

## Response time differences in the aesthetic judgment of individuals on beautiful and ugly images

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**ABSTRACT:** *Beauty is complicated and hard to define, but ugly things resist unification. Aesthetic sensitivity is the recognition of beauty possessed by aesthetic sensitive individuals. Everyone is not good at the aesthetic judgment. Aesthetic judgments are different from other decisions because they are rapid and usually occur within seconds of exposure. Furthermore, they are involuntary, requiring little cognitive effort. Moreover, aesthetic responses are either positive or negative and not nuanced to multidimensional evaluation. To understand the general population's behavior and 'aesthetic sensitive individuals,' the author investigated participants' response time while the aesthetic judgment of beautiful and ugly images. Using E-prime behavioral analysis software, the present study analyzed that the ugly assessment is a time-consuming process, and aesthetic sensitive individuals are good at the aesthetic judgment as they respond to the beautiful-ugly images faster than the general population.*

**KEYWORDS:** *Aesthetics response, Aesthetics Sensitivity, Aesthetics Judgement, Aesthetic sensitive individuals, Consumer behavior.*

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### I. INTRODUCTION

Aesthetic responses are fast, immediate, involuntary (Bloch et al., 2003), usually occurs at a subconscious level in a few milliseconds at the very early stage of perception. Further, they require little cognitive effort (Ulrich, 2011; Veryzer, 1993). Aesthetic responses are first responses, and they matter because "beauty is an honest signal of an unobservable quality attribute" (Ulrich, 2011). Moreover, the aesthetic responses may get suppressed by preference based on cognitive analysis (Ulrich, 2011). In philosophical terms, the sense of time and space disappears during the aesthetic experience, and they are highly subjective without reasoning (Mishra, 2006).

People differ in their aesthetic taste, aesthetic preference, aesthetic sensitivity, and aesthetic judgment, leading to different aesthetic experiences (Hekkert & Piet C. W. Van Wieringen, 1996). The ability to find or examine beautiful aspects of artwork and make an aesthetic judgment is known as aesthetic sensitivity (Bamossy et al., 1985; Cvetkova, 2009). Aesthetics play a significant role in design (Reich, 1993). It is essential to industrial design (Ross & Wensveen, 2010) and a prime motive for design (Ulrich, 2011). Therefore, knowledge and understanding about the creation of beautiful artifacts that elicit an aesthetic response such as "*sensory pleasure and delight*" (Hekkert & Schifferstein, 2008) are fundamental to the design profession (Hung & Chen, 2012; Munari, 2008).

Again, aesthetic sensitivity is 'the perception of beauty' possessed by few aesthetic sensitive individuals regarding identifying the harmonious variable that determines the artwork's quality. It is independent of intelligence and personality, positively correlated with creativity, helps us recognize the degree of good and bad taste, and vital to an artist, designer, and all of us (Child, 1962; Duffy, 1979; Eysenck, 1983; Lundy et al., 2010;

Munari, 2008; Myszkowski et al., 2016). The critical issue is that only a few aesthetic sensitive individuals are good at the beautiful and ugly judgment. (Bloch et al., 2003; Child, 1962; Duffy, 1979; Eysenck, 1983; Hekkert & Leder, 2008; Hoyer & Stokburger-Sauer, 2012; Lundy et al., 2010; Munari, 2008; Myszkowski et al., 2016). Earlier in research, (Augustin et al., 2008) found that the style follows content in the art perception, context-based information extracted from presentation time of 10 ms onwards to 202 ms whereas, style base information was from 50 ms to 3000 ms. In another study, (Cupchik & Berlyne, 1979) showed that people could distinguish collative properties within the presentation time of 50 ms. Further, the judgment of impressiveness requires a long exposure time than beauty judgment (Verhavert et al., 2018). To our knowledge, no study so far has empirically examined the response time of aesthetic sensitive individuals towards beautiful-ugly images. A discussed earlier that 'everyone doesn't have good taste' (Child, 1962; Duffy, 1979; Eysenck, 1983; Goetz et al., 1979). Some people are equipped with higher aesthetic sensitivity levels and help construct a higher social class (Hekkert, 2006; Hoyer & Stokburger-Sauer, 2012). Therefore, identifying aesthetic sensitive individuals, groups, cities, states, or countries through an instrument would be valuable for designers and marketers to understand the market need and investment.

Therefore, using E-prime Chronos, behavioral analysis software, this present study follows a 'classical micro-genetic' approach and investigates the relationship between aesthetic judgment and response time of forty engineering student participants' beautiful-ugly images. In this study, we also aimed to identify the goodness of aesthetic sensitive individuals during the aesthetic judgment of beautiful-ugly images concerning response time. We found that the judgment of 'the ugly' is a more time-consuming process than the beautiful assessment. Additionally, the author identified the aesthetic sensitive individuals through the pre-reported new aesthetic sensitivity test (Bairisal & Kumar, 2019). Further found that 'aesthetic sensitive individuals' were good at the aesthetic judgment of 'beautiful-ugly' images concerning 'response time.'

