Research on the Landscape of Urban Leftover Sport Spaces under Perceptual Cognition and Interaction

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Abstract
This paper is based on the research of urban residual sports landscape, combining the research results of sports landscape, taking the sports cognitive interaction as the entry point, and taking the actor as the research object. It explores the cognition of the actors in the urban sports space. The research is motivated by exploring the relationship between the landscape and user cognitive interactions in urban residual sport spaces, aiming to understand the behaviour and perceptions of urban dwellers through understanding their behaviour and perceptions in sport spaces. The potential contribution of this research is to provide a methodology for optimising urban sport spaces through interactive landscape design, thereby enhancing user experience and satisfaction. This will not only help to improve the efficiency of utilising the remaining urban movement space, but also provide new theoretical and practical guidance for urban planning and landscape design.

Keywords: Perceptual Cognition, Sports Space, Interactive Landscape, Behavioral Psychology

Theoretical Interaction between Urban Sports and Landscape
Interactive Landscape in Urban Sports Spaces
"Interactive landscape research" refers to the process in which researchers use interactive research concepts to create landscapes that can communicate and interact with people. This research is guided by the needs and goals of visitors, and researchers stimulate participants to provide feedback by enhancing the landscape's output information. This feedback is manifested in participants' cognitive, behavioral, or emotional responses, thus optimizing the landscape information loop.

This study uses the users of urban Leftover Sport Spaces as the subjects, with urban residents as the behavior subjects. By understanding the exercise habits of urban residents, it establishes basic principles for the landscape research of urban sports spaces under the principles of interactive landscape research, thereby realizing the landscape of urban sports spaces. The landscape feedback from urban sports spaces then influences their users. Interactive landscape research involves a cyclic transmission and feedback process of information among participants, researchers, and urban landscapes, characterized by the
coexistence of instantaneous and delayed information transmission. To apply interactive landscape research comprehensively, it is necessary to analyze it with a perspective of continuous development.

Perceptual Interaction in Sports Space Landscape
Research on landscape from the perceptual interaction level emphasizes the experiential significance of the landscape, focusing on its form, color, space, etc. In sports space landscape research, creating a good environment is undoubtedly a driving force for urban residents' perception. Good perceptual cognition is a way for participants to experience sports spaces. Whether from visual, auditory, olfactory, gustatory, or tactile senses, the initial impression of perceptual interaction landscapes is crucial. This initial impression consists of knowledge, feeling, and experience, where the sensation in the perceptual layer is intuitive and enters the mind. Common needs for sports projects should be considered, and users' demands for these projects should be strengthened. American cognitive psychologist Bruner described the process by which humans perceive and convert external objects or events into internal psychological events as cognitive representation and impression. The cognitive characteristics of space impressions affect the psychological process of environmental information feedback in the visual field. The impression of landscaped sports spaces on campuses is the overall landscape impression of sports venues, which maximizes users' desire, fulfilling the functional role of sports spaces. Landscaping of sports spaces significantly enhances this impression. In the emerging field of sports architecture sociology abroad, the impression of sports spaces has entered the research field, becoming a way to evaluate the facilities and usage experiences of sports spaces, thereby enhancing the impression and providing users with a better experience.

