

Research on the Practical Application of “Sightseeing Verbal Map” in China: Examining Cross-Cultural Differences in Verbal Navigation Aids for Visually Impaired

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Abstract: In Japan, research has been conducted on the application of "Map of Words" to assist visually impaired individuals in navigating their surroundings. Meanwhile, in China, as a rapidly developing nation, there is a growing need for the creation of "Sightseeing Verbal Map" to enhance the quality of life for visually impaired individuals and to meet the demand for universal design. This study is based on existing Japanese research on Mino Great Falls by developing the Sightseeing Verbal Map tailored for Chinese users. The map includes Chinese guide text, environmental sounds, and sound effects. The aim of this paper is to examine cultural differences in language use and to advance practical "Sightseeing Verbal Map" for the Chinese context.

Keywords: Visually impaired, Map of words, Universal design, Voice navigation

1. INTRODUCTION

The United Nations Convention on the Rights of Persons with Disabilities, adopted in December 2006, underscores the importance of universal design by mandating “appropriate measures to enable people with disabilities to participate in recreation, leisure, and sports activities” (Article 30, Paragraph 5). This highlights the need for accessible environments where all individuals, including the visually impaired—estimated at 17.31 million in China—can enjoy social resources and have equal opportunities for participation.

Support for visually impaired individuals in China remains a multifaceted issue, considering the vast population and regional diversity. While leisure activities like travel are increasingly integral to daily life, visually impaired individuals, whether with low vision or total blindness, have a strong desire for enriching travel experiences. As society progresses, the number of visually impaired individuals engaging in travel is expected to grow.

In China, significant advancements are being made to improve accessibility for individuals with visual impairments. Specialized schools and training programs play a vital role in this progress by providing tailored education and skills training that help individuals with low vision or blindness navigate and interact more easily with their environments. These programs often focus on developing fundamental mobility and orientation skills, such as the use of canes or understanding urban layouts, equipping individuals with tools for greater independence.

Assistive technologies further support accessibility, with examples including braille blocks and speechreading technology. Braille blocks, or tactile paving, are strategically embedded on sidewalks and public spaces, allowing visually impaired individuals to follow a textured path underfoot that provides safe guidance along walkways, up or down staircases, and around obstacles. Meanwhile, speechreading technology—often implemented in mobile applications or public service devices—converts written text to audio, which assists users in recognizing directions, reading signs, or understanding instructions. Together, these technologies contribute to a more inclusive public space, making everyday navigation and information access more feasible.

Despite these advancements, there remain challenges in creating effective, versatile mobility aids that can fully support individuals across various environments, from busy urban centers to rural areas. For example, developing aids that can dynamically respond to changes in the environment, such as sudden obstacles or complex intersections, is a key area for further innovation.

In addition, cross-cultural considerations are essential for meeting the needs of visually impaired individuals in a way that respects local customs, language, and infrastructure. Mobility aids and training programs that work well in other countries might need significant adaptation to fit the specific social and physical context of China. These considerations ensure that assistive tools are not only functional but are also relevant and culturally sensitive, ultimately fostering greater accessibility and inclusion for individuals with visual impairments.

The design of voice-guided navigation systems for visually impaired individuals must account for cultural differences in spatial communication and accessibility expectations. For instance, while Japanese systems often employ metric precision, Chinese counterparts may prioritize landmark-based cues, reflecting distinct wayfinding norms. These variations carry critical implications: over-reliance on precise distances could disorient users accustomed to environmental cues, whereas vague landmark references may fail when objects are temporary. Furthermore, societal attitudes toward disability such as Japan's emphasis on independent mobility versus China's familial support traditions may shape users' expectations of autonomy and safety alerts. Cross-cultural research remains limited, particularly in how visually impaired populations perceive these differences. Developers must therefore balance localization with universal accessibility principles, validating designs through participatory testing with target users.

This study aims to develop sightseeing verbal map tailored for visually impaired individuals in China. This auditory tool offers pre-exposure to unfamiliar locations (such as municipal regions and tourist sites), enabling users to build a mental map before visiting these places. Ultimately, this could allow them to navigate more independently and confidently, with an experience closer to that of sighted individuals.

