UDC 7.05:711.4(512.5)
DOI https://doi.org/10.24919/2308-4863/97-2-21

Jianfeng LIU,
orcid.org/0009-0000-8012-3980
Postgraduate Student at the Department of Graphic Design
Kyiv National University of Technologies and Design
(Kyiv, Ukraine) lccw7846@gmail.com

Nataliia SKLIARENKO,
orcid.org/0000-0001-9188-1947
Doctor of Study of Art, Professor,
Professor at the Department of Architecture and Design
Lutsk National Technical University
(Lutsk, Ukraine) nata_skliarenko@ukr.net

FEATURES OF THE COLLABORATIVE DESIGN OF TEXT AND ICONS IN SIGNAGE FOR CHILD-FRIENDLY SPACES

This paper takes the collaborative relationship between text and icons in signage for child-friendly spaces as its research object, focusing on sign design in children's hospitals, children's libraries, children's museums, and related public service and play environments. Unlike existing studies, which have largely approached the issue from a single perspective such as children's cognition, environmental wayfinding, text readability, or icon recognizability, this study regards text and icons as interactive elements within the same unit of information. From the perspective of their collaborative relationship, it examines their combined role in spatial recognition, information comprehension, and experiential guidance in children's spaces. The study adopts a combination of case analysis, comparative analysis, and visual induction, and constructs an analytical framework consisting of the formal dimension, semantic dimension, and guidance dimension. On this basis, a comparative study was conducted on nine representative cases of signage in child-friendly spaces. The findings show that the interaction between text and icons in such signage can be mainly summarized into three types: confirmation-oriented, semantic-cohesive, and experience-participatory. These correspond respectively to three core needs: rapid recognition, stable understanding, and active approach. Overall, effective collaboration is not primarily manifested in the synchronized formal transformation of text and icons at the level of visual styling, but rather in a configurational form of collaboration. In this relationship, text provides a stable framework for reading and hierarchical order, while icons assume the functions of differentiated identification, semantic cueing, and situational participation. This study provides an analytical and practice-oriented research framework for the design of signage in child-friendly public spaces, and also offers a reference for optimizing text organization, icon configuration, and text–image relationships in contemporary children's spaces.

Key words: *child-friendly spaces, signage design, textual information, icon design, collaborative design, visual elements.*

Цзяньфен ЛЮ,
orcid.org/0009-0000-8012-3980
аспірант кафедри графічного дизайну
Київського національного університету технологій та дизайну
(Київ, Україна) lccw7846@gmail.com

Наталія СКЛЯРЕНКО,
orcid.org/0000-0001-9188-1947
доктор мистецтвознавства,
професор кафедри архітектури та дизайну
Луцького національного технічного університету
(Київ, Україна) nata_skliarenko@ukr.net

ОСОБЛИВОСТІ СПІЛЬНОГО ПРОЄКТУВАННЯ ТЕКСТУ ТА ПІКТОГРАМ У ЗНАКОВИХ СИСТЕМАХ ДРУЖНЬОГО ДО ДІТЕЙ ПРОСТОРУ

У статті об'єктом дослідження виступає спільна взаємодія тексту та піктограм у знакових системах дружнього до дітей простору, що зосереджується на дизайні знаків у дитячих лікарнях, дитячих бібліотеках, дитячих музеях, а також у середовищах громадського обслуговування та ігрових просторах, пов'язаних із

