts trust, perceived quality, and intentions to purchase. Further, this study reveals a new form of social presence found in pictures online referenced as "inferred social presence" which focuses on the psychological presence of humans and the feeling of warmth as opposed to the mere physical presence of humans.

The most important implication of this study is the identification of a new form of social presence: inferred social presence. This study demonstrates that an inferred social presence (personal objects but no humans in the photo) has an equal, if not superior, impact on emotion than a photo with observed social presence (humans in the photo). For management, this means that they do not need to invest a significant amount of money into human models in order for the picture to have the desired outcome. Considering that many photos are viewed through online platforms and social media, it is important that management consider the importance of promoting and sharing photos that evoke positive emotional responses in order to help consumers form perceptions, and positive behavioral intentions. The results demonstrated that this can be done by promoting photos of higher levels of social presence and that are highly staged. Finally, the results from this study deny support to the notion that the source of the photo impacts its perceived diagnosticity.

Keywords: inferred social presence, electronic commerce, pictures, social presence, emotion, arousal, valence, perceived diagnosticity, online consumer behavior, staging

Research methods: A two-phased approach was conducted for this study. The first phase consisted of a pre-test in order to check the manipulation of the predictor variables with a large base of 264 photos. The results from this phase lead to a 2x2x3 experimental design which took into consideration three forms of social presence (observed, inferred, not observed), two levels of staging (low, high), and two sources (consumer and brand). In order to determine how these

characteristics found in pictures online impact consumer outcomes, a within subject online questionnaire was administered on Qualtrics and distributed on Amazon Mechanical Turk (Mturk) to a total of 335 participants in North America.

This thesis is divided into 5 chapters. It begins with an introduction followed by a detailed review of current literature. Next a scientific article prepared for the *International Journal of Electronic Commerce* is presented. Then, a short managerial article follows. This thesis then ends with a conclusion.

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Foreword

In order to submit this thesis, the request was approved by the administrative management of the M.Sc. program. Authorization was then provided by the Academic Affairs office. The article in Chapter 3 was written in preparation to be submitted to the International Journal of Electronic Commerce. Similarly, the managerial article in Chapter 4 was written in preparation to be submitted to a journal within the “Institut de tourisme et d'hôtellerie du Québec”.

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Chapter 1: Introduction

The emergence of the World Wide Web has greatly impacted the way people conduct their day-to-day lives. One activity that has been completely reshaped by the introduction of the internet is shopping. Online shopping provides the convenience of a purchase from any location, an array of options from all around the world, better prices, and the efficiency of only a few clicks to purchase (Chan, Cheung et Lee, 2017). Furthermore, it has changed the way product and service-related information is shared and communicated. Through channels such as social media and third-party websites, information is now being communicated more effectively through visual content such as photos (Burri, 2012; Childers et Houston, 1984). The advantages provided by the World Wide Web has therefore led to an explosion of online shopping. In 2018 alone, the estimate of B2C e-commerce purchasers was 1.8 billion and global e-retail sales were 2.8 trillion U.S dollars (Statista, 2020).

Traditionally, consumers depended on physical retail locations to first acquire information about a product or service when shopping. Offline shopping provides many informational cues to help consumers identify and interpret the products they will potentially purchase such as emotional and sensory experience (Tauber, 1972), social interaction with peers or employees (Gefen et Straub, 2003) or the ability to touch and feel the product prior to purchasing (Tauber, 1972). A cue is either the characteristics of the stimulus or its environment that trigger the use of basic heuristic in order to form judgements regarding a task (Chaiken, 1999; Teng et Khong, 2015). Offline shopping performs similarly in the services industry. Although services never presented the opportunity for clients to visit them firsthand before booking, it conducted bookings in person or through travel agents where consumers were able to physically meet with a representative in an office setting (e.g., in the hospitality industry).

However, the effect of the internet has greatly impacted how consumers receive information about products and services (Government of Canada, 2019). Not only has the internet become an important distribution channel for products and services (e.g. hospitality industry) (Lehto, Kim et Morrison, 2006; Lien *et al.*, 2015), it also provides consumers with a greater access to information regarding an offering (Government of Canada, 2019). Consumers now depend on e-commerce websites, social media, and social networking sites to deliver information about an offering before

purchasing it. In fact, 43% of internet users use social media when researching products or services to buy (Cooper, 2020). That being said, online platforms lack some of the traditional product and service informational cues that consumers depend on to make decisions when shopping which leads to more uncertainty (Akdeniz, Calantone, and Voorhees, 2013; Yang, Zhao, and Wan, 2010). For example, consumers can no longer try on or feel the product before purchasing and they no longer have the benefit of shopping as a social activity. However, the popularity of social media shopping has created a new and reliable medium for the communication of product or service-related information: photos (Burri, 2012; Childers et Houston, 1984).

To cope with such uncertainty online and to make inferences about product or service quality and attributes, consumers search for cues which deliver the same level of certainty and information that is found in offline shopping (Akdeniz, Calantone et Voorhees, 2013). Existing literature has examined the impact of marketing cues such as price (Akdeniz, Calantone et Voorhees, 2013; Rao et Monroe, 1989), advertising (Kirmani et Wright, 1989), warranty (Boulding et Kirmani, 1993), brand reputation (Akdeniz, Calantone et Voorhees, 2013; Baek, Kim et Yu, 2010; Erdem et Swait, 2004), and third-party information (Akdeniz, Calantone et Voorhees, 2013). Other studies have examined how creating a feeling of human contact through social presence in reviews, chat boxes, and the use of people within photos provide a social cue that allows consumers to collect socially rich information regarding a product or service (Huang et Benyoucef, 2013; Baozhou Lu, Fan et Zhou, 2016; Olbrich et Holsing, 2011). More importantly, the use of visual cues such as the aesthetics of an e-commerce website and the use of photos have become extremely important for consumers' online shopping experience (Fiore, Jin et Kim, 2005).

In online environments, the attractiveness and visual appeal of an e-commerce website is important because it leads to more positive attitudes towards an online store (Fiore, Jin et Kim, 2005). Furthermore, the quality of a website has proven to influence consumer ' perceptions of product quality, which in turn, increases online purchase intentions (Wells, Valacich et Hess, 2011). However, in contexts where the website environment is not available, such as on social media, photos are an important medium for communication of product or service-related information (Childers et Houston, 1984; Highfield et Leaver, 2016). On Instagram alone, 92% of users admitted to either following a brand, clicking on their website, or made a purchase after seeing a product/service picture on the platform (Cooper, 2020). On Facebook, posts with a picture generate

2.3X more engagement than those without images (Mawhinney, 2020). On Pinterest, more than twice the travelers are active on the photo-sharing platform than on the top travel agency website (Bagadiya, 2018). Additionally, Snapchat, WhatsApp, and third-party websites such as TripAdvisor and Wayfair are all important platforms where visual content such as photos are shared and viewed in abundance.

The use of photos has offered a medium to many informational cues sought by consumers when shopping online. Not only can consumers see the product or service, they can view it from different angles and sizes, see it in different contexts and colors, and in the case of user-generated pictures, they can see if from a different perspective. Photos have been found to attract viewer attention (Riegelsberger, 2002) and to increase credibility of online articles (Cyr *et al.*, 2009; Fogg *et al.*, 2002). Furthermore, they have been found to induce emotional responses leading to more favorable attitudes (Riegelsberger, Sasse et McCarthy, 2003) and have been found to directly aid consumers' understanding of products when shopping online (Xin Li, Wang et Chen, 2014). They have also been found to have a positive effect on online shoppers' perception of a website when searching for experience goods (Desrochers *et al.*, 2019). Thus, retailers have invested much effort into creating photos that will be appealing to their target market (Xin Li, Wang et Chen, 2014). Photos have become such imperative cues in delivering information about a product or service that retailers and companies can not survive without them. An internal study conducted by TripAdvisor discovered that properties with at least one photo see an increase of +138% in travel engagement and +225% likelihood in booking inquiry (Gonzalo, 2014). Photos contribute to a more effective way of communicating (Burri, 2012) and do not only function as a visual source of information, but also as an indicator of a product's real quality (Eriksson et Frohm, 2018). According to the picture superiority effect, compared to textual content, pictures draw more attention, are more informational, and are remembered more (Childers et Houston, 1984). Furthermore, we can notice their importance in websites such as Wayfair and TripAdvisor, where consumer reviews are now accompanied by one or more photos of the product or service in question.

It is clear that the internet, social media, and e-commerce websites allow consumers to easily and quickly retrieve more information about products and services (Government of Canada, 2019). However, this increased access presents challenges. Anyone with a computer and a camera can take a picture of a product or service and become a publisher online. A new problem therefore

arises: How do consumers process and evaluate the quality of the information provided in the photo? Petty and Cacioppo's (Petty et Cacioppo, 1986, 1996, 2012) elaboration likelihood model (ELM) provides a useful conceptualization for understanding how photos can be processed cognitively. According to the ELM, informational cues are processed either through the central and/or peripheral route. The central route involves the elaboration, critical thinking, and analysis of the information being processed. The peripheral route, however, involves the processing of a cue influenced by factors devoid of issue-relevant information (e.g. peers' influence, emotions). Whether a picture is processed through the central or peripheral route is said to be dependent on the level of involvement (Miniard *et al.*, 1991). For example, when making a purchase decision about a car, consumers are more likely to exert a higher level of involvement with the purchase and process information through the central route. Contrarily, consumers making a decision regarding an item of clothing requires a lower level of involvement and can be influenced by peers. However, both a picture processed through the central route and one processed through the peripheral route are said to be influential on consumer behaviour (Miniard *et al.*, 1991). Despite being developed in the mid-1970s, the ELM model continues to be applied in current research to better understand how stimuli is processed. In fact, current use of the ELM model has helped researchers better understand the influence of stimuli in a digital environment, such as on social media and digital devices (Hur *et al.*, 2017; Kim, Bonn et Lee, 2017; Ruohan Li et Suh, 2015). This indicates that this theory remains relevant to this today.

Of all cues found on social media platforms, 87% are processed through the peripheral route (Teng et Khong, 2015). This can be explained through the fact that consumers make minimum cognitive efforts processing information when on social media platforms (low involvement situation) (Teng et Khong, 2015). When individuals lack motivation or are distracted, they tend to take shortcuts in the formation of attitudes and decision making by utilising peripheral cues (e.g., price, picture, attractiveness of the speaker, celebrity endorsement, peer influence) (Teng et Khong, 2015). Peripheral cues, with an emphasis on simplicity and diagnosticity, (Alba, Marmorstein et Chattopadhyay, 1992) are argued to outweigh central route cues in the influence on brand choices. Furthermore, they are said to serve an important role in consumer decision-making (Miniard, Sirdeshmukh et Innis, 1992). Peripheral cues, such as pictures, are said to be influential through the affect-transfer process where a stimuli (e.g. photo) evokes an affective response (Stuart, Shimp et Engle, 1987). In other words, photos that evoke imagery and emotions are influential through

the peripheral route processing (MacInnis et Price, 1987). For example, a photo of people having fun on a cruise ship may generate a feeling of joy and desire. These emotions serve as informational cues in forming judgements, attitudes and behaviours about the cruise line (Miniard *et al.*, 1991).

Many studies have looked at the impact of e-commerce website cues on consumer attitudes and intentions. However, considering the importance associated with photos on online platforms such as social media and third-party sites, little is known about what types of cues are found in product or service photos and how they impact consumers' attitudes and behaviors. There is a lack of understanding of what cues within photos deliver the most positive and impactful outcomes. For this reason, we have developed the research question below:

Which informational cues found in pictures online lead to positive emotions, perceptions, and favorable purchase intentions in consumers?

Through a 2x2x3 experimental design administered through an online questionnaire, this study answers the above research question by identifying the informational cues delivered through product and service photos and how they influence consumers' attitudes and behaviors. An introduction of this paper and the context of this study was discussed in this first chapter. Chapter 2 will present the key concepts studied in this paper that have allowed the identification of existing gaps in the literature. Chapter 3 presents the scientific article that is in preparation to be submitted to the *International Journal of Electronic Commerce* which summarizes the experimental method used as well as a detailed account of the findings. It addresses the impact of three picture characteristics on consumer's emotions, perceptions, and behaviours online, notably social presence (observed, inferred, not observed), staging (low, high), and the source of the photo (consumer, brand). The article ends by discussing key contributions and implications of this study for researchers and management and three key areas for future research. Chapter 4 of this thesis is a short managerial article written for the *Institut de tourisme et d'hôtellerie du Québec*. It proposes three key guidelines for management to follow in the tourism industry in order to increase their impact online. The last chapter of this thesis is a conclusion which provides a summary of the entire study.

The personnel contribution of the student is detailed in the table. This figure summarizes the important implication of the student in her thesis at the Tech3Lab.

Student's contribution and responsibilities in the realisation of this thesis.

*These percentages do not take into account the support and input of the directors during this project.

Step in the process	**Contribution**
Research question	Identifying gaps in current literature and defined the research problem - Identified the problem and its implications - **100%** ● Defined research questions ● Identified the constructs to be tested
Literature review	Conducting relevant research, read scientific articles related to the constructs and topic, and wrote the literature review - **100%**
Conception and experimental design	Designing the experimental protocol - **100%** ● Develop experimental design Determining the operational stimuli - **100%** ● Searched and collected over 500 pictures online ● Edited all the pictures to 500 x 400 pixels on GIMP Creating the study questionnaires – **100%** ● Wrote the questionnaire based on research and constructs identified Applying to the CER - **100%** ● Prepare documentation related to the submission of the application to the CER
Pre-tests	In charge of the operations during the pre-tests for both phases of this study – **100%**

Recruitment	Recruiting participants for the studies – **60%** ● I provided important criteria for participant recruitment.The operation team at the Tech3lab oversaw applying my guidelines and collecting the data on Amazon Mechanical Turk. They were also in charge of distributing the compensation.
Analysis	Conducting the statistical analyses – **90%** ● Analyzed the results on SPSS Formatting the data file for the analysis statistics was done by the lab statistician.
Writing the thesis	Writing the articles and thesis - **100%** My supervisors guided me through this process with their feedback that allowed me to perfect my thesis.

Chapter 2: Literature Review

This chapter will begin by providing a brief introduction to the fundamental principle of information processing established by Cacioppo and Petty called the "Elaboration Likelihood Model Theory" (ELM). Based on this theory, it then identifies different information processing mechanisms that are used when evaluating pictures online. Next, it discusses different characteristics (cues) found in photos online that predict these processing outcomes. Throughout this review, areas are highlighted where additional research is needed in order to better understand consumer emotions, perceptions, and behaviours online.

2.1 Introduction to literature review: Understanding how information is processed through pictures online

With the popularity of posting and sharing pictures on social media, social networking sites, and e-commerce websites, consumers now have access to an abundance of information about products and services communicated by anyone who has a computer (Government of Canada, 2019). This increase in available information provided through pictures about products and services presents new challenges in understanding how the quality of the information is processed and understood. Petty and Cacioppo's (Petty et Cacioppo, 1986, 1996, 2012) elaboration likelihood model (ELM) provides a useful conceptualization for understanding how photos can be processed cognitively. The Elaboration Likelihood Model (ELM) states that when faced with a message or a task, consumers process the information either through the central or peripheral route (Geddes, 2018). The central route processing involves a high degree of elaboration and motivation in understanding the content of the message (Geddes, 2018). Therefore, when consumers are processing a picture through the central route, they are concentrated in examining it and focused on the quality of information portrayed. In contrast, when a picture is processed through the peripheral route, there is a low level of elaboration, motivation, and cognition (Geddes, 2018). Therefore, other factors in the environment can influence how they process the information communicated such as peer influence, emotion, price, audio stimuli, attractiveness of a speaker, endorsements, etc (Teng et Khong, 2015). Cacioppo and Petty's Elaboration Likelihood Model Theory (ELM) provides an explanation for how stimuli are processed and how attitudes are developed from this influence on their behavior (Petty et Cacioppo, 1986). When faced with a picture online, consumers will process it using either a high or low level of elaboration, cognition, and motivation. However, of all cues

found on social media and social networking platforms, 87% are processed through the peripheral route (Teng et Khong, 2015). This can be explained through the fact that consumers make minimum cognitive efforts processing information when on social media platforms (Teng et Khong, 2015) and therefore take shortcuts in the formation of attitudes and decision making by utilising peripheral cues (e.g., price, picture, attractiveness of the speaker, celebrity endorsement, peer influence) (Teng et Khong, 2015).

