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Bigger is Better: The Influence of Physical Size on Aesthetic Preference Judgments

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ABSTRACT

The hypothesis that the physical size of an object can influence aesthetic preferences was investigated. In a series of four experiments, participants were presented with pairs of abstract stimuli and asked to indicate which member of each pair they preferred. A preference for larger stimuli was found on the majority of trials using various types of stimuli, stimuli of various sizes, and with both adult and 3-year-old participants. This preference pattern was disrupted only when participants had both stimuli that provided a readily accessible alternative source of preference-evoking information and sufficient attentional resources to make their preference judgments. Copyright © 2002 John Wiley & Sons, Ltd.

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Research has demonstrated that people rely on a variety of heuristics on memory and judgment tasks. In performing these tasks, people have been shown to rely heavily on information that is computationally simple (e.g. Hunt and Agnoli, 1991), readily available (Tversky and Kahneman, 1974), representative (Tversky and Kahneman, 1974), and attentionally salient (e.g. Taylor and Fiske, 1978). Furthermore, a substantial body of research suggests that people often use simple judgment rules that rely on readily apparent context information (cf. Kahneman, Slovic, and Tversky, 1982) in preference to normative strategies that depend on information that is computationally complex (e.g. Pelham, Sumarta, and Myaskovsky, 1994) or difficult to access (Bryson *et al.*, 1991; Funke, 1991; Schooler, Ohlsson and Brooks, 1993).

HEURISTICS IN AESTHETIC JUDGMENTS

Simplicity also appears to have a strong influence on aesthetic judgments. In particular, research in a variety of domains suggests that individuals tend to prefer objects that are easily processed. For example, familiar

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objects tend to be preferred over unfamiliar objects (Whittlesea, 1993). Another illustration of this preference pattern is the mere exposure effect, which claims that repeated exposure to an object increases preference for that object (Zajonc, 1968). This effect can influence preference judgments even when individuals show no improvement in recognition of the stimulus objects (Seamon, Brody, and Kauff, 1983), and even for different objects with similar characteristics to those of previously exposed objects (Gordon and Holyoak, 1983). Most generally, the preference for easily processed objects is described by the body of research on perceptual fluency (e.g. Bornstein and D'Agostino, 1994). This research has demonstrated that objects that are more easily processed on the basis of longer exposure times, stronger contrasts between figure and ground, and priming with similar rather than dissimilar objects are preferred over objects that are more difficult to process (e.g. Fischer and Hawkins, 1993). Furthermore, preferences can be influenced by perceptual fluency effects even when individuals do not consciously recognize the stimulus objects (Anand and Sternthal, 1991).

In addition to direct evidence that ease of processing influences preferences, people have also been shown to rely heavily on simple contextual cues to make aesthetic judgments. For example, certain height to width ratios appear to be systematically preferred over others (e.g. the 'golden ratio'; see, e.g. Ohta, 1999; see also Macrosson and Strachan, 1997 for data indicating that other proportions might be seen as ideal). Other suggested contextual cues that influence aesthetic preferences include prototypicality (e.g. Martindale and Moore, 1988; Martindale, Moore, and West, 1988; Hekkert and Snelders, 1995; for a critique, see Boselie, 1991) and complexity (Lombardo, 1991).

The goal of the present paper is to demonstrate the influence of another simple contextual cue, physical size, on preference judgments. We propose that people will generally prefer larger objects over smaller ones—in other words, aesthetic judgments are influenced by a simple 'bigger is better' heuristic.

THE CASE FOR PHYSICAL SIZE AS A JUDGMENT CUE

Why should people prefer larger objects? Especially in an age when corporate success can be measured by the ability to build the smallest laptop computer, the smallest cellular phone, or the smallest microchip, it seems counterintuitive to suggest that people actually prefer larger objects over smaller ones. Nevertheless, there is substantial evidence that size plays an important role in judgment processes in both animals and humans. For example, investigations of animal behavior demonstrate that physical size can serve an important function with regard to both mate attraction and threat repulsion. Size-enhancing strategies have been observed in a wide variety of species, such as the manes of male baboons and large felines, the ruffling and spreading of tail feathers in birds, the extension of a porcupine's quills, and the puffing out of the neck in many bird and reptilian species (Alcock, 1984; Campbell, 1976).

