

Mapping the Emotional Landscapes of Users with Acquired Blindness in Public Spaces

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Introduction

Emotional mapping has been used as a tool to generate data that can help assess the public's perception [1]. We aim to apply a similar process to identify inequities and accessibility concerns in public infrastructure. We concern ourselves with the blind and low-vision (BLV) community looking at specifically those who have acquired blindness over their lifetime. These users have developed their own methods to discover the spaces they visit through the means of assistive technologies and aids.

Leisure refers to free time that is not occupied by work, responsibilities, or essential activities, allowing individuals to engage in activities of their own choice for relaxation, enjoyment, or personal fulfillment. It is often associated with recreation, entertainment, hobbies, or simply doing nothing. The key characteristic of leisure is to afford the individual freedom of choice. It is a highly subjective activity employed by an individual to relax or achieve personal fulfillment. Some example leisure activities include reading, painting, exercising, traveling, exploring nature, playing games, socializing, or simply resting.

As leisure is usually practiced in public spaces, the design of such spaces is a key contributor to the quality of the experience. Care is usually taken to optimally facilitate experiences like exercise, casual resting, playing sports or games, etc. in public spaces such as parks. Such care is often not inclusive. Members of the BLV community interested in engaging in leisure in public spaces face unique challenges.

The goal of the study is to examine what leisure looks like in public spaces through emotional maps generated by members of the BLV community alongside the reasons that evoked those emotions. The results from the study can help us define design guidelines for public spaces to facilitate easier, more accessible discovery of such spaces. The study will also help create a database of emotional and physical cues for other users with acquired blindness looking to explore leisure.

Methods

2.1 Leisure Observation Baseline

On November 15th, we visited Piedmont Park to conduct a self-reflective exercise aimed at mapping our own emotions while engaging in leisure activities and observing others in similar contexts. This served as a preparatory exercise for the emotional mapping activity planned with study participants. The visit lasted approximately two hours and included both walking around the park and sitting on a bench to make detailed observations.

Timeline and Observations

During our walk, we focused on identifying and reflecting upon our emotional states and their underlying causes. We found that our sense of relaxation stemmed from various environmental factors, including the absence of vehicular noise, the soft sunlight, the sound of rustling leaves, and the overall pleasant weather. Additionally, the sight of other individuals enjoying leisure activities, such as walking or sitting in groups, contributed to our feelings of calmness. Notably, visual stimuli played a significant role in shaping our emotional responses.

After the walk, we seated ourselves on a bench to observe how others engaged with the park. We recorded a range of leisure activities, such as individuals listening to music, jogging, and walking their dogs. We also observed couples conversing while seated or lying on the grass, as well as children fishing near the pond. The park's infrastructure—comprising paved and dirt paths, benches, ponds, and expansive grassy areas—seemed to facilitate these diverse activities and contribute to the overall atmosphere of relaxation and recreation.

Reflections on Emotional Mapping and Accessibility

This exercise allowed us to analyze how physical spaces influence emotional experiences and demonstrated the significant impact of visual and sensory cues, as well as the familiarity of a place, on emotional states. Importantly, this reflection led us to consider how blind or low-vision (BLV) individuals might experience large, open spaces like a park. We questioned how they navigate such environments and engage in leisure activities, which will be a key focus of this study.



Figure 1, 2: Images from researcher's baseline leisure experiences in Piedmont Park.

2.2 Emotional Mapping

As part of our research, we conducted a pilot study with a participant, Alonso Zubillaga, who was introduced to us by Dr. Stangl. Initial contact was established via a phone call during which we introduced ourselves and outlined the objectives of our project.

Study Context and Locations

To conduct the emotional mapping interview, we met Alonso on November 19th and visited several locations, including the Lenox MARTA station, the Buckhead MARTA station, a park near Tower Place, and his apartment building. The session lasted approximately three hours, encompassing time spent at these locations and commuting between them.

Study Procedure

The session began with an introductory interview to understand Alonso's background and condition. We posed open-ended questions, such as, "*Can you explain your blindness to us?*" and "*What do you do?*". Alonso responded candidly, providing detailed insights into his experiences.

