Article

Analysis of Urban Public Space Design from the Perspective of Environmental Behavioral Psychology

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Abstract: Urban public places are where citizens spend their daily lives and serve a multitude of objects and purposes, from social gatherings to relaxation to cultural participation. Many design values today are converging around formalism or technical rationality, excessively valuing visual acuity while overlooking users' psychological experiences. Environmental psychology suggests the social and ecological effects of human and environment dynamics exist beyond material representations, that meaning and use are formed through spatial cognitions, emotional attachments, and social interactions, and that the overall efficacy of many spaces are rationalized by their non-object perspectives. This theory supports the regularities and formalities of individuals' perceptions, interpretive actions, and behavioral choices in their environment, and can help frame a paradigm for re-structuring public spaces. Design practices must evolve beyond spatial form just being a nexus for user experience, but broaden to consider and experiment with representations of behavioral actions that satisfy a nominee of more human and inclusive urban space design.

Keywords: environmental behavioral psychology; urban public spaces; spatial cognition; behavioral patterns

1. Introduction

Public spaces are literally physical containers for urban social relations, and the related design quality makes a difference to citizens' sense of belonging and urban life. Environmental behavior psychology studies the nature of human-environment interactions. It examines how spatial scale, symbols and atmosphere chart emotional and behavioral pathways. The underlying logic is recognising personal orientation needs, shared group territoriality and the processes that create and enhance the spirit of place as a way to improve spatial quality. There are many existing spaces that fail to address these related principles, and poor social appeal and inefficient use are the result. Rethinking and reconstructing research-based design logic to enable spaces that positively shape human behavior and build social identity needs to be a focal point for the creation of human-centred cities.

2. The Core Theories of Environmental Behavioral Psychology and Their Connection to Public Space Design

2.1. The Basic Theoretical Framework of Environmental Behavioral Psychology

Environmental behavioral psychology theory focuses on the continuous and dynamic process of mutual shaping between humans and the built environment. Its core lies in analyzing how individuals and groups perceive, interpret information, and form stable behavioral patterns in specific places. Space users are not passive recipients of environmental stimuli but actively use their senses and experience to construct a mental map of the place. This cognitive process profoundly influences their sense of security, directional

judgment, and willingness to explore. Behavioral patterns are rooted in deeper psychological needs and sociocultural contexts, manifesting as individuals' differentiated choices between private and social, restful and active activities, and the formation of habitual behavioral trajectories. Public space design practices must deeply understand these underlying mechanisms. Physical elements such as spatial layout, scale and proportion, visual transparency, and interface details collectively form a non-verbal communication system that silently guides users' movement directions, gathering tendencies, dwell times, and even the likelihood of interactions occurring. Design decisions require a subtle response to the implications conveyed by spatial symbols and potential behavioral expectations, transforming abstract psychological needs into concrete spatial language that can be experienced in physical form, thereby invisibly supporting diverse and spontaneous urban lifestyles [1]. The basic theoretical framework of environmental behavioral psychology is shown in Figure 1.
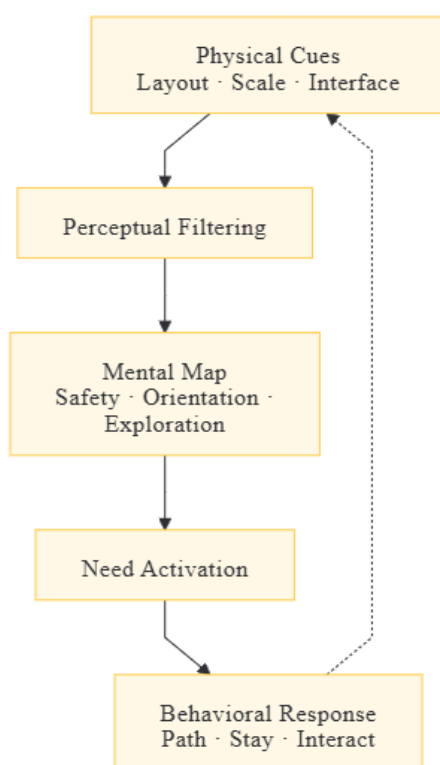

Figure 1. The Basic Theoretical Framework of Environmental Behavioral Psychology.

