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Research on the Visual Presentation and User Experience of Art Design in Wearable Smart Textiles

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Article

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ABSTRACT

The functionalization of textile substrates with smart materials has enabled new forms of wearable technology, shifting the focus from purely functional applications to human-centered design. However, the impact of aesthetic choices on the user experience (UX) of interactive textiles—particularly the visual presentation of their dynamic coloration—remains underexplored. This study investigates how two specific patterns, selected to represent a contrast between a simple, structured geometric design and a complex, organic biomimetic design, influence user responses to photochromic smart textiles. We conducted a controlled experiment (N = 40) in which participants were exposed to two distinct dynamic patterns—a geometric grid and a biomimetic pattern—applied via screen printing of photochromic dyes onto a cotton-blend fabric. The patterns were activated by UV light to induce a color change. User experience was quantified using the Self-Assessment Manikin (SAM) for valence/arousal and scales for Perceived Visual Understandability and Technology Acceptance (TAM). Results revealed that the biomimetic pattern elicited a significantly higher emotional valence (p < .001) and was perceived as more aesthetically pleasing. Conversely, no significant difference was found in visual understandability, indicating that the core functionality of the textile's color-changing property was perceived equally. These findings provide empirical evidence that, in the context of this comparison, the organic and visually complex nature of the biomimetic pattern was a critical factor in shaping a more positive affective dimension of user experience. This research underscores the necessity of integrating aesthetic design principles into the textile engineering and apparel design process to create more desirable and resonant interactive textile products.

KEYWORDS

smart textiles, photochromic dyes, textile printing, interactive textiles, apparel design

INTRODUCTION

The proliferation of wearable technology has marked a significant paradigm shift in how humans interact with digital information [1]. Moving beyond handheld devices, technology is increasingly being integrated directly into the fabrics that adorn our bodies, giving rise to the field of smart textiles [2]. These textiles, embedded with electronic components or composed of advanced materials, possess the ability to sense, react, and adapt to their environment or user input [3]. Early developments in this domain were predominantly driven by engineering objectives, focusing on enhancing functionality, durability, and connectivity for applications in healthcare, athletics, and military contexts [4]. However, as smart textiles transition from niche prototypes to consumer products, the user's subjective experience—encompassing usability, aesthetics, and emotional response—has become a crucial determinant of their acceptance and success [3,5]. The aesthetic dimension, in particular, which governs the visual and stylistic integration of technology into clothing, plays a pivotal role in this experiential landscape.

Despite the growing recognition of design's importance, a significant portion of research in smart textiles continues to prioritize technical performance over human-centered considerations [6,7]. The visual output of many smart textiles often defaults to simplistic or rudimentary displays, such as basic color changes or glowing indicators, which may lack aesthetic appeal and emotional resonance [8,9]. This oversight represents a missed opportunity, as the visual presentation of information on a textile surface can profoundly influence a user's perception, engagement, and overall satisfaction [10,11]. Unlike rigid electronic screens, textiles offer a unique canvas that is soft, flexible, and intimately connected to the human body, suggesting that design strategies should be tailored to this distinct medium [7,8]. The artistic design of a dynamic visual element is not merely decorative; it is an integral component of the user interface that communicates information, evokes emotion, and shapes the identity of the wearable object [12].

This paper addresses a specific gap in the existing literature: the lack of empirical investigation into how artistic pattern design affects the user experience of dynamic, non-emissive smart textiles. We focus specifically on photochromic textiles, which change color in response to ultraviolet (UV) light. This technology provides a subtle, integrated, and power-efficient method for creating dynamic visual displays. The central research question guiding this study is: How do different design paradigms—specifically, a standard geometric grid (representing current technical minimalism) versus a complex organic pattern (representing future aesthetic integration)—influence a user's emotional response, functional understandability, and willingness to adopt the technology? By conducting a controlled experiment with human participants, this study aims to move beyond anecdotal observations and provide quantitative data on the impact of artistic choices. The findings are intended to offer evidence-based guidelines for designers and engineers, fostering a more collaborative and integrated approach to the creation of future wearable smart textiles that are not only functional but also aesthetically compelling and emotionally engaging.

