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# BEYOND THE PALETTE: WHY COLOR PREFERENCES CANNOT ACCURATELY PREDICT PERSONALITY

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**Abstract:** It is commonly believed that someone's preferred color can be used to identify their personality. This review analyses evidence for this. Color perception and preference are affected by a variety of factors including light estimation, semantics, objects, social identity and culture. None of these require personality to be a causal factor. Although direct assessment has been undertaken, findings have been inconsistent. Neither a priori testing of 11 common color-personality connections against the Big Six personality domains nor a clinical investigation of color preference in healthy people identified any relationship. However, three studies have reported statistically significant relationships between color preference and personality: one involving adults in Korea, another comprising preprint student data , and a third investigating students in Pakistan. These relationships are generally weak, vary between studies, and rely on short participant self-assessments and non-representative samples. Furthermore, color preference accounts for only a limited proportion of personality variation. Evidence for the most widely recognized color personality test, the Lüscher color test, shows poor convergent validity and variable test-retest reliability. Taken together, there is currently insufficient evidence to suggest that color preference is a valid method for determining personality. However, weak, situational relationships may exist. Subsequent research should include a priori testing, use well-validated extended personality assessments, and involve bigger and more representative samples. Cross-cultural replication is also recommended.

**Keywords:** color perception; color preference; personality; Big Six; Lüscher color test

## Introduction

It is commonly thought that an individual's favorite color can reflect aspects of their personality. However, there are various reasons why people perceive and prefer colors differently; these include the brain’s interpretation of light [1], color term acquisition [2], emotion evoked by objects of a particular color [3], social identity [4], and cultural and linguistic effects [5]. Therefore, some reasons for favoring different colors have nothing to do with personality, so it cannot be concluded that color preference is a good reflection of personality.

Although this is not a formal review of research, it highlights areas of research most relevant to this topic. Sections 1 and 2 describe the non-personality-related aspects of color perception and color preference. Section 3 describes both confirmatory and exploratory evidence relating to this topic. Firstly, confirmatory research investigating common beliefs is discussed [7]. It then analyses both confirmatory and exploratory research reporting correlations [8–11], and finally a clinical study [12]. Section 4 explores color personality tests and, in particular, the Lüscher test [11, 13]. Section 5 then summarises the evidence.

Overall, the evidence is inconclusive. Confirmatory research does not back up common beliefs [7]. Exploratory research does, however, identify weak yet statistically meaningful correlations; however, these are not dependably replicated across studies and measures. As the majority of studies are self-report and based on easily accessed participants, the extent of an actual effect is unclear.

**1 Color Experience Is Constructed**

Humans have 3 color-detecting cone cells. However, both a light- and a dark-colored object can appear to be the same color under different illumination conditions. Consequently, our brains work out what the lighting is and adjust accordingly [1]. This was illustrated by a viral picture of a 'dress' which caused differing responses. Those who thought the lighting was cool described the dress as white and gold (30%). Those who thought it was warm described it as blue and black (57%). Furthermore, older people and women were more inclined to describe it as white and gold. Responses also differed depending on the context of the picture and the amount of information regarding the lighting [1].

Language can additionally influence color perception. Between 12 and 19 months, babies modified their color perceptions in an area in which hues from two different color groups overlap after being taught color words [2]. Therefore, color classification is not wholly instinctive and can differ between individuals due to language and life experiences.

Although the above studies refer to perception, they are still relevant to the present query. Both light estimation and language can independently impact color perception. Evidence must therefore demonstrate that personality does exert further influence on color perception, even after considering the effects of both of these other variables. In addition, this should occur across a range of contexts [1, 2].

**2 Learned and Cultural Sources of Color Preference**

Ecological valence theory suggests that people's color preferences relate to their feelings toward items associated with colors [3]. Generally, blue is favored as it is associated with the sky and water. Conversely, dark yellow-brown is typically disliked as it is related to rotten food and rubbish. The theory explained 80% of the variation in color preference data (for 32 different colors) from a sample of American adults [3]. As the theory focuses on explaining average color preferences, it provides limited information about why someone's preferences may differ from these averages. There is therefore room to investigate whether personality influences color preference.

Group differences can also occur due to people's learned color preferences. Students from competing universities favored their university's colors particularly if there was a strong school spirit [4]. It is unclear whether these group differences originate from enduring personality differences.

Whilst some color-meaning is universal, other colors can have differing connotations in various regions. Within a global sample of 4598 people from 30 countries, color-emotion associations were largely similar worldwide (mean cross-country correlation = .88). Furthermore, countries that were either nearer to each other geographically or shared a common language had more comparable color associations [5]. Again, this refers to variation between countries and not to variation within a country.

Context can likewise influence meaning. Elliot reviewed recent work examining the psychological effects of colors such as red [6]. Thus, color can be affected by both personal and other factors. Although this does not rule out a possible link between color and personal characteristics, any relationship must be demonstrated to be independent of these factors.

