Impact of Colour Theory on Human Psychology: A Study on AI-Generated Colour Schemes and User Emotions

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***Abstract*—Background: Colour influences humans at various scales. It triggers human emotions consciously and subconsciously. With the emergence of Artificial Intelligence it got prominence over the apps and websites that adapted the fascinating feature of auto colour changing based on user mood, day timings, or environments. Thus, it becomes crucial to introspect the impact on individuals psychology.**

This study investigates user expectations and emotional responses toward AI-generated adaptive colour systems compared to traditional static interfaces.

Methods: A Google Form survey was designed with four sections collecting demographic information and rating static and adaptive colour interfaces using a 5point rating scale, and open-ended feedback on perceived advantages and disadvantages. Participants included were university students and staff.

Results: Adaptive interfaces conquered higher ratings over the comparison. Its potentially measured dimensions are as follows: emotional comfort (23% improvement), visual appeal (22% improvement), and engagement (28% improvement). Adaptive systems experienced trust in moderate ratings. Three primary advantages emerged: visual comfort and eye health, enhanced user experience, and the reduced cognitive load. Few main concerns were observed such as distraction and over-stimulation, loss of control, and privacy transparency.

Conclusion: It is observed that AI-generated themes and colours schemes are more visually appealing and likable among the users due to its efficacy and significant potential enhancing user experience. However, in this fast pace and rapid changing era successful implementation requires addressing user concerns about predictability, control, and transparency through thoughtful design.

***Index Terms*—Colour Psychology, AI-Generated Design, Adaptive Interfaces, Emotional Design, Human-Computer Interaction**

I. INTRODUCTION

Colour molds human thinking and emotions in such a way that often operate under conscious awareness and sometimes subconsciously by our brain. The deep blue of oceans often associated with the release of calming hormone and promoting focus and stability. The warm orange of sunset creates feelings of comfort. The vibrant red triggers the danger or emergencies that instantly activates survival mode of fight or flight. Green emphasizes soothing, rejuvenating, peaceful effect on mind. These responses are not merely learned preferences but biological reflexes wired into human nervous systems through evolution [1].

Elliot and Maier [1] demonstrated that red increases heart rate because it historically signaled ripe fruit or danger. Green signals safety through association with water and shelter. Blue promotes calm through association with open sky and calm waters. These responses continue shaping every digital experience.

Screens are becoming the non-separable part of day-to-day interaction dominating the human attention. Due to technological advancements, individuals—from kids to elders spending maximum of their time interacting with digital interfaces for work, education, entertainment, updates, and social connections. Even getting extensively used over a period, most of the interfaces remains static—with their similar archaic visual effects at day as well as night despite of adjusting to user needs or environmental context.

After the integration of Artificial intelligence in the digital era, adaptive interfaces are enabled. Phones adjust displays at sunset to eye comfort. Apps soften contrast after prolonged use making the image appear less sharp or more subdued. Screens are learning to respond to the humans who use them [2]. This study

investigates how people perceive and expect to feel when interfaces adapt through colour.

Through a structured survey, participants shared their expectations and concerns about both static and adaptive colour interfaces. Through the individuals responses and feedbacks one can understand the importance of understanding human emotions while handling the technology for betterment

II. LITERATURE REVIEW

2.1 Psychological Foundations of Colour Perception

Elliot and Maier [1] did thorough research on how the colours impact human emotions and extensively studied the various context where how an individual response the same colour might result different depending on the situations, beliefs, surroundings and culture.

They identified common patterns in research where the red triggers danger, mistakes, romance, urgency. Blue is associated with trust, calmness, balance. Green posses soothing, grounding effect, nature, peacefulness.

Liu[3] study shows the peoples natural association of specific colours to the state of particular emotion and how colours association can influence persons perception and interpretation.

Phrases like "Golden Opportunity " or "Out of the blue" refers to as optimistic situations and fortunate events. These kinds of associations are rooted so deep down, that regardless of any cultural or geographical distinctions the experiences and emotional states remain indentical.

