

Visual and Verbal Presentations of Haptic Information in Online Fashion Stores and Consumers' Imagery Information Processing

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Abstract

This study investigated how the visual and verbal presentation format of haptic information on apparel products in online stores affects consumers' imagery information processing. This includes the quantity and vividness of mental imagery, the ease of evoking mental imagery, and the evocation of imagination imagery. Additionally, the study explored consumer satisfaction with the information and online store. The study also tested a conceptual model to examine the effects of three imagery types on imagination imagery (as elaborated imagery) and how this imagination imagery affects consumer satisfaction. Employing a $2 \times 3 \times 2$ between-subjects factorial design, twelve one-page websites were created for the experiment. 528 women in their 20s and 30s were randomly assigned to one of the 12 treatment conditions and answered the questionnaire. The results demonstrated significant differences in the three types of mental imagery, consumers' evocation of imagination imagery, and their satisfaction with information and online stores based on presentation format. The SEM analysis revealed that the quantity and vividness of mental imagery influenced the evocation of imagination imagery, affecting consumers' satisfaction with the information. These findings suggest that online retailers must provide close-up pictures or descriptive text of apparel products to elicit positive consumer responses.

Key words: Mental imagery, Haptic imagery, Imagery information processing, Haptic information, Online fashion store

I. Introduction

Business of PC- and mobile-based online shopping in Korea has been exceeded ₩14.7 trillion with a year-on-year growth of 11.8% in October, 2023 and apparel product ranked the fourth in transaction (Statistics Korea, 2023). However, several studies reported consumers' negative experience during their purchase decision-making process in online stores. Cho et al. (2006) found that consumers' uncertainty caused by lack of information in online store influenced their abandonment of purchase. Other studies (Ji, 2009; Kim et al., 2013; Roh, 2023) also reported that the lack of information and the difference

between the real product and information about its size, color and texture were deterrent factors to consumers' purchase.

According to the news from Korean journals, a cashmere muffler sold on major online fashion stores in Korea turned out to be a fake product composed of polyester and rayon. Those famous online stores offered a false product information presenting that the muffler is made of cashmere, wool and rayon (Kim, 2023). Even though the apparel products' textile is an attribute that need to be touched and evaluated by consumers' physical inspection (Punj & Moore, 2009), more efforts are being made to provide detailed information on the texture and characteristics of apparel products in the BtoB (business to business, BtoB) online commerce field than in BtoC (business to consumer, BtoC)

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ness to consumer, BtoC) online commerce. For example, online platform companies or apparel textile manufacturers have tried to digitize the real fabrics in 3D and provide a database of digital fabrics on online platforms for apparel manufacturers, independent labels, or vendors (Na, 2023; Onepixel, 2017, 2022; PR Newswire, 2022). As examples of related research, Chang and Lee (2017) compared the material property reproducibility depending on 5 types of textiles of virtual clothing with real clothing. Kim (2022) compared the material expression similarity degree of 3D virtual fur images with real fur images. However, researchers have pointed out that there have been few studies on digital fabric in 3D, or texture expression of virtual clothing that has been increasingly used in fashion supply chains in Korea (Chang & Lee, 2017; Kim, 2022; Park et al., 2018).

Moreover, as for the way of presentation of apparel products' textiles provided in a general online shopping environment, few studies have been conducted, in particular, to examine which way of presentation of textiles is effective for consumers' information processing of apparel products. In related studies, Shin and Lee (2004) compared the difference in the texture perceived between 55 real cotton fabrics and their video version provided on a computer screen and identified that thin and light fabrics with smooth surfaces have the smallest similarity between real touch and visual contact. Kim and Ha (2019) in their study using in-depth interviews suggested that haptic communication with consumers is most needed in the product research step of fashion products in VR (virtual reality, VR) store, and consumers still need the haptic technology applicable to fashion product shopping in VR store which allow them to judge physical properties of a fashion product.

By the reason of impossibility of physical touch, information on clothing material plays an important role in consumers' evaluation of apparel product in an online context and impacts the consumers' purchase behavior (Citrin et al., 2003; Jeon, 2006; Park, 2009). Citrin et al. (2003) revealed that clothing is the product requiring the high level of tactile cues in its evaluation on the Internet environment and belongs to one of the product category which consumers are still hesitant to purchase in an on-

line store due to their need for tactile input.

In that the tactile cues of apparel products are important in their evaluation during consumers' information processing, prior researches examined in an online context how verbal descriptions and concrete pictures as the type of fabric information impact the consumers' response (Kim & Lennon, 2008; Park, 2009). They demonstrated that the presence of described text or pictures of apparel product enabled consumers to visualize product images in their minds, and the images evoked by such an online product presentation impact their attitude and behavioral intention (Choi & Taylor, 2014; Kim & Lennon, 2008; Park, 2009; Yoo & Kim, 2014). In particular, these studies identified that consumers use the visualized images of apparel product in their mind by concrete text or pictures, namely the mental imagery, during their information processing.

Mental imagery refers to images generated by individuals in their minds when they perceive objects during their information processing (Finke & Slayton, 1988; Kosslyn et al., 1984; MacInnis & Price, 1987; Yuille & Catchpole, 1977). The evocation of imagery involves a multi-sensory dimension incorporating visual, tactile, auditory, gustatory, and/or olfactory properties of the information, and also a single sensory dimension such as visual sensation (MacInnis & Price, 1987). Mental imagery as a multi-sensory or sensory process can be a mental representation that is similar to the initial phases of an individual's perception of a stimulus and comes without actual perception (Kosslyn et al., 2006; Rinaldo & Childers, 2010). From this perspective, imagery processing is a conceptually distinct way of representing information and evoking sensory or perceptual experience in working memory by picturing a stimulus object (Yoo & Kim, 2014; Yuille & Catchpole, 1977), and includes perceptual information processing (Kosslyn et al., 1984; MacInnis & Price, 1987).

In the case of studies examining consumers' information processing using their mental imagery on apparel products in the BtoC online shopping context, these studies focused on consumers' imagery processing on apparel product image itself (Kim & Lennon, 2008; Park, 2009) or one with a relevant consumption background

(Yoo & Kim, 2014) rather than imagery evoked by haptic information on apparel textiles.

As the haptic information on apparel textiles includes tactile cues perceived by the sense of touch (Citrin et al., 2003), the use of mental imagery may be helpful when consumers process information on apparel textiles in online stores where real products would not be seen or touched. Therefore, this study focused on consumers' imagery processing that promotes their mental visualization of images of apparel textiles and imagination of the tactility based on the haptic information on apparel products offered by online fashion stores. That is, the study aimed to investigate the effect of the presentation formats of haptic information on apparel products that are visually and verbally in different ways represented on online store website on the types of mental imagery, and consumers' attitudes toward product information and website. This study also tried to identify empirically the relationship between the types of mental imagery and consumers' attitudes.

