



ASSOCIATION FOR CONSUMER RESEARCH

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A Sign of Things to Come: Increasing Desired Behavior Through Dynamic Iconography

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[to cite]:

Aradhna Krishna, Luca Cian, and Ryan Elder (2014), "A Sign of Things to Come: Increasing Desired Behavior Through Dynamic Iconography", in NA - Advances in Consumer Research Volume 42, eds. June Cotte and Stacy Wood, Duluth, MN : Association for Consumer Research, Pages: 27-31.

[url]:

<http://www.acrwebsite.org/volumes/1017279/volumes/v42/NA-42>

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Unexplored Sides of Mental Imagery

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Paper #1: A Sign of Things to Come: Increasing Desired Behavior through Dynamic Iconography

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Paper #2: Dark is Durable, Light is Convenient: Color Value Influences Perceived Product Attributes

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Paper #3: So Close I Can Almost Sense it: The Impact of Differences in Sensory Imagery Distance on Consumer Attitudes and Intentions

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Paper #4: Sense and Mental Imagery: The Persuasive Implications of Visualizing Proximal and Distant Senses

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SESSION OVERVIEW

Mental imagery is a familiar aspect of most people's everyday life (Marks 1999). Defining and measuring it, however, is difficult (Kosslyn, Thompson, and Ganis 2006).

Paivio (1969) was among the first to demonstrate the fundamental importance of imagery in memory and information processing, and to show that this construct can be experimentally manipulated. Since then, imagery has been studied extensively within consumer behavior literature. However, the vast majority of research has focused either on static visual imagery (the mental representation of static and fixed objects; e.g., Petrova and Cialdini 2005), or on how to facilitate and induce visual imagery of an attribute (e.g., McGill and Anand 1989).

The goal of this special session is to group together research on less studied, but not less important, aspects of mental imagery. Each of four papers contributes uniquely to our understanding of mental imagery and raises several important questions. Collectively, we ask what unexplored elements of mental imagery can be relevant in consumer research. Consequentially, can a subtle variation in these imageries automatically and subconsciously affect consumer perceptions, preferences, and behaviors? As these papers show, imagery is relevant in numerous research domains within consumer behavior, and the special session is uniquely positioned to attract a broad audience at ACR.

The first paper in the session, by Cian, Krishna, and Elder, focuses on dynamic imagery, an aspect of imagery that has received almost no attention in consumer research. Across four studies incorporating multiple methodologies and technologies, the authors show that icons able to evoke dynamic imagery affect consumer behavior (in their propensity to act).

With an analogous reasoning, in the second paper, Hagtvædt proposes that colors are able to change how consumers imagine product attributes. Previous studies in consumer research that have examined colors have left the relation between colors and mental imagery largely unexplored. In this work, seven studies address this issue showing how judgments related to density, heaviness, durability, and convenience change systematically based on the color of the stimuli.

The third and the fourth papers in the session focus on multi-sensory experiential imagery beyond visual imagery. Specifically, the third paper, by Elder, Poor, and Xu, shows across four studies how images evoked using different sensory modalities (e.g., imagining a barbecue through smell versus vision) affect perceptions of distance from the product advertised, ultimately affecting behavioral intentions and attitudes.

The fourth paper, by Schlosser, continues the theme of how multi-sensory imageries can vary in psychological distance, changing the perspective. Indeed, the three studies described in this paper use different manipulations of social distance and show how imagery vividness mediates the effect.

Each paper contributes to our overall theoretical understanding of the less explored aspects of mental imagery and their effect in a consumer context. Ultimately, we hope this session, in accordance with the ACR theme of this year, will spur further discussion of and *inspire passion* in the exploration of these new topics.

A Sign of Things to Come: Increasing Desired Behavior through Dynamic Iconography

EXTENDED ABSTRACT

We propose that perceived movement (or dynamic imagery) from static visuals prepares the observer for action and impacts behavior. The ability of static images and icons to convey movement presents one of the more intriguing, yet underexplored characteristics of visual stimuli. Unlike static visual imagery, dynamic imagery allows for images within the mind to continue in motion, resulting in a moving trajectory or perceived movement of a static image (Clark and Paivio 1991).

We operationalize our research within the context of traffic icons. The number of people injured or killed in traffic accidents each year is staggering, and traffic signs are placed in areas of potential danger to evoke desirable driving behaviors and reduce accidents. Can a subtle difference in traffic icons affect human behavioral response?