2.2 Colour in Digital Environments

As individuals are indulging themselves into technology their life is revolving around digital spaces. Researchers are examining colour functions on screens and disseminating the effects. Andersen and Maier [5] studied how colour captures attention in interfaces, finding strategic colour use guides users through complex tasks without conscious effort.

Gong and colleagues [6] examined background colour effects on comprehension, showing reading performance improves with appropriately chosen backgrounds. Niemi [7] conducted a systematic review concluding colour choices significantly affect user satisfaction, task performance, and emotional comfort—yet most interfaces treat colour as aesthetic rather than psychologically functional.

2.3 Emergence of Adaptive Interfaces

In recent years we have seen changing interfaces based on context or user state. Medjden and colleagues [8] developed systems reading facial expressions and body posture, adapting behaviour to match detected emotions. Participants reported feeling ”seen,” though some expressed concern about data collection.

Brodschelm and colleagues [9] created mood-adaptive displays shifting colour to influence user emotional states. Liang and colleagues [10] proposed frameworks for emotion-aware mobile applications, integrating colour psychology with multimodal user state recognition.

2.4 Research Gap

Variety of researches are conducted in Colour Psychology and Adaptive Interfaces but very few of the thorough, integrated researches are performed for examining human emotions regarding the exposure. Despite advances—limited research examines user expectations and concerns regarding adaptive colour systems empirically. This study addresses that gap.

III. METHODOLOGY

3.1 Survey Design

We perform the empirical research using a Google Form which was designed specifically for this study with exclusive four sections:

Section 1: Demographic Information

- Name (optional), Age, Gender
- Previous experience with AI-based apps (Yes/No)
- Colour vision difficulties (Yes/No/Not sure)

Section 2: About Static Colour Interface Experience Participants rated on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree):

- ”I would feel emotionally comfortable using it”
- ”I would find the colours visually pleasing”
- ”I would feel focused and engaged while using it”

Section 3: About AI-Adaptive Colour Interface Experience Participants rated on a 5-point Likert scale:

- ”I would feel emotionally comfortable using it”
- ”I would find the colours visually pleasing”
- ”I would feel focused and engaged while using it”
- ”I would trust this interface”

Section 4: Open Feedback

- ”What do you think are the advantages of AI that changes colours automatically?” • ”What do you think are the disadvantages of such AI systems?”

3.2 Participants

Participants from different spheres were recruited and most of them were from university settings. The sample included both male and female respondents, all regular users of digital interfaces.

3.3 Data Collection and Analysis

The google survey form was distributed via electronic devices and gadgets and collected the data empirically. Responses were anonymous and used for academic purposes only. We used Descriptive Statistics for analyzing the Quantitative data including mean scores and percentage comparisons and for Qualitative data we use Thematic analysis.

IV. RESULTS AND FINDINGS

4.1 Comparative Ratings:

Table 1: Comparative Rating Overview

Dimension	Static	Adaptive	Improvement
Emotional Comfort	3.4	4.2	23%
Visual Appeal	3.6	4.4	22%
Engagement	3.2	4.1	28%
Trust	–	3.9	–

Static vs Adaptive Interfaces

Individuals experience Adaptive interface more appealing and it resulted in consistently higher ratings across all measured dimensions.

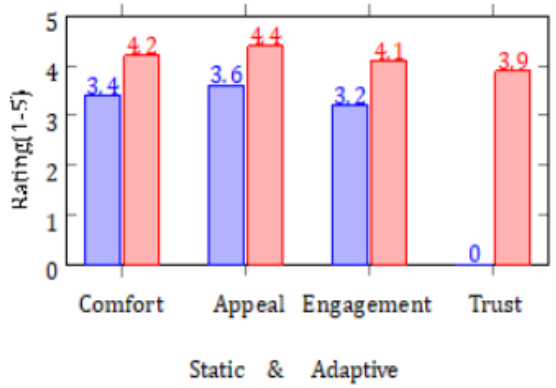

Figure 1: Side-by-side Comparison

Table 2: Participant Demographics

Characteristic	Category	Percentage
Gender	Female	53%
	Male	47%
AIAppExperience	Have used AI apps	93%
	Never used AI apps	7%
ColourVision	Normal	94%
	Difficulties	3%
	Notsure	3%

