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Cultural Differences in Imagery Generation: The Influence of Concrete versus Abstract Thinking

No. 37, March 2010

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Abstract

Do concrete stimuli help generate more images than abstract ones? Although past research has suggested this, the finding may not hold true across cultures. Our investigation suggests that since East Asians tend to think concretely as compared to Westerners, they tend to generate more imagery than Westerners when subjected to abstract messages. However, when the stimuli are concrete, the concreteness of the stimuli overwhelms the differences in the natural tendency toward imagery generation. The study also finds that under abstract stimuli, limiting mental resources makes cultural differences in imagery generation disappear but mere instructions to imagine do not. Moreover, the paper also separates ways of thinking from views of self to suggest that it is not views of self but ways of thinking that drive imagery generation.

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Over fifty years ago, White (1959) discussed the imagery generated by advertisements influences advertisement perceptions. Since then, several scholars have sought to decipher the ways in which the imagery process operates (cf. Block 1981; Cartwright, Marks and Durrett 1978; Edell and Staelin 1983, Paivio 1965). Imagery generation plays an important role in information processing (Block 1981), as it influences various outcomes such as incidental learning, choice processing, the likelihood and timing of purchases, and perceptions associated with many hedonic or symbolic consumption experiences (MacInnis and Price 1987). External stimuli responsible for imagery induction include pictures, concrete words, instructions to image, and guided imagery (Alesandrini and Sheikh 1983; Lutz and Lutz 1978; MacInnis and Price 1987).

Imagery is a process by which concrete sensory information is represented in working memory (MacInnis and Price 1987). The image generated may be multisensory (combination of smell, taste, sight, and touch), or be composed using a single sense such as sight (MacInnis and Price 1987). Past research has contributed substantially to our understanding of the process of imagery. However, the impact of culture on imagery generation still remains unexplored. To better appreciate the role of culture in imagery generation, we seek to explore the following issues: (1) How abstract versus concrete stimuli differentially influence imagery generation among Western and East Asian subjects; (2) How ways of thinking impacts imagery generation; and (3) How views of self—apart from ways of thinking--influence imagery generation.

Abstract versus Concrete Thinking

According to Paivio (1971), the words used in the course of communication play a big part in imagery generation. He categorizes words into "concrete" or "abstract," based on their capacity for imagery generation (also see Paivio and Foth 1970; Paivio and Csapo 1973; Paivio, Yuille, and Madigan 1968; Richardson 1980). For example, concrete words such as apple, banana, table,

and chair are more likely to generate imagery in people's minds compared to abstract words such as love, freedom, justice, and virtue.

However, abstract words or phrases can be made more imaginal if combined with concrete words or examples (Pavio 1965; Unnava and Burnkrant 1991). For example, the claim, "Brand A camera can capture people in fast-moving roller coaster" is more likely to generate a mental image than simply saying "brand A camera captures fast movement." Cartwright (1980) and his colleagues (cf. Cartwright, Marks, and Durrett 1978) infer that instructing subjects to think of an imagery-based example can stimulate the generation of imagery. For example, abstract words like "peace" and "quarrel" could lead to conjuring images of a dove (the symbol of peace) or a mental image of people actually engaged in an altercation.

Even in the absence of external stimuli, imagery can be evoked by a person's knowledge about objects (Bruner 1957; Solso 2001). Specifically, imagery generation can be influenced by how one stores or retrieves information in and from memory (MacInnis and Price 1987; Yuille and Catchpole 1977). Cousins (1989) has suggested that East Asians and Westerners have different ways of thinking (concrete vs. abstract thinking) and that given the same stimulus, they may store and retrieve different information in and from memory. East Asians tend to think concretely, so they have "a tendency to perceive things a part of the real-life settings from which they normally take their meaning, rather than to mentally isolate objects or their attributes" (Cousins 1989, p. 124). Given this way of thinking, East Asians are likely to generate imagery even in the absence of external stimuli. In contrast, Westerners tend to think abstractly, so they have "a tendency to mentally isolate objects or their attributes and generalize across contexts on the basis of conceptual similarity" (Cousins 1989, p. 124). Therefore, they may store and retrieve abstract dispositions in and from memory and are less likely to generate imagery when imagery-

inducing stimuli are absent. It is therefore a distinct possibility that findings generated from imagery research conducted in Western cultures, primarily the United States, may not hold across all cultures.

Cultural tendencies towards abstract or concrete thinking are attributed to differences in self construal (Markus and Kitayama 1991; Ng and Houston 2006). Scholars in cross-cultural psychology contend that people from distinctive cultures have the different views of self (Markus and Kitayama 1991; Trandis 1989, 1990; Trandis, McCuster, and Hui 1990). Members from Western cultures (e.g., Americans) have an *independent* view of the self, where the self is construed as bounded, unitary, and stable; and separated from social context. Westerners thus tend to define their self as autonomous from others, a self that expresses its own distinct internal attributes, and not subject to subordination to their in-group (Hofstede 1991). Their attitudes, feelings, and behaviors are individually determined and not controlled by any external factors (Markus, Mullally, and Kitayama 1997). This does not imply that Westerners are non responsive to their social environment. This responsiveness, however, stems largely from the need to determine the best way to express or assert the internal attributes of the self (Fiske 1991).