II. Literature Review

1. Mental Imagery Processing on Haptic Information

The role of mental imagery in information processing has been debated in terms of consumers' use of imagery in product information processing by retrieving memory or using imagination based on prior consumption experiences (MacInnis & Price, 1987). From this perspective, the use of imagery in information processing called imagery processing can be a mode of processing sensory information (Ellen & Bone, 1991; Smith et al., 1984). For example, consumers can retrieve from working memory haptic information including sensory attributes of the product already experienced, and imagine the product by using this haptic information in a situation where they cannot see or touch the product (Lee, 2014). Strategies that generate consumers' imagery have been used in brand or product advertising to promote their product information processing before purchase. Accordingly, researchers have examined mainly the impact of such an

imagery-evoking strategy in the context of consumers' understanding, learning, and memory of brand name or product information in advertising (Babin & Burns, 1997; Burns et al., 1993).

On the other hand, in the context of product evaluation, consumers can imagine the situation of product usage, and this imagined scenario may be used for product attribute evaluation to help decision-making process (MacInnis & Price, 1987). If consumers use imagery processing on product information in an online environment where they do not directly contact the product, they imagine not only the product attributes but also the situation where they use the product, which affects their evaluation and attitude toward the product (Yang & Kim, 2011). In this perspective, as haptic information of apparel products is a critical source for product evaluation (Choi & Taylor, 2014; Rinaldo & Childers, 2010), consumers' imagery processing through haptic information can help them make choice decisions about apparel products, especially in an online shopping environment.

Mental imagery evoked by haptic information containing salient haptic attributes such as texture, weight, and temperature of apparel textiles appears as visual images in consumers' minds through their mental visualization, which is called haptic imagery (Lee, 2014; Park, 2009; Rinaldo & Childers, 2010). In their study on mobile phones, Yang and Kim (2011) found that haptic imagery appears even when consumers only visually see the product without touching it, making it possible to process information about the product. Peck et al. (2013) also insisted in their study on koosh ball and blanket that consumers can process and obtain haptic information by using haptic imagery accompanied by visual images about haptic attributes such as softness, texture, and weight.

Considering the role of mental imagery in helping consumers' information processing and purchase decision-making process through mental visualization of haptic information, it is necessary to examine the effect of haptic information evoking the mental imagery accompanied by visual images about haptic attributes in an environment of the absence of direct contact with apparel products.

2. Type of Mental Imagery

According to previous researches, mental imagery consists of several types such as the quantity, vividness of mental imagery, and the ease in eliciting imagery (Babin & Burns, 1997). Walters et al. (2007) suggested that mental imagery has two types, one is related to the number of images evoked in individual's mind, and the other refers to images' vividness, clarity, intensity and sharpness.

1) *The Quantity and Vividness of Mental Imagery*

The quantity of mental imagery refers to the number of images elicited during imagery processing (Babin & Burns, 1997). Smith et al. (1984) reported that the quantity of imagery evoked in imagery processing depends on the type of stimuli. McGill and Anand (1989) identified that instructions to imagine, or guided mental imagery resulted in a larger number of evoked images.

Meanwhile, the vividness of mental imagery represents the level of intensity of mental imagery evoked in individual's mind (Ellen & Bone, 1991). Ellen and Bone's (1991) study on radio advertising for fictitious popcorn brand demonstrated that the more verbal cues such as concrete words, sensory descriptions and imagery instructions are used in advertising, the greater quantities of mental imagery are generated in individual's mind, and also the more vivid the mental imagery is. Burns et al. (1993) proved that concrete copy in advertising positively influenced the vividness of mental imagery. Olsen et al. (1986) showed that various visual elements used in advertising for vacation destinations influence consumers' perception of the vacation experience with their prior experiences.

Consistent with prior researches, Yoo and Kim's (2014) study empirically demonstrated that concrete picture of relevant consumption backgrounds in product page of apparel website had a significant positive effect on the number of images and the vividness of imagery evoked in consumers' mind. On the other hand, it revealed that concrete text portraying consumption background had no influence the number of images and the vividness of imagery. Walters et al. (2007) demonstrated

that the concrete picture help consumers evoke vivid and more imagery rather than less concrete picture and no picture. They also clarified that the combination of instructions to imagine and concrete words is significantly effective in evoking vivid and more imagery than instructions to imagine and concrete words.

Based on empirical evidences of previous studies, this study proposes the hypotheses claiming that by seeing concrete picture or receiving descriptive text, consumers can use more information in their decision-making process, and subsequently evoke a larger quantity of imagery and experience the vividness of imagery.

H1: The quantity of mental imagery will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H2: The quantity of mental imagery will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

H3: The vividness of mental imagery will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H4: The vividness of mental imagery will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

2) *The Ease of Evoking Mental Imagery*

Ease of imagining as an important aspect of imagery processing refers to individual's easy generation of mental imagery of visual and verbal stimuli (Anderson, 1983; Sherman et al., 1983). According to prior researches (Ellen & Bone, 1991; Walters et al., 2007), concrete pictures, or detailed text facilitate consumers' imagery processing by helping them process the referents immediately and generate readily their mental imagery. Rossiter's (1982) study revealed that concrete words and sentences contribute to the ease with which associated images can be elicited, and promote the imagery processing by having an impact on recall. In the same context, Yoo and

Kim's (2014) study examining the effect of concrete word or text on mental imagery demonstrated that more concrete words or text than abstract verbal cues with referring to certain objects or materials readily induce mental imagery processing and also evoke multisensory experiences.

On the other hand, according to Kosslyn et al. (1984) who explained the ease of evoking mental imagery in relation to the time to elicit images, depictive cues of certain referent facilitate the creation of imagery by reducing the time of generating associated images. In the context of product evaluation, when consumers try to solve a problem such as attributes evaluation of product via visual thinking process, descriptive cues can shorten the amount of time for examining product and imagining the situation of product usage (Simon & Hayes, 1976).

From the perspective of visual imagery processing of product information, it is possible to suggest that the cues concretely portraying product attributes make product evaluation easy via creation of imagery in a shorter time. In other words, visually or verbally detailed information on product attributes can help consumers readily visualize the product and use its imagery much easier. Accordingly, this study's fifth and sixth hypotheses predict that visually or verbally more concrete haptic information on apparel textile enable to evoke a mental imagery easily.

H5: The ease of evoking mental imagery will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H6: The ease of evoking mental imagery will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

3) *The Elaboration for Evocation of Imagination Imagery*

In relation to the mechanism of imagery as a way of processing information, imagery processing involves the process of imaging of sensory information in working memory during individual's perceptual process, as well the process of elaboration of such images by retrieving

and activating an existing knowledge or prior experiences stored in long-term memory (Kosslyn et al., 1984). The first process is associated with the evocation of imagery visualizing sensory information. The second one is the process by which sensory information visualized in working memory might be manipulated by individual's activating the knowledge structure or retrieving information such as memories and prior experience about an object, person, event, or action that are stored in this structure in long-term memory (Kosslyn et al., 1984; Yuille & Catchpole, 1977). Therefore, "imagery processing corresponds to an elaboration continuum including simple evocation and elaboration of imagery (MacInnis & Price, 1987, p. 473)".