Humans have been found to use size in a similar fashion. Size-inspired threat and power displays include the wearing of height- and weight-enhancing clothing and apparatuses, including headdresses and shoulder pads (Campbell, 1976). Size appears to serve a variety of other functions as well. For example, research suggests that physical height in males is positively correlated with physical attractiveness, income, and occupational status (see Jackson, 1992). Size also appears to be related to political success. In the past 23 US presidential elections, the tallest candidate won all but four. In 1990, the tallest candidate for the US Senate won 21 of 31 contested Senate races (*Newsweek*, 1992). Additionally, male US senators are, on average, 3.5 inches taller than the average American man (Boller, 1984).

Physical size has been shown to influence other types of decision processes as well. For example, Josephs, Giesler, and Silvera (1994) found that a wide variety of judgments were strongly influenced by non-diagnostic physical size information through the application of a 'bigger is better' rule. For example, by increasing the physical size of a pile of completed or ongoing work through non-diagnostic means (e.g. in a proofreading task, attaching each piece of completed text to an empty cardboard box, thus increasing the height of the completed pile of work), judgments of productivity and progress increased dramatically. These researchers argued that the salience and computational simplicity of physical size information caused a 'judgment by quantity' strategy to dominate over the use of more complex normative judgment information.

Although the preceding evidence suggests that physical size can have a significant influence on judgment and decision processes, this influence is not always observed. For example, although tall men are generally viewed as more virile, extreme height (i.e. over $6\frac{1}{2}$ feet tall) in males is not seen as a desired trait (Jackson, 1992). Furthermore, when looking at individual features, larger eyes might be viewed as more attractive (e.g. Berry and MacArthur, 1985), but the same cannot necessarily be said for noses. In fact, attractiveness in faces seems to be governed by a good balance of characteristics rather than by the size or prominence of any single characteristic (e.g. Langlois, Roggman, and Reiser-Danner, 1990).

What might be the source of this apparent inconsistency? Much of the research that has failed to find a reliable relation between size and preference, and much of the large body of literature investigating general stimulus-based preferences, has been conducted within the context of person perception, focusing on the effects of the size of human targets (e.g. height, weight, and other physical attributes). We believe that the informational richness and specific sociobiological functions of such stimuli make it unlikely that any single stimulus characteristic (e.g. size, color, shape) will exhibit a systematic or predictable relation to preference. In other words, we propose that the complexity associated with preference judgments in the particular domain of human physical features might obscure a fundamental, reliable association between physical size and human preference.

THE PRESENT RESEARCH

In the current set of experiments, we examined the effects of physical size on preferences among pairs of abstract shapes, alphanumeric characters, and Chinese Kang Xi characters. All these stimuli are relatively simple, have no 'real' association between size and functionality, and presumably bear little or no resemblance to human physical features. We hypothesized that participants would generally prefer larger stimuli over smaller stimuli.

To investigate this hypothesis, we conducted a series of four experiments in which participants were asked to make preference judgments among pairs of two-dimensional stimuli that varied in size and informational complexity. In all, 130 different stimuli ranging in size from 0.56 to 97.5 square inches were used. The purpose of Study 1 was to demonstrate the basic effect, namely that larger objects would be preferred over smaller objects in pairwise preference judgments. In addition to adult participants, young children were included in Study 1 to demonstrate that the effects of physical size on preferences exist even at an early age and are thus unlikely to be a learned, cultural phenomenon. The purpose of Study 2 was to demonstrate that the effect of size on preference is not limited to an idiosyncratic set of stimuli by varying the size, nature, and complexity of stimulus objects. The purpose of Studies 3 and 4 was to examine the extent to which deeper cognitive processing of stimuli disrupts the association between size and preference by encouraging participants to think about semantic associations for the stimulus objects.

STUDY 1

Method

Overview

Both undergraduate students and 3-year-old participants were used in this study. Undergraduate participants were presented with a series of 19 trials in which they viewed stimulus pairs composed of geometric shapes and alphanumeric characters and were asked to select the member of the stimulus pair they preferred. Of the 19 trials, 9 were buffer trials where the stimuli were of approximately the same size. In the remaining 10 test trials, one of the stimuli was substantially larger than the other. Three-year-old participants used a randomly selected subset of the undergraduate stimuli, they did not have any buffer trials, and they had only 9 test trials. It was predicted that, during test trials, all participants would show a tendency to prefer large stimuli over small stimuli.

Participants

Participants were 16 University of Texas undergraduates (8 male, 8 female) who participated for course credit and 14 3-year-old children (7 male, 7 female) whose parents volunteered their participation.

