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PHENOMENOLOGICAL AND THERMAL DIMENSIONS OF IN- BETWEEN SPACES IN LAHORE'S VERNACULAR ARCHITECTURE

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Abstract
Urban heat and climatic change are the accelerating worldwide necessity for sustainable urban development. Particularly in the face of intensifying urban heat and a changing global climate, creates a critical need for architectural responses that thoroughly connects human experiences with environmental performances. This work is motivated by the fact that historical vernacular construction techniques, once provided complex and climatic responsive solutions in building enclosures, are not as widely observed in contemporary practices, despite their potential to organize a more embodied relationship between inhabitants and their environment. The current body of architectural literature emphasizes passive design strategies and thoroughly examines the methods for mitigating the effects of climate change while ensuring thermal comfort in building envelops. Likewise, the relevance of In-between spaces or the liminal zones that bridges the interior and exterior environments has been widely acknowledged due to their social role and potential to influence human interaction in urban fabrics. Regardless, of this informative responses there remains a critical research gap: a limited exploration into how particular vernacular "In between spaces", serves simultaneously as experiential thresholds (forming human behavior and producing embodied knowledge) and as climatic buffers (passively providing thermal comfort). More specifically not much has been explored about the phenomenological epistemology of how the felt experience of climatic improvement within urban corridor actively informs user's distinct understanding and adaptive practice. In attempt to bridge this gap, this qualitative phenomenological study investigates vernacular "In between spaces" of Gali Surjan Singh in walled city of Lahore, Pakistan. This paper introduces a human-based sustainable living model that links experiential design emphasizing more informed and embodied epistemologies of thermal comfort in a space.

INTRODUCTION

In the pursuit of modern urban development and growing reliance on technology, cities, have often cut the deep connection that once existed between people and their environment. The growing global issues of urban heat and the far reaching effect of climate change call for fundamental rethinking of current architectural practices. Cities worldwide are experiencing the increasing

impacts of these phenomenon, which not only threatens urban livability especially for vulnerable communities but also puts strains on energy systems. (Shen et al., 2025) (Salameh & Touqan, 2023). The crisis is intensified by the fact that building sector is a primary consumer of the global energy, with a significant share dedicated to mechanical heating and cooling. (Yildiz, 2015) (Chandel et al., 2016). Traditionally, the fabric of cities, particularly their streets and communal spaces, served as a vital connection between residents and their climate, encouraging the form of "climatic literacy" through design responsive to local needs and cultural practices. (Salameh & Touqan, 2022b). However, contemporary urban development prioritizes more towards technological control and vehicular movement. As a result, cities lose their human centered character becoming "faceless" spaces that fails to serve their local communities. This research seeks a different path, encouraging human centered approach to thermal resilience by re-engaging with culturally rooted spatial strategies.

1.1 Critique of Conventional Architectural Responses

Conversely, contemporary architectural practice has come to depend more on mechanical systems to manage thermal discomfort, creating what phenomenological theorist identify as a growing disconnect between occupants and their environments. While sealed, mechanically cooled spaces, may provide immediate relief from heat and thermal stress, it also creates conditions known as "Sensory Impoverishment" (De, 2017). In this state, these spaces diminish full range of sensory engagement that characterizes meaningful architectural experience.In hot climates, architecture now rely on energy intensive cooling systems, that can use up to 70% of country's electric supply also adding substantially to carbon emissions (Salameh & Touqan, 2022b) (Salameh & Touqan, 2023). Critics argue that this reliance destroys traditional urban character, neglects local climates and cultural context, and fails to deliver truly comfortable and healthy living conditions (Salameh & Touqan, 2022b) (Basunbul & Braham, 2023). The phenomenological critiques of modern architecture, based on the foundational work of theorists such as Juhani Pallasmaa, Christian Norberg-Schulz, and Maurice Merleau-Ponty, finds strong support in repeated failure of such designs in creating a holistic, embodied, sensory rich relationship between human and their built environment (Trivic, 2023) (Economidou et al., 2024).

This critique goes beyond philosophy; these issues have tangible consequences as mechanically conditions spaces intensify urban heat and creates a cycle where technological solutions for thermal discomfort perpetuate the problem they aim to solve (McKim, 2016). Additionally, this overreliance on artificial environments leads to energy dependency which is neither ecologically nor economically sustainable. Architectural phenomenology provides vital counter narrative to this focus on technology by emphasizing bodily perception (sight, touch hearing) and crucial temperature sensation to understand architectural meaning, environmental engagement and true thermal comfort (McKim, 2016).Drawing lesson from a lost climatic literacy, this view point argues that achieving sustainable thermal comfort requires more than technical fixes; it demands a fundamental reconsideration of how architectural space meditates environmental conditions and inform its user.