Following this initial interaction, we proceeded to the Buckhead MARTA station and walked to Tower Place Park. Alonso shared that he learned to navigate this area with his guide and now often visited the park to relax between work commitments and meeting his wife who worked nearby. During this phase, we employed a think-aloud protocol, encouraging Alonso to verbalize his thoughts and emotions as he walked.

Next, we attempted to book The Buck, a free shuttle service in Buckhead, to travel to Alonso's apartment. However, the service was unavailable due to evening rain and traffic. As an alternative, we walked back to Buckhead MARTA station, took the MARTA to Lindbergh station, and subsequently to Lenox station. From there, we walked approximately 15 minutes to Alonso's home.

At his residence, Alonso shared additional aspects of his life. He played the steel drum for us and introduced his family. In the apartment courtyard, he performed fire poi, an art form involving swinging weighted balls with flame-resistant wicks attached to the ends, manipulated in a dance-like manner.



Figure 4, 5, 6: Alonso navigating his way in the park.



Figure 7, 8: Alonso in his apartment playing steel drum, in his courtyard performing fire poi.

Reflections on Methodology

To conclude the session, we asked Alonso to reflect on the exercise and his experience. While the emotional mapping process provided valuable insights, annotating emotions in real-time proved challenging, as it risked disrupting the participant's natural expression. To mitigate this, we audio-recorded the entire session and subsequently annotated the emotions on a map the following day.

This pilot study highlighted the complexities of capturing nuanced emotional data in situ while ensuring the participant's comfort and engagement. It also provided critical insights into refining our approach for future sessions.

Following are the emotional maps generated from this pilot study.

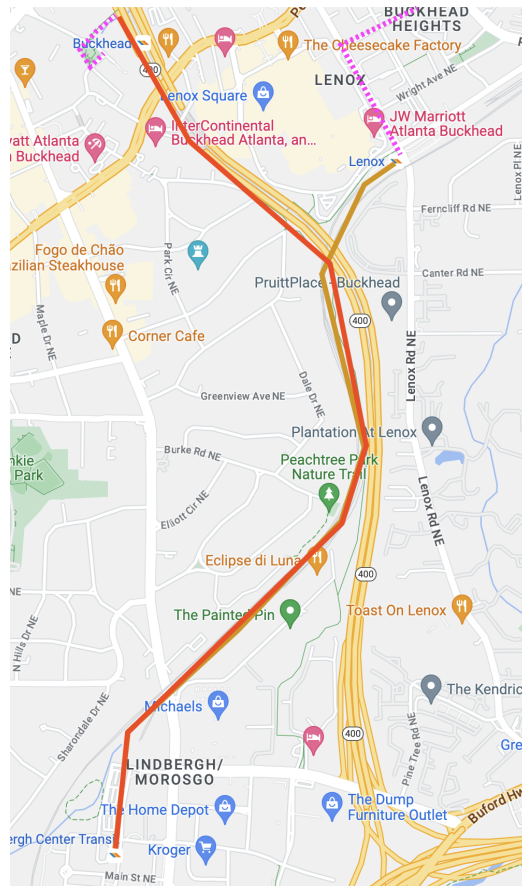


Figure 6: Overall journey for the interview.