2.2. *The Diverse Types and Functional Roles of Urban Public Spaces*

Urban public spaces exhibit a rich spectrum of forms, ranging from expansive civic squares and winding waterfront promenades to hidden community pocket parks. The diversity of these types directly stems from their mission to accommodate complex social activities. Large assembly squares naturally host celebrations and public expressions, requiring a clear focal point and open vistas; linear street spaces primarily serve efficient circulation and street-front commercial interaction, with continuity of interfaces and pedestrian scale being critical; small green spaces or street corner gardens tend to provide individuals or small groups with moments of respite and reflection. Designers must accurately identify the core functional positioning of each type of space and understand the typical behavior patterns expected to occur in specific places—whether it is the hustle and bustle of group gatherings, the rush of the daily commute, or the relaxed chatter of neighbors. The generation of spatial forms is not an isolated aesthetic choice. Its boundary treatment, ground paving, vegetation configuration, and even seating layout closely respond

to the pre-set activity types and intensities, striving to ensure that the physical environment can naturally support spontaneous and diverse slices of urban life, as naturally as breathing. This deep integration of type and function forms the basic framework for environmental behavior adaptation.

2.3. The Interactive Relationship Between Environmental Characteristics and Behavioral Patterns

A continuous, bidirectional chain of organic connections forms between spatial characteristics and behavioral patterns, with subtle differences in the physical environment catalyzing specific behavioral responses. Clear spatial boundaries naturally divide areas into zones of varying activity intensity, suggesting potential choices between safe refuge and open communication. Differences in the tactile qualities of ground materials guide changes in walking speed, with hard surfaces accelerating the pace of movement, while soft lawns encourage slower walking and lingering. The transparency of vertical surfaces modulates social density, with low shrubs providing psychological comfort through visual connections, while high walls create a sense of privacy through isolation. Light distribution and wind protection in microclimatic environments regulate where people gather. Sunny corners attract people to rest in winter, while dense tree shade becomes a natural social hub in summer. Spatial design decisions should anticipate the range of behaviors that combinations of environmental factors may elicit. The arrangement of seating suggests a tendency toward solitude or conversation, while path widths hint at the possibility of walking side by side or at a brisk pace. Elevation differences stimulate instinctive responses of exploration or avoidance [2].

3. Key Issues in Current Urban Public Space Design That Neglect Psychological and Behavioral Needs

3.1. Confusion in Spatial Cognition and Insufficient Wayfinding

The lack of a clear hierarchical structure in the spatial layout imposes cognitive load, while the indiscriminate repetition of paving materials blurs the distinctions between different areas, making it difficult to determine direction. The failure of the signage system manifests as information overload and/or the absence of key wayfinding cues, with conflicting directional arrows and obscure diagrams forcing users to make repeated decisions. Visual continuity is disrupted by abrupt structures that block sightlines, and the absence of reference points at turning points interrupts the construction of mental maps. Disrupted spatial sequence rhythms weaken path predictability, while the continuous appearance of similar intersections depletes directional reserves. Hesitation in body posture in unfamiliar environments exposes underlying anxiety. Users frequently shift their gaze to search for positioning cues, and unconscious detour trajectories reflect spatial disorientation. Potential risks to evacuation efficiency in emergencies are hidden within everyday orientation challenges.

3.2. Blurred Hierarchical Boundaries and Lack of Privacy Protection

The current design of urban public spaces generally lacks precise processing of spatial hierarchy and fails to clearly define the transition boundaries between public, semi public, and private areas. Users find it difficult to identify activity locations with appropriate behavioral scales. The arbitrariness of facility layout exacerbates the dilemma of privacy protection, with designs often neglecting to provide necessary visual occlusion or distance buffering. Individuals are exposed to an open field of view and continue to endure psychological pressure from excessive observation or accidental disturbance. Space cannot meet the basic psychological needs of users seeking temporary shelter and controlling the environment, leading to a sense of tension and anxiety when people relax or talk, significantly weakening the comfort and attractiveness of public spaces. The main characteristics of the above problems are summarized in Table 1.