4.2 Perceived Advantages of AI Adaptive Colour

Using Thematic analysis these are some primary perceived advantages that came to the surface. Representative Participant Quotes: • ”The colours changing with time makes it feel more natural, especially at night when my eyes are tired.”

- ”I like that it adapts without me having to do anything. It feels thoughtful.”
- ”It keeps the interface feeling fresh and personalized to my needs.”

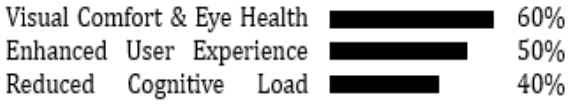

Figure 2: Advantages Frequency

4.3 Perceived Disadvantages and Concerns

Three main concerns emerged from participant responses.

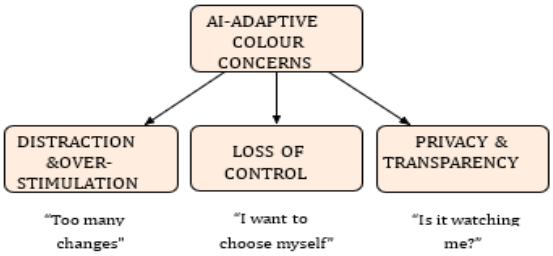

Figure 3: Concerns Thematic Map

Representative Participant Quotes: • ”If it changes too much, I get distracted and lose focus.”

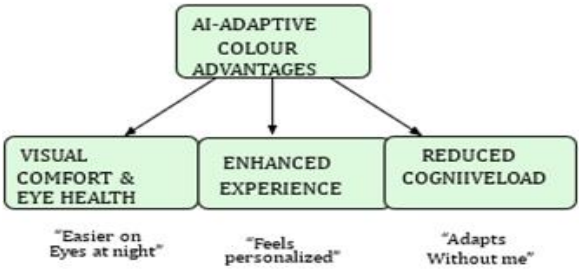

Figure 4: Advantages Thematic Map

4.4 The Trust-Transparency Connection

Analysis revealed a pattern: participants expressing privacy concerns showed greater hesitation about trusting adaptive systems.

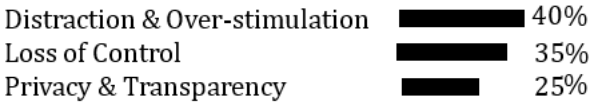

Figure5: Concerns Frequency

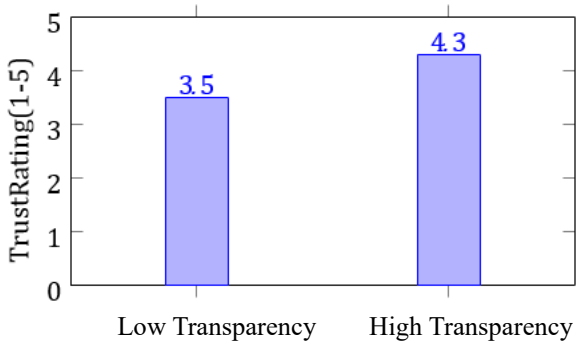

Figure 6: Trust-Transparency Relationship

- ”I would want to know WHY it’s changing - is it watching my behavior?”
- ”Sometimes I just want things to stay the same so I know where everything is.”

V. DISCUSSION

5.1 Emotional Architecture of Digital Spaces

Findings suggest digital interfaces are emotional environments, not neutral tools. Just as room lighting affects mood and behavior, screen colours shape emotional experience of digital activities. Static interfaces miss opportunities to support well-being.

