



Peculiarities of perception of the urban environment in the system of a modern metropolis (on the example of children's autonomy in an urban environment)

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Abstract. This article explores how preschool children perceive the urban environment and how urban space influences the development of their autonomy. Drawing on interdisciplinary perspectives from urban planning, environmental psychology, and child development, the study analyzes the ways young children interact with and interpret their everyday urban surroundings. A mixed-methods research design was employed, combining qualitative and quantitative approaches, including semi-structured interviews, children's drawings, and content and cluster analyses. The empirical study was conducted with a sample of 130 preschool children aged 4-6 years living in the central districts of Baku. The findings demonstrate that children's urban experiences are largely shaped by interactions with parents and close relatives, while environmental awareness is strongly influenced by intergenerational factors, particularly the role of grandparents. Limited opportunities for independent interaction with urban objects and spaces lead many children to compensate through imaginative constructions of an idealized, fairy-tale city. Children's perceptions reveal early sensitivities to environmental problems, social behavior in public spaces, and the availability of safe and accessible areas for play and communication. The results highlight that children's views of the city serve as an important indicator of how urban environments support or constrain cognitive, emotional, and social development. The study emphasizes the necessity of incorporating children's perspectives into urban planning and social policy, offering practical implications for the design of inclusive, child-friendly, and sustainable urban environments.

Keywords: urban environment, architectural space, urbanization, landscape, metropolis, visual environment

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1. INTRODUCTION

Human communities have always interacted with and reshaped their surrounding environment, yet the intensity and scope of this interaction have expanded dramatically over time. With each successive decade, technological progress, demographic growth, and economic development have accelerated the transformation of natural and built landscapes. In recent years, rapid urban expansion has resulted in the formation of vast metropolitan regions characterized by dense infrastructure and complex spatial organization. Within these growing urban centers, large-scale construction projects have become a defining feature of development. New residential complexes, multifunctional business hubs, and modern commercial facilities are continuously emerging, reflecting both population demands and evolving economic priorities. At the same time, advancements in architectural design, sustainable materials, and innovative construction methods have altered not only the skyline of cities but also their internal functionality. Consequently, contemporary urban environments differ markedly from those of previous generations. The integration of modern engineering solutions, energy-efficient technologies, and adaptive planning strategies has redefined the aesthetic appearance and operational dynamics of metropolitan areas, shaping cities into more technologically sophisticated and structurally complex systems [1].

At the same time, the reduction of natural territories—meadows, forests and green belts—both within cities and in suburban zones, has become increasingly evident. Natural landscapes are progressively replaced by engineered recreational forms such as small urban squares, decorative plantings between traffic arteries, or formalized “green pockets” around residential complexes. Although landscape architects attempt to enhance comfort and increase the proportion of greenery in dense urban structures, not all of them consider the physiological and developmental needs of vulnerable groups—particularly children—whose spatial behavior and sensory perception are highly dependent on accessible natural environments [2].

Every geographical area, regardless of whether it is urban or rural, is evaluated by its residents through the lens of everyday comfort, life satisfaction, and prospects for self-realization. People tend to compare territories in terms of access to education, healthcare, employment, cultural life, and transportation. For this reason, cities are frequently regarded as offering broader opportunities and higher standards of service provision than rural settlements. As a result, migration trends increasingly favor large urban centers and megacities, where individuals believe they can more effectively satisfy both basic needs and social aspirations. In this context, the challenge of shaping urban environments that prioritize not only economic growth but also social equity, inclusiveness, and long-term sustainability becomes particularly significant.

The urban environment represents a multidimensional system in which constant interaction occurs between people and the physical setting that surrounds them. The configuration of streets, public spaces, residential areas, and green zones influences patterns of movement, communication, and everyday practices. Research in environmental psychology emphasizes that individuals develop behavioral attachments to specific places, forming perceptions of ownership, familiarity, and security. The built environment—comprising architectural structures, transport networks, open spaces, and recreational areas—serves as a tangible framework within which residents orient themselves, create cognitive representations of space, determine safe pathways, and assess how effectively the environment meets their practical and emotional needs.

Accordingly, contemporary urban planning must extend beyond purely technical or infrastructural considerations. Attention should also be given to visual harmony, sensory experience, and the emotional atmosphere of public spaces. A thoughtfully organized city should ensure accessibility, safety, and aesthetic coherence while fostering psychological comfort. Such an environment supports independent mobility, especially for children and vulnerable groups, and encourages residents to perceive the city not merely as a physical setting, but as an engaging and meaningful space for daily life and social interaction [4] (Fig. 1).

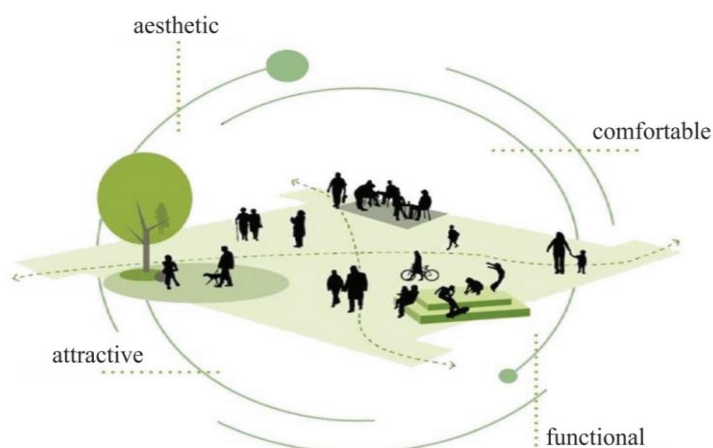


Fig. 1. Diagram of objective requirements for urban areas (visualization by authors, 2024).

One of the earliest research initiatives focusing on children's and adolescents' experiences in urban environments, conducted with their direct participation, demonstrated that children form distinct evaluations of the social and physical conditions of the city. Later studies confirmed that children's well-being is a crucial indicator of the overall quality of the urban environment and should be considered a central criterion for assessing democratic sustainability in urban life [5]. Based on these findings, researchers developed sets of indicators reflecting children's own positive and negative assessments of the spaces they inhabit, emphasizing that young citizens perceive the city through experiential, emotional, and developmental dimensions.

Despite this, children remain among the least represented groups in urban planning. Scholars argue that this results from outdated professional attitudes that underestimate children's capacity as active social agents. Their perception differs sharply from adults in both cognitive processing and emotional engagement with urban spaces. Recent empirical studies emphasize that incorporating children's lived experiences can contribute to inclusive and comfortable urban environments where children are mobile, autonomous, and actively engaged in urban life [6].

Research also demonstrates that children not only identify strengths and weaknesses of the urban environment but are capable of proposing concrete improvements that help align their imagined "ideal city" with the real one. Psychologists highlight that children's drawings and verbal descriptions reveal developmental patterns, symbolic thinking, and subjective interpretations of environmental elements [7].

A recurring theme in contemporary scholarship is the decline of children's independent mobility due to increasing urban density, traffic, technological lifestyles, and parental concerns. Studies show that restrictions on free outdoor play and unaccompanied mobility reduce opportunities for autonomy, decision-making, and social competence. Access to safe play spaces, child-friendly infrastructure, and green areas significantly shapes children's subjective well-being and strengthens their ability to explore and interact independently with the environment [8].

Urban environments thus play a fundamental role in shaping human behavior and development. As cities expand, understanding how different population groups—especially young children—perceive and navigate urban space becomes increasingly important. Evidence suggests that children experience the city differently from adults due to developmental, emotional, and social factors. Despite this, their perspectives remain underrepresented in city design and policy processes.

The present study aims to examine how preschool children perceive the urban environment, which factors influence their autonomy, and how their perceptions differ across social and environmental conditions. Based on existing literature, we hypothesize that children's perception is shaped by interaction with parents, exposure to green spaces, opportunities for safe mobility, and socially engaging public areas. Children's sense of autonomy is expected to correlate with the availability of safe, interactive, and developmentally supportive urban spaces.

2. METHODS AND MATERIALS

This study adopts a mixed-methods research design, combining both qualitative and quantitative techniques to gain a comprehensive understanding of preschool children's perception of the urban environment. The integration of interviews, visual methods (drawings), and statistical analysis provides triangulated insights into the experiences and preferences of young urban residents.