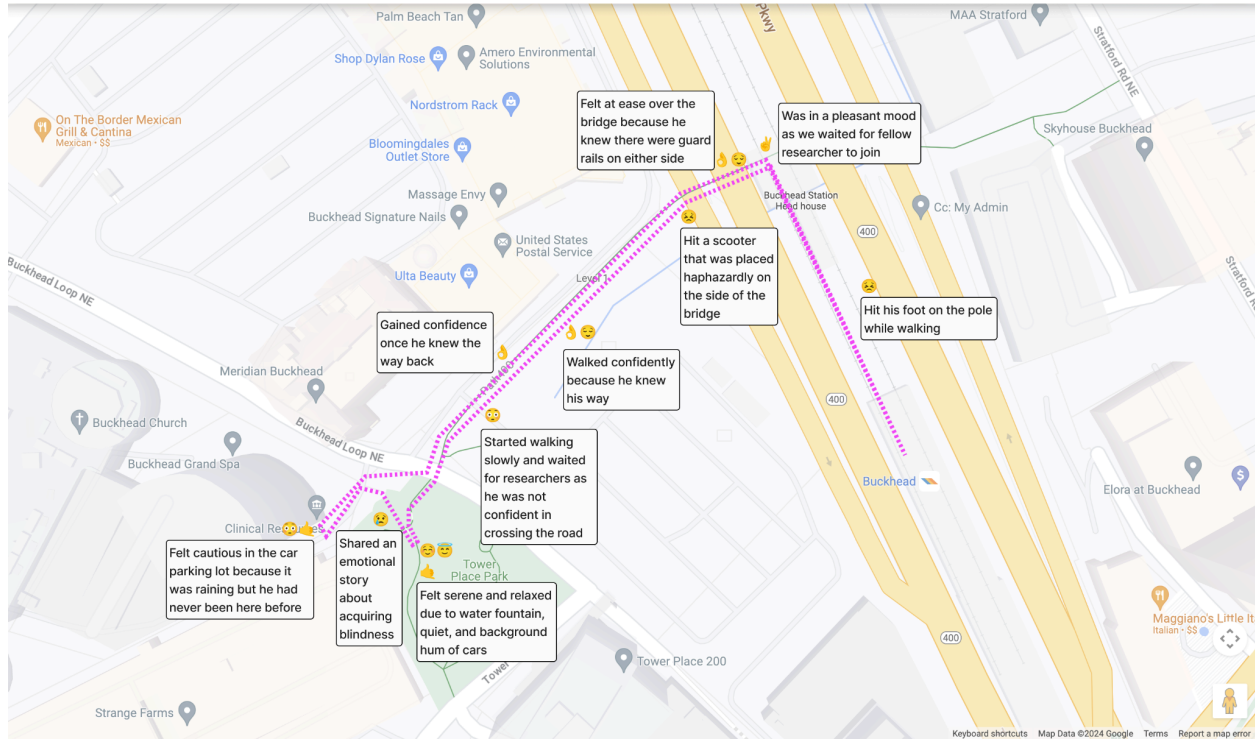


Figure 7: Emotional Map of Buckhead Station and Tower Place Park.