Materials

All stimulus pairs were either geometric shapes and symbols (e.g. an equilateral triangle) or alphanumeric characters (e.g. an ampersand). Originally a set of 75 such stimuli were collected, after which 38 stimuli were randomly selected from this set for use in the experimental procedure. The same 38 stimuli were used for all undergraduate participants, and a randomly selected set of 18 of these stimuli were used for 3-year-old participants. Approximately half of the set was composed of geometric figures, and the other half of alphanumeric characters.

Each stimulus object was represented in a small and a large configuration. The small configurations ranged in size from 0.56 to 1.1 square inches in area, and the large configurations ranged in size from 10.5 to 22.6 square inches in area. Each configuration of each stimulus object was printed on white paper using a high-resolution, 400 dpi Hewlett-Packard Laser Printer, then attached to thin sheets of cardboard backing to enhance their durability. A uniform white paper margin surrounding each stimulus object was constructed to be proportionate to the surface area of the stimulus object. Stimuli were laminated for 3-year-old participants in order to prevent degradation. Stimuli were presented at a distance of approximately 2 feet from participants.

For each test trial, two stimulus objects were randomly selected (without replacement) from the set of 38. The sequential (left-to-right) ordering of the two stimulus objects for each trial was randomly determined. For test trials, it was then randomly determined which of the pair of stimulus objects would be presented in its large configuration and, by default, which of the pair would be presented in its small configuration. This procedure was performed separately for each participant.

Procedure

Participants were informed that they would be presented with a series of randomly paired images of different shapes and sizes, and that they would be asked to point to the member of the pair that they 'liked better'. For undergraduate participants, a total of 19 stimulus pairs were presented. Of the 19 trials, 9 were buffer trials consisting of same-size pairings (5 trials paired small figures and 4 trials paired large figures). Buffer trials always occurred on trials 1, 2, 3, 5, 8, 10, 12, 13, and 16. In the remaining 10 test trials, one of the stimulus objects was presented in its large configuration and the other was presented in its small configuration. For 3-year-old participants, there were no buffer trials and there were only 9 test trials.

Undergraduate participants were instructed not to deliberate about each decision, but rather were told to 'allow your initial, gut-level reaction to determine your preferences'. These participants were then instructed to place the selected member of each pair into a box labeled 'preferred' and the other member into a box labeled 'not preferred'. Three-year-old participants were simply told to point to the object they preferred. The procedure was timed by the experimenter.

After the procedure was completed, adult participants were debriefed and probed concerning what they believed was the purpose of the experiment. None of the participants confidently identified size as the variable of interest in the study, although a few participants did mention a variety of possibilities that included physical size.

Results and discussion

The results supported the hypothesis that larger objects would be preferred over smaller objects. The larger stimulus object was preferred significantly more often than would be expected by chance by both undergraduate ($M = 63.13\%$), $t(15) = 3.75$, $p < 0.01$, and 3-year-old participants ($M = 61.92\%$), $t(13) = 2.67$, $p < 0.05$.[1] A one-way (experimental group: undergraduate or 3-year-old) ANOVA showed no difference between the preference patterns of undergraduates and 3-year-olds, $F < 1$.

Possible preference confounds

Although size had a significant influence on participants' preferences among stimuli, none of the other variables in the present study appeared to have any influence at all. Gender had no impact on preferences for large stimuli as compared with small stimuli, $F < 1$. Also, the pattern of left–right preferences did not significantly differ from chance, $t(29) = 1.31$, $p = 0.20$. In addition, the complexity of each stimulus object was measured as the number of lines plus the number of inflection points on curved lines plus the number of distinct elements in the stimulus object. Preferences were not significantly related to complexity either on test trials or on buffer trials, F's < 1.

These results demonstrate that size can play an important role in determining preferences. Furthermore, the fact that the size–preference relation was demonstrated in 3-year-old children as well as in adults suggests that this relation is extremely pervasive and is perhaps the result of our fundamental 'hard-wired' nature rather than of socialization processes. However, this result has only been demonstrated for stimulus objects of a particular size and type (i.e. fairly small geometric figures and alphanumeric characters). The objective of Study 2 was to alter the stimuli used in Study 1 to provide evidence for the generality of the relation between size and preference.

STUDY 2

It is possible that some particular characteristic of the type of stimuli used in Study 1 (geometric figures and alphanumeric characters) caused the observed relation between size and preference. In particular, it is possible that some characteristic of familiar symbols such as the letters in the standard American alphabet are processed differently than unfamiliar symbols. The first objective of Study 2 was to rule out this potential limitation by demonstrating the relation between size and preference using a different and novel set of stimulus objects.

