

EMBODIED SIMULATION EFFECT OF FITTED VISUAL PERSPECTIVE AND ADVERTISING MESSAGE

Chung-Lin Toung

Nanfeng College of Sun Yat-sen University

ABSTRACT

In this study, we hypothesize that when imagining from different visual perspectives, individuals prefer different product benefit messages. The experiment was performed in two phases. In the first phase, the subjects were primed to generate different visual perspectives, which resulted in different cognitive focuses. In the second phase, the carry-over effect of the primed cognitive focus in the first phase was used to assess product advertisements. The experimental stimuli were smartphone advertisements with different product benefit messages, and 196 college students were recruited as subjects. The results show that if an individual imagines from the actor's perspective, the advertisement message should emphasize the product's experiential benefits, whereas if the individual imagines from the observer's perspective, the advertisement message should emphasize the product's symbolic benefits. This study also confirms that the persuasiveness realized through fitting the visual perspective and advertising message is mediated through embodied simulation.

JEL: M31, M37

KEYWORDS: mental imagery, visual perspective, embodied simulation, actor's perspective, observer's perspective

INTRODUCTION

One of the human being's greatest abilities is the embodiment of the past, the future, and even counterfactual events through mental simulation that transcends the current moment. This ability plays an important role in many human cognitive processes. When performing mental simulation, an individual can adopt two different perspectives: the actor's perspective and the observer's perspective. As individuals adopt the actor's perspective, the imaginary scenes unfold directly before them as if they were living in these scenes. In contrast, individuals can also imagine from the observer's perspective and view their own actions in imaginary scenes as an outsider (Libby & Eibach, 2011a, 2011b).

Different visual perspectives provide different pieces of visual information, which in turn influence an individual's interpretation of the imaginary event. For example, the observer's perspective tends to enable us to understand the causes of an individual's behavior based on the individual's characteristics, while the actor's perspective tends to enable us to understand the causes of the behavior based on the sensory components of the scenario. The origin of this difference is that individuals tend to attribute

the causes of behavior to cognitive focus. When performing mental simulation, those who adopt the observer's perspective derive their cognitive focus from the individuals themselves, while those who adopt the actor's perspective place their cognitive focus on the scenario (Libby, Shaeffer, Eibach, & Slemmer, 2007; Nigro & Neisser, 1983).

“Mental imagery” refers to the psychological processing of sensory information in short-term memory, which is also a mental simulation outcome and a way of generating cognitive activities (Dahl & Hoeffler, 2004). “Embodied simulation” refers to the mental imagery that an individual forms after exposure to environmental stimuli. The formation of such an image may occur through unconscious imitating, unconscious associating, and unconscious priming (Bargh, 2002; Bargh & Morsella, 2008; Barsalou, 2008). Most previous studies on mental imagery and visual perspective have been focused on memory and emotion. In the field of consumer psychology, investigations on how different visual perspectives influence how consumers process and evoke mental imagery advertisement have not been reported. It is well known that manufacturers frequently use the advertising communication strategy of evoking mental imagery to convey product benefit messages to consumers (Petrova & Cialdini, 2008). Understanding how consumers interpret the advertising messages of manufacturers under different visual perspectives not only helps manufacturers design their advertising messages but also enables us to study the relationship between mental imagery and persuasiveness with new orientations. In addition to clarifying the fitting effect of visual perspective and advertising message, we also wish to investigate the mediating role of embodied simulation. We hypothesize that the more easily that the mental imagery content of embodied simulation is generated, the greater the persuasive effect of the mental imagery appeal.

Studies have shown that when simulating from the actor's perspective, individuals are only able to perceive the surrounding environment of the imaginary event. They are unable to see themselves. However, when simulating from the observer's perspective, they are able to see not only the surrounding environment but also themselves. It was found that compared to the observer's perspective, recollection and imagination through the actor's perspective resulted in to high responsiveness in terms of contextual detail and emotional evocation and more information regarding emotion and physical perceptions. In contrast, recollection and imagination through the observer's perspective contained more information and inferences regarding the individuals' characteristics and their past behaviors (Libby & Eibach, 2011a, 2011b; Libby, Valenti, Hines, & Eibach, 2014). Because the imagination of the actors and the observers touches on different pieces of visual information, past studies have confirmed that compared to the actor's perspective, once individuals imagine from the observer's perspective, they tend to place their cognitive focus on the behavior that is executed in the imagination, which results in more inference and attribution to the individual's characteristics than to the scenario (Libby & Eibach, 2002). For example, in one study, the investigator asked the subjects to imagine their future successful academic work from the observer's perspective and found that (1) the

subjects perceived that the academic work genuinely mattered and (2) the subjects attributed their imaginary behavior to their personalities (Vasquez & Buehler, 2007).