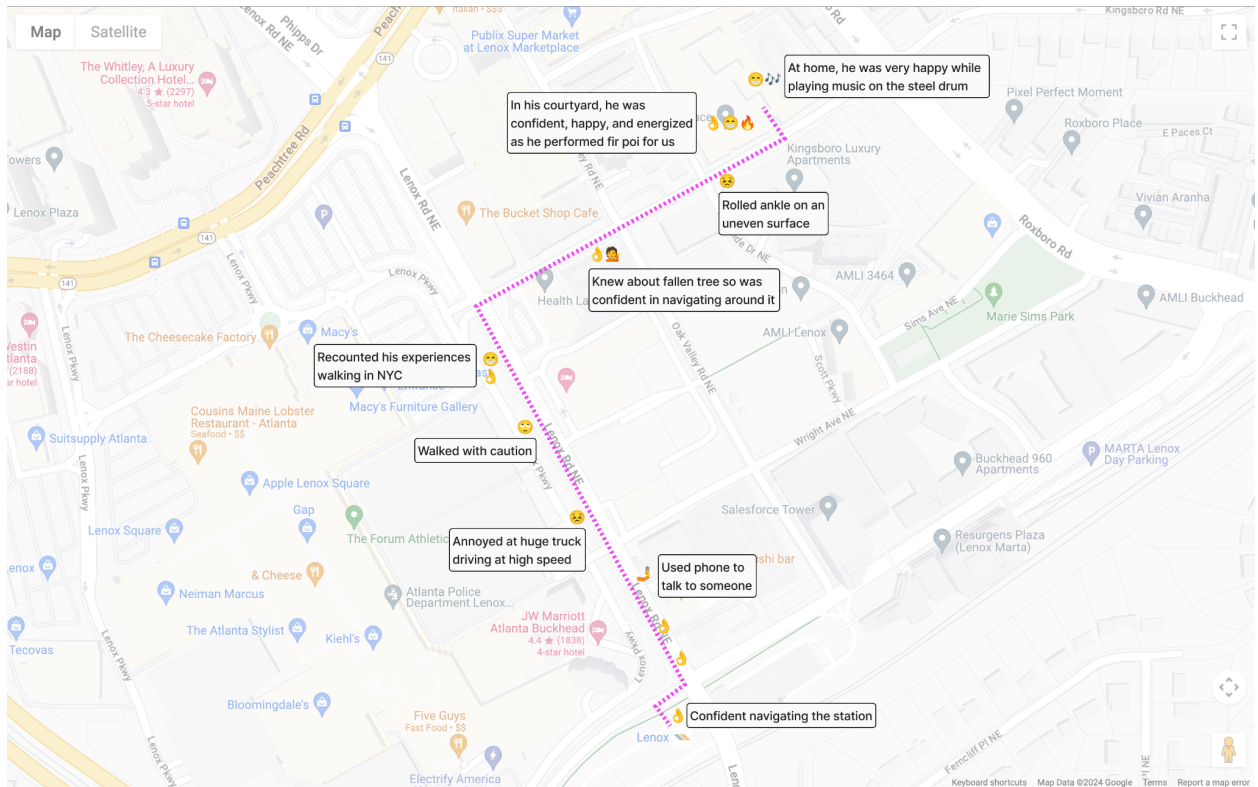


Figure 8: Emotional Map of Lenox Station and walk to participant's home.

2.3 Focus Group with Support Group at Center for Visually Impaired

In our initial conversation with Alonso which occurred over the phone, he generously offered for us to sit in on a support group he attends every Thursday. The objective of this mission for us as researchers was to quietly observe and when the time came, explain our project to understand the feeling in the room and hopefully build a network within the BLV community to understand the context of our problem more richly.

Study Context and Locations

The support group meeting took place on a particularly windy November 21st at the Center for Visually Impaired in Atlanta's Midtown area. We arranged with Alonso to meet a little before the session began. However, we arrived a little earlier than him and we were kindly guided to the right room by another member of the support group. We observed that the individual guiding us used his own mental model of the building while occasionally asking us if he was going the right way (towards the correct elevator car, for example). The individual also used the Braille on the elevator buttons and room signs to determine his route and destination.

Study Timeline and Observations

The support group session lasted from 1 PM to 2.30 PM. It began with everyone arriving and greeting each other. Thirteen individuals (11 of them had visual impairment conditions, 2 of them were partners of attendees there for moral support and notetaking) were in person in the room while another 5-6 joined over the phone. The moderator of the group began the session by describing how the session would unfold and laying down some ground rules such as identifying ourselves by name before making any remarks during the session. This was to respectfully let the group know who was speaking. The moderator then asked that everyone introduce themselves by name and announce their vision condition. When it was our turn, we identified ourselves as sighted individuals who were students in Georgia Tech's Master's in Human-Computer Interaction program and said that we had been invited there by Alonso to observe for our research.

After the introductions, the moderator requested Alonso to have us describe our project in depth. At this point, we laid out our intentions for the emotional mapping project as well as our question for them (paraphrased here): "*What does leisure mean to you and where do you experience it?*". We offered up our own experience at Piedmont the past weekend as an example of leisure to get the conversation flowing.

