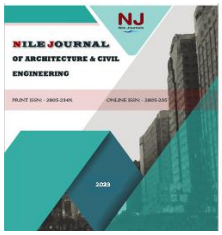
Nile Journal of Architecture & Civil Engineering

Journal Webpage: *https://njace.journals.ekb.eg*

Volume 6, March 2025



Phenomenology in Urban Spaces: Enhancing Multisensory Experiences for Psychological Well-being and Social Connectivity

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Abstract

Urban spaces are more than physical constructs; they are lived experiences shaped by human perception, cognition, and sensory engagement. This research explores the concept of sensory urbanism, a design approach that prioritizes multi-sensory experiences to create immersive, memorable, and emotionally resonant urban environments. Drawing on theories from environmental psychology, phenomenology, and urban design, this study investigates how the integration of sight, sound, smell, touch, and taste can enhance human well-being, foster social interaction, and strengthen cultural identity in urban spaces.

The research employs a mixed-methods approach, combining a systematic literature review, case study analysis, sensory mapping, and data analysis. The High Line, New York City, serves as a primary case study, demonstrating how the CDTA framework (Center, Direction, Transition, Area) can organize sensory elements into a coherent spatial structure. Findings reveal that sensory-rich urban spaces, such as the High Line, engage all five senses to create dynamic and inclusive environments that resonate emotionally and culturally with their users.

This study contributes to the growing body of knowledge on sensory urbanism, offering practical guidelines for architects and urban planners to design multi-sensory urban spaces. By bridging theory and practice, this research aims to inspire a new generation of urban designers to create environments that are not only functional but also emotionally and culturally meaningful.

Keywords: Sensory urbanism, multi-sensory design, urban perception, CDTA framework, environmental psychology, urban well-being.

1. INTRODUCTION

Urban spaces are more than mere physical constructs; they are dynamic environments where human experiences are shaped by a complex interplay of perception, cognition, and sensory engagement. In an era of rapid urbanization, cities are often designed with a focus on functionality, efficiency, and visual aesthetics, while neglecting the full spectrum of human senses. This narrow approach can lead to sterile, uninspiring environments that fail to resonate emotionally or culturally with their inhabitants. As a result, there is a growing recognition of the need for a more holistic approach to urban design—one that engages all five senses to create immersive, memorable, and meaningful urban experiences. This research explores the concept of sensory urbanism, a design philosophy that prioritizes multi-sensory engagement to enhance human well-being, foster social interaction, and strengthen cultural identity in urban spaces.

The importance of sensory experiences in shaping human perception and behavior has been well-documented in environmental psychology and phenomenology. According to (Pallasmaa, 2005), architecture is not merely a visual art but a multi-sensory experience that engages the body and mind. Similarly,(Zumthor, 2006) emphasizes the role of atmosphere in architecture, arguing that the quality of a space is determined by its ability to evoke emotional and sensory responses. These insights highlight the need for urban designers to move beyond the visual dominance of modern architecture and consider how sound, smell, touch, and taste can contribute to the overall experience of urban spaces.

The psychological stages of perception—sensation, cognition, and spatial behavior—play a critical role in how individuals interact with their environment. As (Chavis & Wandersman, 1990)notes, perception is the process of becoming aware of a space through sensory information, while cognition involves the mental processing of this information to form an understanding of the environment. Spatial behavior, in turn, reflects the responses and reactions to this perceived environment. By designing urban spaces that engage all five senses, architects and urban planners can create environments that are not only functional but also emotionally and cognitively stimulating.

Despite the growing interest in sensory urbanism, there is a lack of well-developed theory and practical guidelines for integrating multi-sensory design into urban planning. (Ruddell et al., 1989) highlight the challenges of accounting for the relationship between visual preference and scenic attributes in urban spaces, while (Thwaites & Simkins, 2006) argue for a deeper

understanding of the human-environment relationship in urban design. This research seeks to address these gaps by proposing a comprehensive framework for sensory urbanism, drawing on theoretical insights, case studies, and practical guidelines.

The objectives of this research are threefold: first, to explore the theoretical foundations of sensory urbanism, focusing on the role of perception, cognition, and phenomenology in shaping urban experiences; second, to propose a set of multi-sensory design principles that can be applied to urban spaces; and third, to analyze case studies of successful sensory-rich urban environments and extract best practices for future projects. By bridging theory and practice, this research aims to inspire a new generation of urban designers to create environments that engage the full spectrum of human senses, enhancing well-being, social interaction, and cultural identity.

This study is significant for several reasons. First, it contributes to the growing body of knowledge on sensory urbanism, offering a comprehensive framework for designing multi-sensory urban spaces. Second, it provides practical guidelines for architects and urban planners, helping them to integrate sensory design principles into their projects. Finally, it highlights the transformative potential of sensory urbanism in creating urban spaces that are not only functional but also emotionally and culturally meaningful. By engaging all five senses, this approach offers a pathway to more inclusive, engaging, and human-centered urban environments.

2. LITERATURE REVIEW

The theoretical framework of this research is grounded in the interdisciplinary fields of environmental psychology, phenomenology, and urban design (Table 1). It explores how human perception, cognition, and sensory engagement shape the experience of urban spaces, and how these insights can inform the design of multi-sensory urban environments. This section is divided into four key areas: perception and cognition in urban spaces, phenomenology in architecture, environmental perception, and cognitive mapping.

