



The influence of traditional Chinese color schemes on visual attractiveness: The mediating role of emotional responses

 Yingying Xue^{1,2}

 Shahrel Nizar

Baharom¹⁺

 Mohd Nasiruddin

Abdul Aziz¹

¹Faculty of Art and Design, Universiti Teknologi MARA, Perak Branch, 32610 Seri Iskandar, Perak, Malaysia.

¹²Email: 2021405968@student.uitm.edu.my

²Fuzhou Institute of Technology, No. 8 Xijiangbin Avenue, Lianjiang County, Fuzhou City, Fujian Province, 350506, China.

¹Email: shahr169@uitm.edu.my

¹Email: mohdn571@uitm.edu.my



(+ Corresponding author)

ABSTRACT

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This paper explores the hypothesis that Traditional Chinese Color Schemes (TCCS) increase perceived visual attractiveness in modern visual communication and explores the mediation of this relationship by emotional responses. A quantitative cross-sectional design was chosen, and data were gathered using a WeChat mini-program where 360 participants rated standardized visual stimuli with five-point Likert scales. The hypothesized associations between TCCS, emotional reactions, and visual attractiveness were assessed through partial least squares structural equation modelling (PLS-SEM) with bootstrapping methods. The results indicate that TCCS has a strong positive influence on visual attractiveness, both directly and indirectly, in favor of a partial mediation model. More precisely, these culturally based palette systems contribute to attractiveness not only by eliciting positive affective resonance but also by reinforcing direct evaluative judgment of perceived harmony, cultural congruence, and semantic meaning. This implies that an emotional response contributes to an important portion of the relationship, and a significant direct impact is present. This study takes the color psychology and visual communication studies a step further by conceptualizing TCCS as a perceptual scheme level construction and not a set of individual hues in isolation, in a culturally grounded design context. In practice, the findings suggest that designers, cultural-creative practitioners, and heritage communication teams need to go beyond the mere formal aesthetics and evaluate the palette systems on their capacity to convey cultural authenticity, elicit emotionally meaningful audience reaction, and bridge the gap between traditional heritage and modern design practice.

Contribution/Originality: The study adds to the existing body of literature by looking at the effects of Traditional Chinese Color Schemes on visual attractiveness in terms of emotional reactions. The paper estimates the direct and indirect relationships through PLS-SEM. The present study is among the very few studies that have examined emotionally mediated influences of culturally based palette systems in modern visual communication.

1. INTRODUCTION

Color is one of the quickest and most informative aspects of visual communication because it shapes first impressions, affective appraisal, and approach-related judgments across retail, architectural, interface, and cultural-creative contexts (Kim, Hyun, & Park, 2020; Zhu, Liu, & Chen, 2024). With the growth of cultural-creative industries, designers increasingly use palette systems that can communicate both visual appeal and cultural meaning. Traditional Chinese Color Schemes (TCCS), which draw on historical color vocabularies, artefacts, painting traditions, and

architectural palettes, have therefore become relevant resources for branding, interface design, tourism communication, and cultural products (Deng, Zhou, & Zhang, 2022; Yao, Mingrui, Zirong, Yonglan, & Mengshan, 2025).

Although TCCS are increasingly used, the psychological rationale for their ability to promote visual attractiveness remains insufficiently explained. Existing studies have mainly examined color extraction, classification, computational reconstruction, or design application rather than the perceptual and affective processes that make culturally grounded palettes attractive to contemporary viewers (Chen et al., 2024; Deng et al., 2022). This is a meaningful gap because visual attractiveness is not only a beauty judgment; it can influence attention, clicking, choice, approach, and other design-relevant responses (Jylhä & Hamari, 2019; Perrig, Ueffing, Opwis, & Brühlmann, 2023).

In the Chinese context, color is closely associated with ritual symbolism, social meaning, and historical aesthetics. Recent research has mapped traditional Chinese color vocabularies and heritage color features, but these developments do not by themselves explain why a modern design using TCCS may be perceived as more attractive (Hu, Xu, & Chen, 2025; Yao et al., 2025). Therefore, this paper examines how TCCS influences visual attractiveness and tests emotional responses as a mediator within the stimulus-organism-response logic, in which color schemes function as stimuli, emotional responses operate as the organismic state, and visual attractiveness represents the evaluative response (Mehrabian & Russell, 1974).

By focusing on TCCS, this paper extends color-emotion research from individual colors and generic stimuli to a culturally grounded palette system relevant to modern visual communication (Elliot & Maier, 2014; Jonauskaitė et al., 2020). It evaluates both the indirect effect through emotional responses and the remaining direct effect from TCCS to visual attractiveness, thereby testing partial rather than complete mediation. The following part identifies the variables of interest and provides the theoretical foundation. This is followed by the literature review, methodology, results, discussion, implications, limitations, future research directions, and conclusion.

1.1. *Traditional Chinese Color Schemes (TCCS)*

Traditional Chinese Color Schemes (TCCS) are schemes of palette that are understood to be (a) culturally correct, (b) true to traditional Chinese aesthetic systems and (c) semantically related to heritage objects like architecture, textiles, paintings, and ceremonial objects. Notably, TCCS is not an individual color, Chinese red; instead, it refers to an organized system of color words, color families, and rules of combination that historically arose out of material technologies (pigments and dyes), artistic conventions, and symbolic cosmologies.