The following section of the literature review will address how pictures are processed online using the peripheral route established by Cacioppo and Petty's Elaboration Likelihood Model Theory (ELM).

2.1.1 Diagnosticity

Diagnosticity refers to perceived reliability of a cue in distinguishing between alternative categorizations of products (Akdeniz, Calantone et Voorhees, 2013). For example, a 5-star quality rating system allows consumers to differentiate between a product with a 4-star quality rating and one with a 2-star quality rating. Diagnosticity allows people to form judgements and decisions based on the perceived relevance and usefulness of information they see (Ahluwalia, Unnava et Burnkrant, 2001; Miniard, Sirdeshmukh et Innis, 1992). In the case of e-commerce, the perceived diagnosticity (usefulness and relevance of the information provided by a picture online) would impact the consumers final judgement and decision regarding the product or service. A photo that has high diagnosticity would be an illustration of the product or service that is helpful to evaluate its attributes (Kempf et Smith, 1998). Since online shopping lacks many of the informational cues used in offline shopping such as physical inspection of the product, it is important to understand how helpful the information being uploaded online is for the consumer's understanding of the product or service in order for them to then form attitudes and make decisions regarding it. Cues that discriminate among alternatives have higher information value or diagnosticity than cues that do not and are thus preferred by consumers (Fischhoff et Beyth-Marom, 1983). In other words, the 5-star rating example mentioned above would lead to a higher diagnosticity of the product or service since the consumer can clearly evaluate its quality (4-star versus a 2-star product). However, a product related cue that does not allow consumers to evaluate alternatives would not be perceived as being diagnostic. An example of this could be if the consumer reviews of a product are evenly split between positive and negative feedback.

Since pictures on social media and social networking sites are mainly processed through the peripheral route, cues such as price, picture, attractiveness of the speaker, celebrity endorsement, and peer influence impact how consumers evaluate and process the information communicated within them (Teng et Khong, 2015). Therefore, evaluating the perceived diagnosticity of these cues is imperative to better understand how perceptions and judgements are created and their influence on behaviour. However, research in psychology has mainly examined the effect of diagnosticity after exposure to a stimuli as well as its subsequent positive impact on attitudes and behaviour (Ahluwalia, Unnava et Burnkrant, 2001; Klar, 1990; Pullig, Netemeyer et Biswas, 2006). For example, the higher the perceived diagnosticity, the higher consumers believe in what they are seeing (Jiang et Benbasat, 2004, 2007). Since diagnosticity has proven to impact attitudes and behaviour after exposure to a stimulus, (Pham et Muthukrishnan, 2002; Pullig, Netemeyer et Biswas, 2006), a higher diagnosticity will impact consumer's level of trust in what the image is depicting and the overall perceived quality of the product or service being illustrated. Furthermore, the more diagnostic a cue is perceived (the more information can be derived from the cue), the greater the intention is to purchase the product or service and the greater the judgement of perceived quality (Gabisch et Gwebu, 2011; Pham et Muthukrishnan, 2002; Pullig, Netemeyer et Biswas, 2006). In turn a high perceived diagnosticity cue exerts stronger impact on attitudes and behavioural intentions (Ahluwalia, Unnava et Burnkrant, 2001; Gabisch et Gwebu, 2011; Klar, 1990; Pham et Muthukrishnan, 2002; Pullig, Netemeyer et Biswas, 2006).

However, not all information that generates high diagnosticity will necessarily lead to favourable consumer perceptions and behaviors. It is important to note that the relationships relating to perceptions of product and service quality and intentions to purchase mentioned above are relevant for information that is perceived as being both helpful and positive (Ahluwalia, Unnava et Burnkrant, 2001). However, when the information is perceived as helpful but negative, these relationships may differ. For example, a detailed customer review that explains that the fabric of a dress they purchased is of low quality provides details that are helpful to evaluate the dress. Despite the review leading to high diagnostcity (helpful to evaluate the dress), consumers will likely not have positive perceptions of the product and will likely not purchase it. Therefore, in cases where the information provided to evaluate the offering is helpful but negative, the outcome will likely be different than for positive information (Ahluwalia, Unnava et Burnkrant, 2001). In sum, an

informational cue that is perceived to be high in diagnosticity generates more trust regardless of its nature, whereas higher levels of diagnosticity lead to higher perceptions of quality and intentions to purchase when the information is also perceived as positive.

2.1.2 Emotion: Arousal & Valence

Psychologists have been studying for years how affective states are infused into thoughts when processing information. Based on the Affect Infusion Model (AIM), people use their emotional state as information in reaching a decision about some target (Forgas, 1995). An emotion is a short but intense feeling that has a clear cause and cognitive content (Forgas, 1995). For example, if a situation makes you feel scared (an intense feeling that has clear cause and cognitive content), then you interpret the situation as being dangerous (short lived until out of danger). Emotion has been defined as occurring in two dimensions spanning valence and arousal (Barrett et Russell, 1999; Reisenzein, 1994). Emotional valence describes whether an emotion is positive or negative whereas arousal measures the strength and intensity associated with the emotional state (Barrett et Russell, 1999; Lang, Bradley et Cuthbert, 1997; Russell, 2003). Valence and arousal are assumed to be distinctly different (Barrett et Russell, 1999; Reisenzein, 1994).

One specific mechanism of affect infusion identified by the AIM is the affect-by-information model, where feelings directly inform judgments when processing is fast and heuristic as a short-cut to evaluating a target (Clore, Schwarz et Conway, 1994; Niedenthal, 1990; Schwarz, 1991; Schwarz et Clore, 1983). Here, people rely on their current heuristic emotion to form judgements and opinions regarding a target as long as it is perceived to be relevant for the judgment to be made (Clore, 1992; Schwarz, 1990; Schwarz et Clore, 1983). For example, when asked to compare two product photos online, consumers may simply ask themselves: How do I feel about each one? Thus, basing the evaluation and judgement of the target on current emotion felt at that moment. Furthermore, affective emotions (such as valence and arousal) can have an important impact on judgment and the evaluations of stimuli in low-thinking conditions (e.g. (Cohen, Pham et Andrade, 2008; Isen, 2001; Pham, 2004; Schwarz et Clore, 1996, 2007). For example, in the case where consumers are distracted or concentrating on multiple tasks at a time.

The Elaboration Likelihood Model (ELM), posits that when faced with a message or a task, consumers process the information either through the central or peripheral route where the central

route involves a high degree of elaboration and thinking whereas elaboration in the peripheral route is at a minimum (Geddes, 2018). ELM states that when people are not very motivated, not able to think carefully, or working through low-effort, persuasion variables such as emotion have an impact on attitudes and decisions through the peripheral route (Petty et Briñol, 2015; Petty et Cacioppo, 1979, 1986; Petty *et al.*, 1988; Petty, Wells et Brock, 1976). Emotions have also been shown to serve a coordination role, triggering psychological, behavioural, and communicative responses that allow the consumer to deal quickly with a task at hand (Frijda, 1986; Lerner et Keltner, 2000; Levenson, 1994; Oatley et Johnson-Laird, 1996). For example, in low level thinking and attention conditions, valence has directed consumers' intentions of purchase (Nguyen *et al.*, 2020). Emotion related cognition has also been shown to interrupt current processes to direct attention and judgement towards the emotion-driven task or event (Johnson-Laird et Oatley, 1992; Lazarus et Lazarus, 1991; Lerner et Keltner, 2000; Schwarz, 1990; Simon, 1967; Tooby et Cosmides, 1990).

A large number of studies have shown that emotions exert stronger influence when they are perceived to be informative for the judgment at hand (Greifeneder, Bless et Pham, 2011; Schwarz et Clore, 1983). In other words, arousal and valence can be perceived as diagnostic in order to form attitudes and make decisions if it is useful for the task at hand. This is the case when feelings properly reflect the characteristics of the target that is evaluated and when they are relevant for the particular judgement or decision to be made (Pham, 1998; Strack, 1992). Furthermore, under a high arousal state, high diagnosticity cues have more influence on information processing (Pham, 1996). Finally, in a context where people are not highly motivated and when thinking conditions are low, emotions such as arousal and valence can impact perceived diagnosticity (Cohen, Pham et Andrade, 2008; Isen, 2001; Pham, 2004; Schwarz et Clore, 2007).

In sum, in situations where motivation and thinking conditions are low, emotions evoked through cues like photos serve as information about a product and/or service since they are processed through the peripheral route (Cohen, Pham et Andrade, 2008; Isen, 2001; MacInnis et Price, 1987; Pham, 2004; Schwarz et Clore, 2007; Stuart, Shimp et Engle, 1987; Teng et Khong, 2015). Thus, they influence consumer judgements and processing through emotional responses spanning arousal and valence (Barrett et Russell, 1999; Lang, Bradley et Cuthbert, 1997; MacInnis et Price, 1987; Russell, 2003; Stuart, Shimp et Engle, 1987). Since diagnosticity refers to how helpful the

information communicated is for forming judgements and making decisions, under the conditions described above, emotions can serve as a predictor variable. Therefore, the degree of arousal and valence evoked through photos found online can impact how the information is processed and the perceived diagnosticity of the cue.

2.2 Understanding which characteristics within pictures online impact how information is processed

The types of photos found on social media platforms are numerous. This means that the informational cues found within these photos which impacts how processing takes place are abundant and diverse. The below section will investigate which variables within photos of products and services can generate emotional impact and in turn, higher perceived diagnosticity.

2.2.1 Social Presence

Social presence describes the extent to which a medium allows users to experience others as being psychologically present (Fulk *et al.*, 1987). The earliest applications of social presence in e-commerce was the installation of a review and rating system by Amazon in the late 1990s (Baozhou Lu, Fan et Zhou, 2016). This allowed consumers to witness other people's experiences and to interact socially by leaving a comment. Since then, social presence has been incorporated in websites through the use of chat boxes, blogs, models, emails, videos, and using people in pictures (Huang et Benyoucef, 2013; Baozhou Lu, Fan et Zhou, 2016; Olbrich et Holsing, 2011).

Social interaction is important for mental health, recognition, developing attitudes, and is the base of creating relationships (Young, 2008). Social interaction is found in many basic human activities such as work, sports, leisure, and of course in shopping. Shopping has always been a social activity (Baozhou Lu, Fan et Zhou, 2016). Consumers tend to be influenced by others when shopping, appreciate the ability to talk to experts in person regarding the products of services, and enjoy the leisure and fun aspect of shopping with friends and family. However, one of the most noticeable differences between offline and online shopping is the lack of emotions derived from social interactions with humans (Technology, Institute of Korea Science, 1996). E-commerce websites struggle to provide a strong degree of sociability leaving the shopping experience often lonely and impersonal (Baozhou Lu, Fan et Zhou, 2016).

Previous research on social presence has focused on its ability to transmit verbal and nonverbal informational cues such as facial expressions, posture, dress (Short, Williams et Christie, 1976) while others focus more on its relationship in communicating rich information and interaction through the medium (Rice, Hughes et Love, 1989; Sproull et Kiesler, 1986; Detmar Straub et Karahanna, 1998; Detmar W Straub, 1994). However, more recently, researchers have focused on the psychological connection of social presence through the presence of warmth, sociability, connectivity, and sensitivity (Gefen et Straub, 2003; Hassanein et Head, 2005, 2007; Rice et Case, 1983; Steinfield, 1986; Yoo et Alavi, 2001). For example, the friendly interaction between customer and employee in bricks-and-mortar stores can be induced by using social cues on websites such as graphic representations and animated videos of a real person (Wang *et al.*, 2007). Adding social presence to a website is said to make the interaction between human and computer feel more "natural," and make consumers feel like they are interacting with a social actor, such as a friendly employee (Wang *et al.*, 2007). In turn, consumers feel more comfortable and emotionally satisfied (Sproull *et al.*, 1996). Therefore, in more recent contexts, social presence is perceived to be high when there is an emotional satisfaction through human warmth, sociability, connectivity, and sensitivity.

The social aspect of shopping has proven to be very impactful in developing more positive emotions in consumers (Jones, 1999; McGrath et Otnes, 1995). Mehrabian and Russell's (1974) classic affect model supports the notion that stimuli in the physical environment influences people's arousal and pleasure responses in physical retail stores (e.g., (Baker, Levy et Grewal, 1992; Robert et John, 1982) (Mehrabian et Russell, 1974). Similarly, it also influences people's arousal and valence when shopping online (Eroglu, Machleit et Davis, 2003). By increasing the social presence on websites, the amount of human warmth and sociability also increased (Gefen et Straub, 2003; Hassanein et Head, 2007; Rice et Case, 1983; Steinfield, 1986; Wang *et al.*, 2007; Yoo et Alavi, 2001). Thus, the positive emotions derived from the social interaction also increased (Gefen et Straub, 2003; Hassanein et Head, 2007). As the sense of perceived social presence increases, there is a stronger and more positive impact on emotions and behavior (Argo, Dahl et Manchanda, 2005). High social presence has proven to increase trust in e-sellers (Cyr *et al.*, 2007; Baozhou Lu, Fan et Zhou, 2016), enjoyment of the shopping experience (Cyr *et al.*, 2007), higher purchase intentions (Gefen et Straub, 2003), and higher appeal and aesthetics (Cyr *et al.*, 2009).

As previously stated, the use of social presence on e-commerce websites has many important benefits. For example, by reading a review written by another consumer or chatting to an employee on the live chat box, consumers feel a higher degree of social interaction leading to more favorable emotions. Therefore, creating more pleasure and certainty in their shopping experience. However, pictures have been seen to have a stronger effect in creating a sense of social presence than text (Short, Williams et Christie, 1976). Hassanein and Head (2007) conducted a study in which it was confirmed that human-centric pictures resulted in the highest levels of social presence by delivering best on human warmth, sociability, and sensitivity. Few studies have looked at the impact of social presence as a product or service informational cue within photos alone. Most studies have evaluated the impact of social presence in a website's entirety including reviews, photos, models, descriptions, emails, etc (Cyr *et al.*, 2007; Gefen et Straub, 2003; Xin Li, Wang et Chen, 2014; Baozhou Lu, Fan et Zhou, 2016). For example, when evaluating the impact of little social presence on a website, most studies would only include a short product description with a simple picture of the product (Cyr *et al.*, 2009; Hassanein et Head, 2007). Whereas a higher level of social presence on a website, would include a review, rich text description and a human in the picture (Xin Li, Wang et Chen, 2014). However, in these studies, the positive impact of a higher level of social presence (human in the picture with rich text description and reviews) is only considered in comparison to a level of no social presence (no human in the pictures and only minimal description). There is limited consideration made as to how social presence may be multidimensional and how these different dimensions impact attitudes and behaviours. In other words, considering the warmth and sociability aspect of social presence, it would be interesting to better evaluate if this concept can be categorized into levels and what the impact of these multiple levels are for emotions online.

Only a handful of studies have begun to investigate the possibility of categorizing social presence in more than two possible levels (no social presence vs high social presence). One study conducted by Hassanein and Head (2007) proposed that adding socially rich product description with a photo added a lower level of social presence. Another study by Cyr, Head, Larios, and Pan (2009) suggested that seeing a picture of a human silhouette while navigating a website can be considered as a medium level of social presence. However, both these studies still evaluate social presence on a website as opposed to within a picture. Considering the importance of photos online and the multiple social media platforms dedicated to the sharing of photos such as Instagram, Facebook,

and third-party sites, it would be beneficial to evaluate this concept within photos alone. Furthermore, it would be interesting to determine if there exists a level of social presence without any humans in the photo or text but still generates a high degree of warmth and sociability. Furthermore, to the best of the researchers' knowledge, no studies have investigated the impact of social presence within photos in the service industry.

