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Strategies in Children'S Outdoor Playgrounds: a  
Case Study of Archie Nature-Friendly Park

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# STUDY ON THE LIGHT AND SHADOW NARRATIVE STRATEGIES IN CHILDREN'S OUTDOOR PLAYGROUNDS: A CASE STUDY OF ARCHIE NATURE-FRIENDLY PARK

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## ABSTRACT

With the advent of the digital age, the problem of children's nature deficit disorder is becoming more and more serious, and the distance between children and nature is increasing. In the era of stock, the acceleration of urbanization, children's outdoor space is also being compressed, and the proportion of space designed from children's point of view in urban construction and landscape design is very small. In such a background, how to create a fun and educational outdoor space for children to play at night in the limited outdoor space has become a problem to be solved at present. As a new design technique, light and shadow narrative provides new ideas for the design of children's outdoor amusement parks. In this paper, we will take Achille's Nature Friendly Amusement Park as an example to explore the light and shadow narrative strategy of children's outdoor amusement parks. The main object of the research is children aged 1-14 years old, through the in-depth study of children's behavior and psychological laws, to understand their needs and preferences in the outdoor light environment. By combining theory and practice, the study organically integrates the artistic expression of children's theatrical lighting, the professional skills of outdoor light environment design, as well as the cutting-edge research results of children's literary narrative theory and the innovative concept of spatial narrative into the theoretical framework of light and shadow narration, providing comprehensive theoretical guidance for the construction of creative and attractive light and shadow narration for children's outdoor amusement parks. The study innovatively proposes to use the method of "service design" to visualize the fluency of narrative and emotion through user journey maps, in order to evaluate and adjust the light and shadow narrative strategy. The aim of the study is to construct outdoor light and shadow narrative playgrounds that fit children's perspectives, promote the construction of child-friendly cities, and enrich the diversity of children's outdoor activities.

Keywords: Children's amusement park, spatial narrative, light environment design, design strategy

## 1. INTRODUCTION

The digital age has led to a widespread deficiency in children's exposure to natural environments, compounded by the compression of available outdoor spaces and the lack of child-centric perspectives in nighttime urban planning[1]. Consequently, children tend to engage in static indoor activities, resulting in insufficient outdoor activity. Addressing the quality and upgrading urban nighttime outdoor spaces for children has thus become a critical task. Incorporating children's perspectives into the design of nighttime activities can meet their developmental needs, expand their activity range, and enhance their sense of participation and belonging in urban life. This approach provides a significant opportunity to meticulously reshape the built environment and meet the spatial development needs of children.

The design research is dedicated to exploring the light and shadow narrative design strategy of children's amusement parks under the threshold of children's vision. Based on the disciplinary context of light environment design, with "light and shadow narrative" as the core, starting from children's visual behavior and psychological cognitive needs, combining children's light environment theory research and children's spatial narrative design of the two fields of the latest research theories and results as a guide, put forward based on the children's point of view of outdoor amusement parks light and shadow narrative The study proposes a spatial design strategy based on children's perspectives of light and shadow narratives.

## 2. RESEARCH SUBJECT

### 2.1 Research target

Different societies and cultures have different conceptualizations of the child. The United Nations Convention on the Rights of the Child clearly defines the concept of a child: "A child means every human being below the age of eighteen years unless under the law applicable to the child, majority is attained earlier." [2] In Chinese society, it is considered that adolescents over the age of 14 are physically and mentally mature, and it is customary to refer to those under the age of 14 as children. Given that this study focuses on the specific environment of children's amusement parks, this paper defines the age of the children under study as 1-14 years old.

### 2.2 Research space

The spatial environment of interest in this study is the unpowered children's park, unpowered facilities are non-electric, hydraulically-driven or pneumatically-driven by any and other power devices, such as slides, climbing frames, swings, teeter-totters, and other multi-functional components and structures, fasteners, and connecting parts of the composition [3]. An unpowered children's park is an open park with multiple unpowered play equipment forming the core.

