



# The Neurodiverse City

## Report on Neurodivergence Research, Technology, and Public Space

by Lucy Jiang, PiTech Impact Fellow 2024

This work was conducted while I was a Siegel Family Endowment PiTech PhD Impact Fellow in 2024 and joined the Design Trust as a researcher of the Neurodiverse City project.

In this report, I contribute insights on designing a technological tool for assessing public spaces for neuroinclusivity and synthesize perspectives from the neurodivergent community, human-computer interaction and accessibility, and architecture and urban planning. I first describe the background and initial learnings grounding the project. Then, I share findings from interviews with Design Trust partners and neurodivergent advisory committee members and describe the process by which we created the final evaluation strategy. Finally, we close with a discussion of recommendations for researchers and designers aiming to make public spaces more accessible for neurodivergent people.

### Background and Initial Learnings

As a PiTech Fellow working on the Neurodiverse City (NDC) project, my goals were twofold:

- 1. Study available technologies and their relevance for evaluating public spaces, and
- 2. Create and test evaluation strategies with and for neurodivergent (ND) people.

Through this project, we do not necessarily aim to rigorously determine exactly what makes all spaces more accessible to all neurodivergent people, as we understand that this will be a continuous effort rather than one single solution. Instead, we aim to design and develop user-led solutions to provide decision-makers – such as researchers, designers, and policy makers – with more information on current access issues and ideas for how to make surveyed public spaces more accessible and enjoyable to the neurodivergent community.

While these technologies are intended to be used in the short term for a pre- and post-occupation evaluation of two specific public spaces, the streetscape at 200 Water Street and the playground at Public School 112, we hope that our findings from this work can inform future research and work on neurodivergent public space accessibility in any urban spaces, extending beyond the scope of these place-based efforts in New York City.

### Interviews with Partners (VCA & WIP)

This project is co-led by the [Design Trust for Public Space](#), [Verona Carpenter Architects \(VCA\)](#), and [WIP Collaborative](#). As part of my onboarding process, I interviewed both partners to better understand their prior and ongoing efforts, which included in-person audits with neurodivergent community members and drafts of surveys to collect feedback more broadly.

Through the interviews, both organizations emphasized that the findings from the audits are preliminary and not generalizable. The audits included methods such as annotating maps, surveys, and interviews. The audits illuminated that *“predictability is helpful for parents to help motivate kids to go to a playground”* and that there is still a need for better tools for working with less verbal or nonverbal participants, with suggestions such as a *“visual communication board / GoPro style cameras that kids can wear while playing, with permission.”*

Neurodiverse City streetscape  
audit with an instant print camera

photo by Katt Manzueta







## Design Dimensions for the Evaluation Tool

The interviews helped with identifying **four binary design dimensions** to guide the design of our evaluation strategy: synchronous vs. asynchronous, text-based vs. multimodal, guided vs. unguided, and group vs. individual.

- Both organizations wished to gather feedback from ND people **synchronously and asynchronously**, as they found that only recording what happened while conducting an audit at a site was fairly limiting. They felt as though asynchronous feedback, which could be collected through methods such as diary studies or standard surveys, would allow for greater participation and more longitudinal data collection about different days, times, and weather conditions.
- Both organizations were also interested in **multimodal** feedback, which could include photos, video, audio, etc. These modes of feedback may be more accessible for ND people by asking the same question in diverse ways and by allowing participants to choose their preferred method of communication.
- Both organizations valued **unguided** evaluations supplemented with some open-ended questions to scaffold inquiry, especially given concerns with researcher presence yielding biased results. While they acknowledged that this may not be possible given the nature of the pre- and post-occupation evaluations as part of the NDC project, we aim to reduce the amount of researcher guidance necessary for completing the evaluation – not only does this allow ND people more agency, but it can also be a step towards developing solutions to collect feedback asynchronously. Open-ended questions should be broad to allow ND people to freely express their feedback; however, including some examples and additional scaffolding could also help to avoid potential confusion or overwhelm.
- Lastly, the organizations had differing preferences for whether to have the evaluations in groups or individually. Whereas VCA preferred **individual interactions** for their playground evaluations, given some challenges with working with a large group of children, WIP preferred **group assessments** to enable more collective participation.