From this point of view, Kosslyn et al. (1984) reported that the elaboration of imagery is the result of regeneration of reorganized mental imagery through individual's imagination using information stored in long-term memory. Such regenerated imagery is an imagery integrated with images of imagination and called the imagination imagery. For example, through the elaboration process of mental imagery, objects such as an elephant and the moon can produce new combination of image like 'an elephant flying over the moon' evoked by previously viewed novel scenes (Richardson, 1969, as cited in Kosslyn et al., 1984). This image combination regenerated by the imagination and the elaboration of imagery could be imagination imagery.

According to Childers and Houston (1983) and Kosslyn et al. (1984), the image of certain object might be likely to be transformed in individual's mind in various ways through the operation of imagination imagery, and such image transformation and reorganization are critical in most visual thinking. Childers and Houston (1983) regarded the imagination imagery as an output of creating of new identity for the object by the elaboration of imagery. Kosslyn et al. (1984) viewed the imagination imagery as an output of mental operation performing various image transformations and reorganization in an elaboration continuum of imagery processing.

With using imagination imagery, an individual can imagine objects and project them outward as if they were real and physical in the external world (Branthwaite,

2002). Mazzocco and Brock (2006) called such an experience of engaging in imagination imagery processing a 'phenomenological experience'. From the perspective of marketing, Branthwaite (2002) insisted that in the consumption context in real life, an individual can mentally manipulate product image through imagination imagery. From this point of view, it is possible to suggest that imagination imagery enables consumers to experience the consumption situation of products that they have not yet experienced by enabling a 'phenomenological experience'.

In association with consumer's imagination imagery, several studies reported the effective means for the evocation of consumer's imagination imagery through an elaboration process of imagery. Rossiter and Percy (1978) demonstrated that the use of a visually oriented layout and concrete verbal copy in advertisement maximizes the creation of elaborated visual imagery through the consumer's visual reinforcement process by imagination. Ellen and Bone (1991) insisted that the more concrete elements in advertisements, the deeper consumers engage in imagery processing through their imagination by activating their memory or prior experience.

Based on prior research suggesting that the effect of

the type of visual and verbal representation of information on the imagination imagery in imagery processing, this study postulates that more concrete visual and depictive verbal information on apparel textiles help consumers retrieve various associations in their long-term memory, and activate their elaboration of mental imagery leading to evoke imagination imagery. The following hypotheses synthesize the above arguments, and a review of prior researches to establish the hypotheses is as follows (Table 1).

H7: The evocation of imagination imagery will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H8: The evocation of imagination imagery will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

Meanwhile, some researchers investigated the interactive effect of visual and verbal information on mental imagery processing on the condition of offering simultaneously concrete visual and verbal information. Rossiter

Table 1. Research on the type of mental imagery evoked by visual or verbal stimuli

Type of stimuli	Type of mental imagery	Context	References
Visual	Quantity	Tourism advertising	Olsen et al. (1986)
Visual	Quantity & Vividness	Online store	Yoo & Kim (2014)
Visual & Verbal	Vividness	Tourism advertising	Walters et al. (2007)
Verbal	Quantity	Tourism advertising	Walters et al. (2007)
Verbal	Quantity & Vividness	Food product advertising	Ellen & Bone (1991)
Verbal	Vividness	Automobiles advertising	Burns et al. (1993)
Visual & Verbal	Ease of evoking	Food product advertising	Ellen & Bone (1991)
Visual & Verbal	Ease of evoking	Review of reference	MacInnis & Price (1987)
Visual & Verbal	Ease of evoking	Tourism advertising	Walters et al. (2007)
Verbal	Ease of evoking	Restaurant script	Anderson (1983)
Verbal	Ease of evoking	Described scene experiment	Kosslyn et al. (1984)
Verbal	Ease of evoking	Described scene experiment	Sherman et al. (1983)
Visual & Verbal	Elaborated imagination imagery	Food product advertising	Ellen & Bone (1991)
Verbal	Elaborated imagination imagery	Described scene experiment	Kosslyn et al.(1984)
Verbal	Elaborated imagination imagery	Described message experiment	Mazzocco & Brock (2006)

and Percy (1978) examined that advertising containing strong visual emphasis and concrete copy revealed a strong effect on the likelihood of visual imagery formation as an initial response and the occurrence of visual reinforcement as a sequential response. Walters et al. (2007) found a significant interactive effect of visual and verbal information on the ease of evoking mental imagery. However, Yoo and Kim (2014) reported that there was no interactive effect of these two types of information on the quantity and vividness of mental imagery. Accordingly, this study tried to examine the interactive effect of visual and verbal presentation formats of haptic information on the three types of mental imagery and on the elaboration for evoking imagination imagery. This study's 9th hypothesis postulates as follows.

H9: The visual and verbal presentation format of haptic information will have an interactive effect on three types of mental imagery and evocation of imagination imagery.

3. Consumer's Mental Imagery, Information Satisfaction and Online Store Satisfaction

The presentation formats of information that elicit an individual's imagery are better remembered and more positively evaluated than the others (Lutz & Lutz, 1978). Prior research demonstrated that visual or verbal information on advertising influences consumers' attitudes toward advertising (Rossiter & Percy, 1980). Several studies examining the effects of imagery on consumer attitudes demonstrated that advertising using imagery-eliciting strategies promoted positive attitudes (Lutz & Lutz, 1978). Babin and Burns (1997) reported a positive impact of concrete pictures and verbal information on attitudes toward advertising and advertised brand. Yoo and Kim (2014) insisted that verbal information provoked emotions by activating visual representations of emotional events. Choi and Taylor (2014) examined that in the case of clothing products in online stores, consumers' mental imagery evoked by the 3D format of product image had a positive effect on their satisfaction with online store and revisit intention.

From this viewpoint, this study addresses how the mental imagery evoked by concrete visual and verbal information about apparel products impacts consumers' information and online store satisfaction. The following hypotheses synthesize the above arguments.

H10: Haptic information satisfaction will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H11: Haptic information satisfaction will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

H12: Online store satisfaction will be different according to the extent of levels of concreteness of the visual presentation format of haptic information in online fashion store.

H13: Online store satisfaction will be different according to the extent of levels of description of the verbal presentation format of haptic information in online fashion store.

4. Conceptual Model of Mental Imagery Processing as an Elaboration Continuum

Based on the literature claiming that mental imagery processing corresponds to an elaboration continuum including simple evocation of mental imagery and elaboration for imagination imagery (MacInnis & Price 1987; Smith et al., 1984), some researchers paid attention to the elaboration process of mental imagery. Mental imagery represented in an individual's working memory can be integrated with information stored in long-term memory during information processing and consequently regenerated new combinations through such a cognitive elaboration involving creative thinking using prior knowledge and experiences (Kosslyn et al., 1984). In other words, imagery processing at a low level of cognitive elaboration corresponds to mental visualization of a stimulus object, and "information processed at this low level of elaboration might elicit only a recognition response (MacInnis & Price, 1987, p. 475)".