RELATED WORK

A comprehensive understanding of the research problem requires an interdisciplinary review of literature spanning smart materials, user experience theory, and the psychology of aesthetic perception.

Photochromic Smart Textiles

Smart textiles can be broadly categorized into two groups: those incorporating conventional electronics (e-textiles) and those utilizing advanced materials with inherent smart properties [13,14]. Photochromic textiles belong to the latter category. They are created by treating fabrics with photochromic dyes or pigments, which undergo a reversible molecular transformation when exposed to specific wavelengths of light, typically UV radiation [15,16]. This change alters their absorption spectrum, resulting in a visible color change. Upon removal of the UV source, the molecules revert to their original state, and the color fades. This technology has been explored for various applications, including UV radiation sensors, adaptive camouflage, and interactive fashion [17,18]. Compared to emissive displays like LEDs, photochromic materials offer a more subtle and integrated aesthetic, as the display is part of the fabric's material essence rather than an embedded component [8]. Existing research in this area has largely concentrated on the material science aspects, such as improving the durability, colorfastness, and response time of the dyes. Studies focusing on the human-computer interaction (HCI) and design aspects of these materials are comparatively scarce, leaving a void in our understanding of how to best design visual experiences with them [16,19].

User Experience in Wearable Technology

User experience (UX) is a multifaceted concept that describes a person's perceptions and responses resulting from the use or anticipated use of a product, system, or service [20,21]. In the context of wearables, UX extends beyond traditional usability metrics (e.g., efficiency, effectiveness) to include critical factors such as comfort, social acceptability, aesthetics, and affective response [5,22]. As wearables are worn on the body, often as a form of self-expression, their aesthetic qualities are not superficial but are central to the user's experience [23]. Research in HCI has shown that aesthetically pleasing designs can positively influence users' perceptions of usability and foster a stronger emotional connection with technology [11,24]. This phenomenon, known as the aesthetic-usability effect, suggests that users are more tolerant of minor usability issues in a product they find visually appealing. For smart textiles, which are fundamentally fashion items, the visual design is therefore inextricably linked to their overall perceived quality and desirability [3,25].

The Role of Pattern in Visual and Aesthetic Perception

The choice of pattern is a fundamental element of textile design. Patterns can convey meaning, evoke associations, and elicit emotional responses [26,27]. Psychological research into visual perception provides a theoretical basis for understanding these effects. For instance, the Biophilia hypothesis posits that humans have an innate tendency to seek connections with nature and other forms of life. This suggests that patterns inspired by natural forms—biomimetic patterns such as leaf veins, cellular structures, or water ripples—may be perceived as more calming, pleasing, and interesting than purely artificial or abstract geometric forms [28,29]. Geometric patterns, characterized by repeating lines, shapes, and symmetry, often convey a sense of order, logic, and modernity [30]. While effective in many design contexts, they can also be perceived as rigid or monotonous. The dynamic nature of smart textiles adds another layer to this consideration. The way a pattern appears, changes, and fades over time constitutes a temporal aesthetic experience. Research on how the style of these dynamic patterns influences user perception is essential for creating meaningful and engaging interactions. This study aims to bridge this gap by systematically comparing the UX outcomes of two fundamentally different pattern styles—geometric and biomimetic—within the context of photochromic textiles.

METHODOLOGY

To empirically assess the influence of pattern design on user experience, a controlled within-subjects laboratory experiment was designed. This approach allows for direct comparison of the different pattern conditions while minimizing the impact of individual differences among participants.

Participants

Forty participants (22 female, 18 male) were recruited from a local university community. Their ages ranged from 19 to 31 years (mean = 24.5, SD = 3.2). All participants had normal or corrected-to-normal vision and no self-reported color blindness. To ensure responses were not biased by prior knowledge, a screening question confirmed that no participants had previous experience with or specialized knowledge of photochromic textiles. All participants provided informed consent before the experiment and received a small honorarium for their time.