ними. На відміну від наявних досліджень, у яких проблема переважно розглядається в контексті дитячого пізнання, просторової навігації, читабельності тексту або розпізнаваності піктограм, у цій роботі текст і піктограми трактуються як інтерактивні елементи в межах єдиного інформаційного блоку. Виходячи з їхньої спільної взаємодії, проаналізовано їх сукупну роль у просторовому розпізнаванні, розумінні інформації та досвіді орієнтації в дитячих просторах. У дослідженні поєднано аналіз зразків, порівняльний аналіз і візуальну індукцію, а також побудовано аналітичну схему, що включає формальний, семантичний і навігаційний виміри. На цій основі проведено порівняльне дослідження дев'яти репрезентативних прикладів знаків у дитячих просторах. Результати показують, що взаємодію тексту та піктограм у таких знаках зведено до трьох типів: підтверджувально-орієнтаційного, семантично-цілісного та досвідно-партисипативного. Вони відповідно співвідносяться з трьома ключовими потребами: швидким розпізнаванням, стабільним розумінням і активним наближенням. Загалом ефективна колаборація виявляється не стільки в синхронних змінах тексту та піктограм на рівні формотворення, скільки в конфігураційному типі узгодження. У такій системі текст забезпечує стабільну схему для зчитування та ієрархічний порядок, тоді як піктограми виконують функції диференційованої ідентифікації, семантичного підказування та ситуативного залучення. Це дослідження пропонує аналітичну й практикоорієнтовану схему дослідження для проєктування знакових систем у дружніх до дітей громадських просторах, а також може слугувати орієнтиром для оптимізації тексту, конфігурації піктограм і взаємозв'язку між текстом та зображенням у сучасних дитячих просторах.

Ключові слова: *дитячий простір, дизайн знакових систем, текстова інформація, дизайн піктограм, спільне проєктування, візуальні елементи.*

Problem Statement. With the continued advancement of the concept of child-friendly city development, public environments such as children's hospitals, children's libraries, parent – child commercial spaces, children's museums, and integrated play spaces are increasingly adopting "child-friendliness" as an important direction for spatial renewal and design optimization (UNICEF, 2018). In this process, signage systems are no longer merely conventional tools for orientation and instruction; they also perform the functions of spatial identification, route judgment, and information communication, and further influence how children understand, approach, and emotionally perceive their surroundings. Compared with adults, children rely more heavily on visual information that is intuitive, clear, concrete, and embedded with contextual cues during the processes of spatial recognition and information reception. Recent studies have shown that children's navigation performance in unfamiliar environments is closely related to the visibility of visual landmarks, the salience of environmental cues, and the overall characteristics of space. Children typically prioritize these perceptible cues when establishing directional judgment, rather than first processing abstract textual or directional information (Attiya, Allani, 2025: 92–104). Therefore, signage design in child-friendly spaces cannot simply replicate the expressive logic of adult-oriented environments, but should instead demonstrate more explicit age-appropriate characteristics in information organization, formal presentation, and emotional guidance.

In recent years, signage design in child-friendly spaces has moved beyond the mere provision of directional instructions and functional explanations. Greater emphasis has been placed on enhancing children's recognition experience, emotional response, and willingness to approach space through more approachable, engaging, and contextualized environmental graphics and wayfinding expressions (Seevinck et al., 2024; Zheng et al., 2024). This is a positive development, but the related issues have not therefore been fully resolved. In some signage, textual information still displays a clear adult-oriented tendency: the wording remains overly formal, and the hierarchical organization does not sufficiently correspond to children's reading habits. Some icons, meanwhile, suffer from an excessive degree of abstraction, insufficient semantic clarity, or a lack of distinctive formal characteristics. Even more commonly, although text and icons appear together, they do not truly form a collaborative relationship, but are merely placed side by side as two independent elements, resulting in a loose text – image relationship, unclear informational hierarchy, and an insufficiently smooth reading rhythm.

From a research perspective, what deserves greater attention is the gap reflected behind these phenomena. Existing discussions on signage in child-friendly spaces have largely focused on single directions, such as children's cognition, environmental wayfinding, graphic design, or affective expression, while still lacking a relatively systematic analysis of how text and icons interact and how they jointly contribute to children's spatial recognition and information comprehension. Previous studies have often discussed the readability, hierarchical organization, and visual style of text on the one hand, or the recognizability, semantic capacity, and symbolic function of icons on the other, but have rarely examined the two as an interactive relationship within the same unit of information. Recent research has shown that the combination of text and icons can significantly affect comprehension speed, attention allocation, and judgment accuracy,

indicating that what children encounter is often not isolated text or graphics, but rather a text – image unit that needs to be understood as a whole (Hung, Tan, 2024). On this basis, this paper takes text and icons in signage for child-friendly spaces as its main research objects. From the perspective of interaction between visual elements, it analyzes the relational characteristics between the two in terms of form, semantics, and modes of guidance, and further clarifies their design significance in children's spatial recognition, information comprehension, and experiential guidance.