In this research, we focus on one dimension of the traffic icon – the perceived movement (or dynamic imagery) that the icon elicits. We hypothesize that dynamic imagery will affect human behavior. Specifically, perceived movement will lead to a propensity for the observer to act, influencing his/her behavior, reaction times, and attention. We test these hypotheses across four studies.

Exploring the implications of subtle changes in traffic signs on consumer behavior, we also contribute to a recent call for research on consumer and societal well-being (Mari 2008; Mick 2008; Mick et al. 2011).

In study 1a, we created four different stimuli, with each stimulus containing a road with a road sign of children crossing as seen from above. Two of the signs were visual icons of children (with lower and higher dynamism visuals). The other two signs were control conditions (higher and lower dynamism verbal depictions of the visual sign, namely, “running children” and “children ahead”). These verbal depictions allow us to test whether differences in behavior are due to differences in inferred conceptual meaning of perceived movement, or whether there is something unique about dynamic visual imagery. Participants were randomly assigned to view one of the four maps and were instructed to imagine themselves driving

on the road depicted in the picture. They were further instructed to click on the location of the road where they would start to slow down their vehicle in response to the traffic sign. We programmed the survey to place a small car where the participant clicked. The final position of the car (click), as measured in pixel coordinates, represented our main dependent variable of interest. We found support for our hypothesized effect: participants indicated earlier positions to begin slowing down when shown a higher dynamism versus lower dynamism visual sign. Similarly, the higher dynamism visual sign differed from both verbal signs. Together, this suggests that the perceived movement in the higher dynamism visual sign affects behavior and not simply the activation of the concept of the sign.

Study 1b tests if the results of study 1a carry over to a consumer setting, and within a less familiar context with less known signs. We created an aerial view of a mall parking lot with a road sign. The road sign portrayed a higher or lower dynamism icon of a shopper with a shopping cart. Instructions and the procedure were similar to study 1a. As in the prior study, participants indicated earlier positions to begin slowing down when shown a higher dynamism versus lower dynamism visual sign.

In study 2, we extend the findings of studies 1a and 1b in a video driving simulation. We created a driving video that showed a drive along a country road as seen from the driver's point of view. During the video, two types of traffic signs appeared randomly on the screen (warning signs or informative signs). The warning signs were traffic signs with either lower or higher dynamism. We use informative signs as control condition. Participants were asked to press the "i" key if the sign was informative and "w" if the sign was a warning. Our dependent measure in study 2 is reaction time to the signs presented. Supporting our hypothesis, results revealed that participants reacted significantly faster to warning signs with higher dynamism than to warning signs with lower dynamism, or to informative signs. There was no difference between warning signs with lower dynamism and informative (control) signs.

In study 3, we examine how perceived movement affects attention. Specifically, we created eight pictures depicting a first-person driving view, with four lower dynamism and four higher dynamism signs. We used four different driving scenes and backdrops. Participants were randomly assigned either to a condition with only lower dynamism signs or to a condition with only higher dynamism signs. We used eye-tracking technology to measure the time to first fixation, which is the time in milliseconds from when a scene is shown to a person until the person's eyes fixate the traffic sign. The eye-tracker results in study 3 support our hypotheses that static pictures with higher perceived movement are able to draw attention more quickly, resulting in an earlier fixation (vs. less dynamic signs).

Our findings show the behavioral consequences of perceived movement from static visuals. In four studies, using multiple methodologies and technologies, a higher dynamism (vs. lower dynamism) icon results in an earlier (studies 1a and 1b) or faster (studies 2 and 3) propensity to act.

Theoretically, our exposition of the effects of perceived movement on behavior provides a foundational framework for future research within consumer psychology and behavior. Finally, our studies show dynamic imagery to be an important and underexplored construct within both cognitive psychology and consumer behavior.

Dark is Durable, Light is Convenient: Color Value Influences Perceived Product Attributes

EXTENDED ABSTRACT

This research demonstrates that consumer perceptions of product attributes such as durability and convenience are malleable; they can be influenced by something as simple as the shade of color applied to the product's surface. Darker shades enhance the perception of durability, but lighter shades enhance the perception of convenience. Both effects arise because consumers associate darkness with weight (Alexander and Shansky 1976; Walker, Francis, and Walker 2010). We expect that when consumers imagine using heavy products (relying on their mental imagery), they tend to view them as more robust and durable, but less convenient or easy to handle, than lighter products. The current findings contribute to the literature on sensory and imagery phenomena in general (Krishna 2012) and color in specific (Bagchi and Cheema 2013; Gorn et al. 2004; Labrecque, Patrick, and Milne 2013), as well as durability and convenience (Berry, Seiders, and Grewal 2002; Bruce, Desai, and Staelin 2005).