Participants and Sampling Criteria

The research involved 130 preschool children aged 4 to 6 years living in central districts of Baku. Participants were selected based on the following criteria:

- Enrollment in formal preschool institutions,
- Living in two-parent households,
- Residing in neighborhoods with relatively similar urban conditions (e.g., presence of green areas, accessibility of public spaces).

This purposive sampling ensured a homogenous sample in terms of developmental stage and urban exposure, allowing for clearer interpretation of perception patterns.

Data Collection Tools and Procedures

Three primary tools were used for data collection:

1. Semi-Structured Interviews

- Conducted individually in a familiar preschool environment to ensure comfort and spontaneity.
- Questions included prompts like: “What do you like/dislike in your city?”, “If you could change something, what would it be?”
- Interviews were audio-recorded and transcribed verbatim for analysis.

2. Children’s Drawings

- Each child was invited to draw a picture titled “The City I Live In.”
- No restrictions were placed on content or format.
- Drawing sessions were conducted after the interview, allowing children to express themes they had mentioned.

3. Questionnaire (Structured Observation Sheet)

- Researchers noted non-verbal cues and contextual details during both interviews and drawing sessions.
- Additional questionnaires were completed by preschool teachers, providing contextual understanding of each child’s behavior and urban exposure.

Ethical Considerations

- Informed consent was obtained from all parents/legal guardians.
- Anonymity and confidentiality were ensured.
- Activities were designed to be playful and age-appropriate, minimizing any form of pressure or stress.

Groups of data collection

1. Content Analysis

- Verbal and visual data (interviews and drawings) were categorized into five thematic areas:
- Objective-Spatial Environment
- Social Interactions
- Natural Elements
- Environmental Concerns
- Emotional Tone
- Color usage, subject inclusion, and spatial elements in drawings were systematically coded.

2. Cluster Analysis

- A non-hierarchical cluster analysis (e.g., K-means) was conducted to group children based on shared features in their responses and drawings.
- This revealed four main perception clusters: “Socially Oriented,” “Nature Lovers,” “Locally Oriented,” and “Young Ecologists.”

3. Theoretical Anchoring

- Interpretation of findings was guided by Gibson's theory of affordances (1979), emphasizing the perceived action possibilities in an environment, and Lewin's concept of valence (1936), which reflects the emotional charge children attach to urban elements.

3. RESULTS AND DISCUSSION

The spatial environment of most modern metropolises is increasingly considered unfavorable, a situation that is widely acknowledged in contemporary urban studies. As urbanization intensifies, the question of restoring and improving the environmental conditions of cities becomes critically important. The urban environment is the primary habitat for modern citizens, and all essential human activities occur within it. Therefore, it must adequately meet fundamental physiological, social and psychological needs. Regardless of technological advancement or distance from natural ecosystems, humans require access to nature-like spaces within cities to maintain comfort and well-being. Research confirms that proximity to natural elements remains one of the main criteria in choosing a living environment [9].

However, a structural conflict exists between natural landscapes and dense urban development. The city cannot be filled exclusively with unaltered natural environments; therefore, urban planners, architects, and landscape designers play a central role in resolving this contradiction. Guided by normative documentation, planners regulate the balance of land use, including the proportion of green spaces, the placement of sanitary-protective zones between residential and industrial districts, and the overall functional zoning of the territory. Yet these measures, although essential, address only the explicit regulatory framework and do not fully define the quality of urban space.

Urban space is far more than a settlement with green patches between buildings. It is a complex, multi-layered system that requires professional architectural organization to ensure spatial comfort, aesthetic harmony, and functional adaptability. The integration of natural and artificial environments—and consequently the creation of a truly comfortable urban space—is possible only through deliberate architectural design based on spatial composition, structure, and symbolic meaning.

In this sense, architectural space within the urban environment consists of external, open areas that have their own compositional elements: visual accents (landmarks), spatial boundaries, and directional axes. These spaces include courtyards, inter-yard territories, public gardens, squares, pedestrian zones, covered passages, malls, plazas, and other open or semi-open systems. Each of these may serve distributive, recreational or communicative functions depending on the needs of the urban population.

In modern architecture, the role and meaning of urban space are gradually shifting toward ecological design principles. Although references to nature have always been present in architectural works, contemporary interpretations increasingly emphasize broader ecological significance—using natural archetypes, biomorphic forms, the constructive adaptation of natural structures, and innovative landscaping strategies [10] (Fig. 2).

Developing new architectural spaces alone cannot resolve environmental challenges within metropolises. It is equally necessary to reorganize existing urban territories that are in critical condition or require aesthetic and functional rehabilitation. The quality of the urban environment is determined by several key factors:

- geographical and microclimatic conditions,
- functional and morphological characteristics of urban elements,
- the density, configuration and visual permeability of the built environment,
- the ecological productivity and protective capabilities of landscapes,
- cultural and aesthetic-psychological attributes of space.

Thus, the effective organization of urban architecture relies not on the passive expansion of green areas, but on the optimal structuring of all spatial components. Urban space must be designed with artistic expressiveness, formal harmony, ecological efficiency and aesthetic value, ensuring that every fragment contributes to the environmental and social well-being of the city as a whole.

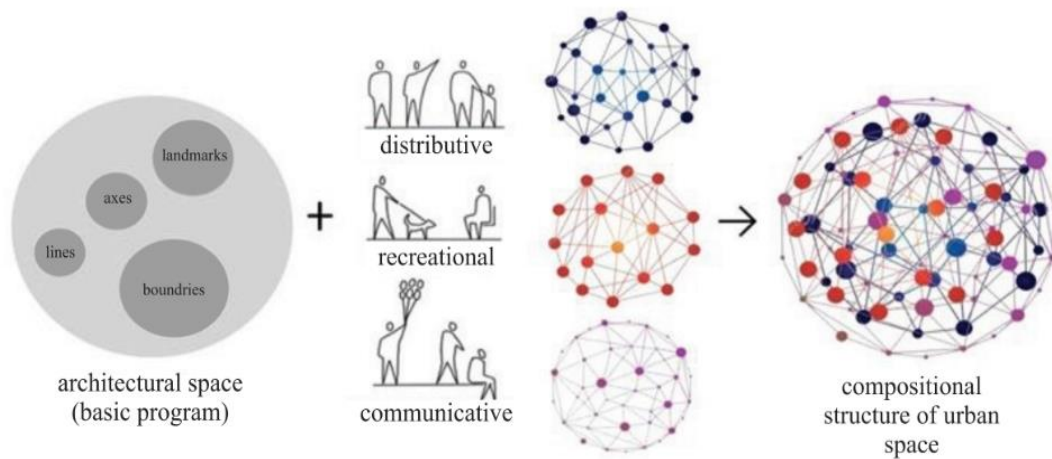


Fig. 2. Compositional structure of urban space (visualization by authors, 2024).

The urban environment of a modern metropolis is understood as a system of multifunctional spaces that must enhance both living comfort and the aesthetic identity of the city. The spatial organization of these systems depends on a combination of established urban planning regulations and natural landscape conditions. Their formation is indirectly shaped by the morphological configuration of the city—whether linear, radial, ring-shaped, or network-based—and by key structural elements such as community centers, transportation networks, public service facilities, and green infrastructure systems. Such spatial frameworks make it possible to distribute public areas evenly throughout the urban fabric. Microdistrict centers, inner courtyards, semi-private inter-building zones, tree-lined boulevards, embankments, pedestrian corridors, and civic plazas together create a network of shared spaces that sustain everyday communication and collective urban life. When these elements are thoughtfully interconnected, they support social interaction, recreation, and a sense of belonging at different spatial scales—from the immediate residential environment to citywide public domains. Global practice confirms that deliberate architectural and spatial modeling can significantly improve the quality of urban environments. A compelling illustration can be found in Japan, where highly dense metropolitan regions have been shaped with strong attention to human comfort. Even within compact and vertically developed cities, spatial organization often avoids the sense of overcrowding and psychological stress frequently associated with megacities [11]. Urban designers achieve this balance by introducing multi-level public terraces, small-scale courtyards, green balconies, play areas for children, and carefully arranged micro-landscapes that soften rigid building lines. Traditional garden principles—emphasizing harmony, proportion, and natural materials—are adapted to contemporary settings, allowing greenery and water elements to be integrated into even the narrowest urban gaps. As a result, these compact spaces gain sensory diversity, visual depth, and emotional warmth, demonstrating that high density does not necessarily preclude human-centered design.