Another possible limitation of the findings from Study 1 is that they only apply to extremely simple stimulus objects. The second objective of Study 2 was to address this issue by using more complex stimuli.

Finally, a possible alternative explanation for the results of Study 1 is that the small stimulus objects were simply too small to be well-liked. For example, previous research in the domain of perceptual fluency has shown that people tend to prefer objects that are easy to process (e.g. Fischer and Hawkins, 1993). Although this argument should be irrelevant with regard to the findings of Study 1—the stimuli in Study 1 were very

[1]All tests comparing either the preference for large versus small stimuli or the preference for stimuli presented on the left versus the right are one-sample t-tests against an expected value of 50%.

simple symbols printed with high resolution—it could be argued that the size of the small stimuli made those objects more difficult to process than the large stimuli. This difference in ease of processing could thus be a potential cause of the participants' preference for large stimuli. Even if perceptual fluency is not an issue, it remains a possibility that participants in Study 1 were simply expressing a distaste for stimuli of a particular size (i.e. the small stimuli were too small to be well-liked) rather than demonstrating a general preference for larger over smaller objects. Study 2 also addressed this issue by using a set of larger stimuli.

Method

Participants

Forty-five University of Texas undergraduates (19 male, 26 female) participated for course credit. People with prior knowledge of the Chinese language were excluded from participation.

Procedure

Participants were randomly assigned to one of three experimental groups. The first group, the replication group, used exactly the same stimuli and procedure described for undergraduate participants in Study 1. The second group, the Chinese character group, followed the same procedure as the replication group with the exception that a different set of stimuli was used to avoid the possibility that preferences were influenced by the nature of, or perhaps by prior exposure to, the stimulus objects. Chinese Kang Xi characters were selected as stimulus objects for this group because (a) Chinese characters are unfamiliar stimuli for American undergraduate students, (b) the informational complexity of these characters varies greatly, including very complex ideographs and deflective characters, and (c) similar characters have been used in earlier research to test for simple stimulus effects (e.g. Zajonc, 1968; Edwards, 1990). The characters used as large and small stimuli were approximately the same size as the stimuli used in Study 1. Thirty-eight Chinese characters (20 test, 18 buffer) were randomly chosen from the complete set of 214 Kang Xi characters (obtained from Fazzioli, 1986), and were used as the stimulus set for all participants.

The third group, the large character group, used the same set of stimulus objects as the replication group. However, the large stimuli for the replication group were used as the small stimuli for the large character group. These were paired with even larger stimuli ranging in size from 81 to 97.5 square inches in area. The smaller stimuli for this group were thus simple figures that filled a space approximately the size of a 3×5 index card presented at a distance of approximately 2 feet, a size that should be large enough to avoid any hindrance to perceptual fluency.

It was predicted that each of the experimental groups would show a significant positive association between size and preference.

Results

The results supported the hypothesis that larger objects would be preferred over smaller objects. The larger stimulus object was preferred significantly more often than would be expected by chance by participants in each experimental group: replication ($M = 67.65\%$), $t(16) = 3.50$, $p < 0.01$; Chinese characters ($M = 63.33\%$), $t(14) = 2.87$, $p < 0.05$; large characters ($M = 62.31\%$), $t(12) = 2.85$, $p < 0.05$. A one-way (experimental group: control, Chinese character, or large character) ANOVA showed no association between experimental group and the frequency of preference for large stimuli over small stimuli, $F < 1$.

As in Study 1, none of the other variables in the present study appeared to have any influence on the relation between size and preference. The complexity of each stimulus object was measured as the number of lines plus the number of inflection points on curved lines plus the number of distinct elements in the stimulus object. As a manipulation check, a one-way (experimental group) ANOVA confirmed that the

Chinese characters were significantly more complex than the stimuli used in the other groups, $F(2, 42) = 2394.34$, $p < 0.001$. A one-way (chosen versus unchosen stimuli) repeated-measures ANOVA showed no association between preference and complexity either on test trials, $F(1, 44) = 2.28$, $p > 0.10$, or on buffer trials, $F(1, 44) = 1.73$, $p > 0.15$. Preferences were also not related either to gender, $F < 1$, or to presentation position (left versus right), $t < 1$.

The first two studies provide substantial evidence for a relation between size and preference, such that larger objects are preferred over smaller objects. The large characters condition from Study 2 also provides evidence that the influence of physical size on preference is not a result of perceptual fluency. In fact, it is quite possible that at the presentation distance of approximately two feet, the 'larger' stimulus objects (average of about 90 square inches) were *more* difficult to process than the less preferred 'large' stimulus objects (average of about 16 square inches) because they filled such a large portion of the participant's visual field.