Analysis of research. In recent years, research on child-friendly spaces has gradually shifted from macro-level advocacy to more specific discussions of environmental design, emotional support, and user experience. Bahrami, B. et al. (Bahrami et al., 2025) pointed out that children show relatively clear preferences for natural elements, opportunities for play, open social spaces, and forms of environmental expression that can provide a sense of autonomy. These preferences further influence their comfort, willingness to participate, and approach behaviors within space. Zheng, H. et al. (Zheng et al., 2024) further demonstrated that, in the design of children's hospital environments, emotional support, visual guidance, color organization, and playful expression have been regarded as important factors in improving treatment experience and environmental friendliness. This indicates that research on child-friendly spaces no longer remains confined to the levels of safety and function, but increasingly emphasizes how space can respond to children's needs in terms of perception, comprehension, and emotion.

From the perspective of spatial cognition, children's route learning and environmental orientation are not simply reduced versions of adult patterns. Attiya A., and Allani N. (Attiya, Allani, 2025) pointed out that, in unfamiliar environments, children rely more prominently on landmark visibility, visual salience, and overall spatial characteristics to establish directional judgment. Morag I. et al. (Morag et al., 2024) further showed that wayfinding in hospitals is not a one-time map-reading process, but a continuous decision-making process in which users constantly make judgments while moving on the basis of the most valuable architectural features and informational cues. This means that, when discussing signage design in child-friendly spaces, one cannot assume that children will "automatically decode" information according to adult reading logic; rather, the organizational logic of text – image guidance should be reconsidered from the perspective of children's reliance on visual cues.

In the field of wayfinding and spatial recognition, recent attention has moved beyond the question of whether signage exists to how signage is seen, understood, and used. Sahoo, B. et al. (Sahoo et al., 2024) showed that a clear signage system not only affects wayfinding efficiency, but also further influences patient experience, sense of safety, and service quality. Through eye-tracking and behavioral research, Kwon J. et al. (Kwon et al., 2025) pointed out that problems in wayfinding systems are not limited to insufficient information, but also include imbalanced allocation of visual attention, inappropriate sign placement, and interference from non-informational components during search behavior. This suggests that current wayfinding research has gradually turned toward a more integrated examination of the relationships among visual attention, spatial cognition, and environmental experience.

With regard to text presentation and information organization, recent studies on children's reading have shown that format readability features, such as typeface and spacing, affect children's reading speed and comprehension performance. Day S. L. et al. (Day et al., 2024) pointed out that appropriate text presentation helps reduce information load and improve reading fluency. This finding has direct implications for research on signage in children's spaces: text is not merely a neutral container of content, and its readability, hierarchical organization, and visual rhythm all influence the efficiency with which children receive information. By contrast, overly formal, fragmented, or excessively decorative textual expression may still invisibly raise the threshold of legibility.

Recent reviews of safety signage systems have indicated that the effectiveness of signage depends not only on the symbol itself, but also on age-related cognitive abilities, contextual understanding, and modes of visual design. Wang T. et al. (Wang et al., 2025) argued that dynamic, intuitive, and visually salient forms of expression are more conducive to improving children's understanding of and compliance with safety information. At the same time, Hung Y. H., and Tan Y. (Hung, Tan, 2024), through eye-tracking research, showed that the combination of text and icons can significantly improve comprehension speed and accuracy. This improvement is not a simple accumulation of elements, but is closely related to patterns of attention allocation and cognitive processing. Therefore, in current research, icons and text are no longer regarded as two independent information systems, but are increasingly understood as a text – image unit that requires overall coordination.

Overall, current research has provided a relatively sufficient basis for discussing signage design in children's spaces from such perspectives as child-friendly healthcare environments, visual guidance design, text

readability, icon comprehension, and text–image combinations. The problem, however, is that although existing studies have paid increasing attention to children's emotions, perception, and experience in environmental contexts, they still tend to discuss text, icons, color, or spatial interfaces from a single dimension, and only rarely take the interactive relationship between text and icons as an independent and specific research object. In particular, there remains a lack of systematic induction based on actual cases regarding how the two work together in children's recognition and confirmation, semantic comprehension, and experiential guidance. It is precisely within this research gap that the present study no longer treats text and icons as two separate elements, but instead examines them as an interactive unit, with a focus on their collaborative relationship and design value in signage for child-friendly spaces.