Recent empirical mapping of traditional Chinese color nomenclature proposes that the system is organized into hierarchical terms and categories, making systematic classification and design retrieval possible (Hu et al., 2025). Studies of traditional Chinese color systems show that heritage color features can be understood through historically grounded color terms, digital color-composition patterns, and culturally meaningful palette structures (Chen et al., 2024; Hu et al., 2025). In applied design, TCCS have been operationalized through palette extraction, computational matching, and interactive optimization for cultural-creative products (Deng et al., 2022).

Visual analytics has also enabled designers to explore the color-composition logic of traditional Chinese painting, suggesting that traditionality may be associated with recognizable distributional patterns, tonal restraint, and material-related color clustering (Chen et al., 2024). The theoretical framework used in this paper is therefore grounded in cultural semiotics and cultural congruence: colors are not neutral surface properties, but cultural indicators that signal historically stabilized meanings such as ritual, prosperity, restraint, and reverence.

Evidence from heritage-scape research further shows that color treatments can influence perceived heritage features, authenticity, and continuity in historically meaningful environments (Yao et al., 2025). This implies that color belongs to the cultural code of heritage. When commercial colors are incompatible with historically plausible palettes, they may weaken heritage perception; when they are congruent, they can reinforce perceived cultural

continuity. In this study, TCCS are therefore treated as palette-level cues of cultural authenticity and stylistic congruence.

The current study conceptualizes TCCS as a reflective latent variable that defines how traditionally and culturally fitting the palette is perceived by the viewer. Modern design artifact. This focus of perception is significant since (a) the judgments made by viewers are not made based on pigment but on what the palette tells them. chemistry and (b) in digital form, the same traditional color name may be expressed by varying values of the device-dependent RGB. As such, TCCS is here described as an experiential and meaning-infused sense of a palette being traditionally Chinese, not a set of colors. Lastly, the context of the color is important.

Research on Chinese consumers' responses to culturally salient colors also shows that single-color effects are not universal. For example, red may produce different psychological effects depending on perceptual inferences such as distance and spaciousness in the visual field (Zhao & Guan, 2023). This supports the present study's scheme-level approach: the effect of traditional color is expected to operate through combinations, contextual fit, authenticity, harmony, symbolism, and distinctiveness rather than through isolated hues.

1.2. Emotional Responses (ER)

Emotional Responses (ER) refer to immediate affective reactions to a visual artifact, including pleasure, calmness, interest, excitement, pride, and nostalgia. Design and environmental psychology studies show that physical visual stimuli such as color can influence emotion and subsequent evaluation (Kim et al., 2020; Zhu et al., 2024). Color is especially relevant because it can be processed quickly and can produce affective associations even before viewers explicitly articulate the reason for their response (Jonaskaite et al., 2020).

Color-emotion associations contain both broadly shared tendencies and culturally shaped variation. A cross-cultural study found that universal patterns in color-emotion links are further shaped by linguistic and geographic proximity, indicating that culture can influence how colors map onto affective meaning (Jonaskaite et al., 2020). These findings justify treating ER as a systematic psychological response rather than as an idiosyncratic or purely personal reaction.

Applied design studies provide more direct evidence that color can affect emotional and aesthetic responses. Interior color in luxury service settings has been shown to influence customers' emotions and aesthetic perception (Kim et al., 2020). Similarly, shopping-mall facade color can shape emotional response and aesthetic perception in ways that affect entry decisions (Zhu et al., 2024). These findings are consistent with an S-O-R pathway in which emotion operates between design stimulus and evaluative response.

Traditional cultural colors may produce especially meaningful emotional responses because cultural palettes carry narrative, identity, and heritage associations. Heritage color research suggests that color treatments can alter perceived heritage atmosphere and cultural continuity (Yao et al., 2025). In the present study, ER is therefore expected to include both general positive affect and culturally associated emotions, such as pride, connection, or nostalgia.

In this paper, ER is conceptualized as a reflective construct that captures positive affective reactions, activation or interest, and culturally associated feelings elicited by TCCS-based designs. Operationally, ER is measured through self-reported responses immediately after exposure to the visual stimulus, which is consistent with color-and-design studies that quantify evaluative feelings through short affective scales (Perrig et al., 2023; Zhu et al., 2024). Because the title emphasizes a mediating role, ER is treated as the key psychological mediator between TCCS and VA.

1.3. Visual Attractiveness (VA)

Visual Attractiveness (VA) refers to the perceived aesthetic appeal of a visual object, including the extent to which viewers perceive it as beautiful, pleasing, interesting, and worth attending to. VA is not a pure beauty judgment;

it is an evaluative construct associated with attention, preference, interaction, and approach-related tendencies in digital and physical spaces (Jylhä & Hamari, 2019; Perrig et al., 2023).

In retail and architectural settings, attractiveness-related evaluations can influence entry, exploration, and purchase-related actions (Kim et al., 2020; Zhu et al., 2024). Processing-fluency theory also suggests that visual objects are evaluated more positively when they are easier to process and structurally coherent (Reber, Schwarz, & Winkielman, 2004). Color harmony is therefore relevant because it can reduce cognitive burden and support perceived appeal (Wu, Tan, & Liu, 2022).

In cultural design contexts, color-based cues may also signal authenticity, continuity, and heritage meaning. This symbolic layer is especially relevant for TCCS because culturally congruent color combinations can make a design appear more historically appropriate and aesthetically meaningful (Yao et al., 2025). Thus, color is not merely an aesthetic variable; it can operate as a semantic cue that shapes higher-level design impressions.