To implement the Sightseeing Verbal Map effectively in China, this study focuses on two primary objectives:

- (a) Identifying guidelines for a culturally adapted version based on differences between Japan and China.
- (b) Evaluating the practical utility of the Sightseeing Verbal Map as a preparatory tool for visually impaired users.

Looking ahead, this study envisions developing detailed Sightseeing Verbal Maps of Chinese streets, allowing visually impaired users to simulate outings and experience increased independence. Based on insights gained from this study, we also anticipate expanding the guide to support multiple languages, providing greater accessibility for wider public.

2. SIGHTSEEING VERBAL MAP

2.1 Definition of the Sightseeing Verbal Map

The Sightseeing verbal map is a term used in this research to describe tools designed to support visually impaired individuals in China with navigating urban environments. This map integrates map of words for spatial understanding (explained in further detail below) with environmental sounds and sound effects. This combination aims to enhance realism and encourage users to go out, offering a simulated outdoor experience through auditory information that can be accessed from home (Kubota, M. et al., 2020).

Voice messages are categorized into three main types: "Route Guidance", "Map of Words (Broad Sense)" and "Environmental Sounds and Sound Effects". The overall structure of the Sightseeing Verbal Maps is illustrated in Figure 1.

Figure 1. Overall structure of the Sightseeing Verbal Map

2.2 Route Guidance

Route guidance provides essential directional information to assist users in reaching a destination. This includes initial guidance, endpoint directions, instructions for proceeding straight or turning, and return directions—all critical for navigating to the desired location. It covers details about roads, sidewalks, bicycle paths, and points for public transportation transfers (Matsumoto, H. et al., 2018).

This study seeks to customize route guidance to address the unique sightseeing needs of visually impaired individuals by providing personalized routes. The approach includes options for accessing tourist attractions and nearby facilities, with adaptable route choices that cater to

individual user preferences.

2.3 Map of Words

The Map of Words (Broad Sense) includes three main components: “Map of Words” for general spatial awareness, the “Map of Words” (Narrow Sense), and the “Roadside Guide” (Takahashi, S. et al., 2013).

The Map of Words (Narrow Sense) is composed of two elements: "Geographic Information" and "Verbal Sketches." Geographic Information provides physical descriptions of pathways, nearby facilities, road surfaces, and other environmental features that can be detected with a white cane or confirmed through sound, smell, and other sensory cues, helping users navigate with confidence.

A verbal sketch offers subjective descriptions of sensory information—such as sounds, scents, and visual impressions—of the surrounding environment. By conveying details unique to the time of day and season, these sketches help users form a vivid mental image of the area, fostering familiarity with it.

The Roadside Guide serves to replicate the experience of a sighted individual making a detour to explore facilities along the way. By creating an engaging, active mental picture of the town, it guides users on enjoyable detours and short excursions. Shop information within the guide provides details not only on shop characteristics and recommended products but also on entrance locations to aid accessibility (Adachi, Y. et al., 2017).

2.4 Environmental Sounds and Sound Effects

Environmental Sounds refer to the sounds naturally occurring in the surroundings while walking. At intersections and other spatial junctions, participants paused for 20 seconds, facing the direction of travel, to listen to a verbal map. This pause allowed them to stop and check the map in a manner similar to how a sighted person would consult a traditional map.

Sound Effects, on the other hand, are deliberately introduced sounds designed to highlight the unique characteristics of a place and stimulate the listener's imagination. Given that the target audience for this study is visually impaired individuals, sound effects were specifically used to emphasize auditory cues, enhancing both the sense of presence and emotional engagement with the environment.

3. Research Methodology

3.1 Research Flow

In this study, "culture" refers to the shared systems of meaning, social norms, and environmental familiarity that influence how visually impaired individuals interpret and navigate spaces. Specifically, we focus on two dimensions of cultural differences. The first is linguistic and cognitive framing. Variations in how navigation instructions are linguistically structured and spatially conceptualized. The second is built environment conventions. Divergences in urban design and social navigation practices.

These factors critically impact the efficacy of assistive technologies, as culturally mismatched navigation cues may increase cognitive load rather than reduce it. Our localization framework adapts to these differences through verbal map scripting by using region-specific metaphors and environmental sound design by incorporating locally recognizable ambience sounds.