Materials and Apparatus

The controlled laboratory presentation was implemented to isolate the effect of pattern design on first-impression responses while minimizing uncontrolled environmental variability.

- Textile Samples: Two identical 20 cm × 20 cm fabric samples were prepared from a bright white, medium-weight cotton-polyester blend fabric (50/50), which featured a non-reflective, matte finish. This substrate was chosen for its smooth surface and good ink absorption properties.
- Photochromic Ink: A commercially available, water-based photochromic screen-printing ink was used. The ink was colorless under indoor lighting and transitioned to a deep violet color upon exposure to UV radiation.
- Pattern Designs: The photochromic ink was screen-printed onto the fabric samples in two different patterns (see Figure 1).
- Geometric Pattern: A grid of 1.5 cm squares with 0.2 cm line thickness. This design was chosen to represent a structured, artificial, and predictable visual style.
- Biomimetic Pattern: This pattern was derived from the vein structure of a leaf and featured organic, branching lines of varying thickness. To provide a quantitative comparison with the geometric pattern, the line thickness in this design was intentionally varied, with major veins having an approximate thickness of 0.3 cm, tapering down to approximately 0.1 cm for the finest branching lines. This design was chosen to represent a natural, complex, and ordered-yet-unpredictable visual style.

  The total inked area was kept consistent across both patterns to ensure a comparable intensity of color change.

