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Sensitivity to moral goodness under different aesthetic contexts

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ABSTRACT

Does context influence our appreciation of beauty? To answer this question, two experiments were conducted to determine the effect of contextual aesthetics on the recognition of moral behavior. Experiment 1 demonstrated that individuals in a high-aesthetic context had a quicker recognition time for moral behavior than those in a low-aesthetic context. In a low-aesthetic context, individuals recognize immoral behavior more quickly than in a high aesthetic context. Individuals showed greater recognition rates for moral behavior in a high aesthetic context and higher recognition for immoral behaviors in a low aesthetic context for behavior with unclear information. Experiment 2 revealed that individual fixation counts were smaller under the conditions of high aesthetic context and moral behavior than under the conditions of low aesthetic context and moral behavior, indicating a correlation between low aesthetic context and immoral behavior. This study shows that high aesthetic context facilitates the recognition of moral behavior, which has implications for moral education.

KEYWORDS

Contextual aesthetics;
sensitivity to moral
goodness; moral behavior

Introduction

En somme, la Beauté est partout. Ce n'est point elle qui manque à nos yeux, mais nos yeux qui manquent à l'apercevoir.

–Auguste Rodin

There is no scarcity of good things or beautiful gestures that inspire us to remember them; however, if we are blinded by other things, it makes us oblivious to the beauty of other things. We are incapable of noticing and appreciating attractive things. Goodness is a form of beauty; typically, we associate it with inner beauty (Paris, 2019). Consequently, we investigated the effects of contextual aesthetics on sensitivity to morality.

Rest (1984) offers a four-component model of morality in which moral sensitivity, moral judgment, and moral motivation control moral conduct. Moral sensitivity is an individual's capacity to perceive the moral substance of a situation and to be aware of the event's consequences (Rest, 1984). The gestures of charity and gratitude struck us with their beauty, inciting a strong desire to perform such behaviors. We believe that a higher sensitivity to good behavior in our context will help us find beauty in our lives. Therefore, to discover how we can improve our ability to find beauty, we centered our research on moral sensitivity.

Scenes generally consist of a context and foreground objects, and individuals gradually accumulate knowledge of scenes in their lives (scene schemas) such as knowledge about the occurrence of a certain type of object in a certain place or situation. Therefore, when an object appears in a context that is

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compatible with it (the object's situation is maintained in the scene schema; for example, the shoes are on a shoe rack), the object can be identified more quickly. Therefore, object recognition is influenced by contextual information (Bublatzky et al., 2020; Droll & Eckstein, 2008; Eckstein et al., 2006; Oliva & Torralba, 2007; Romero-Ferreiro et al., 2018). The finding also is found in moral sensibility. Researchers found that contextual circumstances influence one's moral sensibility. Zheng and Cen (2007) discovered that an individual's moral sensitivity is influenced by the clarity of contextual information and that it decreases when faced with increasing moral ambiguity. Therefore, we hypothesized that context can assist in detecting moral behaviors in daily life. The sensitivity to moral goodness can also be influenced by contextual information.

Researchers have discovered that semantic empirical data and physical characteristics play direct roles in real-world situations (Henderson et al., 2009; Lee et al., 2015; Zhang et al., 2013). Davenport and Potter (2004) investigated the influence of consistent and inconsistent relations between objects and contexts and found that when stimuli and contexts were consistent, object recognition was more accurate than when they were inconsistent. In other word, object – context congruence facilitates object recognition (Boyce et al., 1989; Hollingworth & Henderson, 2000; Loftus & Mackworth, 1978). Identifying an object in a scene requires related task knowledge or conceptualization processing (Henderson et al., 2009). The time required for target stimulus processing is shorter when people are shown information about a stimulus, such as its relation with the target object and its context, prior to its actual appearance. For example, Boyce et al. (1989) found that individuals named items more quickly in a consistent and ordered context (the object made sense in the scene) than in a non-sensical or inconsistent context. Hietanen and Astikainen (2013) also used happy and sad faces as target stimuli, and positive or negative emotional scenarios as priming stimuli prior to these facial expressions, and indicated that when the priming and target stimuli were consistent, the correct rate was greater and the response time was faster than when they were inconsistent. These results support our hypotheses.

Wu and He (2021) examined the effects of environmental aesthetic value on moral judgments and moral behavioral intentions, and discovered that high aesthetic environments led to more positive moral judgments and higher behavioral intentions toward moral behavior, whereas low aesthetic environments led to more positive moral judgments and higher behavioral intentions toward immoral behavior. To this end, researchers have suggested an environmental-behavioral matching hypothesis, which proposes a relation between environmental aesthetic value and moral behavior, resulting in changes in moral judgment and moral behavioral intentions in different aesthetic environments. Reber et al. (1998) suggested that factors such as priming, symmetry, presentation duration, and higher semantic coherence (contextual matching) affect object processing fluency – the ease with which information flows through a person's cognitive system – which can lead to changes in individual decision-making (He et al., 2019; Reber et al., 2004; Shen et al., 2010). Similar results have been obtained for moral decision-making (Lam et al., 2017; Spears et al., 2018).