**3 Direct Tests of the Personality Claim**

**3.1 A pre-specified test: favorite colors and the Big Six**

Jonauskaitė et al. [7] investigated common assumptions relating to favorite colors and the Big Six (Extraversion, Agreeableness, Conscientiousness, Emotional Stability, Openness and Honesty). 11 hypotheses were extracted from six highly visited sites. 323 (including 52 males) French-speaking first-year psychology students gave their favorite color and filled in a personality

questionnaire. None of the 11 hypotheses were shown to be correct. Those who favored red were not more extraverted. Ten of the 11 results revealed no relationship. There was one nominal relationship – between pink and Agreeableness (d = -0.54, 95% CI -1.00, -0.09). However, this was based on a limited number of people, and the confidence interval was large. Across the analyses, effect sizes varied from d = -0.54 to 0.47. Overall, favorite color is not a strong predictor of personality (partial $\eta^2$ = .035) [7].

What can we conclude regarding these results? For those favoring red (N=49), the impact on Extraversion was d = -0.08 (95% CI: -0.38, 0.23). Thus, effects above around d = 0.23 can be discounted for this relationship at 95%. For less favored colors (such as white, turquoise and pink; N=11-28) there is much greater uncertainty in the results. Occasionally, even positive effect sizes of up to d = 1 are obtained. Although moderate or large effects are thus unlikely for favored colors, small effects and those for unfavoured colors cannot be completely discounted [7].

**3.2 Studies that report associations**

Fetterman et al. [8] analyzed 4 studies, the first three involving 104, 102 and 170 undergraduate students respectively. Participants who favored red or were more likely to interpret colors as red demonstrated slightly increased levels of interpersonal hostility (partial $\eta^2$ = .04 for Study 1; coefficients of .23 and .31 for Studies 2 and 3). People inclined to see colors as green did not show different levels of hostility. Participants favoring red were also more stringent in their morality and more likely to refuse unjust financial rewards (partial $\eta^2$ = .06 and .07). The p-values for Studies 1 and 2 (.04 and .03) are just below the conventional significance level. Confidence intervals were not provided, and so the actual effect sizes are not well defined. Furthermore, only one color and one personality attribute were analyzed.

Jue and Ha [9] carried out an internet-based survey of 854 Korean adults (aged 20-60). Participants indicated their favorite colors from a list of 10 and then completed the 10-item Ten Item Personality Inventory (TIPI). Significant relationships were identified between favorite colors and 4 of the 5 personality attributes (except for extraversion). Most strongly, preference for red was negatively related to emotional stability (r=-.16). Light blue was positively associated with agreeableness, conscientiousness, and emotional stability (r=.12-.13). Four of the 5 personality attributes were predicted by color preference, although only 3-5% of variance was explained ($R^2$=.03-.05). Surprisingly, extraverts favored green rather than red. The authors concluded that favorite colors can predict personality. However, they recognized that the relationships observed were relatively weak and only approximate. In addition, the TIPI may lack fine-grained detail, and the conclusions may not be applicable to other adult populations outside Korea [9].

Watten and Fostervold [10] (note: pre-print and therefore not peer-reviewed) asked 206 students to identify their favorite color from blue, green, red, yellow, black, or white. Students then completed the 44-item Big Five Inventory. Compared to the remainder of the sample, those favoring blue exhibited greater agreeableness and extraversion. Red favourers were less agreeable. No personality differences were seen for other colors [10].

Jamil and Malik [11] assessed 395 Pakistani university students (222 females and 173 males) using the 8-card Lüscher test alongside the 10-item Big Five Inventory (BFI-10), together with psychosocial measures. Weak relationships were identified between color preference and personality attributes (for instance, blue and extraversion: r=.14). Again, 3-6% of variance in each personality attribute was explained by color preference ($R^2$ = .03-.06). The authors concluded that this research supported the link between color preference and personality. Nevertheless, the weak relationships imply that in addition to color preference, other variables are involved. Poor internal consistency was evident for the BFI-10 subscales ($\alpha$=.48-.58). Furthermore, the sample was purposefully selected and comprised students from just two universities within one city [11].

**3.3 A clinical comparison**

Tao et al. [12] investigated color preference along with personality characteristics in both a sample of healthy volunteers and a group of schizophrenia patients. No significant relationships were identified between personality and color preference for the healthy participants. Patients who favored black showed increased Neuroticism-Anxiety (n=63, $\beta$ = .29, adjusted $R^2$ = .07), and those

who favored pink and orange showed reduced Activity [12]. Underlying personality characteristics may partly influence variation in color preference amongst schizophrenia patients. However, because the results were limited to a clinical sample, they do not show that typical color preference can indicate personality in the general population.