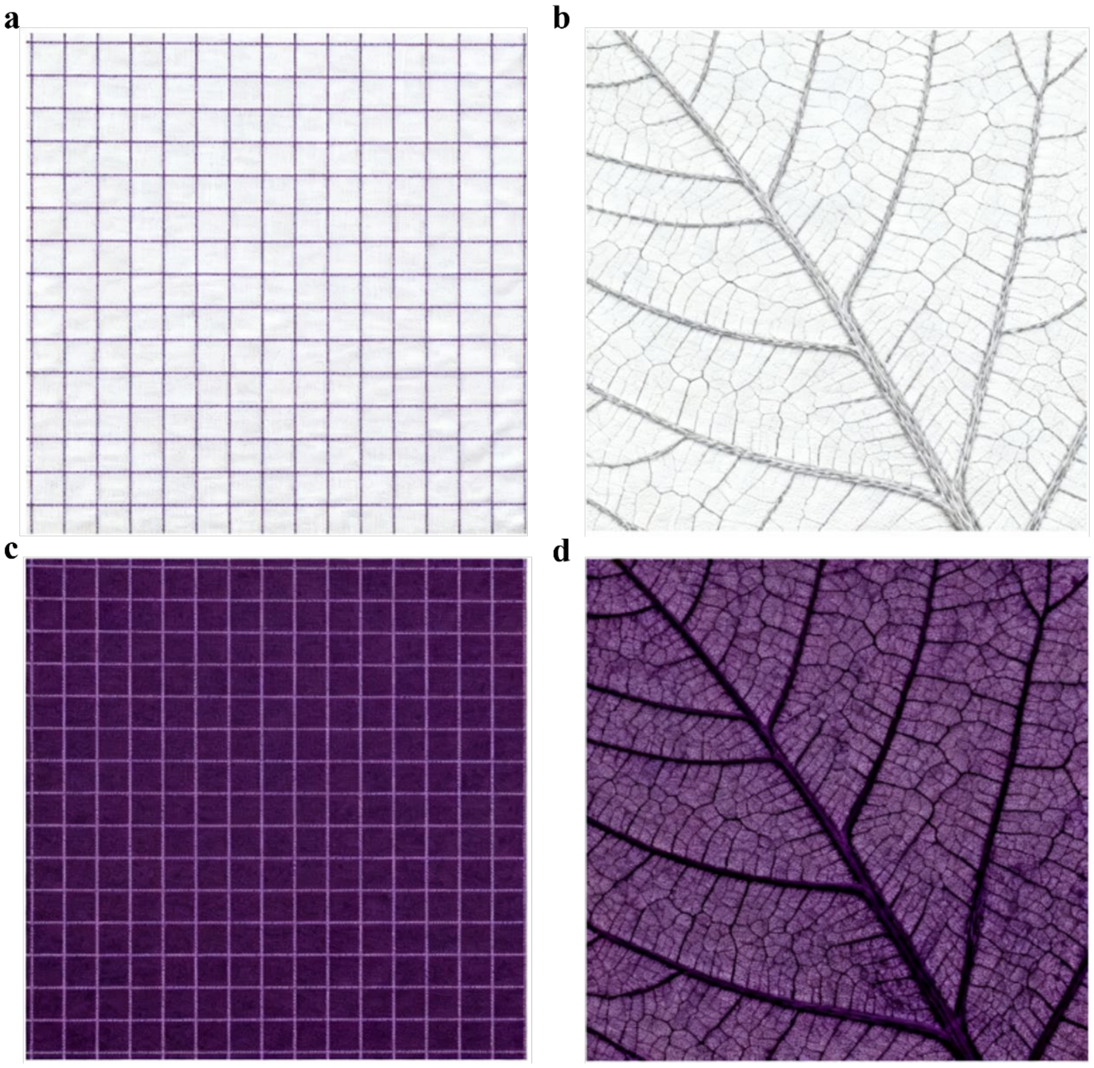

Figure 1. The experimental stimuli used in the study. (a) Geometric pattern—inactive; (b) Biomimetic pattern—inactive; (c) Geometric pattern—UV activated; (d) Biomimetic pattern—UV activated. Images were captured using fixed exposure settings and underwent brightness calibration to ensure visual consistency between the pattern conditions

- Apparatus: The experiment was conducted in a room with controlled ambient lighting. Each textile sample was placed on a flat surface. A 365 nm UV LED array was mounted 30 cm above the sample. The UV light was controlled by the experimenter and could be switched on to activate the photochromic effect uniformly across the fabric.

Measures

A combination of standardized and custom questionnaires was used to quantify user experience.

- Emotional Response: The Self-Assessment Manikin (SAM) was used to measure the affective dimensions of valence (pleasure–displeasure) and arousal (excitement–calmness). SAM is a non-verbal pictorial assessment technique that uses a 9-point scale for each dimension.

- Perceived Visual Understandability: To assess the functional effectiveness of the textile display, a custom scale was developed focusing on visual legibility. Participants rated the patterns on clarity ("I could clearly distinguish the signal"), immediacy ("The color change conveyed information instantly"), and lack of ambiguity.
- Technology Acceptance: To evaluate the potential for user adoption, we adapted the Technology Acceptance Model (TAM) for a wearable context. Participants rated their perceived usefulness of the function and their behavioral intention to wear or purchase the design if it were a commercial product.
- Aesthetic Perception: A custom 7-point Likert scale questionnaire was developed to assess specific aesthetic qualities. Participants rated each pattern on three items: "The pattern is beautiful," "The pattern is interesting," and "The pattern is desirable" (1 = Strongly Disagree, 7 = Strongly Agree).

Procedure

Participants were tested individually. The order of presentation of the two patterns (Geometric and Biomimetic) was counterbalanced across participants to mitigate any ordering effects.

Introduction: Participants were briefed on the study's purpose without revealing the specific hypotheses. They then provided informed consent and completed a short demographic questionnaire.

First Exposure: The first textile sample (in its colorless state) was presented. The participant was instructed to observe it closely. The experimenter then activated the UV light for 45 seconds, allowing the pattern to fully develop. The light was then turned off.

First Assessment: Immediately after the exposure, participants completed the SAM, the Perceived Visual Understandability items, the TAM-based acceptance items, and the aesthetic perception questionnaire.

