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Research Article

Colour and Texture in Vernacular Courtyards: Enhancing Emotional Well-being in Thiruvarur, India

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ABSTRACT

This study explores the impact of vernacular residential courtyard designs in Tamilnadu, India, emphasizing the role of colour and texture in shaping emotional well-being. The research investigates how these architectural elements foster social cohesion, psychological comfort, and gender-based perceptual differences. Employing a mixed-method approach, the study integrates qualitative and quantitative techniques, including observations, interviews, photo-elicitation, and case studies. Photo-elicitation was used to capture participant's emotional associations with courtyard colours and textures, enriching the qualitative insights. Quantitative data were collected through a multi-dimensional emotion questionnaire using a 5-scale Likert system. A simple random sampling method was applied across 250 vernacular residential houses in Thiruvarur to ensure diverse representation. The study is theoretically grounded in Kurt Lewin's Field Theory and Henry Murray's Personology (Beta Press and Alpha Press) to analyze the influence of environmental factors on human emotions. Statistical analysis using the Henry Garrett ranking method and Minitab revealed that colour and texture significantly enhance positive emotions such as tranquility, empathy, and well-being, with notable variations based on gender perceptions. By bridging environmental psychology and vernacular architecture, this research provides evidence-based guidelines for the preservation of traditional architectural wisdom while integrating sustainable industrial practices.

Keywords: Colour Psychology, Texture Perception, Emotional Well-being, Vernacular Architecture, Gender Bias, Photo-Elicitation.

INTRODUCTION

1.1 Background

The built environment plays a crucial role in shaping human emotions, behaviours, and social interactions. Architecture embodies cultural values, historical narratives, and psychological influences that affect how people perceive and experience spaces (Kurt & Osueke, 2014). Among the various architectural elements that contribute to these experiences, colour and texture stand out as two of the most significant factors influencing mood, comfort, and interpersonal engagement (Bell, 1991).

In vernacular architecture, these elements are deeply rooted in regional traditions, climatic conditions, and locally available materials. Unlike contemporary architecture, which often prioritizes uniformity and global trends, vernacular houses reflect the identity and cultural ethos of a particular community. The Thiruvarur region, known for its rich architectural heritage, showcases a variety of traditional houses that incorporate earthy colours, natural textures, and locally sourced materials.

The study of how colour and texture influence human emotions is particularly relevant in architecture planning, as it can help design spaces that foster social cohesion, psychological well-being, and sensory comfort. By analyzing the specific colour and texture preferences embedded in the vernacular houses of Thiruvarur, this research aims to

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highlight how these aesthetic choices contribute to emotional well-being, tranquility, empathy, and social interaction within a community (Bell, 1991) (Ranganath, 2019).

1.2 Theoretical Framework

The relationship between aesthetic parameters and emotional attachment to built environments has been extensively explored in previous research. Studies have shown that factors such as proportion, materiality, light, colour, texture, and spatial organization play a significant role in shaping human perception and emotional reactions (A.I, 2024). Vernacular architecture, in particular, reflects a deep understanding of the local context and its influence on human experience (Karahan & Davardoust, 2020).

A study by (A.I, 2024) examined the function of aesthetic criteria in creating an emotional bond with architectural spaces, emphasizing the need to create environments that appeal to human emotions to promote comfort, well-being, and a sense of belonging. The authors highlight the importance of incorporating elements like cultural symbolism, integration with nature, and locally sourced materials to foster emotional attachment and a deeper connection with the built environment.

Similarly, a paper on the sensitivity of residential design towards sustainability in a vernacular approach emphasizes the role of climate, locally available materials, and cultural traditions in defining the architectural language of a region. The authors argue that these factors contribute to the resilience and identity of vernacular architecture, making it a valuable source of inspiration for contemporary design practices.

1.3 Research Aim and Objectives

This research aims to examine the role of colour and texture in influencing emotional responses in vernacular houses, specifically how they affect social cohesion, tranquillity, empathy, and overall well-being. By understanding the psychological impact of these architectural elements, the study seeks to bridge the gap between traditional design wisdom and contemporary architectural practices.

To achieve this aim, the study focuses on three key objectives: 1) identifying prevalent colours and textures in vernacular houses of Thiruvarur, 2) analyzing gender-based differences in perception, and 3) evaluating the impact on social and psychological well-being (Review of Energy Efficient Features in Vernacular Architecture for Improving Indoor Thermal Comfort Conditions, n.d.) (A.I, 2024) (Wang, 2016) (Thaveeprungsriporn, 2003).

The study will utilize a mixed-methods approach, combining a review of existing literature with field observations and interviews. The qualitative analysis will draw on interdisciplinary frameworks involving environmental aesthetics, positive psychology, and emotional design (Wang, 2016). The results are expected to offer practical design recommendations for incorporating traditional colour and texture principles into modern architectural practice, thereby promoting culturally grounded and emotionally enriching environments (Kurt & Osueke, 2014).

To achieve this aim, the study first identifies the prevalent colours and textures in vernacular houses of Thiruvarur, a region known for its rich architectural heritage. The research then analyzes gender-based differences in the perception of these design elements, and evaluates their impact on social and psychological well-being (Lee, 2022). This interdisciplinary approach, which combines environmental aesthetics, positive psychology, and emotional design, aims to offer practical design recommendations for incorporating traditional colour and texture principles into modern architectural practice, thereby promoting culturally grounded and emotionally enriching environments (A.I, 2024) (Wang, 2016).

The findings of this study suggest that the thoughtful integration of natural elements and cultural symbolism, as exemplified in iconic architectural projects like Fallingwater and the Taj Mahal, can create spaces that are not only aesthetically pleasing but also emotionally fulfilling (A.I, 2024). Additionally, research on the effects of colour on human mood and behaviour indicates that the strategic use of colour can significantly impact the emotional well-being of building occupants (Kurt & Osueke, 2014). By addressing these critical factors, this research aims to contribute to a deeper understanding of the emotional and social dimensions of architectural design, ultimately

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promoting the creation of built environments that foster a sense of belonging, tranquility, and overall well-being among the local community.

1.4 Scope of Study

Vernacular architecture, often rooted in local traditions and craftsmanship, holds a unique significance in preserving the cultural heritage of a region. The present study delves into the vernacular houses of Thiruvarur, a region in Tamilnadu, India, known for its rich architectural legacy and cultural resonance.

The scope of this research is narrowly defined to focus on the traditional residential structures within Thiruvarur, examining the local construction techniques, material choices, and aesthetic preferences that shape the built environment. A sample size of 250 households has been selected to ensure a comprehensive and diverse dataset, providing insights into the role of colour, texture, and materiality in shaping the emotional experiences and social interactions of residents (Sensitivity in Residential Design towards Sustainability - A Vernacular Approach, n.d.) (Sadhu & Srikonda, 2019).