In this research, VA is operationalized as a reflective latent construct using aesthetic evaluation statements such as visual attractiveness, beauty, liking, and preference for the visual appearance. This operationalization is consistent with recent user-experience and interface-aesthetics research that treats visual attractiveness as a measurable evaluative perception (Moshagen & Thielsch, 2010; Perrig et al., 2023). The structural model treats VA as the primary dependent variable.

2. LITERATURE REVIEW

2.1. Traditional Chinese Color Schemes (TCCS) and Visual Attractiveness (VA)

Research on Traditional Chinese Color Schemes has increasingly shifted from broad cultural description to measurable palette structures. Recent studies have mapped traditional color terms and digital color-composition patterns, showing that TCCS can be treated as structured cultural design resources rather than isolated hues (Chen et al., 2024; Hu et al., 2025). However, much of this work still emphasizes palette classification, reconstruction, or design application rather than audience-based attractiveness judgment. Applied research on cultural-creative color matching supports the design value of traditional palettes, but it does not fully explain how viewers evaluate their attractiveness (Deng et al., 2022). This creates a need to connect TCCS research with visual-aesthetic evaluation.

Visual attractiveness is a meaningful evaluative outcome in design and communication research. Product aesthetics research shows that visual form can influence consumer response and that individuals differ in the importance they attach to visual product aesthetics (Bloch, Brunel, & Arnold, 2003). Interface-aesthetics research similarly treats visual attractiveness as a measurable perception that shapes user judgment, preference, and willingness to interact with a visual object (Moshagen & Thielsch, 2010). Therefore, VA is not treated here as a superficial beauty rating, but as an evaluative response that can connect visual form with attention, preference, and interaction.

The expected relationship between TCCS and VA can be explained through processing fluency and cultural congruence. Processing fluency theory argues that visual objects are evaluated more positively when they are easier to process and structurally coherent (Reber et al., 2004). Color-preference theory further suggests that preferences are partly shaped by affective associations with color-related objects and contexts (Palmer & Schloss, 2010). In cultural settings, color can also signal authenticity and heritage continuity, making a design appear more culturally appropriate and aesthetically meaningful (Yao et al., 2025). Therefore, TCCS are expected to enhance VA because they combine visual harmony, cultural recognizability, and symbolic meaning.

H₁: Traditional Chinese Color Schemes (TCCS) positively influence Visual Attractiveness (VA).

2.2. Traditional Chinese Color Schemes (TCCS) and Emotional Responses (ER)

Color is a psychologically active stimulus because it carries perceptual, affective, and cultural meanings. Color psychology research shows that color perception can influence affect, cognition, and behavior, although these effects

depend on context, learned associations, and task conditions (Elliot & Maier, 2014). Cross-cultural evidence further indicates that color-emotion associations contain both shared tendencies and culturally shaped variation (Jonauskaitė et al., 2020). Earlier color-science studies also showed that color combinations can evoke systematic emotional impressions, supporting the treatment of ER as a theoretically grounded response to color-based visual stimuli (Ou, Luo, Woodcock, & Wright, 2004).

Applied design studies provide more direct evidence that color can shape emotional states in visual and environmental contexts. Interior color in luxury service settings has been shown to influence customer emotion and aesthetic perception (Kim et al., 2020). Shopping-mall façade color can also shape emotional response and aesthetic perception in ways that affect entry decisions (Zhu et al., 2024). These findings show that color is not merely a physical surface property; it can function as a design stimulus that produces affective responses before or alongside evaluative judgment.

In the specific context of TCCS, emotional responses are likely to involve more than generic pleasure or calmness. Traditional Chinese palettes are linked with artifacts, ritual symbolism, cultural continuity, and heritage-related visual memory. Heritage color research suggests that color treatments can influence perceived heritage features and cultural atmosphere (Yao et al., 2025). At the same time, research on Chinese consumers' responses to culturally salient colors supports the present study's scheme-level approach rather than a single-color explanation (Zhao & Guan, 2023). Accordingly, TCCS are expected to produce stronger ER because they operate as culturally meaningful palette systems rather than isolated chromatic stimuli.

H₂: Traditional Chinese Color Schemes (TCCS) positively influence Emotional Responses (ER).

2.3. Emotional Responses (ER) and Visual Attractiveness (VA)

Aesthetic evaluation is closely connected with affective experience. The information-processing model of aesthetic appreciation proposes that perception, classification, cognitive mastering, and evaluation jointly shape aesthetic judgment, with affective response contributing to appreciation (Leder, Belke, Oeberst, & Augustin, 2004). Interface aesthetics research further shows that perceived visual aesthetics can strengthen quality judgments, preference, and user engagement (Lavie & Tractinsky, 2004; Moshagen & Thielsch, 2010). These studies suggest that ER can serve as a proximal psychological antecedent of VA.

Empirical color and design studies provide additional support for the ER to VA path. In service and built-environment contexts, emotional states triggered by color-related design cues are associated with aesthetic evaluation and approach-related judgments (Kim et al., 2020; Zhu et al., 2024). In digital contexts, app and interface aesthetics can also influence user experience and interaction tendencies (Jylhä & Hamari, 2019; Perrig et al., 2023). Therefore, when TCCS-based designs elicit pleasure, interest, calmness, pride, or nostalgia, viewers are more likely to evaluate the design as visually attractive.