Washout Period: Between the two pattern conditions, a 5-minute washout interval was introduced to allow the photochromic textiles to fully return to their baseline colorless state. This interval was necessary due to the material reset time required by the dyes. A simple puzzle-based filler activity was provided during this period to keep participants engaged, but it served no experimental purpose and was not intended as an affective manipulation.

Second Exposure and Assessment: The procedure was repeated from steps 2–3 with the second textile sample featuring the other pattern.

Debriefing: After the final assessment, participants were fully debriefed about the research objectives.

Data Analysis

The collected data were analyzed using SPSS software. Paired-samples *t*-tests were chosen as the primary statistical method to compare the means of the dependent variables (valence, arousal, visual understandability scores, technology acceptance scores, and the three aesthetic ratings) between the two within-subjects conditions (Geometric vs. Biomimetic). The significance level was set at $\alpha = 0.05$.

Internal consistency reliability was assessed for all multi-item scales used in the study. The Perceived Visual Understandability scale demonstrated acceptable reliability (Cronbach's $\alpha = 0.70$). The Aesthetic Perception scale showed strong internal consistency (Cronbach's $\alpha = 0.88$). The Technology Acceptance measures also demonstrated good to excellent reliability (Perceived Usefulness: $\alpha = 0.84$; Behavioral Intention: $\alpha = 0.90$). These results indicate that the scales reliably captured the intended constructs.

RESULTS

The analysis of the collected data revealed significant differences in the emotional and aesthetic responses to the two patterns, but not in perceived visual understandability. The mean scores, standard deviations, and statistical test results are summarized below.

Emotional Response

The analysis of the SAM scores showed a significant effect of pattern design on emotional valence. The biomimetic pattern (M = 7.15, SD = 1.08) was rated as significantly more pleasant than the geometric pattern (M = 5.30, SD = 1.26). This difference was statistically significant, $t(39) = 7.82$, $p < 0.001$, Cohen's $d = 1.58$. For the arousal dimension, the biomimetic pattern (M = 5.25, SD = 1.45) also scored slightly higher than the geometric pattern (M = 4.80, SD = 1.34), but this difference was not statistically significant, $t(39) = 1.65$, $p = 0.107$, Cohen's $d = 0.32$. These results, visualized in Figure 2, indicate that while both patterns were similarly stimulating, the biomimetic design elicited a much more positive emotional state.

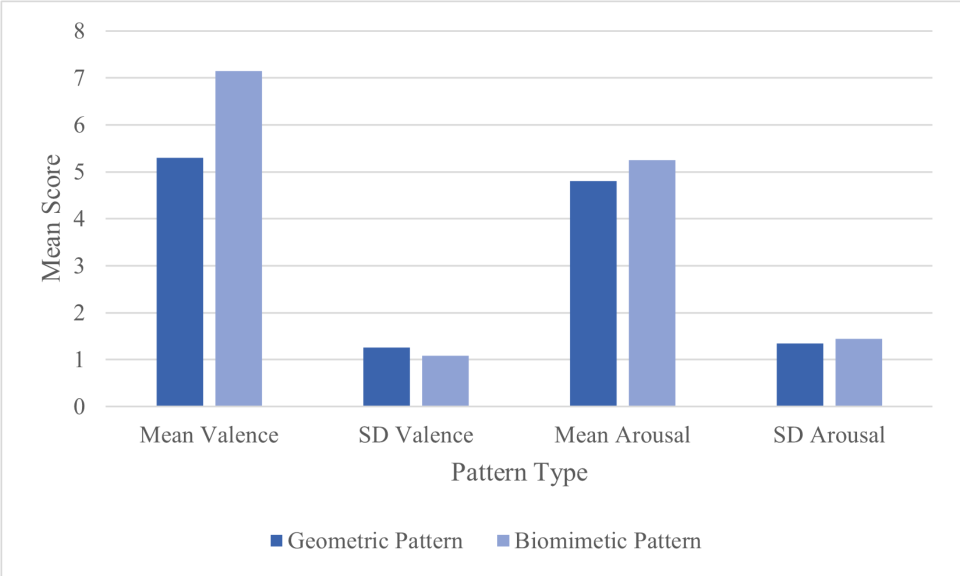

Figure 2. Comparison of mean emotional response scores for the geometric and biomimetic patterns