An important question, however, is how the affective preference judgments made in these studies related to cognitive processing of the stimuli. Research involving the mere exposure effect (e.g. Zajonc, 1968; see also Bornstein, 1989, for a review) suggests that simple preferences such as those demonstrated in the first two studies can occur independently of any cognitive reactions to the stimuli. This position has been controversial, however (for debate, see e.g. Lazarus, 1984; Zajonc, 1984), and other research indicates that assignment of personal meanings can influence emotional evaluations (e.g. Lazarus and Smith, 1988). The purpose of Studies 3 and 4 was to investigate the association between size and preference in the context of conceptual representations of the stimuli.

STUDY 3

The preceding studies have demonstrated the existence of size-based preferences, but only for abstract stimuli that, by and large, do not provide readily accessible alternative sources of preference-evoking information. It is possible that invoking some form of semantic content in connection with the stimuli might attenuate or eliminate the association between size and preference.

This possibility was examined in Study 3, in which stimuli were paired with an alternate source of preference-evoking information by requiring some participants to extract a personally significant meaning or association from each stimulus object. The objective of this study was to identify the relative contributions of conceptual and perceptual processing in the context of the association between size and preference.

Method

Participants

Twenty-nine University of Texas undergraduates (14 male, 15 female) participated for course credit.

Procedure

The stimulus set and stimulus sizes used in this experiment were identical to those used in Study 1. Participants were randomly assigned either to a 'perceptual' condition that used the same procedure used in Study 1 or to a 'conceptual' condition.

In the conceptual condition, participants generated a meaning for each member of each stimulus pair, wrote down the meanings on a sheet of paper, then indicated which stimulus object they preferred. To familiarize participants with this task, participants were provided with a number of sample stimuli and associated meanings. For example, the letter 'K' was paired with the hypothetical response 'Ku Klux Klan', and a geometric stimulus symbolizing the sun was paired with 'makes my existence on this planet possible'. After completing the preference portion of the experiment, the sheets containing the generated meanings were returned to participants. For each pair of meanings, participants were asked to place a check mark next to the meaning that they judged as more positive. After rating each meaning pair for positivity, participants were asked to indicate the reasons that led them to their stimulus-pair preferences. Participants were encouraged to list as many such reasons as they could.

Results and discussion

As in the previous studies, neither gender, left–right position, nor stimulus complexity was related to stimulus preference, F's < 1.

The experimental results suggest that perceptual, preference-evoking aspects of the stimuli dominated over semantic content. Participants in both the perceptual condition ($M = 64.67\%$), $t(14) = 3.21$, $p < 0.01$, and the conceptual condition ($M = 61.43\%$), $t(13) = 2.28$, $p < 0.05$, showed a preference for large over small stimulus objects. Furthermore, there was no difference in the preference patterns shown by participants in the perceptual and conceptual conditions, $F < 1$.

Clearly the semantic content of the stimuli did not override the influence of size on preference. Instead, it appeared that size influenced the perceived positivity of semantic content. When participants indicated which of the meanings they had generated was more positive, they showed a significant tendency to prefer the meanings that had been associated with large stimuli ($M = 65.00\%$), $t(13) = 5.14$, $p < 0.001$.

Furthermore, participants were not aware of the influence that physical size had on their preferences (e.g. Wilson, 1979), and misattributed their expressed preferences to the meanings they generated (e.g. Nisbett and Wilson, 1977) rather than to the size of the stimulus objects. Of the 14 participants in the meaning-generation condition, only two mentioned the size of the stimulus as having anything to do with their preferences. One participant mentioned other physical features of the stimuli (angular shapes preferred to curved lines), while the remaining 11 participants attributed their preferences to the meanings they had generated. Thus, although the generated meanings did not have any real influence on stimulus preference, participants believed that they did.

STUDY 4

Studies 1–3 have shown that size has a powerful effect on preference. Even generating meanings for the stimuli failed to eliminate this effect, as size appeared to influence the positivity of the generated meanings. In order to eliminate the size-preference relation, then, one possible approach might be to use stimuli that generate meanings independent of the influence of physical size. One stimulus type that has a long history of use for generating such meanings (i.e. free associations) is the projective personality test. To take advantage of the spontaneous associations generated by these tests, participants in Study 4 used the set of abstract stimuli from a projective personality test called the Holtzman Inkblot Technique (Holtzman *et al.*, 1961), which is specifically designed to lead viewers to make spontaneous associations. In this test, viewers are argued to be 'drawn in' and engaged in a visual pattern recognition search guided by unconscious dimensions of personality (e.g. Sarason and Sarason, 1989), presumably independent of any effects due to the size of the inkblots. In other words, the inkblots used in the Holtzman Inkblot Technique provide an alternative source of preference-generating information that is made accessible through the active elicitation, or 'pulling out', of a viewer's responses (e.g. Rabin, 1968).