## II. MATERIALS AND METHOD

### 2.1 Study participants

We received response time data during the judgment of beautiful-ugly images from 40 student participants ranging from 20 to 25 years (mean age 22.2 years). All the participants reported normal or corrected-to-normal vision and had no history of current or past neurological or psychiatric illness.

### 2.2 Equipment used

We Used E Prime behavior experiment software to design experiments, whereas USB-based response and stimulus devices (Chronos) recorded response and time. E-prime. With a precision of 0.5 milliseconds and 99.9% accuracy, the 'Chronos' tool captured participants' response time. 'Chrono keys' numbered '1' to '5' using stickers and labeled with 'most ugly' (besides '1') and 'most beautiful' (besides '5').

### 2.3 Material Used

#### 2.3.1 Aesthetic sensitivity test.

All the 40 participants took an aesthetic sensitivity test before rating the images. The newly created aesthetic sensitive test consisted of five 2d shaped geometric compositions of 'disinterested' in nature. The author used 22 stimulus material from the pre-reported 'aesthetic sensitivity test'(Bairisal & Kumar, 2019). Examples of stimulus material from aesthetic sensitivity tests (Fig. 1).

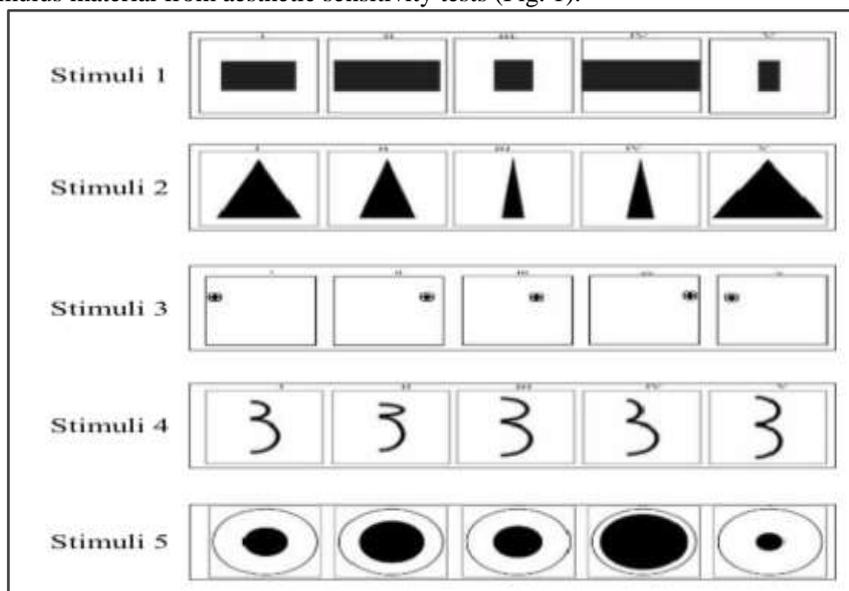


Fig. 1. Example of stimuli used from pre-reported aesthetic sensitivity tests.

2.3.2 Two hundred beautiful and ugly images.

According to the evolutionary psychology of aesthetics, symmetrical balance is an indicator of good health and reproductive fitness. Thus, we want to see symmetry everywhere(Leder et al., 2004), and somehow, we extracted symmetry from nature and transformed into objects(Hekkert & Leder, 2008). Similarly, the color blue is universally beautiful (doctorclaudia, 2018); further, we prefer the savannah over the dense forest(Dutton, 2003). Moreover, most people find glossy surfaces beautiful because the only reflective material on the savannah was water(Ulrich, 2011). Again,(Norman 2004) described a few situations that give rise to us' positive and negative feelings. Positive emotions, such as love, laughter, sorrow, courage, wonder, and peace. Negative situations such as height, crowds of people, forest, darkness, sharp objects, and a snake will raise fear. Additionally, sudden unexpected sound and bitter taste will lead us towards anger. Also, distorted bodies, human body fluids, and vomits give us disgusting emotions. Kant (1790) characterized free beauty, such as natural beauty. We appreciate them without their purpose, and these include flowers, sunrise, sunset, rainbow, waterfall, river, ocean, mountains, trees, forest, savannah, the parrot, the hummingbird, the bird of paradise, and crustaceans. Moreover, eight different object classes are relevant to visual aesthetics(Augustin et al., 2012), such as visual art, artwork, products, landscape, cars interior designs, faces, and geometrical shapes.

Therefore, the author randomly selected a pool of five hundred images from Google. Created thirteen categories of images from the collected five hundred beautiful-ugly images after the consensus of four designers' on beautiful – ugly attributes, finalized two hundred images (one hundred beautiful and one hundred ugly), refer Fig. 2 and 3.