Meanwhile, imagery processing at a higher level of elaboration involves creative activity that enables the activation of other information stored in long-term memory. Through the activation at this stage, mental imagery evoked at a low level of elaboration can turn into multiple creative imageries, i.e., evocation of imagination imagery (MacInnis & Price 1987; Mazzocco & Brock, 2006). According to Mazzocco and Brock (2006), imagination imagery is not an image of the object directly perceived, but a composite image of prior knowledge and sensory experiences including feelings and memories related to the object. Thus, imagination imagery is created through a secondary process corresponding to a high level of elaboration along the elaboration continuum of mental imagery processing.

Smith et al. (1984) insisted that the quantity and easy evocation of mental imagery promote an individual's imagery processing and evoke imagination imagery. MacInnis and Price (1987) suggested that the final dimension of imagery processing is the activation of imagery leading to combination with other information in long-term memory. Ellen and Bone (1991) insisted that the quantity, vividness and easy evocation of mental imagery are factors that help consumers create imagination imagery.

Based on the theoretical perspective of imagination imagery included in the elaboration continuum of imagery processing, this study tried to test the conceptual model of the connection between mental imagery elicited at a low and a high level of cognitive elaboration. From this point of view, this study posited that the types of mental imagery evoked at a low level of elaboration might influence the creation of imagination imagery at a high level of elaboration.

- H14: The quantity of mental imagery will positively influence the evocation of imagination imagery.
- H15: The vividness of mental imagery will positively influence the evocation of imagination imagery.
- H16: The ease of evoking mental imagery will positively influence the evocation of imagination imagery.

In addition, this study included the effect of imagery on consumers' attitudes in the research model. According to prior research (Babin & Burns, 1997; MacInnis & Price, 1987; Yoo & Kim, 2014), consumers engaging in mental imagery processing on visual or verbal stimuli in advertising have a positive attitude toward the advertising. Rossiter and Percy (1978) indicated that consumers' attitude is the appropriate dependent variable for investigating the effect of imagery processing. Mazzocco and Brock (2006) insisted on the role of imagery in the arousal of emotions. Rinaldo and Childers (2010) demonstrated that consumers experiencing haptic imagery from advertising showed a more positive attitude toward the advertising. Yoo and Kim's (2014) empirical test also supported that mental imagery evoked by the online product presentation influenced consumers' positive emotional responses by facilitating their product sensory experiences.

Therefore, this study tried to test empirically the conceptual model including the link between consumers' use of mental imagery and emotional responses proposed by these prior researches. In particular, in the online shopping context, consumer satisfaction with site information and the website is thought as an important variable to assess consumers' emotional responses. Based on Brunner-Sperdin et al. (2014), and Ha and Lennon's (2010) studies, consumers' site information satisfaction enhances their positive emotional states that influence consequently satisfaction with the website. Eroglu et al. (2003) used consumer satisfaction with the website as the outcome variable of the online shopping experience and supported the sequence of consumers' attitudes toward content offered by an online store and store satisfaction. Accordingly, this study included the effect of consumers' satisfaction with apparel product haptic information offered by an online store on their store satisfaction in the research model. The following hypotheses synthesize the above arguments.

- H17: The evocation of imagination imagery will positively influence consumers' haptic information satisfaction.
- H18: The evocation of imagination imagery will

positively influence consumers' store satisfaction.

H19: Consumers' haptic information satisfaction will positively influence their store satisfaction.

III. Methods

1. Research Design and Stimuli Development

This study was designed to simulate consumers' imagery processing from the perspective of visual information processing of product information in fashion online store. For this, the study consisted of two parts for testing hypotheses (Fig. 1). The first part aimed to identify

in online fashion store the difference in the quantity and vividness of mental imagery, in the ease of evoking mental imagery and in the evocation of imagination imagery depending on the degree of concreteness of visual presentation format and description of verbal presentation format of haptic information. In the second part, the study tried to testify the conceptual model of visual imagery processing including the effect of three types of mental imagery generated as an initial response to visual or verbal haptic information on the evocation of imagination imagery as an elaborated imagery at a higher level of cognition (Rossiter & Percy, 1978). The study also tried to test the effect of imagination imagery on consumers' information and store satisfaction, as well as the relationship between these two types of satisfaction (Fig. 2).

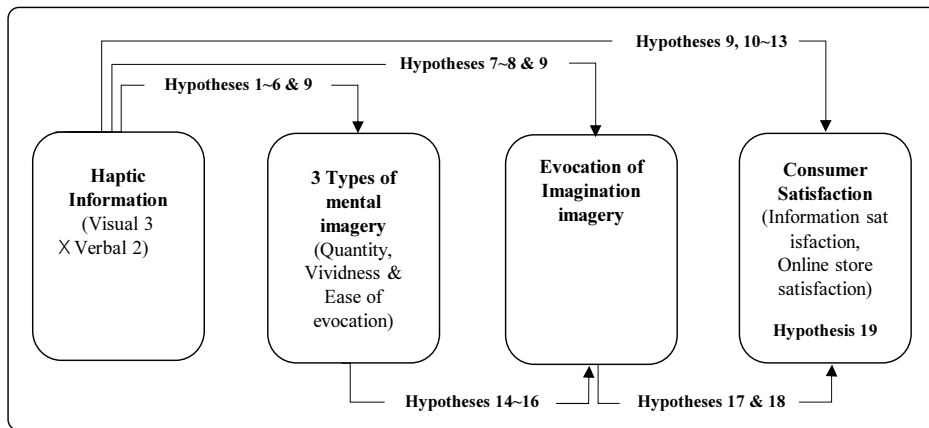


Fig. 1. Research model.

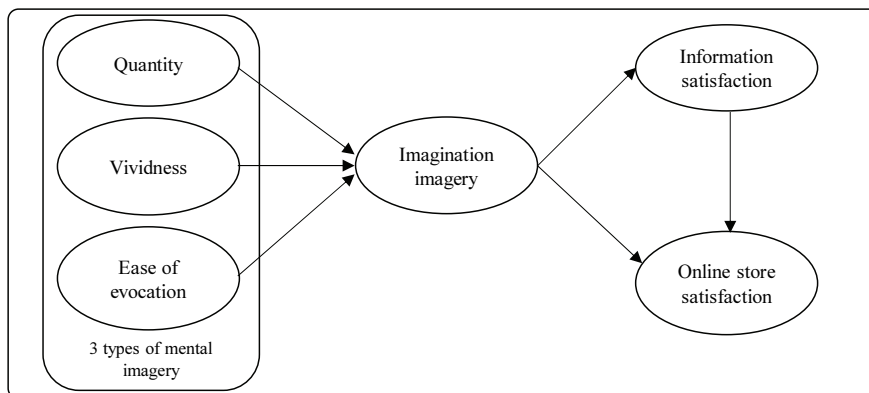


Fig. 2. Structural equation model of research variable.