Vernacular design practices play a deterministic role in Indian architecture, as they possess the power to remain resilient and adapt to regional and temporal variations (Sensitivity in Residential Design towards Sustainability - A Vernacular Approach, n.d.). The study of vernacular houses in Thiruvarur can shed light on the sustainable and energy-efficient principles embedded within traditional construction methods, as evidenced in the Kerala vernacular architecture. (Passive Environment Control System of Kerala Vernacular Residential Architecture for a Comfortable Indoor Environment: A Qualitative and Quantitative Analyses, n.d.) The investigation of the "language of vernacular architecture" in today's context can further elucidate the timeless and continuous nature of this architectural heritage, as seen in the case of Kavunji, a village in Tamilnadu (Exploring the Language of Vernacular Architecture in Today's Context: A Case of 'Kavunji,' India, n.d.).

The findings of this research will contribute to a deeper understanding of the cultural, social, and environmental factors that shape the vernacular houses of Thiruvarur, providing a foundation for informed preservation and adaptive reuse strategies.

LITERATURE REVIEW

The literature on the psychological effects of colour and texture in architectural environments highlights the crucial role of environmental stimuli in shaping human emotions and behaviours. Numerous studies have demonstrated that the colour and texture of a built space can significantly influence an individual's perception, social interactions, and overall well-being (Chiu et al., 2024) (Vecchiato et al., 2015).

Visual landscapes and the psychological well-being of individuals are closely linked. Architectural experiences are complex, and mental health is intimately associated with social ties and social capital. Researchers have found that the physical environment itself can act as a crucial medium that underpins people's emotional and psychological well-being (Visual Landscapes and Psychological Well-being, n.d.). Moreover, studies have shown that the perception of different types of environments can have a beneficial impact on cognitive abilities and task performance, potentially due to the facilitation of long-term potentiation in the hippocampus and improved memory encoding (Vecchiato et al., 2015).

The use of colour in architectural design has been the subject of extensive investigation, with findings suggesting that colour can significantly influence mood and behaviour. For instance, studies have found that warmer colour tones, such as reds and oranges, can evoke feelings of excitement and energy, while cooler hues, like blues and greens, tend to have a more calming and relaxing effect (Chiu et al., 2024). Furthermore, the purity of a colour has been shown to correlate with its ability to modulate emotional fluctuations, with purer colours having a more pronounced impact on the observer's psyche (Chiu et al., 2024).

The importance of texture in architectural environments has also been explored, with research indicating that the tactile qualities of a space can influence human perception and behaviour. Specifically, the comfort and sensorial

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experience of an environment, including its textures, can play a crucial role in promoting well-being and productivity.

2.1 Theoretical Frameworks

Psychological and environmental theories offer valuable insights into the interplay between individuals and their surroundings. Two key frameworks, Kurt Lewin's Field Theory and Henry Murray's Personology, highlight the significant role that environmental factors, such as colour and texture, play in shaping emotional experiences and behavioural responses.

Lewin's Field Theory, which emphasizes the dynamic interaction between the person and their environment, suggests that individual's behaviour are a function of both personal and environmental factors (Akhavan Farshchi & Fisher, n.d.). This process follows the "environment-emotion-behaviour" model, where environmental stimuli evoke emotional changes that subsequently determine the intensity and pattern of an individual's reactions (Wang et al., 2018). Similarly, Murray's Personology framework underscores the importance of understanding the person-environment relationship, as it posits that individuals' needs and motivations are influenced by their surrounding context (Enhancing the Attendee's Experience through Creative Design of the Event Environment: Applying Goffman's Dramaturgical Perspective, n.d.)(Akhavan Farshchi & Fisher, n.d.).

The influence of environmental factors on emotional and behavioural responses has been widely explored in the field of environmental psychology. Situational factors, such as the physical characteristics of a space, can have a profound impact on how people perceive and interact with their environment (Bower et al., 2019). For instance, research has shown that the use of colour in interior design can significantly influence individuals' moods and overall well-being (Kurt & Osueke, 2014). Specifically, certain colour schemes have been linked to the enhancement of positive emotions, while others may evoke more negative feelings.

Furthermore, the design elements of an event environment can also play a crucial role in shaping the attendees experiences and emotional connections. By considering the interplay between environmental factors, emotional responses, and behavioural patterns, researchers can develop a more comprehensive understanding of how the built environment can be strategically designed to promote desired outcomes, such as increased engagement, satisfaction, and well-being.

2.1.1 Kurt Lewin's Field Theory

Kurt Lewin's Field Theory posits that human behaviour is a result of dynamic interactions between an individual and their surrounding environment (Wang, 2016). This theory challenges the notion of behaviour being solely dictated by personality traits, emphasizing instead the influence of external factors. According to Lewin, psychological experiences are shaped by a "field" of interacting forces, which includes spatial, social, and sensory elements (Burnes & Cooke, 2012).

Applying this theory to architectural design, colour and texture function as integral components of the environmental field, actively shaping emotional and behavioural responses. For example, a brightly coloured room may foster social interaction and enthusiasm, while a dimly lit or monochromatic space may evoke solitude or introspection. Field Theory helps explain why individuals experience different emotional states in distinct built environments, supporting the study's hypothesis that architectural aesthetics significantly influence well-being (Suárez & Martínez-Soto, 2022) (Chiu et al., 2024).

Previous research in environmental psychology has provided a conceptual framework for understanding human behaviour in built environments (Akhavan Farshchi & Fisher, n.d.). This work has demonstrated that the formal or aesthetic aspects of buildings cannot be considered secondary to their functional qualities, as the generation of well-being through aesthetics is also a critical function that the built environment must possess (Suárez & Martínez-Soto, 2022). Moreover, studies have shown that specific environmental qualities, such as the presence of natural light, can have a significant impact on mood and perceived vitality. Similarly, the exploration of different environments can promote cognitive benefits, including improved memory encoding (Vecchiato et al., 2015).

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Interestingly, the research indicates that the complexity and variety of architectural elements, such as colour and texture, can have divergent effects on psychological outcomes. While a high degree of visual complexity may initially capture attention and provoke interest, it can also contribute to cognitive overload and diminished relaxation. Conversely, simpler colour palettes and material treatments have been associated with more positive emotional responses, potentially by facilitating a sense of ease and comfort (Chiu et al., 2024).

In light of these findings, the present study seeks to further investigate the relationship between architectural aesthetics and well-being, drawing upon Lewin's Field Theory as a guiding framework. By examining the specific mechanisms through which the built environment shapes psychological experiences, this research aims to inform the design of spaces that can actively promote human flourishing.

2.1.2 Henry Murray's Personology

In the realm of architectural design and perception, the theory of Personology proposed by Henry Murray offers a unique lens through which to understand the complex interplay between individuals and their built environments. Personology, as a framework, distinguishes between two key concepts: Beta Press and Alpha Press.