Behavioral Interaction in Sports Space Landscape
Behavioral interaction landscape research emphasizes the value of landscape participation, focusing on its function, flexibility, and interest. In sports space landscape research, the functionality of sports equipment is the fundamental basis for realizing the value of sports spaces. The behavioral interaction level adapts the perception of sports spaces to the corresponding landscape. In other words, the interaction methods and content of the sports space landscape should adapt to participants' sports experiences. Enhancing users' sustained enjoyment through landscape perception can increase exercise duration and induce repetitive behaviors. Suitable sports landscape environments can encourage spontaneous exercise behavior. This is linked to people's needs for leisure and entertainment, fulfilling different groups' material and spiritual needs, which is the true meaning of leisure sports environments. Good material conditions can stimulate social activities in sports spaces. Therefore, leisure sports environments should meet people's material and spiritual needs, guiding them to engage in leisure sports activities. Good leisure sports environments should have public facilities such as sports fields, equipment, and amenities, which have clear leisure sports guiding characteristics. People react logically to such environmental stimuli, leading to the occurrence of leisure sports behaviors. On the functional level of sports space landscapes, it is essential to create more behavioral possibilities and corresponding supporting measures. Single spaces should have multiple uses, and multi-space collaborations should create multifunctional environments, which is a
basic trend in urban sports space development. Elastic, multi-level protective systems contain various extendable elements and multifunctional elastic combinations of sports spaces and projects. General elements losing function due to weather do not affect the overall operation of sports spaces. The interest in sports spaces can be effectively addressed through multi-space collaborative multifunctional construction. The key focus should be on increasing the frequency of sports interactions, which should be considered in sports space planning and landscape research. The results of the study contribute to a better understanding of the behaviour and perception of urban residents in movement spaces and provide data support for future urban movement space design.

**Emotional Interaction in Sports Space Landscape**

Emotional interaction landscape research emphasizes the initial impression of the sports space theme, focusing on the overall landscape imagery of different sports spaces. Elements of sports characteristics should be prioritized in emotional interaction research. For example, the basketball court's sports characteristics include passion and vigor, so the landscape should feature tall trees and diverse plants with bold color contrasts. On the other hand, table tennis or badminton courts have different characteristics, interacting emotionally with participants. The principles of interactive landscape design proposed in the study will help create more attractive and functional urban movement spaces that promote the physical and mental health of residents.

Emotion resonance is built on perceptual awareness and behavioral experience. Participants seek to break the barriers between themselves and the landscape, achieving emotional resonance. Therefore, sports space landscape research should focus on the users' refined emotional needs and ensure that these needs match the users' multi-level psychological perceptions. This involves a three-step process: "experience needs," "seek needs," and "resulting landscape." By creating immersive experiences, situational exchanges, and humane care, the outcome is a rational and emotional interaction. Researchers analyze rational data and use these results to control variables. The essence of "human-landscape interaction" is to establish rational and objective cognition, helping participants gain comprehensive landscape perception rather than short-term interest and stimulation.

Researchers should control variables effectively, using spatial atmosphere to create sports landscape scenarios, bringing the landscape emotionally closer to users, and enhancing the perception of the landscape's existence. In face of uniform urban sports spaces, constructing differentiated emotional sports spaces based on varying emotional needs enriches the functionality of sports spaces, changes emotional monotony, and achieves multiple emotional interactions between people and landscapes.

**Urban Sports Landscape and Sports Psychology Theory**

Sports psychology is a field with a long history, with the earliest research on sports psychological skill training conducted by Jacobson in 1929. The cognitive psychology school, which emerged in the 1960s and 1970s, has become a major trend in Western psychology, emphasizing the integration of information processing to study human psychological processes. This has positively impacted the development of artificial intelligence and the modernization of psychology. In China, the Sports Psychology Professional Committee of the Chinese Society of Sports Science was established in 1980. Since the 1990s, research fields have expanded, and sports psychology research in China rapidly developed around the Athens
Olympics in 2004, peaking around the Beijing Olympics in 2008. Research has gradually expanded from single competitive sports to various sports fields, becoming more popular among the general public, with a focus on school sports and public fitness. The main task of sports psychology is to study the psychological processes of people participating in sports, such as sensation, perception, imagery, thinking, memory, emotion, mood, and will, and their roles and significance in sports. It also examines the characteristics of personality, ability, and temperament in various sports and the impact of sports on these traits. This paper focuses on the subconscious level of sports psychology, including thinking, emotion, memory, and will. In sports psychology, sports thinking is one of the key factors influencing sports performance. Combining the meaning of sports training science, it is also believed that "sports thinking training refers to learning technical movements and tactical patterns in thinking. It mainly involves mastering the rules of technical and tactical movements, rather than the image of movements or the process of technical activities. It reduces the amount of actual technical practice, improves sports performance and physical activation levels, and is often widely used as a supplement to practical training."