In sum, considering that higher social presence leads to higher warmth and thus more positive emotions (Gefen et Straub, 2003; Hassanein et Head, 2007; Sproull *et al.*, 1996), it is important to explore the dimensional models in which emotion is best measured; that is through arousal and valence (Eriksson et Frohm, 2018; Turnbull et Zahirovic-Herbert, 2011). Furthermore, it is important to identify the multiple dimensions of social presence and how they impact emotional responses.

2.2.2 Staging

The term "staging" is often heard in the context of real estate. It is used to describe the process where a seller uses furnishings and decorations arranged in the most universally appealing way in the hopes of attracting the greatest number of potential buyers (Lane, Seiler et Seiler, 2015). E-commerce websites do something very similar when showcasing their products or services online. Rather than capturing the product or service in the moment, many photos on e-commerce websites are staged. Staging a photo involves making premeditated choices involving placing items, choosing the perfect lighting, and arranging compositions (Martinique, 2016). In other words, constructing the perfect picture. By staging a photo, photographers, manufacturers, and consumers create the environment, and more importantly control perceptions and emotions (Martinique, 2016). Therefore, based on prior research, staging a photo refers to the act of planning and preparing an appropriate setting in such a way as to enhance the attractiveness and emotional appeal of the product or service being sold.

It has been long debated whether staging a product in a context was better than placing it on a plain or white background. It was believed that a contextual background made the visual stimuli more complex, inhibited processing fluency, creating frustration, and making it more difficult and timely for the consumer to understand what they were seeing (Duncan et Humphreys, 1992; Janiszewski

et Meyvis, 2001; Jianwei Lu et Itti, 2005; Orth et Crouch, 2014; Reber, Schwarz et Winkielman, 2004; Reber, Wurtz et Zimmermann, 2004; Rosenholtz, Li et Nakano, 2007).

However, other studies have demonstrated that staging a product in its context offers richer information processing leading to more favorable attitudes and intentions (Cai et Xu, 2011; Landwehr, Wentzel et Herrmann, 2013; Mahnke, Benlian et Hess, 2015; Mai *et al.*, 2014; Maier et Dost, 2018). A context is therefore crucial for the product to be properly evaluated (Eriksson et Frohm, 2018). For example, placing a sofa in a living room offers more information about the offering (color schemes, size relative to other furniture, decoration ideas, performance, functionality, etc.) than placing the sofa on a plain and empty background. Additionally, in the world of real estate, an empty home does not show as well as a (properly staged) furnished home because empty homes lack aesthetic and emotional appeal (Turnbull et Zahirovic-Herbert, 2011). By staging, retailers are able to create a feeling of desire and belonging and thus increase consumers' positive emotions towards (Eriksson et Frohm, 2018).

Staging companies argue that a welcoming home is more emotionally appealing and allows potential buyers to more easily envision themselves living in the home, which is the first step towards buying the property (Lane, Seiler et Seiler, 2015). Similarly, staging the photo into a context can enable consumers to more easily envision it in their own life. By doing so, it generates a feeling of desire, more positive emotions, and higher behavioural intentions. However, staging a product with the obvious intent to sell may have negative effects on consumer perceptions (Eriksson et Frohm, 2018). It can be perceived as inauthentic and undesirable (Eriksson et Frohm, 2018). For this reason, it is important to find the right balance of staging into a relevant context and authenticity in order to derive the optimal attitudes and behaviors.

In sum, by staging a photo into its relevant context, companies have control over how the product or service is perceived by the buyer (Martinique, 2016). By doing so, they increase emotional appeal and offer richer information regarding the offering (Cai et Xu, 2011; Eriksson et Frohm, 2018; Landwehr, Wentzel et Herrmann, 2013; Mahnke, Benlian et Hess, 2015; Mai *et al.*, 2014; Maier et Dost, 2018). However, there is a fine line between positive outcomes and negative outcomes when staging. It must be perceived as authentic for the outcome to be positive (Eriksson et Frohm, 2018).

2.2.3 Source of Photo: Consumer versus Brand

To cope with the uncertainty that is linked with online shopping and form attitudes about a product or service, one of the informational cues consumers search for is third-party information (Akdeniz, Calantone et Voorhees, 2013). In other words, consumers look for the advice and the experience of their peers to acquire information about their potential purchase. The first application of the transmission of third-party information on e-commerce websites was with the development of a rating and review system (Baozhou Lu, Fan et Zhou, 2016).

The rise of social media and social networking platforms have facilitated consumers in sharing their experiences, opinions, and feedback regarding products, services, and brands (Filieri, Hofacker et Alguezaui, 2018). When navigating social networking platforms, people may rely on shortcuts that refer to a peripheral route of processing to acquire information about an offering such as the credibility, experience, expertise, trustworthiness, ranking scores of the source (Filieri, Hofacker et Alguezaui, 2018). Many studies have evaluated the importance of consumer reviews in providing rich informational value (diagnosticity), creating trust, and generating purchase intentions. Since online reviews provide consumer personal experiences and evaluations of the product or service, they are considered to be a rich source of information (Chevalier et Mayzlin, 2006). In this situation, the source of the message is the basis for acquiring information to make a purchase decision (Petty, Cacioppo et Schumann, 1983). Furthermore, it was found that participants voice more trust in product information created by other consumers than in information generated by manufacturers (Cheong et Morrison, 2008). Another study confirmed that a third-party credible source has a higher impact of perceived product quality than the manufacturer or company (Akdeniz, Calantone et Voorhees, 2013). However, not all information provided online is necessarily helpful with decision making. For information to be helpful it must be diagnostic (Filieri, Hofacker et Alguezaui, 2018). Information is perceived as diagnostic if it enables consumers to learn and to evaluate the quality and performance of what is being evaluated (Filieri, Hofacker et Alguezaui, 2018). The more the information provided in the review is perceived as having a high level of diagnosticity, the better the consumers' attitudes towards shopping online (Jiang et Benbasat, 2007) and the higher the influence on purchase intentions (Filieri, 2015). In fact, the source of the information being communicated is proven to have a positive effect on perceived diagnosticity (Filieri, Hofacker et Alguezaui, 2018). Similarly, source

credibility and trustworthiness are fundamental predictors of a consumer's acceptance of a message (McGinnies et Ward, 1980).

However, with the common use of smartphones and social media, consumers are now sharing information about a product or service through the use of photos (Ma *et al.*, 2018). Social media sites such as Facebook, Instagram, Snapchat and third-party sites like TripAdvisor and Yelp are a couple of examples of platforms where the consumers' photos are abundant. Social media platforms are considered to be credible platforms to retrieve information among consumers (Karimi et Naghibi, 2015; Mangold et Faulds, 2009). This makes social media content, such as photos very important for research (Highfield et Leaver, 2016). This is even more true for services where sharing photos is an imperative part of communicating information, experiences, and opinions (Chalfen, 1979; Garrod, 2008; MacKay et Fesenmaier, 1997; Markwell, 1997). Photos alongside written reviews have proven to generate higher impact on consumers' positive perception of services during the decision-making process (e.g., (Lo *et al.*, 2011)).

While there is a growing interest in understanding the value and impact of user-generated content especially online product and service reviews, existing research largely focuses on the textual contents (e.g., (Filieri, Alguezaui et McLeay, 2015; Ma *et al.*, 2018; Xiang *et al.*, 2017)). Within the context of services, consumers rely heavily on other consumer reviews and text descriptions as information in order to make a purchase decision due to the fact that the products are experiential (Ma *et al.*, 2018; Sparks, Perkins et Buckley, 2013; Xiang *et al.*, 2015). Although a lot of research has studied the impact of consumer review both with and without photos in tandem, not much research has been done to evaluate the informational diagnosticity of third-party consumer photos in the service industry. Furthermore, considering the important trend of photo sharing online, there is a lack of understanding on whether photos alone (without the review) are perceived as a diagnostic source of information for product and service-related purchases.

In sum, third-party information is perceived as being a rich source for acquiring information regarding a purchase (Chevalier et Mayzlin, 2006) and is seen to directly impact perceived diagnosticity of the message (Filieri, Hofacker et Alguezaui, 2018; McGinnies et Ward, 1980). However little research has been done to investigate the impact of the source of the photo alone, that is without any accompanying review or description for both product and service pictures. On

social media platforms where photos are often presented alone or with little text descriptions, it is important to understand whether knowing who took the photo (another consumer or the brand) affects the perceived diagnosticity of the visual information provided.

2.2.4 Quality

Since product or service quality is not easily observable on e-commerce platforms, cues like website quality, reviews, pictures, and ratings have been used to signal product quality (Akdeniz, Calantone et Voorhees, 2013; Wells, Valacich et Hess, 2011). Not only has the overall quality of a website been found to increase the quality perceptions of the product for sale, thus increasing purchase intentions, it was found to be higher when consumers had higher information asymmetries (Wells, Valacich et Hess, 2011). In other words, for consumers who had more information regarding the product or service for sale, the quality of the website increased their perceptions of the quality of the product and service.

Similarly to an in-store environment, consumers rely on cues in the digital environment to make inferences about the product. In online shopping, this environment is often the website (Baker, Grewal et Parasuraman, 1994; Zeithaml, 1988). Consumers rely on the online store environment to help them identify information to indicate product quality (Baker, Grewal et Parasuraman, 1994). When the consumer has limited information about the product, such as is the case of online shopping, website quality influences perceived product quality because it can easily be observed and evaluated throughout the entire online shopping experience (Wells, Valacich et Hess, 2011).

However, in environments where website quality cannot be observed such as on social media, the quality of a photo is important in helping the consumer decision making process (Helander, 2000; Koehn, 2003; Wolfinbarger et Gilly, 2001). Photos of an offering online are used to convey information as well as visual proof of the real quality of the product or service (Tarr, 1993). In fact, shoppers now expect high quality photos when on e-commerce platforms for enjoyment purposes as well (Tarr, 1993). However, in a peer-to-peer environment such as on social media or on third party sites, where picture quality is highly diverse, consumers are said to have developed a certain level of tolerance towards poorer quality photos (Tarr, 1993).

Furthermore, quality has been proven to impact emotions when shopping online (Xin Li, Wang et Chen, 2014). Website quality positively affects the evaluation of an online shopping experience, which in turn increases the intensity of the emotions of liking, joy and pride (Éthier *et al.*, 2006). In other words, not only does it increase positive emotions (valence), it also increases their intensity (arousal). Similarly, a positive and cheerful emotion derived from a photo increases consumers' happiness and their intention to purchase (Xin Li, Wang et Chen, 2014). Furthermore, valence has been seen to mediate the relationship between perceived quality of a product and a service and positive behavioural intentions. In other words, perceived quality is shown to increase positive behavioural outcomes through positive emotions.

In sum, the quality of the photo being viewed impacts emotion which in turn is said to increase positive behavioural outcomes (Xin Li, Wang et Chen, 2014). Quality is also said to portray information regarding the quality of the offering being viewed (Tarr, 1993). However, shoppers have become more accustomed to poorer quality photos being shared on social media platforms and third-party sites (Tarr, 1993). Therefore, it is important to investigate how the level quality of a photo online impacts emotional responses and if higher quality photos still generate the best outcomes.

2.2.5 Utilitarian and hedonic pictures

Many researchers have studied the classification of hedonic versus utilitarian goods. Some researchers have used the terms “luxury” and “necessity” to imply that luxuries are hedonic goods (consumed for pleasure) and necessities are utilitarian goods (consumed as a necessity) (Kivetz et Simonson, 2002; Baozhou Lu, Fan et Zhou, 2016). A further classification identifies utilitarian products as effective, helpful, functional, necessary, and practical, whereas hedonic products are fun, exciting, delightful, thrilling, and enjoyable (Dhar et Wertenbroch, 2000; Voss, Spangenberg et Grohmann, 2003). Other researchers have gone more in depth and have classified different products into each category. For example, electronics, office supplies, sport equipment, etc, are considered utilitarian goods whereas jewelry, cosmetics, collectibles, home furnishing are considered to be more hedonic (Kushwaha et Shankar, 2013).

Although services such as hotels are generally considered to be more hedonic and experiential, the utilitarian component is also important (Prabhu, 2019). In fact, there must be a balance between

the hedonic and utilitarian component of a service in order to impact booking intentions of hotels online (Prabhu, 2019). In the restaurant industry, although both hedonic and utilitarian components influence behavioural intentions, the utilitarian aspect plays a greater role in consumer satisfaction and positive behavioural intentions (Lee et Wu, 2017; Ryu, Han et Jang, 2010). Whether a product or service is considered to be hedonic or utilitarian represents an important factor in the consumer decision making (Khan, Dhar et Wertenbroch, 2005). Therefore, both hedonic and utilitarian product or service pictures represent important cues that can impact the consumer's attitudes and decisions online. Although there are scientific classifications and descriptions of the terms utilitarian and hedonic, the real classification remains relative and a matter of perception (Khan, Dhar et Wertenbroch, 2005). In other words, whether a product or service depicted in the photo is considered to be of utilitarian or hedonic value is at the discretion of the consumer.

In sum, both utilitarian and hedonic product and service pictures are important for the consumer decision making process (Khan, Dhar et Wertenbroch, 2005). Utilitarian pictures would be considered more helpful, practical and functional for understanding the offering and for making a decision (Dhar et Wertenbroch, 2000; Voss, Spangenberg et Grohmann, 2003). In turn, hedonic product and service pictures generate a more emotional response as they are perceived as being more fun, exciting and thrilling (Dhar et Wertenbroch, 2000; Voss, Spangenberg et Grohmann, 2003).

2.3 Summary of literature review

Photos induce emotional responses leading to more favorable attitudes and behavioural intentions online (Riegelsberger, Sasse et McCarthy, 2003). However, little is known about what components within photos found online impact emotions and the diagnosticity of the information communicated. This extensive overview of current literature of the topic has identified six possible variables found in photos online which lead to emotional responses and higher perceptions of diagnosticity.

More specifically, social presence, staging, quality, and hedonic product and service pictures are informational cues which have proven to generate an emotional response. Increasing the level of social presence in a photo induces more positive emotions through the creation of human warmth

and sociability (Gefen et Straub, 2003; Hassanein et Head, 2005, 2007). Staging a photo into a relevant context such as a sofa in a living room, increases emotional appeal by creating a feeling of desire (Eriksson et Frohm, 2018; Turnbull et Zahirovic-Herbert, 2011). As for quality, a higher quality photo will increase happiness and in turn more positive behavioural outcomes (Xin Li, Wang et Chen, 2014). Finally, hedonic photos of a product and service are seen to impact emotions through feelings of fun, enjoyment, and excitement (Dhar et Wertenbroch, 2000; Voss, Spangenberg et Grohmann, 2003).

Whereas social presence, staging, quality, and hedonic product and service pictures have proven to impact emotion, the source of the photo (consumer versus brand) offers rich information regarding the product or service being viewed (Chalfen, 1979; Garrod, 2008; MacKay et Fesenmaier, 1997; Markwell, 1997). In other words, the source of the photo appears to have a direct impact on the diagnosticity of the product or service (Filieri, Hofacker et Alguezaui, 2018). Similarly, utilitarian product and service pictures are more helpful, practical and functional in evaluating an offering (Dhar et Wertenbroch, 2000; Voss, Spangenberg et Grohmann, 2003). Furthermore, diagnosticity is one of the main conditions that impacts judgement through the influence of emotions such as valence and arousal in low motivational contexts (Feldman et Lynch, 1988; Greifeneder, Bless et Pham, 2011; Petty et Briñol, 2015; Petty et Cacioppo, 2012; Petty, Cacioppo et Schumann, 1983). In turn, diagnosticity is said to impact attitudes and behaviour after exposure to a stimulus such as a photo (Pham et Muthukrishnan, 2002; Pullig, Netemeyer et Biswas, 2006).

See pages 32 and 33 for a summary of this chapter presented in a table format.