1.2 A Parallel Counter-Narrative

In contrast strike to the modern, universalized design, vernacular architecture serves as an indispensable counter narrative, offering a proven paradigm of climatic adaption that remains relevant (*Architecture for the Poor*, 2025). These traditional strategies and forms, born from centuries of gradual optimization. They respond to local climate, available material and the socio-cultural fabric of their inhabitants (Rapoport, 1969; Oliver, 1997). Recent research emphasizes that vernacular design provides *resilient*, *passive and context specific* thermal comfort solutions. These solutions are essential for addressing todays contemporary climate change (Bodach et al., 2014). Far from being the remnants of the past they represent ways to understand epistemology of

comfort. They show how deep knowledge, cultivated through generational living can be translated to effective and sustainable living strategies.

1.3 Research Aim and Questions:

This research aims to investigate that how vernacular in between spaces generates embodied knowledge of thermal comfort through phenomenological and epistemological inquiry. Specifically, it tries to find the intricate connection between architectural features of such spaces, the multi-sensory experience they provide, and the embodied awareness it generates of how comfort is experienced for long term users. This research is guided by the following questions:

1. How do vernacular in-between spaces function as phenomenological thresholds, shaping the lived, multi-sensory experience of thermal comfort and human-environment interaction for their inhabitants?
2. What embodied knowledge (phenomenological epistemology) do inhabitants acquire and utilize through sustained interaction with these spaces, influencing their adaptive behaviors, perception of comfort, and daily routines?
3. How do the specific architectural characteristics (spatial configurations, materials, light/shade modulation, airflow control) of vernacular in-between spaces contribute to, and are interpreted through, the phenomenological experience of climate adaptation?

2. Literature Review

2.1 Vernacular Architecture and Climate Responsiveness:

This is of no doubts that vernacular techniques have long been recognized for representing an invaluable repository of human creativity in adapting to diverse environmental conditions. It reflects centuries of practical knowledge that distinct from formally trained design. Scholars acknowledge that it responds well to local climate, indigenous material and cultural practices (Rapoport, a. (1969); (Oliver, P. (Ed.) (1997). Studies highlight that with minimal energy consumption, traditional architectural strategies have their effectiveness across diverse geographical contexts. In hot regions, these practices consistently manifest smart passive techniques to provide comfort without mechanical interventions. For instance, passive design feature such as high thermal mass and compact urban layouts are commonly utilized in UAE, to enhance outdoor shading and ease heat stress in arid climates (Salameh & Touqan, 2023). Traditional districts in Sharjah, UAE as shown by simulation study characterized by its compact form and increased shading, achieved constantly lower air temperatures and improved Predictive Mean Vote (PMV) values as compared to the modern ones (Salameh & Touqan, 2022a). Similarly, traditional courtyard houses in Iran illustrate how passive design strategies maintain indoor climates that sustain much cooler environments during summers, demonstrating their efficiency in hotter regions (Khastar & Taleghani, 2024). Hassan Fathy's seminal work in Egypt, shows how traditional principles including thick mud brick walls, internal courtyards and wind catchers, effectively moderates extreme heat, creating naturally tempered living spaces (Fathy, H. (1986). This natural responsiveness goes beyond mere technical fix. It cultivates an understanding of how to live symbiotically with local environment through both space and behavior. Vernacular strategies remain visible in Nepal and Portugal where traditional materials still provide sustainable construction solutions (Bodach et al., 2014b). Studies from hot climate contexts (see Table:1) demonstrates the sophisticated use of architectural elements and most of the empirical study validates the capacity of these vernacular forms to deliver superior thermal performance.

2.2 In-Between Spaces: Climatic and Cultural Meanings:

Central to lasting effect and cultural efficacy of vernacular architecture are it's "*in-between spaces*". Liminal zones that actively connects interior and exterior, as well as public and private worlds. These spaces considered not just as transitional passages; but as an active threshold that allows physical movement, climatic buffering and encourage social interaction. The theoretical

foundations to understand these liminal spaces are extensive. However, reconsideration of in-between spaces within architectural discourse owes much to **Team X**, who challenged CIAM's strict functionalism with a focus on human centered perspective. Among them Aldo Van Eyck, articulated the notion of "*In-between Realms*" or "*In-between place*" drawing inspiration from Martin Buber's philosophy of dialogue and "I-Thou relationship". This concept covers spaces that performs dual role in meditating both physical and social dimension by connecting inside to the outside, as well as the individual to the community.

Aldo Van Eyck also emphasized that these spaces, by performing dual character, help build communal connections and emotional resonance within built envelop. For him thresholds, courtyards and passages were not residual or empty zones but active "place of encounter", mediating between self and the other (Sack, 2024; Park, 2015).