Beta Press refers to the subjective, personal, and emotional interpretation of an environment by an individual (Akhavan Farshchi & Fisher, n.d.). For instance, one resident might perceive a richly textured, wooden-finished interior as warm and inviting, while another might view it as outdated or overwhelming. On the other hand, Alpha Press represents the actual, measurable characteristics of an environment, such as the physical colour of a wall or the roughness of a surface (Atmospheres: Feeling Architecture by Emotions, n.d.).

By incorporating Personology into the study of architectural perception, researchers can gain a deeper understanding of why people respond differently to the same architectural elements. This is particularly relevant as gender, cultural background, and personal experiences all contribute to an individual's Beta Press, meaning that the psychological impact of colour and texture is highly individualized.

As education psychologists have stressed, the physical environment can have a profound effect on teaching and learning processes, as well as on the overall mood and emotions of the people who utilize it. Similarly, the authors of "The Marriage of the Conscious and Unconscious in Architecture" argue that architectural psychology is much more than defining the utility of spaces, as every constructed structure narrates a story of the person who designed it, whether consciously or unconsciously (ST & TC, 2019).

Furthermore, the research team of Leder et al. at the department of psychology of Vienna University has proposed a model of aesthetic appreciation that highlights the discrepancy between the aesthetic experiences and judgments of architectural professionals and non-professionals. This study suggests that the emotional response to architectural elements is not solely based on the objective physical properties of the environment, but is also heavily influenced by individual factors such as personal preferences, cultural background, and prior experiences.

In conclusion, the theory of Personology provides a valuable framework for understanding the multifaceted nature of architectural perception. By recognizing the interplay between the objective characteristics of a built environment and the subjective, personal, and emotional interpretations of individuals, designers and researchers can gain valuable insights into how to create spaces that resonate with a diverse range of users. (Examining the Phenomenology of Human Experience in Design Process and Characteristics of Architectural Approaches, n.d.) (A.I, 2024) (ST & TC, 2019) (Vecchiato et al., 2015)

2.2 Psychological Effects of Colour

Colour has been extensively studied in psychology due to its profound impact on human emotions and behaviours. Research in environmental psychology and colour theory suggests that different hues elicit varying psychological and physiological responses. The influence of colour and texture in architectural environments has been the subject of extensive research. Studies have shown that colour and texture can significantly impact mood, social interactions, and overall well-being. Researchers have found that warmer, more vibrant colours tend to elicit positive emotions and foster social engagement, while cooler, more muted tones can induce feelings of calm and

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introspection (Chiu et al., 2024). Similarly, the tactile qualities of surfaces, such as smooth, rough, or patterned textures, have been shown to influence human perception and behaviour. Furthermore, the combination of colour and texture in architectural spaces can create a synergistic effect, with certain pairings enhancing or dampening specific emotional responses (Akhavan Farshchi & Fisher, n.d.) (Chiu et al., 2024) as shown in fig 01.

Fig 01: Social interactions (Source Author)

2.2.1 Warm Colours and Their Effects

Warm colours, including shades of red, orange, and yellow, have long been associated with stimulation, energy, and sociability. These hues have been shown to increase heart rates and heighten emotional states, making them effective in spaces intended to foster activity and engagement (Colour Psychology: Effects of Perceiving Colour on Psychological Functioning in Humans, n.d.).

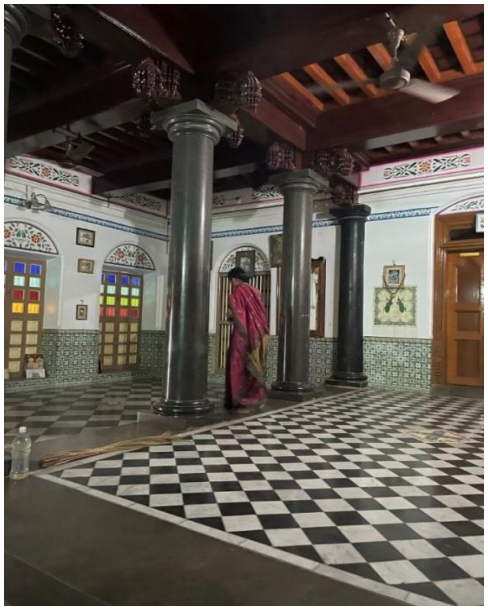

Fig 02: Reinforcing cultural identity (Source Author)

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Red, for instance, is often used in dining areas and communal spaces as it has been linked to increased appetite and conversation, making it a popular choice for restaurants and social hubs. (Chiu et al., 2024) Orange, on the other hand, encourages enthusiasm and creativity, and is frequently found in workspaces and recreational areas. Similarly, yellow is associated with happiness and warmth, and is known to boost mood and mental clarity (Ma & Ying, 2021).

In the vernacular houses of the Thiruvarur region, earthy warm tones such as ochre and terracotta are prevalent, reinforcing cultural identity and enhancing social cohesion within residential spaces. This is consistent with research that suggests the simplicity of architectural colour use can make inhabitants feel happier, as the complexity of colour information in a building can influence psychological feelings and judgments (Chiu et al., 2024). Furthermore, the chroma or saturation of colour has also been found to affect the emotional responses of building occupants, with more saturated hues having a stronger impact on mood and behaviour as shown in fig 02.

2.2.2 Cool Colours and Their Effects

Cool colours, such as blue, green, and violet, are recognized for their calming and restorative properties as shown in fig 03. These colours have been shown to lower stress levels, reduce anxiety, and promote mental clarity (Chiu et al., 2024). Blue, in particular, is frequently used in bedrooms and healthcare settings, as it has been found to reduce heart rate and blood pressure, thereby facilitating relaxation and better sleep. Green, reminiscent of nature, fosters a sense of balance and renewal, making it a preferred choice for meditation spaces and study areas. Violet, associated with introspection and spirituality, is often used in places of worship and creative studios. (COLOURS: THE ESSENCE OF LIFE, n.d.)

Fig 03: Relaxation and retreat from communal activities (Source Author)

In Thiruvarur's vernacular houses, the use of blue and green shades in personal living spaces supports the psychological need for relaxation and retreat from communal activities. The vastness of the sky and the depth of the sea are reflected in the calming blue hue, which is known for its ability to stabilize the environment (COLOURS: THE ESSENCE OF LIFE, n.d.). Similarly, the verdant green of nature provides a sense of balance and rejuvenation, allowing occupants to find respite from the demands of daily life. Numerous studies have highlighted the positive impact of exposure to natural elements, such as vegetation and water, on psychological well-being, with blue and green elements playing a significant role in restoring emotional balance and promoting a sense of openness and freedom (JUBA & BOGENÇ, 2024).