At the same time, attractiveness is not identical to emotion. A design may be attractive because it is easy to process, visually coherent, culturally congruent, or semantically meaningful, even when emotional intensity is moderate (Reber et al., 2004). Color harmony can also reduce cognitive burden and support visual appraisal (Wu et al., 2022). Thus, ER is expected to be an important predictor of VA, but not the only determinant of VA. This distinction is important because the present study tests mediation rather than assuming that emotional response fully explains attractiveness judgments.

H₃: Emotional Responses (ER) positively influence Visual Attractiveness (VA).

2.4. Emotional Responses as a Mediator

The proposed mediation is grounded in the stimulus-organism-response (S-O-R) logic, in which environmental or design cues function as stimuli, internal affective states operate as organismic responses, and evaluative or behavioral outcomes emerge as responses (Mehrabian & Russell, 1974). Retail-environment research has applied this

logic by showing that store atmosphere can influence emotional states and subsequent approach-related intentions (Donovan & Rossiter, 1982). In the present context, TCCS functions as visual-cultural stimuli, ER represents the organismic state, and VA represents the evaluative response.

This pathway is consistent with evidence that color combinations generate emotional impressions (Ou et al., 2004), that color effects depend on psychological meaning and cultural association (Elliot & Maier, 2014), and that affective reactions contribute to aesthetic appreciation (Leder et al., 2004). Mediation analysis is therefore appropriate for testing whether TCCS enhances VA partly by first strengthening ER (Nitzl, Roldan, & Cepeda, 2016).

H₄: Emotional Responses (ER) mediate the relationship between Traditional Chinese Color Schemes (TCCS) and Visual Attractiveness (VA).

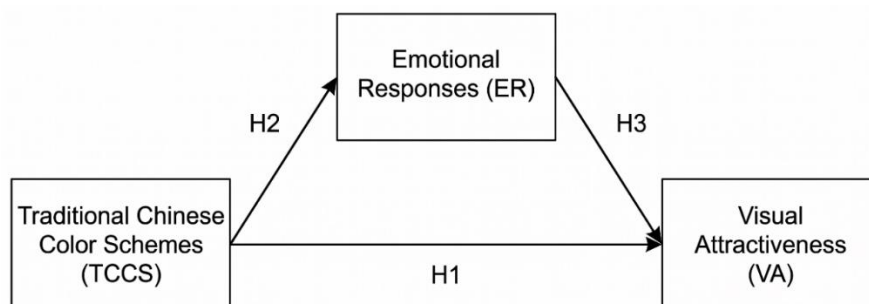
2.5. Partial Mediation of Emotional Responses

A full-mediation explanation would be too narrow because TCCS may influence VA through both affective and non-affective evaluative routes. From a fluency perspective, a coherent palette can be visually pleasing because it is easier to process, even when the viewer does not report a strong emotional response (Reber et al., 2004). From a visual aesthetics perspective, orderly composition, expressive originality, colourfulness, and craftsmanship can support attractiveness judgments through perceptual appraisal and design-quality evaluation (Lavie & Tractinsky, 2004; Mehrabian & Russell, 1974).

In culturally grounded design, TCCS may also produce direct evaluative effects by signalling authenticity, continuity, heritage identity, and semantic congruence. Traditional color systems can structure perceptions of heritage features and cultural meaning (Hu et al., 2025; Yao et al., 2025). Color harmony can also support perceptual efficiency, which means that contextual fit and cognitive fluency may operate alongside emotion (Wu et al., 2022). The present study therefore, expects partial mediation: ER should carry a meaningful share of the TCCS to VA relationship, while the direct TCCS to VA path should remain significant.

H₅: Emotional Responses (ER) partially mediate the relationship between Traditional Chinese Color Schemes (TCCS) and Visual Attractiveness (VA), such that the direct TCCS → VA path remains significant after accounting for ER.

Figure 1 illustrates the theoretical model linking Traditional Chinese Color Schemes (TCCS), Emotional Responses (ER), and Visual Attractiveness (VA).



H₄: ER mediates the relationship between TCCS and VA

H₅: Partial mediation

Figure 1. Theoretical Model.

3. METHODOLOGY

3.1. Research Design

In the current research, a quantitative cross-sectional survey was applied to prove the suggested mediation model of Traditional Chinese Color Schemes (TCCS), Emotional Responses (ER), and Visual Attractiveness (VA). In

contrast to the previous literature that primarily focused on the extraction, classification, or computational optimization of traditional Chinese palettes, the current study revolves around the way viewers psychologically react to TCCS in a modern visual communication setting. This study methodologically considers TCCS to be a scheme-level perceptual construction, and not as an objective set of colorimetric properties. A structured questionnaire comprising 5-point Likert scales (1 = Strongly Disagree, 5 = Strongly Agree) was thus employed to elicit the responses of the respondents with regard to the palette traditionality, emotional reactions, and visual attractiveness in reference to the controlled environment conditions.

The design extends prior TCCS-related research by shifting the focus from palette generation and heritage reconstruction to viewers' perceptual and affective appraisal. Participants evaluated a standardized cultural-creative visual stimulus in which layout, typography, and content were held constant, while the color palette was designed according to TCCS principles derived from traditional Chinese aesthetics and heritage color literature (Deng et al., 2022; Yao et al., 2025). After exposure, respondents rated perceived TCCS, emotional responses, and visual attractiveness. This procedure is consistent with applied color research that measures affective and evaluative responses to controlled visual stimuli (Kim et al., 2020; Zhu et al., 2024). Data were collected through an online WeChat mini-program, and 360 valid responses were retained for analysis. The questionnaire included demographic variables and 15 five-point Likert-scale items measuring TCCS, ER, and VA.