For the research on sports space environments, it is necessary to meet both physiological and psychological and usage requirements of people. Therefore, a good sports space environment provides mutually beneficial psychological interaction, making the sports space landscape qualified. The interaction between people and the environment mainly manifests in two aspects: people's perception of the environment and the environment's demand by people. This interaction often directly affects people's psychological activities, and the external manifestation of psychological activities is the behavior of people in the environment. Thus, the shaping of the environment's impact on psychological states is paramount. When people are in a recreational sports environment, the external material environment often stimulates associations with things and feelings related to recreational sports, influencing their psychological activities and states. People primarily gain their first psychological feelings through participation in recreational sports and their second psychological feelings through associations with different scenes and people. Due to individual differences, everyone has different understandings and feelings about the environment, which are results of their psychological functioning. Although there are differences in individual feelings, the tone of the feelings is derived from the inherent external environment, and the nature of the same environment varies. In the landscape environment of sports spaces, it is important to respect the psychology of those participating in the environment and, on this basis, enable them to achieve a superior psychological state.

**Cognitive Interaction in Sports Space Landscape**

In sports space landscapes, creating good sports scenarios for enthusiasts can lead to better sports thinking and higher performance levels. Research shows that verbal cues can promote sports performance. To effectively recall sports movements, each new action should be associated with a verbal cue. Based on this view, Shea's 1977 experiment had participants associate different verbal cues with different curve movements. Shea hypothesized that if verbal cues provided reliable information related to the endpoint position, these verbal cues would enhance the ability to accurately reproduce movement positions. McPherson (1993) emphasized studying athletes' knowledge representation, noting that conceptual knowledge in problem-solving is particularly necessary because perceptual pattern recognition cannot adequately explain the response choices of athletes with certain
sports levels. Jones (1993) also believed that as sports skill levels increase, the influence of general factors gradually decreases, while the importance of knowledge related to sports tasks becomes increasingly prominent. This indicates that a lack of sports knowledge limits the quality of sports thinking, and the close connection between sports thinking and sports knowledge is one of the important characteristics that distinguish sports thinking from other thinking activities. This explains the cultural atmosphere of sports space landscapes. Rich verbal warning landscapes should be used in sports spaces. A sports verbal warning landscape should function dynamically, with unique identification characteristics enhancing the sports atmosphere. Motivational verbal warnings enhance the sense of competition and confidence, benefiting emotional experiences, elevating behavioral cognition, and enhancing the value of sports cultural identity. A sports verbal warning landscape should function statically in resting areas, providing good reminders with technical warnings and humorous language. This enhances memory of sports levels and improves the atmosphere of sports communication, increasing participants' interest in sports. The sports verbal warning landscape generally has three usage scenarios: First, when participants initially arrive at the sports field, waiting or watching in the resting area, and changing equipment, the verbal warning landscape helps review sports level memories and reinforces skills. Second, during sports breaks, in the resting area, the verbal warning landscape stimulates the fighting spirit, extending the duration of sports activities. Third, after sports, in the resting area, while resting or changing equipment, the verbal warning landscape enhances the sports experience and increases the frequency of participation.