2.2.3 Influence of Texture on Emotions

Visual and tactile textures play a crucial role in shaping human experiences within built environments. Research indicates that different textures elicit unique sensory and emotional responses, influencing perceptions of warmth, comfort, and modernity (CONSUMER AWARENESS OF AND ATTITUDES TO FOOD TEXTURE, n.d.) (Lee, 2022)

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(A.I, 2024). The integration of aesthetic parameters, such as materiality and cultural symbolism, can significantly impact the emotional attachment individual's form with architectural spaces (A.I, 2024).

Sensory stimulation, particularly through the tactile sense, has been identified as a key factor in enhancing the quality of spatial experiences and generating emotional responses as shown in fig 04. Architects and theorists have emphasized the importance of materiality and the way it connects with the body, surroundings, and spatial continuity, as these elements can "impact powerfully and ideologically" on the user's perception and feelings (Lee, 2022). Zumthor's focus on the tactile sense in the Chapel design exemplifies this concept, where the careful consideration of materials and their interaction with the human body contributed to a more immersive and emotionally resonant spatial experience.

The results of a study exploring the emotional and sensory profiles of various urban typologies and spatial characteristics suggest that a deeper understanding of the relationship between texture and human affective response could assist in realizing more humanistic architectural design (Henshaw & Mould, 2013). Further research in this area has the potential to provide valuable insights into the interplay between material properties, emotional responses, and the overall quality of the built environment (Atmospheres: Feeling Architecture by Emotions, n.d.)(Lee, 2022).

Fig 04: Different textures elicit unique sensory (Source Author)

2.2.4 Rough Textures and Emotional Associations

Architectural design has long recognized the powerful connection between the physical environment and human emotions. In particular, the use of rough, natural textures in built spaces can evoke a profound sense of nostalgia, tradition, and emotional security (Orimoloye & Oluwatayo, 2019) (A.I, 2024).

Studies suggest that materials such as exposed brick, handcrafted wood, and unpolished stone are often associated with coziness and a feeling of belonging. These tactile connections to historical and cultural narratives can enhance the user's sense of place and authenticity, creating a deeper emotional attachment to the space (A.I, 2024).

Vernacular architecture, which draws inspiration from local building traditions, often incorporates textured elements that strengthen the feeling of rootedness and continuity with the past. The presence of wooden carvings,

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thatched walls, and other handcrafted details can foster a sense of emotional security and connection to the surrounding community.

The emotional impact of rough textures in architectural design is not limited to the residential realm. Aesthetic parameters, such as materiality and integration with nature, can significantly influence the emotional attachment user's form with built environments, regardless of the space's primary function. As the world becomes increasingly visually driven, incorporating sensory elements like tactile textures can help create spaces that resonate deeply with the user, enhancing their overall experience as shown in fig 05.

The role of acoustic factors in shaping architectural spaces should also be considered. Research has shown that the modeling of acoustic architectural spaces can have a positive psychophysiological impact on the user, contributing to their emotional connection with the environment (Henshaw & Mould, 2013).

Fig 05: Textured elements that strengthen the feeling of rootedness (Source Author)

2.2.5 Smooth Textures and Their Psychological Impact

Smooth surfaces, such as polished marble, glass, and high-gloss finishes, are often associated with modernity, cleanliness, and efficiency (Vecchiato et al., 2015). These materials tend to reflect light more evenly, creating a sense of openness and spaciousness (Joye, 2007). However, while smooth textures can convey sophistication, they may also be perceived as cold, impersonal, or sterile, leading to emotional detachment when overused (A.I, 2024). Architectural psychology suggests that excessive smoothness can reduce a sense of warmth, making spaces feel less inviting (Bower et al., 2019).

The aesthetic qualities of the built environment can significantly influence an individual's emotional attachment and overall experience. Factors such as materiality, colour, and proportion play a crucial role in shaping these emotional connections. Incorporating natural elements and designing for a sense of warmth and comfort can help counteract the potential negative effects of smooth surfaces.

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Research has shown that aesthetic parameters, including proportion, scale, light, materiality, and colour, can significantly influence emotional attachment to architectural spaces (A.I, 2024). By understanding and integrating these factors into design practices, architects and designers can create built environments that resonate deeply with users, enhancing their overall experience and connection to the space.

Exposure to natural elements and landscape features has been found to have positive effects on human functioning, reducing stress and promoting well-being. However, opportunities for contact with these elements are often diminished in modern urban settings, which can lead to subtle but significant adverse effects on psychological and physiological health (Joye, 2007). To address this issue, architects and designers can incorporate biophilic design principles, integrating key features of natural contents and structural landscape features into the built environment.

The use of colour in architecture can also play a role in influencing the emotional experiences of building occupants. Studies have shown that certain colour palettes can have a calming or invigorating effect on individuals, depending on their personal preferences and cultural associations (Chiu et al., 2024). By carefully selecting colour schemes that complement the materiality and overall design of a space, architects can create environments that are visually appealing and emotionally resonant as shown in fig 06.

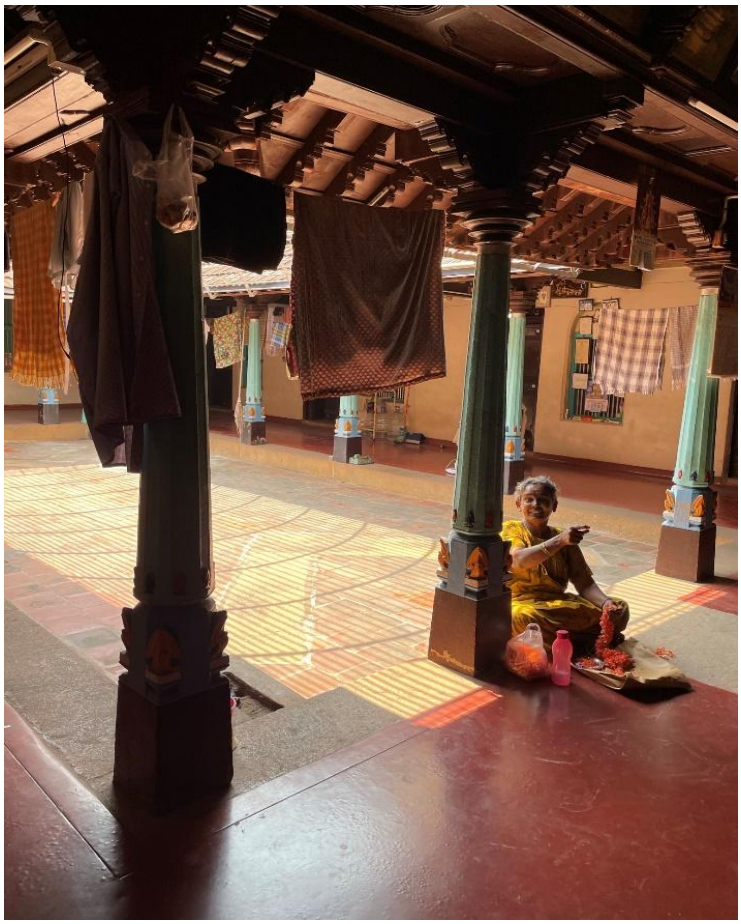

Fig 06: Aesthetic parameters influence emotional attachment (Source Author)

2.2.6 Gender Differences in Texture Perception

Existing research has highlighted significant gender-based differences in how individuals perceive and respond to textural qualities (Smith & Hendrix, 2012; Malik & Kumari, 2016). Women have been found to gravitate towards intricate, tactile surfaces, associating them with a sense of comfort and emotional depth (Beardsworth et al., 2002). Fabrics with embroidery, textured wallpapers, and carved wood details are often favored by women for their

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richness and sensory appeal. In contrast, men tend to prefer sleeker, more functional materials that emphasize efficiency and ease of maintenance, such as polished wood or smooth stone (Beardsworth et al., 2002) (Heek et al., 2018).