This idea was further extended by Alison and Peter Smithson on broader urban settings, coining the term "in-between spaces" to describe the vital connective tissue linking buildings, different urban zones and mobility infrastructure. They encouraged their inherently adaptable and "un-programmed" character,

flexibility that traditional spaces often lack. This very flexibility allowed them to respond organically to changing societal needs. This capacity for adaptability, due to their open ended nature, made them essential for shifts in society's lifestyle (Ramos, 2017; Chicote & Ramírez, 2014).

The argument appears within Smithson's critique of post-war modernism in Van den Heuvel's dissertation Alison and Peter Smithson: A brutalist story, highlighting their focus on every day, communal and informal (Van den Heuvel, 2013). This view point is consistent with regional traditions in hotter region, where liminal zones like courtyards, alleyways and dalans act as adaptable thresholds that promotes both social life and climatic responsiveness. Contemporary analysis deepens our understanding of in-between spaces by exploring that these spaces take different forms and serves multiple purposes. Santos- Garcia and Barga (2025) provide an in-depth review of historical evolution of these spaces. They explain this by grouping these spaces according to user groups (private, communal and public) and by identifying common characteristics such as programming, presence of vegetation and physical dimensions. This emphasis their vitality, not only as physical entities but a crucial component of urban life and social interaction.

Around the world, in-between spaces appear in varied forms: the deep dalans or verandah founded in many traditional architectures that provides substantial thermal buffering, the shaded courtyards (sahn) of traditional middle eastern and south Asian havelis that use stack effect ventilation and thermal mass (Qureshi et al., 2021) and the small often covered alleyways (kuchas and sabaats) that are prevalent in historic city centers.

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TABLE:1: INCLUDES SYNTHESIS OF VERNACULAR PASSIVE DESIGN

PASSIVE DESIGN STRATEGIES		EXAMPLE AND FUNCTIONS	SOCIAL / CULTURAL ROLE	VERNECULAR CONTEXT	KEY REFRENCES
1	Compact Urban Forms	Mutual shading, canyon breeze and reduced sun exposure through narrow streets and attached buildings.	Improves community engagement and walkability.	UAE, Iran, Nepal, Pakistan .	(Salameh & Touqan, 2023; Fernandes et al., 2014;Bodach et al., 2014c; Khastar & Taleghani, 2024b0)
2	Courtyards	Retains cool night air by serving as microclimate regulator, promotes stack effect ventilation and provides semi private, shaded areas for daily activities. Can also considerably reduces indoor temperature.	Family gatherings, semi private social life.	Iran, Egypt, Pakistan, UAE, India.	(Khastar & Taleghani, 2024b; Lubis et al., 2018; Singh et al., 2009; Qureshi et al., 2022)
3	High Thermal Mass	Heat is absorbed by thick walls made up of local materials, during day time and expelled at night. Dampens extreme temperature fluctuation and creates a noticeable time lag.	Support rest and rituals while stabilizing indoor environments	Saudi Arabia (Hijaz), Nepal, Pakistan, India.	(Basunbul & Braham, 2023c; Chandel et al., 2016b; Bodach et al., 2014a; Vakharia & Joshi, 2022)
4	Natural Ventilation Elements	Raised floors, latticed screens (Mashrabiyya), wind catchers(Barajeel/Baad-Geers) and strategically places openings are used to direct and capture airflow, enabling cooling and cross-ventilation.	Comfort in living/work areas, connection with street life	Iran, Egypt, Myanmar, Saudi Arabia.	(Lubis et al., 2018; Khakzand et al., 2023; Zune et al., 2019; Basunbul & Braham, 2023c)

Each typology exhibits a critical dual function: it serves as a social and cultural conduit for interaction, commerce and day to day living while, simultaneously providing essential climatic adaption through efficient shading, natural ventilation and strategic use of thermal mass. The street microclimate is actively influenced by morphology of such urban elements, particularly narrow streets and alleyways, which affects solar access and airflow in urban canyons (Alamoush et al., 2021; Shishegar, 2013; Fozouni et al., 2019).

These findings confirm their vital role in urban resilience, in managing environmental conditions, supporting complex human activities and creating a *sense of place* (Alamoush et al., 2021).

Though these studies effectively describe the form, function and socio-cultural significance of in-between spaces, the way in which these spaces are subjectively experienced and interpreted by inhabitants, remains an underexplored dimension.

2.3 Phenomenology of Space:

This research adopts phenomenology as its main theoretical frame work in order to critically examine the subjective dimension of architectural experience. Developed by Edmund Husserl , as a *"science of consciousness "* (Soltani & Kirci, 2019), phenomenology moves beyond , by shifting focus from objective analysis to subjective *lived experience* (Leib)[1] of being in the world, as deeply articulated by Maurice Merleau-Ponty (Merleau-Ponty, M. 1962; Gallagher, 2010).This method explores the human "lifeworld" a continuous stream of everyday spatial experience by viewing architecture not as inert object, but as constantly evolving surroundings that are encountered, perceived and given meaning by embodied subject (Soltani & Kirci, 2019; Sanabria, 2006; Vesely, D. 2004). Christian Norberg-Schulz further extended this understanding to architecture, who recognized phenomenology as the most ideal way to understand *Genius Loci* (1980) of place and penetrate the "world of everyday existence".