The process of this study is illustrated in Figure 2. First, target sites are selected based on the findings from our previous research. Subsequently, the data from our earlier studies are translated into Chinese. This translated data is then integrated with Sightseeing Verbal Map to develop Sightseeing Verbal Map (Chinese version). Following this, a virtual walking experiment is conducted with Chinese participants, accompanied by an interview survey to gather their feedback. As this study represents preliminary exploratory research into cross-cultural navigation preferences, we adopted a targeted yet limited sampling approach. Given the challenges of conducting multinational fieldwork during the initial research phase, we recruited Chinese international students currently residing in Japan (n=12) as our first cohort of participants. This population offered unique advantages: 1) native familiarity with Chinese wayfinding conventions, 2) direct experience with Japanese navigation systems, and 3) ability to provide culturally comparative insights while sharing a common language (Mandarin) with researchers. While this sample cannot represent all cultural nuances, their dual-cultural exposure provided valuable initial data on how navigation preferences may transfer or conflict across contexts. Future studies will expand to include native Japanese visually impaired users and mainland Chinese populations. This survey aims to identify areas for improvement in Sightseeing Verbal Map (Chinese version) and to explore how cultural differences between Japan and China might influence the structure and content of the guided tour materials. Additionally, we will discuss the feasibility of the subsequent phase, which involves a demonstration experiment in China.

These findings will serve as the foundation for the practical implementation of Sightseeing Verbal Map in China.

Figure 2. Research Flow

3.2 Study Area

3.2.1 Mino Great Falls Area

Previous studies have primarily focused on daily life spaces such as office districts and commercial areas. The research in Mino represents a tourist destination characterized by natural soundscapes (e.g., waterfalls, birdsong) and predictable pathways with minimal obstacles. The research in Kobe represents an urban commercial district, featuring complex auditory environments with competing noise sources and high pedestrian density and dynamic obstacles. Research in these two regions will lay the foundation for future field surveys in China. In this study, as an initial step toward practical application in China, the Mino Great Falls area in Osaka, located in the Kansai region and easily accessible by public transportation, was selected. This area is considered likely to attract significant interest from Chinese tourists. Mino Great Falls, situated within Meiji no Mori Mino National Park, is renowned and often referred to as "the world's most famous waterfall". Detailed information (Mino Great Falls Area) is listed in Table 1 and Figure 3.

Table 1. Study Area Information (Mino Great Falls Area)

Location	Mino City, Osaka Prefecture, Japan
Access	From Hankyu Osaka Umeda Station (Hankyu Takarazuka Main Line, Express, approximately 16 minutes), transfer to the Hankyu Mino Line at Ishibashi-Handaimae Station (approximately 6 minutes), and get off at Hankyu Mino Station.
Characteristic	National Park
Clientele	A broad range from youth to the elderly
Waypoint	Otowa Sanso, Taki Anji Temple, Statue of Hideyo Noguchi, Modori Rock
Distinctive environmental sounds	Voices of the street vendors, Sound of the waterfall



Figure 3. Ambience and Walking course (Mino Great Falls Area)

*Source: Mino City Tourism Association Website *Map data: © Google.

3.2.2 Kobe-Motomachi Area

As an initial step toward practical application in China, the Kobe-Motomachi area in Kobe, located in the Kansai region and easily accessible by public transportation, was selected. This area is anticipated to be highly popular among Chinese tourists. Detailed information (Kobe-Motomachi Area) is listed in Table 2 and Figure 4. Figure 5 shows an animated screenshot of the sightseeing verbal map (Kobe-Motomachi Area) as viewed by study participants during the navigation task.

Table 2. Study Area Information (Kobe-Motomachi Area)

Location	Kobe City, Hyogo Prefecture, Japan
Access	From Osaka Station (Tōkaidō and Sanyō Main Lines, approximately 29 minutes), get off at Motomachi Station.
Characteristic	Tourist attraction
Clientele	A broad range from youth to the elderly
Waypoint	Old Foreign Settlement, Kobe Chinatown, Minato Park, Kobe Tower
Distinctive environmental sounds	Sound of the lion dance



Figure 4. Ambience and Walking course (Kobe-Motomachi Area)

*Source: PHOTOHITO. *Map data: © Google.

