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A Study of the Multisensory Turn in Museums-A Case Study of Teamlab in Japan

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Abstract: *The fields of humanities and social sciences have begun to focus on the study of perception and sensory cultural life, with significant advancements in perception research over the past two decades. Modern museum studies have also gradually initiated a "turn to perception". As an emerging digital art collective, teamLab is renowned for its interactivity, multimedia technology, and immersive experiences. Its exhibition formats are characterized by a multi-sensory approach, aligning closely with the perceptual shift in museums. This paper analyzes specific cases from two art museums in Japan: the indoor exhibition at teamLab Borderless Mori Building Digital Art Museum in Tokyo and the outdoor exhibition at teamLab Botanic Garden in Osaka. It explores how these exhibitions effectively utilize multi-sensory narratives to maximize information transmission and audience engagement. The study finds that the multimedia technologies employed in teamLab's exhibitions not only enrich the expressive capabilities of the artworks but, more importantly, it enhances conceptual transmission and audience immersion through multi-sensory storytelling.*

Keywords: *teamLab; phenomenology; multi-sensory narrative; immersive experience*

1. Introduction

From the 1970s and 1980s to the end of the 20th century, two distinctly different methodological choices emerged in the field of museum studies: object-oriented and community-oriented approaches. The object-oriented methodology has a long history, advocating for research and management of collections, thus emphasizing specific disciplines related to objects. It is believed that possessing training and expertise in thematic disciplines is sufficient to support museum work. At the turn of the 21st century, the object-oriented approach began to reformulate itself, naturally giving rise to a new branch—object-thought-oriented methodology, which, while affirming the importance of museums, recognizes that "we have museums not because of museum objects, but because of the concepts or ideas those objects convey."[1]

As the humanities and social sciences shifted their focus towards the study of sensations and sensory cultural life, research in perception has flourished over the past 20 years. Anthropologists David Howes, Constance Classen, and Anthony Synnott formed the Concordia Sensory Studies Group in 1988, publishing a series of books exploring the diversity of sensory experiences, such as Classen, C. (1998). *The Color of Angels: Cosmology, Gender and the Aesthetic Imagination*. London: Routledge. Classen, Constance (ed.) (2005). *The Book of Touch*. Oxford and New York: Berg. Classen, Constance (2012). Classen, Constance, Howes, David, and Synnott, Anthony. (1994). *Aroma: The Cultural History of Smell*. London: Routledge, among others.

Among these publications related to museums is Classen's *The Book of Touch* (2005), which contains her descriptions of the interactions between audiences and exhibits at the Ashmolean Museum and the British Museum, where visitors touch, pick up, shake, or taste the exhibits.[2] Such tactile, shaking, or tasting experiences integrate visitors' senses of touch, taste, and other sensory inputs.

Multi-sensory narrative can be regarded as a methodological approach in modern museum studies. By employing advanced multimedia technology, audiovisual facilities, and interactive design, it creates a comprehensive sensory experience. This approach emphasizes the phenomenological aspect of exhibitions, wherein visitors are not merely passive observers, but become a part of the phenomenon through their senses, emotions, and interactions during the exhibition process. Such museums create immersive experiences through sound, light, visual effects, and spatial design, allowing visitors not only to see objects but also to feel the complex cultural, historical, and intellectual connotations behind them.

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The importance of multi-sensory experiences in museums lies in their ability to transcend the limitations of traditional object displays, bringing forth entirely new experiential modes through technology and creativity.

TeamLab is an international art collective composed of interdisciplinary experts, including artists, programmers, engineers, CG animators, mathematicians, and architects. [3]The teamLab art museums have long-term or short-term exhibitions in Tokyo and Osaka (Japan), Macau (China), Singapore, Los Angeles (USA), and Jeddah (Saudi Arabia), and their works have been exhibited in cities such as New York, London, Paris, Beijing, Taipei, and Melbourne.[4] In May 2024, I personally visited the teamLab Borderless in Tokyo and the teamLab Botanic Garden in Osaka, where I was deeply captivated by the fluid and transformative artistic environments created by their interactive digital technologies. I also discovered that in some exhibitions, every action taken by the audience directly impacts the content they receive from the exhibition. Therefore, I selected these two museums as typical case studies to explore the perceptual shift in museums.