Juhani Pallasmaa's critique of modern architecture's "ocularcentrism" which he argues has resulted in a *sensory impoverishment,* is central to this comprehension (Pallasmaa, 2005, p.30). As essential to true architectural meaning and environmental awareness, Pallasmaa advocates a multisensory architecture thst engages the entire human body, including hepatic, olfactory, auditory and most crucially thermal sensations (Pallasmaa, 2005). Considering this viewpoint, the term climatic literacy, an innate ability to read, comprehended and adjust to environmental conditions requires this pivotal holistic engagement. Tim Ingold (2000) complements this by highlighting "dwelling" as a practice, where knowledge is deeply embedded in continuous, proactive interaction with one's surroundings. According to this perspective, architectural elements are learning means which encourages epistemology of space, a distinct way of knowing that is derived directly from spatial interaction. As Gary J. Coates (2024b, p.226) articulates, architectural design has a natural language of space.... rooted in the pre verbal meanings of embodied experience. This "natural language" is form of spatial epistemology in which environmental information is implicitly conveyed by the changing qualities of light, the small shifts in air movement and the thermal properties of the surfaces. Within vernacular in-between spaces this constant sensory experience cultivates an embedded understanding of optimal microclimates, productive adaptive behavior and thermal characteristics of their surroundings.

2.4 Thermal Comfort: Technical vs. Experiential Paradigms:

Different paradigms are used to approach thermal comfort, a cornerstone of architectural design. The technical paradigm is preferred by engineers, who also uses measureable matrices and predictive models such as Fanger's Predicted Mean Vote (PMV) and Predicted Percentage of Dissatisfied (PPD) (Shaw, 1972; Fanger 1970).

[1] In phenomenology, Leib (German for "lived body") refers to the body as the sentient subject of experience, distinct from the physical object (Körper). It is the primary means through which humans perceive and make meaning of the world, central to embodied knowledge (Merleau-Ponty, 1962).

Despite being essential for standardized conditioned environments, this approach is limited in naturally ventilated or vernacular settings where dynamic condition require more flexible expectations. The adaptive comfort model, in response suggests that occupant actively adapt to their surroundings through behavioral, psychological and physiological means, suggesting comfort temperatures vary with outdoor conditions (De Dear & Brager, 2002). Even within this framework, though most researches still prioritize quantitative performance matrix such as temperature ranges, airflow rates and energy savings usually neglects the most subjective layer of the space. The way user considers these thermal aspects, their felt experience of the space and its meanings, most crucially the encouraged embodied understanding of environment are all missed by only quantitative based approach. This research advocates a critical shift to deeply analyzing qualitative dimension, to argue that a true sustainable thermal comfort is connected to the linked experience and adaptive knowledge coming directly from the multisensory engagement with built envelopes.

2.5 Regional Vernacular Context- Lahore, Pakistan:

A captivating regional context for understanding climate–responsive vernacular design is provided by Lahore, Pakistan, with its hot arid/semi-arid climate and summer temperature that often surpasses 40 C (Mazhar et al., 2015). A city with highly concentrated constructional forms, spatial organization and building typologies, its indigenous urban fabric particularly the examples from walled city portrays intense socio-climatic intelligence. Spatial Morphology of Haveli, a traditional courtyard house, uses deep *dalan* (verandah) as a transitional element along with centralized courtyard organization to create shaded micro-climates, utilizes thermal mass and enhance stack effect ventilation (Qureshi et al., 2021). Analogous to this, urban alleyways or street networks having narrow width and elevated walls allows breeze channeling and aids in passive shading, resulting cooler pedestrian routes which considered vital for socio-thermal comfort in crowded areas (Alamoush et al., 2021b; Fozouni et al., 2019).