The sample was collected online and is therefore analytically appropriate for estimating the proposed model, but it should not be treated as statistically representative of a wider population. The methodological objective of this study is explanatory model testing rather than population generalization. The respondent profile is presented in the Results section to contextualize the final sample characteristics.

No missing values appeared in the final dataset after screening. All focal constructs were modelled reflectively. PLS-SEM with 5,000 bootstrap resamples was selected because the study estimates latent constructs with multiple indicators and examines both direct and indirect effects in a prediction-oriented mediation model (Hair et al., 2021; Nitzi et al., 2016). Measurement model assessment and structural model testing were conducted in two stages.

Table 1 presents the questionnaire profile and measurement items for Traditional Chinese Color Schemes (TCCS), Emotional Responses (ER), and Visual Attractiveness (VA).

Table 1. Questionnaire profile and measurement items.

Questionnaire profile		
Variables	Indicator	Measurement Items (5-point Likert)
Traditional Chinese Color Schemes (TCCS)	TCCS1	The color combination reflects traditional Chinese aesthetics.
	TCCS2	The palette feels culturally authentic and heritage-related.
	TCCS3	The colors appear harmonious in a way that fits traditional Chinese style.
	TCCS4	The palette seems distinctive compared with common modern color schemes.
	TCCS5	The palette conveys meaningful Chinese cultural symbolism.
Emotional Responses (ER)	ER1	I feel pleasant when I look at this design.
	ER2	This design makes me feel calm/relaxed.
	ER3	This design makes me feel excited/interested.
	ER4	This design makes me feel emotionally engaged.
	ER5	This design makes me feel culturally proud/connected.
	ER6	This design makes me feel nostalgic.
Visual Attractiveness (VA)	VA1	Overall, this design is visually attractive.
	VA2	Overall, this design is beautiful.
	VA3	I like the visual appearance of this design.
	VA4	I would prefer to choose/click/approach this design compared to alternatives.

4. RESULTS

4.1. Respondent Profile

The profile of respondents is shown in Table 2. The proportion of female respondents was 54.7 and that of male respondents was 45.3. The sample was skewed towards younger ages, with a majority of respondents aged between 18 and 24 (40.3) and 25 and 34 (39.7) accounting for four-fifths of the sample. Educationally, 51.4% reported undergraduate-level education and 39.2% reported master level education. Background in design was fairly even (53.3% yes; 46.7% no), and cultural familiarity was on the whole moderate to high, with 3-5 (levels) representing 79.7% of the respondents. These features imply that the sample was able to assess culturally coded visual stimuli in general, but it cannot be considered nationally representative.

Table 2. Respondent profile.

Variables	Category	n	%
Gender	Female	197	54.7
	Male	163	45.3
Age	18-24	145	40.3
	25-34	143	39.7
	35-44	55	15.3
	45+	17	4.7
Education	Undergraduate	185	51.4
	Master	141	39.2
	PhD	24	6.7
	Other	10	2.8
Design Background	Yes	192	53.3
	No	168	46.7
Cultural Familiarity	4	105	29.2
	3	101	28.1
	5	81	22.5
	2	55	15.3
	1	18	5.0

Table 3 presents the reliability and convergent validity statistics for the three reflective constructs.

Table 3. Variables' reliability and validity statistics.

Construct	Cronbach's alpha	rho_A	rho_C	AVE
Traditional Chinese Color Schemes (TCCS)	0.8157	0.8436	0.8715	0.5761
Emotional Responses (ER)	0.8576	0.8758	0.8940	0.5845
Visual Attractiveness (VA)	0.7874	0.8251	0.8628	0.6114

The estimated structural model is presented in Figure 2. TCCS explains 32.8% of the variance in ER, while TCCS and ER together explain 45.5% of the variance in VA.

These values indicate that palette traditionality and emotional response provide meaningful explanatory power in a compact three-construct model. The positive and statistically significant path coefficients also suggest that respondents who perceived the palette as more traditionally Chinese reported stronger emotional responses and higher visual attractiveness, which is consistent with applied color studies linking color cues with affective and aesthetic evaluation (Kim et al., 2020; Zhu et al., 2024).

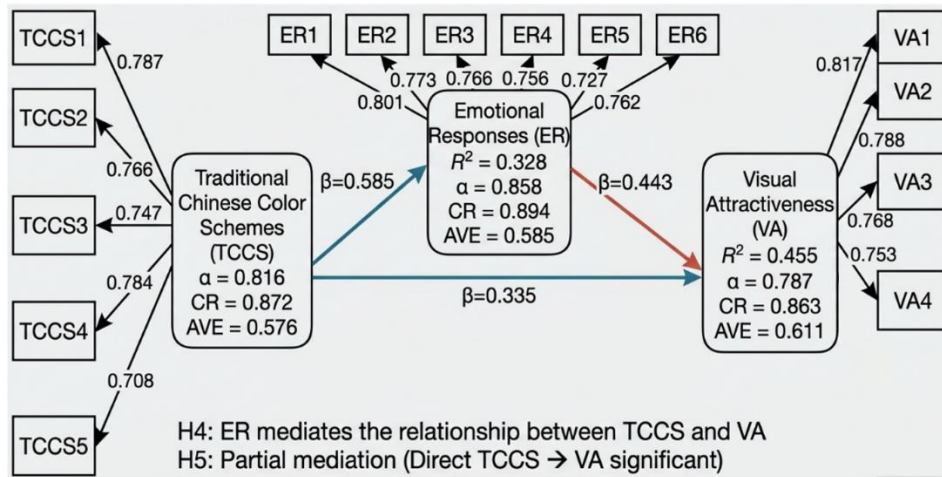


Figure 2. Estimated Model (PLS-SEM).