Participant of streetscape audit  
annotating their photos

photo by Katt Manzueta



## Interviews with Neurodivergent Self-Advocates

I also had a chance to interview neurodivergent self-advocate, [Jezz Chung](#) (they/them), to better understand their experiences and preferences with regards to public space. They also highlighted some valuable insights about some potential technologies that could either make spaces more accessible or aid in the evaluation of assessing public spaces.

In terms of the sensory experience of public spaces, Chung shared that they liked being able to see, hear, and feel all of the elements: heat from the sun, grass and earth, openness and fresh air, and seeing a body of water. In particular, they strongly valued hearing the sounds of nature and mentioned that having at least one element of natural noise could balance ambient city noise (e.g., cars, sirens, etc.) For the senses of smell and touch, they mentioned that they always carry essential oils with them to neutralize the odors of the city and fidget / stim toys or soft items to reduce stress.

They mentioned that some technologies could help with making a space more accessible or engaging. For example, they liked LinkNYC kiosks for learning information about the history and context of a place, and suggested that smart glasses could be useful for this in the coming years. While they preferred writing things physically, they acknowledged that having options to participate through physical and digital options would be valuable.

They also shared their thoughts regarding the four survey design dimensions (synchronous vs. asynchronous, text-based vs. multimodal, guided vs. unguided, and group vs. individual). They advocated for both individual and group assessments, as individual evaluations allow for sharing personal experiences without being influenced by a group, while group settings do involve mutual influence but are more similar to how people would realistically interact in a shared space. They did not have a preference for synchronous or asynchronous feedback, and preferred having as many modalities for engaging as possible (e.g., drawings). They also preferred unguided evaluations for the purposes of having greater agency.

During the conversation, Chung expressed that making public spaces more accessible went beyond making the place itself accessible – many ND people may require more time to “wind up” to go outside, so we must consider how to support and encourage ND people to go to the aforementioned public spaces when staying indoors may be a more predictable and safe option. Furthermore, they emphasized that having more information about how other ND people experienced a space was helpful.

Discussing colors and textures  
with self-advocates

photo by Katt Manzueta







## Selecting the Specific Evaluation Tool

This led us to select a **survey** as the primary public space assessment method, as this allowed for large-scale data collection of ND people's prior public space experiences. As with all data collection, and especially for historically marginalized groups, it is crucial to protect participant privacy and respect their anonymity.

## Data to Collect

Based on the interviews with partners and ND self-advocates, I identified multiple types of data that could be valuable to collect as part of these evaluations. Collecting this data in the survey helps facilitate the implementation of the design dimensions (e.g., supporting photo or video input is an example of multimodality, while allowing someone to enter time of day and date allows for an asynchronous evaluation).

- Time of day and date
  - Time of day can be helpful for exploring amount of shade
  - Date can also impact experiences based on seasons
- Location
  - Can determine a person's proximity to a fire or police station (correlated with likelihood of hearing sirens)
- Open ended feedback about a person's overall experience
  - Can include sensory information, meaning information received through senses such as sights, sounds, smells, etc.
  - Can be in the form of annotated photos, videos, audio recordings, doodles, written text, etc.
  - Can include any additional feedback, in any modality, on a person's overall experience, thoughts, etc.
- Photo or video of the space from the person's perspective
- Measurements, if possible
  - E.g., using the [SoundPrint app](#) to determine the sound level of a space, estimating the number of people present, etc.

Playground ideation session with  
PK, OK, O1, O2, and SE students

photo by Katt Manzueta



Technology Assessment

Our technology assessment yielded six primary technology “types”: survey, tracker, map, whiteboard, posting, and measurement. We propose that these could be combined together for richer data collection (e.g., submitting an annotated map as part of a survey workflow). Below, we present a table containing a variety of technologies that we explored. Each of these technologies may be helpful for a variety of stakeholders, including researchers, ND people, caretakers, and policymakers. For example, having more freeform whiteboard environments (such as Miro) may help ND people express their thoughts about a public space in a less linear way than is somewhat enforced by a form interface. However, this may pose additional limitations for researchers conducting data analysis, as there would likely be less overlap across different people’s responses in such a freeform environment compared to a scaffolded form.