Meanwhile, the dress is one of the products evoking multi-sensory imagery (Workman & Caldwell, 2007) and the flared dress shows the characteristics of apparel textiles in more detail than other apparel products (Ki, 2013; Lee & Lee, 2006). Accordingly, the flared dress in black and camel with long sleeves were selected for the test stimulus. In that colors might distract consumers' imagery processing (Grønhaug et al., 1991), black as an achromatic color and camel as a chromatic color were used for the color of the stimuli object. Moreover, since an offer of information on the tactility of clothing is important in making product choices (Citrin et al., 2003), the presentation format of haptic information on the flared dress was visually and verbally manipulated as an experimental treatment to evoke consumers' imagery.

Based on Lutz and Lutz's (1978) and Park's (2009) study claiming that visual imagery is elicited by visual

stimuli (i.e. pictures, graphs) and concrete verbal stimuli, this study used the close-up pictures and diagrams explaining clothing fabric's properties as a visual stimulus. In the diagram, the reflectivity, thickness, elasticity, tactility, and presence or absence of lining of the textile of apparel product were expressed in 3 levels, and the level corresponding to the material characteristics of the apparel product among the 3 levels was marked with a red box (Fig. 3). This study also used descriptive text as a verbal stimulus for detailed haptic information on clothing fabric. Concerning verbal condition, consumers' apparel product evaluation based on touch usually focuses on properties such as texture, temperature, or weight (Park, 2009; Peck & Childers, 2003). Therefore, this study manipulated descriptive text using the adjective for haptic information focusing on these properties.

Consequently, this study employed 2 (concrete descrip-

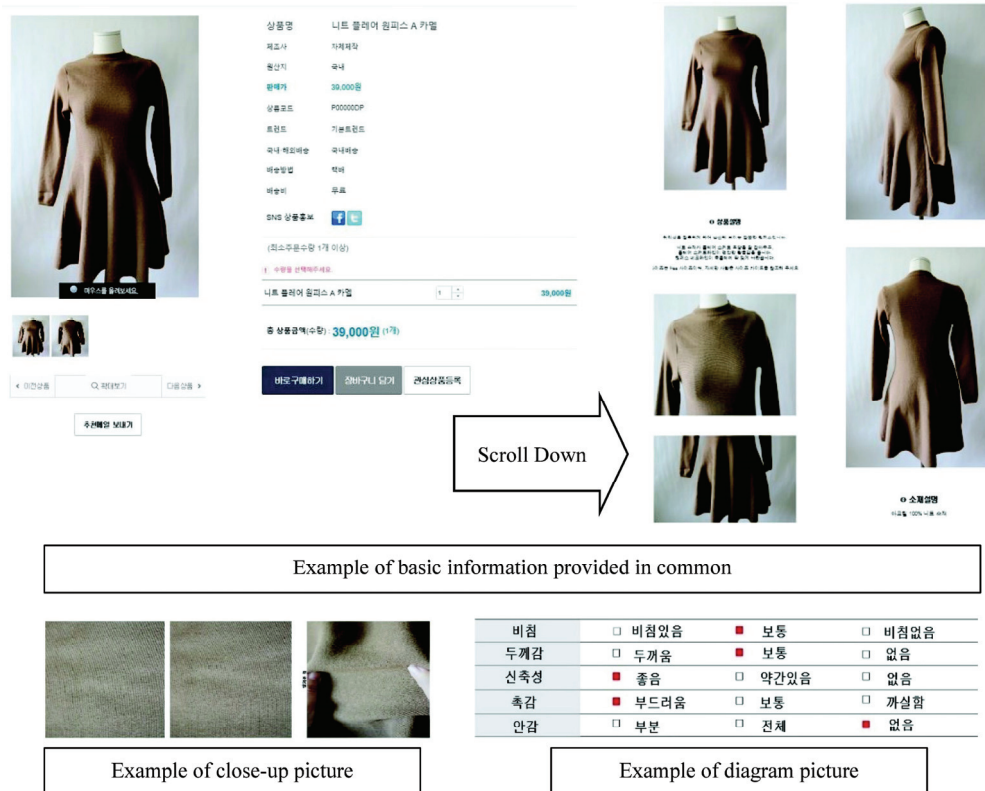


Fig. 3. Apparel product page with visual presentation format of haptic information.

tions vs. no descriptions as treatment for verbal presentation format of haptic information) \times 3 (close-up picture vs. diagram picture vs. no picture as treatment for visual presentation format of haptic information) \times 2 (black vs. camel colored flared dress) between-subjects factorial design. Twelve one-page websites were created for the experiment using web-page-making tool for online store. All images of products were taken in the same condition to eliminate extraneous variables. Each experimental website shared the same photographic images taken of the flared dress worn by the headless mannequins for a basic product image. Except for visual and verbal stimuli for the manipulation of an imagery-evoking strategy, all components of the experimental websites were the same.

2. Pretest

The pretest was conducted with 120 women in their 20s and 30s to develop suitable visual and verbal stimuli for the main experiment. Women in their 20s and 30s are the most frequent online shoppers and make the most purchases online (Whang & Lim, 2022) in Korea. Accordingly, they were thought to be appropriate for this research. Pretest participants were randomly assigned to one of the 12 treatment conditions and evaluated the information believability of visual and verbal stimuli based on MacKenzie et al.'s (1986) 2 items using a 7-point scale for controlling any potentially confounding effect. An ANOVA showed no significant effect for 3 different visual conditions of haptic information (close-up picture vs. schematic diagram vs. no picture) on information believability ($F(2, 117) = 1.91, p > .10$). The result also indicated no significant effect for 2 different verbal conditions (concrete descriptions vs. no descriptions) on information believability ($t = -.23, p > .10$). Thus, no confounding effect created by the difference in text length in verbal stimuli was found.

The manipulation check of visual and verbal stimuli was conducted. Pretest participants rated 3 levels of visual conditions in terms of texture expression and representation of fabric properties which correspond to manipulating an imagery-evoking effect. An ANOVA and

post-hoc analysis revealed that the close-up picture was perceived as the most concrete for offering haptic information on apparel product, followed by a schematic diagram and no picture ($F(2, 117) = 29.88, p < .001$; $F(2, 117) = 20.94, p < .001$, respectively). Pretest participants viewed no descriptions and the concrete descriptions to be significantly different in texture expression and representation of fabric properties ($t = -3.43, p < .001$; $t = -4.10, p < .001$, respectively). Results indicated a successful manipulation.

3. Main Experiment and Dependent Variable Measures

For the main experiment conducted between March 30 and April 7 2017, a convenience sample of women ($N = 528$) in their 20s and 30s was randomly assigned to one of the 12 treatment conditions developed in the pretest and answered the questionnaire including all dependent measures and demographic items. Given that consumers who have no experience with a product category may have difficulty visualizing either the product or usage of the product (Loken, 1984), all participants had an experience of using online store.