Based on the described findings from previous studies, we hypothesize that when imagining a future event two different visual perspectives would project different mentalities and interpretations with respect to the event. From the observer's perspective, the personal meaning and personality traits expressed by the behavior are more emphasized. Thus, imagining from the observer's perspective emphasizes self-expression that extends from self-concept and whether the imaginary behavior has the significance of strengthening self-image. In contrast, imagining from the actor's perspective emphasizes the perception and emotion that extend from the imaginary scenario and whether the imaginary scenario induces experience. That is, imagining from the observer's perspective extracts the abstract portion of the imaginary event, based on which the concept of self is further defined, whereas imagining from the actor's perspective focuses on the concrete portion of the imaginary event, and self-experience is induced through sensory stimulation by the scenario.

In addition, it has been demonstrated that once the interpretation of an event or action from the actor's perspective or observer's perspective is primed, the primed cognitive focus carries over to subsequent unrelated tasks (Libby & Eibach, 2011b; Libby et al., 2014). That is, when an individual is primed to imagine from the observer's perspective (actor's perspective), the individual's perception of the abstract portion (concrete portion) of the action affects the individual's judgment of the subsequent task. For example, Libby et al. (2014) enabled subjects to form different visual perspectives through manipulation and assessed the subjects' interpretations of Aesop's fables after they completed several unrelated tasks. They found that compared with the subjects who were primed to adopt the actor's perspective, the subjects who were primed to adopt the observer's perspective were more inclined to interpret a fable through abstract morality. Thus, in addition to the formation of different pieces of mental imagery information, different visual perspectives also triggered different cognitive processing patterns that were carried over to subsequent behaviors and events.

Based on this discussion, we hypothesize that regarding a mental imagery-evoking advertising message, whether a manufacturer's communication strategy is persuasive depends on the type of visual perspective that a consumer adopts to imagine the advertising messages. If the manufacturer's messages focus on the product's experiential benefits, when consumers adopt the actor's perspective, the persuasion is more effective than that when consumers adopt the observer's perspective. In contrast, if the manufacturer's messages focus on the product's symbolic benefits, when consumers adopt the observer's perspective, the persuasion is more effective than that when they adopt the actor's perspective. However, in the case of functional benefit messages, it is difficult to process such messages through mental imagery (Swann & Miller, 1982). Therefore, it makes no difference which perspective the consumer adopts. Thus, when the manufacturer's advertising message fits the visual

perspective adopted by the consumer, the message is more convincing to the consumer, and the persuasiveness is clearly reflected in the consumer's attitude toward the product and willingness to buy. Accordingly, we propose the following hypotheses:

Hypothesis 1a: When imagining from the actor's perspective, a consumer has a better attitude toward a product and higher willingness to buy in response to a manufacturer's communication strategy that emphasizes the product's experiential benefit message than in response to a manufacturer's communication strategy that emphasizes the product's symbolic benefit message.

Hypothesis 1b: When imagining from the observer's perspective, a consumer has a better attitude toward a product and higher willingness to buy in response to a manufacturer's communication strategy that emphasizes the product's symbolic benefit message than in response to a manufacturer's communication strategy that emphasizes the product's experiential benefit message.

Previous studies on embodied simulation and mental imagery have shown that the degree of embodied simulation through which an individual processes visual imagery information affects the individual's judgment of subsequent tasks. That is, the individual considers not only the pieces of information of visual imagery content but also whether these pieces of information can be easily used by the mental simulation as the basis on which to assess the event (Elder & Krishna, 2012; Petrova & Cialdini, 2008). For example, Petrova and Cialdini (2008) showed that consumers base their willingness to buy on how easily advertising messages can help them generate imagination, and the more easily that such messages help consumers form mental imagery information, the more positively the consumers assess the advertised product. The effect of mental simulation on persuasiveness has been examined. It was found that when the content of a persuasion message matches the individual's cognitive focus, the persuasiveness is higher (Lee, Keller, & Sternthal, 2010). It is believed that the mechanism of higher persuasiveness is that when the content of a message is in line with the individual's mental construal, the individual feels that the message content is easier to process. Thus, this idea of "feeling right" enables the individual to positively assess the attitude target (Kim, Zhang, & Li, 2008; Ziamou & Veryzer, 2005). Therefore, when the type of advertising message of a manufacturer fits the visual perspective adopted by a consumer, it is easier for the consumer to simulate the content of the advertising message through embodied simulation, thus further strengthening the message's persuasiveness. Accordingly, we propose the following hypothesis:

Hypothesis 2: A better attitude toward a product and higher willingness to buy that result from the fitness between a consumer's visual perspective and a manufacturer's type of advertising message are achieved through embodied simulation with more mental images evoked by the fitness.

DATA AND METHODOLOGY

Stimuli

In this study, we adopted the method of Park, Jaworski, and MacInnis (1986) to categorize the product benefit into functional benefits, experiential benefits, and symbolic benefits. When choosing the stimulus, we considered two factors: (1) the subjects' familiarity with the attributes and benefits of the stimulus product and (2) that the subjects have purchased and can afford to purchase the stimulus product. Therefore, a smartphone was chosen as the stimulus product. In terms of product benefit information, to ensure that the description of the product benefit is in line with the categorization definition of Park et al. (1986), a pretest on the descriptions of product benefit categorization was performed on 28 subjects ($M_{age} = 21$, women = 58.4 %), in which the subjects first were educated on the definition of each product benefit and then categorized different product benefit descriptions. The results showed that the "quad-core processor system" best represented the functional benefits, "any time, any way" best represented the experiential benefits, and "low-key luxury, capable yet self-effacing" best represented the symbolic benefits. A total of three advertisements were designed based on the description phrases of product benefit chosen from the pretest.¹

Design and Participants

In this study, an experimental design of 2 (visual perspectives: observer's perspective vs. actor's perspective) * 3 (advertising message types: functional benefits vs. experiential benefits vs. symbolic benefits) was adopted to validate the hypotheses. A total of 196 college students ($M_{age} = 20$, women = 55.1 %) from a university in Taiwan were recruited and randomly assigned to different groups (30-32 participants per group).

Procedure

Because the visual perspective is primed and it is necessary to investigate whether the cognitive processing styles produced by different visual perspectives are carried over to subsequent tasks, two experiments that were disguised as unrelated were designed. The first experiment was presented as a study on the imagination of daily life. The second experiment was presented as a study on the evaluation of product advertisement.

The subjects were invited to the laboratory in groups (at most five subjects per group) and informed that this experiment addressed the imagination of daily life. That is, the experiment aimed to understand the imagination of college students and the vividness of the imagination when different visual perspectives were adopted. Then, the subjects were asked to read the instructions under the guidance of the instructor and imagine the scenario when taking a subway ride. The instructions for the two visual perspectives were as follows:

¹ For brevity, the advertisement stimulus and the complete questionnaire are omitted here. They are available on request.

1. Instruction for the observer's perspective: When you imagine, you describe the surrounding scenes through the observer's eyes and see what is happening from an observer's perspective. When imagining, you can see both yourself and the surroundings.
2. Instruction for the actor's perspective: When you imagine, you describe the surrounding scenes through your own eyes and see what is happening in front of you, and the scenes are presented directly to your face.

After the subjects understood how to imagine, they were asked to close their eyes and imagine for 5 minutes and then to write down the visual information they just saw and answer the follow-up questions. When the subjects completed the tasks of this phase and were about to leave, the instructor suddenly asked the subjects whether they were willing to help a manufacturer evaluate an advertisement of a new product. All the subjects were willing to help, and the test proceeded to the evaluation of the product advertisement.

During the product advertisement evaluation phase, each subject was given an A4 flyer and asked to read the flyer for 1-2 minutes before he/she was given a questionnaire to complete. After completing the questionnaire, each subject was compensated with \$2. The entire test lasted 20-30 minutes, whereby the stimulus tasks lasted 15-25 minutes, and the product advertising assessment task lasted approximately 5 minutes.