The first level of perception in Japanese cities is formed by picturesque courtyards, playgrounds, mini-parks and sculptural compositions, which provide visual relief from dense development. The second level comprises the lower tiers of buildings and narrow streets where vibrant visual culture—particularly illuminated signage—creates a dynamic, gallery-like environment. The third level utilizes the rooftops of mid-rise buildings, where designers place gardens, cafes, recreational decks and even small sports fields, demonstrating the global trend toward vertical expansion of urban green spaces [12].

The use of "vertical greenery"—green roofs, vegetated facades, terraces, pergolas—contributes significantly to improving microclimatic conditions, reducing heat islands, and psychologically softening the built environment. Such solutions blur the boundaries between architecture and nature, a design principle strongly supported by current environmental psychology research [13].

Domestic urban practice has also attempted to create new spatial environments through architectural modeling, though often through large-scale reconstructions of historical zones. In

Azerbaijan, new “humanized” environments emerged primarily as part of heritage restoration projects. However, micro-landscapes—small-scale regulatory elements crucial for everyday comfort—remained overlooked. As a result, many modern city districts lack intimate, environmentally soft, multifunctional spaces that integrate naturally into daily pedestrian experience.

In every city, architectural space requires clearly articulated structural components that make it understandable and distinctive for its users. Elements such as spatial edges, visual focal points, and guiding axes help organize the environment and give it coherence. These components shape how people perceive orientation, recognize significant places, and emotionally relate to their surroundings. When boundaries are well defined, landmarks are visually expressive, and movement lines are logically structured, the urban setting becomes more readable and meaningful. In this way, spatial composition not only establishes identity and clarity but also influences the overall psychological tone and atmosphere of the city. [14].

Architectural space in any urban environment form relies on clearly structured boundaries that shape how people perceive and navigate the city. These boundaries, regardless of scale, determine the legibility, comfort and emotional qualities of space. The first group—base-plane boundaries—includes paving patterns, small differences in relief, decorative lawns or water surfaces. As the foundational level on which all other spatial elements are organized, the base plane sets the conceptual framework of an environment and influences how users, especially children, interpret and interact with it [15].

The second group—vertical boundaries—is represented by buildings, fences, hedges, arcades, colonnades and other architectural or landscape elements. These structures form internal spatial zones and determine the perceived scale of an environment. Vertical boundaries are typically the easiest elements to read visually, allowing both adults and children to orient themselves quickly in space. They guide movement, frame viewpoints, and play a key role in shaping behavioral patterns in urban settings [16].

The third component—upper boundaries—includes pergolas, canopies, tree crowns and shading devices that form the overhead plane. These elements control sunlight penetration, create shade and define the degree of enclosure experienced by the user. Psychological studies highlight that such upper boundaries contribute to feelings of safety, privacy and emotional comfort, making them essential in child-friendly and human-centered spatial design [17].

Alongside boundaries, the presence of landmarks and accents enhances the recognizability and memorability of architectural space. Sculptures, installations, green elements, textured surfaces and color compositions act as memory anchors that help users mentally map the environment. When placed along major compositional lines or at key intersections—such as transitions between active and passive areas—landmarks guide movement and strengthen the identity of the space. For both children and adults, these distinctive markers support intuitive navigation and help create stable mental images of the environment [18].

Another essential component of spatial organization is the system of direction lines and movement patterns. These lines frame the sequential visual impressions a person receives while moving and determine the rhythm of perception in architectural space. A well-designed environment offers readable and inviting paths, natural transitions between functional zones and multiple viewpoints that maintain perceptual diversity. This is particularly important for children, whose spatial experience is highly sensitive to clarity, accessibility and sensory variation. When direction lines are thoughtfully integrated into the spatial structure, they create a harmonious movement scenario that enhances emotional comfort and supports independent exploration [19].

Urban public spaces also rely on functional zoning, which generally divides environments into active and sedative (quiet) areas. Active zones are characterized by dynamic forms, strong color contrasts, open boundaries and higher illumination. Research confirms that such environments foster children’s physical activity, autonomy, social interaction and overall subjective well-being [20]. In contrast, sedative zones are shaped by calm compositions, isolated or semi-enclosed boundaries, soft lighting, nuanced colors and natural elements such as water surfaces or gentle landscape relief. These areas support psychological restoration, reduce stress and promote emotional stability, aligning with evidence from environmental psychology on the restorative potential of nature-inspired settings [21].

In conclusion, architectural space plays a vital role in shaping human well-being across physical, psychological and social dimensions. A systematically organized urban environment—characterized

by balanced boundaries, expressive landmarks, legible movement systems and diverse functional zones—meets the comfort needs of modern city residents while fostering children’s autonomy, safety and emotional development. A human-centered design approach, supported by contemporary empirical research [22], demonstrates that well-structured urban environments enhance social engagement, strengthen community interaction and contribute to healthier and more inclusive city life.

Comparative analysis of children’s perception of the urban environment

The issue of children’s autonomy in the urban environment is closely linked to the development and expression of their subjective qualities—namely activity, independence and the ability to self-regulate behavior while interacting with objects, phenomena and people within the city. In this context, children’s activity should not be understood solely as physical movement. Rather, it reflects an internal motivational need to master external reality and to express themselves through interaction with their surroundings, an understanding supported by contemporary environmental psychology [23].

Children begin to form personal attitudes toward the physical and social world already in early preschool years. Their ability to attribute meaning to urban objects and phenomena reflects the emergence of individuality and early self-awareness. Environmental psychologists explain children’s selective attention to particular objects of the urban environment by referring to concepts such as *affordances* and *valence*, which highlight how specific environmental elements act as attractors that draw children’s interest and engagement. From this perspective, the role of the child as a subject becomes evident: each child evaluates urban environmental features based on personal needs, developmental characteristics and previous experiences. Thus, identical urban objects may be perceived in fundamentally different ways by different children [24].

These theoretical premises served as the basis for formulating our research hypothesis, which assumes that preschool children residing in a large metropolitan area interpret and experience urban conditions in different ways depending on their individual subjective traits. In other words, children’s perception of the city is not uniform; rather, it is mediated by personal characteristics that influence how they evaluate and emotionally respond to their surroundings.

The hypothesis is specified through the following propositions:

- Preschool children display differentiated modalities of attitude toward the physical-spatial, social, and natural dimensions of the urban environment. At the same time, they frequently articulate a need or wish for constructive transformations within the city’s structure, reflecting an emerging evaluative position toward their living space.

- The orientation and intensity of these attitudes correlate with children’s subjective qualities—such as independence, initiative, and the capacity for behavioral self-regulation in urban settings. This relationship suggests that autonomy develops progressively through direct and repeated interaction with urban space, where the child learns to navigate, interpret, and appropriate elements of the surrounding environment (Fig. 3) [25].

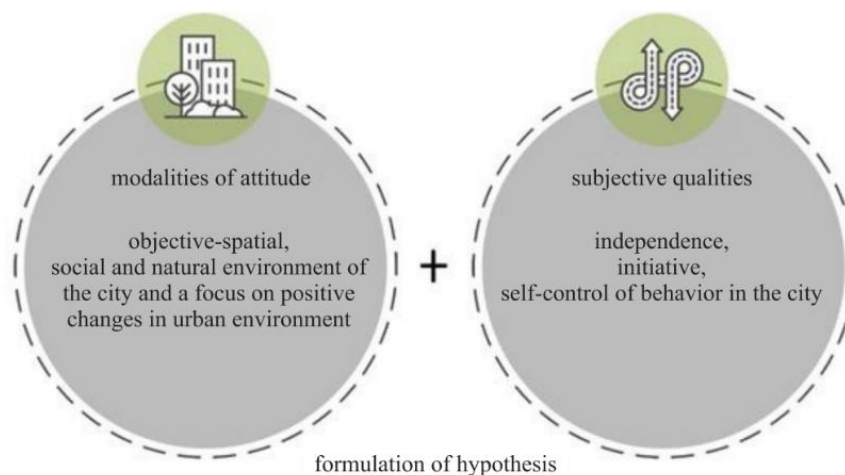


Fig. 3. Formulation of hypothesis (visualization by authors, 2024).