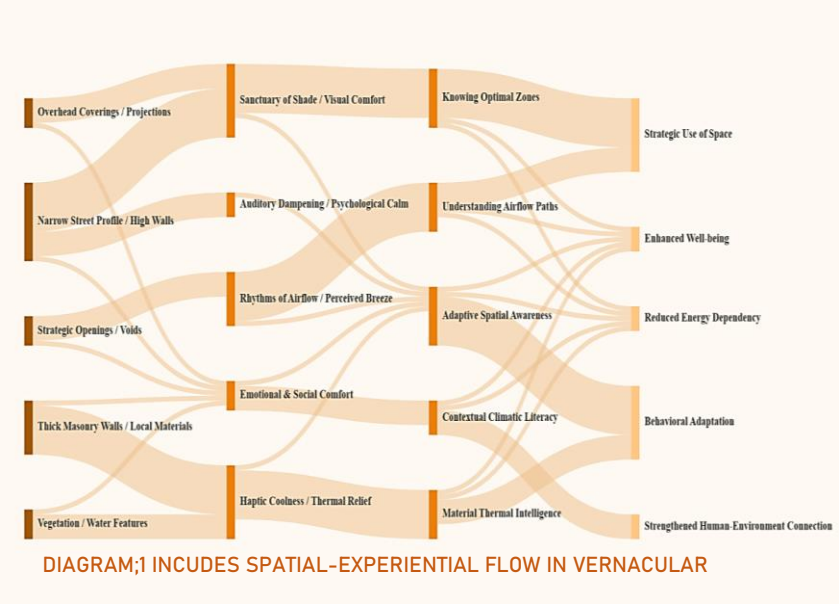
City's vernacular traditions can be understood by its archetypal experiences based on several characteristics, considering its unban patterns and its everyday spatial elements that mediate lived experience, culture and identity (Arshad, 2018; Kabir et al., 2017). Table. 2 synthesizes dimensions by considering these archetypal elements and explains how they are integral to rhythm of communal life instead of merely termed as physical characters. While the Scio-cultural functions of these elements are well established but their phenomenological dimension, how they are felt, sensed and tactility understood by users are largely absent in current studies.

Lahore's vernacular architecture is a unique synthesis, as it's a product of various historc layers, notably shaped by Mughal and colonial eras (Arshad, 2018b). This ongoing development has shaped the identity of city by absorbing and changing features from these dominant historical phases (Kabir et al., 2017b). Under Mughal era (1524-1712), Lahore flourished as a major cultural and political center, acquiring strong architectural vocabulary with detailed elements like ornamental tile work, large gate, minarets, extensive use of Redstone and marble. Imperial mosques, gardens and civic building were where these features were most apparent (Kabir et al., 2017b; Jabeen & Munir, 2023). However, their influence extended to walled city's common neighborhoods, as spaces like courtyards, chowks, havelis absorbed decorative elements and spatial organization from Mughal era (Jabeen & Munir, 2023).

While introducing a contrasting vision, the British colonial period (1849-1947) brought significant changes (Rehman & Arshad, 2012; Shahzad, 2011). It included the creation of "new city" with planned extensions for south and southeast of walled city, new concept for urban planning and a grid based logic that contrasted with organic urban morphology (Rehman & Arshad, 2012). These colonial imprints were demonstrated by structures along Mall Road and Civic Line's residential quarters, even impacted Walled City (Shahzad, 2011). British engineered techniques altered traditional forms and physical characteristics

(Rehman & Arshad, 2012). Similarly, new materials and connection to outer settlements father changed the layout of city. As a result, a hybrid fabric was created that juxtaposed colonial order with vernacular adaptions (Shahzad, 2011).

These legacies are combined in Lahore's vernacular architecture. Although walled city retains most of its traditional character, some



DIAGRAM;1 INCUDES SPATIAL–EXPERIENTIAL FLOW IN VERNACULAR

traces of colonial influence can be found in its construction and infrastructural changes (Shahzad, 2011). Addition to this, as social practices evolves, such as shift in family life, modernization, mobility and cultural expression, city's vernacular architectural identity further shaped by becoming responsive to how people live and value it (Arshad, 2018). This blending demonstrates that its

architecture is not static but dynamic resulting a distinct identity. However, the existing research offers descriptive analysis and quantifiable performance matrix, merely emphasis the phenomenological lived experience of these spaces. It rarely explains the gained knowledge in historically layered urban in-between spaces particularly about climatic adaption from user's perspective.

TABLE :2 INCLUDES ARCHETYPAL ELEMENTS OF VERNECULAR ARCHITECTURE

Archetypal Elements		Climatic Function	Social/Cultural Role	Phenomenological Experience
1	Galis and Kuchas (streets)	Shading, breezing channels	Mohalla life, neighborly ties	Intimacy , discovery
2	Havelis & courtyards (Sahn)	Passive cooling, thermal mass	Family hub , women domains , rituals	Refugee, belongings
3	Rooftops (chhat)	Night cooling , open air	Summer sleeping gatherings	Sky connection , openness
4	Dalans / Balconies	Shaded buffer, air flow	Street watching , in between living	Encounter , threshold
5	Everyday practices(e.g. water sprinkling)	Evaporative relief	Daily rhythm , embodied tradition	Sensory memory "home"

Synthesis and Gap:

The reviewed scholarships make three point evident:

1. The efficacy of vernacular climatic adaption. The vernacular design exhibits passive strategies to create thermally responsive environment specifically in hotter regions (Ahmed & Khan, 2024; Rapoport, 1969).