Purpose of the article. Based on the above research status and the identified research gap, this paper is mainly developed around the following three objectives. First, drawing on representative signage cases in child-friendly public spaces, it examines and summarizes the phenomenon of text – icon collaboration in signage for child-friendly spaces from the perspective of the interactive relationship between text and icons, thereby presenting the basic profile of the text–icon relationship in children's spatial signage. Second, through comparative case analysis, it identifies the typical modes of interaction between text and icons in signage for child-friendly spaces and discusses the specific roles of different modes in spatial recognition, information comprehension, and experiential guidance. Third, at the theoretical level, this paper aims to define the text–icon relationship in signage for child-friendly spaces as a design issue worthy of independent discussion, thereby promoting related research from the analysis of single visual elements toward the classification of text–image interaction and the analysis of collaborative mechanisms. At the practical level, it seeks to summarize the key points of signage design in child-friendly spaces on the basis of case-based induction, so as to provide a reference for signage optimization in children's hospitals, children's libraries, parent – child service spaces, and play environments.

Presentation of the main material. This paper no longer treats text and icons as separate visual elements, but instead examines them as an interactive unit within signage for child-friendly spaces. Drawing on the cognitive characteristics of children's spatial recognition, the basic logic of environmental wayfinding, and relevant insights from studies on text – image combinations, this study selects representative signage cases from children's hospitals, children's libraries, children's museums, parent – child public service spaces, and play environments for comparative analysis, with particular attention to the ways in which text and icons work together in real usage contexts (Lingwood et al., 2015). The rationale for this analytical approach lies in the fact that, when reading spatial signage, children do not usually separate text and graphics mechanically; rather, they tend to receive text–image information as a whole within a short period of time and, on this basis, form judgments about direction, function, and spatial atmosphere. This process is closely related to children's cognitive characteristics in landmark use, route learning, and meaning confirmation (Spiers, Maguire, 2008).

In the specific analysis, this paper mainly examines the interactive relationship between text and icons from three dimensions. The first is the formal dimension, namely whether the organization of textual information in terms of font size, weight, color, proportion, position, and hierarchy, together with the contour features, complexity, and stylistic tendencies of icons, constitutes a unified visual language. The second is the semantic dimension, that is, whether text and icons complement and confirm each other in the expression of meaning, thereby helping children make judgments more quickly. The third is the guidance dimension, namely whether the text–image combination forms a clear organizational logic in terms of layout, nodal position, reading sequence, and viewing path, so as to support children's recognition, confirmation, and action in real spaces (Passini, 1996). Previous studies have shown that the familiarity, structural clarity, and hierarchical organization of text affect reading efficiency and comprehension preferences (Beier, Larson, 2013), while the concreteness, familiarity, and complexity of icons significantly influence recognition performance (McDougall et al., 1999). Therefore, analyzing text and icons as a relational system rather than as two independent elements is closer to the actual way in which children receive and process information in real spatial contexts.

Based on the results of the comparative case analysis, this paper summarizes the interaction between text and icons in signage for child-friendly spaces into three main types: confirmation-oriented, semantic-cohesive, and experience-participatory. These three types are not mutually isolated, but correspond respectively to three focal needs in children's signage reading, namely rapid recognition, stable understanding, and active approach. This classification is not only consistent with the core findings presented in the abstract, but also provides a clear path for the subsequent analysis. For the convenience of later discus-

sion, the cases included in the study are organized in Table 1 according to type classification and their main text – image characteristics.

The first type is the confirmation-oriented type. This type of signage emphasizes the establishment of a recognition entry point as a priority, helping children complete directional confirmation in the shortest possible time. It usually appears at entrances, turning points, functional zoning nodes, and path-choice locations. Its primary task is not to create a complex experience, but to ensure that judgment is both rapid and accurate. In terms of the text–icon relationship, this type places greater emphasis on clear division of roles: textual information remains structurally clear, hierarchically ordered, and directly expressed, so as to undertake the tasks of route confirmation and content explanation; icons, colors, and zonal graphics provide a more intuitive recognition entry point, helping children form a preliminary spatial judgment before fully reading the text (McDougall et al., 1999). From the perspective of wayfinding research, this approach of prioritizing the establishment of a recognition entry point at critical nodes is more conducive to the rapid completion of directional judgment (O'Neill, 1991).