Table 1: Key theoretical concepts

	Petty et Cacioppo, 1986, 1996, 2012	Akdeniz, Calantone et Voorhees, 2013	Forgas, 1995 Schwarz et Clore, 1983 Clore, 1992	Fulk *et al.*, 1987	Cyr *et al.*, 2009 Hassanein et Head, 2007 Xin Li, Wang et Chen, 2014
Elaboration Likelihood Model Theory (ELM)	x				
Diagnosticity Conceptual Definition		x			
Affect Infusion Model (AIM) and Affect-by-Information Model			x		
Social Presence: Conceptual Definition of Psychological Presence of humans				x	
Social Presence: A Human-Centric Focus					x

Table 2: Summary of suggested relationships and key references

Opportunities for future research within online pictures							
	Gabisch et Gwebu, 2011 Ahluwalia, Unnava et Burnkrant, 2001 Filieri, Raffaele, 2015 Jiang, et Benbasat, 2004 Pham et Muthukrishnan,2002 Pullig, Netemeyer et Biswas, 2006	Pham,1996, 1998,2004 Russell, 2003 Cohen, Pham et Andrade, 2008 Schwarz et Clore,2007	Gefen et Straub, 2003 Hassanein et Head,2007 Argo, Dahl et Manchanda, 2005 Sproull et al., 1996	Turnbull et Zahirovic-Herbert, 2011 Cai et Xu, 2011 Eriksson et Frohm, 2018	Filieri, Hofacker et Alguezaui, 2018 McGinnies et Ward, 1980 Chevalier et Mayzlin, 2006	Xin Li, Wang et Chen, 2014	Dhar et Wertenbroch, 2000 Voss, Spangenberg et Grohmann, 2003
Concept Discussed: Diagnosticity **Suggested Relationships:** Trust, Perceived Quality, and Intent to purchase	X						
Concepts Discussed: Arousal and Valence **Suggested Relationship:** Diagnosticity		X					
Concept Discussed: Social presence **Suggested Relationship:** Arousal and Valence			X				
Concept Discussed: Staging a photo **Suggested Relationship:** Arousal and Valence				X			
Concept Discussed: Source of the photo **Suggested Relationship:** Diagnosticity					X		
Concept Discussed: Quality of the photo **Suggested Relationship:** Arousal and Valence						X	
Concept Discussed: Utilitarian product/services photos **Suggested Relationship:** Diagnosticity							X
Concept Discussed: Hedonic product/services photos **Suggested Relationship:** Arousal and Valence							X

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CHAPTER 3: Article

The impact of online product and service picture characteristics on consumers' perceptions and intentions[1]

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Abstract: When shopping online, people search for informational cues on websites to help them make a decision regarding a product or service such as reviews, chat boxes, and videos. However, with the rise of social media platforms and social networking sites, a new communication medium dominates: digital pictures. In contexts where motivation and attention are low such as the case of social media platforms, people process information they perceive through the peripheral route where judgment is based on emotional response to stimuli. This study evaluates how the factors of social presence, level of staging, and the source of the photo can impact emotional response and diagnosticity in order to form perceptions and make decisions online. In order to test these informational cues, an online survey was conducted with consumers (N = 335). Results confirmed that the level of social presence and staging have an impact on emotion. In turn, emotions are seen to affect diagnosticity which then impacts perceptions and decisions online. Furthermore, this study revealed a new form of social presence referenced as "inferred social presence" in which evoking a psychological presence of humans in pictures online is as impactful as portraying a physical presence. Implications and future research are outlined.

Keywords: inferred social presence, electronic commerce, photos, social presence, emotion, perceived diagnosticity, online consumer behavior

[1] This article is in review at the International Journal of Electronic Commerce

3.1 Introduction

Social media and online sites have dramatically changed the way people search and receive information about a product or service [61]. Traditionally, in-store shopping would provide most of the information needed to decide whether a product or service was worth purchasing (e.g., emotional and sensory experience, social interaction with peers or employees, and the ability to touch and feel the product) [37, 111]. However, since e-commerce sites lack some of the traditional product and service informational cues that are depended on to make decisions, such as touch and peer interaction, a growing trend has emerged towards acquiring information and basing purchase decisions on other online cues and influences. [2, 120]. For example, Twitter and Annalect revealed that of all Twitter users, nearly 40% decided to purchase something because of an influencer's tweet [61].

To cope with the uncertainty of online shopping and to make inferences about product or service quality and attributes, consumers search for informational cues which deliver certainty in their purchase [2]. Existing literature has examined the impact of marketing cues such as price [90], advertising [54], warranty [8], and brand reputation [5, 24]. Other studies have examined how reviews, chat boxes, influencers, and the use of people within photos provide a social cue that allows consumers to collect socially rich information regarding a product or service [45, 60, 61, 78]. However, with the rise of social media and social networking sites, a new medium for communication of product or service-related information now dominates: pictures. Instagram, Pinterest, Facebook, Snapchat, WhatsApp, and third-party websites are all important social networking platforms where visual content such as photos are shared in abundance. On Instagram alone in 2020, 92% of users admitted to either following a brand, clicking on their website, or made a purchase after seeing a product/service picture on the platform [18]. A Facebook post with a picture generates 2.3X more engagement than those without images [73]. On Pinterest, more than twice the travelers are active on the photo-sharing platform than on the top travel agency website [6]. Additionally, an internal study conducted by TripAdvisor discovered that properties with at least one picture see an increase of +138% in travel engagement and +225% likelihood in booking inquiry [38]. According to the picture superiority effect, compared to textual content, pictures draw more attention, are more informational, and are remembered more [14]. Photos have

been found to induce emotional responses leading to more favorable attitudes [97] and have been found to directly aid consumers' understanding of products when shopping online [58].

However, not all pictures are analyzed and processed equally when forming judgements and attitudes. Of all cues found on social media platforms, such as photos, 87% are processed and analyzed through what psychologists call the peripheral route [114]. According to the elaboration likelihood model (ELM), the peripheral route involves the processing of a cue influenced by factors devoid of issue-relevant information (e.g., peers' influence, emotions, music, attractiveness, reputation) [81-83]. This can be explained through the fact that consumers make minimum cognitive efforts processing information when on social platforms [114]. When individuals lack motivation or are distracted, they tend to take shortcuts in the formation of attitudes and decision making by utilizing peripheral cues such as price, picture, attractiveness of the speaker, celebrity endorsement, or peer influence [114]. This is a reason why there has been an exponential growth in the use and effectiveness of influencer marketing as a tool to communicate product related news on social networking platforms [60]. Peripheral cues are said to be influential through the affect-transfer process where a stimuli (e.g., photo) evokes an affective response [109]. In other words, photos that evoke imagery and emotions are influential through the peripheral route processing [64]. For example, a photo of people having fun on a cruise ship may generate an emotion of joy and desire. These emotions would serve as informational cues in forming judgements, attitudes and behaviors about the cruise line [65].

Some studies have begun to evaluate the impact of certain cues found in photos on consumer perceptions and decisions online. Hassanein and Head (2007) conducted a study in which human-centric pictures resulted in the highest levels of social presence [42]. Therefore, providing a sense of social connection and emotional satisfaction. Other studies evaluated the impact of staging a product into its relevant context on processing fluency and emotional appeal [10, 22, 25, 46, 56, 62, 66-68, 79, 91, 92, 98]. However, to the best of the researchers' knowledge, no study has evaluated these cues within photos alone, but rather in a website's entirety. Furthermore, although much research has proven that third-party reviews and peer influence are perceived to be more credible representations of the offering, little research has been done on photos alone without the accompanying reviews [2, 12, 13, 60].

This study aims to identify the informational cues delivered through product and service photos and their impact on consumer's emotions, perceptions, and ultimately, their intentions to purchase. Through a 2x2x3 experimental design administered through an online questionnaire, this study answers the above research objective by identifying that social presence, staging, and the source of the photo are informational cues within pictures that influence consumers' attitudes and behaviors. This research then makes key contributions to the literature. From a theoretical standpoint, this study offers a new perspective on the understanding of social presence within pictures online and its impact on consumer emotions. Second, it demonstrates the effects of positive emotional reaction stemming from these picture cues on the ability to form judgements, and decisions in contexts where motivation and attention are low. Finally, considering the growing importance attributed to pictures online, the results from this study are extremely relevant for management and for business decision makers. Since many industry advertisement strategies now include the digital marketing of products and services, a better understanding of this topic would provide key insights for management in order to increase the effectiveness of their online goals. By focusing solely on pictures online as opposed to a complete website, the insights from this study can be applied to multiple photo-sharing platforms as opposed to unique brand websites.

The next section will present the key concepts studied in this paper as well as gaps in current literature. Following the review, a detailed account is made of the two-phased approach conducted in order to test the manipulation of these cues and their impact on perceptions and behaviors. Next, the statistical process and results are explained. Finally, contributions and implications for researchers and management are discussed.

3.2 Research Framework and Hypotheses

The following review begins by addressing possible impacts that online photos have on consumers' perceptions, emotions, and behaviors and why their consideration is important. Next, it seeks to identify which characteristics found within these photos are responsible for generating these reactions. In other words, which informational cues within online photos can predict certain consumer outcomes.

3.2.1 Perceptions as well as emotional and behavior outcomes of photos online

When content is communicated to a receiver, the information is evaluated based on its perceived relevance or usefulness for a decision or task at hand [1]. This concept is referred to as diagnosticity. Diagnosticity is the perceived reliability of a cue in distinguishing between alternative categorizations of products [2]. Diagnosticity allows people to form judgements and decisions based on the quality of the information they see [1, 75]. A photo that has high diagnosticity would be an illustration of the product or service that is helpful to evaluate its attributes [52]. Understanding information diagnosticity is imperative for social commerce organizations because the higher the perceived diagnosticity of the information communicated, the better consumer's attitude will be towards shopping online [48] and the higher will be the influence on purchase intentions [27]. A large number of studies have shown that feelings exert stronger influence when they are perceived to be informative for the judgment at hand [39, 102]. In other words, when they are perceived to be diagnostic. Further, research in psychology has examined the effect of diagnosticity after exposure to a stimulus as well as its subsequent impact on attitudes and behavior [1, 48, 55, 89]. For example, the higher the perceived diagnosticity, the more consumers trust the information they see and the more it is perceived as credible [27, 48, 49]. Furthermore, the more diagnostic a cue is perceived (the more information can be derived from the cue), the greater the preference is to purchase the product or service and the better the judgement of its quality [32, 88, 89].

However, not all information that is perceived as generating high diagnosticity will lead to positive consumer outcomes. It is important to note that the relationships relating to perceptions of product and service quality and intentions to purchase mentioned above hold true for information that is perceived as being both helpful and positive [1]. For example, a detailed customer review explaining that the fabric of a dress they purchased is of low quality provides details that are helpful to evaluate the quality of the dress. Despite the review leading to high diagnostcity (helpful to evaluate the dress), consumers will not have very positive perceptions of the product and will most likely not purchase it. Therefore, in cases where the information provided to evaluate the offering is helpful but negative, the outcome will likely not be positive [1]. In the present study, we focus on pictures that depict products and services positively.

A lot of research has been conducted on understanding how information is processed and how it impacts decision making. However, little is known about how consumers evaluate the diagnosticity of the information that is available in photos alone and its influence on consumers' perceptions and decisions. Therefore:

H1: The higher the perceived diagnosticity of the photo, the more the depiction of the product or service will be trusted.

H2: In the case where the depiction of the product and service is positive, the higher the perceived diagnosticity of the photo, the higher the perceived quality of the offering.

H3: In the case where the depiction of the product and service is positive, the higher the perceived diagnosticity of the photo, the higher the intent to purchase the offering.

Researchers have been studying for years how affective states are infused into thoughts when processing information. As a component of affect, emotion has been defined as occurring in two dimensions spanning valence and arousal where both are assumed to be distinctly different [7, 93]. Emotional valence describes whether an emotion is positive or negative whereas arousal measures the strength and intensity associated with the emotional state [7, 57, 99]. Based on the affect-by-information model, a mechanism identified by the Affect Infusion Model (AIM), feelings directly inform judgments when processing is fast and heuristic as a short-cut to evaluating a target [17, 30, 76, 101, 102]. People rely on their current heuristic emotion to form judgements and opinions regarding a target as long as it is perceived to be relevant for the judgment to be made [16, 100, 102]. For example, when asked to compare two product photos online, consumers may simply ask themselves: How do I feel about each one? Thus, basing the evaluation and judgement of the target on current emotion felt at that moment. Similarly, the Elaboration Likelihood Model (ELM), states that when faced with a message or a task, consumers process the information either through the central or peripheral route [35]. ELM states that when people are not very motivated, not able to think carefully, or working through low-effort, persuasion variables such as emotion have an impact on attitudes and decisions through the peripheral route [80, 83, 84, 86, 87].

Since perceived diagnosticity is the ability to form judgements and decisions based on the quality of the information communicated, it is possible that emotion acts as a predictor of perceived diagnosticity in situations where processing is done fast and when motivation is low such as on social networking platforms [1, 75, 114]. Thus, the perceived diagnosticity of the photo influences consumer judgements through emotional responses spanning arousal and valence [7, 57, 64, 99, 109]. Therefore:

H4: There is a positive relationship between arousal generated by a photo and its perceived diagnosticity.

H5: There is a positive relationship between valence generated by a photo and its perceived diagnosticity.

3.2.2 Picture characteristics that predict these perceptions, emotions, and behaviors online

The above review has instigated how photos online evoke emotional reactions spanning arousal and valence and how their perceived diagnosticity positively impacts trust, perceived quality and intent to purchase. The next section explores variables found within photos of products and services that can predict these responses.

One of the most noticeable differences between offline and online shopping is the lack of emotions derived from social interactions with humans [113]. Social presence describes the extent to which a medium allows users to experience others as being psychologically present [31]. Previous research on social presence has focused on its ability to transmit verbal and nonverbal informational cues and its relationship in communicating rich information and interaction through a medium [96, 103, 104, 107, 108]. However, more recently, researchers have focused on the emotional connection of social presence through warmth, sociability, connectivity, and sensitivity [37, 42, 95, 106, 122]. In other words, the emotional response evoked by social presence. Therefore, in more recent contexts, social presence is perceived to be high when there is an emotional satisfaction through human warmth, sociability, connectivity, and sensitivity.

Shopping has always been a social activity [61]. The social aspect of shopping has proven to be very impactful in developing more positive emotions in consumers [50, 73]. This impact has also been noticed for online shopping. By increasing the social presence on websites, the amount of human warmth and sociability also increased [37, 41, 42, 95, 106, 117, 122]. Thus, the positive emotions derived from the social interaction also increases as well as positive behaviors [4, 37, 42].

Although the use of social presence on e-commerce websites has many important benefits, pictures have been seen to have a stronger effect in creating a sense of social presence than text [103]. Hassanein and Head (2007) conducted a study in which confirmed that human-centric pictures resulted in the highest levels of social presence as opposed to no humans in the photo which was considered no social presence [42]. Therefore, human-centric pictures deliver best on human warmth, sociability, and sensitivity. However, few studies have looked at the impact of social presence as a product or service informational cue within photos alone. Most studies have evaluated the impact of social presence in a website's entirety including reviews, photos, models, descriptions, emails, etc [19, 37, 58, 61, 117]. When navigating websites such as Wayfair and TripAdvisor, products and services are often presented in different visual formats, e.g. (1) no humans present on a simple background, (2) contextual background with human personal belongings but no human physically present, and (3) humans in the pictures, ex: sitting on a chair or bed. This phenomenon found in pictures across online platforms and social media has yet to be investigated beyond the physical presence or absence of humans in pictures. Only a handful of studies have begun to investigate the possibility of categorizing social presence in more than two possible levels (no social presence vs high social presence). The few that have, considered social presence in the websites entirety as opposed to only within a photo (e.g., [20, 42]).

Furthermore, considering the importance of photos online and the multiple social platforms dedicated to the sharing of photos such as Instagram, Facebook, and third-party sites, it would be beneficial to evaluate this concept within photos alone. Additionally, it would be interesting to determine if there exists a form of social presence within pictures that generates a high degree of warmth without focusing solely on the physical presence of humans. Finally, to the best of the

researchers' knowledge, no studies have investigated the impact of social presence within photos in the service industry.