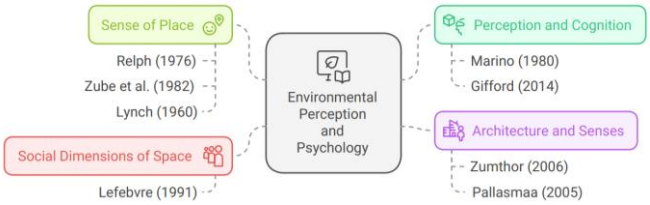


Figure 1: Environmental Perception and Psychology: Key Theories and Concepts

2.1 PERCEPTION AND COGNITION IN URBAN SPACES

Perception and cognition are fundamental processes through which individuals interpret and interact with their environment. According to (Ingold, 2022), perception involves the awareness of a space through sensory information, while cognition refers to the mental processing of this information to form an understanding of the environment. Spatial behavior, in turn, reflects the responses and reactions to this perceived environment. These psychological stages are not isolated but form a continuum, where sensory input leads to cognitive interpretation and, ultimately, to behavioral responses.

In urban spaces, sensory stimuli play a critical role in shaping human experiences. Visual elements such as color, texture, and form are often the primary focus of urban design, but auditory, olfactory, tactile, and even gustatory stimuli also contribute to the overall experience. For example, the sound of water in a fountain, the smell of flowers in a park, or the texture of a stone pathway can evoke emotional responses and create lasting memories. As(Gifford, 2014) notes, environmental perception is a dynamic process influenced by individual, situational, and environmental factors. Understanding these factors is essential for designing urban spaces that resonate with their users.

Key Concepts	Description	Theorists/References
Perception	Awareness of a space through sensory information (sight, sound, smell, touch, taste).	(Ingold, 2022)
Cognition	Mental processing of sensory information to understand the environment.	(Ingold, 2022)
Spatial Behavior	Responses and reactions to the perceived environment.	(Ingold, 2022)
Sensory Stimuli	Visual, auditory, olfactory, tactile, and gustatory elements in urban spaces.	(Gifford, 2014)
Dynamic Process	Perception influenced by individual, situational, and environmental factors.	(Gifford, 2014)

Table 1: Key Concepts of environmental psychology, phenomenology, and urban design

2.2 PHENOMENOLOGY IN ARCHITECTURE

Phenomenology, as applied to architecture, emphasizes the experiential and sensory dimensions of space. Architects such as Peter Zumthor, Juhani Pallasmaa, and Henri Lefebvre have explored how architecture can evoke emotional and sensory responses, creating spaces that are not merely functional but also deeply meaningful.

Peter Zumthor (2006) argues that the quality of a space is determined by its atmosphere, which emerges from the interplay of materials, light, sound, and other sensory elements. He describes architecture as a "physical presence" that engages the body and mind, creating a sense of belonging and emotional connection (Zumthor, 2006). Similarly, Juhani Pallasmaa (2024) criticizes the visual dominance of modern architecture, advocating for a multi-sensory approach that engages all five senses (Pallasmaa, 2024). In his view, architecture should be experienced not just through the eyes but through the entire body, creating a holistic and immersive experience.

Henri Lefebvre (2014) introduces the concept of "lived space," which emphasizes the social and cultural dimensions of spatial experience. He argues that space is not a neutral container but a dynamic entity shaped by human activities and interactions. By designing spaces that engage the senses, architects can create environments that foster social interaction, cultural identity, and emotional well-being (Lefebvre, 2014). Table 2 summarize the description of these theories

Key Concepts	Description	Theorists/References
Atmosphere	The emotional and sensory quality of a space, shaped by materials, light, sound.	(Zumthor, 2006)
Multi-Sensory Experience	Architecture as a holistic experience engaging all five senses.	(Pallasmaa, 2024)
Lived Space	Space as a dynamic entity shaped by social and cultural interactions.	Lefebvre (2014)
Critique of Visual Dominance	Modern architecture often neglects non-visual senses.	(Pallasmaa, 2024)

Key Concepts	Description	Theorists/References
Emotional Connection	Architecture that evokes emotional and sensory responses.	Zumthor (2006)

Table 2: theories of phenomenology in architecture (Author after (Zumthor, 2006), (Pallasmaa, 2024), Lefebvre (2014))

2.3 Environmental Perception

Environmental perception examines the relationship between sensory stimuli and human behavior in urban spaces. It focuses on how individuals interpret and respond to their surroundings, and how these interpretations influence their actions and emotions. The concept of "sense of place" is central to this discussion, referring to the emotional and cultural connections that individuals form with specific locations.

According to (Relph, 1976), a strong sense of place is characterized by a deep emotional attachment to a location, often rooted in sensory experiences. For example, the sound of church bells, the smell of fresh bread, or the texture of cobblestone streets can evoke a sense of nostalgia and belonging. These sensory cues contribute to the identity of a place, making it unique and memorable.

Environmental perception is also influenced by cultural and social factors. As (Zube et al., 1982) note, individuals from different cultural backgrounds may interpret sensory stimuli differently, leading to varied perceptions of the same environment. This highlights the importance of considering cultural context in urban design, ensuring that sensory elements resonate with the local community.

Key Concepts	Description	Theorists/References
Sense of Place	Emotional and cultural connections to a location, rooted in sensory experiences.	Relph (1976)
Sensory Cues	Sounds, smells, textures, and tastes that create a unique identity for a place.	Relph (1976)
Cultural Context	Sensory interpretation varies across cultures, influencing perception.	Zube et al. (1982)
Emotional Attachment	Strong sense of place fosters emotional attachment and belonging.	Relph (1976)
Social and Cultural Factors	Perception shaped by social interactions and cultural background.	Zube et al. (1982)

Table 3: Environmental Perception from the side of Sensory Experience (Relph, 1976)

2.4 Cognitive Mapping

Cognitive mapping, as introduced by Kevin Lynch (1960), refers to the mental representations that individuals create to navigate and understand their environment. Lynch identifies five key elements of cognitive maps: paths, edges, districts, nodes, and landmarks. These elements help individuals orient themselves in urban spaces, creating a sense of order and coherence.(Kevin Lynch, 1960)

Sensory cues play a crucial role in cognitive mapping. For example, the sound of a bustling market, the smell of a bakery, or the texture of a historic building can serve as landmarks, helping individuals navigate and remember urban spaces. As Lynch (1960) notes, the legibility of a city—its clarity and ease of navigation—depends on the presence of distinctive sensory cues that create a coherent mental image.