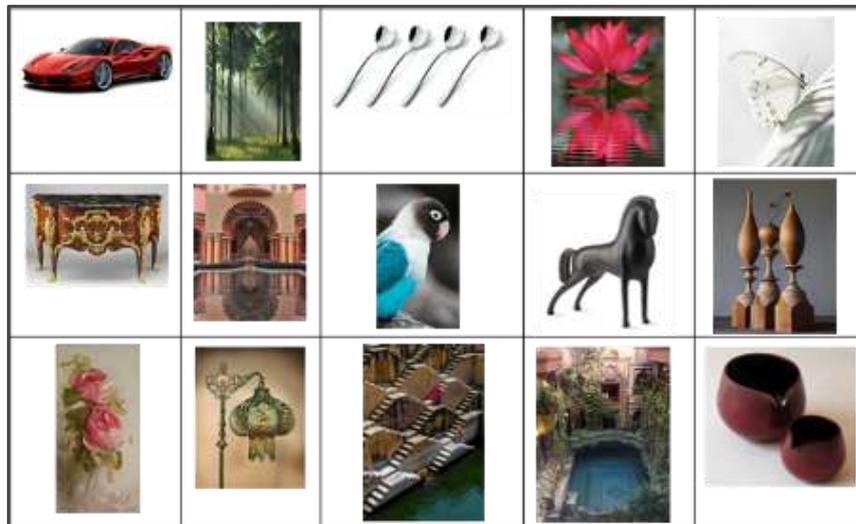


Fig. 2. Example of beautiful images as a stimulus material used in the experiment during aesthetic judgment.



Fig. 3. Example of ugly images as a stimulus material used in the experiment during aesthetic judgment.

### III. STIMULUS PRESENTATION AND TIMINGS

#### 3.1 Stimulus presentation part 1

Shown 22 stimulus material form a pre-reported 'aesthetic sensitivity test' (Bairisal & Kumar, 2019) to every 40 participants. We showed one stimulus at a time on a 32-inch computer screen with the blank screens between any two images shown for a fixed duration of 500 milliseconds. The course of display of the pictures depended on participants' time to rate the aesthetic quality of images (Refer Fig. 4). We asked participants to choose the most beautiful composition among the five designs of an 'aesthetic sensitivity test' stimulus. Among five copies of a stimulus, one of the compositions was of high aesthetic value, and others were low. Those who prefer composition with correct design dimensions of design principles such as golden ratio, balance, and rule of third than its altered version are 'aesthetic sensitive individuals.' Or those who scored high on aesthetic sensitivity tests are 'aesthetic sensitive individuals.' Similarly, those unable to identify harmonious composition among five are 'less aesthetic sensitive individuals.' In other words, those who scored less in the aesthetic sensitivity test are 'less aesthetic sensitive individuals.' Two categories of participants were then formed, such as 'aesthetic sensitive individuals' and 'less aesthetic sensitive individuals' based on the aesthetic sensitivity test score.