2. TeamLab in Japan and Multi-Sensory Narrative

Professor Yan Jianqiang of the Archaeology and Museum Studies Departments at Zhejiang University stated when explaining the relationship between art galleries and museums: “In a museum, if we do not provide the necessary interpretations of exhibits, the audience cannot understand their meaning and value. Therefore, the type of single communication process seen in art galleries cannot be achieved. For this reason, museum researchers must first become receivers, as they have professional training and the ability to decode. In fact, museum research work is essentially a decoding process that conceptually separates information from its carrier. The information recorded symbolically that is separated in this way is what we refer to as research outcomes.” [5] From this perspective, the teamLab art museum is not a museum in the strict sense, as it does not display specific items and lacks traditional explanatory labels akin to those found in conventional museums. However, its multimedia technology not only enriches the ways exhibits are expressed but, more importantly, enhances the conceptual transmission of exhibitions and the immersive experience of the audience through multi-sensory narratives. While teamLab does not have professional guides, the scenes presented by its multimedia technology offer various interpretations of the objects. There is no right or wrong interpretation; the focus is on the immersive sensations brought about by the multimedia technology. The construction of each scene contributes to creating an immersive experience, allowing visitors to interact with the exhibits through their sensory experiences, thereby forming personal understandings of the exhibits on visual, auditory, tactile, and other sensory levels.

“Whether in the museum of intangible cultural heritage or in science centers, what truly constitutes the exhibits is not ‘physical objects’ in the traditional sense, but the ‘phenomena’ generated by human cultural behaviors and natural movements.” [6] If we say that these two types of art museums present non-traditional physical objects, as phenomena produced by human cultural actions and natural movements, then the teamLab museum serves as a collection of multi-sensory experiences. Focusing on phenomenon-based exhibitions, teamLab draws audiences into a space filled with symbolic significance and emotional tension through meticulously designed multimedia technologies, transforming them from passive observers into active participants and decoders. This immersive experience allows visitors to deepen their understanding of the concepts and ideas conveyed by the exhibits as they interact with them.

Furthermore, teamLab’s exhibitions embody the importance of a phenomenon-oriented approach. Although there are no traditional expert guides, the concepts and values of the exhibits are thoroughly interpreted and conveyed through advanced multimedia technologies. This method not only breaks the limitations of one-way information transmission found in traditional museums, but also creates a dynamic, multidimensional narrative space where visitors can freely explore and interpret, forming personalized understandings and feelings. This exemplifies the phenomenon-oriented philosophy in modern museum practice, showcasing the unique charm and potential of objects through multimedia technology and interactive experiences.

The following section will specifically analyze the multi-sensory experiences of teamLab exhibitions, thus illustrating its role as a typical case study of the perceptual shift in museums.

(1) Extensive Use of Multimedia Technology

TeamLab exhibitions utilize a wide range of multimedia technologies such as videos, animations, sound effects, and lighting, which create multi-sensory experiences for visitors. For example, in the exhibition *The Way of the Sea: Flying Beyond Borders*, visual effects suddenly present a school of fish

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before the audience. When an individual visitor reaches out to touch the fish, they change to distinct colors specific to each visitor. This interaction allows the audience to feel the depth of the ocean and the uniqueness of marine life through what seems like living fish. This variety of sensory forms using multimedia technology reconstructs and interprets the essence of phenomena. TeamLab employs these technological means to enhance not only the visual and auditory effects of the exhibitions but also to increase interaction and engagement, enabling audiences to experience artworks in a multi-sensory manner.

(2) Immersive Story Environments

TeamLab's exhibitions transport visitors into a new artistic world through carefully designed spatial layouts and storylines. For instance, the concept of the indoor exhibition *Tokyo teamLab Borderless* is that people connect with others through physical movement, thus experiencing a unique sense of time. However, in the human mind, the boundaries between different thoughts may be blurred, leading them to influence and merge with one another. This exhibition consists of a series of art pieces that form a continuous and boundless world, so there is no fixed route or order for viewing. The seamless connection between exhibition halls and dynamically changing artworks creates the sensation of being in a limitless artistic space, where each piece is accompanied by the creator's artistic vision and narrative interpretation, resulting in a highly immersive experience. [7] Similarly, the outdoor exhibition *Osaka teamLab Botanic Garden* is an open-air museum established in a botanical garden that has no walls; by utilizing natural time, the dark night sky provides a natural display environment for the exhibition, enhanced by artificial light and shadow effects. Visitors can even touch the exhibits and interact during their visit, contributing to their personal storytelling.