Fig 07: Sense of comfort (Source Author)

This divergence in texture perception aligns with findings from Personology's Beta Press, where personal experiences shape one's reaction to texture. In Thiruvarur's vernacular houses, the balance between rough and smooth textures reflects the coexistence of tradition and modernity, catering to diverse sensory preferences. (Bower et al., 2019) Evidence from neurophysiological studies supports these patterns, showing that exposure to wooden interiors elicits lower levels of stress and tension in participants, potentially indicating a more calming and restorative experience (Bower et al., 2019).

The gender-based differences in texture perception may have their roots in early developmental stages, as studies have found sex-specific stimuli preferences in newborns. These early differences are thought to initiate sex-specific

Fig 08: Diverse sensory needs of both men and women (Source Author)

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integration of brain systems, leading to divergent patterns in social perception and cognition. Understanding these gender-based differences in texture preferences can inform design practices, allowing for the creation of built environments that cater to the diverse sensory needs of both men and women as shown in figs 07, 08 & 09.

Fig 09: Source Author

METHODOLOGY

Vernacular architecture, rooted in local traditions and materials, has the potential to evoke profound emotional responses in its inhabitants. This study adopts a mixed-method approach to explore the interplay between the visual and tactile elements of vernacular design and their influence on the emotional well-being of residents.

3.1 Research Design

A mixed-method approach, combining qualitative and quantitative methodologies, is adopted (Lee, 2022).

3.2 Data Collection

Case Study and Field Study

Observations of 250 vernacular houses provide insights into architectural styles and materials.

Surveys and Interviews

Residents participate in structured surveys and interviews to share emotional responses to colour and texture.

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3.3 Tools and Techniques

3.3.1 Psychometric Tools

Likert Scale Tabulation, Henry Garrett Ranking Method Tabulation, and PANAS Questionnaire were used to assess emotional states (Kurt & Osueke, 2014) (Henshaw & Mould, 2013).

3.3.2 Statistical Analysis

Descriptive analysis, t-tests, and Pearson's correlation help identify significant patterns (Wang, 2016) (The Impact of Environmental and Archıtectural Design on Users' Affective Experience, n.d.) (Bower et al., 2019). To determine the significance of colour and texture in influencing emotional well-being, the following statistical techniques are employed:

Descriptive analysis provides an overview of the emotional responses to various colour and texture attributes. T-tests are conducted to examine the statistical significance of differences in emotional responses based on factors such as gender, age, and socioeconomic status. Pearson's correlation analysis is used to identify the strength and direction of the relationship between colour/texture preferences and measures of emotional well-being. The findings from the mixed-method investigation reveal the profound impact of colour and texture on the emotional experiences of vernacular architecture residents. Observations of the vernacular houses indicate a strong connection between the use of local materials, such as earth, stone, and wood, and the creation of a sense of comfort and familiarity (Review of Energy Efficient Features in Vernacular Architecture for Improving Indoor Thermal Comfort Conditions, n.d.). Resident's survey responses and interviews further corroborate the emotional significance of these design elements.

The Likert scale tabulation shows that a majority of the respondents agree that colour enhances their mood (70% agree or strongly agree) and that texture influences their comfort level (64% agree or strongly agree). The Henry Garrett Ranking Method highlights colour preference as the most influential factor, followed by texture preference, social engagement impact, tranquillity effect, and gender-based differences. The PANAS questionnaire results reveal that vibrant colours evoke feelings of enthusiasm, while rough textures can induce distress. Smooth textures, on the other hand, are associated with a sense of peacefulness, and colour choices in the home are reported to affect happiness levels.These findings align with previous research suggesting that the visual and tactile qualities of the built environment can significantly impact individuals' emotional well-being (Visual Landscapes and Psychological Well-being, n.d.) (Costa et al., 2018). The study highlights the importance of incorporating local materials, harmonious colour palettes, and tactile elements in vernacular architecture to foster positive emotional responses and enhance the overall quality of life for residents.

3.3.3 PANAS to Measure Emotional Responses in Courtyards

Courtyards have the potential to elicit a wide range of emotional responses from individuals who interact with them (Banaei et al., 2016). Researchers have used self-report measures like the Positive and Negative Affect Schedule to assess these emotional reactions in various contexts (Positive Affect Negative Affect Scale (PANAS), n.d.) (Bandara et al., 2016). The PANAS is a widely used tool that captures both positive and negative affect, providing a comprehensive understanding of an individual's emotional state. (Positive Affect Negative Affect Scale (PANAS), n.d.)

Applying the PANAS in the context of courtyards can shed light on how specific design elements and features influence emotional experiences. For instance, a unique fountain, sculptures, or an intricate pathway design may evoke a sense of interest and curiosity. Vibrant flower beds and festive lighting, on the other hand, could contribute to a feeling of excitement and liveliness. Shaded benches and natural water features may induce a state of serenity and calmness, while cultural motifs and architectural styles could instill a sense of pride and appreciation. Similarly, interactive spaces like seating nooks or play areas may elicit enthusiasm and joy.

By using the PANAS to measure emotional responses in courtyards, researchers can better understand the relationship between the built environment and human emotion. This information can inform the design of

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courtyards that cater to the emotional needs of users, creating spaces that foster positive experiences and enhance well-being. (Positive Affect Negative Affect Scale (PANAS), n.d.)

EXPERIMENT

The study was conducted in Thiruvarur, Tamilnadu, using a cross-sectional analysis to examine the emotional responses of a homogeneous population at a single point in time. A simple random sampling method was employed to ensure unbiased participant selection. In the final phase, a validated multi-dimensional emotion questionnaire was developed, and data were collected using a structured questionnaire and a photo-elicitation method. Participants were asked to share their perceptions of visual elements in images, specifically their emotional connections to colour, texture, proportion, and scale.