In contrast, members from East Asian cultures (e.g., Chinese, Japanese, and Koreans) have an *interdependent* view of the self, where the self is viewed as flexible and variable, one that emphasizes relationship with others. The self is therefore a part of the surrounding social context, not bounded and isolated. People are an integral part of the setting, situation, or context in which they are imbedded (Markus and Kitayama 1991; Nisbett et al 2001). Individual behavior, therefore, is strongly based on the nature of the context, especially when others are present (Hall and Hall 1990). In East Asia, persons are mere parts of the context and therefore cannot be fully understood devoid of their social context (Phillips 1976; Shweder 1984). Unlike

Westerners, East Asians' expression of their internal attributes, such as personality characteristics, attitudes, and judgments, are highly context dependent. This independent-interdependent characterization of self carries over to perceptions of objects and events (Choi, Nisbett and Norenzayan 1999; Hallowell 1976; Nisbett et al. 2001); perceiving oneself as separated from (or embedded in) a larger context, influences the contents of thought (Kühnen, Hannover, and Schubert 2001; Markus and Kitayama 1991).

Since Westerners pay more attention to dispositions and attributes, and tend to describe themselves in internal dispositions with few references to surrounding contexts (Cousins 1989), abstract terms often serve as the unit of representation (Markus and Kitayama 1991). Westerners are thus more likely to generalize attributes across contexts and organize their knowledge into a hierarchical structure with the individual's distinctive internal attributes as the superordinate nodes (Markus and Kitayama 1991). This results in a more context-independent, abstract mode of thinking (Kühnen, Hannover, and Schubert 2001).

In contrast, the attention of East Asians is more directed to the context in which they and others are embedded. Specific social contexts—as opposed to unique internal attributes of an individual--are more likely to serve as the unit of representation (Markus and Kitayama 1991). Thus, East Asians develop a context-bound, concrete mode of thinking (Kühnen, Hannover, and Schubert 2001). Knowledge, for East Asians, tends not be abstract and generalized across contexts, but instead remains specific to, and contingent upon, the focal context (Markus and Kitayama 1991; Witkin et al. 1974). This abstract-concrete divide is purely cultural, and cannot be attributed to the East Asian inability to generalize across the contexts (Cousins 1989), poor education (Shweder and Bourne 1984), low degree of modernization (Cousins 1989; Ishida

1974; Nakamura 1964; Stevenson, Lee, and Stigler 1986; Yukawa 1967), age (Shweder and Bourne 1984), or linguistic factors (Hamano 1987).

Hypotheses Development

Westerners tend to pay attention to abstract information and isolate objects from the context in which these objects are embedded (Choi, Nisbett, and Norenzayan 1999; Hallowell 1976; Ng and Houston 2006; Nisbett et al. 2001). Also, when retrieving information from memory, largely abstract--as opposed to concrete information—will surface (Markus and Kitayama 1991). We therefore expect that when Westerners read abstract ad messages in which external imagery-inducing stimuli are missing, they are more likely to retrieve abstract information, and less likely to generate imagery.

In contrast, since East Asians tend to direct their attention to specific contexts, they are more likely to store concrete (as opposed to abstract) information in memory, and retrieve this information when presented with abstract cues. For East Asians, imagery generation involves a direct recovery of past experience (Yuille and Catchpole 1977) and scenes of specific contexts retrieved from memory generate concrete imagery even in face of abstract cues (MacInnis and Price 1987). Since abstract representation is unnatural for East Asians, they supplement abstract cues with specific contexts (Cousins 1989). We therefore propose that:

H1a: When exposed to abstract ads, East Asians will generate more mental images than Westerners.

When the ad stimulus presents concrete information, there may be less of a need on the part of East Asians to think more concretely as the desired elements of information are already present in the stimulus. They will, nonetheless, generate images; but this is due to the concrete words and situational cues inherent in the stimulus (Paivio, 1971; Paivio and Csapo, 1973; Paivio and Foth, 1970; Paivio, Yuille and Madigan, 1968; Richardson, 1980).Overall, East

Asians may generate the same number of images when exposed to concrete descriptions as when exposed to abstract descriptions.

H1b: East Asians will generate the same number of mental images for abstract as well as concrete stimuli in ads.

Westerners are likely to generate more imagery when exposed to concrete ads than abstract ads. However, this is not likely to be the case with East Asians. Concrete stimuli provide East Asians with information in the form they desire, hence there will be little motivation to generate additional imagery through information retrieval. In this sense, the "stronger imagery-evoking effect" of concrete stimuli should hold true only for Westerners. We therefore expect that

H2a: Westerners will generate more mental images when exposed to concrete stimuli in ads than when exposed to abstract descriptions.