Upon comparing the options among the different types (assessing for familiarity, ease of access, etc.), we have highlighted three rows that we believe could be the basis of a couple of workflows for evaluation.

When comparing survey platforms, though there are a handful of geolocated options, we determined that ease of use, familiarity, and privacy superseded the need for having a user’s precise location, especially as this is something that they can self-report.

As mentioned above, multiple technologies can be used in concert to provide richer feedback for different scenarios. For example, the combination of a survey (Google Forms), map (Annotation), and Measurement (SoundPrint) could work in tandem with a whiteboarding application (Miro), where groups of participants in an audit can fill out the survey and annotate their maps, then use the whiteboard to compare and contrast their annotations and overall thoughts about a space. For everyday feedback, participants could also fill out the survey with an annotated map and a sound level measurement. If they wish to share their thoughts beyond the repository of responses in the survey, they may share their thoughts on a social media platform such as Instagram.

Survey Assessment

We tested our survey prototype both internally at Rockefeller Park with Design Trust staff and with attendees of a Public Space Potluck held at the Socrates Sculpture Park in Astoria. Through these two pilot studies, we gained insights that helped us refine our survey design to have greater clarity and focus. We synthesize these findings into recommendations for a variety of stakeholders, presented in the following section.

Technology	Type / Involvement	Information Gathered
<a href="#">SurveyCTO</a>	Survey / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location</li><li>Potentially multimodal information</li></ul>
<a href="#">Maptionnaire</a>	Survey / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location</li><li>Potentially multimodal information</li></ul>
<a href="#">Qualtrics Offline App</a>	Survey / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location</li><li>Potentially multimodal information</li></ul>
<a href="#">Google Forms</a>	Survey / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li><li>Multimodal information</li></ul>
<a href="#">EthOS Photovoice</a>	Survey / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>Multimodal information</li></ul>
<a href="#">AirTags</a>	Tracker / Passive	<ul style="list-style-type: none"><li>User’s location</li></ul>
<a href="#">Annotation</a>	Map / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li><li>Multimodal information</li></ul>
<a href="#">Google My Maps</a>	Map / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li></ul>
<a href="#">OpenStreetMap</a>	Map / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li></ul>
<a href="#">Miro</a>	Whiteboard / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li><li>Multimodal information</li><li>Freeform whiteboard environment</li></ul>
<a href="#">Instagram</a>	Posting / Active	<ul style="list-style-type: none"><li>Qualitative responses</li><li>User’s location (self-reported)</li><li>Multimodal information</li><li>Freeform caption box</li></ul>
<a href="#">SoundPrint</a>	Measurement / Active	<ul style="list-style-type: none"><li>Decibel level of an environment</li><li>User’s location</li></ul>



Recommendations

As with above, our recommendations do not center on how to make public spaces themselves more accessible, as people have a wide range of preferences and every public space is different. Rather, based on our findings, we present methodological recommendations for a wide variety of stakeholders aiming to investigate neurodivergent public space accessibility.

We recommend that researchers and designers follow existing guidelines and best practices for working with ND populations. For example, all materials, including recruitment and study materials, should use non-technical and unambiguous language [AbilityNet, Mack et al. 2022] to reduce miscommunications and prevent information overload. Other sources suggest writing at a 6th to 8th grade reading level to ensure broader readability [Adobe Spectrum, Michigan Tech]. Additionally, for synchronous studies, allow participants flexibility based on their energy levels, sensory needs, or other in-the-moment changes [Autistica, Mack et al. 2022]. Providing multimodal methods for engaging are also essential given the diversity of neurodivergent people’s preferred ways of expressing themselves [Mack et al. 2022, Gualano and Jiang et al. 2024].