Table 1. Spatial characteristics and impacts of blurred boundaries and lack of privacy.

Core issues	Specific manifestations at the design level	Behavioral and psychological reactions triggered by the activity
Blurred spatial boundaries	Unclear functional zoning, abrupt transitions, or lack thereof	Interference between activities, increased confusion in making choices
Inadequate privacy protection	Lack of visual barriers, compressed safety distances	Tension and anxiety, avoidance of use behavior
Weak environmental support	Exposed rest areas, lack of enclosure design	Difficulty relaxing, decreased desire to socialize

3.3. Insufficient Behavioral Support Facilities and Restricted Activity Types

The fixed seating arrangement limits the diversity of recreational activities, and the lack of movable furniture restricts users' flexibility to adjust to lighting and wind conditions. The large area of hard flooring discourages informal activities such as ball games or children crawling. The insufficient number of sunshades causes people to seek shelter elsewhere in extreme weather, shortening the effective usage time. The widespread absence of power outlets hinders young people from using electronic devices for extended stays, depriving them of the possibilities of public life in the digital age. The lighting system only meets basic safety brightness requirements, neglecting the precision of lighting needed for reading or board games. Overly dense guardrails along green belts effectively block access to the lawn for lying down and connecting with nature. The spatial layout is designed for single-purpose use, and the flat open space lacks height variation, inhibiting dynamic games such as climbing and jumping. The existing combination of facilities suggests a single behavioral template of passive sitting, and the desire for physical stretching is suppressed by the rigid environment. Spontaneous social interaction gradually dries up due to the absence of supporting elements.

3.4. Weak Sense of Place and Lack of Emotional Connection

The standardized design paradigm for urban spaces erodes regional distinctiveness, with chain store facades and uniform municipal fixtures merging into an anonymous backdrop devoid of local character. Overly standardized interventions strip away narrative carriers of place memory, as lacquered granite paving obscures the cracks and weathering that bear witness to lived histories. Transplanted ornamental trees lack ecological resonance, their seasonal transformations failing to connect with indigenous natural rhythms. Public art installations degenerate into decorative signifiers, where suspended abstract sculptures offer no dialogue with neighborhood narratives. This fragmentation manifests spatially through jarring juxtapositions of functional zones—morning market stall remnants abruptly transitioning into lunchtime food courts without mediating elements. Absence of community engagement frameworks transforms placemaking into unilateral imposition, evidenced when resident-tended vines become dismissed as weeds by maintenance crews. Bodily contact interfaces perpetuate detachment: burnished metal benches repel bodily warmth, while glass curtain walls mirror merely transient silhouettes. Spatial presence atrophies temporally, as departing users leave no resonating narratives behind. Commemorative photographs shot against such backgrounds become indistinguishable from those taken in countless generic urban settings elsewhere.

3.5. Imbalance Between Spatial Accessibility and Social Equity

The long-term malfunction of the barrier-free elevators in the elevated pedestrian walkway system essentially denies wheelchair users access to the waterfront landscape.

The steep stairs at the entrance of the underground passage create obstacles for strollers. The distribution of community parks is overly concentrated in high-end residential areas, and residents in the old city shantytowns have to walk for twenty minutes to see only the greening of the traffic island. The tiered plaza without ramps reinforces the identity gap between spectators and performers, while the revolving doors at the entrance to the sunken commercial area exclude migrant workers carrying large luggage. The dense presence of chain coffee shops squeezes the improvisational performance space for street artists, and municipal management regulations restrict itinerant vendors, cutting off the livelihood ties of low-income individuals. The curved design of the seating excludes the possibility of lying down, and the security personnel's act of chasing away vagrants tacitly allows for the spatial exclusion of these individuals. The blind spots in lighting continue to pose security risks, causing women who walk alone at night to automatically avoid shortcuts and alleys. The spatial resource allocation model implies unequal spatial resource allocation, where physical barriers inadvertently limit the activity trajectories of disadvantaged groups to confined urban areas [3].