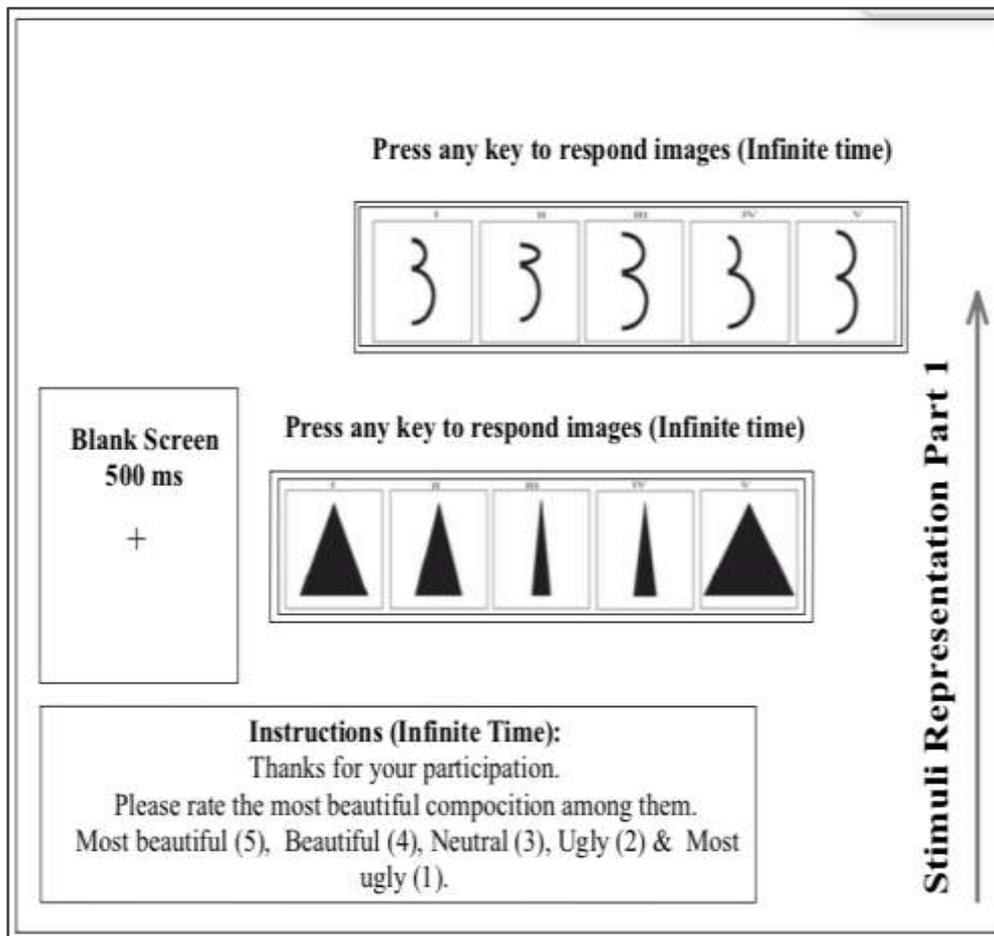


Fig. 4. Illustration of presentation of aesthetic sensitivity test.

#### 3.2 Stimulus presentation part 2

In the next part of the experiment, participants also have to rate the pool of two hundred images (one hundred beautiful and one hundred ugly) one by one. Asked all forty participants to rate the beautiful-ugly images on the five-point scale, where, 5 = most beautiful, 4 = beautiful, 3 = neutral, 2 = ugly and 1 = most ugly (Refer image 5).

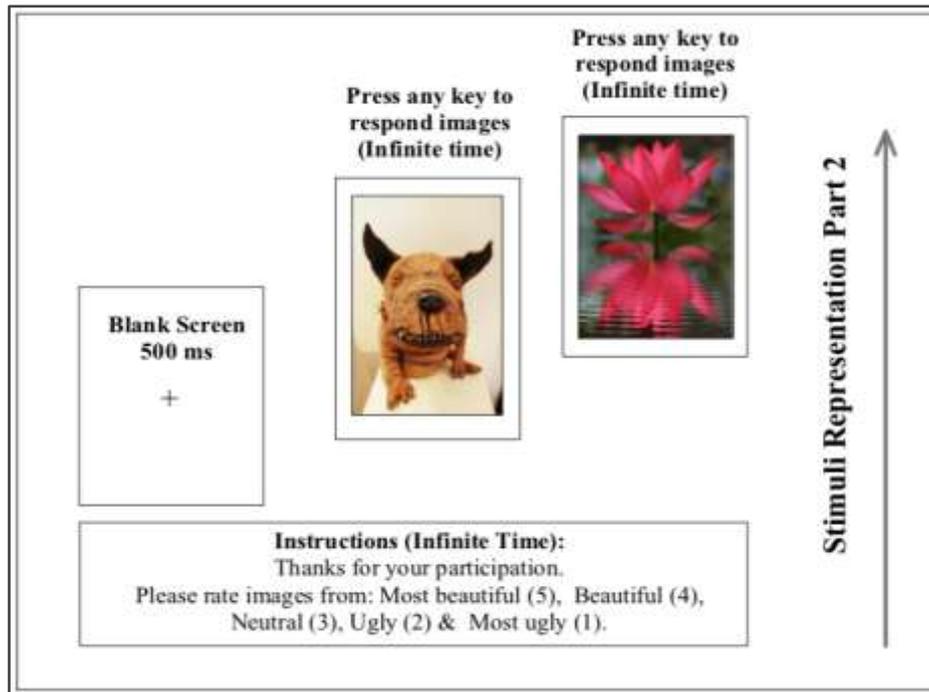


Fig. 5. Illustration of represented beautiful and ugly images in the experiment.

#### OBSERVATION 1

To understand the behavior of participants on beautiful and ugly images concerning time. The mean data of forty participants' response time towards two groups, i.e., beautiful images and ugly images, were calculated. A graph between 'means ratings' vs. 'mean response time' was generated using a scatter plot (Fig. 6). We observed a significant difference between the response time to beautiful images, and ugly images scanned during aesthetic judgment.