2. In-between spaces facilitate social interaction by meditating between public and private life (Van Eyck, 1966; Santos-Garcia & Braga, 2025).

3. Phenomenological and epistemological frameworks emphasis that meaning of architectural spaces are integral to its lived experience and embodied knowledge rather than its form and performance (Pallasmaa, 2005; Merleau-Ponty, 1962). This theoretical foundation becomes more relevant when applied to Lahore's distinctive, historically layered vernacular fabric, shaped by centuries of Mughal and colonial influence. The traditional in-between spaces here retain core principles alongside dominant influences, making it easier to examine the complex relationship between environment and human experience (Arshad, 2018; Shahzad, 2011).

Even with these strong understandings, there is still a significant research vacuum at the intersection of these domains. Existing studies remains largely descriptive, emphasizing more on forms and performance metrics and lived experience of vernacular design separately however there is an obvious need for integrated research. This research should thoroughly investigate the experiential and knowledge related aspects of thermal comfort in in-between spaces.

3 Methodology:

This research adopted a purely qualitative approach grounded in phenomenology and architectural analysis to explores the lived experience and knowledge based capacity of vernacular in-between spaces. This approach aids in capturing the culturally rooted, subjective and physical aspect of human-environment interaction that quantitative approach cannot fully conveys. Operating with an interpretivist and constructivist framework, this study recognizes that social interaction and individual experience constructs the knowledge. It centers the understanding of phenomenon around subjective accounts. This methodological approach supports research's objective of examining how space *feels* and what user *knows*, highlighting the epistemological capacity of architectural forms in raising "climatic literacy."

3.1 Case Study Selection: Gali Surjan Singh, Lahore, Pakistan

Gali Surjan Singh was selected for its typological significance as a linear in-between space and its location within Lahore's hot climatic context. Whereas many existing researches on thermal comfort has included courtyards leaving linear alleyway remains comparatively underexplored. Therefore, this study provides details of how narrow widths, confined/enclosed and partially covered spaces reveals daily life and climate. Its elevated walls (multiple story structures), use of traditional materials, actively engaged users and integrated residential /commercial zone and accessibility made it feasible for phenomenological inquiry.

3.2 Data Collection & Analysis:

A triangulated qualitative data collection method was employed to ensure the multiple perspective of phenomenon understanding This includes phenomenological interview, researcher-led on site observation, and a detailed architectural analysis. As Table.3 illustrates every approach provided unique insight. Interpretive Phenomenological Analysis(IPA) was used for analyzing experiential data.

TABLE: 3 INCLUDES DATA COLLECTION METHOD

Method	N/Duration	Primary Focus	Key Data Outputs
Phenomenological Interview	N=15, long term users, in-situ(summers)	Sensory experiences adaptive responses, meaning-making	Transcripted interviews, field notes, participant quotes.
On site observation	Multiple visits(various time/season)	user behavior sensory conditions, diurnal variations	Detailed field notes, photography essays.
Architectural spatial analysis	Ongoing throughout study	Spatial form, orientation materials, passive elements (coverings, *jalis*, openings)	Annotated sketches, photographic essays, descriptive text.

While architectural documentation underwent thematic analysis. Bringing all this information together was the objective of the final synthesis. As seen in Fig.1, it illustrated the complex feedback loop that links architectural forms, felt experience and lived awareness.

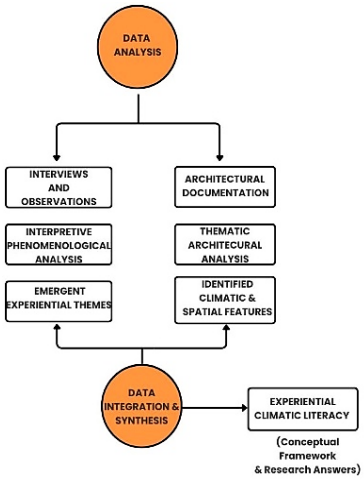


Figure.1 Data analysis Flow chart

4. Findings and Discussion:

Result obtained from investigation will remain the main core of this section as it presents key emergent themes. Significantly, relating the physical characteristics of the site with its subjective user experience and lived realities.