Individuals can aid object identification by collecting suitable information from the surrounding conditions (Bar, 2004; Biederman et al., 1982), leading to individual sensitivity to matching objects, shorter recognition times, and greater recognition rates (Davenport & Potter, 2004; Heise & Ansorge, 2014; Loftus & Mackworth, 1978). Therefore, we hypothesized that an individual's sensitivity to moral behavior would be heightened in an aesthetic context. Contexts with high aesthetic value would make people more sensitive to moral behavior (a higher rate of recognition and shorter recognition time) than contexts with low aesthetic value.

Individuals are more sensitive to immoral behavior in low-aesthetic-value circumstances than in high-aesthetic-value ones. Wu and He (2021) demonstrated a link between contextual aesthetic values and moral behavior. There were implicit connections between contexts with high aesthetic values and moral behavior, and contexts with low aesthetic values and immoral behavior. In addition, we explored the relation between high contextual aesthetic value and moral behavior and confirmed the function of contextual aesthetic value in moral sensitivity: the correspondence between contextual aesthetic value and morality.

Inconsistency and consistency might result in variations in eye motions (Cornelissen & Melissa, 2016; Fernandes et al., 2021; LaPointe et al., 2013; Underwood & Foulsham, 2006). Individual fixation time and fixation count are shorter in the consistent condition than in the inconsistent condition (Brockmole & Henderson, 2008; De Graef et al., 1990; Loftus & Mackworth, 1978; Underwood & Foulsham, 2006). Consequently, using an eye-tracking experiment, we evaluated the correlation between contextual aesthetic information and moral behavior. As anticipated, there was less fixation time and fewer fixation counts when participants were exposed to high aesthetic context/moral behaviors and low aesthetic context/immoral behaviors than when they were exposed to high aesthetic context/moral behaviors and low aesthetic context/immoral behaviors.

This study explored the effect of contextual aesthetic information on moral sensitivity to determine the role of contextual information in finding inner beauty (moral goodness). Using eye-movement techniques, we confirmed the consistency between contextual aesthetic information and morality.

Experiment 1A

Method

Design

Experiment 1 involved a 2 (types of contextual aesthetic value: high vs. low) $\times$ 2 (types of behavioral scene drawings: moral vs. immoral) within-subject experimental design. Participants were instructed to identify the moral information of an behavior based on the context of its aesthetic value. The dependent variables were the reaction time and the correct accuracy rate (ACC).

Participants

We employed G* Power 3.1 to estimate the sample size. A sample size of 36 was a prerequisite when power ($1-\beta$) was set at 0.95 and an effect size of 0.25. Participants were 32 college students between the ages 18–30 years ($M = 21.6$; $SD = 0.98$). Seventeen participants were identified as female and 15 as male. Using G* Power 3.1, this sample size resulted in an estimated power of ($1-\beta = 0.92$) with an effect size ($d = 0.26$). All participants had normal or corrected color vision. All the participants signed an informed consent form. The study protocol was approved by the South China Normal University Ethics Committee (SCNU-PSY-2020-4-050).

Materials

In this study, photographs of high- and low-aesthetic-value contexts were chosen based on the methodology and materials used in previous studies (Wu & He, 2021). A total of 34 color images with high aesthetic contexts and 34 color photographs with low aesthetic, social, and natural contexts were selected from a public archive (<http://baidu.com>). The photographs were 500×300 pixels in size and were processed using Adobe Photoshop. A separate group of 13 individuals (5 males, $M = 25.23$ years, $SD = 4.78$) judged the aesthetics of the contextual materials on a 7-point scale. The aesthetic assessments of surrounding images were significantly different across the two sets of items: $t(12) = -11.65$, $p < .05$, 95% CI $[-3.24, -2.22]$, Cohen's $d = -3.25$ (aesthetic rating for the high aesthetic context, 5.11 ± 0.58 ; aesthetic rating for the low aesthetic context, 2.39 ± 0.84). Figure 1 shows the contextual images used in this experiment. The degree of acquaintance between the two groups did not differ significantly: $t(12) = 0.65$, $p > .05$, 95% CI $[-0.40, -0.74]$ (aesthetic rating for the high aesthetic context, 3.95 ± 0.58 ; aesthetic rating for the low aesthetic context, 3.78 ± 0.96). This behavior drawing image included various contexts of moral and immoral behavior, and the moral and immoral behavior drawings were consistent with an earlier study (Wu & He, 2021). The material samples are shown in Figure 1.



Figure 1. Example of material in Experiment 1a.

Procedure

At the start of the experiment, the participants read the directions. Each trial (136 trials) began with the presentation of a fixation target for 500 ms, followed by a context picture with a label (beauty or ugliness) for 3000 ms. The behaviors' picture became apparent when the label was removed. Each picture appeared randomly. The participants were told to hit the “F” or “J” keys to recognize the behavior in the pictures that were being shown; the “F” key denoted moral behavior, whereas the “J” key denoted immoral behavior. [Figure 2](#) illustrates the process used in Experiment 1a.