To investigate how children and adolescents perceive the urban environment, a comparative analysis was conducted. The research design involved comparative analysis of groups distinguished by different modalities of attitude toward the objective-spatial, social, and natural dimensions of the urban environment, as well as by the degree to which children expressed readiness for positive changes in the city. Such differentiation made it possible to explore variations in perception rather than treating children as a homogeneous category. This methodological orientation corresponds with contemporary child-centered approaches in urban studies, which prioritize the lived experiences and subjective viewpoints of young residents [26].

The empirical sample comprised 130 senior preschool children between the ages of four and six. Of these participants, 48% were girls and 52% were boys. All children resided in two-parent families located in the central districts of Baku. These districts are generally characterized by comparatively stable ecological conditions and the availability of landscaped green areas. Each child attended a preschool educational institution, which ensured relative consistency in early socialization contexts and educational exposure across the sample [27].

To examine children's attitudes toward their city, a structured questionnaire in the form of an interview was administered. The instrument incorporated open-ended prompts encouraging participants to describe aspects of the city they appreciated or disliked, to indicate whether they desired changes, and to propose specific improvements that would enhance their urban experience. This format allowed children to articulate their views in their own words and aligns with established research practices emphasizing the importance of capturing children's narratives as a source of insight into their perception of urban environments [28].

Data processing combined qualitative and quantitative techniques. Through content analysis, children's responses were grouped into thematic categories reflecting three principal domains: the natural environment of the city, the objective-spatial (built) environment, and the social environment. In addition, distinct categories were created to register evaluations of environmental quality and suggestions aimed at improving urban conditions, since such proposals are often interpreted as indicators of emerging environmental awareness among children [29].

Frequency analysis was subsequently applied to determine the most commonly mentioned urban objects and phenomena, forms of social interaction, and participants involved in these interactions. To supplement verbal materials, the study included a projective drawing task developed by the authors, titled "The City I Live In." A content-analysis matrix for the drawings incorporated several evaluative parameters: the use of color (multicolored versus monochrome compositions); depiction of urban infrastructure (residential buildings, preschool institutions, cultural landmarks such as the Maiden Tower); inclusion of natural components (trees, landscapes, animals); representation of environmental conditions (weather, pollution, waste); and the presence of human figures—including self-images, family members, peers, grandparents—as well as scenes illustrating interaction among them (Fig. 4) [30].

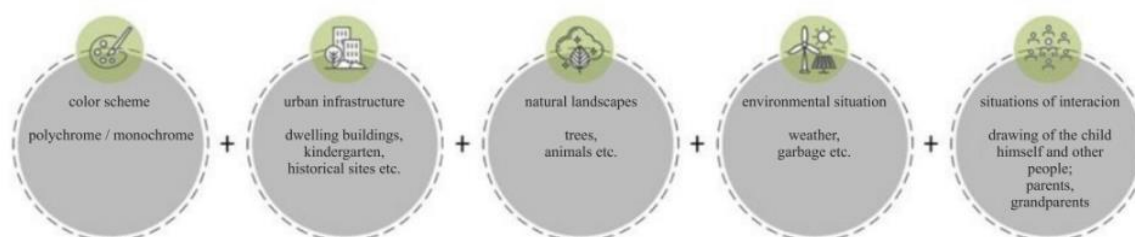


Fig. 4. The matrix of content analysis of the drawings (visualization by authors, 2024).

The analysis of children's perception of the metropolis at the initial stage of the study involved identifying the most frequently mentioned objects and phenomena of the urban environment. Using frequency analysis, children's evaluations were recorded on a simple dichotomous "like/dislike" scale, along with their suggestions for improving urban living conditions. This approach aligns with contemporary child-centered methodologies that highlight the value of children's subjective interpretations of city life [32].

The findings revealed that a considerable proportion of children (42%) evaluated elements of the objective–spatial environment positively. Leisure-related spaces—carousels, amusement parks, playgrounds and shopping-entertainment centers—were mentioned most frequently (25%), followed by references to their own homes and the surrounding residential space (17%). These results support previous studies demonstrating that children’s attachment to place often reflects their emotional experiences with caregivers in specific urban locations [35].

Children also expressed positive attitudes toward the social environment of the city (28%). These evaluations were closely linked to interactions with parents, grandparents and peers—playing in the yard, walking in parks, or spending time together in familiar areas. In contrast, negative attitudes (30%) typically stemmed from observations of strangers’ antisocial or norm-violating behavior. Such findings echo earlier research showing that children readily recognize social norms in public spaces and assess urban environments partially through the lens of interpersonal safety and predictability [38].

With regard to the natural environment, children predominantly reported positive attitudes (33%), highlighting parks, green areas, animals and birds as the most attractive elements. Dissatisfaction, however, centered around environmental challenges typical of large cities—air pollution, noise, unpleasant odors from traffic and garbage accumulation (20%). A substantial proportion also mentioned the city’s climatic features, such as wind, humidity and dust (18%). Only a small share of children (7%) expressed dislike for objects of the objective–spatial environment itself, such as indoor playgrounds staffed by animators or traffic congestion, which children experienced indirectly. These findings reflect broader discussions in environmental psychology about the sensitivity of young children to physical discomfort and sensory overload in dense urban settings.

One of the most notable findings was the considerable share of children who offered concrete suggestions aimed at improving urban living conditions (72%). A significant portion of participants (30%) focused on correcting antisocial behavior, pointing to issues such as rule-breaking or inappropriate conduct in public spaces. This response pattern reflects an emerging sense of social order and collective responsibility at an early age. An even larger group (33%) highlighted the importance of enhancing the city’s visual appearance—renovating façades, beautifying streets, and creating new facilities that would be engaging and beneficial for children. In contrast, only a small minority (5%) addressed ecological concerns, which suggests that although environmental awareness begins to form by around six years of age, large-scale environmental challenges are perceived as more abstract and less directly manageable.

In general, children’s satisfaction with life in a large city was closely connected to the urban spaces they encountered together with their parents. Their assessments were not limited to the material characteristics of buildings, monuments, shopping areas, or parks. Instead, attitudes toward these places were strongly influenced by the emotional experiences and social interactions associated with them. Negative perceptions of the city were more frequently linked to environmental conditions—such as pollution, excessive noise, or unfavorable weather—than to dissatisfaction with architectural structures themselves.

Importantly, children who drew attention to violations of social norms demonstrated more than simple rule awareness. Their responses indicated an understanding that such norms serve a regulatory function within shared urban spaces. This finding suggests that even at the senior preschool stage, children display elements of independent reasoning and recognize the role of social rules in organizing behavior within the city.



Fig. 5. Cluster analysis of children (visualization by authors, 2024).

At the second stage of the research, cluster analysis was applied in order to identify internally homogeneous groups of children who differed in their perceptions of urban conditions and in their attitudes toward various elements of city life. This statistical procedure made it possible to move beyond general tendencies and to distinguish specific perceptual profiles. As a result, four distinct clusters were identified [39] (see Fig. 5).

The first cluster (38% of the sample), provisionally labeled the “socially oriented” group, consisted of children whose perception was primarily focused on the social dimension of the urban environment. Their evaluations of the city incorporated both positively and negatively experienced aspects of social life. A majority of these children (56%) reported enjoying shared leisure activities with adults—such as walks, car rides, observing nature, visiting shopping centers, or going to cafés. At the same time, 31% expressed dissatisfaction with joint activities that did not reflect their own interests but were instead driven by adult priorities (for example, attending preparatory classes instead of spending time outdoors) (13%) (Fig. 6).

Children in this group demonstrated particular sensitivity to breaches of social norms (17%). They mentioned behaviors such as shouting, arguing, excessive noise, and littering in public spaces. Their drawings frequently contained representations of people—most often self-images (55%), as well as unfamiliar city residents (20%), parents (7%), other relatives (6%), and peers (5%)—more frequently than in the other clusters.

Dissatisfaction with inappropriate social conduct generated a desire for change. Notably, these children directed their suggestions not only toward modifying the behavior of relatives or other children (18%) but also toward themselves. Some expressed a wish to regulate their emotional states (10%), for instance by “always being cheerful” or “staying in a good mood,” while others mentioned aspirations related to personal appearance (8%). This indicates an emerging reflexive awareness and a developing sense of agency in social contexts.