In the context of sensory urbanism, as in Table 4 cognitive mapping provides a framework for understanding how multi-sensory design can enhance wayfinding and spatial understanding. By incorporating distinctive sensory elements, urban designers can create environments that are not only functional but also emotionally and cognitively engaging.

Key Concepts	Description
Cognitive Maps	Mental representations of the environment used for navigation and understanding.
Five Elements of Cognitive Maps	Paths, edges, districts, nodes, and landmarks.
Sensory Landmarks	Distinctive sensory cues (e.g., sounds, smells) that aid navigation.
Legibility of Cities	Clarity and ease of navigation in urban spaces, enhanced by sensory cues.
Wayfinding	The process of using sensory cues to navigate and understand urban spaces.

Table 4: Cognitive Mapping according to (Kevin Lynch, 1960)

3. METHODOLOGY

This study employs a **mixed-methods approach**, combining **qualitative** and **quantitative** methods to explore the integration of **sensory urbanism** and the **CDTA framework** (Center, Direction, Transition, Area) in urban design. The methodology is structured into four phases: **literature review**, **case study analysis**, **sensory mapping**, and **data analysis**.

1. **Literature Review**

A **systematic literature review** was conducted to establish the theoretical foundation for sensory urbanism and the CDTA framework. Key sources included academic journals, books, and case studies on sensory-rich urban spaces such as the High Line in New York City.

2. **Case Study Analysis**

The **High Line, New York City**, was selected as a case study due to its successful integration of sensory elements. Data collection methods included documenting sensory elements and spatial organization.

3. **Sensory Mapping**

Sensory mapping was used to visualize the distribution of sensory elements across the High Line. Methods included: document sensory experiences. and Spatial analysis of sensory hotspots and transitions.

4. **Data Analysis**

Data from the literature review, case study, and sensory mapping were analyzed using: Identifying recurring themes in sensory design, Comparing the High Line with other sensory-rich urban spaces, and analyzing the distribution of sensory elements.

4. MULTI-SENSORY DESIGN PRINCIPLES

This section outlines the key principles of multi-sensory urban design, focusing on how each sense—sight, sound, smell, touch, and taste—can be engaged to create immersive and memorable urban spaces. Drawing from the uploaded document and additional scholarly sources, this section provides a comprehensive framework for designing sensory-rich environments.

4.1 Visual Perception

Visual perception is often the primary focus of urban design, as it shapes the immediate impression of space. The use of color, texture, and form plays a critical role in creating visually stimulating environments. For example, vibrant colors can evoke emotions and create a sense of identity, while textures and forms add depth and complexity to urban spaces (Jaglarz, 2023). The

uploaded document highlights the importance of lighting and shadows in enhancing visual experiences, as they can dramatically alter the mood and atmosphere of a space (Gemelli et al., 2013). For instance, the interplay of light and shadow in a courtyard or plaza can create dynamic visual patterns that change throughout the day, adding a temporal dimension to the urban experience (Table 5).

Key Principles	Description	Examples	References
Color Schemes	Use of complementary, harmonious, or discordant colors to evoke emotions.	Vibrant plazas, colorful facades.	(Li et al., 2020)
Texture and Form	Incorporation of varied textures and forms to add depth and complexity.	Rough stone walls, geometric patterns.	Jaglarz, (2023)
Lighting and Shadow	Strategic use of light and shadow to create dynamic visual patterns.	Sunlit courtyards, illuminated pathways.	(Gemelli et al., 2013)

Table 5: Visual Perception understanding in Architecture (Author after (Li et al., 2020), (Gemelli et al., 2013))

4.2 SOUNDSCAPES

Sound is a powerful yet often overlooked element in urban design. Soundscapes—the auditory environments of urban spaces—can significantly influence mood, behavior, and spatial perception. Table 6 emphasizes the role of natural sounds (e.g., water, wind, birds) and human-made sounds (e.g., music, voices) in creating a sense of place and enhancing the urban experience (Carmona, 2021). For example, the sound of water in a fountain or the rustling of leaves in a park can create a calming atmosphere, while the lively chatter in a market can evoke a sense of vibrancy and social interaction.

Key Principles	Description	Examples	References
Natural Sounds	Integration of water, wind, and birdsong to create calming environments.	Fountains, wind chimes, green spaces.	(Carmona, 2021)
Human-Made Sounds	Use of music, voices, and street performances to add energy and identity.	Street musicians, market chatter.	(Pallasmaa, 2012)
Acoustic Zones	Design of areas with balanced noise levels for tranquility or vibrancy.	Quiet gardens, bustling market squares.	(Carmona, 2021)

Table 6: Soundscape in Urban Design (Author after (Li et al., 2020), (Gemelli et al., 2013))

4.3 OLFACTORY DESIGN

Smell is a deeply evocative sense that can trigger memories and emotions, making it a powerful tool in urban design. Table 7 highlights the role of olfactory design in creating memorable urban spaces, with examples such as the scent of flowers in a garden or the aroma of food in a market (Henshaw, 2013). Historical cities often incorporated natural scents (e.g., rosewater, amber) to enhance the sensory experience, while contemporary cities can use olfactory design to create unique identities for specific areas.