A MANOVA test with blocking product colors (black, camel) as a nuisance factor to eliminate experimental error showed that there were no significant differences among the 6 groups in online store familiarity ($F(5, 522) = .301, p = .912$) and clothing involvement ($F(5, 522) = .419, p = .836$) which as a covariate, might affect the measured results (Ellen & Bone, 1991). A chi-square analysis was conducted to test the differences in demographics among 6 the groups by 3 levels of the visual condition and 2 levels of the verbal condition of which cell sizes ranged from 86 to 91. Results showed that at the $p < .05$ level, there were no differences in demographic factors, for example, age ($\chi^2 = .20, df = 5, p = .99$), residence ($\chi^2 = 9.12, df = 10, p = .52$), marital status ($\chi^2 = 4.53, df = 5, p = .48$), educational status ($\chi^2 = 9.38, df = 15, p = .86$) and monthly income ($\chi^2 = 26.23, df = 20, p = .16$). Thus, the group homogeneity was confirmed.

The result of the confounding check showed that participants didn't view 3 visual stimuli to be significantly

different on the information believability ($F(5, 522) = 2.11, p > .10$). At the same time there was also no significant difference between 2 verbal stimuli on the information believability ($t = -.94, p > .10$). The result of the manipulation check indicated the significant differences among 3 visual presentation formats of haptic information on texture expression ($F(2, 525) = 19.38, p < .001$) and the representation of fabric properties ($F(2, 525) = 29.79, p < .001$). In the verbal condition, there were also significant differences between no descriptions and the concrete descriptions version on descriptive expression of texture ($t = -2.46, p < .01$) and explanation of fabric properties ($t = -4.39, p < .001$). The manipulations for the main experiment were reliable and effective. Accordingly, 3 visual stimuli and 2 verbal stimuli were regarded as appropriate for the main experiment.

To measure 3 types of mental imagery (i.e. the quantity and the vividness of imagery, the ease of evoking imagery) and the evocation of imagination imagery corresponding to the continuum of imagery processing, 13 Likert-type items were adopted and revised from the communication evoked imagery scale of Ellen and Bone (1991) and its modified version of Babin and Burns (1997). 8 Likert-type items to measure consumers' haptic information satisfaction and online store satisfaction were adopted from Richard and Chebat (2016). All items used a 7-point scale from 1 (strongly disagree) to 7 (strongly agree).

4. Preliminary Analyses

Cronbach's reliability, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) were used to select and assess the final items that would be used for hypothesis testing. EFA of 13 items included in the mental imagery scale yielded 4 factors; the quantity and the vividness of mental imagery, the ease of evoking mental imagery, and the evocation of imagination imagery. EFA on consumer attitude yielded 2 factors; haptic information satisfaction and online store satisfaction. The reliabilities of the dependent variables ranged from .90 to .96, indicating reasonably high internal consistency of the scales.

The results of 6-factors CFA indicated a satisfactory level of model fit ($\chi^2 = 433.34, df = 174, p < .000$, RMSEA = .05, GFI = .93, CFI = .98). Standardized factor loading (λ) of all items ranged from .81 to .95, and all indicator t-values were significant at the .001 level. Construct reliability estimates ranged from .75 to .94. Variance extracted estimates ranged from .71 to .83, and all were greater than the square of the correlation between their respective constructs. The conditions of supporting convergent validity and discriminant validity were satisfied (Table 2, Table 3).

Data checks indicated no serious violations of the basic assumption of MANOVA. A 6×6 MANOVA was conducted to test the main and interaction effect of visual and verbal conditions on the dependent variables. A structural equation modeling (SEM) analysis was used to test the causal relationship between the 3 types of mental imagery and the evocation of imagination imagery and between the evocation of imagination imagery and each attitude variable. The relationship of the two attitude variables was also assessed.

IV. Results

1. MANOVA and Hypotheses Test

First, hypotheses 1 to 9 to examine the effects of visual and verbal presentation format of haptic information, on 3 types of mental imagery and the evocation of imagination imagery were tested using MANOVA.

The MANOVA results revealed a significant main effect for 3 levels of visual presentation format of haptic information on both the evocation of imagination imagery and satisfaction with information and online store (Wilks' $\lambda = .95, F(5, 522) = 2.10, p < .05$, partial $\eta^2 = .02$). MANOVA results also revealed that a significant main effect for two levels of verbal presentation format of haptic information on mental imagery and consumer's attitude (Wilks' $\lambda = .98, F(5, 522) = 2.20, p < .05$, partial $\eta^2 = .03$) (Table 4). Concerning H1 and H2, univariate results indicated that the quantity of mental imagery was significantly influenced by the verbal presentation format of information ($F(1, 526) = 5.63, p < .05$, partial η^2

Table 2. Results of CFA

Construct and scale items	Standardized factor loading(λ)	Cronbach's α	AVE	CR
Quantity of mental imagery				
While looking at the apparel product page, I imagined many things about the apparel textiles.	.89			
While looking at the apparel product page, I pictured many images of the textile in my mind.	.87	.90	.73	.75
While looking at the apparel product page, many images related to the textile came into my mind.	.86			
Vividness of mental imagery				
The image evoked in my mind was in detail.	.94			
The image evoked in my mind was clear.	.93	.93	.78	.91
The image evoked in my mind was vivid.	.85			
Ease of evoking mental imagery				
This image quickly occurred to me.	.95			
This image easily occurred to me.	.90	.95	.83	.94
I came up with this image without difficulty.	.93			
Evocation of imagination imagery				
I imagined what the properties of textiles would be like if I wore this product.	.90			
I imagined the texture of the product in my mind.	.93	.94	.78	.94
I imagined the feeling of the textile in my mind.	.91			
I imagined the touch of the product in my mind.	.84			
Haptic information satisfaction				
I have a positive feeling about the haptic information provided.	.85			
I am satisfied with the haptic information provided.	.92	.94	.71	.91
I like the haptic information provided.	.85			
The haptic information provided is excellent.	.91			
Online store satisfaction				
I like this online store website.	.94			
I am satisfied with the shopping experience provided by this store website.	.92	.96	.81	.94
I am satisfied with this store's website.	.90			
I feel good about this store's website.	.95			

Table 3. Results of discriminant validity

	IMG*	QUANT	EASE	VVD	INFS	STS
IMG	.78^a					
QUANT	.33 ^b	.73				
EASE	.30	.63	.83			
VVD	.31	.56	.74	.78		
INFS	.18	.21	.27	.24	.71	
STS	.07	.08	.11	.14	.53	.81

a: Average Variance Extracted (AVE) for constructs are displayed on the diagonal.

b: Numbers below the diagonal are squared correlation estimates of two variables.