The 23-28% improvements across dimensions reflect human need for responsive environments. In physical spaces, people adjust lighting, open windows, change clothes. Digital spaces have offered no such flexibility— until now.

5.2 The Adaptation Paradox

Some participants found adaptive colour potentially unsettling, revealing a crucial tension. Attention perceived as care by some feels like surveillance to others. Responsiveness perceived as natural by some feels unpredictable to others.

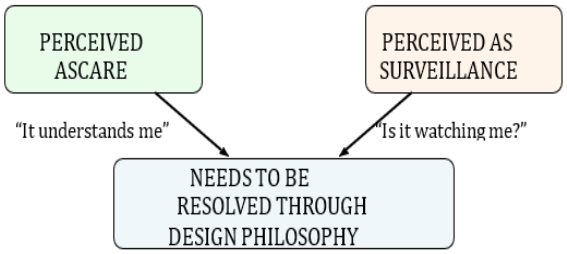

Figure 7:The Adaptation Paradox

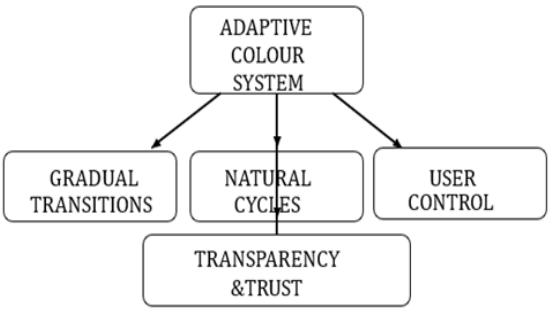

Figure8:Design Recommendations

Table3:Design Recommendations Summary

Recommendation	Rationale
Gradual transitions	Users feel comfortable with gradual changes
Natural cycle anchoring	Matches user daily rhythm
User control	Different people like different patterns
Transparency	People trust what they understand
Predictability	Consistency reduces confusion

5.3 Ethical Considerations

The capacity to influence emotion through colour carries ethical weight. The same mechanisms helping users feel calm could be deployed to keep them engaged longer than intended. The same attention enabling personalization could enable manipulation.

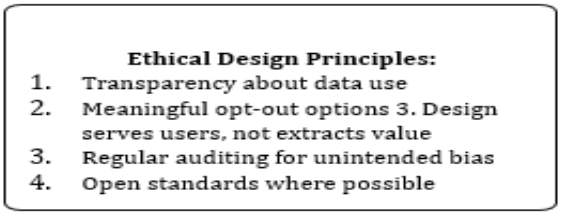

Figure 9: Ethical Design Principles

5.4 Limitations and Future Research

Limitations:

- Participants from similar cultural backgrounds
- Survey measured expected rather than actual responses
- Different applications may yield different preferences

Future Research Directions:

- Cross-cultural validation of adaptation preferences
- Longitudinal studies of adaptive interface experience
- Integration with other adaptive modalities
- Applications for users with visual impairments
- Ethical frameworks for emotion-aware design

VI. CONCLUSION

In this study we ponder over the perennial static interfaces and unravel the impact of AI-generated Adaptive Colours Systems on human perception and psychology. With due inference here our findings reveal both promise and responsibility of the research. Static colour interfaces observed energy draining and less comfortable due to colour rigidity with low rating. While Adaptive interfaces received higher ratings across emotional comfort (23% improvement), visual appeal (22% improvement), and engagement (28% improvement). Three key advantages emerged: visual comfort, enhanced experience, and reduced cognitive load. Three concerns were identified: distraction, loss of control, and privacy transparency. Most participants saw adaptive colour as enhancing experience—making interfaces feel more comfortable, engaging, and personalized. Some expressed concerns about unpredictability and data collection. Both perspectives inform what emotionally intelligent design must address.

The colours surrounding us digitally shape emotional experience of hours spent working, learning, and connecting. When colours respond gently, predictably, and transparently, they can transform digital spaces into environments that truly support human well-being.

VII. ACKNOWLEDGMENT

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