The empirical investigation comprises seven experiments. First, three pilot studies are designed to replicate and add nuance to existing findings pertaining to the influence of color value (i.e., the degree of darkness or lightness in a given color, with black on the low-value end and white on the high-value end) on perceived weight. Next, four main studies shed light on the influence of color value on perceived convenience and durability.

Pilot Study A served as a preliminary investigation of the proposed variable underlying the influence of color value on perceived weight, namely, perceived density. Participants viewed a comparatively light (100% value) or dark (80% value) grayscale image of the same forest, and results revealed that the participants viewing the darker image perceived the forest to be denser. Pilot Study B extended this finding to the context of consumer products. It was designed to investigate the mediating role of perceived density in the influence of color value on perceived weight, while also ruling out an alternative explanation for the findings, namely, that the results might stem from a perception of contrast between target stimuli and background. Participants were randomly assigned to one of six conditions. On a computer screen, they viewed either a light (100% value) or dark (50% value) blue suitcase, placed next to an intermediate (75% value) blue suitcase. The intermediate suitcase served as a benchmark. Contrast was manipulated by displaying the background in one of the three identical shades used for the suitcases. The study was a 2 (color: light vs. dark) x 3 (background: light vs. dark vs. intermediate) between-subjects experiment. Results revealed that the suitcase with the darker (vs. lighter) color was perceived to be heavier, while there were no effects stemming from contrast. Similarly, the darker suitcase was perceived to be denser, and this perception of density mediated the influence of color value on perceived weight. Pilot Study C replicated this pattern of results, including the mediating role of density, but the experiment relied on colored blocks that the participants physically lifted before estimating their weight.

In Study 1A, participants viewed images of two red laptops that were identical in shape and color, except that the color of one was comparatively light (100% value) while the color of the other was comparatively dark (50% value). When given a goal of durability, a significantly larger proportion of participants chose the darker laptop, while also identifying it as the heavier one. In Study 1B, participants viewed the same two laptops but were given a goal of convenience. A significantly larger proportion of participants chose

the lighter-colored laptop, while identifying the darker-colored laptop as heavier.

In Study 2A, participants viewed either a light (100% value) or dark (50% value) blue suitcase, depending on randomly assigned condition, and they reported perceived durability and perceived weight of the suitcase. Results revealed that the darker-colored suitcase was perceived to be more durable as well as heavier than the lighter-colored suitcase. Further, perceived weight mediated the influence of color value on perceived durability. In Study 2B, participants viewed one of the same two suitcases from the previous study, and they reported perceived convenience and perceived weight of the suitcase. Results revealed that the darker-colored suitcase was perceived to be less convenient but heavier than the lighter-colored suitcase. Further, perceived weight mediated the influence of color value on perceived convenience.

In these seven studies, judgments related to density, heaviness, convenience, and durability changed systematically based on the color of the stimuli, showcasing the prominent role of visual imagery in altering the perceived qualities of an object. This research goes beyond prior literature in showing that the perception of usage-relevant attributes depends on product color, suggesting a more elaborate process than would be needed for the perception of basic physical properties such as weight. In each of the main studies, participants only viewed images and hence must base their perception of product attributes such as convenience on the imagined rather than actual use of the products. However, follow-up studies could be conducted to investigate whether these perceptions change when physically interacting with the products.

So Close I Can Almost Sense it: The Impact of Differences in Sensory Imagery Distance on Consumer Attitudes and Intentions

EXTENDED ABSTRACT

Sensory experiences, including sensory images (e.g., visual and haptic imagery), are difficult to compare to one another as they share few common dimensions. However, one underlying dimension that sensory experiences share and uniquely differ on is the distance from the stimulus required for perception (Rodaway 1994). Thus, for a stimulus to be perceived by the sense of touch it must be close to the individual, whereas for the same stimulus to be perceived visually, it may be further away. We propose and show that sensory imagery follows a similar pattern to actual perception on this distance dimension. Across four studies, we specifically highlight how images evoked using different sensory modalities affect both the perceived physical and psychological distances between the consumer and the stimulus, ultimately affecting attitudes and intentions. In general, more proximal (closer) sensory images lead to higher attitudes for physically or psychologically close experiences, whereas more distal (farther away) sensory images lead to higher attitudes for physically or psychologically distant experiences.

Pilot Study. With the pilot study we test whether the five senses differ in their imagined distance from a given stimulus. Forty participants were told to imagine a steak skillet using each of the five senses in randomized order (we chose food as it can be experienced with all of the senses). They then rated how far the skillet was away from themselves in their image (0-10 feet).