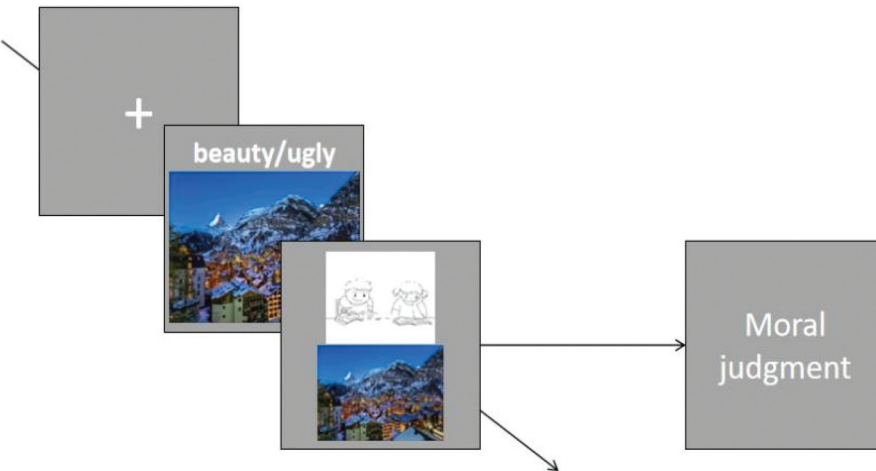


Figure 2. Example of produce in Experiment 1a.

Table 1. Mean RT and ACC in different contexts ($M \pm SD$) in Experiment 1.

Behavior	Contextual aesthetic value	The mean reaction time(ms)	ACC
Moral	High	1034 $\pm$ 265	0.72 $\pm$ 0.06
Moral	Low	1152 $\pm$ 313	0.71 $\pm$ 0.08
Immoral	High	1120 $\pm$ 256	0.73 $\pm$ 0.06
Immoral	Low	1122 $\pm$ 281	0.73 $\pm$ 0.07

Results and discussion

Since the images were clear, they could be accurately detected unless the individual was careless or pressed by accident. Therefore, in Experiment 1a, we compared only the reaction time and not the correct reaction rate. When comparing reaction times, we simultaneously removed trials in which participants pushed incorrect keys, and only evaluated trials in which individuals pressed the proper keys.

A 2 (types of contextual aesthetic value: high vs. low) $\times$ 2 (types of behavioral scene drawings: moral vs. immoral behavior) repeated-measures analysis of variance (ANOVA) was performed on the reaction times of participants.

Table 1 illustrates the mean scores of the reaction time and the ACC in various contexts. According to the ACC findings, the main effect of the contextual aesthetic value type was not significant, $F(1, 31) = 1.60$, $p = .22$. The main effect of the behavioral scene drawing type was not significant, with $F(1, 31) = 1.88$, $p = .18$ (Table 1). The interaction effect between contextual aesthetic value types and behavioral scene drawing types was likewise not significant, with $F(1, 31) = 2.56$, $p = .12$.

The results demonstrated that the main effect of contextual aesthetic value kinds on reaction time was insignificant, $F(1, 31) = 1.93$, $p = .175$, and $\eta^2 = 0.059$. The main effect of the behavioral scene drawing type was significant, with $F(1, 31) = 8.88$, $p = .006$, and $\eta^2 = 0.223$ (Table 1). The interaction effect between types of contextual aesthetic value and types of behavioral scene drawings was also significant, with $F(1, 31) = 11.46$, $p = .002$, and $\eta^2 = 0.27$ (Figure 3). The reaction time for moral behavior was somewhat faster in contexts with high aesthetic values than in contexts with low aesthetic values, with $t(31) = -3.55$, $p = .001$, 95% CI $[-185.54, -50.05]$, and Cohen's $d = -0.63$. The reaction time for immoral behavior did not differ significantly across high and low aesthetic contexts, $t(31) = -0.17$, and $p = .87$.

We generated relations that match (high aesthetic context/moral behavior and low aesthetic context/immoral behavior), as well as relations that did not match (high aesthetic context/immoral behavior and low aesthetic context/moral behavior). It was discovered that

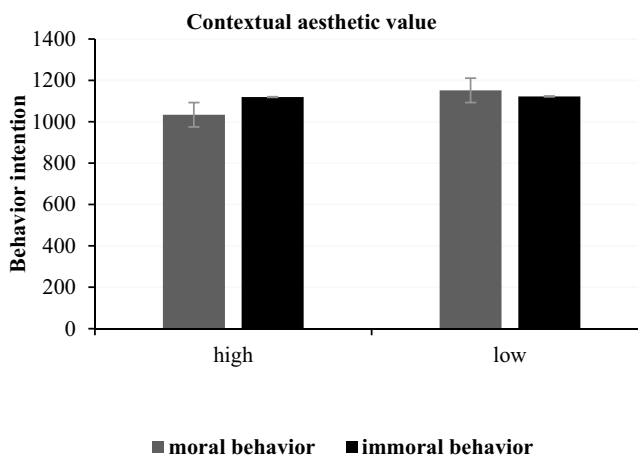


Figure 3. The mean reaction time of different behavior in different contexts. The error bars represent the standard error.