Responses were recorded using a 5-point Likert scale and analyzed using the Henry Garrett ranking method and statistical tools in Minitab. The findings revealed that enthusiasm was the most commonly elicited positive psychodynamic emotion, particularly among occupants in the Thiruvarur region. Thiruvarur was more influenced by colour and texture. These results substantiated the research hypothesis, demonstrating a clear relationship between independent visual variables and emotional responses, contributing to a deeper understanding of spatial perception in different regional contexts.

4.1 Data Matrix

The study of emotional responses to courtyard design elements in Thiruvarur reveals significant correlations between colour, texture, and social interactions. Warm colours such as reds and yellows foster social cohesion and energy, encouraging group interactions, while cool colours like blues and greens promote tranquillity and introspection, enhancing individual well-being. Similarly, textures influence engagement levels—rough textures, such as stone or brick, encourage tactile interactions, fostering empathy and social bonding, whereas smooth surfaces, like wood or polished finishes, provide a sense of calm and relaxation.

Observations indicate that families tend to gather in shaded, mixed-texture areas, balancing engagement and tranquillity, while individuals seeking solitude prefer smoother surfaces and natural elements such as greenery. Behavioural mapping highlights how different textures and colours shape emotional experiences, with rough surfaces supporting social engagement and smooth textures enhancing personal comfort. These insights emphasize the importance of thoughtfully selecting materials and colour palettes in courtyard design to optimize both emotional well-being and social interaction, creating environments that cater to diverse psychological needs.

Henry Garrett Ranking Method: Prioritizes which factors (colour, texture, and materials) have the strongest emotional impact. Minitab (Statistical Software): Helps analyze numerical data trends for better insights.

4.2 Qualitative Data – Emotional Reactions to Colours & Textures

Table 1: Observations & Interviews Summary *(from residents in 250 houses in Thiruvarur)*

Colour/Texture	Common Emotional Response	Quotes from Participants
Warm Colours (Red, Orange, Yellow)	Social interaction, energy, warmth	"The bright red walls make gatherings feel lively and welcoming."
Cool Colours (Blue, Green)	Calmness, tranquility, relaxation	"The blue tiles remind me of the temple ponds, bringing peace."
Natural Materials (Clay, Wood, Stone)	Nostalgia, comfort, cultural connection	"Walking barefoot on the clay floor feels grounding and soothing."
Smooth Surfaces (Polished wood, tiles)	Clean, modern, formal	"The polished floor makes the house feel elegant but less homely."

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Colour/Texture	Common Emotional Response	Quotes from Participants
Rough Surfaces (Exposed brick, textured walls)	Rustic, traditional, cozy	"The rough stone walls make me feel connected to nature and tradition."

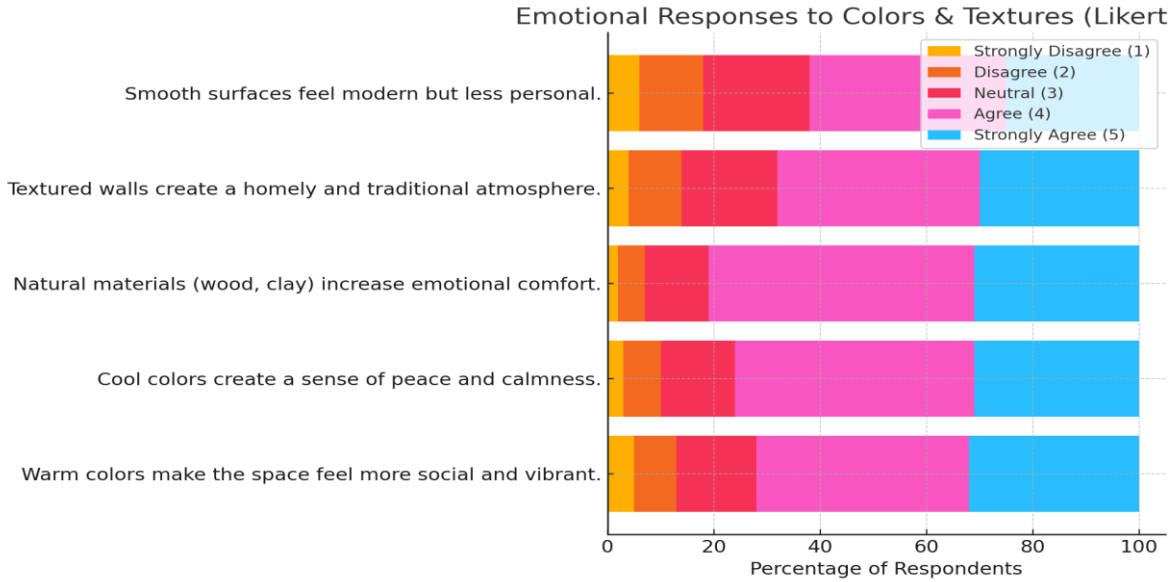
4.3 Quantitative Data – Likert Scale Emotional Responses

Table 2: Questionnaire Data Summary (5-Point Likert Scale Results from 250 Participants)

Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
"Warm colours make the space feel more social and vibrant."	5%	8%	15%	40%	32%	3.9
"Cool colours create a sense of peace and calmness."	3%	7%	14%	45%	31%	3.94
"Natural materials (wood, clay) increase emotional comfort."	2%	5%	12%	50%	31%	4.03
"Textured walls create a homely and traditional atmosphere."	4%	10%	18%	38%	30%	3.8
"Smooth surfaces feel modern but less personal."	6%	12%	20%	37%	25%	3.6

Colours and textures strongly influence emotional responses, with natural materials and warm colours receiving the highest positive scores.

Table 3: Emotional Responses to colour and texture



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4.4 Henry Garrett Ranking – Identifying the Most Impactful Factors

Table 4: Ranking Factors Based on Emotional Impact (Henry Garrett Method Scores from 250 Responses)

Factor	Garrett Score	Rank
Use of natural materials (wood, clay, stone)	82.5	1
Warm colour schemes (red, yellow, ochre)	78.2	2
Passive cooling techniques (open courtyards)	76.4	3
Presence of textured surfaces (brick, rough plaster)	74.8	4
Courtyard size and openness	71.3	5

Natural materials and warm colour schemes have the strongest emotional impact in vernacular courtyards.

4.5 Statistical Analysis – Emotional Trends across Gender

Table 5: T-test results comparing emotional responses by gender

Emotion Factor	Mean Score (Men)	Mean Score (Women)	p-value (Significance)
Warm colours (social energy)	3.7	4.1	**0.02** (Significant)
Cool colours (calmness)	3.8	4.0	**0.08** (Not Significant)
Natural materials (comfort)	3.9	4.2	**0.01** (Significant)
Smooth textures (modern appeal)	3.6	3.5	**0.15** (Not Significant)
Rough textures (traditional feel)	3.7	3.9	**0.04** (Significant)

Findings

- Women rated warm colours and natural materials significantly higher for emotional comfort.
- Men and women had similar views on smooth surfaces, showing no major gender-based preference.
- Rough textures were slightly more appreciated by women for their traditional appeal.