4.2. Measurement Items Fitness Statistics

Indicator loadings were standardized and are reported in Table 4. All indicators loaded strongly on their target constructs (≥ 0.70), supporting indicator reliability and convergent validity. This pattern is consistent with reflective measurement expectations in PLS-SEM, where loadings above 0.70 indicate that indicators share substantial variance with the intended latent construct (Hair, Risher, Sarstedt, & Ringle, 2019).

Table 4. Measurement items fitness statistics (Standardized loadings).

Indicator	TCCS	ER	VA
TCCS1	0.7870		
TCCS2	0.7661		
TCCS3	0.7470		
TCCS4	0.7837		
TCCS5	0.7084		
ER1		0.8014	
ER2		0.7733	
ER3		0.7659	
ER4		0.7560	
ER5		0.7271	
ER6		0.7615	
VA1			0.8171
VA2			0.7882
VA3			0.7678
VA4			0.7530

4.3. Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT). Table 5 presents the Fornell-Larcker matrix; the diagonal square roots of AVE are TCCS = 0.7590, ER = 0.7645, and VA = 0.7819, and each exceeds its inter-construct correlations. Table 6 presents the HTMT ratios, whose off-diagonal values remain below 0.85. Thus, TCCS, ER, and VA are empirically distinguishable constructs (Hair et al., 2019).

Table 5. Discriminant validity (Fornell-Larcker criterion; diagonal = $\sqrt{\text{AVE}}$).

Construct	TCCS	ER	VA
TCCS	0.7590		
ER	0.6851	0.7645	
VA	0.7148	0.7547	0.7819

Table 6. Discriminant validity (HTMT ratios).

Construct	TCCS	ER	VA
TCCS	—	0.5729	0.5724
ER	0.5729	—	0.6204
VA	0.5724	0.6204	—

4.4. Variables Effects Overview

Table 7 is a summary of the direct, indirect, and total effects along with Cohen's f^2 effect sizes. ER has a moderate impact on visual attractiveness ($f^2 = 0.234$), whereas the direct impact of TCCS on VA is minor but significant ($f^2 = 0.129$). Notably, the indirect impact of TCCS on VA via ER ($= 0.259$) is only 43.6% of the total impact ($= 0.594$), whereas the direct impact is slightly greater ($= 0.335$). This trend shows that the emotional reactions contribute a significant portion of the TCCS benefit, yet do not completely explain it. In practice, it implies that when designing, designers must not judge palettes based on their ability to create formal harmony alone, but also on the intensity with which they produce positive emotional responses.

Table 7. Variable effects overview.

Relationship	Direct effect (β)	Indirect effect (β)	Total effect (β)	Cohen's f^2
TCCS $\rightarrow$ ER	0.585			
ER $\rightarrow$ VA	0.443			0.234
TCCS $\rightarrow$ VA (direct)	0.335			0.129
TCCS $\rightarrow$ VA (indirect via ER)		0.259		
TCCS $\rightarrow$ VA (total)			0.594	

4.5. Explained Variance and Predictive Relevance

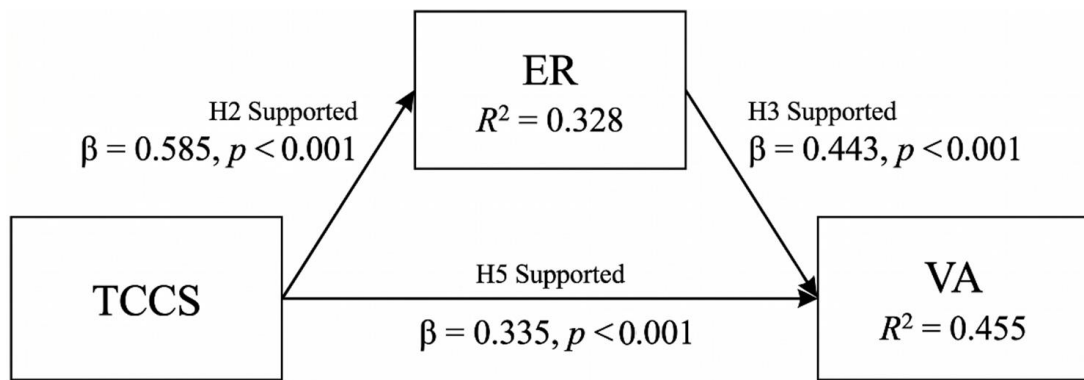
Table 8 reports explained variance, adjusted R^2 , and Q^2 predict values derived from 10-fold cross-validation. The endogenous constructs both show positive Q^2 predict values, indicating predictive relevance. The model explains 32.8% of the variance in ER and 45.5% of the variance in VA, which indicates nontrivial explanatory power in a parsimonious mediation model. Following current PLS-SEM reporting recommendations, interpretation focuses on explanatory power, predictive relevance, and path estimates rather than on a global goodness-of-fit index (Hair et al., 2019).