H2b: When subjected to concrete stimuli in ads, East Asians will generate the same number of mental images as Westerners.

Recall that East Asians tend to possess an interdependent view of the self whereas Westerners have an independent view of their self. Since abstract descriptions are not congruent with the East Asian way of thinking, East Asians "translate" abstractions into concrete elements and contexts. Westerners, however, would not be expected to engage in such cognitive elaboration when exposed to abstract descriptions. Abstractness is totally consistent with their mode of thinking. The differential view of self would impact the types of imagery generated. When exposed to stimuli containing abstract cues, East Asians will generate more images focusing on themselves and others (thereafter *interdependent images*) while Westerners will generate more images highlighting themselves (thereafter *independent images*).

These differences would not manifest themselves when the two groups are presented with concrete descriptions. As stated previously, relatively less cognitive elaboration will be carried

out when East Asians are exposed to concrete descriptions. When concreteness is already inherent in a stimulus, the motivation to enrich or elaborate on that concreteness is low. East Asians and Westerners are therefore expected to perceive concrete descriptions in a similar manner with few differences in the type of imagery suggested. We therefore propose the following hypotheses:

H3a: When exposed to abstract descriptions, East Asians will generate proportionally higher number of interdependent images than Westerners.

H3b: Cultural differences in proportion of interdependent vs. independent images generated will be weaker when exposed to concrete descriptions than when exposed to abstract descriptions.

Under normal conditions, East Asians will generate more imagery than Westerners when exposed to the abstract stimuli. Studies have shown that all parts of the visual cortex are activated in the process of imagery generation (Roland and Friberg 1985). By using PET test, Kosslyn et al. (1993) found greater activation of the visual cortex during imagery generation than during perception. Imagery generation tasks also result in high levels of blood flow in the occipital regions and in the posterior parietal and temporal visual processing areas of the brain (Goldenberg et al. 1990). Imagery generation thus involves not only the brain's visual processing areas but also memory areas (Solso 2001) and therefore demands more mental resources than perceptual tasks such as reading. If the access to mental resources needed to generate imagery is somehow restricted, lesser number of images will be manifested. For example, if East Asians were instructed to read ad descriptions as fast as possible, they may not have the opportunity to retrieve scenes from memory as the reading task is consuming bulk of their mental resources. As a result, fewer mental images will be generated. Westerners, however, tend to think in abstract terms and are less likely to requisition the mental resources to retrieve scenes from memory. For

them, limiting mental resources may have little or no impact on imagery generation. This discussion leads to the following hypotheses:

H4a: Under abstract descriptions, limiting mental resources will have a stronger effect in prohibiting imagery generation for East Asians than for Westerners.

H4b: Under conditions of abstract descriptions and limiting mental resources, cultural differences in imagery generation between East Asians and Westerners will disappear.

The nature and amount of imagery generation will be impacted by providing respondents with specific "instructions to imagine" (MacInnes and Price 1987). While Westerners are conditioned to think in abstract terms, this does not mean that only abstract information is stored in their memory. Rather, they exhibit the tendency to retrieve abstract imagery when provided with abstract descriptions. Asking Westerners to imagine may motivate them to expend more mental resources to retrieve concrete scenes from memory. However, instruction to imagine may not have the same effect on East Asians since they will generate concrete imagery with or without the instruction. We therefore propose the following hypotheses:

H5a: Under abstract descriptions, instruction to imagine will have a stronger effect in imagery generation on Westerners than on East Asians.

H5b: Under conditions of abstract stimuli and instruction to imagine, cultural differences in imagery generation between East Asians and Westerners will disappear.

METHOD AND STUDIES FINDINGS

Hypotheses were tested in an experimental set-up. Three separate studies were conducted, using different samples and treatments.

Study 1

Design. To test the hypotheses H1 through H3, a 2 (description: concrete vs. abstract) x 2 (culture: East Asians vs. Westerners) between-subject factorial design was used. Past studies have established that Chinese tend to think concretely (Ip and Bond 1995; Triandis et al. 1990)

and Americans tend to think abstractly (Cousins 1989). Therefore, for the first study, 42 American and 41 Chinese students from marketing classes at a large Midwestern university in the U.S. were recruited. A small token gift, i.e. a pen or a marker, was provided for their participation. All American students were born and raised in the U.S. For Chinese students, only those who had been in the U.S. for less than six months were chosen in order to rule out any significant acculturation. The original ads and questionnaire were drafted in English, then translated into Chinese. A back translation by a different translator was used to ensure the veracity of the Chinese version.

Stimuli. Treatments used by Unnava and Burnkrant (1991) were adapted for deployment in this study to ensure comparability with regard to dimensions as believability, understandability, meaningfulness, distinctiveness, self-referencing, informativeness, or the perceived strength of arguments. Participants filled an imagery index adapted from Unnava and Burnkrant (1991) on three seven-point semantic differential scales. They were used to measure the imagery-provoking ability of the ad (1 = not imagery-provoking/ dull/boring; 7 = imagery provoking/vivid/interesting). A digital camcorder was used as the target product. This product was chosen because it is of inherent interest to most subjects and students have enough familiarity with the product. If an unfamiliar product with little or no schematic knowledge on the part of subjects were used, respondents' ability to generate images would be inhibited (Wright and Rip 1980). To eliminate any effects of past experience with existing brands, the product was given a fictitious name, Classa.