*IMG=Imagination imagery, QUANT=Quantity of imagery, EASE=Ease of evoking imagery, VVD=Vividness of imagery, INFS=Information satisfaction, STS=Store satisfaction

Table 4. Results of MANOVA and hypotheses test

H	Independent variable	Dependent variable	MANOVA		ANOVA	
			Wilk's λ	F	F	
H1	Visual presentation format	Quantity	.95	2.1*	1.56	n
H3		Vividness			2.17	n
H5		Ease of evoking			2.82	n
H7		Imagination imagery			4.41*	supported
H10		Information satisfaction			4.03*	supported
H12		Store satisfaction			8.04***	supported
H2	Verbal presentation format	Quantity	.98	2.2*	5.63*	supported
H4		Vividness			3.31	n
H6		Ease of evoking			5.20*	supported
H8		Imagination imagery			8.58**	supported
H11		Information satisfaction			8.55*	supported
H13		Store satisfaction			3.16	n
H9	Visual \times Verbal presentation format	Quantity Vividness Ease of evoking Imagination imagery Information satisfaction Store satisfaction	.99	.40	n	n

* $p < .05$, ** $p < .01$, *** $p < .001$

=.01), not by the visual presentation format of information. Thus, only H2 was supported, coincident with the result of Ellen and Bone's (1991) and Walters et al.'s (2007) study which clarified the descriptive text's positive effect on the quantitative type of imagery. Results also showed that the vividness of mental imagery was not significantly influenced by both visual and verbal presentation formats of information, thus failing to support H3 and H4. This is contrary to the results of Walters et al.'s (2007) and Yoo and Kim's (2014) studies respectively indicating the positive effect of concrete text and pictures on the vividness of imagery. The ease of evoking mental imagery was only significantly related to the verbal presentation format of information ($F(1, 526) = 5.20, p < .05$, partial $\eta^2 = .01$), thus supporting H6, but not H5. This is coincident with the result of Ellen and Bone's (1991) study.

Contrary to previous research findings (Walters et al., 2007; Yoo & Kim, 2014), three types of mental imagery (the quantity and vividness, and the ease of evoking mental imagery) were not significantly influenced by the visual presentation format of haptic information. Meanwhile, results demonstrated that when concrete pictures are absent, the presence of descriptive text can increase

the quantity and easy evocation of mental imagery, supporting the result of Ellen and Bone's (1991) and Walters et al.'s (2007) study.

H7 and H8 predicted that the more concrete visual and descriptive verbal presentation format of haptic information, the greater the effect on the evocation of imagination imagery. Univariate main effects of a higher level of concreteness of picture ($F(2, 525) = 4.41, p < .05$, partial $\eta^2 = .02$) and description of text ($F(1, 526) = 8.58, p < .01$, partial $\eta^2 = .02$) significant on consumers' evocation of imagination imagery, thus H7 and H8 were supported. This is coincident with the result of Rossiter and Percy's (1978) and Ellen and Bone's (1991) study. Tukey's post hoc test demonstrated that the close-up picture for visual presentation format of information was significantly more effective than the other two visual conditions in evoking imagination imagery (Table 5).

Another MANOVA test indicated multivariate interaction effect of pictures by text was not significant, thus failing to support H9. This result corresponds to Babin and Burns's (1997) finding, but not to Walters et al.'s (2007). Concerning H10 through H13, univariate main effects of visual ($F(2, 525) = 4.03, p < .05$, partial $\eta^2 =$

Table 5. Post hoc test for comparison of effects of visual presentation formats

Dependent variable	Close-up picture n=178	Diagram n=174	No picture n=176	F
Evoking imagination imagery	5.06 B	4.80 A	4.79 A	4.408*
Information satisfaction	4.32 B	4.09 AB	3.98 AB	3.901*
Store satisfaction	4.01 B	3.70 A	3.52 A	7.913***

* $p < .05$, *** $p < .001$

Tukey test results (A<B)

.02) and verbal ($F(1, 526) = 8.55, p < .01$, partial $\eta^2 = .02$) presentation format of haptic information were significant on consumers' information satisfaction. However, consumers' store satisfaction was only significantly related to the picture information ($F(2, 525) = 8.04, p < .000$, partial $\eta^2 = .03$). Observation of Tukey's post hoc test manifested that the close-up picture was most successful in inducing positive attitudes toward the information presentation format and online store, thus H10, H11 and H12 were supported, but not H13. Overall, this result supported the previous research (Babin & Burns, 1997; MacInnis & Price, 1987) on the impact of mental imagery on consumers' attitudes.

2. Mental Imagery Processing as an Elaboration Continuum

The next stage was to test the hypothesized paths in the proposed research model using single-group SEM. The measurement model met an acceptable level of fit ($\chi^2 = 392.31, df = 177, p < .000$, RMSEA = .05, GFI = .93, CFI = .98). H14 through H16 examined the process that corresponds to an elaboration continuum of mental imagery

processing including both simple evocation and elaboration of imagery (MacInnis & Price, 1987). A path analysis was conducted to demonstrate the mental imagery process by which each of 3 types of mental imagery at a low level of cognitive elaboration would influence the evocation of imagination imagery at a high level of elaboration (Table 6, Fig. 4).

The path coefficient of the SEM revealed that except for the path for the ease of evoking mental imagery on the evocation of imagination imagery, the quantity ($\gamma_{11} = .31, t = 4.24, p < .001$), and the vividness ($\gamma_{12} = .21, t = 2.34, p < .05$) of mental imagery were influential on the elaboration for the evocation of imagination imagery. Thus, H14 and H15 were supported, but not H16. Results also indicated a significant effect of imagination imagery in the imagery-processing continuum on satisfaction with the presentation format of haptic information ($\beta_{21} = .51, t = 9.94, p < .001$), but not on satisfaction with an online store. Meanwhile, consumers' satisfaction with the presentation format of information in the context of evoking mental imagery had a significant effect on the satisfaction with an online store providing such type of information ($\beta_{32} = .77, t = 17.38, p < .001$). Thus, this study demon-

Table 6. Results of structural equation model

H	Model Parameters	Standardized Coefficient	t-value	
H14	γ_{11} : Quantity → Imagination imagery	.31	4.24***	supported
H15	γ_{12} : Vividness → Imagination imagery	.21	2.34*	supported
H16	γ_{13} : Ease of evoking → Imagination imagery	.15	1.61	n
H17	β_{21} : Imagination imagery → Information satisfaction	.51	9.94***	supported
H18	β_{31} : Imagination imagery → Store satisfaction	.10	1.11	n
H19	β_{32} : Information satisfaction → Store satisfaction	.77	17.38***	supported

* $p < .05$, *** $p < .001$

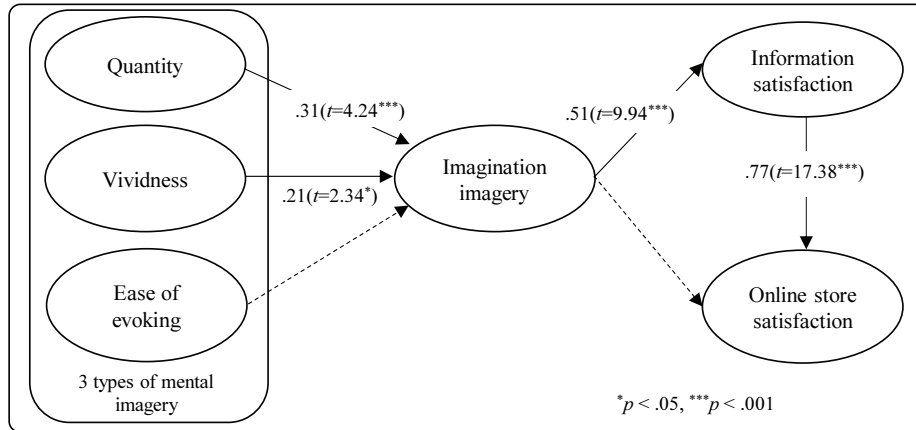


Fig. 4. Structural equation model with standardized path coefficients.

stated that in an online shopping context, consumers' satisfaction with the information presentation format evoking mental imagery mediated the effect of imagination imagery on their positive attitude toward online store, supporting H17 and H19, but not H18.