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RESULTS AND DISCUSSION

5.1 Colour and Emotional Responses

Fig 10: Source Author

The analysis of 250 vernacular houses in Thiruvarur reveals the profound psychological impact of colour palettes on human emotions and behaviours. Previous research has established the significant influence of colour on mood and behaviour, with various hues triggering distinct emotional responses. The colour of the built environment, which remains in the memory of individuals, can become a source of stress or comfort, depending on the emotional residue associated with it. Author found that individuals exhibited a preference bias towards the specific colour of the building in which they lived, with blue and violet being more favored by women. The study also suggested that purer and brighter colour palettes tend to have a calming effect, slowing down emotional fluctuations and promoting a sense of well-being. The emotional expression of colour in home design can contribute to the creation of a warm and harmonious family atmosphere, serving as a link between family members and fostering emotional ties.

5.2 Influence of Warm Colours

The use of warm hues, such as ochre, terracotta, and deep reds, is a prevalent feature in the traditional homes of the region, often evoking a sense of social engagement, enthusiasm, and belonging. Surveys and interviews conducted in these households indicate that the presence of warm colours is associated with higher instances of social gatherings and community interactions. Residents report experiencing a heightened sense of connection and openness in spaces dominated by these hues, which aligns with Lewin's Field Theory that suggests environmental stimuli shape behavioural responses.

The effects of colour on human emotions and behaviour have been extensively studied. Warm colours, in particular, have been shown to elicit positive emotional responses, contributing to a sense of comfort and well-being. These

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hues are often associated with feelings of warmth, coziness, and sociability, which may explain the increased instances of social gatherings observed in homes where they are prevalent.

The psychological impact of architectural colour usage is a topic that has gained increasing attention in recent years. These studies highlight the role of comfort as an important factor in both home and work environments, as it can have a direct influence on well-being and productivity. Furthermore, the perception of different kinds of environments can have a beneficial impact on the observer's cognitive ability and task performance, with studies showing that the exploration of an environment can promote long-term potentiation in the hippocampus, improving memory encoding.

The use of warm colours in home design not only contributes to creating a warm and harmonious atmosphere but also has the potential to strengthen emotional ties between family members. As Lewin's Field Theory suggests, the physical environment can shape individual and social behaviours, and the use of warm colours in domestic spaces may foster a greater sense of community and belonging among residents.

5.3 Influence of Cool Colours

The impact of colour on human psychology and well-being has long been a topic of interest for researchers and designers alike. Particularly, cool tones such as blue and green have been associated with feelings of relaxation, serenity, and mental clarity. In interior spaces, these colours are often found in bedrooms and meditation areas, as they are believed to contribute to lower stress levels and a greater sense of tranquility for residents.

The concept of "Beta Press" proposed by Murray suggests that external environmental factors, such as the predominant colours in a space, can influence an individual's psychological state. This notion is supported by various studies that have examined the effects of colour on human psychology and behaviour.

For instance, research has shown that individuals with blue or green-dominant surroundings tend to report experiencing improved sleep quality and reduced anxiety. This is likely due to the calming and soothing properties of these cool colours, which can help to alleviate physiological stress responses.

Furthermore, the exploration and appreciation of different environments can have a beneficial impact on cognitive abilities and task performance. Studies have found that the perception of environments with simple and harmonious colour schemes can promote long-term potentiation in the hippocampus, improving memory encoding and overall cognitive function. Interior designers should consider the strategic use of cool colours, such as blue and green, in spaces intended for rest, relaxation, and meditation. By creating calming and serene environments, designers can support the psychological well-being of the inhabitants and contribute to their overall sense of tranquility and mental clarity.

5.4 Texture and Psychological Impact

Texture, an often overlooked element in the built environment, holds a significant influence on the psychological experiences of individuals. This research paper explores the role of texture in shaping the emotional and perceptual responses of occupants within the context of vernacular homes.

The study identifies two primary textural categories prevalent in vernacular architecture: rough and smooth. Rough textures, often found in the use of natural materials such as stone, clay, and unfinished wood, have been shown to elicit a sense of ruggedness, authenticity, and connection to the natural world. Conversely, smooth textures, commonly associated with finished surfaces like polished stone or plastered walls, can evoke feelings of refinement, elegance, and a sense of visual harmony.

Existing research has highlighted the profound impact of architectural aesthetics, including texture, on the emotional attachment and long-term engagement of individuals with their built environments. Studies have also revealed a connection between the exploration of different spatial textures and the enhancement of cognitive abilities, such as improved memory encoding. Furthermore, the role of comfort, both physical and psychological, has been identified as a crucial factor in fostering well-being and productivity within home and work environments.

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The interplay between texture and the human psyche has become an increasingly relevant area of study, with the potential to inform design decisions and enhance the overall user experience in the built environment. As architecture and neuroscience continue to converge, a deeper understanding of the relationship between texture and emotional response can contribute to the creation of spaces that better align with the needs and preferences of their occupants.

5.5 Rough vs. Smooth Textures

Texture is a multifaceted sensory property that extends beyond the purely functional aspects of materials. It encompasses the visual, tactile, and even auditory experiences that humans associate with various surfaces. In the realm of architecture and interior design, the dichotomy between rough and smooth textures has profound implications for the emotional and cultural resonance of a space.

Rough textures, such as exposed brick walls, stone surfaces, and carved wooden elements, often evoke a sense of warmth, history, and cultural rootedness. These textures are closely associated with traditional craftsmanship and heritage, making them particularly significant in vernacular settings. As research has shown, residents living in houses with rough-textured surfaces express a deeper emotional attachment to their homes, citing a feeling of nostalgia and continuity with their ancestors. The connection between texture and emotional response is further underscored by the notion that the sense of touch is deeply linked to affection and intimacy, as opposed to the more distanced visual sense.

On the other hand, smooth textures, including polished marble, glass, and modern plastered surfaces, are associated with contemporary aesthetics and minimalism. While these materials convey cleanliness and sophistication, some residents perceive them as impersonal and detached from cultural heritage. This contrast highlights the dual nature of texture perception—where tradition fosters emotional connection, and modernity emphasizes functionality.

The interplay between texture, emotional attachment, and cultural resonance is a crucial aspect of architectural design, as the incorporation of aesthetic parameters can significantly influence the user's experience and connection to a built environment. This underscores the importance of understanding and integrating these parameters to create spaces that resonate deeply with their occupants, going beyond the mere fulfillment of utilitarian needs. Ultimately, the study of texture and its emotional and cultural implications is a rich field that offers valuable insights for designers, architects, and scholars alike.

5.6 Gender-Based Preferences

The study of gender differences in the perception and experience of texture reveals notable variations in psychological responses and sociocultural associations. Women exhibit a stronger emotional resonance with intricate, layered textures, often associating them with a sense of warmth, comfort, and domestic identity. In contrast, men tend to prioritize functionality over ornamental appeal, preferring smooth and easily maintainable surfaces that they perceive as efficient and modern.