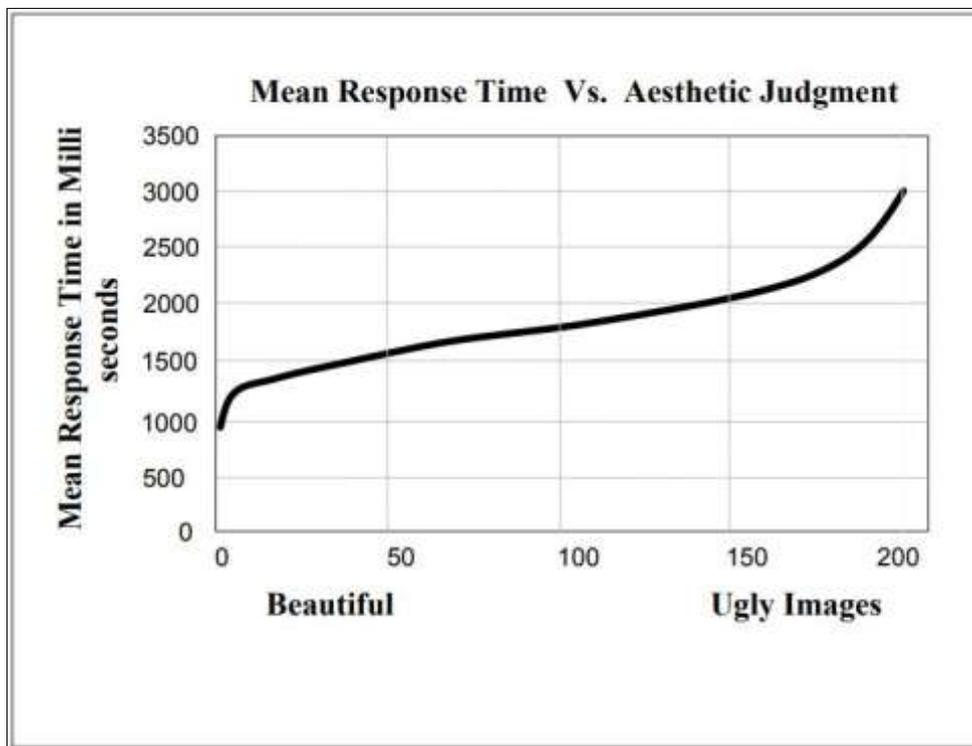


Fig. 6. Graphical representation of the participant's mean rating vs. the participant's response time. A one-way ANOVA test identified that the aesthetic experience during the aesthetic judgment of beautiful-ugly images significantly impacted response time,  $F(21.7)$ ,  $p < 0.0001$ , (Refer Table 1). The mean response time to

assessing the most beautiful images is considerably less than most of the ugly images (Refer Fig. 6). Moreover, the response time to one hundred beautiful images ranges from 0.9 to 2.3 seconds, whereas the range of judgment of most of the ugly images occurs between 1.2 to 3 seconds (Fig. 7).

Table 1. Result of one-way ANOVA across the 200 images on the beautiful-ugly paradigm.

Data Summary				
Group	N	Mean	Std. Dev.	Std. Error
Beautiful images	100	1972.2	415.6	40.3
Ugly images	100	1724.85	354.4	34.4
F -Statistics value	21.736		P-value	<0.00001

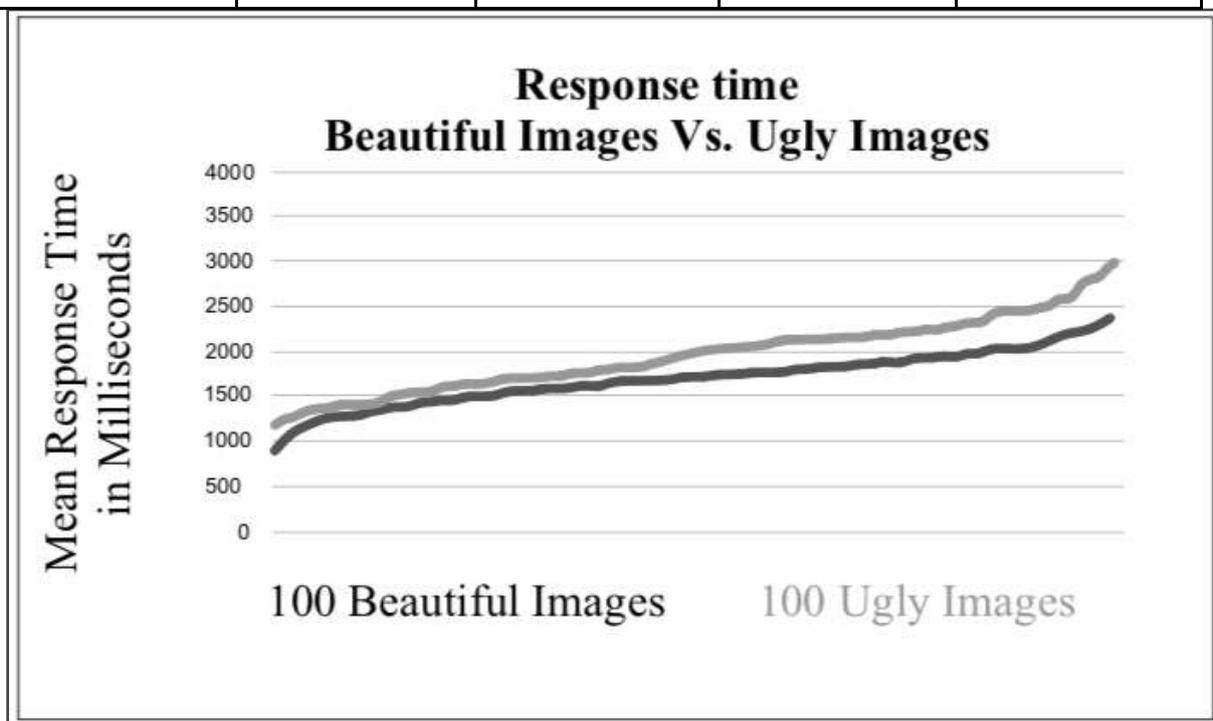


Fig. 7. Graphical representation of the participant's mean response time on the beautiful and ugly images. Additionally, the total response time and the average response time to beautiful images were less compared to ugly images (Table2, Fig. 8, and Fig. 9).