Considering that higher social presence leads to higher warmth and thus more positive emotions [37, 41, 42, 105], it is important to explore the dimensional models in which emotion is best measured; that is through arousal and valence [25, 115]. Therefore:

H6a: The higher the perceived social presence in a photo, the higher the arousal evoked.

H6b: The higher the perceived social presence in a photo, the higher the valence evoked.

Furthermore, rather than showcasing a product or service captured in the moment, many industry professionals prefer to stage their photos. Staging a photo involves making premeditated choices involving placing items, choosing the perfect lighting, and arranging compositions [71]. In other words, constructing the perfect picture. By staging a photo, photographers, manufacturers, and consumers create the environment, and more importantly control perceptions and emotions [71]. Based on prior research staging a photo refers to the act of planning and preparing an appropriate setting in such a way as to enhance the attractiveness and emotional appeal of the product or service being sold.

It has been long debated whether staging a product in a context was better than placing it on a plain or white background. It was believed that a contextual background made the visual stimuli more complex, inhibited processing fluency creating frustration, and making it more difficult and timely for the consumer to understand what they were seeing [22, 46, 62, 79, 91, 92, 98]. However, other studies have demonstrated that staging a product in its context offers richer information processing leading to more favorable attitudes and intentions [10, 56, 66-68]. For example, placing a sofa in a living room would offer information about color schemes, size relative to other furniture, decoration ideas, performance, functionality, etc. By staging, retailers are able to create a feeling of desire and belonging and thus increase consumers' positive emotions towards [25]. Additionally, companies have control over how the product or service is perceived by the buyer [71]. By doing

so, they increase emotional appeal and offer richer information regarding the offering [10, 25, 56, 66-68]. Therefore:

H7a: There is a positive relationship between a higher staged photo and the valence evoked.

H7b: There is a positive relationship between a higher staged photo and the arousal evoked.

The rise of social media and social networking platforms have facilitated consumers in sharing their experiences, opinions, and feedback regarding products, services, and brands [29]. When navigating social networking platforms, people may rely on shortcuts that refer to a peripheral route of processing to acquire information about an offering such as the credibility, experience, expertise, trustworthiness, and ranking scores of the source [29]. In other words, in situations where consumers are not fully concentrated or product related information is not obvious, they rely more on the advice and the experience of peers [2]. In this situation, the source of the message is the basis for acquiring information to make a purchase decision [85]. In fact, the source of the information being communicated is proven to have a positive effect on perceived diagnosticity [29]. Similarly, source credibility and trustworthiness are fundamental predictors of a consumer's acceptance of a message [72]. For information to be helpful it must be diagnostic [29]. In fact, the more the information provided in the review is perceived as having a high level of diagnosticity, the better the consumers' attitudes towards shopping online [48] and the higher the influence on purchase intentions [27] when the information is positive.

Online consumer reviews have become one of the most helpful and influential pieces of information in consumers purchase decisions [29]. Prior studies have established the significant effect of consumer reviews in generating higher sales and revenues in different products and services such as books, beers, restaurants, movies, and hotels (e.g. [13, 15, 18, 21, 59, 121]). Furthermore, since online reviews provide consumer personal experiences and evaluations of the product or service, they are considered to be a rich source of information [13]. Additionally, people voice more trust in product information created by other consumers than in information generated by manufacturers [12]. Another study confirmed that a third-party credible source has a higher impact of perceived product quality than the manufacturer or company [2].

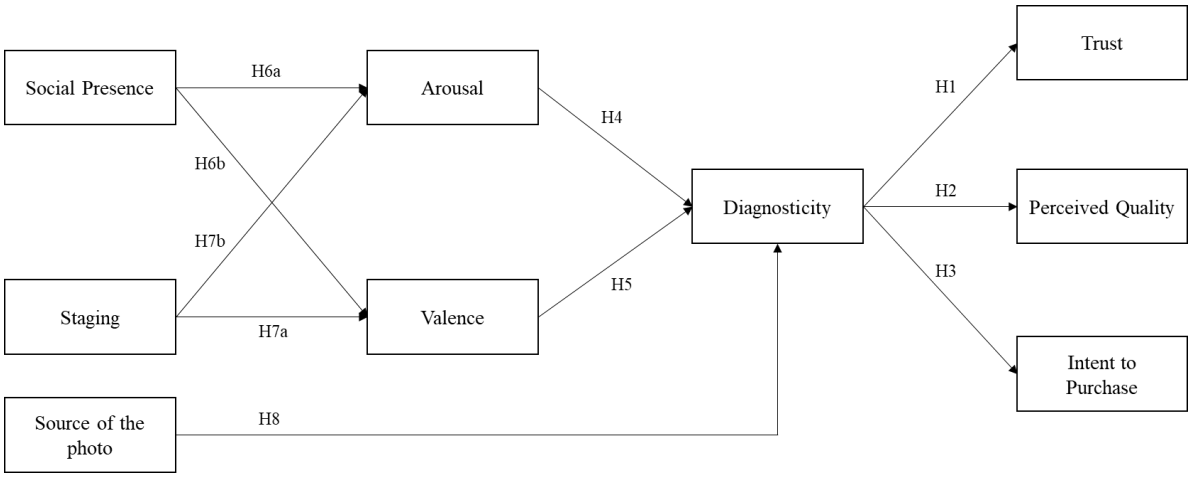
While there is an emerging interest in studying the impact of user-generated content, previous research has focused primarily on investigating textual content such as online reviews (e.g., [28, 63, 119]). Social media and third-party sites such as TripAdvisor and Yelp are a couple of examples of platforms where consumers' photos are abundant. Social media platforms are considered to be credible platforms to retrieve information among consumers [51, 69]. This makes social media content, such as photos very important for research [43]. This is even more true for services where sharing photos is an imperative part of communicating information, experiences, and opinions [11, 33, 65, 70]. Although a lot of research has studied the impact of consumer reviews both with and without photos in tandem, there is a lack of understanding on whether photos alone (without the review) are perceived as a diagnostic source of information for product and service-related purchases. Therefore:

H8: A photo taken by a consumer has a stronger positive relationship on its perceived diagnosticity than a photo taken by the brand.

3.3 Method

The following section presents the two-phased approach conducted for this study. The first phase consists of a pre-test in order to check the manipulation of the predictor variables with a large base of photos. Then, the main study measures the impact of the predictor variables on consumer outcomes. In order to determine which characteristics found in pictures online impact consumer outcomes, a within subject online questionnaire was administered on Qualtrics and distributed on Amazon Mechanical Turk (Mturk). To test the effect of the manipulations, a base of 264 photos was prepared and tested prior to the main study. In order to be eligible to answer both questionnaires, participants had to be located in North America and have a HIT approval rate of at least 85% to ensure the quality of responses. Participants were compensated for their participation. Further, this study was approved by the Research Ethics Board (REB). See Figure 1 below for the research model tested.

Figure 1: Research model



3.3.1 Pre-Test: manipulation check of the predictor variables

A manipulation check was conducted initially in order to verify the participants' perception of social presence and the level of staging within pictures online. This initial phase also identified the appropriate quantity of photos to be tested in the main study. Finally, it confirmed that there exists a form of social presence in pictures that is not human-centric which was labelled "inferred social presence" by the researchers.

In order to select the most appropriate photos for the study, a large base of 264 product and service pictures was tested. Within the 264 photos, 120 were of furniture and 144 were of tourism products. These product categories were selected to provide the most general recommendations for all e-commerce photos online. In particular, furniture was selected since photos in this category are said to be more important for the shopping experience than text descriptions [94]. The types of furniture pictures were desks, tv stands, swing chairs, and sofas. Similarly, travel pictures have shown to be more important than written comments and reviews [38]. The selection of tourism photos were hotels, cruises, and spas. In order to cover a large range of commerce photos found online within these categories, hedonic and utilitarian photo types were selected. The pictures were then selected based on their level of staging, and their form of social presence.

Previous literature has identified that a photo with no social presence would have no human physically present and limited to no warmth whereas a photo with high social presence in turn would have humans present and high warmth [20, 42]. However, as previously mentioned, when navigating websites such as Wayfair, TripAdvisor, and social media, products and services are often presented in different visual formats including variants of either the presence or absence of humans, personal objects, and the existence or absence of a contextual background. As mentioned, the concept of social presence was defined as the extent to which a medium allows users to experience others as being psychologically present [31] and more recently, as higher levels of warmth and sociability [20, 42]. With these definitions in mind, we propose that current literature has not fully investigated the complexity of social presence in photos alone beyond the physical presence of humans. Therefore, the researchers posit the existence of an observed social presence (when humans are **physically** depicted in photos), and an inferred social presence, (when no humans are physically present, but the pictures contain a **psychological** sense of human presence). Further, similar to a picture that has been described as having "no social presence" in previous studies [20, 42], the researchers decided to attribute the name of "Not observed social presence" when no form of social presence was detected. The researchers suggests that an example of inferred social presence in a picture would be a bag left on a bed or reading glasses left on a desk which would convey a psychological sense of human presence and warmth without any physical human present (see Figure 2 below).

Figure 2: Classification of social presence in pictures online

	Not Observed Social Presence	**Inferred Social Presence**	**Observed Social Presence**
Features	• No humans present • No personal objects • Limited warmth	• No humans present • Personal objects • High warmth	• Humans present • Personal objects • High warmth
Photo examples			

In order to collect and retrieve these pictures, third party sites such as Wayfair and TripAdvisor were used as well as Instagram and Google images. In order to ensure no bias regarding the quality of the photos selected, all pictures were modified to 400 x 500 pixels on GIMP, a graphics editor platform. The concept of social presence was measured with two items (one to measure warmth and the other to measure the human component) whereas staging was measured using a single item (see Table 1). Each participant was compensated $1 USD for their participation. See full questionnaire in Appendix 1. Finally, Independent t-tests on SPSS were conducted to test these manipulations.

Table 1: Items used in manipulation check

Constructs	Item(s)	Scale	Source
Social Presence (warmth)	There is a sense of human warmth in this photo	5-point Likert scale "Strongly disagree" to "Strongly agree"	Adapted from the social presence construct developed by Gefen and Straub (2003) [37].
Social Presence (human)	"Looking at the scene in this picture, I think that:	Categorical: (1) Nobody was ever present there (2) People were present there (3) People are currently present there	Developed by researchers
Staged	This photo looks staged	5-point Likert scale "Strongly disagree" to "Strongly agree"	Developed by researchers

3.3.2 Main study: impact of the predictor variables on consumer outcomes

The manipulation check identified that all three forms of social presence and a high versus low staged photo are properly perceived by participants. In addition to testing the impact of social presence and staging on attitudes and intentions, this study also measured the effect of the source of photo manipulation. The manipulation check also determined that only 60 pictures from the initial base of 264 were perceived as distinctly different across each of the predictor variables.

Participants and Design

In total, the questionnaire was completed by 335 participants. Each participant was presented with 12 pictures that were randomly generated by Qualtrics from a base of 60 pictures. The 12 pictures represented a 2x2x3 experimental design where pictures were identified as either observed, inferred, or not observed social presence, high or low staging, and either a consumer or brand's photo. The pictures were evenly spread for a total of 4020 observations. See Table 2 for a breakdown of the participants' demographic variables.

Table 2: Demographic variables

Gender			**N=335**
	Man	67%	[225]
	Woman	32%	[107]
	Non-binary/agender/other	1%	[3]
State/province			
	West of Canada	3%	[10]
	Ontario	7%	[24]
	Quebec	3%	[10]
	Atlantic Canada	1%	[3]
	Midwest USA	15%	[50]
	Northeast USA	18%	[60]
	South USA	30%	[100]
	West USA	23%	[77]
	Other	0.3%	[1]

Age	**N=335**
Mean	36.69
Median	34
Mode	30
Std Deviation	10.99
Minimum	19
Maximum	71

Procedure

Participants were required to complete an online questionnaire through their Amazon Mechanical Turk account. Each participant was asked to answer 8 questions pertaining to the photo's perceived diagnosticity, the level of arousal and valence evoked, their trust in what the photo was depicting, as well as the perceived quality of the offering and their intent to purchase it. This procedure was repeated 12 times so that each participant saw 12 photos, one per cell in the 2x2x3 experimental design. After rating all 12 photos, participants were then required to answer a series of demographic questions. Throughout the questionnaire, participants were presented with two attention check questions that read "For this statement, please select strongly agree". If failed, the questionnaire ended, and their response was not used for the analysis. Finally, participants were compensated $1.50 USD for their participation.

Instrument development

The measurement items were adapted from previous research when possible. All six constructs were measured through formative items. The decision was made to keep each construct at a limit of two items in order to decrease the length of the questionnaire and to provide general recommendations for both products and services. All items were tested through two pre-tests in order to ensure their effectiveness. Table 3 presents the results of the Cronbach's alphas, which indicates that the perceived diagnosticity scale was reliable (0.753) [77]. The lower alpha for trust can be explained by the fact that it was internally created and since it had a low number of items [112]. That being said, recent studies have suggested that values above 0.6 are acceptable [110, 116]. With that consideration, the alpha of 0.683 is sufficient to show that its reliability is acceptable. See full questionnaire in Appendix 2.

Table 3: Main study constructs and items

Constructs	Item(s)	Scale	Source	Cronbach's Alpha
Diagnosticity	How helpful was this photo in evaluating the product or service? How helpful was the information provided in this photo in evaluating the product or service?	5-point Likert scale "Not at all helpful" to "Extremely helpful"	Adapted for this study from two existing scales, the first from Filieri, R., (2015) [27] and the second from Jiang, Z. and I. Benbasat. (2004) [49].	0.753
Trust	I can trust this photo to consider how the product or service will look like This photo is a trustworthy representation of this product or service	5-point Likert scale "Strongly disagree" to "Strongly agree"	Adapted from from Gefen, D., (2000)[36] and Kim, D.J., D.L. Ferrin, and H.R. Rao (2009) [53].	0.683
Arousal	This photo makes me feel excited	5-point Likert scale "Strongly disagree" to "Strongly agree"	Adapted Self-Assessment Manikin (SAM) scale from Bradley, M.M. and P.J. Lang, (1994) [9].	
Valence	This photo makes me feel happy			
Perceived Quality	Based on this photo, this is a high-quality product or service	5-point Likert scale "Strongly disagree" to "Strongly agree"	Adapted from Everard, A. and D.F. Galletta, (2005) [26].	
Preference to buy	If I was looking to buy a product or service like this one, I would buy the one presented in this photo	5-point Likert scale "Strongly disagree" to "Strongly agree"	Adapted from Everard, A. and D.F. Galletta, (2005) [26].	

Furthermore, a statement was provided above each photo in order to identify the source of the photo. For a consumer's photo, the statement read "This photo of a (insert name of product or service in photo) was **taken by a customer**". For a brand's photo, the statement read "This photo of a (insert name of product or service in photo) was **taken by the company providing this product/service**". To test the manipulation of this variable, four manipulation check questions were asked randomly throughout the questionnaire. The photos attributed to either source was done randomly.

Statistical Approach

Since participants were asked to rate 12 photos throughout the questionnaire, the final data consisted of repeated measures. Furthermore, due to the data not being normally distributed and not continuous, a median split was conducted to change the data to binary. This led the researchers to conduct logistic regressions with random intercept.

The interpretation of the coefficients was done using the odds ratio. The odds ratio represents the probability that the event will occur, divided by the probability that it will not [78]. An odds ratio is expressed as the change in likelihood of an event occurring when the predictor variable increases by one unit [3, 78]. It is common practice to express the increase or decrease of the odds ratio as a percentage [3]. However, when the odd ratio is above 1.99, it is expressed in terms of multiplicator [3, 78]. Table 6 shows the results of the logistic regressions model with the probability of the dependent variable having a value of 1 (greater than median). The two-sided p-values were adjusted for multiple testing using the method of Holm-Bonferroni [44].