Key Principles	Description	Examples	References
Natural Scents	Use of flowers, herbs, and trees to create pleasant olfactory environments.	Rose gardens, lavender fields.	Henshaw (2013)
Food-Related Aromas	Integration of bakeries, coffee shops, and food markets to stimulate smell.	Fresh bread, coffee, street food.	Hall (1997)
Avoidance of Negative Odors	Mitigation of pollution and waste odors through urban planning.	Waste management systems, green buffers.	Henshaw (2013)

Table 7: Scents in Urban Design (Author after (Henshaw, 2013))

4.4 TACTILE EXPERIENCES

Tactile experiences involve the sense of touch, which is essential for fostering physical engagement with urban environments. Table 8 emphasizes the importance of **materiality and texture** in creating tactile richness, such as the feel of rough stone walls, smooth wooden benches, or cool metal railings (Pallasmaa, 2012). Interactive elements, such as water features or textured pathways, can further enhance tactile engagement, encouraging users to physically interact with the space.

Key Principles	Description	Examples	References
Materiality	Use of diverse materials (stone, wood, metal) for varied tactile experiences.	Stone pathways, wooden benches.	(Pallasmaa, 2012)
Interactive Elements	Design of water features, textured walls, and tactile pathways.	Fountains, textured pavements.	Diaconu (2011)
Temperature and Texture	Consideration of material temperature and texture for comfort and appeal.	Cool metal railings, warm wooden surfaces.	(Pallasmaa, 2012)

Table 8: Key principles of tactile sensory experience in Urban Design (Author after (Pallasmaa, 2012))

4.5 TASTE AND CULINARY SPACES

Taste is often overlooked in urban design, but it plays a significant role in creating memorable and engaging urban spaces. Table 9 highlights the importance of culinary spaces—such as markets, cafes, and food streets—in promoting social interaction and cultural identity (Naghizade et al., 2022). For example, the taste of street food or a cup of coffee in a bustling market can create a sense of place and foster community connections.

Key Principles	Description	Examples	References
Integration of Food and Drink	Use of culinary spaces to engage the sense of taste.	Food markets, outdoor cafes.	(Naghizade et al., 2022)
Culinary Hubs	Creation of food streets and markets to promote social interaction.	Night markets, food festivals.	(Carmona, 2021)

Key Principles	Description	Examples	References
Local Flavors	Incorporation of local cuisine to reflect cultural identity.	Street food, regional specialties.	(Naghizade et al., 2022)

Table 9: the idea of taste in urban design (Author after (Naghizade et al., 2022))

5. THE VOCABULARY OF EXPERIENTIAL LANDSCAPE

In addition to the sensory attributes previously discussed and the exploration of perception within urban spaces, the investigation of experiential urban environments can be expanded to encompass broader dimensions beyond sensory experience. This research will undertake a comprehensive examination of the constituent elements, establishing an emergent vocabulary for articulating the attributes of experiential urban space.(Lehtovuori, 2012)

- **Center**

Certain environmental features enhance the emotional perception of urban spaces characterized as "Centers." Hillier and Hanson have associated spaces with high social potential in residential areas and extended this concept to examine spatial elements influencing the sensation of Center(Bonnes-Dobrowolny & Secchiaroli, 1983). Among the key attributes that evoke a strong sense of Center is the locational significance of settings, which are often positioned near routes with active pedestrian flow, fostering connectivity rather than isolation. Activities such as sitting, waiting, observing, conversing, and eating, whether performed individually or in groups, contribute to the distinctive locational experience, often independent of surrounding natural features.(Kelkoul & Chougui, 2022) Figure 2

The environmental features of centers for refreshment benefits can be summarized into: Separation from distraction, Comfort and shelter, Provisions for rest and Presence of nature (trees – water – natural materials)

The environmental characteristics that relates to centers are important in individuals' lives because of social communication include: Significant convergence of routes, Presence of elements for waiting, Seating in social groupings, Presence of special elements encourage interaction, low garden border, Places of arrival, takeoff.

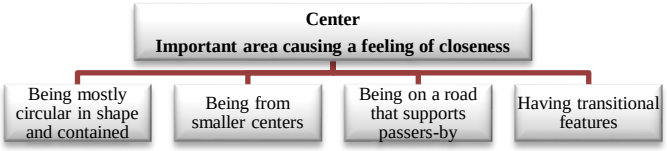


Figure 2: Kinds of Center

Figure 3 shows various ways by which people give importance and value to locations.

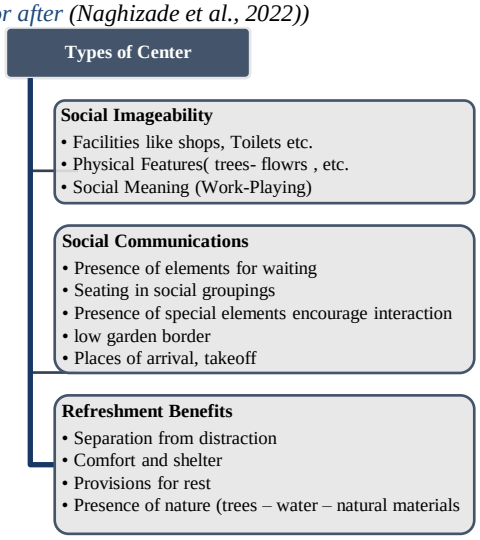


Figure 3: Types of Center (Author)

- **Direction**

The studies about the improvement of Center attributes said that centers aren't isolated from different sorts of spatial experience. Gordon Cullen comprehended this relationship when he said in his investigation of the structure of townscape that (Cullen, 1961):

*"No sooner do we postulate a **here** than automatically we must create a **there**, for you can't have one without the other "*

The investigations of Kevin Thwaites and Ian Simkins(Thwaites & Simkins, 2006) demonstrated that sensation of direction can be conceptualized by three classes of experience which connect the here and there, which is:

- ***Linear control***, this refers to a general feeling of containment that attracts a spatial coherence, and this is affected most by the enclosing surfaces.
- ***Route,*** it reaches out to the awareness of going from here to there. In this category, the main environmental attributes are those provide easy movement.
- ***Anticipation,*** it gives the stimulants to moving from here to there. environmental attributes that stimulate the feeling of suspicion are like what people see and hear, and what they can imagine.