Aesthetic Perception

The participants' ratings on the aesthetic perception scales strongly favored the biomimetic pattern. As shown in Table 1, the biomimetic pattern was rated as significantly more beautiful, interesting, and desirable than the geometric pattern. All comparisons yielded a *p*-value of less than 0.001, with large effect sizes (Cohen's $d > 1.50$ for all metrics), indicating a very strong and consistent preference for the nature-inspired design.

Table 1. Paired t-Test Results for Aesthetic Perception Ratings

Aesthetic Metric	Pattern Type	Mean (SD)	*t*-value	df	*p*-value
Beauty	Geometric	4.20 (1.34)	9.14	39	< 0.001
Biomimetic		6.55 (0.88)			
Interest	Geometric	4.95 (1.47)	6.98	39	< 0.001
Biomimetic		6.40 (0.94)			
Desirability	Geometric	3.85 (1.51)	8.52	39	< 0.001
Biomimetic		6.25 (1.06)			

Functional Legibility and Technology Acceptance

The analysis of functional understanding and user acceptance yielded distinct outcomes. First, regarding Perceived Visual Understandability, the paired-samples *t*-test found no statistically significant difference between the two conditions ($p = 0.521$, Cohen's $d = 0.10$). The geometric pattern (M = 6.15, SD = 0.95) and the biomimetic pattern (M = 6.25, SD = 1.02) were perceived as equally legible. This indicates that the increased visual complexity of the biomimetic design did not hinder the user's ability to interpret the visual signal. Conversely, significant differences were found in technology acceptance. Participants reported a significantly higher behavioral intention to wear the biomimetic pattern (M = 6.45, SD = 0.90) compared to the geometric pattern (M = 3.90, SD = 1.45), $t(39) = 9.54$, $p < 0.001$, Cohen's $d = 2.11$. This suggests that, while both patterns function equally well, the biomimetic design significantly drives the user's willingness to adopt the technology.

DISCUSSION

The results of this study provide compelling evidence that the specific design choice—in this case, between a simple, rigid grid and a complex, organic pattern—has a profound impact on the user's emotional and aesthetic experience, even when the underlying technology and function remain identical. The central finding is the clear user preference for the biomimetic pattern over the geometric one across all affective and aesthetic measures. This supports our hypothesis and offers several important insights for the design and engineering of future wearable technologies.

The significantly higher valence scores for the biomimetic pattern suggest that designs inspired by nature can foster a more positive and pleasant emotional connection with technology. This finding aligns with the Biophilia hypothesis, which proposes an innate human affinity for natural forms and systems. The organic, complex, and seemingly non-repeating lines of the leaf vein pattern may have been perceived as more dynamic and engaging than the rigid, predictable structure of the geometric grid. However, it is important to acknowledge an inherent confound in this comparison. The biomimetic pattern differed from the geometric grid not only in its naturalness but also in its significantly higher visual complexity, level of detail, and non-uniformity. Therefore, the observed user preference could be attributed to a preference for visual complexity and detail, rather than *solely* to the Biophilia hypothesis. However, it is important to note that, in the context of high-end textile design, organic aesthetics are inherently linked to visual richness and complexity. The geometric pattern represents the engineering minimalist approach typical of early smart textiles, while the biomimetic pattern represents a holistic aesthetic approach. Thus, the visual complexity is not merely a confounding variable but an integral component of the organic design strategy we aimed to evaluate. Our findings suggest that users prefer this richer, more complex visual language over the simplistic structures of traditional technical displays. The current study cannot definitively disentangle these two factors. Future research would be needed to isolate this variable, for instance, by comparing a simple biomimetic pattern (e.g., a single leaf outline) with a simple geometric one (e.g., a single square). While the geometric pattern communicates order and logic, it may also evoke a sense of being artificial or sterile. In contrast, the biomimetic design, while still an abstraction, taps into familiar and pleasing natural schemas, making the technological experience feel more organic and harmonious. This distinction is critical for wearables, as they are objects of personal expression intended to be worn in close contact with the body. An emotionally positive response is a key prerequisite for long-term user adoption.