In their imagery study, Unnava and Burnkrant (1991) used seven advertisements as fillers. We decided against introducing fillers for two main reasons. First, research has shown that subjects' immediate recall seems to be limited to about seven units (Solso 2001). The target

advertisement had four messages and more than seven sentences. Under these conditions, fillers could lead to information overload and subject fatigue. Second, the purpose of this study was to examine how different styles of thinking influence consumers' imagery generation ability and attitude, not the magnitude of influence. Fillers create the possibility of participants recalling and writing imagery generated from filler ads, thus contaminating the experiment with irrelevant imagery.

Ad Descriptions. The concrete and abstract descriptions used in this study were adapted from Unnava and Burnkrant (1991). The ad described four attributes of the digital camcorder (size, low light performance, zoom, and the ability to capture sports action). The descriptions are listed in Table 1.

Insert Table 1 about here

Procedure. At the outset, participants were told that a large manufacturer of consumer electronics was planning to introduce a new product in their area and that they were a small group of consumers selected for testing the ad and the concept. This was done to inject realism and increase subject involvement in the study. They were then asked to read a cover story and advertisement messages. After reading the ad, subjects completed a five-minute questionnaire on basic information about the U.S. to clear their short term memory. Then, they were asked to write down the imagery generated in their minds when they were reading the ad; followed by instructions to complete the imagery index. Next, participants completed a series of ancillary measures and a "Ten Statement Test" (TST) in which they were asked to respond ten times to a question, "Who am I?"This concluded the experimented, and participants were debriefed.

Cousins (1989) used a Twenty Statement Test. However, in our pretest, students found it very difficult to complete twenty statements. We therefore used only a "Ten Statement Test" using the same coding schema as Cousins (1989). The categories used were concrete and abstract. Physical (e.g., I am 23 years old), social (e.g., I am a marketing major), concrete preference (e.g., I like swimming; I like cats), concrete wish (e.g., I hope to be an accountant), activity (I am doing a project for my marketing class), and qualified attribute (I am nice to my friends) were coded as concrete statements. Global preference (e.g., I like music/sports/animals), global wish (e.g., I wish the world to be better), pure attribute (e.g., I am friendly), or other global statements were coded as abstract statements.

Dependent Variables

Number of Images. The number of mental images was counted by two independent judges. A sentence or a group of words was coded as one image. If a sentence had different scenes and they occurred at different times, they were coded as different images (e.g., I pictured myself playing tennis -- and went home to play it back, were counted as two images). Disagreements were resolved by mutual discussion.

Type of Images. Two coders grouped the images into three groups: independent images, interdependent images, and others. Independent images are those focusing on an individual (e.g., I imaged a tiny camcorder in my hand). Interdependent images are those focusing on a group of people or the relationship of an individual with others (e.g., I pictured a child's birthday party with a parent taping it). Others are those that have nothing to do with any person (e.g., a small and compact camcorder; a small camcorder on a scale.)

Results

Hypotheses 1-3 were tested based on a 2 (description: concrete vs. abstract) x 2 (culture: East vs. Western) analysis of variance (ANOVA). The means and standard deviations for this study are shown in Table 2.

Insert Table 2 about here

Manipulation Checks. We used two one-way ANOVAs to check American and Chinese responses to the imagery index because individuals from distinctive cultures may have different orientations in responding to Likert-type scales (Heine et al. 2002). The responses of Chinese ($\alpha = 0.895$) showed that concrete words were more likely to induce imagery than abstract words ($M_{concrete} = 4.87$, $M_{abstract} = 3.63$; $F(1, 39) = 12.481$, $p < .01$). Responses of Americans ($\alpha = 0.884$) also showed that concrete words were more likely to induce imagery than abstract words ($M_{concrete} = 4.38$, $M_{abstract} = 3.47$; $F(1, 40) = 7.141$, $p < .05$). Participants also completed a TST. Two judges coded TST into two categories: abstract or concrete statement. The inter-judge reliability was 87%. Conflicts were solved by discussion between judges. As anticipated, the Chinese students generated more concrete statements than did American students ($M_{Chinese} = 6.32$, $M_{American} = 3.21$; $F(1, 81) = 50.885$, $p < .01$).

Generated Images. Two judges who were blind to the purpose of this study counted the number of images generated in the participants' minds. The inter-judge reliability (percentage of agreement) was 89%, exceeding the minimum reliability level of 85% suggested by Kassarjian (1977). Conflicts were solved by discussion between the judges.