Taking Seattle Children's Hospital as an example (Fig. 1:1), its wayfinding system typically embodies the collaborative mechanism between text and graphics in confirmation-oriented signage. The textual information at spatial nodes does not generate visual stimulation through complex styling, but instead performs the functions of directional explanation and content confirmation in a stable and clear manner. What first enters the user's field of vision are often the recognition cues formed by zonal color, animal imagery, and area graphics. In the main image, the overhead suspended directional text is responsible for explicitly conveying route and destination information, while the wall graphics and zonal themes provide advance cues for area prediction, enabling children to form an initial recognition through overall graphic cues before fully reading the text. In the secondary image, the column node further strengthens this relationship: numbers, area names, and animal graphics are organized into the same recognition unit, with the graphic system establishing the intuitive entry point and the textual system providing stable confirmation and hierarchical supplementation. This form of organization corresponds well to children's cognitive tendency to rely on landmarks, shapes, and direct cues when making spatial judgments in unfamiliar environments (Lingwood et al., 2015).

The wayfinding system of the Royal Children's Hospital Melbourne also belongs to the confirmation-oriented type (Fig. 1:2), but it places even greater emphasis on strengthening perceptible landmark features for children, so that spatial recognition no longer depends primarily on abstract directional information, but is instead built upon more memorable area imagery. In the main image, the elevator node is not explained merely through a conventional directional sign; rather, large-scale natural scene graphics and animal images encode the area atmosphere in advance as recognizable visual landmarks. For children, these graphics are not additional decoration, but already play a predictive role before the formal reading of the text. In the secondary image, the overhead suspended textual information directly indicates specific departments and room ranges, performing an efficient and explicit function of route confirmation, while the animal imagery and environmental graphics on the wall continuously reinforce node recognition. What is established here is not that text and graphics each enhance their own presence separately, but that graphics are responsible for building area prediction and spatial memory, while text completes precise explanation and content confirmation.

The wayfinding system of Sant Joan de Déu Barcelona further demonstrates that confirmation-oriented signage does not necessarily rely on highly decorative graphics to attract attention; it can likewise establish a stable and efficient confirmation mechanism through zonal coding, node numbering, and route indication (Fig. 1:3). In the main image, the overhead suspended directional sign performs the function of route confirmation: department names, directional arrows, and node information are compressed into a highly visible position, helping users rapidly complete directional judgment after entering the corridor. At the same time,

Table 1

Summary of child-friendly signage cases

No.	Case	Type	Key text–icon features
1	Seattle Children's Hospital	Confirmation-oriented	Unified text and zoning graphics
2	Hospital Sant Joan de Déu Barcelona	Confirmation-oriented	Concise text and custom icons
3	Royal Children's Hospital Melbourne	Confirmation-oriented	Floor text and animal landmarks
4	Thayer Children's Library	Semantic-cohesion	Zoning text and supporting graphics
5	The Library Initiative	Semantic-cohesion	Entrance text and wall graphics
6	Sugar Hill Children's Museum	Semantic-cohesion	Floor guidance and directional icons
7	Children's Museum of Pittsburgh	Experiential-engagement	Direct text and oversized graphics
8	Museum Lab	Experiential-engagement	Restrained text and spatial atmosphere
9	Louisiana Children's Museum	Experiential-engagement	Stable text and hand-drawn graphics

the repeated colors and vertical graphics appearing along both sides of the corridor are not simply environmental decoration, but also provide advance cues for spatial zoning. In the figure 1:3, letter marker, and textual explanation are concentrated within the same node, forming a highly recognizable information unit; the colored interface behind it and the enclosing spatial relationship further reinforce the presence of the area entrance. This case shows that the effectiveness of confirmation-oriented signage does not necessarily depend on complex narrative, but can instead be achieved through a clear and low-conflict collaborative configuration among textual information, node numbering, and zonal graphics, enabling children to complete area recognition and directional confirmation more efficiently while moving through space (Passini, 1996).