(3) Reinforcement of the Phenomenon's Core Status

Although teamLab's works are predominantly digital art, their core remains the transmission of concepts and ideas through art. TeamLab's exhibitions are not mere technological showcases but use technological means to enhance the expressiveness of art and its information transmission. By employing digital techniques, TeamLab allows these virtual "phenomena" to possess rich meanings and informational value, establishing profound cognition and resonance in the audience's minds. Whether in the indoor *teamLab Borderless* or the outdoor *teamLab Botanic Garden*, appreciating individual artworks forms the basis for an overall impression of the exhibition. Interpretation of each artwork is also central, which is why we can see photos and videos of the overall exhibition on its official website and mainstream social media platforms like Instagram and YouTube. However, only when present at the exhibition can visitors access the official app named teamLab, where they can view interpretations of the corresponding exhibits, and upon completing their visit, return to the app's homepage to see what artworks they have already viewed (marked by open eyes), what artworks they have yet to see, and which artworks they have collected (as shown in Figure 1). The core status of phenomena is thus reinforced through this operation.

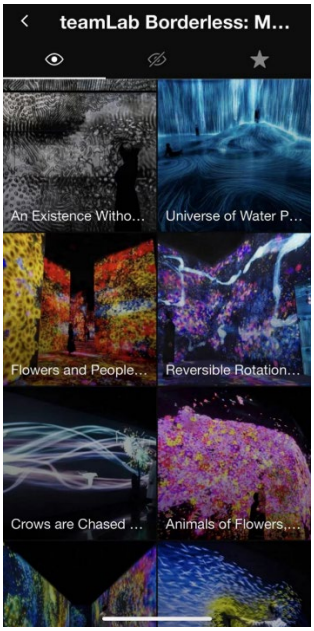

Figure 1: Source from the official teamLab app screenshot

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(4) Audience Participation and Interaction

An important characteristic of phenomenon theaters is the empowerment of the audience to feel immersive and participatory. TeamLab's exhibitions, through interactive technology, make the audience a part of the exhibition. For example, in *teamLab Borderless*, when a person touches certain walls, the images displayed change, thereby involving the person in the narrative. In the teahouse, visitors can purchase a cup of tea, and as the liquid in their container decreases, the shapes of the flowers in the liquid transform. (See Figure 2) In *teamLab Botanic Garden*, individuals can directly touch actual artworks, such as pushing a large bubble-like toy shaped like a roly-poly. (See Figure 3) These interactive installations can change in real-time based on the audience's actions and behaviors, making the audience's participation directly affect the presentation of the artworks. This interactivity not only enhances the audience's sense of involvement but also allows them to gain new understandings and experiences through their interactions with the works. After their visit, attendees receive an email to their ticket-purchasing address, inquiring about their visit experience and inviting feedback and suggestions. Each attentive visitor will have their own personalized experience and expectations. Through this timely feedback and collection of opinions, the teamLab group can continuously improve their existing works and develop new projects, thus enhancing the quality of their exhibitions.

Figure 2 Teahouse in teamLab Borderless (photograph by Zeng Guang)

Figure 3 Teamlab Botanic Garden(photograph by Zeng Guang)

3. The Necessity of Multi-Sensory Narrative:

(1) A Post-Humanist Perspective: When phenomena are imbued with cultural information, they essentially appear as reflections of human civilization. Through a post-humanist lens, phenomena are transformed into memory-bearing information carriers, capable of propelling humanity out of the myth of anthropocentrism. By integrating multimedia, props, and more, phenomena embed objects within their contextual occurrence, allowing the audience to transcend the objects themselves and immerse in the stories that these objects narrate.