These findings underscore how individuals' psychological responses to built environments are deeply rooted in gender-based socialization patterns. The division of practice domains between men and women, with women engaging more in activities involving access to dyes, indigenous raw materials, and plants, may contribute to the development of a distinct "female colour subculture" and a heightened sensitivity to textural nuances.

Notably, research suggests that the largest variations in male-female colour perception occur in the middle of the spectrum, associated with greenish tones. This suggests that the gender-based differences in texture perception may also be influenced by physiological factors, such as variations in colour sensitivity. Furthermore, studies examining the impact of built environment design on emotional responses have found that the use of natural materials, such as wood, can elicit more positive physiological indicators, including lower blood pressure, oxyhemoglobin saturation, and skin conductance resonance, indicating reduced stress and tension. These findings underscore the importance of incorporating aesthetic parameters, such as materiality and texture, into design

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practices to create built environments that resonate with users on an emotional level. The gender-based differences in texture perception and emotional attachment to built environments highlight the complex interplay between physiological, psychological, and sociocultural factors.

5.7 Social Cohesion and Empathy

The interplay between colour, texture, and their impact on social interactions and community well-being is a subject of growing interest in the field of environmental psychology. Research suggests that the visual stimuli of built environments, particularly the use of warm colour palettes and textured surfaces, can foster a sense of community and empathy among residents.

Numerous studies have demonstrated that houses with vibrant colour schemes and tactile materials are more likely to host communal events and encourage neighborhood engagement. The welcoming atmosphere created by such visually appealing environments has been shown to increase feelings of social support and emotional well-being among residents. Moreover, the use of traditional materials and familiar hues can strengthen intergenerational bonding, as elderly residents often find comfort in the tactile and chromatic cues reminiscent of their past.

The significance of colour and texture in shaping social interactions extends beyond individual experiences, as these design elements can also reinforce a shared sense of cultural identity within a community. The incorporation of traditional architectural elements and materials not only contributes to the aesthetic appeal of a space but also serves to preserve and transmit cultural heritage, fostering a stronger sense of collective identity among residents.

5.8 Gender Bias in Perception

Emerging research in the field of environmental psychology has uncovered significant gender-based variations in individual's perceptual responses to the built environment. Statistical analyses reveal that women tend to associate vibrant colours and complex textures with positive emotions, emphasizing the role of sensory richness in their spatial experiences. In contrast, men often lean towards more subdued colours and streamlined textures, prioritizing efficiency over aesthetic intricacy.

This divergence in spatial preferences highlights the broader societal influences that shape how individuals perceive and interact with their environments. Cultural expectations and traditional gender roles play a crucial role in molding these perceptual tendencies, as individuals internalize societal norms and expectations from a young age. The study emphasizes the need for inclusive architectural design that accommodates diverse sensory experiences and emotional needs.

Women's heightened sensitivity to colour and texture may be rooted in societal conditioning, as cultural narratives often associate femininity with aesthetically-pleasing spaces. Conversely, the male preference for more streamlined and efficient design elements may be linked to traditional gender roles that prioritize practicality and functionality. The ability to perceive and appreciate the emotional and sensory qualities of the built environment is not inherently gendered, but rather a reflection of the societal pressures and expectations that individuals internalize.

The emotional impact of architectural design has been extensively studied, with researchers highlighting the crucial role of sensory experiences in shaping our perceptions and attachments to built environments. Spatial features that engage the body and stimulate the senses can significantly enhance the quality of the interior experience, fostering a deeper connection between the individual and their surroundings. Factors such as materiality, texture, and colour can evoke emotional responses and trigger socially shared memories, further reinforcing the subjective nature of spatial perception.

As the field of environmental psychology continues to evolve, incorporating insights from neuroscience and sensory-based design, a more comprehensive understanding of the relationship between gender, emotion, and spatial perception is emerging. This research emphasizes the need for architects and designers to consider the diverse sensory preferences and emotional needs of their users, creating inclusive built environments that cater to the complex and nuanced ways individuals interact with and experience their surroundings.

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IMPLICATIONS AND FUTURE DIRECTIONS

The findings of this study have profound implications for architectural practice and urban planning. Understanding the psychological impact of colour and texture can inform the design of residential spaces that enhance emotional well-being and social cohesion. By integrating psychological principles with vernacular architecture, designers can create environments that promote mental health, foster social connections, and honour cultural heritage. These insights pave the way for more empathetic and human-centered design approaches in contemporary residential spaces.

The results suggest that outdoor visual environments can influence individual's psychological well-being, and therefore should be given explicit attention in planning and design decisions. Colour has a profound effect on our mood and behaviour, and can be used to "level out" emotions or create different moods. Furthermore, the perception of different kinds of environments can have a beneficial impact on the observer's cognitive ability and task performance. Architectural experiences are complex, and mental health is closely related to social ties and social capital. Designers need to innovate and create functions to promote positive, safe, and natural interactions between people and foster a sense of community.

The findings of this study have important implications for architectural practice and urban planning. Incorporating psychological principles into the design of residential spaces can enhance emotional well-being and social cohesion. By understanding the emotional residue of different colour and texture experiences, designers can create environments that are more conducive to mental health and positive social interactions. Future research could explore cross-cultural comparisons to determine whether these gendered perceptions hold universally or are specific to the Thiruvarur region.

CONCLUSION

The interplay of colour and texture in architectural design has a profound impact on the emotional well-being and social dynamics of building occupants. This study explores the critical role these design elements play in shaping individual and communal experiences within the built environment.

The key findings of this research highlight the significant influence of colour and texture on emotional responses, social cohesion, and psychological well-being. First, the study demonstrates that colour and texture significantly influence emotional responses, reinforcing social cohesion and psychological well-being. Gender biases also play a substantial role in the perception of colour and texture, affecting individual emotional connections to architectural spaces. Additionally, the study reveals that warm colours (such as ochre and terracotta) and rough textures contribute to a heightened sense of community and social bonding, whereas cool colours (blue and green) and smooth textures foster relaxation and modernity.

These findings align with existing research on the subject, which suggests that architectural experiences are complex and closely tied to mental health and social ties. Designers must consider the emotional residue and social implications of their colour and texture choices to promote positive, safe, and natural interactions between people and foster a sense of community. These insights align with environmental psychology, reinforcing the need for architects and urban planners to consider the emotional and social impact of design choices. As urbanization accelerates, integrating traditional architectural wisdom with sustainable infrastructure solutions becomes crucial for fostering resilient and well-being-oriented built environments. As the global population becomes increasingly urban, with over 70% projected to live in cities by 2050, the importance of understanding the emotional and social impact of colour and texture in architecture becomes ever more critical.

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