Table 2. Mean RT in different contexts ($M \pm SD$) in Experiment 1a.

	RT		ACC	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Matching relation	1079	263	0.94	0.07
Mismatching relation	1135	274	0.93	0.08

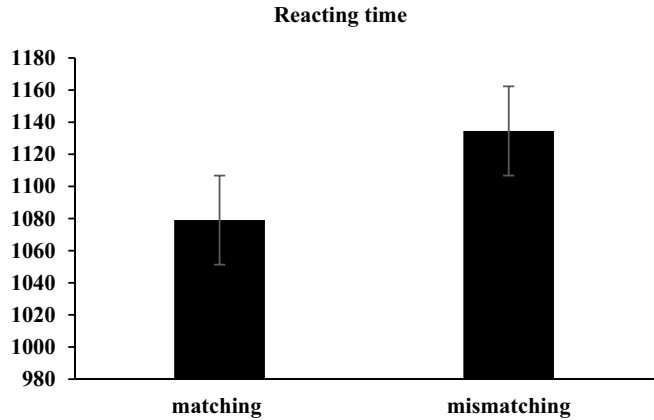


Figure 4. The mean reaction time(ms) of different behavior in different condition. The error bars represent the standard error

participants in the mismatch condition had significantly higher reaction times than those in the matching condition, $t(31) = -3.39$, $p = .002$, 95% CI $[-88.96, -22.12]$, and Cohen's $d = -0.56$. This research also demonstrated that the ACC of individuals in various contexts was not distinct, $t(31) = 1.60$, $p = .12$, 95% CI $[-0.20, 1.64]$ (Table 2 and Figure 4).

Individuals were more quickly responsive to matching behaviors in a context, as revealed in Experiment 1. The high aesthetic context was substantially faster than the low aesthetic context in recognizing moral behavior. However, in Experiment 1, we did not find a difference between high and low aesthetic contexts for immoral behavior in terms of reaction time. It could be due to the fact that the depictions of moral and immoral behaviors were unambiguous, allowing participants to rapidly identify their morality. In Experiment 1b, we employed ambiguous images of behaviors experimental material to limit the influence of this variable and better examine the relation between contextual aesthetic value and sensitivity to moral goodness.

Experiment 1B

Method

Design

Experiment 1b was a 2 (types of contextual aesthetic value: high vs. low) $\times$ 2 (types of behavioral scene drawings: moral vs. immoral) within-subject experimental design.

Participants

We used G* Power 3.1 to determine the sample size. When the power ($1 - \beta$) was 0.95, and the effect size was 0.25, a sample size of 36 was required. Sixty-nine college students between the ages of 18 and 30 years (21 males; M age = 19.80 years, $SD = 1.68$ years) were recruited. All participants had normal or corrected color vision. All the participants signed an informed consent form.

Material

The contextual and behavioral images were identical to those used in Experiment 1. Using Photoshop's Gaussian blur, the researcher ensured that the behavioral material was neither immediately recognizable nor utterly unrecognizable based on clear behavioral photographs. After the blurring process, we extracted ten ambiguous images of moral behavior and ten ambiguous images of immoral behavior. In this experiment, another group of participants was asked to evaluate the semantic ambiguity of the ambiguous behavioral material. Twelve university students (4 males, 26.33 ± 4.27 years old) were re-recruited for Experiment 1b to evaluate the semantic ambiguity of the ambiguous material on a 7-point scale, with 1 representing very ambiguous and 7 representing very clear, and larger numbers showing a clearer meaning of the picture. It was determined that semantic ambiguity did not differ significantly between the two groups of material, [$t(11) = 1.70, p > .05$; moral behavior: 3.30 ± 1.42 , immoral behavior: 3.08 ± 1.54], indicating that the semantic ambiguity of the images was at a moderate level. The ambiguous behavioral and contextual images were then combined and appeared randomly, resulting in 40 pieces of experimental material. Figure 5 shows examples of formal experimental materials.

Procedure

A fixation target was initially presented for 500 ms, followed by a merged image of the context and a ambiguous behavior. All the images appeared arbitrarily. The participant was required to swiftly determine whether the ambiguous behavioral image was moral ("F" key) or immoral ("J" key) (Figure 6).

Results

The results demonstrated that the data followed a normal distribution ($p > .05$). After data removal, we computed the mean reaction time and ACC. A 2 (types of contextual aesthetic value: high vs. low) $\times$ 2 (types of behavioral scene drawings: moral behavior vs. immoral behavior) repeated-measures analysis of variance (ANOVA) was performed for the ACC and reaction time.