Measures

Because the test was disguised as two unrelated experiments, the scale was divided into two parts. Because the first experiment was presented as a study on imagination in everyday life, the scale measures if a certain visual perspective was successfully primed. The subject was first asked to imagine the scenes of taking a ride in the subway from different visual perspectives and then to write down the content of the visual imagery. Then, the success of the experiment was tested with reference to the items of Hung and Mukhopadhyay (2012). The items included two parts. Each item was evaluated on a 5-point scale. The first part concerned visual perspective (I see the subway scene from my own perspective / I see the subway scene from an observer's perspective; 1 = completely from the actor's perspective, 5 = completely from the observer's perspective). The second part concerned vividness (The scenario I was imagining is very vivid / I am fully aware of my perceptions and thoughts when I am in the scenario; 1 = strongly disagree, 5 = strongly agree; Cronbach's $\alpha = 0.95$).

The second experiment was presented as an evaluation of a product advertisement, and the scale measured the persuasiveness of an advertisement when the visual perspective fits the advertising message. Here, the persuasiveness was measured using a 9-point scale, with six items that were

modified from those of Elder and Krishna (2012). The first three items measured willingness to buy (the possibility of buying / the possibility of buying next time/the possibility of searching for the product online or going to the store: 1 = very unlikely, 9 = very likely; Cronbach's $\alpha = 0.94$). The remaining three items measured the attitude toward the product (I think the advertised product is...; 1 = very bad / unappealing / unpleasing, 9 = very good / appealing / pleasing; Cronbach's $\alpha = 0.92$). Embodied simulation was measured through three items (Cronbach's $\alpha = 0.93$) on a 9-point scale modified from items used by Elder and Krishna (2012). The items were as follows. (1) When you see the advertisement, do any scenes appear in which you are using the smartphone product? (1 = no scene, 9 = many scenes). (2) When you see the advertisement, do any scenes appear in which you were using the smartphone product? (1 = no scene, 9 = many scenes). (3) When you see the advertisement, are you able to image that you are using the smartphone product? (1 = very difficult to imagine, 9 = very easy to imagine).

RESULTS AND DISCUSSION

Manipulation Checks

Compared with the subjects with the actor's perspective, the subjects with the observer's perspective were able to see themselves and their surroundings when imagining the subway ride scene, with a mean value difference of 0.90 (std = 0.71), which is statistically significant ($t = 3.88, p < 0.00$). In terms of vividness, the mean value difference between the two groups was 0.37 (std = 0.48) and statistically insignificant ($t = 1.15, p = 0.26$). The results indicate that the manipulation was effective.

Fit Effects on Attitude and Intention

In this study, two-way analysis of variance (ANOVA) was used to analyze the 2 * 3 overall model to test the effect of the fitting of visual perspective and product benefit message with respect to the effectiveness of persuasion. In terms of the attitude toward the product, the overall model of visual perspective and product benefit messages was statistically significant ($F = 4.94, p = 0.00$). In the model, the main effect of visual perspective was not significant ($F = 0.005, p = 0.95$), while that of product benefit messages was significant ($F = 6.07, p = 0.00$). The interaction of visual perspective and product benefit messages was significant ($F = 6.13, p = 0.00$), indicating that under different visual perspectives, the product benefit messages to which the subjects attached importance differed. Analysis of the simple main effect indicated that in terms of functional benefit messages, subjects who adopted the actor's perspective exhibited no difference from those who adopted the observer's perspective ($t = 1.27, p = 0.54$). However, in terms of experiential benefit messages and symbolic benefit messages, subjects who adopted the actor's perspective displayed significant differences from those who adopted the observer's perspective, which was also the source of significant difference of the interaction term. Table 1 shows that compared with the observer's perspective, when the subjects were primed to the actor's perspective, they attached more importance to experiential benefit messages ($t = 4.26, p < 0.00$). Compared with the actor's perspective, when the subjects were primed to the

observer's perspective, they attached more importance to symbolic benefit messages ($t = -4.98, p < 0.00$).

Table 1: Mean Values of Attitude toward the Product Based on Visual Perspective and Appeal Type

	Mean values of attitude toward the product		
	Functional benefit appeal	Experiential benefit appeal	Symbolic benefit appeal
Actor's perspective	5.19 (0.21)	4.96 (0.20)	4.02 (0.29)
Observer's perspective	5.05 (0.29)	4.29 (0.37)	4.80 (0.35)

Note: Numbers in parentheses are standard deviations. Values are from measurements using a 9-point scale. The higher that the score is, the more positive the attitude toward the product.