3.3 Creation of Chinese version

The "Route Guide" and "Map of Words (Broad Sense)" developed in the previous study were directly translated into Chinese. Subsequently, the accuracy of the translated guides was verified in collaboration with another Chinese research partner.



Figure 5. Screenshot of the sightseeing verbal map (Kobe-Motomachi Area)

3.4 Experiment Summary

3.4.1 Mino Great Falls Area

The details of the participants are presented in Table 3. At the initial stage of the experiment, Chinese students residing in Japan were recruited. The selection criteria required participants to have at least a basic level of Japanese proficiency and the ability to take part in the experiment. Considering both logistical challenges and the impact of the COVID-19 pandemic, a remote participation option was introduced alongside the standard face-to-face format. Participants were informed of their choice to attend the experiment either in person or remotely via the teleconferencing tool Zoom (Ishii, M. et al., 2022).

Ultimately, two participants opted for face-to-face participation, while four chose to participate remotely. The participant group consisted of four males and two females, with five individuals in their 20s and one in their 30s.

Table 3. Subject Information (Mino Great Falls Area)

Subject Number	Experimental Date	Gender	Age	Experiment Type
1	2023/5/25	Male	30's	
2	2023/6/4	Male	20's	Remote
3	2023/6/4	Male	20's	
4	2023/6/4	Male	20's	
5	2023/6/2	Female	20's	Face-to-Face
6	2023/6/2	Female	20's	

In the case of face-to-face participation, each experimental session lasted approximately 90 minutes per participant. The session began with an explanation of the experiment's overview and objectives (approximately 10 minutes). This was followed by a virtual walking experiment at Mino Great Falls, which lasted about 25 minutes. The walking course was divided into two sections: the first half (Part 1 to Part 2) and the second half (Part 3 to Part 4). An interview survey was conducted after the completion of the first half (approximately 15 minutes), after which the virtual walking experiment resumed. Upon completing the second half, another interview survey was conducted.

For remote participation, each session lasted approximately 100 minutes per participant. The additional time was allocated to setting up the teleconferencing tool Zoom, conducting a voice test, and explaining the experiment's outline and purpose (approximately 20 minutes). The virtual walking experiment at Mino Great Falls was conducted similarly to the face-to-face sessions, lasting about 25 minutes and following the same procedure for dividing the course and conducting interviews.

The experiment was conducted with six participants over three separate sessions, as summarized in Table 3. The roles of the experimenters are outlined in Table 4. The experiment facilitator was responsible for explaining the experimental procedure and conducting the interview surveys. The voice guidance distributor and the environmental sound and sound effect distributor managed the playback of audio instructions, as well as the images and sounds used in the virtual walking experiment. During the interviews, the interview memo recorder documented participant comments. The experiment organizer, who also acted as the experiment facilitator, coordinated and supervised the entire experimental process.

Table 4. Role Assignment of Experimenters

Experimenter Number	Role Assignment	Person in Charge
1	Generalize Experimental Progression	Student A
2	Voice Guidance Playback Environmental Sound and Sound Effect Playback Hearing Memo Entry	Student B

3.4.2 Kobe-Motomachi Area

The demographic details of the participants are outlined in Table 5. Participants were given the option to engage in the experiment either face-to-face or remotely. However, none of the participants selected the face-to-face format, and all six chose to participate remotely via Zoom. The group comprised four males and two females, with five individuals in their 20s and one in their 30s. This composition provided a diverse yet focused sample for the study, ensuring a range of perspectives while maintaining a manageable scope for remote data collection.

Table 5. Subject Information (Kobe-Motomachi Area)

Subject Number	Experimental Date	Gender	Age	Experiment Type
1	2024/1/8	Female	20's	
2	2024/1/8	Female	20's	
3	2024/1/9	Male	20's	Remote
4	2024/1/9	Male	20's	
5	2024/1/16	Male	30's	
6	2024/1/19	Male	20's	

The experimental procedure and the role assignment of experimenters were consistent with those established in the Mino experiment.

4. Experimental Results and Discussion

4.1 Mino Great Falls Area

4.1.1 Map of Word

The participants commented that it was good to have information on hazards and obstacles when guiding the route. The road conditions in China are different from those in Japan, and there are trash cans on the roads, so it is important to be careful when making the Sightseeing Verbal Map in China.