Table 8. Explained variance and predictive relevance statistics.

Construct	R^2	Adjusted R^2	Q^2 predict	RMSE	MAE
ER	0.3282	0.3264	0.3194	0.8695	0.7146
VA	0.4550	0.4519	0.4480	0.7961	0.6368

4.6. Structural Model for Path Analysis

Figure 3, the structural model, examines the hypothesized associations among TCCS, ER, and VA. The bootstrapped t values are shown in Figure 3. All structural coefficients are positive and statistically significant, confirming the hypothesized directions. Consistent with prior applied color studies, the findings suggest that culturally based color schemes influence evaluative judgment partly through emotional states and partly through direct appraisal-based mechanisms (Kim et al., 2020; Zhu et al., 2024).



Indirect effect (H4): $\beta = 0.259, p < 0.001$
 Total effect (H1): $\beta = 0.594, p < 0.001$

Figure 3. Structural model for path analysis.

4.7. Path Analysis

Table 9 summarizes the hypothesis-testing results for the structural model and mediation analysis (H1–H5). All five hypotheses are supported ($p < 0.001$). Because both the indirect effect (H4) and the remaining direct effect (H5) are significant, the results indicate partial rather than full mediation: TCCS continues to influence visual attractiveness even after ER is included in the model.

Table 9. Structural model path analysis results.

Hypothesis	Original sample (β)	STDEV	T statistics	P values	Decision
H1: Traditional Chinese color schemes (TCCS) positively influence visual attractiveness (VA) (total effect).	0.594	0.043	13.894	<0.001	Supported
H2: Traditional Chinese color schemes (TCCS) positively influence emotional responses (ER).	0.585	0.044	13.385	<0.001	Supported
H3: Emotional responses (ER) positively influence visual attractiveness (VA).	0.443	0.049	8.976	<0.001	Supported
H4: Emotional responses (ER) mediate the relationship between TCCS and VA (indirect effect).	0.259	0.035	7.465	<0.001	Supported
H5: Emotional responses (ER) partially mediate the TCCS→VA relationship (direct effect remains significant).	0.335	0.050	6.736	<0.001	Supported

5. DISCUSSION

This paper examined whether Traditional Chinese Color Schemes influence perceived visual attractiveness and whether emotional response mediates this relationship. Overall, the results support the proposed mediation model and move the discussion beyond a simple association between traditional palettes and attractiveness. The findings show that culturally coded color systems can influence aesthetic judgment through both affective resonance and direct evaluative appraisal.

First, TCCS had a positive total effect on VA. Designs perceived as culturally authentic and traditionally harmonious were evaluated as more attractive, indicating that attractiveness is shaped not only by formal beauty but also by culturally informed perceptual cues. This interpretation is consistent with heritage color research showing that color can contribute to perceived authenticity and cultural continuity (Yao et al., 2025).

Second, TCCS had a strong positive effect on ER, and ER had a positive effect on VA. These findings suggest that culturally grounded palettes can elicit positive affective reactions, including pleasure, interest, pride, and nostalgia, which then strengthen aesthetic evaluation. This result extends color-emotion research from generic color stimuli to culturally meaningful palette systems (Jonauskaitė et al., 2020).

Third, the mediation result is substantively important. The indirect effect of TCCS on VA through ER was significant, but the direct effect remained significant. This means that emotional response explains a meaningful part of the TCCS benefit, but it does not exhaust the relationship. The remaining direct effect suggests that processing fluency, perceived harmony, cultural congruence, and semantic meaning may also contribute to attractiveness judgments (Reber et al., 2004; Wu et al., 2022).

This partial-mediation pattern has practical significance. Designers should not evaluate TCCS only by asking whether a palette looks formally harmonious; they should also test whether the palette produces the intended emotional response. At the same time, emotional testing alone is insufficient because a palette may remain attractive through perceived coherence, cultural appropriateness, and ease of processing even when emotional intensity is moderate.

The results should still be interpreted conditionally rather than universally. Prior research shows that responses to culturally salient colors can vary across perceptual context, meaning that a single color cannot be assumed to produce the same effect in all design settings (Zhao & Guan, 2023). The present study therefore, supports a scheme-level explanation: meaningful color effects in cultural design are produced through combinations, contrasts, contextual congruence, and perceived authenticity rather than through one isolated hue.

Finally, the observed effect sizes and explained variance indicate that palette design is a high-leverage variable in cultural visual communication. ER shows a moderate effect on VA, and the model explains nearly half of the variance in attractiveness. This does not mean that typography, layout, form, or content are unimportant; rather, it shows that palette traditionality and emotional appeal are substantive components of aesthetic evaluation in modern cultural design.

In practical terms, the findings support a two-step evaluation logic. Practitioners should first examine whether a palette is culturally appropriate and visually coherent, and then test whether it elicits the desired emotional reaction. Both pathways matter because the evidence suggests that TCCS can influence attractiveness through emotional resonance as well as through direct appraisal of harmony, authenticity, and cultural meaning.