V. Discussion

This study investigated first how different visual and verbal presentation formats of haptic information for apparel product's textile in fashion online store influence the three types of mental imagery, imagination imagery evoked in consumers' minds, and their satisfaction with information presentation format and online store. The results of the study demonstrated that during the process of simple evocation of imagery in imagery processing only verbal information influenced the three types of imagery. Specifically, the descriptive verbal presentation format of haptic information had an impact on the quantity and ease of evoking imagery among the three types of mental imagery, supporting the findings of Ellen and Bone (1991), and Walters et al. (2007). However, the findings of Babin and Burns's (1997), and Walters et al.'s (2007) study applied to print advertising for tourism destinations indicated the significant effect of concrete pictures and instruction to imagine on the vividness of imagery.

Compared to prior researches, this study found no significant effect of visual presentation format of haptic in-

formation on the quantity and vividness of imagery, and the evocation of imagery. Even though participants of this study answered in the pre-test that the close-up picture was the most concrete visual stimulus in offering haptic information on apparel product, the close-up picture used in this study mainly showed the texture of apparel textiles, which makes participants perceive haptic attributes such as reflectivity, elasticity, and thickness rather than temperature, weight, or tactility. Therefore, it can be assumed that this limitation in presenting more various haptic attributes may hinder participants from easily evoking imagery, and more quantitative and vivid imagery as well.

In addition, this study revealed that a more descriptive verbal presentation format in offering haptic information was not significant for the evocation of vivid imagery. The vividness of mental imagery is regarded as more related to the clarity or intensity of the imagery (Ellen & Bone, 1991). Based on this study's result, it is possible to suggest that in an online shopping environment, the verbal presentation format of haptic information has the limitation of delivering visual detail of apparel textiles.

For the evocation of imagination imagery activated during the second process corresponding to the elaboration of mental imagery, concrete visual presentation formats such as close-up pictures and descriptive verbal presentation format of haptic information were influential respectively. Meanwhile, consistent with the result of

Yoo and Kim (2014) conducted in an online environment, but contrary to Walters et al.'s (2007) finding in the context of print advertising, the interaction effect of visual and verbal presentation format of haptic information was not found in this study. This study indicated that when concrete pictures of apparel textiles are presented in an online store, the presence of descriptive verbal information has no imagery effect, or same as vice-verse. According to the result of this study, consumers' attitudes toward information may be enhanced by the concrete picture and descriptive text. However, their online store satisfaction may be influenced by the visual presentation format of information. This is consistent with Lutz and Lutz's (1978) study claiming that visual treatments are more associated with consumer's positive attitudes.

The finding from SEM also provided empirical support for the conceptual model indicating imagery processing as an elaboration continuum. In summary, if consumers experience a large number of mental imagery and vivid imagery in online stores, it would lead them to evoke imagination imagery. The ease of evoking mental imagery as one of three types of mental imagery was not significantly related to the elaboration into imagination imagery.

Considering that the ease of evocation of mental imagery is more closely associated with time for processing quantitative and detailed information (Ellen & Bone, 1991), such a result revealed that the ease of evocation of mental imagery is related to participants' ability to evoke mental imagery. Based on this result, it can be assumed that the quality of mental imagery such as its quantity and vividness is more important for the evocation of imagination imagery.

The empirical test identified that consumer satisfaction with the presentation format of information plays a mediating role in consumers' online store satisfaction. Babin and Burns (1997) insisted on the necessity of the research investigating the role of consumer's affective responses in advertising using imagery-eliciting strategy. This study showed that consumers' online store satisfaction may be indirectly affected by their positive attitude toward the product information stimulated by imagination imagery in the imagery-evoking context.

VI. Limitations and Marketing Implications

This study had several limitations. First, when it comes to the imagery-evoking process, this research focused on visual thinking processing based on prior studies that conceptually distinguish mental imagery processing from verbal processing (Babin & Burns, 1997; Park, 2009; Peck & Childers, 2003; Rossiter & Percy, 1978). The study was also performed in Ellen and Bone's (1991) aspect indicating that visual thinking processing has a greater ability to activate other information in long-term memory than verbal processing. Second, although there were no differences among participants in online store familiarity and clothing involvement that may influence their imagery processing in an online environment, this study did not include differences in participants' visualization ability.

Meanwhile, the results of this study provide theoretical and practical insights that may help both academic researchers and retailers understand the different effects of visual and verbal presentation formats of haptic information in fashion online stores on the evocation of mental imagery. The results propose that to meet consumers' online store satisfaction, their need for sufficient information on apparel products should be first fulfilled, in particular by offering various visual information or focusing on detailed images, or verbal descriptions with concrete words.

In addition, the results of this study give insight to online fashion retailers that to increase consumers' haptic information satisfaction, it would be effective to use the strategy activating consumers' imagination imagery by presenting close-up pictures or descriptive text including specific adjectives as the haptic information on apparel products. It is also possible to suggest that online retailers can increase consumers' information and store satisfaction by using visual or auditory formats of haptic information such as video clips and 3D images stimulating consumers' imagination imagery. This study suggests that if there is no close-up picture to show fabric traits of apparel products, it would be necessary to use descriptive text which evokes easily a large number of consumers'

mental imagery and promotes the elaboration of imagination imagery leading to information and online store satisfaction.

From an academic perspective, this study extended the existing literature related to mental imagery processing in the context of online retail by validating empirically a research model including the imagination imagery component. In addition, the study proved the effectiveness of strategy using consumers' mental imagery to help their information processing. Based on the results of this study, it is possible to suggest follow-up research on the effects of imagery processing when consumers process information about apparel products or textiles in an online shopping environment that accepts innovative technologies such as virtual stores and 3D fashion products.

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2. Ethics and consent

Not applicable.

3. Availability of data and materials

The datasets collected and analyzed in this study are not available to the public due to another ongoing study that will be generated from the current datasets.

4. Conflicting interests

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6. Authors' contributions

Both authors developed the research idea and analyzed the data, and prepared the manuscript. YJL guided the overall process of the research and revised the manuscript. TYK was mainly responsible for data collection and analysis along with writing the manuscript. All of the authors read and approved the final manuscript.

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