A 2 (culture) x 2 (description) ANOVA with the number of mental images as an interdependent variable was conducted. A significant main effect of culture ($M_{Chinese} = 2.78$,

$M_{American}$ = 1.90; F = 21.258, p < .01) and description (M = 2.84, M = 1.80; F = 27.601, p < .01) emerged. The interaction effect was also significant (F = 12.064, p < .01; see Figure 1). Since the interaction effect was significant, four contrasts were conducted using pooled error. When exposed to abstract descriptions, the Chinese generated more images than did Americans ($M_{Chinese}$ = 2.60, $M_{American}$ = 1.00; F = 31.527, p < .01), thus H1a was supported. For the Chinese, there was no significant difference between concrete and abstract descriptions ($M_{concrete}$ = 2.95, $M_{abstract}$ = 2.60; F = 1.567, p > .1), thus lending support to H1b. In contrast, the Americans generated more images when exposed to concrete descriptions than when exposed to abstract descriptions ($M_{concrete}$ = 2.73, $M_{abstract}$ = 1.00, F = 38.491, p < .01), as suggested in H2a. When exposed to concrete descriptions, there was no significant difference between the Chinese and Americans ($M_{Chinese}$ = 2.95, $M_{American}$ = 2.73; F = 0.670, p > .1); which supports H2b**.**

Type of Images. Two judges who had not been told of the purpose of this study coded images into three groups: interdependent images, independent images, and others. The inter-judge reliability was 94%. *Z*-tests were used to test the proportions of number of interdependent images to the sum of interdependent and independent images. Americans generated more interdependent images when exposed to concrete descriptions than when exposed to abstract descriptions (54.5% vs. 27.8%; z = 2.281, p < .05). For the Chinese, there was no significant difference in the proportion of interdependent images between concrete (59.6%) and abstract descriptions (67.3%; z = 0.82, p > .1). When exposed to abstract descriptions, the proportion of interdependent images was higher for the Chinese than for the Americans (67.3% vs. 27.8%; z = 2.893, p < .01; see Figure 2). H3a was therefore supported. When exposed to concrete descriptions, there was no significant difference between the Chinese (59.6%) and Americans (54.5%; z = 0.545, p > .1; see Figure 2) in the proportion of interdependent images, thereby

supporting H3b.

Insert Figures 1 & 2 about here

Study 2

This study was designed to test the hypotheses 4a and 4b. The intent of the experiment was to observe the impact of restricted mental resources on imagery generation. Under condition of limiting mental resources, participants were asked to read the ad descriptions as fast as possible. Stimuli for this study were the same as those used in Study 1. Seventy-eight American students and 62 Chinese students from a Southeastern U.S. university participated in the study. Procedures used were identical in most respects to the first study with the additional manipulation of reading speed.

Students in the "fast" condition were asked to read the ad descriptions as fast as possible while those in the slow condition were not asked to do so. After reading the cover story, participants were asked to go to next page to read the ad when the experimenter started an on-line stopwatch shown on a projection screen. After finishing reading the ad, participants were asked to write down the time they used according to the timer on the screen. They then answered a single question pertaining to the imagery-provoking ability of the ad (1 = not imagery-provoking; 7 = imagery provoking). A single-item measure was deemed adequate as earlier research suggests that there is no difference in the predictive validity between the single-item and multiple-item measures of the same construct (Bergkvist and Rossiter 2007).

Manipulation Check. English script is alphabetic while Chinese is ideographic. In English, a letter equals one byte. The length of English words can vary significantly, from one byte to more than ten bytes. Most English words have at least three letters (three bytes). However,

writing Chinese words with different strokes only takes two bytes. So the length of a Chinese word is fixed. Being ideographic, the processing of Chinese script is analogous to processing of pictures. Therefore, the processing the "same" message in Chinese may be faster than in English. Analysis of variance was used to assess speed manipulation. For Chinese subjects, a 2 (speed) x 2 (description) ANOVA with time to read the ad as an interdependent variable only revealed a significant main effect of speed (M_{slow} = 39.45, M_{fast} = 30.52; $F(1, 58) = 18.118$, $p < .01$). Under the slow condition, Chinese spent a little more time reading the abstract description than the concrete one ($M_{abstract}$= 40.94, $M_{concrete}$ = 37.87), but the difference was not significant. For Americans, a 2 (speed) x 2 (description) ANOVA with time to read the ad as an interdependent variable only revealed a significant main effect of speed (M_{slow} = 45.49, M_{fast} = 36.08; $F(1, 74)$ = 21.515, $p < .01$).

A 2 (speed) x 2 (descriptions) ANOVA was conducted for Americans and Chinese respectively to check the manipulation of abstract versus concrete messages. For Chinese, only a significant main effect of description emerged ($M_{abstract}$ = 3.84, $M_{concrete}$ = 5.13; $F(1, 58) = 17.619$, $p < .01$). Analysis of variance revealed the same result for Americans with only a significant main effect for message emerging ($M_{abstract}$ = 4.40, $M_{concrete}$ = 5.42; $F(1, 74) = 20.217$, $p < .01$). As expected, concrete descriptions were more imagery provoking than abstract descriptions.