The second cluster (20%), conventionally referred to as the “nature-oriented” group, was characterized by a predominant focus on the natural components of the urban environment. These children expressed positive attitudes toward parks, green spaces, city animals—including visits to the zoo—and birds (31%). Natural motifs were also dominant in their drawings, where vegetation and landscape elements appeared more frequently than in other groups (32%).

Their dissatisfaction with city life was primarily associated with climatic and environmental factors such as humidity, wind, and dust (37%). When referring to built elements of the city, these children more often mentioned historical landmarks of Baku (10%) and cultural institutions—such as theaters, museums, the zoo, or the circus (10%)—indicating that their appreciation of the city’s material environment was closely connected with places offering aesthetic, educational, or experiential value.

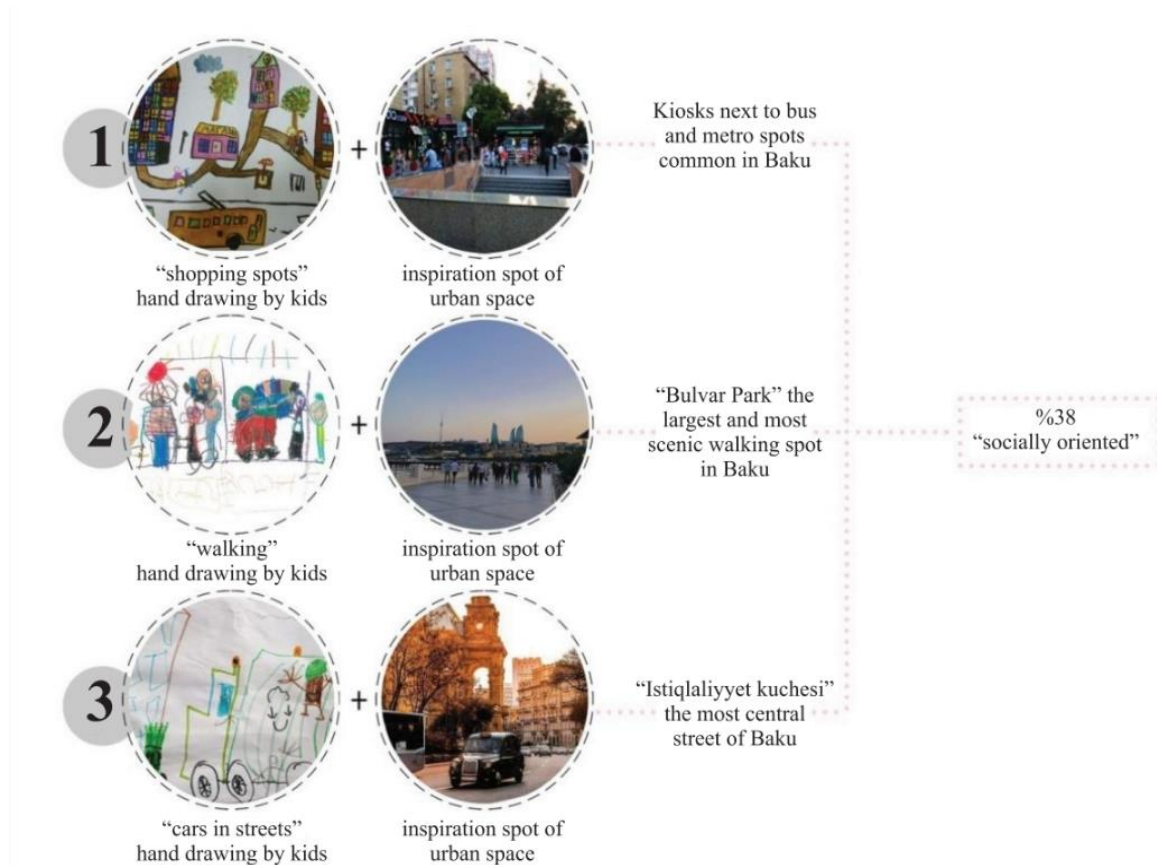


Fig. 6. Three sample drawings from the first group of children and inspirational points in the city are shown (visualization by authors, 2024).

Compared with the first cluster, the orientation of this group toward transforming the broader environmental situation of the city was less clearly expressed. It is noteworthy that the “nature-oriented” children, including those who emphasized cultural and recreational experiences, evaluated the social dimension of urban life less positively than did participants in other clusters [41] (see Fig. 7). This suggests that their primary emotional attachment was directed toward natural and aesthetic components rather than toward interpersonal dynamics within the city.

The third cluster (17%), provisionally described as the “locally oriented” or “fantasizing” group, demonstrated a concentrated and spatially limited focus in their perception of the urban environment. Their positive evaluations were directed mainly toward specific, familiar, and entertainment-related objects. Shops (30%) and leisure facilities (45%)—including amusement parks, carousels, restaurants, and shopping-entertainment centers—were frequently mentioned. In addition, they expressed attachment to their own apartment, house, and yard (22%), selecting these micro-level spaces from the wide array of urban elements.

This orientation was reflected in their drawings, where images of roads and transport (20%), entertainment spaces such as playgrounds and rides (13%), their own home (43%), and other residential buildings (47%) appeared prominently. When depicting people, these children most often drew themselves (60%), while peers (3%) and unfamiliar city residents (6%) were included only rarely. Notably, significant adults—parents or grandparents—were largely absent from their visual

representations. Distinct from the other groups, children in this cluster frequently incorporated fairy-tale or fantastical elements into their drawings (13%), sometimes replacing realistic cityscapes with imaginative plots. Such symbolic substitution may indicate a psychological mechanism aimed at expanding their perceived sphere of autonomy and control within the urban environment (see Fig. 8).

The unidirectional and relatively monomodal pattern of attitudes observed in this group may be associated with family-related factors, including parenting styles, patterns of parent–child interaction, value orientations within the household, and preferred forms of shared leisure.

The fourth cluster (25%), conventionally labeled “young ecologists,” displayed a different configuration of perceptions. These children most frequently expressed positive attitudes toward the objective-spatial (built) components of the city (68%), often limiting their evaluations to the microdistrict level—such as their own apartment, residential building, courtyard (33%), and nearby shops (17%). However, their assessments of the social environment were predominantly negative (50%) rather than positive (21%), with antisocial behavior in public spaces emerging as the main source of dissatisfaction. At the same time, approximately one-third of children in this cluster (37%) expressed appreciation for elements of the urban natural environment, indicating an integrative but critically reflective perspective on the city.

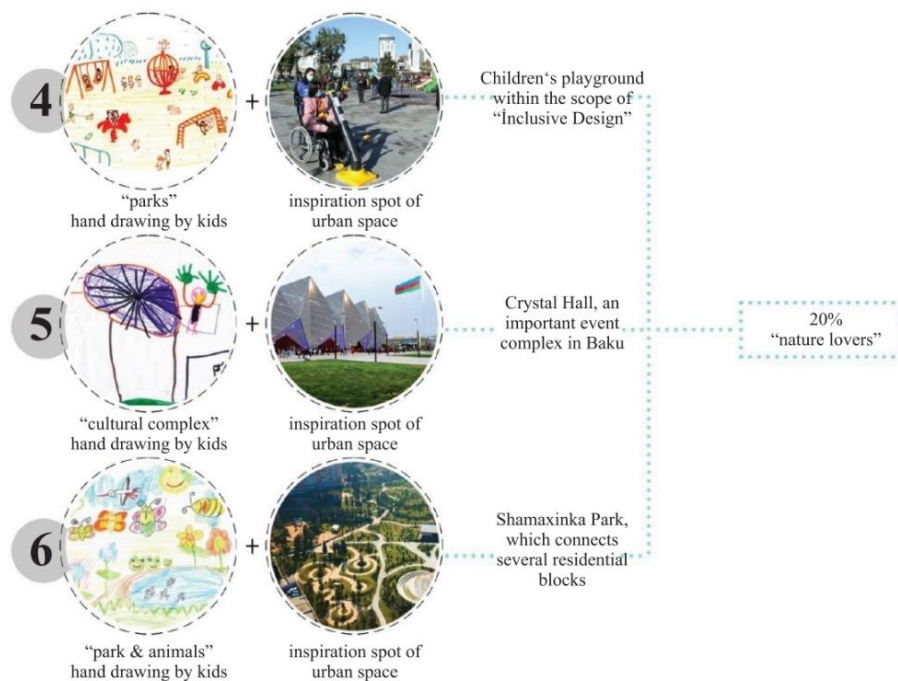


Fig. 7. Three sample drawings from the second group of children and inspirational points in the city are shown (visualization by authors, 2024).