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For example, in the work *"Universe of Water Particles on a Rock When People Gather"* (as shown in Figure 4), the exhibition simulates the movement of water flowing over rocks. By calculating the interactions of water particles, the shape of the flow is depicted. When visitors stand on the rock or touch the waterfall, their presence alters the direction and form of the water flow. The changes in the water's flow are real-time responses triggered by audience interaction. This piece perfectly embodies the core idea of multi-sensory narrative, where multimedia technology and interactive means enable the phenomenon to "speak" and tell a story. Here, water and rock become the protagonists of the exhibition, and the audience's participation directly influences the presentation of the phenomenon. According to the interpretations in the app, visitors can also be seen as "rocks". This real-time interaction not only enhances the audience's immersion but also makes them a part of the narrative. Through interaction, the phenomena (water and rock) become information transmitters, and the audience's actions alter the state of the phenomena, reflecting and challenging the fixed meanings posited by post-structuralism. The flow and changes of water symbolize uncertainty and dynamism, reflecting postmodernism's focus on fluidity and diversity. From a post-humanist perspective, phenomena are no longer passive existences but active information carriers and interactive subjects. In this piece, the audience breaks through the limitations of anthropocentrism through their interactions with water and rock, experiencing the dynamic relationship between humans and phenomena. This relationship underscores the impact and responsibility of human behavior on nature, encouraging visitors to reflect on the harmonious coexistence between humanity and the natural world.

Figure 4: Source from the official teamLab app screenshot

Similarly, in the work *"Flowers and People"* (as shown in Figure 5), teamLab creates an environment where flowers interact with humans. When visitors remain still, the surrounding flowers grow more abundantly and bloom; however, when the audience touches or steps on the flowers, they wither and die instantly. Through this striking visual contrast, the artwork conveys the idea of harmonious coexistence between nature and humanity. By using interactive technology and multimedia means, the flowers become carriers of information and the center of the narrative. The audience's actions directly influence the state of the flowers, reinforcing the core status of the phenomenon and the audience's participation. In this process, the audience is not merely an observer but also a participant and changer.

The flowers, as a phenomenon, are imbued with rich cultural information, symbolizing the fragility and beauty of nature. Through audience interaction, the growth and withering of the flowers serve as a mirror of human behavior, reflecting nature's sensitivity to human activities. This mirroring effect prompts visitors to reflect on their actions and their impact on the natural environment. The artwork visually illustrates the interactive relationship between humanity and nature. When visitors remain still, the flowers flourish, symbolizing harmonious coexistence; when they touch or step on the flowers, the flowers wither, representing human destruction of nature. This significant visual contrast not only enhances the expressiveness of the work but also conveys profound environmental awareness and ethical

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reflection.

This piece further expands the post-humanist perspective, emphasizing the significance of the phenomenon (flowers) as an information carrier and interactive subject. Through their interaction with the flowers, the audience experiences the fragility of nature and the consequences of human actions. This experience encourages visitors to reassess humanity's place and role within nature, transcending traditional anthropocentric views.

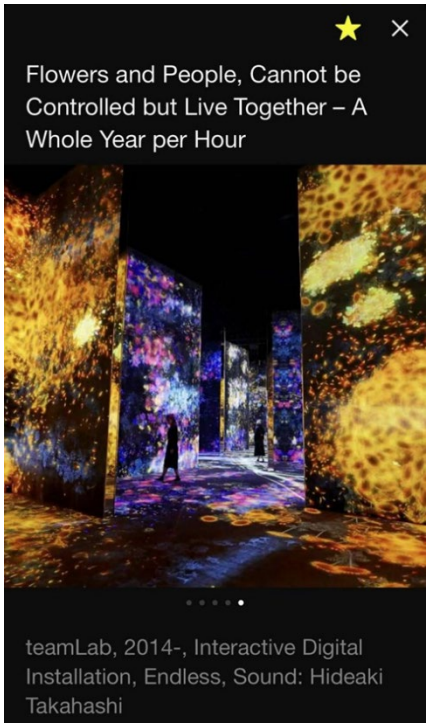

Figure 5: Source from the official teamLab app screenshot

(2) The Possibility of In-Depth Interpretation: This entails telling a story by transcending the material shell through processual phenomena. Humans understand themselves and the world through stories, as narratives contain profound viewpoints and meanings. The presentation of museum spaces has shifted from simple object displays to the shaping of experiences. This requires us to adopt a more inclusive perspective in examining exhibition spaces, considering them as part of a narrative text that achieves isomorphism with storytelling. At the same time, we should maintain a critical awareness of the motives and forces behind the shaping of these spaces.