Figure 4 shows the conceptual model for direction, which summarize some important points:

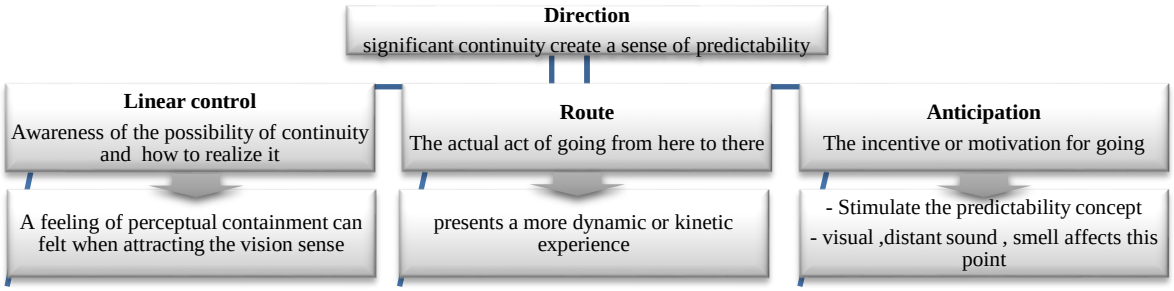


Figure 4 : Conceptual model for Direction

- **Transition**

The sensation of transition is the thing that enables us to experience differences between neighboring places, it is a sense of transformation in mood, atmosphere or function Norberg-Schulz describe transition as the tie which gather spatial parts to shape a coherent environment.(Norberg-Schulz, 1971)

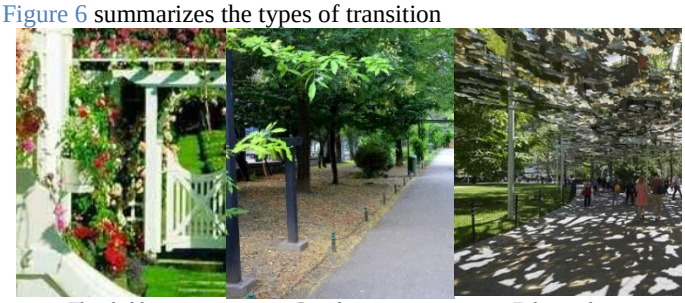
From Kevin Thwaites and Ian Simkins studies (Thwaites & Simkins, 2006), they have recognized four types of transition, which are:

- ***Threshold***, the simplest type of transition since it happens in a moment characterized by a significant sudden difference on either side of it.

- ***Corridor*** is more extensive than a threshold as transition experience happens step by step, most times it appears as a confined and directed path.
- ***Segment***, more complex kind than threshold and corridor; segments are usually formed from the interaction of two adjacent spaces.
- ***Ephemeral***, it perceives characteristics of the environment that can produce strong transitional sensations yet are not permanent. like the transient impacts of sun and shade, varieties in temperature, and wet to dry in rainy climate.

Figure 5 shows some examples from the different types of transition. From that transition can be described in some points: Spatially focused or spatially expanded, Change in material, shading, color, shape and direction, entryways and framed scenes features and Decision of movement.

Figure 6 summarizes the types of transition



Threshold Corridor Ephemeral

Figure 5: Different types of transitions(the Butchart Gardens in Canada) www.butchartgardens.com

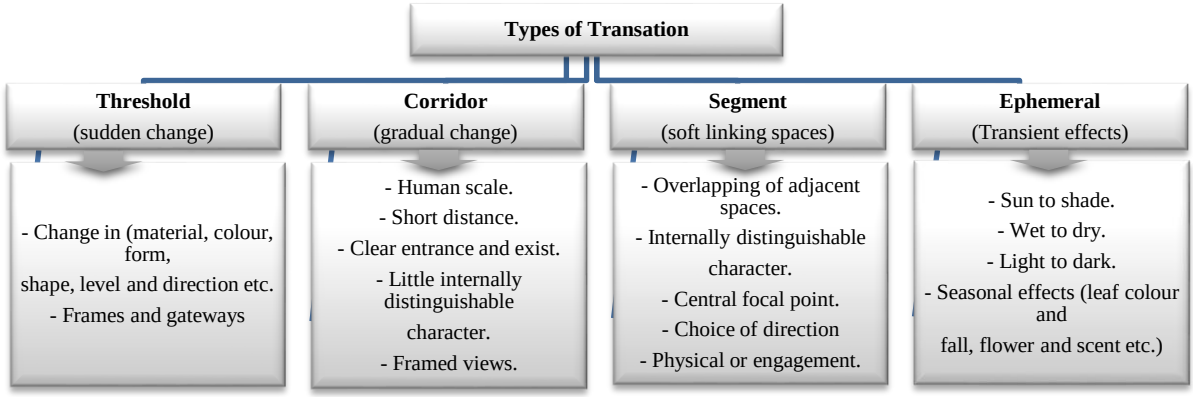


Figure 6 **:** Conceptual model for Transition

- **Area**

The last segment in the experiential urban space idea is general and less sensual than the other three, and it has different role.(Thwaites & Simkins, 2006) .

Figure 7 shows the relation between Area and other experiential landscape elements.