## 3. SITE RESEARCH AND DESIGN CONCEPTUALIZATION

### 3.1 Site status survey

The Achiree Nature-Friendly Park is located in the southwest part of Longtan Zhonghu in Dongcheng District, Beijing (Figure 1). It is bordered by the General Administration of Sport of China to the north, Temple of Heaven Park to the west, and a moat to the east and south.

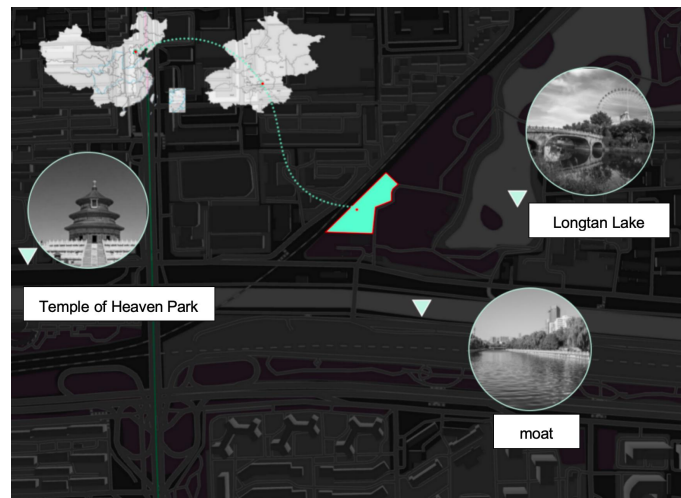


Figure 1. Project location diagram

Achiree Nature-Friendly Park spans an area of 14,000 square meters and is specifically designed for children. The park is divided into four main areas: the Fun Zone for sensory exploration primarily aimed at children aged 3-6, the Expansion Zone for physical activities aimed at children aged 6-9, the Comprehensive Zone centered around a theater and supporting services, and the Garden Zone focused on sensory and planting experiences. While catering to children's growth preferences, the park also accommodates people of all ages.

Currently, Achiree Nature-Friendly Park operates mainly during the day and lacks nighttime activities, with only a few basic lights available at night (Figures 2-4). The current lighting in the park presents several issues:

- (1) Lack of nighttime activities and insufficient lighting fixtures.
- (2) Limited variety of lighting in the children's playground.
- (3) Aging facilities pose safety hazards.

## (4) Uneven distribution of lighting fixtures.



Figures 2-4. Lighting conditions at 7 PM closing time

### 3.2 Design Concept and Ideas

This design targets children as the primary users, emphasizing principles such as safety, cognitive appropriateness, narrative coherence, spatial readability, diversity and inclusiveness, and cognitive stimulation. The overarching theme, "Growth," has been selected to enhance the nighttime appeal of the playground. This theme aims to provide children with an engaging and culturally rich outdoor nighttime experience, transforming the playground into a light and shadow narrative environment.

### 3.3 Construction of Light and Shadow Narrative Themes

Given the spatial particularities of an outdoor children's playground, which primarily serves children aged 1-14, it is essential to understand their cognitive patterns and narrative comprehension abilities. This analysis ensures the narrative design is appropriately positioned to convey positive and educational content. The design must consider the developmental stages of children, incorporating elements that are both engaging and educational, thereby fostering a positive learning environment through the medium of light and shadow.

#### 3.3.1 Overview of the Narrative Text

The selected narrative text is "The Wonderful Adventures of Nils" by Selma Lagerlöf, [4] the first female Nobel Prize in Literature laureate, published in 1906. This magical realism story, written as a geography textbook for children, narrates the adventures of a mischievous boy who, after being shrunk by an elf, travels on the back of a goose. Throughout his journey, he explores natural landscapes, learns about geography and culture, and gradually corrects his faults, developing virtues such as learning and progress.

#### 3.3.2 Reasons for text selection

##### (1) Value Orientation

The theme and content construction of the children's outdoor playground can draw from the directions found in children's literature and artistic works. Children's literature needs to possess literary value, popularity, accessibility, dramatic conflict, and themes of natural adventure. During the preliminary design stage, a comprehensive comparison was made among various works such as "The Wizard of Oz," "You Look Yummy," "Alice's Adventures in Wonderland," and Andersen's fairy tales including "The Shadow." "The Wonderful Adventures of Nils" was chosen for its narrative text. After selecting the story, an in-depth exploration of its themes was conducted to find commonalities with the playground's themes.