A one way ANOVA with the number of concrete statements as an interdependent variable was conducted. The analysis showed that Chinese are more concrete than Americans ($M_{Chinese}$= 5.32, $M_{American}$ = 3.21; $F(1, 138) = 46.422$, $p < .01$).

Images. A 2 (culture) x 2 (speed) x 2 (description) ANOVA with the number of images as an interdependent variable was conducted. A significant three-way interaction emerged ($F(1, 132) = 5.076$, $p < .05$). For abstract stimuli, a 2 (culture) x 2 (speed) ANOVA was conducted.

Significant main effects of culture ($F(1, 67) = 7.681$, $p < .01$) and speed ($F(1, 67) = 17.999$, $p < .01$) emerged. There was also significant interaction effect between culture and speed ($F(1, 67) = 10.869$, $p < .01$). The planned contrast showed that when exposed to abstract descriptions, Chinese generated more images under the slow condition than under the fast condition ($M_{slow} = 2.065$, $M_{fast} = 0.87$; $F(1, 29) = 25.339$, $p < .01$). For Americans, however, there was no significant difference between slow and fast conditions ($M_{slow} = 1.10$, $M_{fast} = 0.95$; $F(1, 38) = 0.510$, $p > .1$). Furthermore, under the fast condition, there was no significant difference in the number of images generated by Americans and Chinese ($M_{American} = 0.95$, $M_{Chinese} = 0.87$; $F(1, 33) = 0.118$, $p > .1$). H4a and H4b were thus supported. As hypothesized, when subjected to abstract stimuli, limiting mental resources prohibited the imagery generation capability of Chinese but not Americans. Consequently, the differences in imagery generation observed in Study 1 ceased to exist.

STUDY 3

Stimuli, Participants, and Procedure. This study was used to test hypotheses 5a and 5b. Stimuli used were the same as those used in Study 1. Eighty-two American students from a Southeastern university in the U.S. and 84 Chinese students from a Southwestern university in China participated in the study. Procedures used were identical in most respects to those used in Study 1. The only added manipulation of was "instructions to imagine." Students in the "instruction condition" were asked to imagine when reading the ad while those in "no instruction" condition were not asked to do so. Also, in line with Study 2, participants in this study was asked to answer a single question to measure the imagery-provoking ability of the ad (1 = not imagery-provoking; 7 = imagery provoking).

Manipulation Check. Participants were asked to answer whether they tried hard to

imagine when reading the ad. A 2 (culture) x 2 (instruction) x 2 (description) ANOVA was conducted to test the hypotheses. A significant main effect of instruction emerged ($F(1, 158) = 18.859$, $p < .01$). A significant two way interaction between instruction and culture ($F(1, 158) = 6.701$, $p < .05$) also emerged. For Americans, a 2 (instruction) x (description) only revealed a main effect of instruction ($M_{\text{instruction}} = 5.65$, $M_{\text{no instruction}} = 4.62$; $F(1, 78) = 21.160$, $p < .01$). Americans tried harder to imagine when asked to do so than when not asked. For Chinese, a 2 (instruction) x (description) revealed no significant results. Even when not asked to imagine, they tried hard to imagine.

In order to avoid the possible cross-cultural variations in responding to Likert scale, a 2 (instruction) x (description) ANOVA was conducted for American and Chinese participants to check the manipulation of descriptions. For Americans, only a main effect of descriptions ($M_{\text{concrete}} = 5.59$, $M_{\text{abstract}} = 4.55$; $F(1, 78) = 14.302$, $p < .01$) emerged. Americans thought that concrete descriptions are more imagery provoking. For Chinese, only a main effect of descriptions ($M_{\text{concrete}} = 5.36$, $M_{\text{abstract}} = 4.43$; $F(1, 80) = 18.941$, $p < .01$)emerged. Chinese also thought that concrete description are more imagery provoking.

Results and Discussion. A one-way ANOVA with the number of images as an interdependent variable and instruction to imagine (or not) as an independent variable were conducted for American and Chinese groups respectively. Although Chinese generated a few more images when asked to imagine than when not asked to do so, the difference was not statistically significant ($M_{\text{instruction}} = 2.33$, $M_{\text{no instruction}} = 1.95$; $F(1, 40) = 2.819$, $p > .1$). For Americans, ANOVA revealed a significant main effect of instruction ($M_{\text{instruction}} = 1.81$, $M_{\text{no instruction}} = 1.95$; $F(1, 38) = 5.077$, $p < .05$). Americans generated more images when instructed to imagine than when not instructed. Instruction to imagine has a stronger effect on Americans than

on Chinese, thus lending support for Hypothesis 5a.

