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Could sex difference in color preference and its personality correlates fit into social theories? Let Chinese university students tell you

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ABSTRACT

The unclear picture of the sex difference in color preference might result from personality variations. We invited 359 Chinese university students (166 men and 193 women) to undergo a color preference test and the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ), a five-factor model test. Depressive trends were measured by the Plutchik-van Praag Depression Inventory (PVP). There was no significant difference between men and women regarding either ZKPQ or PVP scale scores. However, men preferred blue and green significantly more, and their preference order of yellow was negatively correlated with ZKPQ Sociability. Women preferred purple, pink and white significantly more, their preference order of gray was positively correlated with Neuroticism-Anxiety, and the order of orange negatively with Aggression-Hostility. Our results suggest that, partly from a biological layout, men as hunters and women as gatherers prefer some different colors on the one hand, but from a social structural layout, they might try to adjust some personality traits by preferring other colors on the other, in order to attain a sex-equality but polychromatic world.

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1. Introduction

Colors are rife in our daily encounters with people, objects, and are even presented in dreams, and have a pronounced effect on many aspects of human functioning including emotional regulation (Hill & Barton, 2005; Kuller, Ballal, Laike, Mikellides, & Tonello, 2006; Manav, 2007; Ou, Luo, Woodcock, & Wright, 2004). Previous research has arrived at different conclusions regarding the sex difference in color preference. For example, Eysenck (1941) argued that no sex difference existed in color preference, and this argument was verified by other investigators (Dittmar, 2001; Rosenbloom, 2006). However, other evidence supports that on average, men and women differ in their preferences for colors. Elliot and Niesta (2008) reported that red led men to view women as more attractive and more sexually desirable, but did not influence women's perceptions for the attractiveness of other women, or men's perceptions of women's overall likeability, kindness, or intelligence. Other studies have shown that men usually prefer more "cool" colors such as blue and green, and women "warm" ones such as red, yellow, orange, pink and purple (Ellis & Ficek, 2001; Silver & Ferrante, 1995; Silver et al., 1988).

According to the Hunter-Gatherer Theory (Hurlbert & Ling, 2007; Regan et al., 2001), the sex difference in color preference is developed under a survival pressure throughout the development of society, when men and women face different adaptive problems. Thus, a woman's brain or visual system is more specialized for gathering-related tasks, e.g., identifying the ripe (purple or red) fruits or berries embedded in green foliage, and these specializations underpin the preference for "warmer" colors. By the same token, as hunters, men would prefer the colors they encountered frequently in the natural environment, e.g., the blue sky or the green ground-field.

On the other hand, the Social Structural Theory might influence the sex difference in color preference, as most other sex differences in society result from the sex role socialization, by appropriate ways of thinking, feeling, and behaving (Eagly, 1987; Maccoby, 2000). In addition, the sex difference could be larger in some countries which are less prosperous, or less egalitarian, but often may be smaller than others with higher levels of prosperity and sex equality (Schmitt, 2005). Furthermore, men and women often show a crossover effect in daily lives, which would erode sex differences to some extent (Eagly, 1987; Maccoby, 2000), the possible

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sex difference in color preference might reflect a great effort for building a social role equality.

There are discrepancies over sex difference in color preference, but one can easily outline the design flaws in previous studies. A lack of consistent controls of color stimuli is the first illustration, i.e., no controls of saturation and brightness when investigators had studied the effect of hue. Furthermore, some previous studies did not use actual colors as stimuli but instead, used verbal labels of color (e.g., "blue" or "red") (Ellis & Ficek, 2001; Silver & Ferrante, 1995).

The second illustration is the complicated results that might be related to the individual difference, or personality trait on color preference. Compared to women, men scored higher on Aggression-Hostility, Impulsive Sensation Seeking, and Activity, and women scored higher on Neuroticism-Anxiety and Sociability (Aluja, García, & García, 2002; Costa, Terracciano, & McCrae, 2001; Zuckerman, 2002). Whether the sex difference in personality traits contributes to the sex difference in color preference is still open to question. Nonetheless, in general, we can see an effort to build a link between personality trait and color preference throughout the years. Some scholars have tried to build the tie by demonstrating that color preference reflects the unconscious drive. For example, Eysenck (1981) proposed that extraverts would prefer "exciting" colors like red or yellow to increase their internal arousal, while introverts would prefer "calm" ones like blue to reduce or maintain their optimum level of arousal. Lüscher and Scott (1969) also claimed that people who favored red and yellow were more extraverted than those who preferred blue and green, suggesting that individuals with similar personality characteristics should express similar color preference. Other scholars have viewed the color-personality relationship as a reflection of reportable values rather than of unconscious drive. For example, yellow was usually related to positive feelings, such as "warm" and "stimulating" (French & Alexander, 1972; Yildirim, Akalin-Baskaya, & Hidayetoglu, 2007), and red was usually related to danger (Elliot, Maier, Friedman, & Pekrun, 2009). Recently, Lange and Rentfrow (2007) have shown that nearly all Cattell's 16 personality factors were well predicted by color preference. In addition, another arousal related personality trait, sensation seeking, was related to color preference (Rosenbloom, 2006). The use of different personality assessments might result in these outcomes. Indeed, no study has employed the well established measure of the five-factor model of personality, for instance, the NEO-PI-R (Costa & McCrae, 1992) or the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993).