Children classified as “young ecologists” were distinguished by a particularly acute and emotionally intense perception of environmental problems in the urban setting. In comparison with the other groups, they demonstrated the highest level of dissatisfaction with the ecological condition of the city (50%). Their attention was primarily directed toward air pollution caused by heavy traffic and vehicle emissions (35%), which they perceived as a significant threat to urban well-being. Additional concerns included the presence of garbage in public spaces (4%), excessive noise and loud sounds (8%), as well as discomfort associated with extreme or unfavorable weather conditions (9%). These findings indicate that children in this cluster not only recognize visible environmental issues but also associate them with broader urban processes such as transportation intensity and infrastructural density. The heightened sensitivity observed in this group reflects an early development of ecological awareness and a critical stance toward environmental quality within the city.



Fig. 8. Three sample drawings from the third group of children and inspirational points in the city are shown (visualization by authors, 2024).

In the drawings produced by children from this cluster, elements of the natural environment—such as parks and green squares—appeared relatively infrequently (8%). Instead, the visual focus was directed toward built and infrastructural components of the city. Shops were depicted in 15% of cases, roads and various forms of transport in 30%, their own home in 33%, and other buildings in 43% of the drawings. This distribution suggests that their perception of the urban environment was strongly centered on constructed space rather than on natural landscapes.

Human figures were also present in many of the illustrations. Most often, children portrayed themselves (55%), followed by grandparents (15%), parents (8%), unfamiliar city residents (8%), and peers (4%). The prominence of self-representation indicates a personalized and experience-based perception of the city, where the child places themselves at the center of the urban narrative.

A distinguishing feature of this group was their proactive orientation toward transforming the city. Unlike children who limited themselves to description, these participants expressed clear intentions to improve urban conditions. They proposed changes aimed at enhancing the ecological situation (26%), correcting inappropriate behavior among citizens (35%), and modifying elements of the built environment (37%) (Fig. 9). This pattern reflects not only environmental awareness but also an emerging sense of agency and responsibility regarding the quality of urban life.

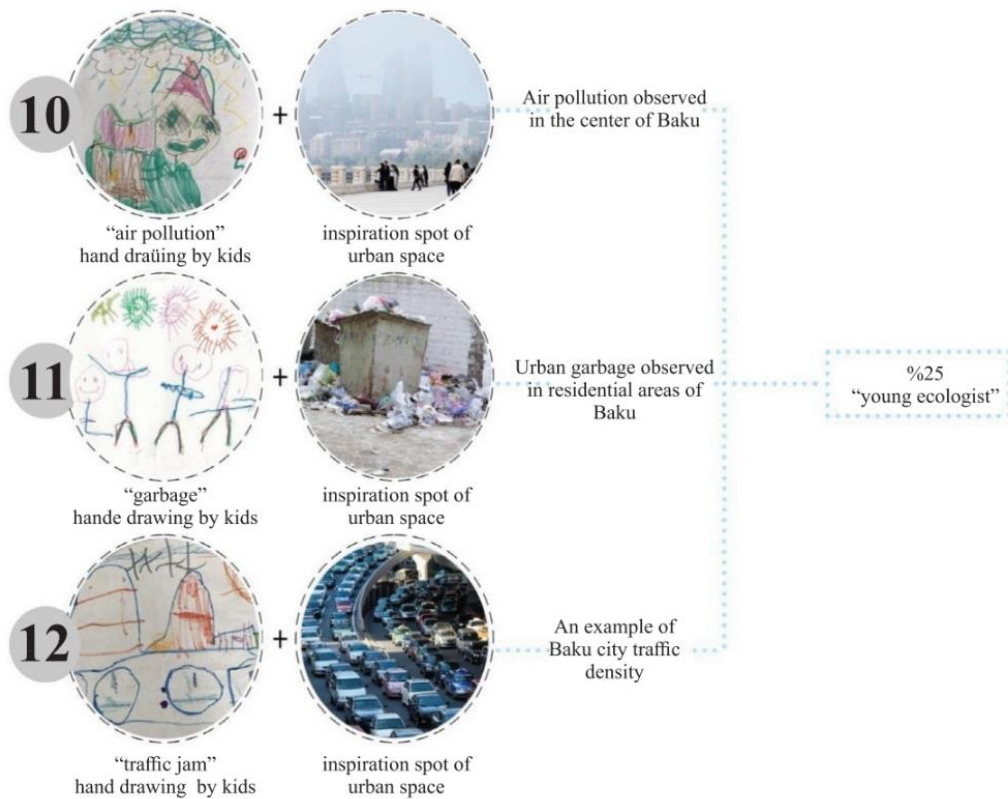


Fig. 9. Three sample drawings from the fourth group of children and inspirational points in the city are shown (visualization by authors, 2024).

In summary, the findings indicate that preschool children living in a large metropolis cannot be viewed as a uniform group in terms of how they perceive and evaluate urban living conditions. The identified clusters differ significantly in their orientation toward the social, natural, and objective-spatial components of the city, as well as in the degree to which they focus on environmental concerns. Each group demonstrates its own pattern of attention, emotional evaluation, and readiness to propose changes.

This selectivity in perception is shaped by a combination of objective and subjective factors. Among the objective factors are the specific characteristics of urban objects and phenomena that directly correspond to children's developmental needs—such as accessibility, safety, opportunities for play, and emotional comfort. These features influence which elements of the city become salient and meaningful to them.

At the same time, subjective determinants play a crucial role. Children's attitudes toward the city are closely connected to their self-perception, personal interests, and the meanings they assign to particular places and experiences. Their needs, preferences, and previous interactions with urban spaces significantly influence how they interpret and evaluate their surroundings. Importantly, the breadth and depth of such interactions largely depend on family upbringing and on parents' willingness to expand the child's experiential and cognitive engagement with the urban environment. Through guided exploration and shared experiences, parents contribute to shaping the child's mental representation of the city and to developing a more nuanced and autonomous understanding of urban life.

Color in the architectural space of a metropolis

The visual environment of a city encompasses all elements that surround a person throughout life: buildings and structures, recreational areas, transportation infrastructure, and many other components. Human interaction with this environment occurs through all sensory modalities; however, vision plays the dominant role, providing up to **80% of all incoming information**. Since humans evolved in

natural landscapes, the mechanisms of visual perception were shaped over thousands of years. Therefore, the historically short period of rapid urbanization has not allowed the sensory system, particularly vision, to fully adapt to the artificial conditions of a modern metropolis [43].

This inadequate adaptation contributes to an increased number of visual apparatus disorders. Research indicates that **myopia occurs 1.5–2 times more often in metropolitan residents** compared to individuals living in rural regions. Moreover, schoolchildren in industrial districts exhibit higher rates of visual impairment than their peers in residential “dormitory-type” neighborhoods.

Modern architectural forms and other visual components of the urban environment may cause disturbances in eye movement. The visual field of large cities becomes increasingly “polluted” by excessive and monotonous elements: **uniform high-rise construction**, extensive **monochrome surfaces** (mirrored façades of commercial centers, grey residential blocks), and **aggressive advertising**. Such visual overload disrupts natural saccadic movements of the eyes, leading to neurological symptoms, fatigue, headaches, and perceptual disorders. These effects are especially dangerous for children under 15, whose visual systems are more vulnerable and demonstrate significantly higher rates of ophthalmic diseases.