A 2 (culture) x (description) ANOVA was conducted for instruction task. A marginally significant main effect of culture ($M_{Chinese}$ = 2.43, $M_{American}$ = 2.14; $F(1, 81) = 2.771$, $p < .1$) and a significant main effect of description ($M_{abstract}$ = 2.07, $M_{concrete}$ = 2.49; $F(1, 81) = 5.500$, $p < .01$) emerged. H5b was not supported as the Chinese subjects still generated a few more images than Americans.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

This study extends extant research on imagery generation by exploring differences in generated imagery on the part of East Asians and Americans under various conditions. Consistent with our conceptual underpinnings, several key differences across the two groups were observed. However, this study has some limitations which need to be overcome in future studies.

First, we conducted our research under an experimental setting which raises the issue of generalizability of findings. To what extent would the same differences emerge if East Asians and Americans were reading ad descriptions under natural conditions? A related issue is our use of student samples. Capability of imagery generation increases with age as more and more concrete information gets stored in the brain with the passage of time. Future research could assess how imagery generation varies with age, and whether age can moderate culturally derived differences in imagery generation.

In this research we asked subjects to list and describe the imagery generated in their mind. We could have reinforced our findings by using a brain scanner. A brain scanner was not deemed feasible for the current research mainly due to cost limitations. Also, our knowledge with the Chinese culture led us to believe that the use of a brain scanner would be difficult, if not impossible, with Chinese subjects. Furthermore, the brain scanner would have measured merely

the intensity of activation in the visual processing and memory areas, not the number of images generated. Nonetheless, it would be important to know how abstract versus concrete descriptions impact brain activation, and the role of culture in the activation process.

For this research, participants read the ads at their own pace as no fixed time was set for the task. Overall, Chinese subjects took somewhat longer to read the ad compared to their U.S. counterparts. Since the Chinese subjects spent more time reading the ad, they may also have had greater opportunity to generate imagery while reading. This may have somewhat confounded the findings of this research. Future research could overcome this shortcoming by controlling for the time spent in reading the ads. Despite these limitations, which can be addressed with more sophisticated studies, this research points to important managerial implications in the area of cross-national marketing communication.

MANAGERIAL IMPLICATIONS

Past studies have suggested that concrete words are likely to create images in people's mind than abstract words. They have also shown that imagery enhances memory (Bower 1970; Paivio 1969, 1971; Yates 1966). Ad attributes are made more memorable through imagery as images make attributes more concrete (Wright and Rip 1980). It is therefore suggested that ads contain concrete as opposed to abstract descriptions of product attributes.

But this study found that the process and mechanics of imagery generation are not universal. Culture impacts the nature and number of images generated while processing ads. Specifically, East Asians generate more images than Americans when exposed to abstract ads. This suggests that abstract ads be used when communicating with East Asians but vivid and concrete ones be used for American audiences (MacInnis and Price 1987).

Moreover, because people allocate more resources to generate imagery, there are fewer

resources to process information about other brands, thus compensating somewhat for undesirable commercial clutter. Providing East Asians with abstract stimuli not only prompts them to devote resources for imagery generation, it would also shield the advertiser from the effects of competing messages vying for the target's attention. When subjected to concrete messages, both East Asians and Westerners would have more resources to process information about other brands. Thus, while concretizing attributes can make ad content more memorable, it also makes the advertiser more vulnerable to competing messages. This tradeoff can only be sorted out with more research.

Another key issue emerging from the present research is East Asians' attitude toward abstract ads. While abstract ads would compel East Asians to get more involved with the ad and engage in active imagery generation, abstractness runs counter to their concrete style of thinking. Similarity-attraction hypothesis would therefore suggest that East Asians will be less favorably disposed to abstract ads than to concrete ads (Byrne 1971). The positives of greater involvement with ad and less likelihood of processing competing stimuli thus need to be weighed against possible negative attitude toward the ad.

SUMMARY

This study extends previous research on imagery generation and on the differences in thinking styles between East Asians and Westerners. The concrete thinking style of East Asians enables them to generate more images than Westerners. However, when exposed to concrete stimuli, there are no significant differences in the number of images generated by East Asians and Westerners.

Significant differences were also observed with regard to the type of images generated by East Asians and Westerners. Under abstract stimuli, East Asians generated more interdependent

images whereas Westerners generated more independent images. However, when subjected to concrete descriptions, the interdependent- independent differences disappear.

Limiting access to mental resources can neutralize the differences in imagery generation between East Asians and Westerners. In this study, access to mental resources was manipulated by asking subjects to read the ad as fast as possible and assessing the images generated under this condition. Also, asking Western subjects to actively generate imagery while exposed to abstract stimuli did result in more images being produced. However, the increase was not large enough to neutralize the inherent cultural differences between East Asians and Westerners. Cumulatively, these findings offer very interesting research and managerial implications, and reinforce the need for testing fundamental findings in consumer behavior in cross-cultural settings.