Overall, the core of confirmation-oriented signage lies in establishing a recognition entry point as a priority and, on that basis, completing directional confirmation. Its effectiveness does not primarily derive from complex visual expression, but from the clear and low-conflict configurational relationship formed among text, icons, color, and zonal graphics. For children, this type mainly serves rapid judgment and route confirmation, and therefore constitutes the foundational layer of text–image organization in child-friendly spaces.

Fig. 1. Confirmation-oriented type of signage: 1 – Seattle Children's Hospital; 2 – Royal Children's Hospital Melbourne; 3 – Sant Joan de Déu Barcelona

Compared with the previous type, the semantic-cohesive type of signage is more concerned with the accuracy of comprehension. It is commonly found in contexts involving functional explanation, behavioral prompts, area naming, and route guidance. Its focus is not merely to make children notice information, but to enable them to complete meaning judgment in a relatively stable manner after receiving it. In comparison with the confirmation-oriented type, the semantic-cohesive type places greater emphasis on the mutually corroborative relationship between text and icons: text is responsible for explicit naming, explanation, and hierarchical confirmation, while icons and environmental graphics supplement meaning in a more intuitive way, making it easier for children to connect the information they see with semantic judgment and subsequent action (Hung, Tan, 2024). Relevant studies have shown that the concreteness, familiarity, and semantic distance of icons significantly affect their comprehension efficiency, while different modes of text – image combination further influence the fluency of visual cognition and the effectiveness of semantic matching (McDougall et al., 1999; Zhu et al., 2022). Therefore, the key to semantic-cohesive signage lies not in whether the amount of information is sufficient, but in whether text and icons can form a low-ambiguity, continuous, and easily understandable explanatory relationship.

Taking Thayer Children's Library as an example (Fig. 2:1), its entrance interface rather typically embodies the text – image collaboration formed through textual naming and graphic supplementation of meaning in semantic-cohesive signage. The emphasis here is not on route judgment, but on helping children and other users develop a stable understanding of the spatial identity. In the main image, the textual sign "Children's Library" directly completes the naming of the space. At the same time, the large-scale color zoning and tree-shaped graphics developed around the entrance are not additional decoration, but together with this name constitute a more concrete and perceptible semantic field. The secondary image further shows that this semantic confirmation does not remain at the entrance, but is continuously reinforced after entering the space through the service desk, wall graphics, color zoning, and activity furniture. Here, text performs the functions of naming and informational confirmation, while graphics and environmental cues transform the abstract spatial name into a more concrete scene that is easier for children to understand and accept.

The L!brary Initiative further illustrates the organizational mode of semantic-cohesive signage in a continuous environment (Fig. 2:2). Compared with the previous case, the emphasis here is not only on entrance naming, but also on how the meaning of "library" continues to be maintained and reinforced after entering the space. In the main image, the prominent word "LIBRARY" at the entrance first completes functional naming, while the entrance interface, marked by a strong red–blue contrast, transforms this naming from mere textual information into a clearly identifiable spatial unit. As children and other users approach the entrance, they do not first process the word in an abstract manner; rather, they form an overall judgment through the combined effect of text, color, and entrance form. The secondary image shows that this semantic confirmation does not end at the entrance, but is further extended through the contin-

uous line-drawing figures of people, the organization of bookshelves, and the reading scene. Here, text is responsible for confirming the name, while environmental graphics transform "library" from an abstract concept into a more concrete reading atmosphere and activity attribute.

Compared with the previous two cases, Sugar Hill Children's Museum of Art & Storytelling more prominently demonstrates the combined role of semantic-cohesive signage in route comprehension and area comprehension (Fig. 2:3). Its distinctive feature is that text, icons, and direction of action are not treated separately, but are compressed into the same continuous chain of information, enabling children to complete the transition from receiving information to making a judgment within a relatively short time. In the floor-based directional graphic, arrows clearly indicate the direction of movement, text lists the specific destinations, and icons provide intuitive recognition entry points for different functions. In this way, children do not need to read all of the text before making a judgment, but can instead establish directional understanding relatively quickly through the continuous relationship among arrows, icons, and names. In the other image, large-scale numbers, spatial naming, and human figures further reinforce area identity confirmation, so that the floor or zone no longer remains merely an abstract name, but is organized into a spatial unit that can be quickly recognized. What is operative here is not the strength of any individual textual or graphic element in itself, but the consistency of their meaning expression.