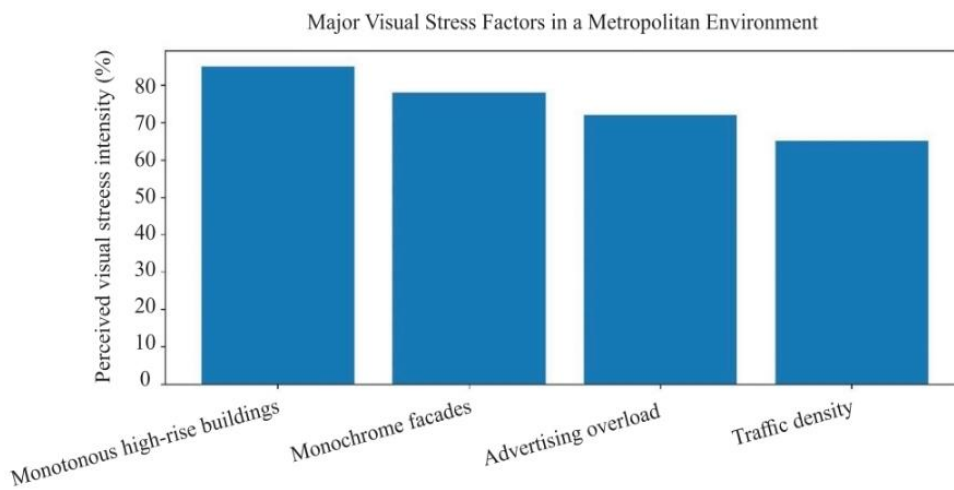


Fig. 10. Major visual stress factors in a metropolitan environment.

Fig. 10 presents the distribution of major visual stress factors characteristic of a modern metropolitan environment. The analysis shows that monotonous high-rise buildings represent the most intensive source of visual stress, accounting for the highest perceived impact on the urban visual field. Extensive monochrome façades also demonstrate a high level of influence, indicating that large uniform surfaces significantly contribute to perceptual overload.

Advertising overload and traffic density, although slightly less dominant, remain substantial contributors to visual pollution. The accumulation of repetitive visual elements, artificial lighting, and moving vehicles increases sensory pressure and disrupts natural eye movement patterns. Such conditions interfere with saccadic eye activity, leading to visual fatigue and reduced perceptual comfort.

The results highlight that excessive uniformity and visual aggressiveness in architectural design negatively affect the quality of the urban visual environment. These effects are particularly critical for children, whose visual and neurological systems are still developing and are therefore more sensitive to prolonged exposure to visually stressful environments. Overall, the findings confirm that visual characteristics of the built environment play a significant role in shaping perceptual well-being and underline the importance of visually balanced and diversified architectural solutions in metropolitan areas.

The Role of Color in the Urban Environment

Color represents a fundamental element in the formation of a visually balanced and psychologically supportive environment. Its impact operates simultaneously at psychophysiological, psychological, and social levels, influencing how individuals perceive space, orient themselves within it, regulate emotional responses, and experience general well-being. Through visual stimuli, color affects attention, mood stability, cognitive processing, and even patterns of movement within architectural settings.

Within architectural design, color performs several interrelated functions [44]:

1. **Providing spatial and temporal orientation.** Color contrasts and tonal variations assist individuals in distinguishing zones, identifying entrances, and navigating complex environments. They may also signal functional differences between spaces and indicate temporal changes, such as day–night transitions or seasonal adaptations.

2. **Structuring and emphasizing environmental elements.** Strategic use of color helps highlight architectural features, delineate boundaries, and organize visual hierarchies. This contributes to improved legibility of the urban fabric and enhances clarity in the perception of space.

3. **Ensuring emotional and psychophysiological comfort.** Harmonious color schemes can reduce visual fatigue, support calmness, and foster a sense of safety. Conversely, poorly coordinated color environments may provoke tension or overstimulation.

4. **Forming a meaningful and emotionally resonant urban atmosphere.** Through associative and symbolic qualities, color contributes to the identity of places, strengthens attachment to the environment, and shapes the overall affective character of urban space [44].

Properly selected color combinations relieve eye strain, stabilize perception after saccades, and enhance visual performance. Historically, architects enriched the visual environment by analyzing the natural palette, landscape dynamics, and cultural patterns. For example, Finnish architect **Reima Pietilä** integrated buildings into natural landscapes, emphasizing harmony rather than contrast.

In earlier centuries, color was used deliberately to structure environments: vivid accents appeared on shutters, domes, columns, and roofs. Contrasting materials—such as red-brown brick paired with white stone ornamentation—created rhythmic, diverse visual fields. Multicolored façades with blue, green-blue, or orange tones contributed to a visually stimulating and emotionally rich environment.

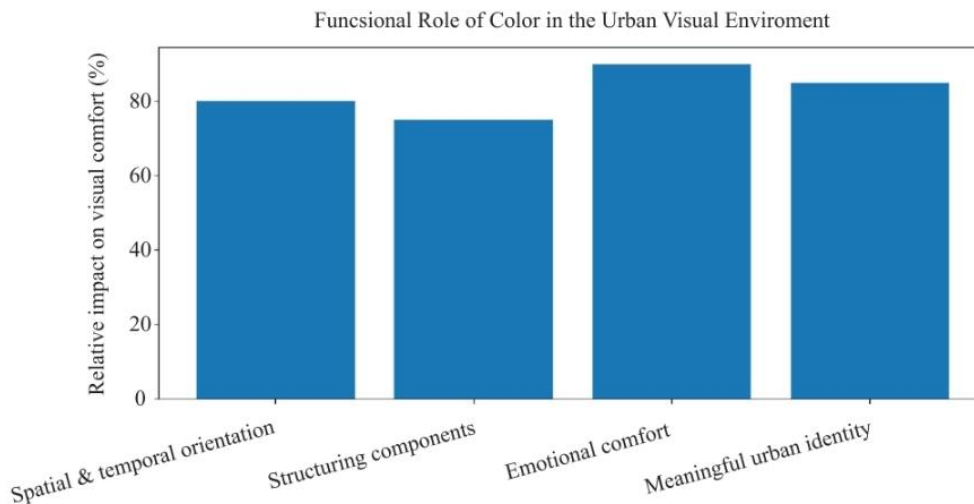


Fig 11. Functional role of color in the urban visual environment.

Fig. 11 illustrates the functional significance of color in shaping the urban visual environment. The results show that color plays a particularly strong role in creating emotional and psychophysiological comfort, followed by its contribution to forming a meaningful and recognizable urban identity. Color plays a significant role in facilitating both spatial and temporal orientation within the urban environment. Through contrasts, tonal differentiation, and coordinated palettes, it helps individuals

recognize zones, identify pathways, and distinguish functional areas within complex city structures. In this way, color not only guides movement but also contributes to the organization and visual hierarchy of architectural and environmental elements.

The results of the study indicate that a thoughtfully composed color scheme positively influences visual perception. Harmonious color combinations reduce visual strain, promote perceptual stability, and create a sense of coherence within the urban landscape. Consequently, balanced color design contributes to enhanced visual comfort and supports a higher overall quality of urban space.

Natural vs. Modern Urban Visual Fields

Natural environments—forests, mountain landscapes, rivers, clouded skies—provide the most comfortable visual fields. Retinal photoreceptors, particularly **ON/OFF neural systems**, operate optimally in these conditions. In nature, repetitive images rarely occur; light and shadow continuously change, preventing visual fatigue.

Modern cities, however, generate excessive **homogeneity** (uniform elements) and **aggressive visual fields** (overly repetitive patterns). One effective approach to improving visual comfort is modifying building interiors and façades. Among the simplest and most beneficial interventions is **urban greening**, especially vertical landscaping, which recreates natural visual dynamics.

Educational facilities can enhance their visual environment by applying **artistic murals** to building façades. Unlike temporary banners, murals offer longevity and aesthetic variety. They may depict natural landscapes, famous artworks, or imagery related to children’s narratives, fairy tales, or school subjects—geography, history, literature—thus enriching both emotional and cognitive engagement.

Color Perception and Emotional States

Color has a substantial impact on emotional self-regulation and overall psychological balance. In urban regions with extended winters and reduced daylight—particularly in northern cities—the surrounding color environment can meaningfully shape mood patterns and support (or weaken) emotional resilience. When natural light is limited, chromatic solutions in architecture and public space design become especially influential in sustaining a positive mental state.

Some widely observed emotional associations include:

- **Unfavorable combinations:**

- o Yellow applied over red – often perceived as visually aggressive and disharmonious
- o Brown + gray, brown + red, black + gray, black + yellow → commonly associated with heaviness, sadness, or anxiety

- **Favorable combinations:**

- o Blue on white – typically experienced as balanced and visually comfortable
- o Blue + green → associated with calmness, stability, and confidence
- o Blue + red → linked to energy and enthusiasm, although highly saturated reds may provoke irritation

Thus, maintaining a thoughtful and balanced color scheme is essential not only for aesthetic harmony but also for supporting emotional well-being within the urban environment.