While we only intended to take up a few minutes of their time and gather some quick thoughts on our question, the group were enthusiastic and the discussion took on a life of its own. The rest of the session was spent discussing aspects of blindness, leisure, their intersections and divergences. Below is a compilation of observations from the session:

- The group was pretty diverse both in background (teacher, musicians, engineer, content creator, massage therapist) and vision condition (fully blind, partially blind, acquiring blindness).
- The group immediately jumped into a solutioning phase by suggesting a variety of traditional skill-based and modern tech-based solutions (some solutions aimed at improving navigation which, in turn, would enhance the experience of leisure):
 - White cane
 - Textured maps, raised maps (Alonso mentioned this from his interactions with Dr Stangl)
 - Be My Eyes
 - Seeing AI
 - Vibrating bracelets you can wear on your wrist or cane to improve your spatial awareness - this was offered as an alternative to those who seemed resistive or hesitant to use a white cane when navigating large, crowded spaces such as shopping malls
 - Virtual reality
 - Speech-to-text and text-to-speech
 - Voice search and voice-based communication
 - Audible
 - GLASS Library, Georgia (now the Georgia Library Service for the Blind and Print Disabled)
 - Meta RayBans
- The group seemed to initially think that our project involved reimagining how people experienced leisure in parks and offered up textured walkways and maps as a solution. They described how maps could outline longer and shorter trails in different textures so that they could accordingly prepare themselves. They also mentioned including a legend on such maps that could also be used to highlight the location and proximity of restrooms, water fountains, rain shelters and other park amenities.
- A different suggestion stressed the utility of voiceover. An idea offered up by the group described a white cane fitted with proximity or location sensors that could detect park landmarks and trigger voice descriptions of the location to aid in better grounding and spatial awareness for the individual. This, coupled with Braille, were mentioned as bare necessities when making spaces accessible for BLV individuals.
- Some in the group also held the opinion that it might be easier, cheaper and faster to fold in accessible changes to existing technology rather than invent new technology to support BLV use cases. In the context of movie theatres, the individual mentioned that Braille could be used on existing signs outside movie halls to indicate which movie was playing where.

Some notable quotes from the session have been included below:

- On the need for textured/raised maps at public spaces like parks:
“if it helps the vision impaired, it helps everyone”
- While expressing reluctance towards adopting new technology created for BLV individuals:
“I’m old school, I didn’t play with all the things that these young kids play with... so how am I supposed to know what represents a bathroom, what represents a water fountain, what represents a bridge?”

While on the flip side, some expressed enthusiasm and excitement for tech breakthroughs:

“I can’t wait for the Meta RayBans”

- On ADA seating:
ADA seating at places of leisure helps their experience both on an individual as well as the company with whom they visit these places.
 - “[ADA seating]... usually comes with suites with top seats, food and drink...”
 - “... you have a bathroom near and a concession stand near you so you don’t have to spend half the concert trying to find a suitable place”
- On interdependence and independence:
While interdependence is nice, independence is necessary:
 - “Using a white cane can sometimes make you an easy target”
 - “We need to show up for ourselves”
 - “Need to advocate for myself”
- On navigational hazards:
“for visually impaired people, those scooters are like landmines”
- On reconnecting with nature while on a trail in the Fernbank:
[paraphrased] “What I remember is the smell... all my other senses were capturing so much more than before”

After the meeting, when we compiled our observations, the list of places the group members mentioned in the context of experiencing leisure were as follows:

- Parks
- Movie theatres
- The ballet
- Sports games (Hawks, Falcons)
- Zoos
- Fernbank
- Concerts
- Shopping at a store (stressed that it is leisurely when early in the day as it is less crowded)
- Going to the mall
- Being out in nature

Reflections on Methodology

Similar to the individual contextual inquiry where we intended to generate emotional maps, we found it challenging to capture and annotate this information in real-time and so fell back to allow the conversation to unfold organically and then annotate post-hoc. It also seemed intrusive to interrupt what was their regular support group meeting to harvest information for our study. A suggestion would be to clearly express prior to such sessions how the session would unfold and what the expectations of the participants would be.

We believe that the true challenge lies in expressing what the researchers mean by leisure and what we anticipate as an answer. To this end, it would be quite beneficial for researchers in future sessions held with BLV individuals to prime them with examples of their own experiences with leisure and emotional journeys contained within. For example, once we described our experience at Piedmont and the impact the visuals and scenery had on our relaxation, the participants expressed their own emotional journeys when attempting to experience leisure.