Study 4 also tested the proposition that the use of size as a preference cue functions in a similar way to other judgmental heuristics. Research has shown that heuristic-based errors are especially prevalent when attentional resources are low, but that these errors are often reduced or eliminated when attentional resources are abundant (e.g. Gilbert, 1991). The reduction of these errors, however, depends on the accessibility of an alternative information source. We propose that the influence of size on preference should follow the same pattern.

To test this proposition, participants in Study 4 were placed either under a high or low level of attentional load. It was predicted that all participants would prefer larger stimuli except when they had both a source of meaning independent of physical size (i.e. Holtzman inkblot stimuli) and sufficient attentional resources to process alternative preference cues (i.e. low attentional load).

Method

Participants

Sixty undergraduates at the University of Texas (31 male, 29 female) participated for course credit.

Procedure

Participants were presented with eight pairs of geometric/alphanumeric shapes and eight pairs of Holtzman inkblots. The two classes of stimuli were blocked, and presentation order was counterbalanced. Thus, half of participants received the inkblots first and half received the geometric/alphanumeric stimuli first. Randomization and buffer trials were identical to the procedures used in Study 1, except that only eight buffer trials were used (four with geometric/alphanumeric shapes and four with inkblots). The sizes of both classes of stimuli were within the range used in Study 1. In addition, attentional load, a between-subjects factor, was manipulated via the amount of time participants had available to form a judgment. The high load condition used the same set of instructions that were used in previous experiments, except that speed of response was emphasized. Participants were instructed to decide between the members of each pair as rapidly as possible (limited time has previously been used to manipulate attentional load; see e.g. Wegner and Erber, 1992). Immediately after participants indicated their preference, the next stimulus pair was presented. In the low load condition, participants were told that they would have 20 seconds to judge each stimulus pair. Participants' compliance and the timing of each interval were controlled by the experimenter, who revealed each subsequent stimulus pair at 20-second intervals.

Results and discussion

The load manipulation was effective, with participants in the high load condition choosing among stimulus pairs in an average of 1.7 seconds, as compared with 20 seconds in the low load condition.[2]

A 2(stimulus type: inkblot or alphanumeric/geometric) $\times$ 2(cognitive load: high or low) mixed ANOVA was performed with the percentage preference for large stimulus objects as the dependent variable. This analysis showed the predicted interaction between stimulus type and cognitive load, $F(1, 58) = 4.08$, $p < 0.05$, such that cognitive load had a larger impact on preferences for large stimuli with the inkblots than with the alphanumeric/geometric stimuli. There was also a significant main effect for stimulus type, $F(1, 58) = 14.41$, $p < 0.001$, such that the percentage preference for large stimulus objects was greater for alphanumeric/geometric stimuli than for inkblots. Cognitive load did not have a significant main effect on preference patterns, $F(1, 58) = 1.03$, $p < 0.30$. Exhibit 1 shows the percentage of trials in which the large stimulus object was preferred in each experimental condition.

Planned comparisons were conducted to examine these effects more closely. Participants' preference for large inkblot stimuli was significantly stronger under high cognitive load than under low cognitive load, $F(1, 58) = 5.11$, $p < 0.05$; conversely, cognitive load had no effect on preferences for alphanumeric stimuli, $F < 1$. This supports the proposition that a combination of both an alternative source of meaning (i.e. inkblot

[2]Across the first three studies, excluding the meaning-generation condition of Study 3 (mean viewing time = 39.2 seconds), the average time spent viewing stimulus pairs was 6.5 seconds.

Exhibit 1. Percentage of trials in which large stimuli were preferred in Study 4

	Cognitive load					
	High			Low[a]		
Stimulus type	*M*	*SD*	*n*	*M*	*SD*	*n*
Inkblot[a]	59.38[b]	23.11	32	47.78	15.23	28
Alphanumeric/Geometric	65.64[b]	21.30	32	68.30[b]	26.02	28

[a]For inkblot stimuli, high cognitive load participants were significantly more likely to prefer large stimuli than low cognitive load participants, $p < 0.05$. For low cognitive load participants, large alphanumeric/geometric stimuli were preferred at a significantly higher frequency than large inkblot stimuli, $p < 0.05$.
[b]These values are significantly different from the 50% preference pattern that would be expected by chance, $p < 0.05$.

content) and attentional resources (i.e. no cognitive load) is needed to negate the influence of size on preference judgments.