The ACC in various contexts are presented in Table 2. The results demonstrated that the main effect of the contextual aesthetic value type was significant, $F(1, 68) = 18.39, p < .001$, and $\eta^2 = 0.20$. The main effect of the behavioral scene drawing type was insignificant, $F(1, 68) = 2.92, p = .092$, and $\eta^2 = 0.041$ (Table 3). Interaction effect between types of contextual aesthetic value and types of behavioral scene drawings produced a substantial interaction effect, with $F(1, 68) = 33.65, p < .001$, and $\eta^2 = 0.33$ (Figure 7). In high aesthetic contexts, the ACC for moral behavior was greater than in low aesthetic contexts, with $t(68) = 5.15, p < .001$, 95% CI [0.17, 0.38], and Cohen's $d = 0.62$. The ACC for immoral behavior was significantly different across high- and low-aesthetic contexts, $t(68) = -6.11, p < .001$, 95% CI [-0.52, -0.26], and Cohen's $d = -0.74$.



Figure 5. Example of experimental materials.

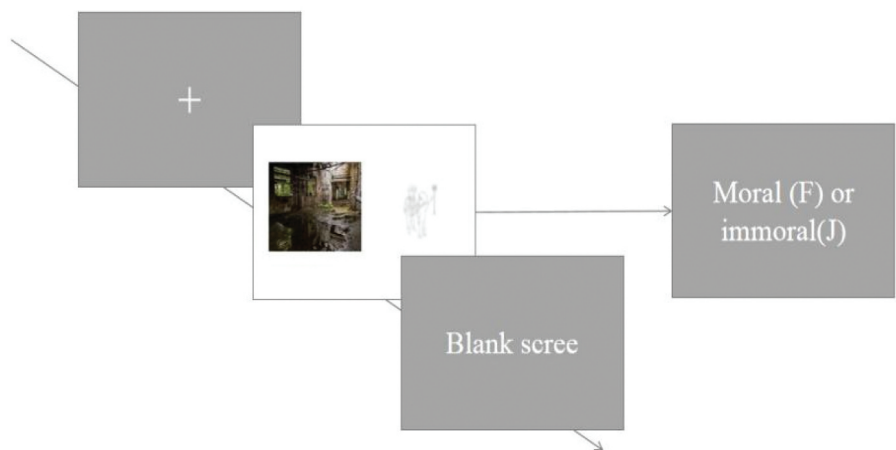


Figure 6. Example of event sequences in Experiment 1b.

Table 3. Mean ACC in different contexts (M $\pm$ SD) in Experiment 1b.

Behavior	Contextual aesthetic value	ACC(M $\pm$ SD)
Moral	High	0.63 $\pm$ 0.20
Moral	Low	0.35 $\pm$ 0.34
Immoral	High	0.35 $\pm$ 0.29
Immoral	Low	0.74 $\pm$ 0.31

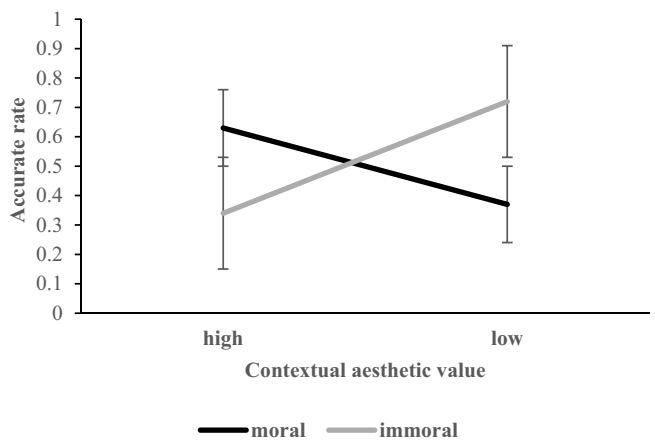


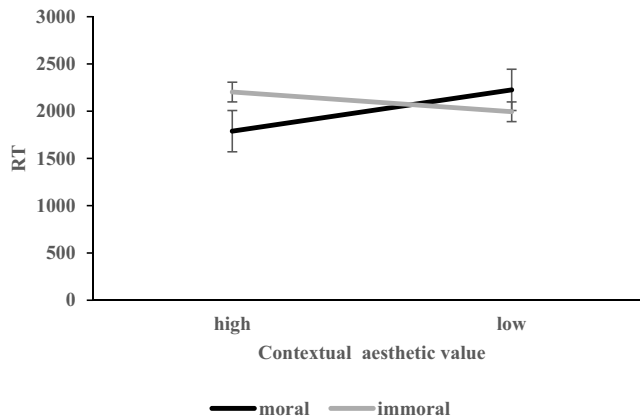
Figure 7. The interaction effect between behavioral type and contextual type. The error bars represent the standard error.

During the comparison of reaction times, we excluded data from participants who obtained a score of 100% in certain conditions and 0% in others. Finally, 38 individuals were included in this study.