Data Analysis

Data analysis was primarily conducted through qualitative methods.

Qualitative Analysis. For qualitative analysis, we applied thematic coding to our leisure observations, Alonso's narrative responses, and narratives we heard at the support group. We identified common themes related to sensory perceptions and emotional responses within specific spaces. We conducted open coding to identify emerging themes and axial coding to explore relationships between categories, such as sensory perceptions (e.g., auditory, tactile cues) and emotional responses (e.g., relaxation, anxiety) in different areas of the space. This process highlighted how environmental factors—like crowd density, seating, soundscapes, and pathway textures—shaped participants' comfort and safety, providing a nuanced picture of their sensory and emotional experiences.

Spatial-emotional mapping. Additionally, spatial-emotional mapping integrated all collected data, highlighting areas where physical or sensory elements correlated with positive or negative emotions.

Findings

I. Research Question: What sensory and environmental factors contribute to or detract from sighted individuals' well-being in public spaces?

Data Sources: Observation in Piedmont Park, findings from own experiences with leisure, reading related work

Findings:

1. **Affordances for Leisure Activities:**

Physical features of public spaces provide affordances that enable a range of leisure activities. For example, curved, sloping concrete paths encouraged walking and jogging, while expansive grassy areas offered opportunities for sitting and relaxing. The pond served as a designated area for fishing, while park benches and swings facilitated a variety of sedentary activities such as conversing, reading, writing, and listening to music. Collectively, these features allowed the park to accommodate diverse forms of leisure.

2. **Impact of Visual Cues on Mood and Behavior:**

Visual cues played a pivotal role in shaping emotional states and informing behavior. The absence of vehicles and traffic enabled free movement, while the presence of natural features such as trees, dirt paths, and ponds contributed to a sense of calm. Seasonal elements, like the soft winter sunlight, encouraged slower, more relaxed pacing. Sparse crowds further promoted opportunities to sit and engage in quiet activities. Observing others partaking in leisure activities fostered a sense of safety and encouraged relaxation. Thus, visual cues emerged as the primary contributor to a relaxed emotional state.

II. Research Question: What sensory and environmental factors contribute to or detract from visually impaired individuals' well-being in public spaces?

Data Sources: Emotional Mapping exercise with Alonso, focus group with Center for the Visually Impaired members.

Findings:

1. **Role of Textural Cues in Navigation and Emotional State:**

Textural cues were instrumental in facilitating navigation and enhancing emotional well-being. Alonso highlighted the importance of tactile markers, such as the textured dots on MARTA platforms, which help guide movement. He also described recognizing changes in texture, such as slippery metal surfaces, to anticipate obstacles. Physical barriers like nets along bridges provided a sense of safety. Similarly, CVI members emphasized the role of textural feedback in fostering freedom, such as feeling grass underfoot or having an embossed map of an open space to know where different amenities like bathrooms are located.

2. **Challenges Posed by Inconsistent and Unanticipated Objects:**

Unpredictable environmental elements often detract from the well-being of visually impaired individuals. For example, one CVI participant likened electric scooters left on sidewalks to "land mines." This issue was observed firsthand when Alonso encountered two scooters blocking his path. Similarly, the absence of standard accessibility features, such as curb cuts and even sidewalks, was reported as a significant barrier, making leisure activities like walking unpleasant or unsafe.

3. **Importance of Interdependence in Navigating Public Spaces:**

Trust in others was a recurring theme that contributed to emotional well-being. Alonso demonstrated this during his interview by requesting to hold one of the researcher's elbow, which simplified navigation for everybody involved. He attributed his confidence in

unfamiliar spaces to the support of trusted individuals and familiarity developed through prior guidance. For example, his wife provided verbal cues while he performed fire poi. Similarly, CVI members frequently described attending leisure activities—such as sports games, concerts, and parks—with trusted companions, which eased navigation challenges. A sighted participant in the focus group noted the importance of encouraging others to proactively assist visually impaired individuals. These interactions underscored the reliance on social support for navigating and enjoying public spaces safely.