Table. 2. Total response time and average time of forty participants to two hundred beautiful and ugly images.

Total Time	Beautiful images	Ugly images	Average Time	Beautiful images	Ugly images
	<b>7313377</b>	<b>8362159</b>		<b>1724.85307</b>	<b>1972.20731</b>

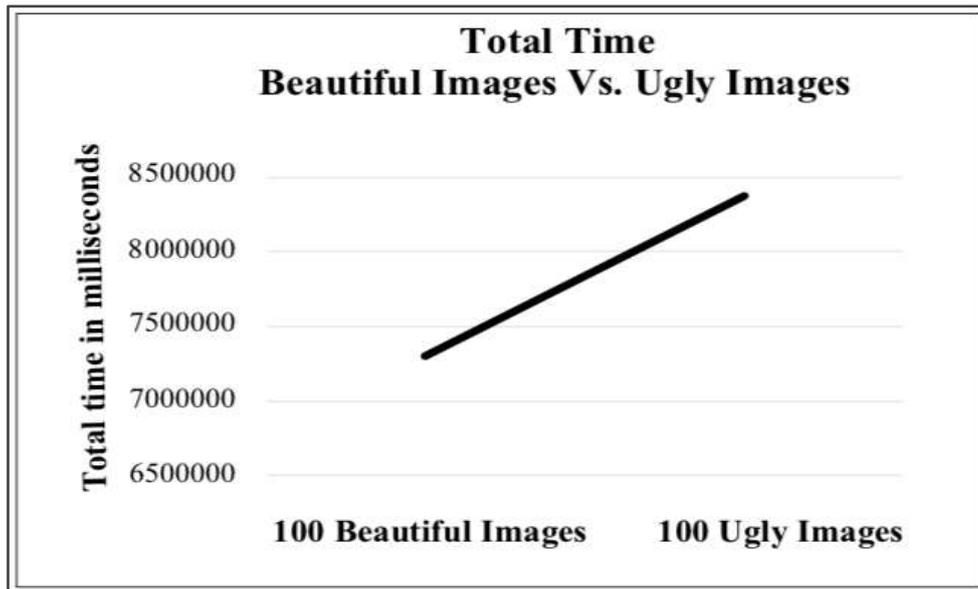


Fig. 8. Graphical representation of forty participants 'total time on the one hundred beautiful and one hundred ugly images.

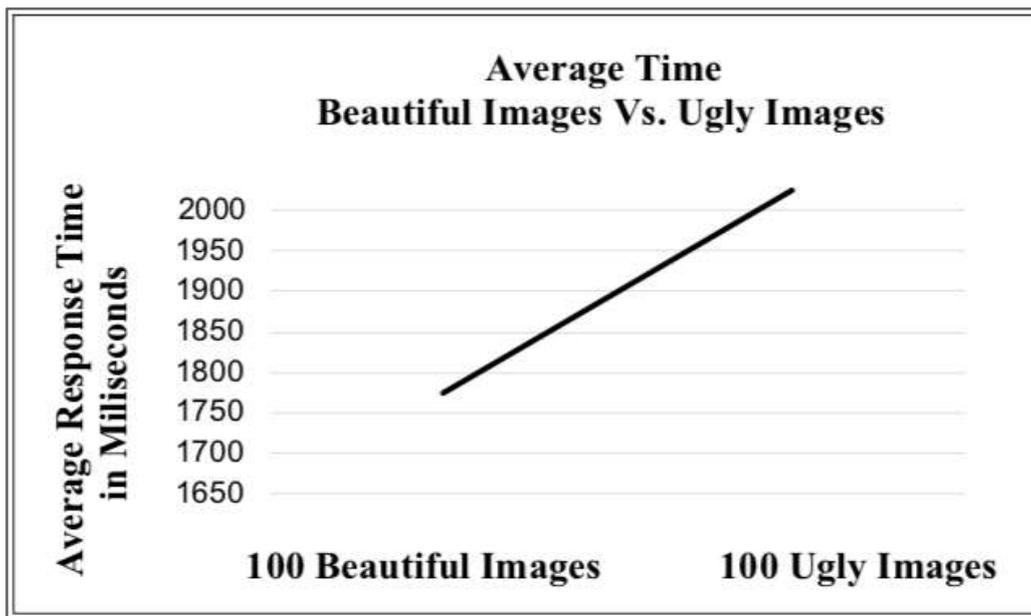


Fig. 9. Graphical representation of 'average time' of forty participants on the one hundred beautiful and one hundred ugly images.