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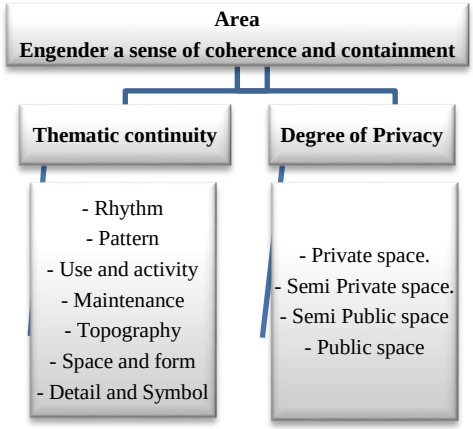

Figure 7: Conceptual model for Area

6. CASE STUDY: THE HIGH LINE, NEW YORK CITY – A SENSORY URBANISM APPROACH

The High Line, an elevated linear park in New York City, is a prime example of how sensory urbanism can transform urban spaces into immersive, multi-sensory environments. By integrating the five senses (visual, auditory, olfactory, tactile, and gustatory) with the CDTA framework (Center, Direction, Transition, Area), the High Line offers a rich and engaging experience for its visitors. This case study explores how the High Line employs sensory design principles to create a dynamic and memorable urban space.

6.1 1. CENTER: THE 10TH AVENUE SQUARE

The **10th Avenue Square** serves as a central gathering point along the High Line, functioning as a **Center** within the CDTA framework. This area is designed to attract visitors and foster social interaction through its amphitheater-style seating, vibrant plantings, and panoramic views of the Hudson River. Figure 8

- **Visual**: The Square features dynamic lighting and iconic views of the city skyline, creating a visually striking focal point. The use of seasonal plantings adds color and texture, enhancing the visual appeal (Figure 9).
- **Auditory**: The sound of water features and occasional street performers adds an auditory layer to the experience, creating a lively and engaging atmosphere.
- **Olfactory**: The scents of flowers and plants, particularly during the spring and summer months, contribute to a pleasant olfactory experience.
- **Tactile**: Textured seating and railings encourage physical interaction, allowing visitors to touch and feel the materials, which include wood and metal.
- **Gustatory**: Food vendors offering local snacks and beverages engage the sense of taste, making the Square a popular spot for socializing and relaxation.

The Tenth Avenue Square, with amphitheater-like seating and an unusual view up Tenth Avenue at 17th Street.

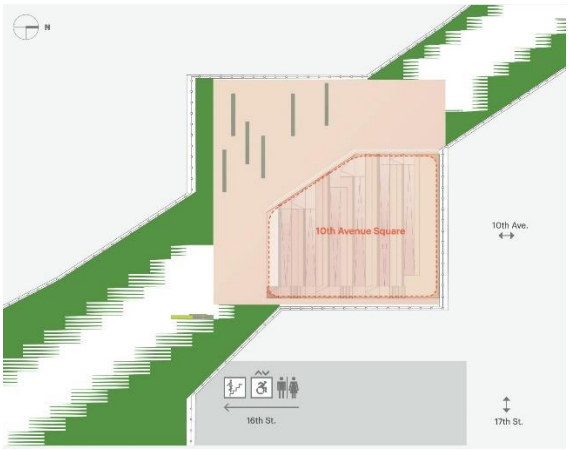

Figure 8: The 10th Avenue Square, High Line, NYC (Author)

Figure 9: The High Line landscape is marked by slowness, distraction and an otherworldliness that preserves the strange, wild character of the High Line, yet doesn't underestimate its intended use and popularity as a new public space

6.2 DIRECTION: THE LINEAR PATHWAY

The High Line's linear pathway serves as the **Direction** component of the CDTA (Figure 10). framework, guiding visitors through a series of sensory experiences. The pathway is designed to create a sense of movement and progression, with sensory cues that enhance the journey.

- **Visual**: Art installations, changing landscapes, and views of the surrounding cityscape provide visual interest along the pathway. The design incorporates a mix of natural and urban elements, creating a dynamic visual experience Figure 11.
- **Auditory**: The sounds of the city, such as traffic and street activity, are balanced with natural sounds, including rustling leaves and bird calls, creating a layered auditory experience.
- **Olfactory**: Seasonal plants and flowers along the pathway release scents that change with the seasons, adding an olfactory dimension to the journey.
- **Tactile**: Varied textures of pathways, including wooden planks and gravel, provide tactile feedback as visitors walk along the High Line.
- **Gustatory**: Pop-up food stalls and refreshment stands along the route offer opportunities to engage the sense of taste, encouraging visitors to pause and enjoy the space.

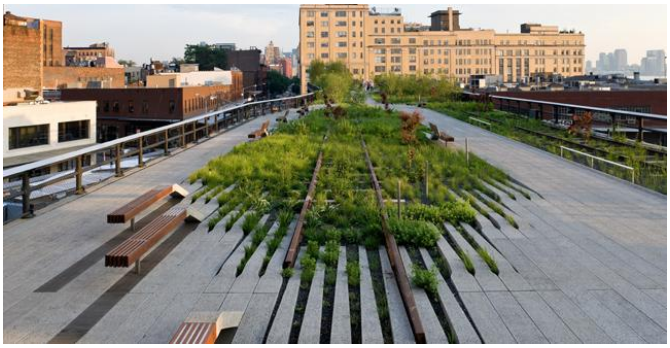

Figure 10: The Linear Pathway, High Line, NYC (Author)

Figure 11: mix of natural and urban elements

6.3 TRANSITION: THE CHELSEA MARKET PASSAGE

The **Chelsea Market Passage** marks a **Transition** point between the High Line and the surrounding neighborhood. This area is designed to signal a change in atmosphere and function, using sensory elements to create a sense of arrival or departure.