In terms of willingness to buy, the overall model of visual perspective and product benefit messages was statistically significant ($F = 4.65, p = 0.00$). Here, the main effect of visual perspective was not significant ($F = 0.15, p = 0.69$), while that of product benefit messages was significant ($F = 7.13, p < 0.00$). The interaction of visual perspective and product benefit messages was significant ($F = 4.44, p = 0.00$), indicating that under different visual perspectives different product benefit messages resulted in different levels of willingness to buy. Analysis of the simple main effect indicated that in terms of functional benefit messages subjects who adopted the actor's perspective exhibited no difference from those who adopted the observer's perspective ($t = 1.17, p = 0.42$). However, in terms of experiential benefit messages and symbolic benefit messages, subjects who adopted the actor's perspective displayed significant differences from those who adopted the observer's perspective, which was also the source of the significant difference of the interaction term. Table 2 shows that compared with the observer's perspective, when the subjects were primed to the actor's perspective, they attached more importance to experiential benefit messages ($t = 3.57, p = 0.00$). Compared with the actor's perspective, when the subjects were primed to the observer's perspective, they attached more importance to symbolic benefit messages ($t = -4.84, p = 0.00$).

Table 2: Mean Values of Willingness to Buy Based on Visual Perspective and Appeal Type

	Mean values of willingness to buy		
	Functional benefit appeal	Experiential benefit appeal	Symbolic benefit appeal
Actor's perspective	5.28 (0.22)	4.85 (0.21)	4.25 (0.23)
Observer's perspective	5.20 (0.24)	4.14 (0.34)	4.83 (0.25)

Note: Numbers in parentheses are standard deviations. Values are from measurements using a 9-point scale. The higher that the score is, the higher positive the willingness to buy.

These results support the inference of Hypotheses H1a and H1b. That is, subjects who imagine from different visual perspectives prefer different product benefit messages. The subjects who imagined from the observer's perspective preferred the symbolic benefit messages of the product, while those who imagined from the actor's perspective preferred the experiential benefit messages of the product. Next, we analyze through which mental mechanism the persuasiveness of the fitness was mediated, i.e., the presence or absence of the mediator variable of the embodied simulation.

Mediating Role of Embodied Simulation

In this study, the test of mediating effect proposed by Baron and Kenny (1986) was adopted and was performed through three regression equations. Regarding the attitude toward the product, Table 3 shows that visual perspective * product benefit messages exerted a significant effect on the attitude toward the product ($\beta = 0.37$, $t = 3.17$, $p < 0.01$). In Model 2, visual perspective * product benefit messages exerted a significant effect on embodied simulation ($\beta = 0.64$, $t = 6.75$, $p < 0.01$). In Model 3, in which embodied simulation was included as a mediating variable, the β value of visual perspective * product benefit messages on the attitude toward the product was decreased and insignificant ($\beta = 0.05$, $t = 0.52$, $p > 0.05$). The mediating effect of embodied simulation on visual perspective * product benefit messages and on the attitude toward the product was significant ($\beta = 0.67$, $t = 8.9$, $p < 0.01$), indicating that visual perspective * product benefit messages exerted a positive impact on the attitude toward the product through the mediating role of embodied simulation.

Table 3: Analysis of the Mediating Effect of Embodied Simulation

	Attitude toward product			Willingness to buy		
	Mode 1:	Mode 2:	Mode 3:	Mode 1:	Mode 2:	Mode 3:
	Attitude toward the product	Embodied simulation	Attitude toward the product	Willingness to buy	Embodied simulation	Willingness to buy
Visual perspective	0.18 (1.93)	0.42*** (5.64)	0.10 (1.24)	0.22 (2.53)	0.42*** (5.64)	0.05 (0.63)
Attributes benefit message	0.44*** (4.48)	0.43*** (5.41)	0.15 (1.17)	0.46*** (4.90)	0.43*** (5.41)	0.18 (2.13)
Perspective*Appeal;	0.37*** (3.17)	0.64*** (6.75)	0.05 (0.52)	0.46*** (4.41)	0.64*** (6.75)	0.04 (0.44)
Embodied simulation			0.67*** (8.9)			0.65*** (9.11)

** p < 0.05 *** p < 0.01 Note: Numbers in parentheses are t values.

Regarding willingness to buy, in Model 1, visual perspective * product benefit messages exerted a significant effect on willingness to buy ($\beta = 0.46$, $t = 4.41$, $p < 0.01$). However, in Model 2, it exerted a significant impact on embodied simulation ($\beta = 0.64$, $t = 6.75$, $p < 0.01$). In Model 3, in which embodied simulation was included as a mediating variable, the β value of visual perspective * product benefit messages on willingness to buy was decreased and insignificant ($\beta = 0.04$, $t = 0.44$, $p > 0.05$). The mediating effect of embodied simulation on visual perspective * product benefit messages and on willingness to buy was significant ($\beta = 0.65$, $t = 9.11$, $p < 0.01$), indicating that visual perspective * product benefit messages exerted a positive impact on willingness to buy through the mediating role of embodied simulation.