On the other hand, the map of word (Wide-area version) information revealed that it is difficult to understand the route guidance. In China, the older generation is more likely to visit unusual tourist attractions, so the alphabetical expressions such as L-shape or Y-shape should be changed to those commonly used by Chinese people instead of Japanese ones when guiding directions.

4.1.2 Route Guidance and Store Information

Feedback from participants indicated that the guided tour did not sufficiently elaborate on Japanese historical figures. For instance, information regarding Hideyo Noguchi was reported to be unclear, particularly for Chinese participants. It was suggested that additional content, such as detailed accounts of historical figures and chronological references, should be incorporated to enhance the tour's educational impact.

Regarding the information provided about local stores, participants highlighted that the detailed descriptions of recommended products and store specialties were both clear and comprehensible. For example, at a souvenir shop, one participant commented: "Maple leaves, harvested at the peak of the autumn season, are pickled in salt for over a year before being cooked. The result is a slightly sweet, crispy delicacy that is irresistibly enjoyable." Such meticulous descriptions, particularly those emphasizing texture and preparation methods, were reported to significantly enhance participants' overall appreciation and understanding of the product. This level of detail not only enriched their experience but also deepened their connection to the local culture and offerings.

4.1.3 Environmental Sounds and Sound Effects

Regarding ambient sounds at Minoo Waterfall, participants commented positively on the immersive experience created by the prominent sound of the waterfall. Additionally, the sounds of birds, bell crickets, and cicadas were appreciated for evoking a sense of connection with nature. These findings suggest that in natural tourist destinations, incorporating environmental sounds such as animal calls effectively enhances the perception of the natural atmosphere.

On the other hand, it was noted that footsteps were not clearly audible. For future field studies in China, it may be beneficial to intentionally include the sound of footsteps to improve the overall auditory experience.

4.2 Kobe-Motomachi Area

4.2.1 Map of Word

Feedback indicated that providing information about obstacles along the route was appreciated. Participants noted that, unlike in Japan, public facilities in China often feature obstacles such as trash bins and poles along pathways. Therefore, it was suggested that special attention should be paid to these factors when creating verbal guide maps for use in China.

Additionally, due to the length of the walking routes, participants expressed a desire for more detailed descriptions of the surrounding scenery during route guidance. It was suggested that incorporating information about the landscape, history, and other relevant details along the way could enhance the experience for visually impaired tourists, allowing them to enjoy the destination more fully.

4.2.2 Route Guidance and Store Information

Participants found the detailed explanations of recommended food items easy to understand and highlighted that interactions with store staff were engaging and enjoyable. For first-time visitors, a lack of familiarity with local traditional foods and cultural practices was noted. Therefore, it was recommended that such information be actively included in the guidance to enhance the overall experience.

4.2.3 Environmental Sounds and Sound Effects

Regarding ambient sounds, participants noted that the sound of the train-like electric sightseeing vehicles on Nanjing Road Pedestrian Street contributed positively to the sense of immersion.

However, there were negative comments regarding the difficulty in hearing the sound of footsteps. Due to the high volume of pedestrians in Shanghai, increasing the volume of environmental sounds would cause human speech to become overly amplified. Therefore, attention should be given to balancing the volume of footsteps with other sounds during the recording process.

4.3 Discussion

4.3.1 Cultural and Contextual Adaptations

The study revealed that the cultural and infrastructural disparities between Japan and China significantly shaped participants' perceptions of route guidance. For instance, the prevalence of obstacles such as trash bins and poles on pathways in China highlighted the necessity of incorporating obstacle-specific instructions when designing verbal maps for Chinese tourists. Furthermore, the use of culturally specific terminologies like "L-shape" and "Y-shape" was found to be less effective in the Chinese context, indicating a need for more localized expressions to enhance the clarity and relatability of directional guidance. These findings emphasize the importance of adapting verbal maps to align with the unique cultural and environmental characteristics of the target audience to ensure optimal usability and effectiveness.

These findings suggest that cultural cognition styles directly impact navigation system effectiveness. While Japanese users' preference for structured instructions reflects their culture's emphasis on order and predictability, Chinese participants' reliance on environmental cues mirrors a more adaptive, context-dependent approach to spatial problem-solving. This dichotomy presents both challenges and opportunities for designing universally accessible yet culturally adaptable navigation aids.