6. THEORETICAL IMPLICATIONS

Theoretically speaking, the study has advanced the study of the psychology of colors and visual communications by emphasizing the scheme-level structure that is culturally grounded, instead of the particular hue. The results indicate that TCCS can be used as a significant stimulus in an S-O-R model, which arouses emotions, which in turn affect visual attractiveness. This is an extension of the previous color-emotion studies that have often relied on decontextualized color patches by demonstrating that historically important palette systems can be used as psychologically consequential design stimuli. The other theoretical refinement is the mediation results. Emotional responses form an important source through which TCCS influence attractiveness, but the remaining portion of the direct effect is that aesthetic judgments are also defined by cognitive and semantic appraisal processes such as perceived harmony, identification of cultural authenticity, and meaning congruence. This adds to a more nuanced explanation of culturally-based design assessment.

7. PRACTICAL IMPLICATIONS

Practically, the results have a number of design implications. To start with, the choice of palette in cultural-creative design, branding, interfaces, and heritage communication must be shifted away from trend-oriented color selection to palette systems that are seen to be culturally authentic and internally consistent. Computational palette

tools may prove helpful, but must be reviewed in terms of user-based perception and not based on visual matching. Second, since such aspects as emotional reaction explain a significant portion of the attractiveness effect, design evaluation must explicitly include affective measures of attractiveness, including pleasure, calmness, pride, and nostalgia, and not just measure formal harmony. Third, the other direct effect reflects the significance of cognitive fluency and contextual meaning, which implies that effective usage of TCCS presupposes the congruence between palette, design situation, and cultural story. Institutionally, the research findings also form the basis of the creation of more culturally informed palette policies in museums, heritage communication projects, cultural-creative industries, and the presentation of digital cultural content to the public so that the use of colors can be harmonized with both audience reaction and heritage interpretation.

8. LIMITATIONS

Although this study has its contributions, there are several limitations that have to be noted. To begin with, the research design is a cross-sectional survey design, which restricts a solid causal inference between TCCS, emotional reactions, and visual attractiveness. Even though the suggested relationships are theoretically based and justified by mediation analysis, the data are based on self-reported perceptions at one point in time. Stronger causal leverage would be offered by experimental or longitudinal designs. Second, the utilization of one standardized visual stimulus enhances control and allows isolating the effect of palette, but it also restricts the generalizability of the results to design situations. Visual attractiveness can be different when TCCS is used with other artifacts like interfaces, packaging, architectural environments, or immersive environments. Third, all focal constructs were measured on Likert-scale items, which were self-reported. Though it is appropriate for studies that are based on perception and emotions, it is still susceptible to common method bias and is not fully representative of consequential behavior such as actual clicking, choice, or approach intentions in the field. Lastly, the sample was gathered online via a WeChat mini program, and it was gathered via convenience sampling; thus, it cannot be assumed that the sample is statistically representative of a larger population. Furthermore, the working of TCCS is based on perceived traditionality and cultural authenticity in contrast to the objective colorimetric qualities of color, saturation, lightness, and contrast. Future work must be more concerned with relating perceptual responses to measurable color parameters.

9. FUTURE RESEARCH DIRECTIONS

Based on these limitations, a few recommendations are provided on the way forward in future research. Subsequent research can be carried out in experimental designs that systematically manipulate the color schemes and hold other visual aspects constant. An example would be the comparison of the classic Chinese color schemes with the modern/neutral ones to establish the cause-effect relationships and clarify the incremental value of the scheme-level traditionalism in comparison with the impact of individual colors.

Several visual settings and areas of application might be added in future studies as well. To better benefit the hypotheses of the proposed TCCS emotion attractiveness mechanism, it would be more beneficial to test the hypotheses in different design settings, such as digital interfaces, cultural-creative products, retail or heritage spaces, to enhance the external validity of the findings and provide more domain-specific design data. Besides, the combination of behavioral and physiological indicators to complement self-reported information can be used as the basis of the further studies.

The choice behavior, dwell time, eye-tracking measures, or psychophysiological measures may be more reflective of how the emotional response to color schemes is transduced into actual engagement and aesthetic preference. The other avenue that can be taken up with good results is the improvement of the conceptualization of emotional responses. Instead of considering emotional responses as one construct, it is possible that in the future, we will be able to study separate emotional dimensions (e.g., pleasure, arousal, cultural pride, nostalgia) as parallel mediators.

This would enable a more subtle interpretation of the most influential affective elements to influence visual attractiveness within culturally based design settings.

Lastly, the contribution of individual and cultural differences could be examined in the future. The effects of the traditional Chinese color scheme on attractiveness rating and emotionality might be mitigated by such factors as cultural familiarity, design knowledge, age, or aesthetic sensitivity. The study of such boundary conditions would help to understand to whom, and under what circumstances, culturally based color schemes are the most effective.

10. CONCLUSION

This paper shows that Traditional Chinese Color Schemes (TCCS) boost perceived Visual Attractiveness (VA) directly and indirectly via Emotional Responses (ER), and therefore, a partial mediation model is supported. The results show that the palette systems based on culture not only affect the aesthetic judgment in the form of affective resonance, but also directly in the form of harmony, cultural congruence, and semantic meaning. The research is relevant to the study of color psychology and visual communication by conceptualizing TCCS as a scheme-level perceptual object, instead of individual hues. This way, it explains how culturally relevant palette systems are psychologically consequential design resources in modern visual communication. In practical terms, the results indicate that palette systems must be considered by designers, museums, heritage communication teams, and cultural-creative industries not only in terms of formal harmony, but also its ability to convey cultural authenticity and elicit emotionally significant responses in the audience. In a wider scope, the findings contribute to the creation of culturally competent palette principles of modern heritage-related design and digital cultural communication.

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