GENERAL DISCUSSION

In a two-alternative forced-choice paradigm using a variety of abstract stimuli, both adult college students and 3-year-old children showed preferences for larger stimulus objects over smaller ones. Physical size also influenced the positivity of meanings associated with stimulus objects, thus protecting size-based preference effects against disruption by alternative sources of information associated with these objects. Furthermore, participants appeared to misattribute their preferences to the meanings they generated, suggesting a lack of awareness that physical size was the guiding force behind their preferences (cf. Nisbett and Wilson, 1977). The only successful disruption of size-based preference effects was achieved using stimuli specifically designed to evoke content-based meanings in viewers, and this disruption only occurred under conditions of low attentional load.

Based on the fact that the preferences of young children and the preferences of adults who did not engage in deeper (i.e. meaning-based) processing were both associated with physical size, it appears likely that the influence of physical size on aesthetic preferences is fundamental in nature rather than a learned cultural phenomenon. The present results are also consistent with the notion that the size of an object can act as a heuristic cue for preference judgments. Considering that physical size is both easily observable and easy to apply to judgments, it is ideally suited to this usage. But why is size used as a basis for preference judgments at all? It seems clear, at least for the types of stimuli used in the present experiments, that size is in no way a 'valid' indicator of value or aesthetic quality.

One possible basis for size-based judgments can be found in the history of mankind. Leaky (1971) has argued that simple quantity information (including physical size information) might have functioned as an appropriate guide across a wide array of human preferences until quite recently in human history. However, these preferences arose during a simpler time, and human cultural evolution has progressed at an incredible rate, particularly during the past 200 years (e.g. Hardin, 1961). This suggests that many size-based preferences might be obsolete, and would be best served by replacement. Unfortunately, as Einstein pointed out when expressing his fears about the nuclear age: 'The splitting of the atom has changed everything but our way of thinking' (cited in Barash, 1986, p. 188). The present research suggests that well-entrenched judgment rules based on easily quantifiable information (e.g. bigger is better) continue to flourish even as the appropriateness of these rules is further diminished by the complexities of modern life.

Possible limitations of the present results

Although the present studies demonstrate the influence of size on preference across a variety of shapes, sizes, and participant populations, we do not intend to imply that physical size is the only determinant of human preference. It seems particularly relevant here to discuss other characteristics of stimuli that are likely to attenuate, eliminate, or interact with the influence of size on preference.

Typicality/familiarity

We have proposed that the influence of physical size on aesthetic preferences is fundamental in nature rather than a learned cultural phenomenon. It seems clear, however, that this ‘bigger is better’ principle does not apply to certain types of objects (e.g. watches). With these ideas in mind, it seems reasonable to suggest that the association between size and preference can be unlearned through socialization and enculturation processes, as well as perhaps through simple exposure to objects of a particular size (i.e. learning that size is appropriate for that object). For example, the mere exposure effect (Zajonc, 1968) demonstrates that liking for simple stimuli can be increased by repeated exposure that makes those stimuli more familiar. Another illustration of a familiarity effect is the finding that human faces with average or typical features tend to be viewed as most attractive (e.g. Langlois *et al.*, 1990). Both of these phenomena can potentially be explained by perceptual fluency research demonstrating that people tend to prefer objects that are easy to process (e.g. Fischer and Hawkins, 1993). In other words, objects that are typical for their category or frequently viewed are easier to process and thereby preferred over other objects.

It seems clear that there are conditions under which the impact of typicality on preference can compete or interfere with size effects on preference. This could result, for example, in preferences for conventional hammers over 10-foot long hammers and for men who are 6-feet tall men over men who are 50-feet tall. However, examples such as these do not necessarily imply a failure in the relationship between size and preference; instead, they suggest that there are cases in which the influence of typicality on preference might be more powerful than the influence of size on preference and override an otherwise robust tendency to prefer larger objects. It should perhaps also be noted that functionality can play a similar role to that of typicality in preference formation; for example, a pair of eyeglasses that are too large to wear comfortably is unlikely to be viewed favorably.