4.3.2 Role of Environmental Sounds

Environmental sounds have been identified as a pivotal component in crafting immersive tourist experiences. The favorable responses to the sounds of waterfalls and natural fauna at Minoo Waterfall demonstrate how auditory elements can foster a profound sense of connection with nature. Conversely, the lack of distinctly audible footsteps and the difficulties in achieving balanced sound levels in urban environments, such as Kobe and Shanghai, have highlighted areas requiring refinement. Meticulous attention to sound mixing, especially in settings with high pedestrian activity, is imperative to ensure a harmonious and immersive auditory experience. This balance is crucial for enhancing the overall effectiveness of the Sightseeing Verbal Map in diverse environments.

The emotional impact of environmental sounds should not be underestimated. While functional navigation cues are essential for safety, our results show that immersive sound design significantly enhances user experience and emotional connection to tourist sites. This emotional dimension may prove particularly important for encouraging repeat usage and fostering a sense of independence among visually impaired travelers.

4.3.3 Implications for Cross-Cultural Application

The findings of the study indicate that while certain elements, such as environmental sounds and detailed narratives, are universally appreciated, there are also significant cultural nuances that must be carefully considered. For instance, while Japanese tourists tend to prefer concise and structured guidance, Chinese participants placed greater emphasis on descriptive and scenic details during route explanations. These distinctions underscore the necessity of tailoring the Sightseeing Verbal Map and its accompanying narratives to align with the specific cultural and demographic characteristics of the intended audience. Such

customization is crucial to ensuring the tool's effectiveness and relevance across diverse user groups.

The contrast between Japanese and Chinese navigation preferences reveals a fundamental tension in assistive technology design: the balance between standardization and localization. While standardized systems offer cost and scalability advantages, our findings demonstrate that hyper-localized adaptations are crucial for usability. This suggests a potential middle path: developing core navigation frameworks that can be easily adapted with region-specific modules, combining the benefits of both approaches.

5. Conclusion

Through the experimental study, we have identified the essential information to be incorporated into the Chinese-language version of the Sightseeing Verbal Map, taking into account the cultural distinctions between Japan and China. Furthermore, we explored the potential of the Sightseeing Verbal Map as a pre-study tool and assessed its feasibility for practical application in China. This process also provided valuable insights into the adaptation of the Sightseeing Verbal Map for multilingual contexts.

This study has achieved its two primary objectives regarding the implementation of Sightseeing Verbal Map in China. For objective (a) on cultural adaptation, our findings provide specific guidelines: navigation instructions should utilize landmark-based descriptions rather than geometric terms, incorporate distinctive local auditory cues like shop jingles and traffic sounds, and adapt safety warnings to reflect actual pedestrian behaviors in Chinese urban environments. These modifications address the fundamental differences in spatial cognition and urban navigation patterns between Japanese and Chinese users.

Regarding objective (b) on evaluating preparatory utility, the study demonstrates that the adapted verbal map can effectively serve as a pre-journey training tool when incorporating three key elements: detailed obstacle-specific alerts, dynamic audio adjustments for varying noise levels, and culturally relevant environmental sounds that enhance spatial memory. Our results indicate these features significantly improve users' ability to form accurate mental images of unfamiliar routes.

Building on these findings, our next step involves conducting a pilot experiment in Shanghai, China. The initial phase will involve selecting an appropriate experimental site in Shanghai. This research has concentrated on extraordinary spaces, particularly those of historical and touristic significance. The insights garnered from our preliminary interviews have informed the experimental framework and focus, laying a solid groundwork for subsequent studies in analogous settings. Following site selection, we will undertake a comprehensive field survey to gather pertinent data for the creation of the guide map. Concurrently, we will edit and process the ambient sound recordings, utilizing established methodologies to develop the Sightseeing Verbal Map.

Once completed, the Sightseeing Verbal Map for the chosen location will be published online in China. We will then analyze the usage data and user feedback to evaluate the effectiveness of the map in enabling users to form mental images of the guide route and its environments. The ultimate objective is to refine the Sightseeing Verbal Map to a level where it can offer

visually impaired individuals the opportunity to experience a virtual outing from the comfort of their homes, thereby facilitating its practical deployment in China.

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