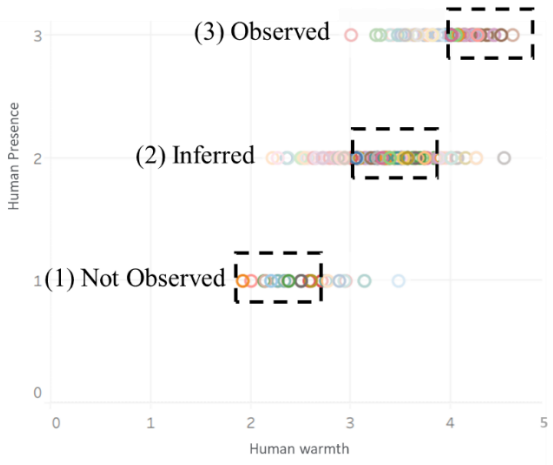
3.4 Results

3.4.1 Pre-test: manipulation check of the predictor variables with a large base of photos

Since the main contribution of this study pertained to social presence, the first step conducted was to determine if an inferred level of social presence exists. All 264 photos were initially classified based on their human presence (categorical) and level of warmth (numerical). Figure 2 illustrates this classification. Independent t-tests were then conducted on SPSS to test significant differences

between the 3 forms of social presence. The photos classified as not observed social presence (2.35 ± 0.24) were significantly different from those classified as inferred social presence (3.41 ± 0.05) ($p < 0.0001$) and those classified as observed social presence (4.33 ± 0.11) ($p = 0.004$). Furthermore, the photos classified as inferred social presence (3.41 ± 0.05) were significantly different from those identified as observed high social presence (4.33 ± 0.11) ($p = 0.009$). These results confirm that there is in fact an inferred social presence that exists in photos online where there are no physical humans in the photo, but a psychological human presence and a high degree of warmth is conveyed. See Figure 3 for results. A final independent t-test was conducted to verify whether there were significant differences for a high and low staged photo across all three types of social presence. The results were positive ($p < 0.05$) which indicates that the combination of all three forms of social presence as well as a high versus low staging provide significant and distinct differences between the photos (see Table 4). The combination of these two tests narrowed down the appropriate total of photos to 60 from the initial base of 264 which were all significantly different based on their perceived social presence and level of staging categorizations.

Figure 3: Statistical categorization of 3 forms of social presence in pictures online



Social Presence	N	Mean	Std	Sig. ($p < 0.05$)		
				1 vs 2	1 vs 3	2 vs 3
1	20	2.35	0.24			
2	20	3.41	0.05	<0.0001	0.004	0.009
3	20	4.33	0.11			

Table 4: Independent t-tests for staging in all 3 levels of social presence

Social Presence	High Staged	Low Staged	Sig ($p < 0.05$)
Not Observed	3.98	3.28	0.001
Inferred	3.87	3.13	< 0.0001
Observed	3.83	3.00	< 0.0001

3.4.2 Main study: hypotheses validation of the predictor variables on consumer outcomes

Table 5 highlights the descriptive statistics for each experiment cell. For each of the 12 cells, the mean and standard deviation are identified, showcasing each picture type's effect on perceived diagnosticity, arousal, valence, trust, perceived quality, and intent to purchase.

Table 5: Descriptive statistics for experimental cells

Cell				Diagnosticity (Median = 4)		Trust (Median = 4)		Preference to buy (Median = 4)		Perceived Quality (Median = 4)		Arousal (Median = 4)		Valence (Median = 4)	
Cell number	Social Presence	Staging	Source	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
1	Not Observed	High	Consumer	3.79 [7,8,10,12]	0.84	3.92 [5 - 12]	0.74	3.74 [8,10,12]	0.93	3.92 [3,5,7 - 10,12]	0.87	3.43	1.04	3.59 [8,10]	1.00
2	Inferred	High	Consumer	3.87 [7,8,10,12]	0.87	3.97 [5 - 12]	0.77	3.87 [1, 5 - 10, 12]	0.94	3.96 [5, 7 - 10,12]	0.93	3.71 [1,5,7,8,10,12]	1.14	3.79 [4,5,8,10,12]	1.00
3	Observed	High	Consumer	3.77 [8,12]	0.82	3.88 [7,8, 11, 12]	0.76	3.74 [5,7,8,10,12]	0.93	3.80 [8,10]	0.93	3.63 [10]	1.14	3.76 [4,5,8,10,12]	0.99
4	Not Observed	High	Brand	3.87 [7,8,10,12]	0.84	3.93 [5 - 12]	0.67	3.73 [7,8,9,10,12]	0.98	3.87 [3,5, 7- 10,12]	0.87	3.53 [10]	1.14	3.59 [10]	1.06
5	Inferred	High	Brand	3.82 [8,12]	0.82	3.84 [8,12]	0.84	3.67 [8,10, 12]	1.06	3.77 [8,10]	0.99	3.64 [10]	1.19	3.70	1.14
6	Observed	High	Brand	3.79 [8, 12]	0.90	3.79 [8,12]	0.81	3.72 [8,10,12]	1.01	3.84 [8,10,12]	0.89	3.67 [1,7,8,10]	1.09	3.87 [1, 4, 5, 7 - 12]	1.01
7	Not Observed	Low	Consumer	3.73 [8, 12]	0.86	3.82 [8]	0.82	3.57	1.08	3.72 [8,10]	0.95	3.39	1.19	3.58 [8,10]	1.04
8	Inferred	Low	Consumer	3.63	1.05	3.69	0.96	3.55	1.13	3.68	1.08	3.49	1.19	3.56	1.16
9	Observed	Low	Consumer	3.86 [8,12]	0.87	3.86 [8,12]	0.83	3.75 [8, 10, 12]	1.01	3.82 [8,10]	0.90	3.74 [1,3,4,5,7- 10,12]	1.05	3.77 [8,10]	1.07
10	Not Observed	Low	Brand	3.72 [8, 12]	0.93	3.77 [8,12]	0.83	3.48	1.13	3.54	1.12	3.31	1.29	3.39	1.17
11	Inferred	Low	Brand	3.87 [7,8,10,12]	0.82	3.86 [8,12]	0.85	3.79 [5, 7,8,10,12]	0.93	3.95 [8,10,12]	0.96	3.71 [7,8,10]	1.12	3.76 [8,10]	1.07
12	Observed	Low	Brand	3.64	1.04	3.73	0.93	3.55	1.15	3.73 [10]	1.03	3.54 [10]	1.17	3.54	1.14

Note: The numbers in superscript represent the experimental cells which are significantly different.

This next phase aimed to measure the impact of the picture characteristics on emotions, perceptions, and intentions online. The first relationship tested with a logistic regression was the impact of perceived diagnosticity of the product or service photo on trust, perceived quality, and intention to purchase (H1, H2, and H3). The logistic regressions confirmed that a photo that is perceived to have high diagnosticity increases the odds of generating higher trust by 8.5 times (OR 8.523, p= 0.001), perceived quality by 4.9 times (OR 4.851, $p < 0.0001$), and higher intent to purchase by 4.8 times (OR 4.827, $p < 0.0001$) as opposed to a photo that is perceived to generate low diagnosticity. Thus, hypotheses 1, 2, and 3 are supported. Next, a logistic regression with arousal as the independent variable and perceived diagnosticity as the dependent variable was performed. The results show that the odds of generating higher diagnosticity is 4.1 times higher if the picture evokes higher arousal as opposed to lower levels of arousal (OR 4.114, $p < 0.0001$). This result supports Hypothesis 4. Furthermore, another logistic regression was performed but with valence as the independent variable and perceived diagnosticity as the dependent variable. The results demonstrated that a photo that evokes higher valence increases the odds of generating higher diagnosticity by 4 times (OR 4.040, $p < 0.0001$) as opposed to a photo which induces lower valence. Therefore, Hypothesis 5 is also supported. Table 6 illustrates these results for more detail.

Additionally, the logistic regressions indicate that social presence is seen to significantly impact the dependent variables of arousal and valence. A picture with an observed social presence can expect to increase the odds of generating high arousal by 33% (OR 1.343, $p < 0.0001$) compared to a photo with not observed social presence. Furthermore, a photo with inferred social presence is 41% more likely to increase the odds of generating high arousal than a photo with not observed social presence (OR 1.409, $p < 0.0001$). However, the odds of generating high arousal from a photo with observed social presence is not significantly more than for a photo with inferred social presence (OR 1.047, $p = 0.061$). Next, logistic regressions were conducted to measure the impact of social presence on valence. Results showed that a picture with observed social presence can expect to increase the odds of generating high valence by 28% (OR 1.284, p= 0.002) compared to a photo with not observed social presence. A photo with inferred social presence was seen to increase the likelihood of generating high valence by 44% (OR 1.438, $p < 0.0001$) compared to a photo with not observed social presence. However, there is no significant difference between the odds of generating high valence between a photo with observed social presence and one with

inferred social presence (OR 1.115, p = 0.072). Hypothesis 6a and 6b are still upheld as higher forms of social presence (observed and inferred) performed significantly better than pictures with not observed social presence. There were no significant differences between the level of arousal and valence evoked between a photo with inferred social presence and one with observed social presence (p > 0.05).This indicates that both types of social presence have similar effects on the emotion derived from product and service pictures. See Table 6 for these results.

Further, logistic regressions indicated that a higher staged photo increases the likelihood of generating higher valence by 18% (OR 1.181, p= 0.011) as opposed to a photo that is low staged. These results support Hypothesis 7a. However, a high level of staging did not increase the odds of generating high arousal significantly more than a low staged photo. Hypothesis 7b is therefore not supported (OR 1.075, p = 0.082). Hypothesis 8 stipulated that a consumer's photo will have a higher impact on diagnosticity than a brand's photo. However, the logistic regression indicated that the likelihood of generating higher perceptions of diagnosticity from a consumer's photo is not significantly higher than for a brands's photo (OR 1.006, P =0.928). This result therefore confirms that Hypothesis 8 was not supported. See Table 6 below for a breakdown of all the logistic regressions and Figure 4 for a visual representation of these results in the research model.

Table 6: Logistic regressions

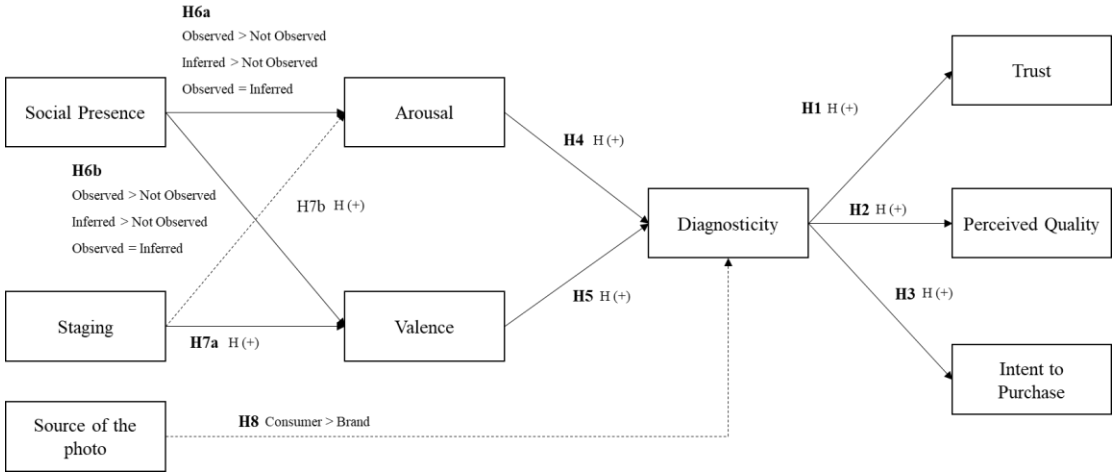
Effect	Contrast	Dependent variable	B	SE B	Wald $\chi 2$	p	OR
Social presence	Observed vs Inferred	Arousal	0.295	0.078	14.161	0.061	1.047
Social presence	Inferred vs Not Observed	Arousal	0.046	0.075	10.37	< 0.0001	1.409
Social presence	Observed vs Not Observed	Arousal	0.343	0.079	19.032	< 0.0001	1.343
Social presence	Observed vs Inferred	Valence	0.25	0.079	9.907	0.072	1.115
Social presence	Inferred vs Not Observed	Valence	0.364	0.08	20.657	< 0.0001	1.438
Social presence	Observed vs Not Observed	Valence	0.107	0.08	1.975	0.004	1.284
Staging	High vs Low	Valence	0.072	0.065	1.22	0.011	1.181
Staging	High vs Low	Arousal	0.112	0.064	3.024	0.082	1.075
Source	Consumer vs Brand	Diagnosticity	0.006	0.064	0.008	0.928	1.006
Arousal	High vs Low	Diagnosticity	1.414	0.069	425.651	< 0.0001	4.114
Valence	High vs Low	Diagnosticity	1.396	0.069	407.818	< 0.0001	4.04
Diagnosticity	High vs Low	Trust	2.143	0.071	915.577	0.001	8.523
Diagnosticity	High vs Low	Intention to buy	1.574	0.067	556.491	< 0.0001	4.827
Diagnosticity	High vs Low	Perceived quality	1.579	0.069	519.898	< 0.0001	4.851

Note:

1) The logistic regressions model the probability that the dependent variables have a value of 1 (greater than the median).

2) Two-sided p-values adjusted for multiple testing using the method of Holm-Bonferroni.

Figure 4: Visual Representation of Results in Research Model



3.5 Discussion

The results from this study began by identifying that an inferred social presence exists in photos found online. This level of social presence did not include humans but still evoked a psychological presence and a high degree of human warmth through the use of personal objects. Next, this study confirmed that higher levels of social presence perform best on evoking higher arousal and valence. However, evidence from this study suggests that both inferred and observed social presence perform similarly on these emotions. This study also supported the notion that a higher staged photo generates higher valence, however it did not impact the level of arousal. The results deny support for the impact of the source of the photo on its perceived diagnosticity. Finally, pictures that are perceived as having higher diagnosticity have a more positive impact on trust, perceptions of quality, and intent to purchase.

The results from this study have several theoretical contributions. First, these results confirm that humans do not need to be physically present in pictures in order to convey social presence. This is a critical contribution to existing literature on social presence which up to now strongly emphasized the importance of portraying physical humans during online shopping experiences [19, 20, 42, 117]. Therefore, our understanding of social presence has changed and has enriched

the original definition regarding the psychological presence of humans. This study shows that an inferred social presence (personal objects in the photo that convey warmth without physical humans present) has an equal, if not superior, impact on emotion than a photo with observed social presence (humans in the photo). Furthermore, this study confirmed that higher levels of social presence perform better on evoking positive emotional responses than photos with not observed social presence. Additionally, this study confirms previous research conducted on the effects of emotion on the ability to form judgements in contexts where motivation is low through the peripheral route [64, 74, 75, 81-83, 114]. In fact, higher arousal and valence had a positive impact on the perceived diagnosticity of the picture viewed. Considering that participants were asked to complete a 15-minute questionnaire online and their level of involvement with the offering was very low, motivation was likely quite low as well. Participants therefore relied on the arousal and valence evoked by these photos in order to acquire information to diagnose the product or service and base their perceptions and decisions.

Next, this study identified that photos that are highly staged increase consumer's happiness (valence), but not their level of excitement (arousal). Although high staged photos generate positive emotions, it was not enough to increase the intensity of that emotion alone. This was perhaps due to the fact that their involvement with the products and services was low and since they were in a low motivated context. Finally, the researchers were unable to find support for the notion that the source of the photo impacts its perceived diagnosticity. This could be explained for several reasons. It is possible that a photo alone with a statement to explain the source is not enough for participants' perceptions to be impacted. A study conducted by Yufeng Ma, Zheng Xiangb, Qianzhou Duc, and Weiguo Fand (2018), found that third-party photos alone did not provide enough informational cues to help users make judgements about the helpfulness of reviews [63]. However, when combining them with review texts, they provided a complementary and reinforcement effect to the review [63]. Therefore, it is possible that these results can be explained by the fact that the source of the photo must be accompanied by a review, description, or the online environment in order to have an impact on perceived diagnosticity.