Other stimulus characteristics

There is no doubt that human preference is determined by several factors (e.g. color, shape, and texture). In the present studies, these factors were held constant, excluded, or allowed to vary randomly to isolate the influence of size on preference. For example, it would be reasonable to expect that a small object with other desirable properties might often be preferred to a large object with other undesirable properties (e.g. one of the authors would almost certainly choose a small, blue object over a large, olive-green object). A more empirical illustration of the influence of other stimulus characteristics is the fact that people often show preferences for letters in their names over letters not in their names, and for numbers associated with their birth date over other numbers (Kitayama and Karasawa, 1997). In any case, it is likely that these ‘other’ factors often influence preference in a way that is idiosyncratic to a particular individual rather than general to all individuals (e.g. some people prefer square objects whereas others prefer round ones), or at least in a way that is orthogonal to the influence of physical size on preference. It is also likely that the presence of characteristics other than size in the stimuli used in the present research (e.g. some of our alphanumeric stimuli undoubtedly matched some participants’ names or birthdates while other stimuli did not) created additional variance in participants’ preferences and thereby made the influence of size on preference appear smaller than it might be if these other factors could be held completely constant.

Extreme values of size

Although preference appeared to be a monotonically increasing function of size in the present studies, it is possible that this function does not extend to extreme values of size. However, it is likely that preference judgments for extremely large or small objects are influenced by additional factors other than physical size. For example, perceptual fluency naturally comes into play for stimuli that are too small to be seen clearly. We believe that such extremely small stimuli would generally be preferred over microscopic (i.e. even smaller) stimuli. Although such a finding would be consistent with our proposed relationship between size and preference, it would probably be better explained by perceptual fluency than by any direct influence of physical size on preference.

Similarly, objects that are too large to be completely contained in a person's visual field are likely to be especially difficult to process. In this case, these excessively large objects might not be preferred over somewhat smaller objects. Again, however, such a finding would not be evidence against an association between size and preference so much as an argument that sometimes perceptual fluency is a more powerful determinant of preference that can override the influence of physical size.

Because of the complications associated with extreme values of size (i.e. other variables like perceptual fluency confounding the influence of size on preference judgments), it is difficult to determine whether aesthetic preference is a monotonically increasing function of physical size or whether the function is actually an inverted U-shape with some magical size limit above which increasing size results in decreasing preference. We would suggest, however, that a linebacker with shoulders 10-feet wide is even more impressive than one with merely 9-foot wide shoulders and that a pile of completed work that goes to the ceiling is even more impressive than one that merely goes to shoulder height. Similarly, it is reasonable to suggest that size might have a monotonically positive relationship with preference, but that this relationship is clouded by other variables at the extremes of the size continuum.

From a more practical perspective, the present studies have demonstrated an association between physical size and preference across a very extensive range of sizes. For example, the retinal image of the larger stimuli used in Study 2 was, on average, equivalent to what would be produced by a 9000 square inch object (approximately 8 feet by 8 feet) presented at a distance of 20 feet. With this in mind, the vast majority of potential applications of these findings to domains such as advertising, persuasive argumentation (e.g. in a courtroom), and even psychology experiments, are likely to use stimulus objects that are well within the range of sizes covered by the present studies.

Applications

Although the present experiments used abstract stimuli in an attempt to clearly identify an association between size and preference, this association might potentially have a number of concrete, practical applications within the domains of politics, law, and advertising. For example, a size-based effect was recently demonstrated in the domain of political perception. Merely increasing the size of a political candidate depicted on a TV monitor increased liking for that candidate (Reeves, unpublished manuscript, 1994). It seems clear that these findings can be applied for political gain by enlarging images (and perhaps political objectives) for one candidate while shrinking images of his or her opposition.

With regard to legal issues, it has been demonstrated that quantitative data are often presented in the courtroom in ways that oversimplify complex information and can lead to erroneous verdicts (e.g. Koehler, 1993). The heuristic influence of size on judgment could be used to influence verdicts as well. For instance, a defense attorney could make her arguments appear more imposing simply by displaying them in a larger format than the counterarguments of the prosecution.

In all likelihood, however, the domain that will afford the widest variety of applications for the relation between size and preference is that of advertising. The present paradigm is a direct analog to many television advertisements: (a) advertisements often rely heavily on abstract symbols (e.g. company logos) similar to those used in the present studies; and (b) advertisements often rely on pairwise comparisons (e.g. Coca-Cola versus Pepsi). With this analog in mind, researchers and advertisers might be well served to examine the effects of size-based preferences on advertising effectiveness.

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