4. Core Strategies for Optimizing Urban Public Space Design Based on Environmental Behavioral Psychology

4.1. Enhancing Spatial Cognition and Readability Design

To enhance spatial cognition and legibility design, it is necessary to establish a clear spatial coordinate system. Designers set up visually dominant vertical elements at the core of the site to form directional reference points. These reference points serve as anchors for spatial cognition and connect secondary functional areas through visual penetration, forming the overall spatial framework. The key to conveying zoning information through spatial interface language lies in the continuous control of material colors. The pavement color stripes extending along the main path form a harmonious relationship with the building facade color system during the journey. The materials and textures in the same functional area maintain significant commonality, while adjacent zones adopt gently transitioning gradient boundaries. Differences in material tactile sensations also assist visually impaired individuals in perceiving changes in spatial structure. The guidance system and spatial cues constitute a dual-track guidance mechanism. Key path nodes are equipped with highly standardized signs to solve directional decision-making problems. The design relies more on the implicit behavioral cues of the environment itself. The orientation of seats indicates the location of rest areas, the elevation of landscape microtopography guides the direction of active lines, lighting focuses on areas to reveal functional zone transitions, and spatial physical elements collaboratively convey usage logic; the plant configuration strategy deepens the ecological dimension of spatial readability, with street tree arrays shaping linear spaces to guide the direction of progress. Canopy height variations in arbor groups naturally delineate spatial boundaries, and seasonal ornamental vegetation becomes a positioning memory point in the temporal dimension. Eliminating directional confusion requires detailed design to carry redundant information. Tactile symbols on stair railings supplement visual information blind spots, warm-colored light sources indicate safe paths at night, and raised material boundaries indicate functional zone transitions. Multiple sensory cues cross-validate the spatial structure logic, forming an intuitive cognitive network that requires no conscious recognition [4].

4.2. Creating Multi-Layered Domain Spaces and Ensuring Privacy

The spatial structure creates a clear transition layer from an open square to a semi enclosed courtyard and then to a private corner, utilizing changes in elevation, green plant partitions, or lightweight structures to naturally form a gradient in the field. There is a clear division of activity areas with different behavioral intensities at the domain level, accommodating diverse needs for collective gatherings, small group communication, and individual solitude. Privacy elements are integrated into specific design details, such as

providing back support and side cover for resting seats, and setting visual buffering corner spaces at path nodes. Spatial scale adjustment focuses on individuals' sensitivity to distance, reserving sufficient personal space in quiet reading areas or conversation points to avoid excessive penetration of sight and sound. The key design techniques for multi-level space and privacy protection are summarized in Table 2.

Table 2. Key points for multi-level spatial design and privacy protection.

Design dimension	Core operating techniques	Target function orientation
Construction of spatial hierarchy	Create gradual transitions and clarify domain gradients	Match the intensity of diverse behaviors
Physical interface shaping	Using partitions and supporting objects to form a visual barrier	Provide a sense of security and control
Distance scale adjustment	Reserve personal buffer distance and control line of sight penetration	Reduce interference and enhance comfortable stay

4.3. Providing Abundant Behavioral Support Facilities and Flexible Spaces

The spatial support system keenly captures the changing curve of behavioral needs. The array of movable flower boxes and the cluster of folding chairs invite people to reorganize their resting spots according to the sun's trajectory. The subtle curvature of the curved lounge chairs naturally distinguishes between the physical domains for solitary contemplation and social interaction. The flexible venue retains undefined potential areas. The grass-embedded pavement area not only supports the anchor points for temporary market tents but also transforms into a natural playground for children to play in after rain. Intelligent environmental devices establish a dialogue relationship with natural elements. The wind speed-triggered translucent canopy provides immediate shelter for pedestrians during sudden rainstorms, and the mist forest system creates a cool social oasis when activated at the threshold of intense heat. The infrastructure reserves creative interfaces. The power module embedded in the tree pool accommodates the operation of electric tools by craftsmen, and the guardrail slot system switches between picture book racks and fitness equipment functions during day and night. This dynamic mechanism gives birth to a spatially self-organizing ecosystem. Morning exercisers push flower boxes to form a Tai Chi formation, while lunchtime office workers assemble desks and chairs to create temporary office islands. In the evening, street theater groups connect lighting ports to build miniature stages. The symbiotic relationship between space and users is evident here, as citizens' physical experiences continuously reshape the functions of the place, allowing static physical structures to resonate with the pulse of life [5].