##### (2) High Compatibility with the Site

When constructing the theme for children's activity spaces, it is crucial to fully analyze the narrative vocabulary of the site and the reading characteristics of children. The site vocabulary and children's needs were comprehensively evaluated and analyzed, culminating in the establishment of a narrative vocabulary database. This approach facilitates the creation of a distinctive nighttime theme from the children's perspective. The environmental descriptions in the text closely match the current state of the site, allowing for minimal changes to the existing environment.

##### (3) Non-Linear Narrative for Flexible Spatial Relationships

The story's lack of a strict causal logic allows for flexible adaptation, enabling visitors to focus on any detail and transition seamlessly. [5] This slice-of-life approach allows visitors to genuinely perceive the story and environment in an immersive manner.[6]

#### 4. DESIGN OF LIGHT AND SHADOW NARRATIVES FOR CHILDREN'S OUTDOOR PLAYGROUNDS

##### 4.1 Analysis and Reconstruction of Narrative Texts

The light and shadow narrative design in children's outdoor playgrounds combines site characteristics, children's perception, and storytelling methods to create an environment rich in educational and entertainment value. Text analysis further enhances the design and experience. By integrating narrative texts with site information, appropriate narrative structures can be selected, decoded, reconstructed, and arranged.

Traditional text analysis methods decompose and reconstruct narrative texts. This process involves breaking down geographical locations, character relationships, scenes, and conflicts, simplifying the plot, and integrating key elements with the site

##### 4.2 Character Analysis and Design

The character design for light and shadow narratives begins with a director's perspective, analyzing character image, personality, role, destiny, and relationships. Based on site conditions, spatial routes, and story nodes, the number of characters is determined, character biographies are written, and designs are created.

The adapted narrative from The Wonderful Adventures of Nils aligns with the site and light-shadow narrative, incorporating an additional "audience" character named Shanshan. This character connects the existing IP of the site with characters from the story, driving the plot forward.

The adapted story, full of magic and adventure, revolves around the quest to find the enchanted friend Nils. During the quest, Shanshan and her companions (child visitors) embark on a challenging and surprising journey. They learn about Nils's plight from his diary and gain strength from interactions with sprites to aid their search. Along the way, they encounter various magical creatures and settings, including a pine forest theater, the light-shadow ball at Venita Castle, a rescue mission at Vixi Falls, and a journey through the digital plant kingdom. By collecting feathers representing bravery, wisdom, joy, unity, and kindness, they eventually find Nils and help free him from the enchantment. The adapted text is transformed into a storyboard (Figure 5.) and character analysis ( Figure 6.), facilitating further light and shadow narrative design for the site.