Furthermore, the strong and consistent preference for the biomimetic pattern across the ratings of beauty, interest, and desirability reinforces the importance of aesthetics in technology design. The pattern was not just seen as prettier, but also as more interesting, suggesting it captured and held attention more effectively. The higher desirability score is a direct indicator of its potential market appeal. This demonstrates that, for consumer-facing smart textiles, investing in sophisticated artistic design is not a superficial endeavor but a direct driver of perceived value and user preference. Crucially, the juxtaposition of significantly higher Interest scores with non-significant differences in Arousal offers a nuanced insight consistent with the Biophilia hypothesis. It suggests that the biomimetic pattern successfully captured cognitive attention (high interest) without inducing excessive physiological stimulation or stress (moderate arousal). This aligns with the notion that nature-inspired designs can be simultaneously engaging and calming, creating a restorative user experience that is visually rich yet affectively balanced, unlike the potentially monotonous stimulation of the geometric grid. Designers of smart textiles should therefore look to nature not just for functional inspiration (e.g., biomimicry in materials science) but also for aesthetic inspiration in crafting the user interface.

Perhaps the most nuanced finding is the lack of a significant difference in perceived visual understandability. This result is equally important, as it demonstrates that the increased complexity of the biomimetic design did not compromise its functional legibility, thereby isolating the influence of the pattern design to the affective and aesthetic domains of UX. Furthermore, the divergence between the static legibility scores and the significantly higher technology acceptance scores for the biomimetic pattern highlights a critical insight:

for smart clothing, aesthetic resonance is a primary driver of adoption. Users are willing to wear the technology not just because it works (legibility), but because it connects with them emotionally. Both patterns were equally successful at communicating the core function—a color change in response to a stimulus. Participants understood what was happening in both cases and found the system equally easy to use. It is important to highlight, however, that the system tested here was exceptionally simple, involving only the passive observation of a color change. It lacked the traditional interactive components (e.g., task efficiency, learnability, error recovery) that standard usability metrics are typically designed to evaluate. The finding of no difference in functional legibility is therefore logical, as the core function was rudimentary. This result should be understood in light of the system's simplicity: although the two designs elicited different aesthetic and emotional responses, both conveyed the functional color-change signal equally clearly. Therefore, differences emerged primarily in affective preference and acceptance rather than in functional legibility. Rather, the primary contribution of artistic design in this context is to enrich the *quality* of the experience. It highlights that a complete user experience is composed of multiple independent dimensions; a product can be perfectly usable but emotionally sterile, or it can be both usable and emotionally resonant. The goal for successful smart textiles should be to achieve the latter, and this study shows that thoughtful pattern design is a key pathway to doing so.