Table 4 shows the mean scores for the mean reaction time in a variety of contexts. The findings demonstrate that the main effect of contextual aesthetic value was insignificant, $F(1, 37) = 1.93$, and $p = .175$. The main effect of behavioral scene drawings was not significant, with $F(1, 37) = 0.60$ and $p = .44$ (Table 4). The interaction effect between contextual aesthetic value types and behavioral scene drawing types was also noteworthy, with $F(1, 37) = 5.37$, $p = .026$, and $\eta^2 = 0.13$ (Figure 8). A high aesthetic context was associated with a slightly shorter mean reaction time for moral behavior than a low aesthetic context, with $t(68) = 5.15$, $p < .001$, 95%

Table 4. Mean RT in different contexts ($M \pm SD$) in Experiment 1b.

Behavior	Contextual aesthetic value	RT
		$M \pm SD$
Moral	High	1789 $\pm$ 1153
Moral	Low	2226 $\pm$ 1244
Immoral	High	2203 $\pm$ 1014
Immoral	Low	1994 $\pm$ 1137

**Figure 8.** The interaction effect between behavioral type and contextual type. The error bars represent the standard error.**Table 5.** Mean RT and ACC in different contexts ($M \pm SD$) in Experiment 1b.

	RT		ACC	
	M	SD	M	SD
Matching relation	1892	1029	0.68	0.22
Mismatching relation	2214	834	0.35	0.28

CI [0.17, 0.38], and Cohen's $d = 0.32$. There was no significant difference in the mean reaction time for immoral behavior between high- and low-aesthetic contexts, $t(37) = -156.18$, and $p = .25$.

Based on the research of Wu and He (2021), we divided contexts with different aesthetic values and behaviors into relations with matching aesthetic values and behaviors (high aesthetic context/moral behavior and low aesthetic context/immoral behavior) and relations with mismatching aesthetic values and behaviors (low aesthetic context/moral behavior and high aesthetic context/immoral behavior). We also compared differences between the matching and mismatching relations. In terms of the accuracy rate, the matching relation performed better than the mismatching relation, $t(68) = 5.84$, $p < .001$, 95% CI [0.21, 0.44], and Cohen's $d = 0.69$. Individuals in the mismatching relation demonstrated considerably slower reaction times than those in the matching condition, $t(37) = -2.32$, $p = .026$, 95% CI [-605.20, -40.66], and Cohen's $d = -0.38$ (Table 5).

Discussion on experiment 1

Both of the Experiment 1's studies validated the notion that individuals are more sensitive to moral behaviors in contexts with high aesthetic value. This demonstrates that we can build a sense of aesthetic appreciation depending on circumstances. Our findings confirmed the importance of context in object recognition, as predicted by our hypothesis (Bublitzky et al., 2020; Romero-Ferreiro et al., 2018).

Previous research has indicated that contextual information helps object recognition when there is a link between the context and behavior (priming effect). We attribute the influence of contextual information on sensitivity to moral goodness to similarities between contextual information and morality. Eye-movement measurements have revealed significant variations between congruent and incongruent interactions (LaPointe & Milliken, 2016; Spotorno et al., 2013; Underwood et al., 2008). According to previous research, there are significant differences in eye-movement metrics between consistent and inconsistent relations. In Experiment 2, we used eye movements to demonstrate whether contextual aesthetic value and morality have a matching relation. Under the conditions of high aesthetic context/moral behavior and low aesthetic context/immoral behavior, participants had fewer fixations than those in the cases of high aesthetic context/immoral behavior and low aesthetic context/moral behavior.

Experiment 2

Method

Design

Experiment 2 was a 2 (types of contextual aesthetic value: high vs. low) $\times$ 2 (types of behavioral scene drawings: moral vs. immoral) within-subject experimental design. The dependent variables were the participants' fixation counts and times while viewing the various types of images.

Participants

We used G* Power 3.1 to estimate the sample size. When power ($1-\beta$) was 0.95, and the effect size was 0.25, 36 samples were needed. Thirty-six college students between the ages of 18 and 30 years (21 males; M age = 22.92 years, SD = 2.76 years) were recruited and reimbursed for their participation. All participants had normal or corrected color vision. All the participants signed an informed consent form.

Materials

The materials resembled those used in Experiment 1. We constructed a variety of correlations between scene images and behavior. The matching relations were generated by contexts with high aesthetic value and moral behavior, and contexts with low aesthetic value and immoral behavior. Mismatching relations were generated by contexts with high aesthetic value and immoral behavior, and contexts with low aesthetic value and immoral behavior (Figure 9).

Experiment Builder (SR Research) was used to control the presentation of stimuli, and all stimuli were displayed on a 22-in monitor connected to a Pentium 166-MHz computer interfaced with an SR Research Eye Link 1000 Plus eye-tracking system with high spatial resolution and a sampling rate of 2,000 Hz. The scenes subtended $32^\circ \times 25^\circ$ of the visual angles, and on average, the targets subtended 2.59° along their longest axis. Participants sat at a distance of 65 cm from the display with their heads supported by a head and chin rest. They observed scene images using binocular vision; however, only the right eye was tracked.