Emotional Interaction in Sports Space Landscape
In sports space landscapes, creating good sports emotions for enthusiasts leads to better sports experiences. Michel (2002) studied decision-making in sports, highlighting the impact of emotions on sports decisions. Thomas (1999) studied the relationship between emotions and competitive levels, showing a significant correlation between emotion and attention control ($r=0.41$, $p<0.001$), further indicating that good emotions are important regulatory variables for improving competitive levels. Changiz (2009) also pointed out that emotions play an important regulatory role between intention and behavior. In his study on the relationship between sports cognition, emotion, and competitive levels, Chinese scholar Zhu Zixin pointed out that confidence significantly impacts competitive performance, predicting the importance of confidence in competition performance. Personal failure anxiety directly affects competitive levels and has a highly negative effect. Related research confirms that comfortable environments and favorable situations influence athletes' emotions, behaviors, and cognition, which in turn affect the sources and levels of confidence, also impacting athletes' less changeable characteristics.

The functional nature of sports space landscapes inherently helps alleviate sports emotions, reducing emotional anxiety through the resilient vitality of plants and positive motivational language landscapes that enhance participants' confidence. Sports space landscapes should have environments with suitable temperature and humidity, complemented by certain water landscape elements, which help create a small climate in the sports landscape area, providing environmental stability. Water landscape elements enhance vitality and increase liveliness, providing vivid and rich psychological feelings. Affinity landscape perceptions in sports spaces eliminate loneliness, offering a warm sense of belonging and finding self-worth and meaning.
Favorable situational sports space landscapes should have enclosed forms, providing wind stability and enhancing oxygen quality while blocking noise interference, ensuring participants feel relaxed, happy, and free psychologically.

**Nature Admiration Interaction in Sports Space Landscape**

Urban sports space landscapes, aimed at young people who love life and freedom, are rooted in urban positioning. As young people's desire for nature grows, integrating plants into space landscapes has a long history. Plants are a natural gift, providing comfort and optimizing modern landscape research for better suitability. This desire for nature relates to humanity's inherent need for belonging, driven by an internal yearning for a close connection with the natural environment. Psychological studies show that humans fear loneliness and crave warmth and security. Interaction with the environment in sports spaces can fulfill this psychological need, leading to a sense of belonging.

To achieve a natural garden-like urban sports space, the plants in the sports landscape should be arranged artistically based on the psychological feelings of participants, fulfilling the functional requirements of garden naturalization. This involves using plant materials like canopy width, density, and height to form different interfaces, creating enclosed, divided, or transitional spaces. The plant nature of sports landscapes should reasonably use base surfaces, vertical segmentation surfaces, and covering surfaces to form open, enclosed, covered, or vertical sports spaces. Sports plant spaces have ecological attributes and relative seasonal changes, enriching the connotation of sports spaces to some extent, making urban landscapes more aligned with the naturalization of sports psychology.

Using vibrant plant materials, colors, postures, and scents at different levels influences people's natural admiration feelings. Plants' positions should meet psychological needs. The scent of plants is a charming element in sports landscapes, with different sports landscapes having different plant scents, maintaining a suitable distance from the sports space, increasing the attraction of naturalized spaces. Planting seasonal fragrant plants matching sports projects can create a fragrant environment. For example, planting fragrant plants at the entrance of sports landscapes, with the scent drawing attention while maintaining distance from the main sports area, ensures a good mood for sports. Using mildly scented plants near benches provides a pleasant resting and communication time. The most overlooked aspect of sports landscapes is the natural sounds that meet psychological needs, such as bird songs, cicada calls, trickling springs, babbling brooks, and rustling leaves. These natural sounds offer incomparable auditory comfort, and for participants in sports landscapes, they relax the body and mind, providing joyful emotions and enhancing meditation. (Limited to urban spaces, simulated in virtual scenes.

**Social Interaction Needs in Sports Space Landscape**

Urban sports space landscapes should create spaces for social interaction, offering opportunities for communication. Ryan (2018) "Plural urbanism embraces the diversity of urban forms and practices, advocating for a city that accommodates a multitude of uses and experiences." Urban youth are in the initial stage of exploring external things and should have open attitudes to meet the needs of this stage. Young people usually prefer to gather in small groups for common sports, forming "small group ecology." If conditions allow, urban sports spaces should have interactive areas for simultaneous participation and communication. Research concludes that informal communication is less effective than secondary
communication, and young people in cities prefer "coincidental fates" rather than "results" from valuable formal communication. Common sports interests provide broader opportunities for communication, and urban sports spaces provide good landscape environments for social interaction, making the natural scenery more beautiful and relaxing for people.