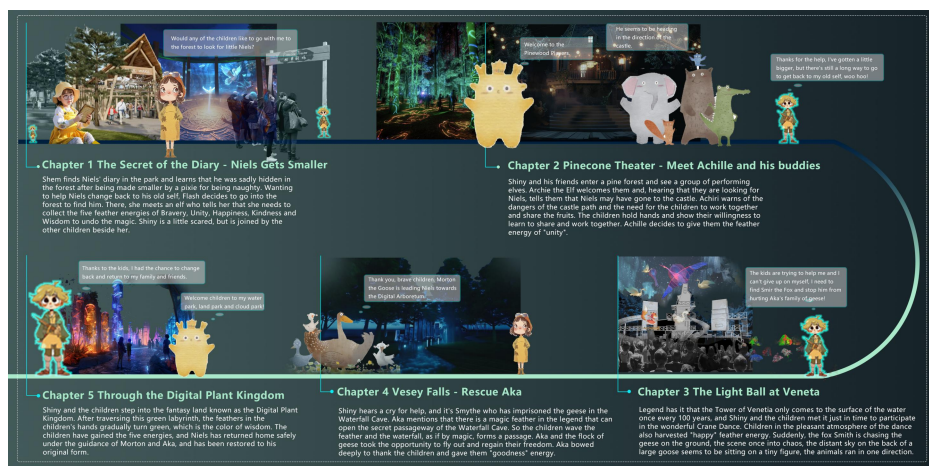


Figure 5. Storyboard

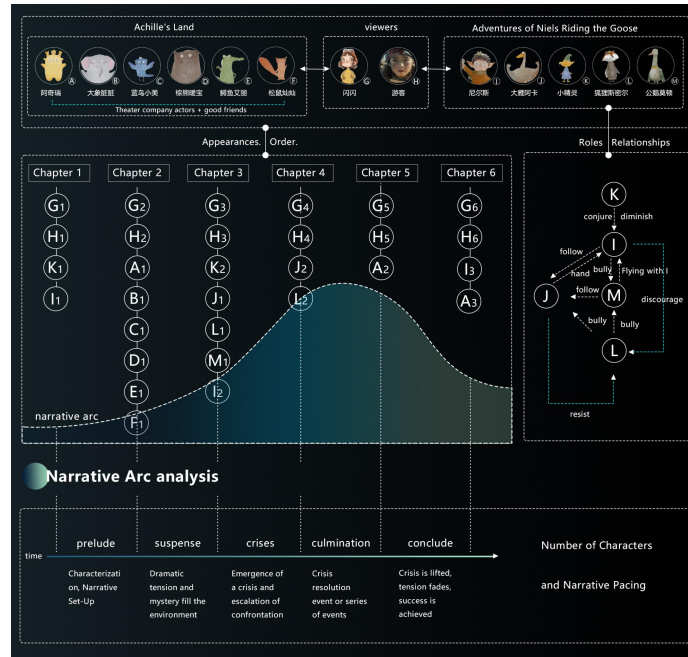


Figure 6. Character Analysis (Source: Author)

### 4.3 Narrative Structure Arrangement

Both Chinese and foreign children's literature aspire to the charm of stories and plots, providing interesting and readable narratives for children. This is a fundamental aesthetic principle adhered to by children's literature creators worldwide. Therefore, in the nighttime design of a children's outdoor playground, stories and scenarios become crucial elements determining the park's attractiveness to children. The arrangement of the plot directly impacts the children's most intuitive experience in the space.[7] The narrative structure for children's spaces can be mainly divided into chronological, flashback, interspersed, and jumping narrative types. This design uses a combination of jumping and chronological narrative modes.

#### (1) Jumping Narrative: Daily Mode

Regarding children's space design, Japanese artist Isamu Noguchi once stated: "A playground is not a place to tell children what to do but a place for endless exploration and countless opportunities to change the form of play." Therefore, in the daily mode, the narrative in space is non-linear, encouraging children's exploration. The design scatters the story throughout the playground, comprising five main stories. Each story is an independent short story: Nils becoming small, meeting the Acir family in the Pinecone Theater, the light-shadow ball at Venita, rescuing Akka at Vixi Falls, and traversing the digital plant garden. These stories are adapted from the original text, and children need to complete tasks in these narrative spaces to gain feather energy.

#### (2) Chronological Narrative: Activity and Celebration Mode

To deepen the children's experience in the narrative space, linear narrative content is incorporated, resembling "environmental theater." Every evening from 8 to 9 PM, there are two 20-minute performances. Children and parents can voluntarily participate, with Shanshan leading visitors from the entrance, explaining how Nils became small and how to help him. Visitors are guided through narrative spaces to complete corresponding tasks, forming a complete loop where Nils, portrayed by an actor, thanks each visitor at the exit. During this time, children and parents can choose to join or leave the narrative at any point.

### 4.4 Construction of Light and Shadow Narrative Space

Light and shadow narrative scenes can be categorized into three levels: structural mimicry, semiotic simulation, and semantic inclination. Using specific narrative techniques, children can more intuitively experience and understand the various information in the environment.

#### 4.4.1 Basic light environment design



(1) Lighting Layout

For nighttime activities, the primary function of lighting is essential. Improving the quality of public space lighting environments is necessary to ensure visual comfort and novelty. Therefore, it is crucial to meet the basic functional lighting needs of the children's playground (Figures 7-9). The narrative design should focus on the connection between space and human activities, not only fulfilling functional requirements but also inspiring and accommodating specific events and activities. Elements related to the narrative within the space should convey the story and theme and be appropriately highlighted.