Procedure

Thirty-six participants were examined by using various photographs. Participants were calibrated using nine points at the beginning of the trial, and all points were considered correct within $0.25^\circ \sim 0.5^\circ$ of the estimated fixations in the Eye Link 1000 Plus. After the calibration was completed, the participants were instructed to keep their heads as far away as possible throughout the experiment. Calibration was originally evaluated, and recalibration was performed when the accuracy fell below the defined standards. Following the calibration, the participants were advised to keep their heads as far away as feasible for the remainder of the experiment. Calibration was initially assessed, and recalibration was performed when the accuracy was below predetermined standards. This procedure was

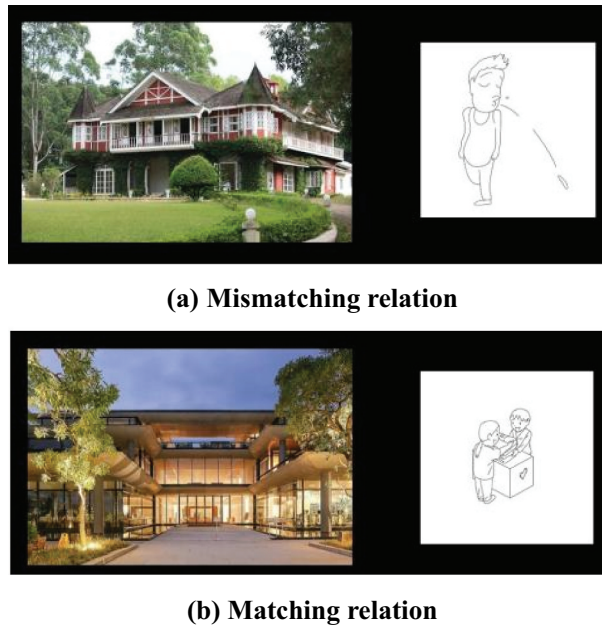


Figure 9. Example of materials in Experiment 2. (a) Mismatching relation. (b) Matching relation.

comparable to that used in Experiment 1. First, a fixation cross (+) was shown for 500 ms, followed by diverse images for 3000 ms. During this period, participants' eye movements were recorded.

Eye-movement data analysis

The findings revealed that the main effect of contextual type on fixation count for the moral behavior was statistically significant, $t(35) = -2.06$, $p = .047 < 0.05$, 95% CI $[-1.45, -0.01]$. Furthermore, the result indicated that the main effect of contextual type on fixation count was insignificant when confronted with immoral behavior ($p = .66$).

The findings demonstrated that the main effect of contextual type on fixation time when confronting moral behavior was not significant, $t(35) = -0.40$, $p = .69$, and 95% CI $[-6.02, 4.03]$ and the main effect of contextual type on fixation time in the presence of immoral behavior was not significant, $t(35) = 0.48$, $p = .63$, 95% CI $[-4.21, 6.81]$ (Table 6). In addition, the main effect of relation type on fixation time was statistically significant ($p < .05$), and for fixation count was insignificant ($p > .05$) (Table 7).

Table 6. Mean fixation count and fixation time in different contexts (M $\pm$ SD).

Behavior	Context	Fixation count	Fixation time
Moral	High aesthetic	17.47 $\pm$ 3.86	257.18 $\pm$ 35.00
	Low aesthetic	18.20 $\pm$ 4.73	258.17 $\pm$ 40.51
Immoral	High aesthetic	17.54 $\pm$ 4.08	255.40 $\pm$ 36.71
	Low aesthetic	17.67 $\pm$ 4.23	254.10 $\pm$ 37.42

Table 7. Mean fixation count and fixation time in different relations (M $\pm$ SD).

	Matching relation	Mismatching relation	<i>t</i>	<i>p</i>	95%CI		Cohen's <i>d</i>
Fixation count	17.50 $\pm$ 3.85	17.93 $\pm$ 4.37	-2.12	0.042	-0.85	-0.017	-0.34
Fixation time	256.24 $\pm$ 35.29	256.13 $\pm$ 38.53	0.058	0.95	-3.72	3.94	

As in Experiment 1, we divided contexts and behavior with differing aesthetic values into corresponding relations (high aesthetic context/moral behavior and low aesthetic context/immoral behavior) and mismatching relations (low aesthetic context/moral behavior and high aesthetic context/immoral behavior). The fixation count and fixation time were compared between the different relations. Statistical analysis of the fixation count revealed a significant difference between the matching and mismatching relations ($p < .05$), whereas there was no difference between the matching and mismatching relations fixation time.

The variation in fixation count and time may be indicative of difficulties in acquiring data. Rayner and Duffy (1986) discovered that the fixation time for ambiguous words with two equally likely meanings was longer than that for ambiguous words with a single highly probable meaning. The number of fixation counts and fixation time was lower in the consistent condition than in the inconsistent condition (Brockmole & Henderson, 2008; Fernandes et al., 2021; Underwood & Foulsham, 2006). As a result, we hypothesized a correlation between a high aesthetic context and moral behavior and a low aesthetic context and immoral behavior.