This study has also identified several key insights to be considered by management when considering what types of photos to share and promote online. As there is no significant differences

between the impact of a photo with inferred social presence and observed social presence on arousal and valence, management does not need to invest an important portion of their marketing budget to recruit human models for their promotional photos in order to create the desired impact. Additionally, many studies have confirmed that there exist forms of unconscious bias in regards to race and gender when consumers view advertisements online with human depictions [23, 34, 40, 47, 118]. The race of actors has been shown to influence the type of audience drawn to a movie [47, 118], hosts on Airbnb are seen to less likely rent properties to racial minorities [23], some Uber drivers have cancelled rides for men with Black-sounding names at more than double the frequency as men without Black-sounding names [34], and female workers on freelance websites have received fewer reviews than men workers with equivalent work experience [40]. Portraying product and service pictures with inferred social presence would allow management to mitigate the risk associated to unconscious bias while still having positive outcomes on their business goals.

Furthermore, this study identified that photos that are highly staged increase consumer's happiness. For management, this indicates that their current efforts to share properly staged photos that are of good quality are having a positive impact on consumers. They should therefore continue their efforts in staging photos. Additionally, this indicates to management that in their efforts to encourage user-generated content and adopt influencer marketing tactics, high staged photos should be a top requirement in order to share content. Their photos shared online must be perceived to be premeditated or planned as well as be aesthetically pleasing. Considering that many photos are viewed through online platforms and social media, it is important that management promote and share photos that evoke positive emotional responses in order to help consumers form perceptions, and positive behavioral intentions. The results demonstrated that this can be done by promoting photos of higher levels of social presence and that are highly staged.

Finally, as with any research study, there are some limitations that should be noted. Firstly, since this study was conducted using a questionnaire, measurements were limited. Future research should consider using physiological and eye tracking measurements (heart rate, breathing and galvanic skin response, emotional and cognitive states, visual attention) in order to test automatic and unconscious behaviors as well as affective and cognitive states. Additionally, this study focused on several furniture and tourism products only. Future research should test additional

product categories in order to confirm the generalizability of these results. Lastly, due to the nature of studying these characteristics in photos alone, future research should test these results in the context of social media and web pages in order to confirm their effect.

Considering the importance associated with photos on online platforms such as social media and social networking sites, this study sought to identify which informational cues found in pictures online lead to positive emotions, perceptions, and favorable purchase decisions in consumers. Understanding the effects of different factors found in photos online can significantly impact the performance of digital marketing tactics. This study provided insights to help marketers and management follow specific guidelines to promoting photos and to encouraging photo-sharing online. In addition to providing management with these key guidelines, it also identified key theoretical implications and areas for future research.

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CHAPTER 4: Managerial Article

Hôtellerie et tourisme: Comment choisir les meilleures photos pour promouvoir vos produits et services

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Sommaire

Il existe peu de connaissances sur les types de photos en ligne qui influencent les intentions d'achat des consommateurs dans le secteur hôtelier et touristique. Notre équipe a récemment mené une étude en ligne auprès de 335 consommateurs nord-américains afin de répondre à cette question. Nos résultats ont permis d'identifier que les photos de consommateurs avec une présence sociale inférée (objets personnels dans la photo, mais sans individus) et une mise en scène élevée ont eu le plus d'impact sur les intentions d'achat. Ainsi, il n'est donc pas nécessaire de consacrer une grande partie du budget marketing à des modèles humains dans les photos promotionnelles pour obtenir l'impact désiré.

4.1 Introduction

Sur quels critères est-ce que les professionnels du secteur hôtelier et touristique devraient se baser pour choisir les photos à partager en ligne? Est-ce que les influenceurs et les consommateurs devraient être encouragés à partager des photos et, si oui, quelles lignes directrices devraient-ils suivent afin de générer les meilleurs résultats? Quelles sont les photos qui influencent le mieux l'intention d'achat en ligne? Les réponses à ces questions permettraient aux professionnels de cette industrie de prendre de meilleures décisions d'affaires quant aux choix de photos à diffuser en ligne.

L'internet a profondément modifié la façon dont les consommateurs se renseignent et achètent des produits dans l'industrie hôtelière et touristique. Lorsque les consommateurs effectuent des recherches en ligne pour leur prochaine destination de voyage, ils se tournent désormais vers les sites tiers comme TripAdvisor, les réseaux sociaux et blogues d'influenceurs et dans les communautés en ligne afin de poser des questions, se renseigner sur les expériences vécues, et pour prendre des décisions d'achat[1]. En fait, plus de 85% des voyageurs suivent au moins trois

comptes en ligne d'influenceurs de voyages, de mode et/ou de style de vie[2]. L'information fournie entre consommateurs est maintenant considérée comme étant plus fiable que toute information fournie par les compagnies et les agences de voyage[3]. De plus, une étude interne menée par TripAdvisor a révélé que les photos de consommateurs sont encore plus importantes pour les réservations en ligne que les commentaires[4]. Avec l'essor des médias sociaux et la popularité des contenus générés par les utilisateurs, les photos sont devenues un moyen de communication très populaire pour toutes informations liées aux voyages. Plus précisément, les photos d'influenceurs et de consommateurs.

Malgré l'importance accordée aux photos d'influenceurs et de consommateurs dans le secteur de l'hôtellerie et du tourisme, il existe très peu de directives concernant les types de photos à partager en ligne afin d'obtenir les meilleurs résultats. C'est pour cette raison que la présente étude cherche à répondre aux trois questions suivantes:

1. La présence sociale est-elle importante dans les photos? Si oui, quel niveau de présence sociale a le plus d'impact sur les intentions d'achat en ligne (soit observée, non observée ou inférée)?

2. Les intentions d'achat sont-elles plus importantes pour une photo avec une mise en scène élevée ou une mise en scène faible?

3. Les photos de consommateurs conduisent-elles à des intentions d'achat plus élevées que les photos prises par les entreprises touristiques?

La présence sociale est la capacité d'un média de permettre aux utilisateurs de ressentir de façon psychologique la présence d'autres personnes[5]. Tandis que la mise en scène d'une photo réfère à l'acte de planifier et de préparer un contexte approprié de manière à renforcer l'esthétique et l'attrait émotionnel du produit ou du service vendu[6].

Afin de répondre à ces questions, nous avons testé auprès de 331 consommateurs une série de photos hôtelières et touristiques trouvées en ligne. Ces photos ont ensuite été évaluées à l'aide d'un questionnaire en ligne (voir l'encadré dans les notes pour plus de détails).

4.2 Les meilleures pratiques à suivre pour le partage de photos hôtelières et touristiques en ligne

Les résultats de notre étude ont permis d'identifier les tendances à prendre en considération par les professionnels dans l'industrie hôtelière et touristique lors de la sélection de photos à partager en ligne pour faire la promotion en ligne:

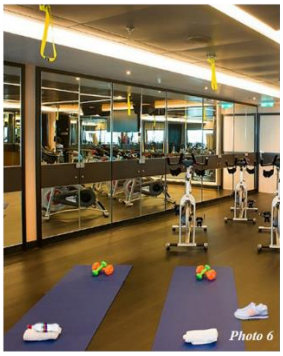
1. Un humain n'a pas besoin d'être présent dans la photo pour convier une présence sociale

Les résultats ont démontré qu'une présence sociale inférée (objets personnels dans la photo, mais sans individus) a une portée égale, voire supérieure, sur les intentions d'achat, que les photos avec une présence sociale observée (humains dans la photo). Dans tous les cas, une certaine présence sociale sera plus performante qu'une photo qui n'en a aucune. Ceci indique qu'il n'est pas nécessaire d'investir dans le recrutement de modèles humains (réduction de frais) pour la prise de photos promotionnelles afin d'obtenir l'impact désiré.

Figure 1 : de gauche à droite: 1) Présence sociale non observée : aucune indication que des humains ont été présents dans la photo, 2) Présence sociale inférée: les objets personnels suggèrent que des humains ont été présents dans la photo récemment, et 3) Présence sociale observée: un ou plusieurs humains sont visibles dans la photo.

2. **Une photo du consommateur qui contient des objets personnels, mais aucun être humain et qui a une mise en scène élevée a le plus d'impact sur les intentions d'achat**

Les résultats de cette étude indiquent que les photos les plus performantes sont celles qui ont une présence sociale inférée, une mise en scène élevée et qui sont prises par les consommateurs. Pour les entreprises qui ont recours au marketing de contenu, les types de photos qui devraient être encouragées à partager sont ceux qui ont une présence sociale inférée et une mise en scène élevée. Les photos ci-dessous en sont des exemples:

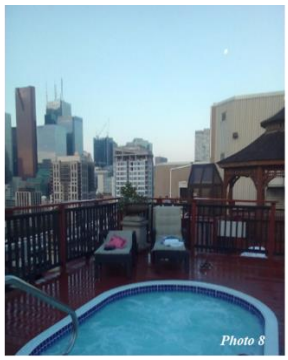


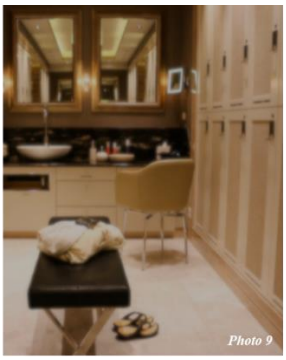
3. **Il faut éviter l'utilisation de photos avec les caractéristiques suivantes:**

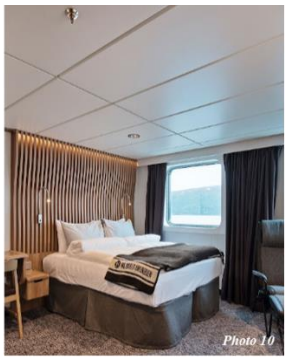
   A. Une présence sociale inférée, une mise en scène faible prise par un consommateur

   B. Une présence sociale non observée, une mise en scène faible prise par l'entreprise touristique

Pour les entreprises qui ont recours au marketing de contenu, il est essentiel que les photos soient perçues comme ayant une mise en scène élevée. De plus, lors de la création de photos à l'interne, il est important qu'elles ne soient pas perçues comme ayant une présence sociale non observée ni une mise en scène faible. Voici des exemples de photos à éviter:







En somme, les photos les plus performantes sont celles qui ont une présence sociale inférée, une mise en scène élevée qui sont prises par les consommateurs mêmes. Le facteur le plus important à éviter est les photos qui ont une faible mise en scène.

Méthodologie

Au total, 335 consommateurs nord-américains ont été invités via la plateforme Amazon Mechanical Turk à répondre à un questionnaire en ligne. Afin de mesurer l'impact des photos dans l'industrie hôtelière et du tourisme sur les intentions d'achat en ligne, nous avons effectué un test de dépendance (Independent sample t-test), une régression logistique et des ANOVA à mesures répétées.

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Source des photos :

Photo 1: TripAdvisor (2020). « Hotel newstar (Montréal, canada) ». https://www.tripadvisor.it/Hotel_Review-g155032-d1475949-Reviews-Hotel_Newstar-Montreal_Quebec.html

Photo 2: TripAdvisor (2017). « Hotel le dauphin Montréal centre-ville ». https://www.tripadvisor.com/Hotel_Review-g155032-d639063-Reviews-Hotel_Le_Dauphin_Montreal_Centre_Ville-Montreal_Quebec.html

Photo 3: Carnival Cruise Line. « Accomodations ». https://www.carnival.com.au/staterooms.aspx

Photo 4: Pinterest. «The aft deck swimming pool is one of the largest ever built on a yacht of any size.: Yacht design, Water slides, Yacht interior ». https://www.pinterest.ca/pin/794815034209944682/

Photo 5: Oasis Parcs (2020). « Abondance: Mountain & Wellness Resort ». https://www.oasisparcs.com/oasis-abondance-mountain-wellness-resort/holiday-homes/luxury-penthouse-with-sauna-8-pers

Photo 6: Royal Princess Cruises (2013). « Royal Princess -- fitness center ». https://www.flickr.com/photos/princesscruises/10158849353

Photo 7: Hotel Gavarni. « Conference room: Hotel Gavarni, Paris ». http://www.gavarni.com/en/meetings/

Photo 8: TripAdvisor (2017). « Grand Hotel & Suites - UPDATED 2020 Prices, Reviews & Photos (Toronto, Ontario) ». https://www.tripadvisor.ca/Hotel_Review-g155019-d183586-Reviews-Grand_Hotel_Suites-Toronto_Ontario.html

Photo 9: Chowda, C. (2015). « FOUR SEASONS HOTEL DES BERGUES, GENEVA: SPA MONT BLANC ». http://camchowda.com/four-seasons-geneva-spa-mont-blanc/

Photo 10: Cruise Norway (2020). « MS Roald Amundsen Ship: Find Your Voyage With Cruise Norway ». https://www.cruisenorway.com/ships/roald-amundsen/

Photo 11: Vrbo. « Awesome Arcade House - GAME Room! - St. George, Utah ». https://www.vrbo.com/en-ca/cottage-rental/p1118401vb?CID=a_ph_6

Chapter 5: Conclusion

Considering the quantity of photos shared online, this thesis aimed to better understand the impact of this growing trend. More precisely, the objective of this thesis was to measure the impact of certain informational cues found in pictures online on consumers' emotions, perceptions, and purchase intentions. Social presence, level of staging, and the source of the photo were the manipulated variables. The forms of social presence found within a photo was identified as not observed, inferred, or observed; the level of staging was either low or high; and the source of the photo was either the consumer or the brand.

This last chapter summarizes the method that this thesis undertook to test these manipulations. Next the research question and results are revisited. Lastly, the theoretical and managerial implications of this thesis paper are discussed.

5.1 A two-phased approach experimental design

In order to arrive at the 2x2x3 experimental design, a manipulation test was initially conducted. This test aimed to verify the perception of the three forms of social presence as well as a high versus low staged picture. A base of 264 pictures collected online were tested based on their social presence and level of staging. The goal was to determine how many pictures from this base provided significant differences between the manipulated variables. In total, 60 pictures out of 264 were distinctly different across all three forms of social presence and both levels of staging. Furthermore, these results concluded that a form of social presence in pictures online exists that is not depended on an observed physical human presence. This level was referenced as inferred social presence. This form of social presence evokes a feeling of a psychological presence of humans and a high degree of warmth within pictures. The source of the photo (consumer versus brand) was added in the end to arrive to the 2x2x3 design.

After confirming all three forms of social presence, both levels of staging, adding both sources, and identifying 60 photos from the base of 264, the main study sought to determine how these characteristics impact consumers' emotions, perceptions, and purchase intentions online. More

precisely, to measure the outcomes of an observed, inferred, or not observed social presence, a high or low staged photo, and either a consumer or brand's photo.

5.2 Reminder of research question and main findings

The results from this study allowed the researchers to answer the research question posed at the beginning of this paper. Furthermore, these results were able to either support or reject the research hypotheses in this study.

H1: The higher the perceived diagnosticity of the photo, the more the depiction of the product or service will be trusted.

The significant results from this relationship demonstrate that pictures that are perceived to be of high diagnosticity increase the odds of generating higher trust in the product or service depicted than pictures that were perceived as low diagnosticity. Hypothesis 1 is therefore confirmed.

H2: In the case where the depiction of the product and service is positive, the higher the perceived diagnosticity of the photo, the higher the perceived quality of the offering.

The significant results from this relationship demonstrate that pictures that are perceived to be positive and of high diagnosticity increase the odds of generating higher perceived quality of the product or service than pictures that were perceived to be positive but low in diagnosticity. Hypothesis 2 is therefore confirmed.

H3: In the case where the depiction of the product and service is positive, the higher the perceived diagnosticity of the photo, the higher the intent to purchase the offering.

The significant results from this relationship demonstrate that pictures that are perceived to be positive and of high diagnosticity increase the odds of generating higher intentions to purchase than pictures that were perceived to be positive but low diagnosticity. Hypothesis 3 is therefore confirmed.

H4: There is a positive relationship between arousal generated by a photo and its perceived diagnosticity.

The significant results from this relationship demonstrate that pictures that evoke high arousal increase the odds of generating higher perceived diagnosticity than pictures that evoke low arousal. Hypothesis 4 is therefore confirmed.

H5: There is a positive relationship between valence generated by a photo and its perceived diagnosticity.

The significant results from this relationship demonstrate that pictures that evoke high valence increase the odds of generating higher perceived diagnosticity than pictures that evoke low valence. Hypothesis 5 is therefore confirmed.