4.1 Street as climatic threshold

The harmonious co-existence of daily life and architecture, makes a spatial pattern one encounters while walking the Gali Surjan Singh. Street has almost 23 residential houses and most of them are multiple stories. The distinctive morphology of street, having commerce/shops on ground floor and residences above describe its mixed-use character as referred by one of the resident there: *"always alive and socially charged"* (Fig.2). This reflects Van Eyck's thought of experiential thresholds (RQ1), where the
mix of public and private spaces blend to create living social interface. This continuous connection between inside(interior) and outside(exterior) is more sustained through the direct interface of windows and doors (Fig. 3) opening in the street. Importance of this built design is also highlighted by many participants and users as they described their connection to the street is through there window. Researcher's observation combines this with narrowness of the

street in traditional urban layouts that allows inhabitants to exchange not only material things but emotions also, making it a *living threshold* between two worlds. In this case, social presence is not abstract but tangible relating to Pallasmaa's ideology of lived and multi-sensory architecture. The informal social gathering points like *tharas* and *bathaiks*, encourage collective rest as one participant states "the day ends". These daily rituals feature the site tendency of providing collective knowledge(RQ2) of how spaces supports communal experiences. Street provides porous transition from private homes to public zone, where the physical openness allows residents, users and shopkeepers to interact naturally. Frequent users of the site mentioned that here, the design itself invites to stay, through permeable social accessibility. Observation based on architectural elements as shown in (fig.2), creates an embodied process of learning (RQ2) the interaction etiquettes and climatic buffering within the street aids in extending the social use. This articulation highlights the implication of human –centered design for the vitality of socio thermalcomfort.



Figure.2 social interactions in Gali Surjan Singh (a) informal conversation at thara (b) market activity during day time. Source: Author, 2025

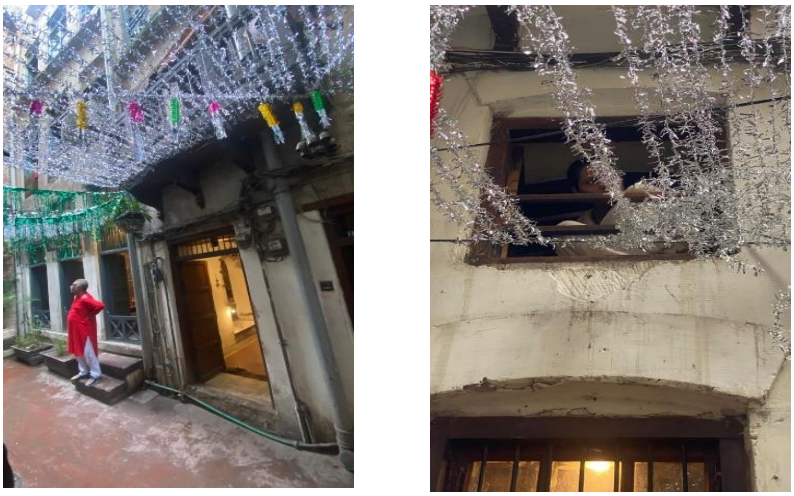


Figure.3 opening as social interfaces in Gali Surjan Singh (a) visual engaging with street life (b) blur boundaries between inside-out. Source: Author, 2025

4.2 Haptic thermal Awareness:

Materiality of constructed fabric and surface temperatures in Gali Surjan Singh, forms haptic awareness in which vital comfort cues comes from direct body contact with surroundings i.e. walls and ground surfaces.