1 2 3

Fig. 2. Semantic-cohesive type of signage: 1 – Thayer Children's Library; 2 – The L!brary Initiative; 3 – Sugar Hill Children's Museum of Art & Storytelling

Overall, the key to semantic-cohesive signage lies not in increasing the amount of information, but in enhancing the continuity and stability of comprehension through the coordinated organization of text and icons. Text is responsible for naming, explanation, and hierarchical confirmation, while icons and environmental graphics supplement meaning in a more intuitive manner, enabling children to complete meaning judgment more smoothly. Compared with the confirmation-oriented type, this type places greater emphasis on reducing ambiguity and stabilizing the process of comprehension.

The experience-participatory type includes emotional reassurance, atmosphere construction, and the stimulation of willingness to participate. It therefore appears more frequently in children's hospital waiting areas, library reading spaces, museum education zones, and integrated play environments. In these contexts, signage no longer merely explains information, but also needs to help children develop a spatial feeling that is more relaxed and more inviting. Relevant studies have shown that children usually display relatively clear preferences for thematic, color-based, and more approachable forms of environmental expression, and that these preferences further influence their spatial experience and emotional responses (Bahrami et al., 2025). Therefore, the focus of experience-participatory signage is not simply to increase visual stimulation, but to enable text, graphics, and spatial tone to form a consistent mode of expression, so that children gradually develop a sense of approachability and willingness to participate while receiving information.

Taking the Children's Museum of Pittsburgh as an example (Fig. 3:1), its signage system distinctly embodies the directness and openness of text–image collaboration in the experience-participatory type. In the main image, "GO TO THE BATHROOM" does not appear in the form of a conventional small-scale directional sign, but enters the spatial interface through a large-scale, direct, and clearly colloquial expression, allowing what would otherwise be a simple functional prompt to simultaneously convey a relaxed, explicit, and slightly playful spatial attitude. For children, the significance of this treatment lies not merely in its greater visibility, but in the way it transforms functional information from an abstract explanation into an action cue that can be immediately perceived and accepted. The reception node in the secondary image further shows that this experiential quality does not occur only at a single functional point. The striking "Hi" above, presented in an extremely simple textual form, establishes a welcoming gesture at the reception interface, allowing children to first sense a friendly and pressure-free spatial atmosphere before fully understanding subsequent information. Here, text is no longer merely a carrier of functional explanation, but participates together with color blocks, interfaces, and spatial scale in the organization of emotion.

By contrast, MuseumLab demonstrates another path of experience-participatory text – image collaboration (Fig. 3:2). It does not rely on exaggerated colors, cartoon-like graphics, or a strongly playful tone

to establish child-friendliness. Instead, within a more mature and restrained visual expression, it creates an environmental experience that feels worth entering and exploring through the joint effect of textual information, nodal organization, and the character of the architectural space itself. In the main image, the directional signage does not exist independently of the space, but is embedded within an architectural environment with a pronounced historical texture. The clear destination list and directional information first ensure legibility, yet the real force of these textual elements lies not only in their content itself, but in the coordinated relationship they form with the stone surfaces, columns, suspended devices, and the overall spatial atmosphere. The "museumlab" identification in the secondary image reflects a gentle guiding logic at the entrance node: it does not organize the space in a commanding manner, but instead, together with the reception desk, open interface, and architectural structure, forms a softer entry interface. This shows that the experience-participatory type does not mean the one-sided pursuit of liveliness and excitement; it can equally be established through a restrained, stable, and place-sensitive relationship between text and image.