The third illustration is that few studies have controlled for the depressive mood of their participants, and color preference might vary according to depressive mood (Adams & Osgood, 1973; Schaie, 1961; Valdez & Mehrabian, 1994). According to some epidemiologic surveys, women reported higher rates of depression than men did in both clinical and community settings (Kessler, 2003; Munce & Stewart, 2007), and women's social performance was also influenced by depression (Kessler, 2003).

Bearing these concerns in mind, we conducted the current study by employing the ZKPQ to search for possible personality effects on sex differences in color preference, and the Plutchik-van Praag Depression inventory (PVP; Plutchik & van Praag, 1987) to measure the depressive mood in a sample of university students. Consistent with previous studies (e.g., Hardin, 1998), we chose eleven basic colors, i.e., white, gray, black, red, green, blue, yellow, orange, pink, brown, and purple, to measure color preference. We hypothesized that, consistent with the Hunter-Gatherer Theory, women would prefer warm colors and men would prefer cool ones; moreover, sex difference in color preference might help to adjust personality traits in order to reduce gaps between the two sexes, thus fitting the Social Structural Theory.

2. Methods

2.1. Participants

Four hundred and thirty-six Chinese university undergraduates were asked to participate in this study for extra course credits. Data from participants who scored higher than three on the ZKPQ Infrequency scale, or higher than 25 on PVP (see below) were excluded from analysis. Statistical analyses were carried out on data from 359 participants (166 men, mean age: 21.75 years ± 2.83 S.D., age span: 17–35 years; 193 women, mean age: 21.69 ± 2.32, age span: 18–34; no age difference between genders, $t = .21$, $p = .83$). Participation was restricted to individuals with normal color vision as verified on the color vision test. A semi-structured interview was performed for each healthy volunteer in order to ascertain that they were not suffering or had not suffered from any psychiatric problems, including any type of personality disorder. All participants were naïve to the study design and had normal or corrected-to-normal visual acuity. The study has been approved by a local Ethics Committee, and all participants gave their written informed consents to participate in the study.

2.2. Procedures

2.2.1. Color preference test

Participants sat at a distance of 50 cm from a PC monitor (1280 × 800 pixels, vertical refresh rate, 75 Hz), in a dark room. The background was set gray by employing the Red-Green-Blue (RGB) chromaticity and the corresponding Hue-Saturation-Brightness (HSB) schemes (RGB = [153, 153, 153], HSB = [0, 0, 60]) through the Adobe® Photoshop® CS3 Extended (Table 1). The illumination within the room consisted of the direct, diffused light from 40 W fluorescent lamps. At the beginning of the test, participants adapted to the color of the background for three minutes. All target colors were displayed on the computer monitor as rectangular patches (2.5 cm × 2.5 cm each).

Participants were instructed to look at the eleven color patches, presented against the gray background, for about 3 min, then they were asked to write down their preference orders of these colors, from eleven to one beneath the name of these colors on a piece of paper, with the bigger number representing the more preferred one. There was no time limit on the response, but participants were asked to select as quickly as possible, without cogitation and particularly without reference to any other color-vectors outside the monitor.

2.2.2. Questionnaires

After the color preference test, participants were asked to complete the following two questionnaires on-site in another quiet room. A brief overview of each questionnaire is described below:

Table 1
The chromatic scheme values of Red-Green-Blue and of Hue-Saturation-Brightness for eleven colors.

Color	Red	Green	Blue	Hue	Saturation	Brightness
Black	0	0	0	0	0	0
White	255	255	255	0	0	100
Gray	153	153	153	0	0	60
Brown	153	0	0	0	100	60
Red	255	0	0	0	100	100
Pink	255	204	204	0	20	100
Orange	255	153	0	36	100	100
Yellow	255	255	0	60	100	100
Green	0	255	0	120	100	100
Blue	0	0	255	240	100	100
Purple	255	0	255	300	100	100

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