4.4. Cultivating Sense of Place and Strengthening Place Attachment

In planning and designing urban public places, environmental behavioral psychology has not sufficiently guided practice. Designers seem overly focused on formal aesthetics and not on users' schematic needs for spatial layout. The layout component elements are chaotic, or the circulation paths are intertwined and unclear, causing users to not be able to psychologically construct a stable spatial map, deteriorating their ability to recognize direction and even leading to anxiety. The absence of guidance is due to the overly simplistic approach to the guidance system in the design, with too few or inconsistent provision of effective signage, and the visual cues following no coherent logic. Users have to rely on accidental references during the walking process, but have no systematic support that adds to the individual psychological load and indirectly detracts from their comfort and fluency of use of the space. Any improvements in design practice should

first include elements of spatial guidance. For example, providing a logically clear hierarchy of signage at key nodes across the entire space can enhance coherence in navigation.

4.5. Promoting Spatial Accessibility Equity and Social Inclusion

From the perspective of planning and design, enhancing spatial accessibility equity requires a thorough reflection on the formation mechanisms of physical barriers and psychological divides. Designers must go beyond the basic requirements for barrier-free facility configuration and consider the broader group of people with different mobility abilities. They should carefully examine whether the height, width, and floor materials of spatial entrances are sufficient to accommodate diverse modes of travel, while also analyzing potential navigation obstacles for different groups of people in complex path networks. While expanding physical pathways, it is necessary to eliminate invisible psychological divisions within public spaces. Spatial layout strategies need to actively avoid creating subtle divisions based on social identity, allowing the distribution of resting points and activity areas to naturally mix users of different ages and professional backgrounds. The use of visual elements should convey an atmosphere of equality and openness, rather than reinforcing labels of specific groups. Achieving deep social inclusivity requires that the public environment itself possesses the potential ability to accommodate diverse social interactions. The arrangement of functional facilities should create just the right opportunities for random interactions. The arrangement and combination of seating can appropriately guide comfortable contact between strangers. The inclusivity of the event venue design can stimulate common interests among participants of different cultural backgrounds rather than creating barriers related to cultural preferences. A well-designed public environment can become a gentle carrier for community members to spontaneously establish connections and enhance social cohesion.

5. Conclusion

Environmental behavioral psychology is critical in deconstructing the myths associated with the material appearance of how public space is designed and shows us its materiality as both a container for behavior and a carrier of meaning. The clearness of spatial cognition, the subtlety of domain hierarchy, the exactness of the facility as support, the authenticity of place spirit, and the equity of access all fulfil the function of enacting the vitality of space. Research and practice demonstrate that every great practice is built on an intimacy to the behaviors and the psychological needs of the users. Each boundary treatment, material selection or sight guidance notion predicts and reacts to potential behavior. Urban public spaces' ultimate objective is to inspire and stimulate the vitality of social interaction; providing a space where people can reflect and engage, while allowing groups of people to feel dignity and belonging. The future design needs to internalize psychological principles and develop them into the flesh and blood of spatial language so that the physical environment can be understood as a vessel for carrying collective memory and emotional bonds. Only when designers truly understand how the curvature of benches affects the willingness of strangers to converse, how the distribution of shade changes the duration of rest, and how path turns evoke a desire to explore, can public spaces transcend the simple superposition of concrete and greenery, and be sublimated into living organisms that cultivate social cohesion and manifest the spirit and temperament of the city, growing lasting humanistic warmth and inclusive energy within the mechanically rational urban fabric.

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