(2) Lighting Selection

Visual comfort is a critical principle in designing children's spaces. Besides selecting lighting products with good glare protection, it is essential to ensure no flicker, uniform illuminance distribution, and avoidance of direct dazzling glare. To better cater to children's vision needs and emotional states, lighting should ideally feature dimming controls to adjust brightness levels flexibly, creating a comfortable and healthy visual environment. Additionally, lighting fixtures should be chosen according to relevant standards for children's outdoor lighting, considering long-term energy efficiency and environmental protection.



Figure 7-9. False Color Map

**4.4.2 Spatial Layout of Light Environment Design**

The light and shadow are divided into four spatial languages (Figure 10): basic lighting areas presenting the site's original appearance, special light environment areas offering a different perception from daytime, interactive light environment areas where visitors immediately participate in the narrative, and narrative light environment areas immersing visitors in the story. Interaction and experience are key to completing the narrative.



Figure 10. Light and Shadow Space Analysis Map

**4.5 Landscape Node Design**

**4.5.1 Light and Shadow Narrative Node One: Entrance Lawn**

There are five main narrative nodes. The entrance lawn (Figure 11) attracts visitors with firefly lights and glowing glass houses. Here, there is no narrative function but an introduction to the park's story content, including themed merchandise sales, storybooks, or related video displays.

At the park entrance (Figure 12), mist and lasers create an enchanting atmosphere. Research shows that dynamic light significantly affects people's evaluations, especially for children who may feel fear, worry, or anxiety in new spaces. Therefore, dynamic light at the entrance can attract children. Additionally, a gauze screen projection plays the story background, helping children better understand the narrative.

Shanshan gives participating children a color-changing feather, which turns blue as they accept the challenge, symbolizing the energy of "bravery."



Figure 11. Entrance lawn rendering

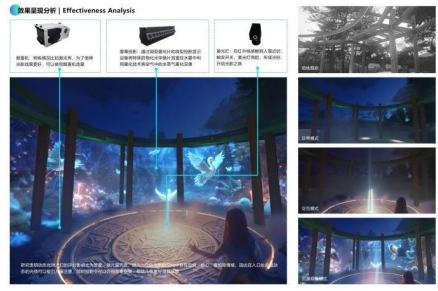


Figure 12. Niles House rendering

#### 4.5.2 Light and Shadow Narrative Node Two: Pinecone Theater Encounter with Acir Theater Troupe

The playground features pine trees as the main plants (Figure 13). To the east of the entrance, a dense pine forest ends with a laser light simulating sunset. Light strips and mushroom lights decorate the trees and ground, creating a magical forest atmosphere.

After crossing the pine forest, a theater appears where children and parents can sit and watch outdoor short plays (Figure 14). The Acir family, the daytime IP characters of the park, perform in the theater. Children and parents can also participate in the performances.

Visitors' feathers turn purple, representing the energy of "unity."

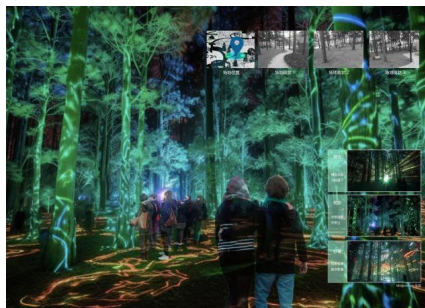


Figure 13. Effectiveness of crossing the pine forest

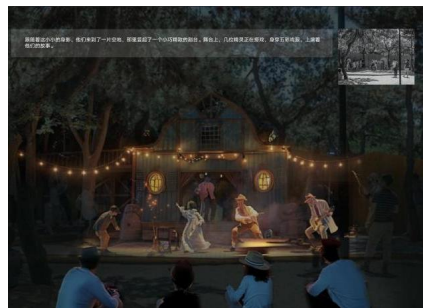


Figure 14. Effectiveness of pine cone theater

#### 4.5.3 Light and Shadow Narrative Node Three: Vinnita Light and Shadow Ball

Within the park, a key node is the "Magic Tower," (Figure 15) where architectural projections and illuminated flying inflatables, combined with cheerful background music, create a festive dance atmosphere. Children and parents can dance and interact together. The feathers in their hands turn yellow, representing the energy of "joy."