As hypothesized, taste was rated as the closest sensory image, followed by touch, smell, vision, and sound. The imagined distance for hearing did not differ from that of vision or smell. However, hearing, smell, and vision each significantly differed in distance from both touch and taste. Touch and taste did not differ from one another.

Thus, the results from the pilot study suggest that hearing, vision, and smell may be classified as more distal sensory experiences, with touch and taste classified as more proximal sensory experiences. We use this classification of sensory experiences in the subsequent studies.

Study 1A. In study 1a, we randomly assigned participants to use their sense of taste (proximal) or sense of vision (distal) to imagine all of the experiences they would have while visiting a restaurant. Our dependent variable measured how far the imagined restaurant was perceived to be from where participants lived (0-200 miles). We found that when participants were told to imagine a proximal sensory experience, they reported the distance of the restaurant to be significantly closer than those told to imagine a distal sensory experience ($M_{\text{proximal}}=13.67$, $M_{\text{distal}}=29.96$; $p<.05$).

Study 1B. In study 1b, participants read a restaurant review that contained either proximal (taste and touch) or distal (vision and sound) sensory experiences. Participants were shown a six-month calendar and were asked to indicate when they would like to make a reservation for the restaurant. This measure served as our dependent variable. We also measured attitudes toward the restaurant to ensure that any differences in temporal distance weren't attributable to differences in attitudes. There was no difference in attitudes resulting from the reviews ($p>.5$). However, there was a difference in the reservation date. When participants read the proximal review they made reservations significantly closer in the future than when they read the distal review ($M_{\text{proximal}}=5.62$ weeks, $M_{\text{distal}}=9.50$ weeks; $p<.05$).

Study 2. In study 2 we establish conditions of congruence and incongruence between sensory imagery and physical distance, and then explore the impact of the level of congruity on attitudes. We hypothesize that congruence between sensory imagery and physical distance will lead to higher attitudes than incongruence.

One hundred and seventy-five participants were told that they would be imagining a restaurant experience. Participants were randomly assigned to one of two physical distance conditions (city in which they live or different state). Next, they were randomly assigned to imagine all of the taste or visual experiences they would have at the restaurant. We captured attitudes toward the restaurant as our dependent variable.

As hypothesized, the interaction between sensory imagery and physical distance was significant ($p=.02$). Planned follow-up contrasts reveal that within the same-city condition, proximal imagery led to higher attitudes than distal imagery ($M_{\text{proximal}}=8.06$, $M_{\text{distal}}=7.64$; $p=.09$). Within the different-state condition, distal imagery led to higher attitudes than proximal imagery ($M_{\text{proximal}}=7.32$, $M_{\text{distal}}=7.78$; $p=.07$).

Study 3. One of the natural consumer contexts in which differences in sensory imagery proximity may be consequential is when comparing online versus in-person purchase decisions. In study 3, we explore this context. We propose that for an in-person (online) presentation proximal (distal) sensory imagery will lead to higher attitudes.

One hundred and fifty-seven undergraduates were told that they would be providing product evaluations for a toy football. Participants were randomly assigned to read one of two advertisements: a proximal advertisement focused on the touch experience of the football, or a distal advertisement focused on the sound the football made when squeezed. Next, participants were randomly assigned to either view the football in person, by opening a box to the side of the computer (but not to touch or move the football inside), or to view a picture of the football online. We captured their attitudes toward the football as our dependent variable.

The hypothesized interaction was significant ($p < .005$). Follow-up contrasts revealed that when the football was presented in-person, the proximal advertisement led to higher attitudes than the distal advertisement ($p < .01$). However, when the football was presented online, the distal advertisement led to higher attitudes than the proximal advertisement ($p = .13$).

Our findings across a pilot study and four additional studies suggest that the specific sensation consumers use to form their images can have important consequences on attitudes and intentions.

Sense and Mental Imagery: The Persuasive Implications of Visualizing Proximal and Distant Senses

EXTENDED ABSTRACT

Mental imagery is often treated as synonymous with visual imagery. Yet, as reflected in the mental-imagery scale developed by Betts (1909), mental imagery encompasses all of the senses: sight, sound, smell, touch and taste. Although it has been recognized that mental imagery can involve all five senses, the majority of research on mental imagery has concentrated upon visual imagery (Elder 2008; MacInnis and Price 1987). Consequently, it is unclear whether there are differences in imagery evoked across these different senses, and if so, when one is more effective than the other. This research aims to address these questions.