- **Visual**: Archways and changes in lighting signal the transition, while views of the Chelsea Market and surrounding buildings provide visual interest (Figure 12).
- **Auditory**: The sounds of the market, including chatter and music, blend with the sounds of the High Line, creating a unique auditory experience.
- **Olfactory**: Aromas of food from the Chelsea Market, such as baked goods and spices, enhance the olfactory experience, making the transition memorable.
- **Tactile**: Textured flooring and handrails provide tactile feedback, guiding visitors through the transition.
- **Gustatory**: Food vendors offering diverse cuisines engage the sense of taste, making the Chelsea Market Passage a popular stop for visitors. (Figure 13)

Figure 12: The Chelsea Grasslands, looking north. New plant species were carefully selected to produce a primarily native, resilient, and low-maintenance landscape, building upon the existing self-sown landscape and working with specific environmental conditions

The Chelsea Market Tunnel, looking south. Combinations of white and blue LED fixtures create a dramatic space at night overlooking the Hudson River. The tunnel also showcases a variety of public artists through extensive art programming and rotating exhibitions. (Figure 13)

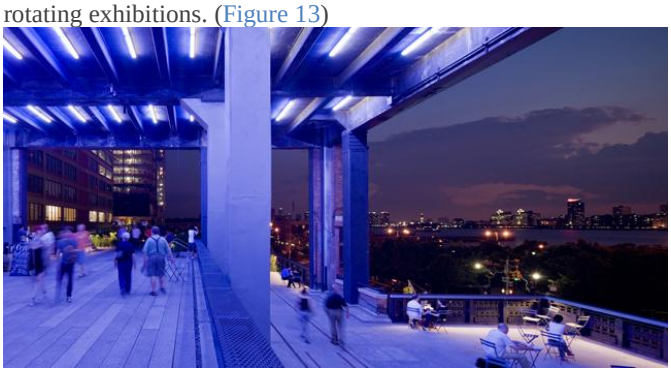

Figure 13: The Chelsea Market Passage, High Line, NYC

6.4 AREA: THE DILLER-VON FURSTENBERG SUNDECK

The **Diller-von Furstenberg Sundeck** (Figure 14) is a distinct **Area** within the High Line, characterized by its open views, water features, and recreational opportunities. This area is designed to provide a unique sensory experience, distinct from other parts of the park.

- **Visual**: Open views of the Hudson River and the city skyline create a visually stunning experience. Water features, including shallow pools, add a dynamic visual element (Figure 4).
- **Auditory**: The sounds of water and wind create a calming auditory environment, contrasting with the bustling sounds of the city.
- **Olfactory**: Scents of nearby plants and flowers contribute to a pleasant olfactory experience, enhancing the sense of relaxation.
- **Tactile**: Wooden loungers and water play areas encourage physical interaction, allowing visitors to touch and feel the materials. (Figure 15)
- **Gustatory**: Refreshment stands offering drinks and snacks engage the sense of taste, making the Sundeck a popular spot for relaxation and socializing.

Figure 14: The Sundeck, one of the High Line's most popular gathering spots, between West 14th and West 15th Streets. Large-scale outdoor furnishing, aligned along a gentle curve of historic rail track, is surrounded by fragrant grasses and perennials.

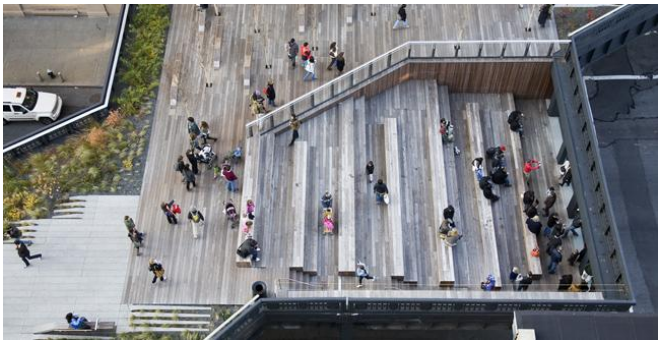

Figure 15: Aerial view of the Tenth Avenue Square. Wood seating steps cut into the existing structure with views up Tenth Avenue while a wooden deck with trees and seating is oriented toward views of the Statue of Liberty

6.5 DISCUSSION

The High Line exemplifies how the CDTA framework can be integrated with sensory urbanism to create a cohesive and engaging urban space. By focusing on the five senses, the High Line transforms an abandoned railway into a vibrant, multi-sensory park that attracts millions of visitors annually. The Center (10th Avenue Square) serves as a focal point for social interaction, while the Direction (linear pathway) guides visitors through a series of sensory experiences. The Transition (Chelsea Market Passage) marks a change in atmosphere, and the Area (Diller-von Furstenberg Sundeck) provides a distinct sensory identity.

This case study demonstrates the potential of sensory urbanism to enhance the quality of urban spaces, making them more inclusive, engaging, and memorable. The High Line's success lies in its ability to balance sensory elements with functional design, creating a space that resonates emotionally and culturally with its users.

The High Line, New York City, serves as a model for integrating the **five senses** with the **CDTA framework** in urban design. By creating a sensory-rich environment that engages sight, sound, smell, touch, and taste, the High Line offers a transformative urban experience. This case study highlights the importance of sensory urbanism in creating spaces that foster well-being, social interaction, and cultural identity. Future urban design projects can draw inspiration from the High Line's approach, using sensory design principles to create more inclusive and engaging urban environments.