According to **V.F. Petrenko**, the emotional impact of color is explained by **synesthesia mechanisms**, in which stimuli from one sensory modality are interpreted through another (e.g., “velvety voice,” “sharp flavor”). Thus, each color creates a psychological “background,” and color combinations produce emergent meanings that depend on spatial context.

When designing urban spaces, it is crucial to ensure that every colored element integrates harmoniously into the broader environment. Otherwise, visual dissonance may negatively affect the emotional well-being of residents.

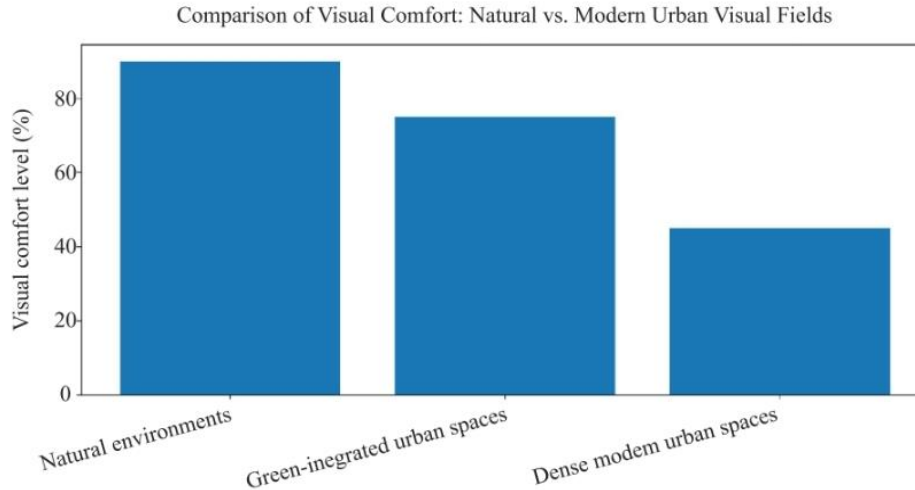


Fig. 12. Comparison of visual comfort in natural and modern urban visual fields (visualization by authors, 2024).

Fig. 12 presents a comparative analysis of visual comfort across natural environments, green-integrated urban spaces, and dense modern urban areas. The results clearly indicate that natural environments provide the highest level of visual comfort. Continuous variation in light, color, texture, and spatial composition supports optimal functioning of retinal ON/OFF neural systems and prevents visual fatigue.

Green-integrated urban spaces demonstrate a moderately high level of visual comfort. The presence of vegetation, vertical landscaping, and natural color palettes partially restores visual dynamics typical of natural settings, reducing perceptual stress within the built environment. In contrast, dense modern urban spaces show the lowest visual comfort levels. Excessive homogeneity, repetitive architectural patterns, and aggressive visual stimuli contribute to sensory overload and disrupt natural eye movement.

The results demonstrate that the visual character of an urban environment largely depends on how effectively natural elements and varied color compositions are integrated into architectural design. The presence of greenery, organic forms, and balanced chromatic schemes contributes to a richer and more harmonious visual field, reducing monotony and enhancing perceptual clarity.

These factors are especially important for children, whose visual and emotional systems are more vulnerable to overstimulation, visual rigidity, or monotonous urban landscapes. Uniform façades, excessive contrast, or harsh color combinations may increase tension and fatigue, whereas diversified, nature-inspired visual environments tend to promote calmness and positive engagement.

Taken together, the findings highlight the necessity of incorporating principles derived from natural visual organization into urban planning practices. Such an approach supports emotional self-regulation, stabilizes perceptual processes, and fosters sustainable psychological comfort within the urban environment over the long term.

4.CONCLUSIONS

The findings align with Gibson's affordance theory, which suggests that an environment presents opportunities based on the perceiver's abilities and experiences. Children's experiences in the city indicate that playgrounds and parks provide positive affordances, enhancing their sense of autonomy and social interaction. Conversely, traffic congestion, pollution, and restricted mobility create negative affordances, limiting their independent exploration.

Four distinct clusters of children's perceptions emerged from the analysis. The "Socially Oriented" group (38%) focused on social interactions in urban spaces, including playgrounds and family outings. The "Nature Lovers" (20%) expressed a preference for green spaces and natural environments. The

"Locally Oriented" group (17%) demonstrated a limited perception of urban life, mostly centered around their immediate surroundings such as home, school, and local stores. The "Young Ecologists" (25%) exhibited strong environmental awareness and advocated for cleaner and greener cities.

Comparing these results with previous studies, Broberg, Kytta, & Fagerholm (2013) emphasized the role of participatory urban planning in child-friendly cities, while Tonucci (2020) argued for integrating children's perspectives into city policies. Jans (2004) further highlighted that children should be recognized as active social agents in shaping urban spaces. The study findings align with these perspectives, reinforcing the need to prioritize children's experiences in urban planning efforts.

Urban living space should be designed not only to satisfy functional human needs but also in accordance with fundamental psychophysiological principles. Architectural and planning solutions must take into account how people perceive, process, and emotionally respond to visual stimuli, ensuring that the urban environment is not merely practical but also emotionally engaging—especially for children, whose sensitivity to visual impressions is heightened.

The findings of the present study contribute to a deeper understanding of how children perceive the city. It was established that young residents of a metropolis tend to evaluate positively those urban objects and spaces that support opportunities for free interaction with peers and meaningful shared experiences with parents. These results are largely consistent with findings reported in international research conducted with adolescents of various age groups and may be interpreted within the broader framework of socio-psychological well-being among urban children. The clearly expressed orientation of the participants toward transforming aspects of the city further reflects their active and subjective stance in relation to the urban environment.

The practical relevance of these outcomes lies in their implications for urban design. Professionals involved in shaping metropolitan living spaces should consider not only adult perspectives but also children's viewpoints and experiential needs. The children who participated in the study demonstrated not only an articulated attitude toward their home city but also distinct differences in their expectations and priorities as metropolitan residents. Recognizing these variations is essential for creating inclusive urban environments that genuinely reflect the interests and well-being of young citizens.

The study demonstrates that children's perception of the city is shaped by their daily interactions with family and public spaces. Environmental factors, such as pollution and traffic, influence their sense of autonomy and well-being. Urban planning strategies should prioritize children's needs and preferences by adopting inclusive and participatory approaches.

To create child-friendly cities, policymakers should consider several key recommendations. First, urban planning initiatives should actively involve children through participatory design workshops in schools and local communities. Second, the number of safe, accessible parks and pedestrian-friendly zones should be increased to provide children with safe spaces for exploration and play. Third, child-friendly traffic control measures should be implemented to enhance safety, including designated pedestrian crossings and reduced-speed zones near schools. Fourth, educational programs should be introduced to teach children urban navigation skills, fostering independence and confidence in urban environments. Finally, comparative studies across different cultural contexts should be encouraged to expand the generalizability of these findings and refine urban design strategies accordingly.

When creating an urban environment, it is important to take into account not only socio-economic indicators, but also socio-psychological ones. First of all, any settlement should be organized in such a way that there is an opportunity to meet human needs. For example, the need for a comfortable, beautiful and functional environment is the heterogeneity of environmental elements (fountains, small architecture, roads, convenient crossings, functional diversity of buildings, etc.). The opportunity to communicate with friends, relatives, colleagues – these are squares, benches, i.e. places for communication, etc.

To create the most comfortable visual environment in the city, it is necessary to adhere to a number of recommendations:

- careful attitude towards historically valuable architectural objects, preservation of the compositional design of facades;
- improvement of the territory of the historical center: small architectural forms, orderly landscaping, pedestrian path coverings of different colors and textures;
- taking into account the requirements of video-ecology when designing new facilities, namely:

- refusal of high-rise construction in the territory of the historical center, since low-rise buildings create a more comfortable visual environment than multi-storeyed buildings;
- the use of various spatial structures that give variety and modernity to the visual environment, forming expressive silhouettes;
- creating tiered compositions;
- creating a harmonious combination of colors of old and new buildings.

An important element of the visual urban space is the color design of the city, the work states that when using color combinations, one color becomes dominant and carries the main emotional load. When designing urban space, it is important to take into account and rely on psychophysiological and psychological parameters, and not just economic indicators.

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