In urban surplus sports space landscapes, Talen (2012) "Urban regulations profoundly influence the physical character and livability of cities, shaping everything from building heights to public spaces." how to maximize social interaction needs rather than just surface-level greetings is crucial. Applying the psychology of social interaction needs to urban sports spaces allows unfamiliar individuals to have deeper exchanges. Social interaction spaces must first be based on common sports interests, and the arrangement of locations and seating is crucial. Generally, when providing resting seats, strangers are unlikely to sit in the same area and tend to choose empty spots or relatively distant places, indirectly reducing potential communication. Familiar friends, on the other hand, desire deep and intimate communication and prefer large, intimate social interaction spaces, even at a "cost," fulfilling each other's deep psychological needs for mutual psychological satisfaction.

It is noteworthy that when people are in sports spaces, their physical and psychological states are relaxed, making it easy to bring people closer together, creating a time conducive to communication and interaction, generating topics for discussion.

Based on the psychological needs for social interaction in urban sports spaces, interactive resting spaces should be relatively independent, combining closeness and distance to meet the needs of unfamiliar individuals who desire social interaction. This reduces the inner barriers and fosters social interaction. In areas further from the sports space, the interactive resting spaces should cater to those who are relatively familiar and seek deep interaction. These areas should be open, sunny, and green, with diverse layers of trees, shrubs, and stone elements, creating an elegant and comfortable atmosphere, bringing people closer together.

This study explores the landscape of urban Leftover Sport Spaces through the lens of perceptual cognition and interaction. It emphasizes the importance of integrating cognitive, behavioral, emotional, and natural admiration interactions to create landscapes that resonate with users' psychological and emotional needs, thereby enhancing the overall experience and promoting sustained engagement in physical activities.

Interactive landscape research involves creating spaces that communicate and interact with people, guided by visitors' needs and goals. This research highlights the cyclic process of information transmission and feedback among participants, researchers, and urban landscapes, optimizing landscape information loops and enhancing the users' experience. Perceptual interaction in sports space landscapes focuses on the experiential significance of landscape form, color, and space, emphasizing the importance of initial impressions in attracting urban residents and enhancing their participation in sports.

Behavioral interaction highlights the value of landscape participation, focusing on functionality, flexibility, and interest. Good sports space environments can stimulate spontaneous exercise behavior and social activities, fulfilling different groups' material and spiritual needs. Emotional interaction emphasizes creating strong initial impressions through landscape imagery, tailored to the unique characteristics of different sports. This approach fosters emotional resonance, breaking barriers between participants and the landscape, and enhancing psychological satisfaction.
Sports psychology's integration into landscape design addresses both physiological and psychological needs, ensuring that environments provide mutually beneficial psychological interactions. The study underscores the role of cognitive and emotional interactions in sports spaces, demonstrating how verbal cues and motivational landscapes can improve sports performance and emotional states. Nature admiration interaction appeals to the inherent human desire for connection with nature, using vibrant plant materials and natural sounds to create comfortable and engaging environments. These elements help reduce loneliness and foster a sense of belonging, crucial for sustained engagement in sports activities. Finally, social interaction needs in sports space landscapes highlight the importance of creating spaces that facilitate meaningful communication and interaction among users. By carefully designing interactive areas and considering the psychological needs of different user groups, urban sports spaces can enhance social connections and provide a more fulfilling sports experience. This study provides valuable insights into the design of urban sports spaces, emphasizing the need for a holistic approach that integrates cognitive, behavioral, emotional, and natural elements to create engaging and sustainable environments for physical activity.

References