The multi-sensory narrative of this exhibition possesses the ability to evoke audience memories and connect histories through objects within specific spaces. In this way, audiences achieve deep processing of information through interaction. For example, in the work *Reversible Rotation* (as shown in Figure 6), this piece has a unique characteristic: its rotation direction depends on the viewer's perspective. Whether the audience chooses to view it clockwise or counterclockwise, the artwork visually presents the same rotational effect. This phenomenon evokes an association: no matter from which direction one views it, the piece tells the same story. This is akin to the circular narrative technique in literature, where reading the text from left to right or right to left may yield the same story.

This exhibition expresses the depth, speed, and power of brush strokes by reconstructing calligraphy in three-dimensional space. The artist then flattens these calligraphy elements using what is referred to as "Ultrasubjective Space". This spatial handling results in a unified narrative effect on multiple dimensions, achieving a unique harmony visually and constructing a consistent narrative experience in the audience's mind. Through dynamic and interactive displays, viewers can experience the same story from different angles and positions. This approach transcends the material shell, telling a unified story through processual phenomena (such as rotation and the three-dimensional reconstruction of calligraphy), allowing audiences to understand the deeper meanings of the work from multiple perspectives and layers. The combination of three-dimensional calligraphy and space evokes memories and associations in the audience, connecting to historical culture. Through their interaction with the piece, visitors engage in deep processing of information, experiencing the visual rotational effect as well as the power and beauty of calligraphic art.(See Figure 6: Source from official app screenshot)

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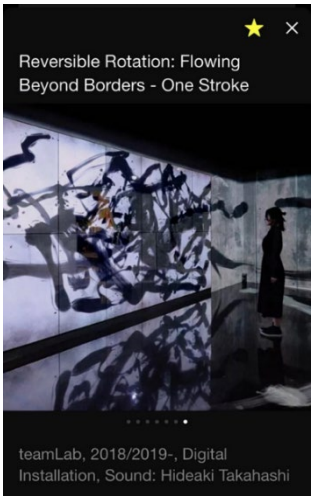

Figure 6: Source from official app screenshot

Work 2: Crows Are Chased and the Chasing Crows Are Destined to Be Chased: Flying Beyond Borders (as shown in Figure 7)

In this piece, crows are depicted by light as flying forms in space, their flight paths creating a form of spatial calligraphy. The crows chase each other and collide while being pursued; after the collisions, they disperse and transform into flowers. The crows attempt to fly around the crowd in space, but when they collide with the audience, they also scatter and become flowers.

This work constructs a symbolically rich narrative through the dynamic processes of the crows' flight and the transformation into flowers. The flight paths of the crows not only visually form flowing spatial calligraphy but also dynamically showcase the fragility and transformation of life. This processual phenomenon allows the audience to understand the deeper meanings of the work through dynamics and interaction.

Using multimedia and interactive means, this piece positions the crows and flowers as the core phenomena of the narrative. The constant chasing and collision of the crows, transforming into flowers, constitutes a circular narrative. Regardless of the angle from which the audience observes or interacts, the transformation between crows and flowers continues, forming an endless narrative loop. In this process, the audience not only witnesses the changes of the crows and flowers but also experiences the cyclical nature of life and nature. The flight path of the crows in space and the blooming of flowers after collisions create a dynamic and dramatic spatial narrative. Through interaction with the crows in this space, the audience experiences the changes of phenomena and the transmission of information. The flight of the crows and the blooming of the flowers are not only visually impactful but also evoke reflections on life, death, and rebirth in the audience's minds. As the audience interacts with the work, they witness the transformation of crows into flowers and are guided to contemplate the fragility of life and the cycles of nature. This experience encourages the audience to maintain a critical awareness of the exhibition space and narrative methods, further enhancing their multi-dimensional experience.(See Figure 7: Source from official app screenshot)