#### 4.6.4 Light and Shadow Narrative Node Four: Rescuing Akka at Vixi Waterfall

Using TouchDesign and Kinect components, an interactive electronic display screen is set up. When visitors wave their feathers as instructed, water particles on the screen disperse, and wild geese fly out. (Figure 16)

#### 4.5.5 Light and Shadow Narrative Node Five: Digital Plant Kingdom



During the day, this area serves as a vegetable garden for children's botanical education. At night, the design concept continues with colorful digital cylindrical screens displaying digital plants, providing scientific knowledge and spreading information. (Figure 17)



Figure 15. Vinnita Light and Shadow Ball

Figure 16. Vixi Waterfal

Figure 17. Digital Plant Museum

#### 4.6 Structuring and Optimizing Light and Shadow Narratives

In any complete story, the narrative arc typically follows five stages: exposition, rising action, crisis, climax (resolution of the dilemma), and falling action (denouement). Similarly, in design, it is essential to guide the emotions and excitement of the participants through a natural cycle. Service design methods, such as user journey mapping (Figure 18), can help outline and optimize this process by tracking design touchpoints and the corresponding emotional changes during the experience. This approach allows designers to assess whether the design meets the expectations from the perspective of the visitors.

To ensure the coherence of the light and shadow narrative, theoretical methods from service design can be employed. For instance, in the initial planning stages, user journey maps can be used to test the narrative flow. In light and shadow narratives, touchpoints can be understood as moments when children interact with light and shadow. It is necessary to analyze the user experience at these touchpoints to identify potential issues and areas for improvement.

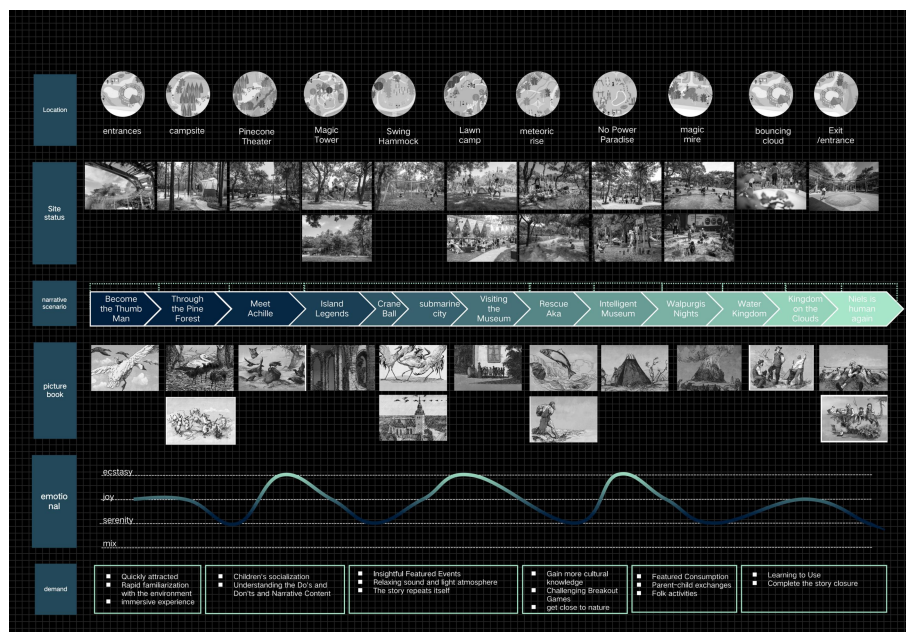


Figure 18. User Journey Map

## 5. CONCLUSION

During the research process, it was found that there are relatively few studies on children's perspectives in outdoor light environments. Therefore, it is hoped that in the future there will be opportunities to continue to conduct light environment related research on children's cognitive psychology and physiological structure.

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