General discussion

This study aimed to investigate the sensitivity of moral goodness in various aesthetic contexts. We investigated sensitivity to moral goodness in various context in Experiment 1, and the results demonstrated a shorter reaction time for moral behavior in a high-aesthetic context and for immoral behavior in a low-aesthetic context. Individuals in a matching context had higher recognition rates and shorter recognition time for matching behavior, indicating a high recognition rate for moral behavior in a high aesthetic contexts. Consistent with previous research, this study found that persons in the matching condition were more sensitive to the matching object (Davenport & Potter, 2005; Hietanen & Astikainen, 2013; Loftus & Mackworth, 1978; M. L. H. Vö & Henderson, 2009). The Experiment 2 examined the correlation between contextual aesthetic value and morality. The matching condition (high aesthetic context and moral behavior) was associated with a lower fixation time and count than was the mismatching condition (low aesthetic value context and moral behavior). Fixation count and time are associated with visual processing (Pannasch et al., 2008). Consequently, the difference on the fixation count between matching relation and mismatching relation demonstrated a diminished cognitive conflict between a high aesthetic context and moral behavior and a low aesthetic context and immoral behavior. In contrast, participants faced greater cognitive conflict when confronted with the situations of high aesthetic context/immoral behavior and low aesthetic context/moral behavior. Based on prior research, we point out the consistent or matching relation between high aesthetic context and moral behavior, and that low aesthetic context and immoral behavior influence perceptions of morality in high aesthetic contexts.

Objects are recognized by extracting pertinent information from their contexts (Torralba, 2003). Generally, behaviors are present in certain contexts and are accompanied by contextual information. Scenes are stored in the long-term memory through visual experiences to generate scene knowledge (Mandler & Johnson, 1977; Potter, 1975). This information enables viewers to immediately extract the meaning of a visual scene and form expectations regarding the object-scene and what-and-where relations. Consequently, this enhances object identification and minimizes the cognitive demand for scene processing (Draschkow & Vö, 2017; M.L. -H. Vö et al., 2019). Elevated moral sensitivity in an high aesthetic context may be due to the activation of corresponding information when the context is active. Faster recognition occurs when an activated concept matches a target concept (Bar, 2004; Biederman et al., 1982). There is a matching relation between a high aesthetic context and moral behavior; therefore, when a high aesthetic context is presented, the individual's corresponding moral behavior is activated. When the target is moral behavior, the relevant concept activated by the individual matches the target, and the target behavior (moral behavior) is identified more quickly.

Neuroscience has discovered a connection between aesthetics and morality in the emotional brain regions, with aesthetic and moral judgments having the same active medial orbitofrontal and insular

cortical regions (Heinzelmann et al., 2020). Since both the medial orbitofrontal cortex and the insular cortex are emotion-regulating brain regions, we hypothesized that the high aesthetic context and hypersensitivity to immoral behavior may be a result of the cognitive load resulting from the emotional mismatch triggered by aesthetics and morality. This study examined the influence of contextual aesthetic values on the perception of moral virtue. According to previous research, congruence and in-congruence leads to differences in the N400 (Schirmer & Kotz, 2006; Schirmer et al., 2002). Future studies can employ EEG to determine whether there are changes in p300 when different behaviors arise in contexts with different aesthetic values, as well as the link between the size of these waves and behavior, providing brain-neural evidence for the matching relation. There is no dearth of beauty in life; rather, there is an absence of perceptive eyes. Therefore, it is worth investigating how aesthetic can be better discovered in aesthetic education. As there is a relation between contextual aesthetics and the morality of behavior, our results reveal that we are more sensitive to moral behavior in contexts with a high aesthetic value. Therefore, in future aesthetic education, we can facilitate the discovery of beauty by altering or reshaping the context to develop a pair of eyes capable of perceiving both morality and beauty.

Conclusion

This study uncovered the significance of context in behavior recognition, enabling us to develop an eye for spotting beauty within the context in which the behavior occurs. When we are in a context with high aesthetic value, we are more sensitive to moral behavior and can perceive it more readily. The findings aid in comprehending the relation between context and behavior and provide a solid foundation for aesthetic and moral education.

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Disclosure statement

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Data availability statement

The data that support the findings of this study are available from the corresponding author, [X. H], upon reasonable request.

Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of Ethics Committee of South China Normal University.

Authors' contributions

C. W wrote the first draft, C. W and H. Z conducted the statistical analysis and wrote the analytical part, C. W and H. Z made the study concept and design, C. W, and H. Z interpreted the results. All the authors had a full access to the data in the study and were responsible for the integrity of the data and the accuracy of the data analysis. C. W, H. Z, Y. Z,

W. Z and X.H made a correct for the manuscript. X.H provide the research funding. All authors read and approved the final manuscript.

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