## **OBSERVATION II**

In this second study, we analyzed aesthetic sensitive individuals' behavior during the aesthetic assessment of beautiful-ugly images concerning response time. Experiment design and recording response time to beautiful-ugly images during aesthetic judgment were on E-Prime behavioral analysis software and Chronos stimulus-response device. However, based on the score of aesthetic sensitivity tests, the top five and bottom five participants are sensitive and less sensitive, respectively. We compared, statistically, the summation of five aesthetic sensitive individuals' response time and summary of the five less keen participants to beautiful-ugly images during aesthetic judgment. Found that the Aesthetic sensitivity played an essential role while the aesthetic experience was due to beautiful pictures and had a significant impact on response time due to aesthetic judgment,  $F(174.3)$  and the  $p$ -value is  $< 0.00012$  (Table 3).

Table. 3. Result of one-way ANOVA test of recorded mean response time (expressed in milliseconds) of aesthetic sensitive individuals and less sensitive participants for beautiful images.

<b>Mean response time to beautiful images of 'sensitive and less sensitive individuals.'</b>			
Sensitive participants		Less sensitive participants	
Mean response time	Std. dev	Mean response time	Std. dev
6557.3	282.07	13079.0	4715.74
F = 174.3		p < 0.00001	

Aesthetic sensitive individuals are better at the aesthetic judgment of beautiful images than less sensitive participants. The mean response time to beautiful pictures of sensitive individuals was less than that of less sensitive participants (Fig. 10).

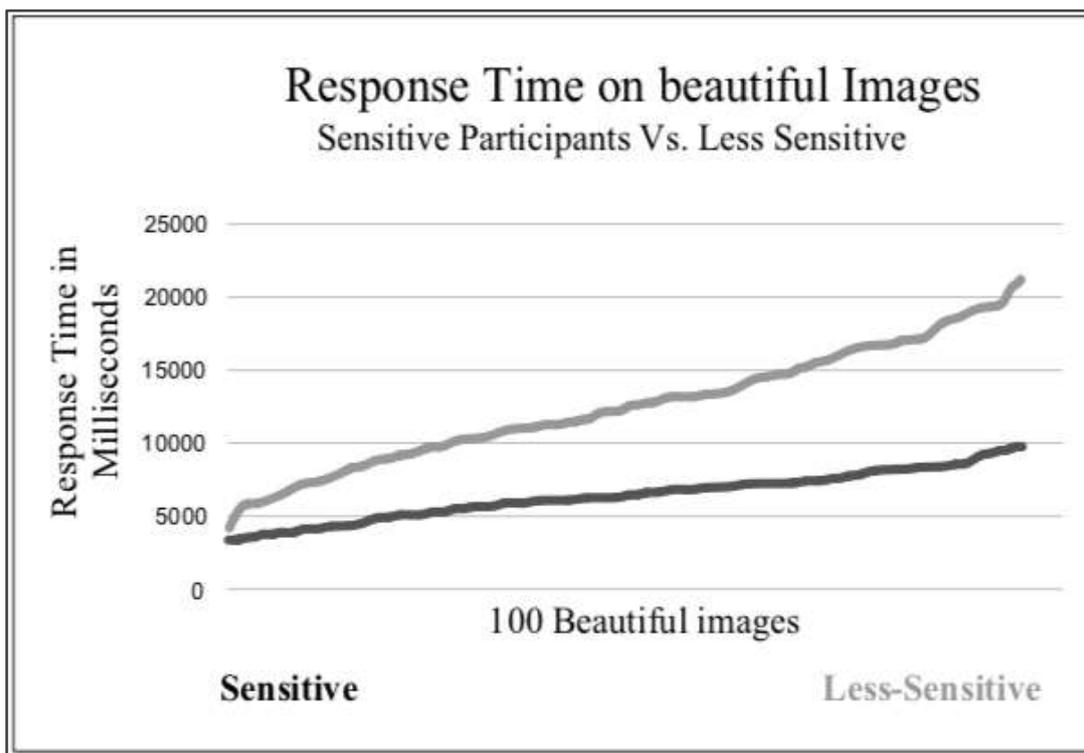


Fig. 10. Mean response time to beautiful pictures; Sensitive participants Vs. Less Sensitive participants.

Similarly, Aesthetic sensitivity played an essential role. In contrast, aesthetic experience due to ugly images had a significant impact on response time due to aesthetic judgment, F (80.6), and the p-value is < 0.0001 (Table 4). Aesthetic sensitive individuals are better at the aesthetic judgment of ugly images than less sensitive participants. The mean response time to ugly images of sensitive individuals was less than that of less sensitive participants (Fig. 11).

Table 4. Result of one-way ANOVA test of recorded mean response time (expressed in milliseconds) of aesthetic sensitive individuals and less sensitive participants for ugly images.