This research has several limitations that suggest avenues for future work. A limitation of this study concerns the ecological validity of the laboratory setting. Participants evaluated the textiles through brief, controlled exposures rather than through real-world use, where tactile interaction, garment context, ambient lighting variation, and body movement may all influence perception. Therefore, the findings primarily reflect users' immediate visual impressions. Nevertheless, such controlled presentation is appropriate for isolating the influence of pattern style on emotion, aesthetics, and acceptance, and provides a foundational basis for future studies incorporating more immersive or context-rich evaluation environments. The primary limitation of this study is the significant gap between the controlled laboratory experiment and the real-world context of *wearable* smart textiles. Participants evaluated static, 20 cm × 20 cm fabric swatches under controlled, uniform UV lighting, which is a scenario far removed from the dynamic experience of actual apparel. A user's acceptance of a garment is influenced by factors not measured here, such as how the pattern interacts with the body's movement, its appearance in variable and natural lighting conditions (e.g., the pattern activating as the user walks outdoors), and the critical social context of wearing a visibly smart item. Therefore, the preferences identified for these static swatches represent a preference for a *material sample* and cannot be directly extrapolated to predict user acceptance or the desirability of a finished, wearable garment. This remains a major constraint on our findings. Future research should explore these interactions in situ, for example, by creating garments that are worn by users over an extended period. The study also compared only two distinct patterns. Further investigation could explore a wider range of designs, including abstract, cultural, or data-driven patterns, to build a more comprehensive design framework. Furthermore, this study primarily focused on the user's response to the fully activated static pattern, neglecting the *temporal dynamics* of the activation process itself. Although the same photochromic dye was used, the significant differences in line density and distribution between the geometric and biomimetic patterns likely resulted in two very different visual experiences as the color appeared. The filling process of the complex biomimetic pattern may have been perceived as more organic or alive than the uniform activation of the grid. This dynamic, time-based element could have acted as a confounding variable, particularly influencing the reported scores for Interest and Arousal, independent of the final pattern's aesthetic. Finally, different smart materials, such as thermochromic or electroluminescent textiles, may have different aesthetic properties and temporal dynamics, and the findings from this study on photochromic materials may not be directly transferable. Replicating this experimental paradigm with other technologies would be a valuable next step. Finally, the nature of the 5-minute washout task presents a potential methodological limitation. While this interval was necessary for the photochromic pigments to return to baseline, the simple puzzle activity employed as a distraction may have introduced unintended cognitive load or affective influence (e.g., frustration or satisfaction). However, any potential carryover effects were minimized through counterbalancing, ensuring that residual mood effects were symmetrically distributed across conditions. Moreover, the strong significant differences observed between pattern conditions suggest that the washout procedure did not overshadow the main effects of the visual designs. Nevertheless, future replications should utilize more passive, affectively neutral tasks—such as listening to ambient music—to further ensure an emotional baseline.

CONCLUSION

This study set out to investigate the influence of artistic pattern design on the visual presentation and user experience of photochromic smart textiles. The findings suggest that moving beyond simplistic geometric indicators toward more visually rich, nature-inspired design strategies may substantially improve user appeal and adoption potential without compromising functional legibility. The biomimetic, nature-inspired pattern consistently elicited more positive emotions and was judged as more beautiful, interesting, and desirable than its geometric counterpart.

The central contribution of this research is the empirical demonstration that artistic design choices significantly shape the user's affective experience, while the functional legibility of a simple display function remains unaffected. The synthesis of our key findings—a strong divergence in emotional valence combined with a null result in visual understandability—provides a powerful directive for the field. It suggests that, for non-complex smart textiles, enhancing the aesthetic and affective quality is not a secondary goal to be "balanced" against function. Rather, it is a parallel objective that can be aggressively pursued to dramatically improve user desirability and acceptance, moving the field beyond mere functionality and toward true, emotionally resonant wearable integration.

Availability of Data and Materials

The datasets used and/or analysed during the current study were available from the corresponding author on reasonable request.

Author Contributions

Hanlin Li and Zhuoning He designed the study; all authors conducted the study; Zhiliang Zhu and Yifan Ding collected and analyzed the data. Fangmin Zhang and Zibin Wang participated in drafting the manuscript, and all authors contributed to critical revision of the manuscript for important intellectual content. All authors gave final approval of the version to be published. All authors participated fully in the work, took public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or completeness of any part of the work were appropriately investigated and resolved.

Ethics Approval and Consent to Participate

This survey was conducted in compliance with Ethics Committee of Guangxi Arts University. Participants were informed of the study's purpose and data usage prior to participation, and responses were collected anonymously. No personally identifiable information was stored.

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Not applicable.

Conflict of Interest

The authors declare no conflict of interest.

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