The Louisiana Children's Museum more intensively reflects a design approach within experience-participatory text – image collaboration in which an approachable tone is used to reduce unfamiliarity (Fig. 3:3). Compared with the previous two cases, the emphasis here is not on generating spatial tension through a strong attitude, but on allowing children and families to first feel a sense of welcome and accessibility through a gentler relationship between text and graphics as they enter the space. In the main image, the textual information "Family" is itself extremely concise and does not employ complex explanation, yet it is organized together with the adjacent hand-drawn-style human figure within the same interface, so that the spatial indication no longer remains at the level of simple functional naming, but is further transformed into a situational cue with emotional warmth. The secondary image shows that this experiential quality is not an accidental effect of a local sign, but continues to operate throughout the processes of entering, staying, and participating in activities. The vertical signboard maintains a clear and stable textual organization, while the open and bright stair space, the children's actual activities, and the overall relaxed environmental interface together reinforce a spatial tone that is enterable, explorable, and participatory.

Overall, the focus of experience-participatory signage does not lie in intensifying visual stimulation, but in reducing children's psychological distance from unfamiliar environments through a consistent expression formed by text, graphics, and spatial tone. Its role is not only to convey information, but also to organize emotion, create atmosphere, and stimulate willingness to approach and participate. Compared with the previous two types, this type places greater emphasis on the role of text – image collaboration in emotional support and spatial approachability.

Fig. 3. Experience-participatory type of signage: 1 – Children's Museum of Pittsburgh; 2 – MuseumLab; 3 – Louisiana Children's Museum

The three types summarized above are not mutually isolated, but correspond to different focal needs in children's spatial reading: the confirmation-oriented type emphasizes rapid recognition, the semantic-cohesive type emphasizes stable understanding, and the experience-participatory type emphasizes active approach. In actual child-friendly spaces, they often appear in overlapping ways, although different types tend to dominate at different nodes. Overall, the collaboration between text and icons in signage for child-friendly spaces is not primarily manifested in synchronized changes at the level of form, but rather in a configurational mode of collaboration: text provides a stable framework for reading and hierarchical order, while icons undertake the functions of differentiated recognition, semantic cueing, and situational participation. What is truly important is not whether the two are simultaneously "visually prominent," but whether they can form an interactive relationship that accords with children's cognitive characteristics in specific spatial contexts. This understanding may provide a reference for the organization of text, the configuration of icons, and the optimization of text – image relationships in child-friendly public spaces.

Conclusion. This paper discusses the collaborative design of text and icons in signage for child-friendly spaces and analyzes the problem of information communication in children's spaces from the perspective of text–image interaction. Through the comparison and induction of representative cases, the paper summarizes the interaction between text and icons into three main types: confirmation-oriented, semantic-cohesive, and experience-participatory. These three types correspond respectively to the

three core needs involved in children's spatial reading rapid recognition, stable understanding, and active approach, showing that text and icons are not simply juxtaposed, but together constitute an important visual unit through which children understand spatial information.

From an overall perspective, the collaboration between text and icons in signage for child-friendly spaces is not primarily manifested in synchronized changes at the level of form, but rather in a configurational mode of collaboration: text provides a stable framework for reading and hierarchical order, while icons undertake the functions of differentiated recognition, semantic cueing, and situational participation. This result indicates that what truly affects children's use of signage is not the individual element itself, but whether a clear, stable, and cognitively appropriate interactive logic is established between text and icons. Based on this understanding, signage design in child-friendly spaces should give priority to clarity of recognition, strengthen the semantic consistency between text and icons, and adjust the relative prominence of text – image relationships according to different spatial nodes.

At the theoretical level, this paper defines the text–icon relationship in signage for child-friendly spaces as a design issue worthy of independent discussion, and, on the basis of comparative case analysis, proposes three collaborative types with explanatory value. At the practical level, the findings may provide a reference for signage optimization in children's hospitals, children's libraries, parent–child service spaces, and integrated play environments. It should be noted that this study is mainly based on case analysis and visual induction, and has not yet been validated through behavioral observation or comprehension testing with child users. Future research may further incorporate empirical data from children of different age groups in order to examine more deeply the differences among various text – image combination modes in terms of recognition efficiency, semantic comprehension, and emotional experience.

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Дата першого надходження статті до видання: 04.03.2026
Дата прийняття статті до друку після рецензування: 25.03.2026
Дата публікації (оприлюднення) статті: 19.05.2026