Based on construal level theory, I derive predictions about referring to different senses is most persuasive and why. Psychological distance is egocentric, with the reference point being the individual in the present moment, and can vary depending on the degree of temporal, spatial, and social distance (Trope and Liberman 2010). Similarly, senses can be characterized in terms of distance from the individual. For instance, based on whether an item needs to be within an individual's reach in order to be sensed, smell and touch have been characterized as intimate senses, whereas hearing and sight have been characterized as distant senses (Rodaway 1994). Likewise, others have proposed that taste is most proximal because an object needs to be inside one's mouth in order to be tasted, followed by touch, smell, hearing and sight (Skurnik and George 1964; Trope and Liberman 2010). If senses vary in psychological distance, then referring to a sense should be more persuasive when it matches other dimensions of psychological distance (e.g., both sense distance and social distance are proximal). Furthermore, the underlying mechanism is proposed to be ability to vividly imagine the product. I predict that individuals will be better able to formulate a vivid mental image when sense distance matches the psychological distance of a different dimension (e.g., taste and present tense). I test these hypotheses in four experiments.

Study 1 examines 31,889 Yelp.com restaurant reviews posted in 2012. Consistent with prior research on online reviews, the key dependent variable was the number of "useful" votes a review received from readers (Chen and Lurie 2013). Furthermore, consistent with other research on online reviews (Ludwig et al. 2013), the text of the reviews were automatically coded using the linguistic inquiry and word count (LIWC) program (Pennebaker et al. 2007). The key independent variables extracted from the LIWC were mentions of present tense and mentions of sight and touch. As predicted, regression analyses yielded both a significant present x sight effect ($b = -.02$, $p < .05$), and present x touch effect ($b = .02$, $p < .05$), such that more mentions of sight (touch) led to more useful votes when there were also more (less) use of the present tense.

Study 2 extends these results with a lab study comparing a different pair of senses (sight and sound), and using a different dimension of psychological distance. 107 participants were randomly

assigned to a condition in a 2 (social distance: pictures present vs. absent) x 2 (sense: sight and sound) experimental design. Because study 1 compared the most proximal sense (touch) to the most distant sense (sight), sound was chosen to provide the most conservative test of the hypothesis. All participants read an extremely favorable (5-star) review of a stereo written by a male who lived in the same city as where they attended school (to hold constant spatial distance). To manipulate social distance, consistent with past research indicating that pictures of reviewers can reduce social distance (Schlosser 2009), in the low (high) distance condition, a picture of the reviewer was present (absent). Sense was manipulated in the review itself. Using content from actual peer reviews of stereos posted on websites, two reviews were constructed that either discussed the favorable features of how the stereo looked or sounded. After reading the review, participants reported their attitudes toward the stereo as well as their perceptions of the reviewer. At the very end of the study, participants reported their demographic information. Participants' gender and whether they are a native English speaker were included as covariates in the analyses to control for any variation in social distance due to being of a different gender or nationality than the reviewer. As expected, the sense x social distance interaction was significant ($F(1,99) = 4.85$, $p < .05$; $F(1,103) = 4.24$, $p < .05$ without covariates). Attitudes were higher when sound was mentioned and social distance was low than high ($M_s = 5.64$ vs. 5.11), whereas attitudes were higher when sight was mentioned and social distance was high than low ($M_s = 5.41$ vs. 5.20).

Study 3 further tests the hypothesis by comparing sight with touch, using a different manipulation of social distance as well as tests for mediation. 100 participants were randomly assigned to a condition in a 2 (social distance: own vs. different university) x 2 (sense: sight vs. touch) experimental design. Participants saw a screen capture of a website for a university sweatshirt that they were considering buying for a friend who either attended the participant's university (low social distance) or a different university (high social distance). General information about the sweatshirt was identical with the exception of being described in terms of touch ("See the difference") or sight ("Feel the difference"). In addition to product attitudes, participants also reported their intentions to buy the product and their attitudes toward the website. Finally, to test for mediation, participants completed a measure of how vivid their image of the product was. Replicating and extending the results of the prior studies, the sense x social distance interactions were significant for product attitudes, site attitudes and purchase intentions ($F_s(1,93) > 4.98$, $p < .05$) with the cell means being in the predicted direction. Furthermore, sense x social distance significantly affected imagery vividness ($F(1,93) = 4.27$, $p < .05$). Finally, bootstrapping methods suggest that imagery vividness is a significant mediator of the sense x social distance effect on attitudes and intentions (95% confidence intervals excluded zero).

Taken together, the results of three studies are suggestive that human senses can vary in psychological distance, thereby influencing how persuasive a message is.

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