These results support Hypothesis H2. That is, the persuasiveness of the fitness of visual perspective and product benefit messages was mediated by embodied simulation. Therefore, when the product benefit messages emphasized by the manufacturer fit the visual perspective adopted by consumers, it is easier for the consumers to imagine the content of advertisement information through embodied simulation, thereby further enhancing the persuasiveness of advertising messages.

CONCLUDING COMMENTS

The main objectives of this study were to understand how different visual perspectives affect an individual's cognitive focus and subsequently result in the individual's preference for different product benefit messages. We hypothesize that when exposed to advertising messages that evoke mental imagery, individuals who imagine from the observer's perspective place their cognitive focus on how they should perform in the imaginary event and are more inclined to emphasize the exhibition of individuality and personality in the imaginary scene. Thus, they prefer symbolic benefit messages. In contrast, individuals who imagine from the actor's perspective place their cognitive focus on the perceptions and emotions that extend from the imaginary event and are more inclined to emphasize the sensory stimuli triggered by the imaginary event. Thus, they prefer experiential benefit messages.

In this study, an unrelated imagining task was used to prime the subjects to adopt different visual perspectives and generate different cognitive focuses. The subjects that had been primed to imagine from the observer's perspective adopted cognitive focuses that placed more emphasis on messages related to self-personality or self-expression. In contrast, the subjects that had been primed to imagine from the actor's perspective adopted cognitive focuses that attached more importance to messages related to sensory perception or self-experience. Therefore, when the subject's cognitive focus fitted the product benefit message, it was easier for the subject to simulate the contents of the advertisement stimulus through embodied simulation and fluently process the mental imagery information generated by the advertisement stimulus.

This study also confirms that when the visual perspective adopted by the subjects fits the product benefit message, the attitude toward the product and the willingness to buy are positively enhanced through the mechanism of embodied simulation. Embodied simulation is an interactive process between the individual and environmental stimuli. The more capable that the individual's cognitive focus is in processing the content of environmental stimuli, the easier the mental images of embodied simulation are generated, and these mental images are used as criteria to judge and assess the related event (Borghi & Cimatti, 2010; Sadeghipour & Kopp, 2012). Previous studies on mental imagery and persuasiveness showed that the more easily individuals process the mental images triggered by advertisement stimulus, the more subjective meaning the individuals generate toward the advertisement stimulus, which further influences their willingness to buy and their evaluation of the product (Elder & Krishna, 2012; Petrova & Cialdini, 2008). Therefore, when the subjects' visual perspective fitted the product benefit message, they were more capable of simulating the content of an advertising stimulus through embodied simulation, automatically creating a mental image of product use and giving subjective meaning to the product after use.

According to previous studies on visual imagery, embodied simulation is a quantitative concept. Elder and Krishna (2012) confirmed that when a product is arranged to fit the consumer's dominant hand

(i.e., the fitted group), it positively affects the consumer's attitude toward the product and his or her willingness to buy. In addition to verifying the mediation effect of embodied simulation, the same researchers found that compared with the unfitted group, the subjects from the fitted group generated a higher amount of embodied simulation. In this study, we only measured the mediating effect of embodied simulation, not the amount of embodied simulation (which will be measured in a follow-up study). Additionally, whether an individual's choice of visual perspective is predisposed when imagining still remains unclear. However, in real life, many individuals have a preferred visual perspective when imagining. Therefore, predisposition in the choice of visual perspective should be investigated in follow-up studies.

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BIOGRAPHY

Chung-Lin Toung (PhD, University of National Chengchi University, 2015) is an Assistant Professor at Nanfang College of Sun Yat-Sen University, Guangdong, China. He is interested in examining the cognitive and affective factors and mechanisms that would impact consumers' decisions.