Mean response time to ugly images of 'sensitive' and 'less sensitive' individuals.			
<i>Sensitive participants</i>		<i>Less sensitive participants</i>	
Mean response time	Std. dev	Mean response time	Std. dev
1511.9	459.0	2564.8	1116.7
F = 80.6		p < 0.00001	

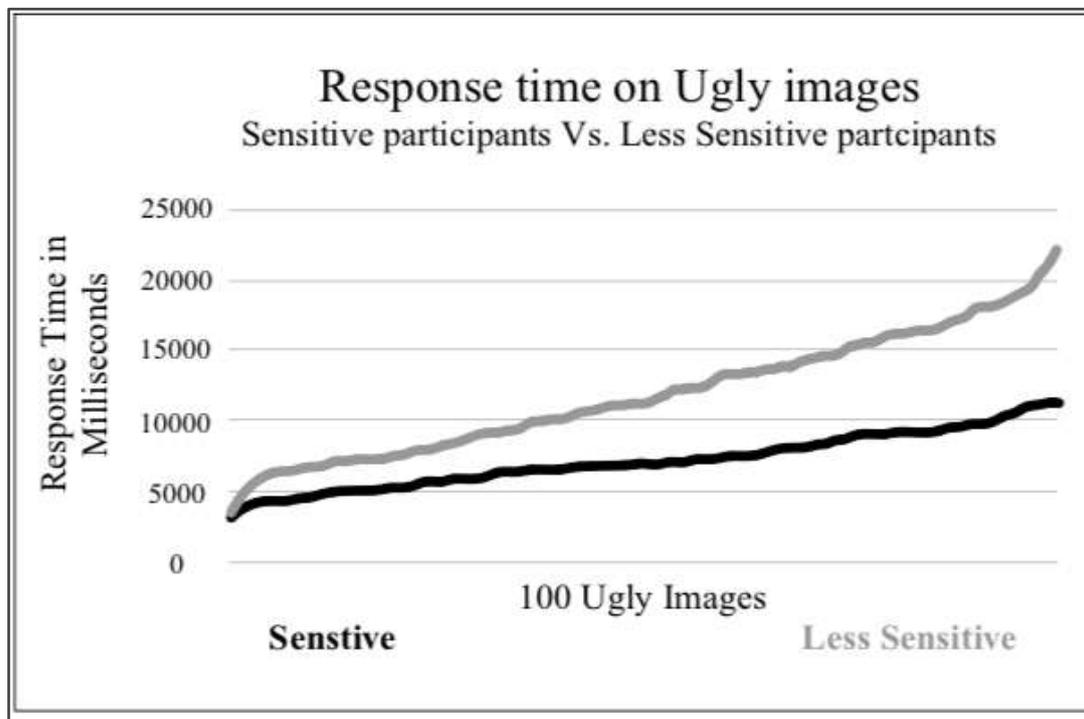


Fig. 11. Mean response time to ugly images; Sensitive participants Vs. Less Sensitive participants.

**IV. RESULTS AND DISCUSSION**

The earlier research discussed the presentation time required to identify style-based contents (Augustin et al., 2008) and collative properties such as ambiguity, complexity, and familiarity (Cupchik & Berlyne, 1979). But in this study, we identified the relationship between the response time between the aesthetic judgment of beautiful images and ugly images. However, earlier, aesthetic sensitive individuals are good at the aesthetic judgment (Cvetkova, 2009). Further, the sensitivity towards beauty is an essential aspect of humans. Moreover, it is fundamental to the design profession (Child, 1962; Duffy, 1979; Eysenck, 1983; Lundy et al., 2010; Munari, 2008). Thus, in this study, the author identified the relationship between aesthetic sensitivity and aesthetic judgment. We considered 100 beautiful images and 100 ugly images based on general norms of beauty and ugly. The participants rated the images one by one on a five-point scale from most beautiful to most ugly. Recorded response time with the help of a Chronos stimulus-response device. Compare the response time to 100 beautiful and 100 ugly images statistically and statistically significant difference in the response time to beautiful images than ugly images, F (21.7), p<0.00001.

Similarly, literature reported that aesthetic sensitive individuals are good at the aesthetic judgment. Therefore, we compared the response time of aesthetic sensitive individuals with less sensitive individuals

towards beautiful, ugly images. We identified a few aesthetic sensitive individuals identified with the help of a pre-reported 'aesthetic sensitive test by the author (Bairisal & Kumar, 2019).

## V. CONCLUSION

Although aesthetic responses due to aesthetic judgment after aesthetic experience from aesthetic designs are quick and immediate, furthermore, from this study, the assessment of ugly is a time-consuming process than the review of beautiful images. In contrast, the decision of beauty is fast and direct. Moreover, aesthetic sensitivity played a role. Indifference, aesthetic experience due to aesthetic judgment of beautiful-ugly images further impacted response to beautiful-ugly images—a significantly less time spent during the assessment of beautiful-ugly images by the aesthetic sensitive individuals. Therefore, it concluded that aesthetic sensitive individuals are good at the aesthetic judgment, i.e., quickly identifying a design's beautiful-ugly features. Aesthetic sensitive individuals responded more rapidly than less sensitive participants during the aesthetic judgment of beautiful and ugly images.

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