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TABLE 1

CONCRETE VERSUS ABSTRACT DESCRIPTIONS

Concrete Descriptions	Abstract Descriptions
The Classa digital camcorder has ultra compact size and can easily be held and operated by one hand.	The Classa digital camcorder has ultra compact size and weights less than one pound.
Picture a child's shiny face, happy smile, and dancing eyes as he blows out his birthday candle. The light of that one candle is enough for Classa digital camcorder.	Classa digital camcorder performs very well under low light conditions. With its new filters and lenses, a light as dim as a candle is enough for recording.
Imagine screaming people on a roller coaster plummeting down the steep track. The excitement on their face can be clearly captured with Classa's high zoom ability (12X optical and 480X digital zoom).	Classa allows you to capture the scene clearly from a long distance with its 12X optical and 480X digital zoom. Because of the high zoom, you can get clear pictures even from a mile away.
Classa can help improve your tennis. As you make a shot on the tennis court, you know that every stroke you made has been captured by your Classa. The tape can be analyzed later, to the minutest detail, using slow motion and freeze-frame.	Classa can help you in sports too. It records all your movements with great accuracy. You play them back to the minutest detail, using slow motion and freeze-frame, to analyze and correct your mistakes.

TABLE 2

MEANS AND STANDARD DEVIATIONS OF STUDY 1

Measures	American		Chinese	
	Concrete	Abstract	Concrete	Abstract
No. of Images	2.73	1.00	2.95	2.60
SD	0.83	0.86	0.86	1.05
n	22	20	21	20

TABLE 3

MEANS AND STANDARD DEVIATIONS OF STUDY 2

Culture	Speed	Message	No. of Images	SD	n
Chinese	Slow	Abstract	2.06	0.57	16
		Concrete	2.20	0.77	15
	Fast	Abstract	0.87	0.740	15
		Concrete	1.63	0.89	16
American	Slow	Abstract	1.10	0.64	20
		Concrete	2.16	0.76	19
	Fast	Abstract	0.95	0.69	20
		Concrete	1.47	0.90	19

TABLE 4

MEANS AND STANDARD DEVIATIONS OF STUDY 3

Instruction	Culture	Message	Mean	SD	N
Instruction to Imagine	Chinese	Abstract	2.33	0.58	21
		Concrete	2.52	0.75	21
	American	Abstract	1.81	1.17	21
		Concrete	2.45	0.67	22
No Instruction	Chinese	Abstract	1.95	0.86	21
		Concrete	2.24	0.77	21
	American	Abstract	1.11	0.74	19
		Concrete	2.15	0.88	20

FIGURE 1

STUDY 1: CULTURE X AD INTERACTION FOR IMAGES

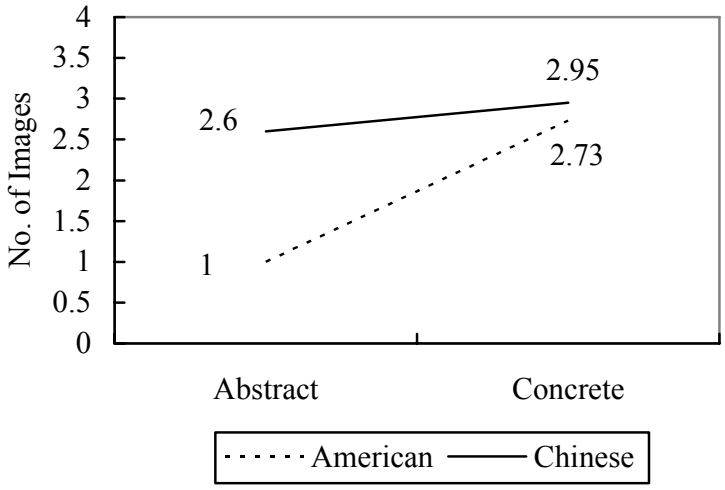

FIGURE 2

STUDY 1: THE PROPORTION OF INTERDEPENDNENT IMAGES

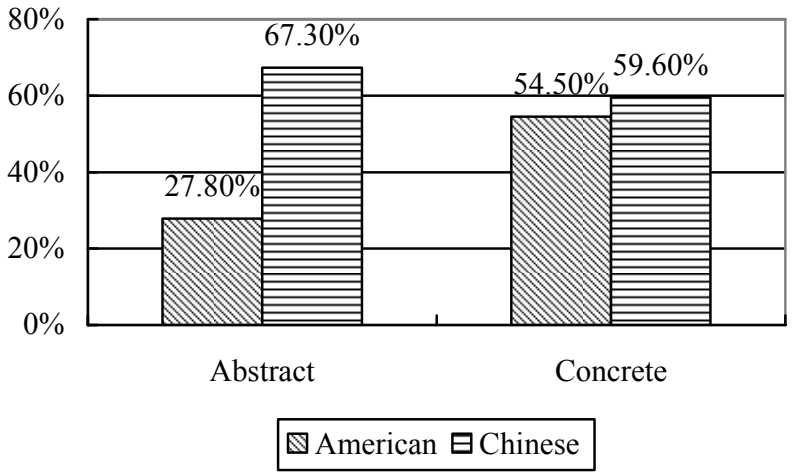

FIGURE 3

STUDY 2: CULTURE X SPEED INTERACTION OF ABSTRACT STIMULI