6.5.1 Sensory Urbanism in Practice

The High Line demonstrates how sensory design can enhance the quality of urban spaces. Each sensory element is carefully integrated into the park's design, creating a cohesive and immersive experience. For example:

- **Visual**: The use of dynamic lighting, seasonal plantings, and iconic views creates a visually stimulating environment that changes with the time of day and season.
- **Auditory**: The interplay of natural sounds (e.g., water features, rustling leaves) and human-made sounds (e.g., street performers, market chatter) adds depth to the auditory experience.
- **Olfactory**: The scents of flowers, plants, and food vendors contribute to a memorable olfactory experience, enhancing the sense of place.
- **Tactile**: Textured materials, such as wooden planks and metal railings, encourage physical interaction, making the space more engaging and accessible.

- **Gustatory**: Food and drink options, from pop-up stalls to permanent vendors, engage the sense of taste and promote social interaction.

6.5.2 CDTA Framework in Action

The High Line effectively employs the CDTA framework to organize its sensory elements into a coherent spatial structure:

- **Center**: The 10th Avenue Square serves as a focal point, attracting visitors and fostering social interaction through its sensory-rich design.
- **Direction**: The linear pathway guides visitors through a series of sensory experiences, creating a sense of movement and progression.
- **Transition**: The Chelsea Market Passage marks a change in atmosphere, using sensory cues to signal the transition between the High Line and the surrounding neighborhood.
- **Area**: The Diller-von Furstenberg Sundeck provides a distinct sensory identity, offering a unique experience within the park.

6.5.3 Implications for Urban Design

The success of the High Line highlights the potential of sensory urbanism to create more inclusive, engaging, and memorable urban spaces. By prioritizing sensory experiences, urban designers can foster emotional connections, enhance well-being, and promote social interaction. The CDTA framework provides a useful tool for organizing sensory elements into a coherent spatial structure, ensuring that urban spaces are both functional and experiential.

The High Line, New York City, exemplifies the transformative potential of sensory urbanism and the CDTA framework in urban design. By engaging all five senses and organizing sensory elements into a coherent spatial structure, the High Line creates a dynamic and immersive urban park that resonates emotionally and culturally with its users. This case study offers valuable insights for future urban design projects, demonstrating how sensory design principles can enhance the quality of urban spaces and foster a deeper connection between people and their environment.

The results of connecting the five senses and the CDTA framework is sown in table 10

CDTA Component	Sensory Elements	High Line Example	Impact on Urban Experience
Center	Visual (lighting, colors), Auditory (music, water), Olfactory (flowers), Tactile (textures), Gustatory (food).	10th Avenue Square	Fosters social interaction and emotional connection.
Direction	Visual (landmarks, signage), Auditory (footsteps, street performers), Olfactory (scents), Tactile (pathways), Gustatory (food stalls).	Linear Pathway	Guides movement and creates a sense of progression.
Transition	Visual (thresholds, lighting), Auditory (sound markers), Olfactory (distinct scents), Tactile (textured elements), Gustatory (food vendors).	Chelsea Market Passage	Signals change in atmosphere and function.
Area	Visual (color, architecture), Auditory (soundscapes), Olfactory (scents), Tactile (materials), Gustatory (food options).	Diller-von Furstenberg Sundeck	Provides a distinct sensory identity.

Table 10: Linking Sensory Urbanism and the CDTA Framework in the High Line

7. CONCLUSION

The definition of landscape perception and research approaches for understanding perception have been introduced. It was concluded that responses to the landscape must be viewed, as a product of the interaction of people with their environments. Furthermore, the main interacting constituents of landscape perception have been analyzed. It was concluded that the perceived landscape quality depends on the physical landscape components, elements and features; and on observer's demographic and socio-economic factors; familiarity and past experience, and situational factors. The analytical review in this chapter has discussed what is the basis of people perceptions, then analyzing the concept of experiential landscape and its components CDTA (Center – Direction – Transition – Area). So, it can be said that the sensory experience in the urban space is divided into two main directions (Experiencing the 5 senses – CDTA Experience).

The High Line, New York City, exemplifies the transformative potential of sensory urbanism and the CDTA framework in urban design. By engaging all five senses—visual, auditory, olfactory, tactile, and gustatory—the High Line creates a dynamic and immersive urban park that fosters emotional connections, social interaction, and cultural identity. This research demonstrates how sensory design principles can be integrated into urban spaces to enhance human experiences and well-being.

The CDTA framework provides a valuable tool for organizing sensory elements into a coherent spatial structure, ensuring that urban spaces are both functional and experiential. The High Line's success lies in its ability to balance sensory richness with functional design, creating a space that resonates emotionally and culturally with its users. Key takeaways from this study include:

- Sensory urbanism enhances the quality of urban spaces by engaging all five senses, creating immersive and memorable experiences.
- The CDTA framework offers a structured approach to organizing sensory elements, ensuring that urban spaces are cohesive and engaging.

The High Line serves as a model for future urban design projects, demonstrating the potential of sensory urbanism to foster well-being, social interaction, and cultural identity.

8. FUTURE DEVELOPMENT

Future research could explore the long-term impacts of sensory urbanism on mental health, social cohesion, and cultural identity. Additionally, the application of the CDTA framework in different cultural and geographic contexts could provide further insights into its versatility and effectiveness. By prioritizing sensory experiences, urban designers can create more inclusive, engaging, and meaningful urban environments that enhance the quality of life for all.

Funding This research received no external funding.

Author Contribution All authors contributed to the study conception and design. Material preparation, data collection and analysis. Also, the authors don't have a conflict of interest over the manuscript.

Data Availability Statement: The data supporting this study are available upon request from the corresponding author.

In the preparation of this manuscript, I used ChatGPT (version GPT-4) as a generative AI tool to refine and enhance the quality of the English language. The tool was employed to improve clarity, coherence, and grammatical accuracy in the text, ensuring that the ideas and findings of the study were communicated effectively. Its use was limited to language refinement and did not involve the generation of original content, data analysis, or interpretation of results.

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