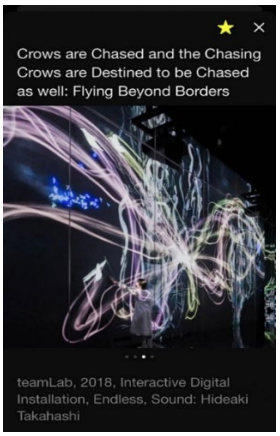

Figure 7: Source from official app screenshot

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(3) The Practice of Gestalt Psychology: Gestalt psychology, also known as figure-ground psychology, is based on the central idea that "the whole is not equal to, but greater than, the sum of its parts." The "whole" possesses characteristics that individual "parts" do not. [8] When we enter a museum, regardless of whether we are aware of it, all our senses begin to perceive everything. Therefore, even if specific parts or details of the exhibition are filled with individuality, what we ultimately gain is a perception that integrates all features. This perception will determine our overall evaluation of the exhibition and whether it resonates with us.

Tokyo's *teamLab Borderless* is a continuous, borderless world composed of multiple artworks. The pieces can move freely from one room to another, interacting and connecting with people while communicating, influencing, and merging with other works. The time concept of these works is similar to that of the human body, allowing people to explore freely, create, and discover new worlds together. Its design philosophy aligns closely with the core ideas of Gestalt psychology. Once the audience enters the exhibition space, they experience a borderless, continuous artistic world through their free movement and comprehensive sensory participation. Whether it is visual, auditory, or tactile, the audience experiences an integrated, holistic perceptual experience. By seamlessly connecting artworks and enabling them to move freely, the exhibition creates a dynamically changing environment, allowing the audience to reinterpret and perceive the artworks in various contexts and situations. This recontextualization not only enhances audience immersion but also amplifies the artworks' expressiveness and emotional impact, fostering a deep resonance between the audience and the works. The interactions and influences between the artworks, as well as the interactions between the audience and the pieces, constitute a dynamic and interwoven whole. This ambiguity and fluidity align with Gestalt psychology's views on the integrative and holistic nature of perception.

By creating a boundary-less, continuous artistic world, this exhibition allows visitors to immerse themselves fully, perceiving and experiencing the charm of art. The perceptual experience within the exhibition is not merely a response to individual works but constitutes a comprehensive evaluation of the entire exhibition space and context. This holistic perception determines the audience's overall assessment and emotional resonance with the exhibition, reflecting the applied value of Gestalt psychology in art exhibitions.

4. Conclusion

Through the analysis of teamLab exhibitions in Japan, we can see the importance and practical value of multi-sensory narratives in modern art exhibitions. By employing multimedia technology, interactive installations, and immersive experiences, teamLab successfully integrates the core role of objects with audience participation, creating a dynamic, continuous, and story-rich exhibition space. This approach achieves recontextualization of objects, enabling the audience to understand and experience artworks from multi-dimensional and multi-sensory perspectives. By incorporating theories such as Gestalt psychology, post-structuralism, and post-humanism into exhibition design, teamLab offers audiences a new and profound art experience, prompting them to gain emotional resonance and cognitive enhancement through interaction. This not only expands the expressive forms of art exhibitions but also provides valuable references and insights for future museum and exhibition design.

This article also has some limitations; for example, the analysis includes images from the official teamLab app, as most of the recordings made on-site were videos that could not be embedded in the article. Many captured images contain other visitors, which could raise issues regarding their portrait rights if published. Additionally, due to the app's settings, the *Tokyo teamLab Borderless* exhibition allows visitors to access the app at the location to view artworks and, after leaving the venue, to check which works they have already seen and which they have not. In contrast, although *Osaka teamLab Botanic Garden* is included in the official app, it may not provide interpretations for works near the visitor's standing position, possibly due to the open space. Consequently, once visitors leave the venue, they cannot access this information. The user manual does not contain details regarding this venue either. Based on the limitations of the materials, the latter part of this article focuses primarily on the *Tokyo teamLab Borderless* exhibition. I also mentioned this issue in my feedback email to teamLab in Japan, hoping for future improvements to the app and the exhibition itself, so that audiences can more deeply appreciate this art museum.

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