III. Research Question: How do visually impaired individuals experience leisure?

Data Sources: Emotional Mapping exercise with Alonso, focus group with Center for the Visually Impaired members.

Findings:

1. Freedom from Navigational and Environmental Worries Enhances Relaxation

A central factor enabling leisure for visually impaired individuals we observed, is the ability to focus solely on the activity without concern for navigation, obstacles, or surrounding individuals. Alonso highlighted his neighborhood park as a preferred leisure space due to its limited foot traffic and proximity to a main road, which provided a sense of security. Similarly, in familiar environments such as his home, we observed Alonso to be most relaxed and engaged—playing the steel drum or practicing fire poi in the courtyard—where he did not need to allocate mental effort to navigating his surroundings. Focus group participants echoed this sentiment, citing examples such as enjoying the sensory experience of the Fernbank Museum or visiting grocery stores during off-peak hours to avoid crowds. These scenarios underscored that the ability to concentrate on the leisure activity itself, free from external worries, is a key component of relaxation.

2. Familiarity Fosters Confidence and Enables Leisure Engagement

Familiar environments or routines facilitate confidence, allowing individuals to anticipate their surroundings and fully engage in leisure activities. Alonso expressed a preference for MARTA transit, as his residual vision prior to complete blindness had familiarized him with its layout and functioning. This familiarity reduced cognitive load, enabling him to navigate effortlessly. Similarly, CVI members noted that revisiting known locations or adhering to familiar patterns helped them feel more secure and able to focus on leisure.

3. Sensory and Auditory Focal Points Enhance Relaxation

In the absence of visual cues, other sensory elements often serve as focal points that enhance the leisure experience. For example, Alonso mentioned being drawn to the sound of water in the Tower Place park, which contributed to his sense of relaxation. Focus group participants described engaging in leisure activities such as attending sports games or concerts, where auditory and tactile stimuli provided a more immersive experience compared to passive activities like sitting in a park. These insights highlight the importance of designing leisure spaces that integrate multisensory features to accommodate visually impaired individuals.

4. Social Cues and Recognition Shape the Leisure Experience

Awareness and recognition of their visual impairment by others can significantly

influence how visually impaired individuals experience leisure. Many focus group participants mentioned that visible cues, such as a white cane or specialized eyeglasses, often prompted sighted individuals to offer assistance, contributing to a greater sense of ease and relaxation. Conversely, Alonso highlighted potential vulnerabilities, noting that his sister uses a guide dog partly as a deterrent against scammers who might target visually impaired individuals. These divergent experiences illustrate the complex interplay between social recognition and personal safety in shaping leisure for individuals across the blindness spectrum.

Future Work

Recommendations for researchers: Any researchers planning on continuing this study should visit a place of leisure and establish a leisure observation baseline for themselves. This will help them to understand the emotions that come up for them and link them to the physical space.

Recommendations for Co-Design Artifacts: While conducting the emotional mapping exercise with Alonso we recognized that asking him to map emotions while walking and talking would prove to be too difficult and ultimately take away from the study. Instead, we propose that future iterations involve recording audio and asking pointed questions like “What are you feeling right now? Why?” to capture the emotions of the participant. Researchers can then either map the emotions on the map themselves or provide the recording to the participant and ask them to plot points on Google/Apple Maps and provide a copy to the researchers. This method will allow both researchers and participants to focus on the moment and allow free flow of thought.

Study Limitations: This was just a pilot of the proposed study and its results cannot be generalized or reported in their current form. The study was a pilot to understand the nuances of conducting it with multiple participants.

Future Research Directions: Future work for this study must include establishing contact with Rosa, Alonso, and the Center for the Visually Impaired in Midtown Atlanta. Attending support groups there will provide researchers with a deeper understanding of various types of blindness and how various individuals deal with them. This knowledge will prove helpful in making more authentic conclusions from the data collected. The center will also allow researchers to recruit more participants for the study.

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