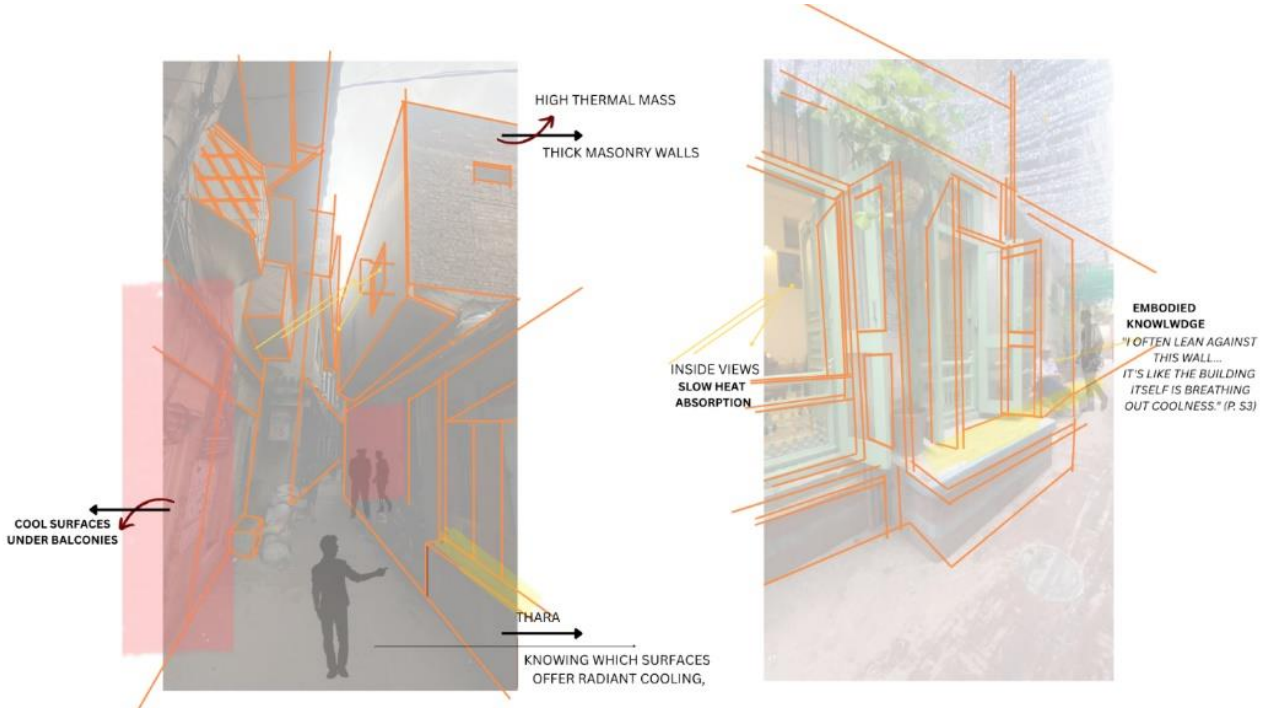


Figure.4 Architectural features of Gali Surjan Singh shaping thermal and social experience Source: Author, field documentation and analysis, 2025

The approach of using high thermal mass materials (RQ3) like thick masonry provides intense thermal intelligence and people in the street comprehended this by having direct contact, like leaning against the wall. This helps user to get better understanding and learning of radiant cooling properties (RQ1) of vernacular design. This aligns with McKim's (2016) argument that climatic knowledge is not isolated from sensory engagement which mostly remains absent with technological treated surroundings. This analysis (Fig.4) illustrates the reliance of knowledge with materials in which spaces provides thermal performance through touch and informs comfort-adjustment tactics.

4.3 Street as Climatic Buffer:

Vernacular design techniques that are widely appreciated in open courtyards, has similar micro climatic performance in linear typology. Understanding the narrow widths of street (as visible in Fig.5) with elevated (3-4 stories) walls produced deep urban canyon by its high aspect ratio. By analyzing how solar heat felt here on the skin, suggests this spatial configuration lowers the solar penetration during peak hours by providing consistent shade and temperature. Thus, creating an informed adaptive behavior including leveraging in cooler pockets, adjusting postures and gaze adjustment to diffused light. Having substantial thermal mass, brick walls absorbs heat and releases gradually at night which helps in temperature fluctuation. Similarly, the narrow cross-section particularly in linear thresholds limits hot air exposure. Participant described it as "felt immediate coolness" and "light feels less oppressive" when enters the street. Balconies and projections (Fig.6) in the street act as secondary shading devices filtering day light and mitigating glare. Gali Surjan Singh, in line with Meraleu-Ponty's notion of lived body experience and vernacular logics directly links form (RQ3) with sensory expression (RQ1) and adaptive behavior. (RQ2)



Figure.5 Narrow street typology of Gali Surjan Singh
Source: Author, field documentation and analysis, 2025



Figure.6 Balconies and projecting elements of Gali Surjan Singh
Source: Author, field documentation and analysis, 2025

4.4 Phenomenology of Airflow

Acting as an active in-between space, Gali Surjan Singh has a subtle airflow perception greatly influence users thermal comfort by shaping a unique understanding through tactile perception. The alley holds gentle, subtle air movement, the narrow typology and enclosing high walls limit cross-ventilation (RQ3). People describe this as "breath" instead of strong wind. Overtime, residents became able to identify the suitable roots where the subtle breeze flows the most with their experience (RQ1) of soft currents, which is confirmed by the researcher 's observation of slight air movement.

4.5 Limitation and Future Research:

The findings from the selected site show that climatic awareness, a learning based on lived experiences can be achieved through vernacular built spaces. Research provides an overview of how particular architectural features create multi-sensory space feels which are not merely observed. Although this study provides deep insights of context specific selected case study, this qualitative single case methodology may restrict the generalizability of conclusion. However, future research could significantly aid in result strengthening by using quantitative analysis method (e.g. microclimate measurement, thermal comfort survey) to cross verify phenomenological findings, on border context.

5. Conclusion:

This study explored the dual function of vernacular in-between spaces understand the phenomenological and epistemological aspect of human centered thermal comfort of Gali Surjan Singh, an urban alley, which was thoroughly analyzed. The research confirmed the dual nature of street as an active experiential zone while providing climatic buffering to the users. The main contribution of this paper is human-centered framework for sustainable dwelling, which promotes design principles that restores felt connection of users with the surrounding for effective mitigation of heat and build urban reliance.

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