H6a: The higher the perceived social presence in a photo, the higher the arousal evoked.

The significant results from this relationship demonstrate that pictures that are perceived to have observed and inferred social presence increase the odds of generating higher arousal than pictures that are perceived to have not observed social presence. However, there are no significant differences between a photo with observed and inferred social presence. Hypothesis 6a is therefore confirmed.

H6b: The higher the perceived social presence in a photo, the higher the valence evoked.

The significant results from this relationship demonstrate that pictures that are perceived to have observed and inferred social presence increased the odds of generating higher valence than pictures that are perceived to have not observed social presence. However, there are no significant differences between a photo with observed and inferred social presence. Hypothesis 6b is therefore confirmed.

H7a: There is a positive relationship between a higher staged photo and the valence evoked.

The significant results from this relationship demonstrate that higher staged pictures increase the odds of evoking higher valence than low staged pictures. Hypothesis 7a is therefore confirmed.

H7b: There is a positive relationship between a higher staged photo and the arousal evoked.

The results from this relationship demonstrate that there is no significant difference between a high and low staged picture on the odds of evoking higher arousal. Hypothesis 7b is therefore not supported.

H8: There is a positive relationship between the source of the photo and its perceived diagnosticity where a consumer's photo has more impact than a brand's photo.

The results from this relationship demonstrate that there is no significant difference between a picture taken by the consumer and taken by the brand on the odds of generation higher perceived diagnosticity. Hypothesis 8 is therefore not supported.

These results provide an answer to the research question: **Which informational cues found in pictures online lead to positive emotions, perceptions, and favorable purchase intentions in consumers?** Firstly, the results from this study demonstrate that social presence, level of staging, and the source of the photo are important characteristics that are found in photos online. Furthermore, it identified that social presence within photos can be categorized into three distinct forms based on the physical presence and the psychological presence of humans (not observed, inferred, and observed). Secondly, it demonstrates that social presence and the level of staging have an impact on emotional response spanning arousal and valence. With the exception of a higher staged photo's impact on arousal, the higher the social presence and the higher staged the photo, the happier and more excited consumers feel. Furthermore, it identified that arousal and valence serve as informational cues that impact the perceived diagnosticity of the picture being viewed. In turn, the higher the perceived diagnosticity of the picture, the more consumers trust the depiction of the product and service, the more they perceive the offering to be of higher quality, and the more they intend to purchase it. However, the results from this study deny support to the notion that the source of the photo impacts its perceived diagnosticity.

5.3 Theoretical and managerial contributions

5.3.1 Theoretical contributions

The results from this study have several theoretical contributions. Most importantly, these results confirm that humans do not need to be physically present in photos in order to convey a sense of social presence. This is a critical contribution to existing literature on social presence which strongly emphasized the importance of portraying physical humans during online shopping experiences (Cyr *et al.*, 2007; Cyr *et al.*, 2009; Hassanein et Head, 2007; Li, Wang et Chen, 2014; Wang *et al.*, 2007). This study demonstrates that an inferred level of social presence has an equal, if not superior, impact on arousal and valence than a photo with observed social presence. Having humans physically present in pictures is therefore not crucial in generating feelings of social presence. Furthermore, this study confirmed current research that higher levels of social presence perform better on evoking positive emotional responses than not observed social presence.

Additionally, this study confirms previous research conducted on the effects of emotion on the ability to form judgements in contexts where motivation is low through the peripheral route (MacInnis et Price, 1987; Miniard *et al.*, 1991; Petty et Cacioppo, 1986, 1996, 2012; Petty, Cacioppo et Schumann, 1983; Teng et Khong, 2015). Considering that participants were asked to complete a 15-minute questionnaire online and their level of involvement with the offering was very low, it is very likely motivation was quite low. Participants therefore relied on their emotions of arousal and valence as information for the processing and the diagnosticity of the picture. Next, this study identified that photos that are highly staged increase consumer's happiness (valence), but not their level of excitement (arousal). Although high staged photos generate positive emotions, it was not enough to increase the intensity of that emotion alone. This was perhaps due to the fact that their involvement with the products and services was low and since filling out an online questionnaire can require little motivation.

Finally, the researchers were unable to find support for the notion that the source of the photo impacts its perceived diagnosticity. This could be explained for several reasons. It is possible that a photo alone is not sufficient to impact processing and perceptions. A study conducted by Yufeng Ma, Zheng Xiangb, Qianzhou Duc, and Weiguo Fan (2018), found that third-party photos alone did not provide enough informational cues to help users make judgements about the helpfulness

of reviews. However, when combining them with review texts, they provided a complementary and reinforcement effect to the review (Ma *et al.*, 2018). Therefore, it is possible that the results from this study are explained by the fact that the source of the photo must be accompanied by a review, description, or the online environment in order to predict perceived diagnosticity.

5.3.2 Managerial implications

This study has also identified several key insights to be considered by management when considering what types of photos to share and promote online. Firstly, management should always promote pictures with higher levels of social presence. However, since there is no significant differences between the impact of a photo with inferred social presence and observed social presence on arousal and valence, management does not need to invest an important portion of their marketing budget to recruit human models for their promotional photos in order to create the desired impact. Additionally, by creating pictures with inferred social presence, management can mitigate the risk associated to unconscious bias which could otherwise lead to negative outcomes. Furthermore, this study identified that photos that are highly staged increase consumer's happiness. For management, this indicates that it is important to properly plan and organize picture taking as well ensure they are aesthetically pleasing. Furthermore, in their efforts to encourage user-generated content and in utilizing influencers online, high staged photos should be a top requirement in order to share content. Considering that many photos are viewed through online platforms and social media, it is important that management consider the importance of promoting and sharing photos that evoke positive valence and arousal in order to help consumers form perceptions, and positive behavioral intentions. The results demonstrated that this can be done by promoting high staged photos that have either inferred or observed social presence.

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Appendix 1

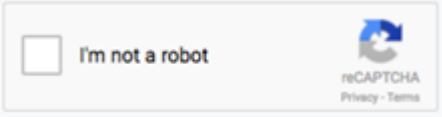
Questionnaire 1

Pre-Test: manipulation check of the predictor variables

Before starting the experiment:

1. Please indicate your MTURK worker ID# to begin:

2. Due to concerns with the presence of automated and/or low-quality responses on Mturk, this question helps verify that our survey respondents are qualified Turkers.



On next page:

Instructions accompanying an anonymous questionnaire

On the following pages you will find an anonymous questionnaire to which we invite you to answer. This questionnaire was developed as part of a research project at HEC Montréal. Answer the questions included in this questionnaire without hesitation, as it is your first impressions that generally best reflects your thoughts. There is no time limit for answering the questionnaire, although we have estimated that it should take you about 10 minutes.

The information collected is anonymous and will remain strictly confidential and will only be used for the advancement of knowledge and the dissemination of aggregate results in scholarly or professional forums.

The online data collection provider agrees not to disclose any personal information (or any other information about the participants in this study) to other users or any other third parties, unless the respondent expressly consents to such disclosure or disclosure is required by law.

You are completely free to refuse to participate in this project and you can decide at any time to stop answering the questions. Completion of this questionnaire will be considered your consent to participate in our research and to use the data collected in this questionnaire for future research. Since the questionnaire is anonymous, once your participation is completed, you will not be able to withdraw from the research project, as it will be impossible to determine which answers are yours.

If you have any questions about this research, you can contact the primary researchers, Sylvain Sénécal and Pierre-Majorique Léger, at the telephone numbers or e-mail addresses listed below.

The Research Ethics Board of HEC Montréal has ruled that the data collection for this study meets ethical standards for research involving humans. If you have any questions about ethics, you can contact the secretariat of this committee at (514) 340-6051 or by e-mail at cer@hec.ca.

Thank you for your precious collaboration.
(researchers provide contact information)

Due to concerns with the presence of automated and/or low-quality responses on Mturk, this question helps verify that our survey respondents are qualified Turkers.

Please select the color of the fruit in the square located in the top row and left most column: (options are: blue, green, orange, red, yellow)

Welcome!

This survey takes about 10 minutes and you will be paid 1$ for your participation. You will be given a code once you complete the survey for getting approved

In order to receive the promised amount, you should complete the entire survey in one sitting (please do not stop and restart) and not participate in the survey multiple times with multiple Mturk worker IDs. If identified to take the survey multiple times, your account will not be credited.

In this survey, you will be asked to rank **15 photos** on several scales. Please rank them as truthfully as possible.

Experiment starts

Part 1: Present the picture

(repeat 15 times)

Statement above photo reads:

"This is a photo of a X."

<insert photo>

Participant is asked the following:

(1) Looking at the scene in this picture, I think that:

Nobody was ever present there	People were present there	People are currently present there
◯	◯	◯

(2) To what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
There is a sense of human warmth in this photo	◯	◯	◯	◯	◯
The overall quality of this photo is good	◯	◯	◯	◯	◯
This photo looks staged	◯	◯	◯	◯	◯
This photo allows me to evaluate the usefulness of this product or service	◯	◯	◯	◯	◯
This photo allows me to evaluate the fun I would have with this product or service	◯	◯	◯	◯	◯

Part 2: Attention check question

(repeat 2 times)

(1) Looking at the scene in this picture, I think that:

Nobody was ever present there	People were present there	People are currently present there
◯	◯	◯

(2) To what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
There is a sense of human warmth in this photo	◯	◯	◯	◯	◯
The overall quality of this photo is good	◯	◯	◯	◯	◯
This photo looks staged	◯	◯	◯	◯	◯
This photo allows me to evaluate the usefulness of this product or service	◯	◯	◯	◯	◯
For this question, please select the answer "Strongly agree"	◯	◯	◯	◯	◯
This photo allows me to evaluate the fun I would have with this product or service	◯	◯	◯	◯	◯

Part 3: Demographic Questions

1.Please indicate your age: (open answer)

2.Please select your gender.

- Male
- Female
- Agender/Non-binary/Other

3. Please indicate which state/province you live in.

- West of Canada (BC, Alta, Man, Sask)
- Ontario
- Quebec
- Atlantic Canada (NB, NS, PEI, NFDL)
- Midwest USA (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, North Dakota, South Dakota, Wisconsin)
- Northeast USA (Connecticut, Maine, Massachusetts, New Hampshire, new Jersey, New York, Pennsylvania, Rhode Island, Vermont
- South USA (Arkansas, Alabama, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia)
- West USA (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming
- Puerto Rico or other US territories

Part 4: Final message

Here is your ID:
Copy this value to paste in Mturk.
When you have copied this ID, please click the next button to submit your survey.

Appendix 2

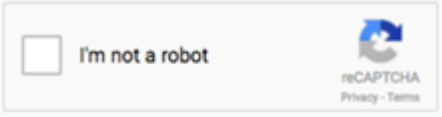
Questionnaire 2

Main Study: impact of the predictor variables on consumer outcomes

Before starting the experiment:

1. Please indicate your MTURK worker ID# to begin:

2. Due to concerns with the presence of automated and/or low-quality responses on Mturk, this question helps verify that our survey respondents are qualified Turkers.



On next page:

Instructions accompanying an anonymous questionnaire

On the following pages you will find an anonymous questionnaire to which we invite you to answer. This questionnaire was developed as part of a research project at HEC Montréal. Answer the questions included in this questionnaire without hesitation, as it is your first impressions that generally best reflects your thoughts. There is no time limit for answering the questionnaire, although we have estimated that it should take you about 10 minutes.

The information collected is anonymous and will remain strictly confidential and will only be used for the advancement of knowledge and the dissemination of aggregate results in scholarly or professional forums.

The online data collection provider agrees not to disclose any personal information (or any other information about the participants in this study) to other users or any other third parties, unless the respondent expressly consents to such disclosure or disclosure is required by law.

You are completely free to refuse to participate in this project and you can decide at any time to stop answering the questions. Completion of this questionnaire will be considered your consent to participate in our research and to use the data collected in this questionnaire for future research. Since the questionnaire is anonymous, once your participation is completed, you will not be able to withdraw from the research project, as it will be impossible to determine which answers are yours.

If you have any questions about this research, you can contact the primary researchers, Sylvain Sénécal and Pierre-Majorique Léger, at the telephone numbers or e-mail addresses listed below.

The Research Ethics Board of HEC Montréal has ruled that the data collection for this study meets ethical standards for research involving humans. If you have any questions about ethics, you can contact the secretariat of this committee at (514) 340-6051 or by e-mail at cer@hec.ca.

Thank you for your precious collaboration.
(researchers provide contact information)

Due to concerns with the presence of automated and/or low-quality responses on Mturk, this question helps verify that our survey respondents are qualified Turkers.

Please select the color of the fruit in the square located in the top row and left most column: (options are: blue, green, orange, red, yellow)

Welcome!

This survey takes about 20 minutes and you will be paid $1.50 for your participation. You will be given a code once you complete the survey for getting approved.

In order to receive the promised amount, you should complete the entire survey in one sitting (please do not stop and restart) and not participate in the survey multiple times with multiple Mturk worker IDs. If identified to take the survey multiple times, your account will not be credited.

In this survey, you will be asked to rate **12 photos** consisting of **products** and different types of **services**. Please rate them as accurately as possible.

Experiment starts

Part 1: Present the picture

(repeat 12 times + randomize items)

Statement above photo reads:

"This photo of a desk was **taken by a customer**."

OR

"This photo of a desk was **taken by the company providing this product**."

<insert photo>

Participant is asked the following:

(1) To what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I can trust this photo to consider how the product or service will look like	◯	◯	◯	◯	◯
This photo is a trustworthy representation of this product or service	◯	◯	◯	◯	◯
This photo makes me feel excited	◯	◯	◯	◯	◯
This photo makes me feel happy	◯	◯	◯	◯	◯
Based on this photo, this is a high-quality product or service.	◯	◯	◯	◯	◯
If I was looking to buy a product or service like this one, I would buy the one presented in this photo.	◯	◯	◯	◯	◯

(2) Please rate how helpful the photo was in each of the following.

	Not at all helpful	Slightly helpful	Neutral	Very helpful	Extremely helpful
How helpful was this photo in evaluating the product or service?	◯	◯	◯	◯	◯
How helpful was the information provided in this photo in evaluating the product or service?	◯	◯	◯	◯	◯

Part 2: Source of photo manipulation check

(repeat 4 times)

According to the statement provided above the photo on the previous page, who took the photo?

- A customer
- The company providing this product or service

Part 3: Attention check question

(repeat 2 times + randomize items)

(1) To what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I can trust this photo to consider how the product or service will look like	◯	◯	◯	◯	◯
This photo is a trustworthy representation of this product or service	◯	◯	◯	◯	◯
This photo makes me feel excited	◯	◯	◯	◯	◯
This photo makes me feel happy	◯	◯	◯	◯	◯
Based on this photo, this is a high-quality product or service.	◯	◯	◯	◯	◯
If I was looking to buy a product or service like this one, I would buy the one presented in this photo.	◯	◯	◯	◯	◯
For this question, please select the answer "Strongly agree"	◯	◯	◯	◯	◯

(2) Please rate how helpful the photo was in each of the following.

	Not at all helpful	Slightly helpful	Neutral	Very helpful	Extremely helpful
How helpful was this photo in evaluating the product or service?	◯	◯	◯	◯	◯
How helpful was the information provided in this photo in evaluating the product or service?	◯	◯	◯	◯	◯

Part 4: Demographic Questions

1.Please indicate your age: (open answer)

2.Please select your gender.

- Male
- Female
- Agender/Non-binary/Other

3. Please indicate which state/province you live in.

- West of Canada (BC, Alta, Man, Sask)
- Ontario
- Quebec
- Atlantic Canada (NB, NS, PEI, NFDL)
- Midwest USA (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, North Dakota, South Dakota, Wisconsin)
- Northeast USA (Connecticut, Maine, Massachusetts, New Hampshire, new Jersey, New York, Pennsylvania, Rhode Island, Vermont
- South USA (Arkansas, Alabama, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia)
- West USA (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming
- Puerto Rico or other US territories

Part 5: Final message

Here is your ID:
Copy this value to paste in Mturk.
When you have copied this ID, please click the next button to submit your survey.