### 3.4 Why the studies disagree

As well as differing from one another, the studies also differ in methodology, and this in turn affects the conclusions that can be drawn. Key differences include:

The relationships identified are generally weak. The highest correlation in the Korean study was r =- .16, which equates to around 3% common variance. Likewise, $R^2$ values in the Pakistani study were within the .03- .06 range. Effects for red and hostility were also weak [8, 9, 11]. Even if potentially statistically valid, these effects are insufficiently strong to allow conclusions to be drawn about someone's personality characteristics based upon their favorite color.

Secondly, there are variations in the assessment tools and statistical analyses. Those studies which identified relationships analyzed personality using brief questionnaires. These included the 10-item TIPI [9] and the low internal consistency BFI-10 [11]. In addition, numerous color-personality attribute combinations were analyzed (for example, 10 colors and 5 personality attributes in the Korean study [9]). Yet there was no mention of multiple comparison adjustment. By contrast, the study that failed to confirm any hypotheses analyzed a limited number of prespecified hypotheses and applied multiple comparison adjustment [7]. Lower reliability reduces the ability to accurately identify effects. Further, undertaking numerous statistical analyses without multiple comparison adjustment increases the chance of obtaining false positives. Consequently, the data do not enable conclusions to be reached in either direction.

Finally, the results are not uniform. Whereas some studies have found that red is associated with reduced agreeableness [10], others have linked it to reduced emotional stability [9], and still others to greater hostility [8]. Conversely, the prespecified hypothesis study failed to find a relationship between red and extraversion [7]. In addition, within the Korean sample, extraverts favored green rather than red [9]. Although not perfect, there is some evidence to suggest that red is associated with reduced agreeableness and emotional stability, and blue with increased agreeableness [8-10]. However, samples, color options and assessment methods differed between studies. Further, the studies analyzed tested different hypotheses from those in the prespecified investigation [7]. No study has yet successfully replicated previous work using identical methodology. All samples were of a convenience nature and predominantly involved students. Moreover, they originated from only a limited number of countries.

## 4 Color-Based Personality Tests: The Lüscher Case

Coloured tests are also widely thought to assess personality. In the Lüscher color test, people are asked to select their most favored colors out of eight; these results are analyzed to form an individual's personality profile [11]. Unlike other tests, the Lüscher test does not provide conventional reliability information, as it is considered projective in nature [11]. Jamil and Malik [11] produced research which drew attention to the limited relationship between colors favored in the Lüscher test and BFI-10 personality attributes. Again, this illustrates the popularity of coloured testing, as well as the challenges involved in analyzing it.

A review of existing Lüscher research has drawn some negative conclusions about the test [13]. It was found to have poor convergent validity (as it does not correlate well with either the MMPI or the IPAT). Furthermore, the test has shown poor test-retest reliability (with a mean correlation coefficient of around .33- .37). There is also no measurement invariance, as color preference varies by culture, sex, and age group. Social desirability influences were also observed. Alongside this, the Barnum effect – whereby general statements are believed to be highly personally applicable – was present. Researchers even claim that the Lüscher test is likely, or even definitely, discredited [13]. As this is a one-person review, its conclusions should be viewed in this context. Nevertheless, they do support the low reliability of color testing identified in previous research.

As mentioned, the Lüscher research has important implications. Firstly, it implies that coloured testing is not an effective method of assessing personality attributes. Secondly, care should be taken when analyzing relationships with data from the Lüscher test [11].

**Conclusions**

There is currently insufficient evidence to suggest that color can be used as an accurate indicator of personality. Color is influenced by inferences around illumination, language, objects, social groups, and culture, and so these factors need to be disentangled from potential personality effects.

A priori investigation of commonly held beliefs did not find evidence to back them up [7]. There was no evidence for links in healthy volunteers within a clinical comparative study [12]. Limited evidence for links has been reported in Korean, preprint student, and Pakistani student samples [9-11]. Red has previously been associated with aggression [8]. However, these links are limited in strength and account for only a small proportion of variance. Furthermore, they are variable between studies. The research also relies upon brief subjective questionnaires and convenient sampling. A review of the most well-known color personality assessment (the Lüscher test) highlights that it too has poor convergent validity and variable test-retest reliability [13].

In addition, the supporting evidence is restricted. Aside from one non-reviewed preprint [10], there have only been a limited number of empirical investigations into this area. Again, these studies originate from a limited number of countries. In addition, this current review is also narrative and non-comprehensive. Thus, whilst robust evidence is insufficient, this should not be taken as decisive evidence for the non-existence of links. Indeed, limited and/or situational links may still exist. From now on, research should include preregistered aims, well-validated extended personality assessments, more extensive and varied sampling, and behavioral endpoints. In the meantime, it remains key to differentiate between general color associations, situational responses, and personality.

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