We also propose additional recommendations for researchers and designers:

- Public spaces are often unpredictable and can undergo rapid change, and each person’s mood or experience of a space can vary greatly. As such, we recommend that designers do not consider a single data point as the ground truth for a public space. For example, temporary winter installations at Bryant Park, large-scale concerts on specific days in Central Park, or even changing levels of shade throughout the day in any public park can impact a person’s comfort and access to a space. Therefore, we suggest for researchers and designers to consider assessment methods that support gathering multiple data points for the same public space, with samples representing different times of day, various seasons, and different cultural events.
- Methods to assess public space must also consider the temporal aspects associated with providing feedback. Whereas real-time feedback mitigates recall bias [Salesforce], there may be times when ND people have a reaction in real-time but do not wish to note it down in the moment and further their discomfort. They may also wish to have additional time to process their thoughts before sharing them with others. For example, if they left a public space feeling uncomfortable and overwhelmed, they might want to think about the specific factors that caused that experience. However, others

Neurodiverse City - Public Space Accessibility Assessment

Prototype of our NDC Public Space Accessibility Assessment!

Most of the questions on this survey are optional - please fill out the ones that you are interested in answering. Your email will be collected due to form requirements / to avoid spam.

ljiang@designtrust.org Switch account

The name, email, and photo associated with your Google account will be recorded when you upload files and submit this form

\* Indicates required question

Email \*

☐ Record ljiang@designtrust.org as the email to be included with my response

Name

Your answer

Approximate Time of Day (of Visit) \*

Time  
: AM

Date (of Visit) \*

MM DD YYYY  
/ /

Location Visited (please be as specific as possible - e.g., Bethesda Terrace instead of Central Park; near the intersection of Washington Sq W and Washington Sq S) \*

Your answer

Link to the Public Space on a Map (i.e., a link to the public space or the nearest landmark on Google Maps or Apple Maps). Please be as specific as possible!

Your answer

Your Experience

How would you describe your experience at the space overall? \*

Your answer

Please share a photo or video of the space from your point of view.

Upload 1 supported file: image or video. Max 1 GB.

Add file

On a scale from 1 to 5, where 1 is not accessible and 5 is extremely accessible, how would you rate this public space? \*

1 2 3 4 5  
Not accessible ☐ ☐ ☐ ☐ ☐ Extremely accessible

Why did you give the above rating about accessibility? \*

Your answer

How did you get to the location? \*

☐ Walking  
☐ Public transportation (e.g., subway, bus, etc.)  
☐ Private vehicle (e.g., car, rideshare, etc.)  
☐ Other:

How would you describe your experience of getting to the location?

Your answer

Would you like to expand on your answers and provide more detail? \*

☐ Yes  
☐ No

Next

Clear form



Neurodiverse City - Public Space Accessibility Assessment

ljiang@designtrust.org Switch account

The name, email, and photo associated with your Google account will be recorded when you upload files and submit this form

\* Indicates required question

Final Thoughts

If you would prefer to share your thoughts about this space in a different way (e.g., audio recordings, videos, doodles, annotated photos, annotated maps, etc.), please use the following file uploads.

File Upload 1

Upload 1 supported file. Max 1 GB.

Add file

File Upload 2

Upload 1 supported file. Max 1 GB.

Add file

File Upload 3

Upload 1 supported file. Max 1 GB.

Add file

If you are using SoundPrint or another noise level measuring application, please share the average decibel measurement of the space.

Your answer

On a scale from 1 to 5, where 1 is would not return and 5 is definitely would return, how do you feel about visiting this location in the future? \*

1 2 3 4 5  
Would not return ☐ ☐ ☐ ☐ ☐ Definitely would return

Why did you give the above rating? \*

Your answer

Any final comments that you would like to share? (For the purposes of the pilot, please use this field to share some feedback on the survey itself!) \*

Your answer

☐ Send me a copy of my responses.

Back

Submit

Clear form





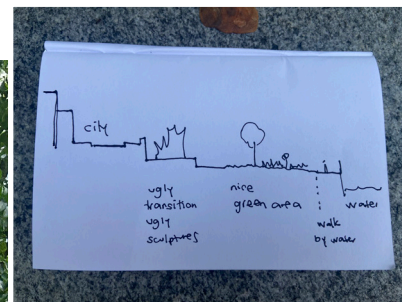
Socrates Sculpture Park

photo by Lucy Jiang



Rockefeller Park and diagram submitted by survey participant

photos by survey participants



may wish to provide their thoughts immediately so as not to forget pertinent details. Therefore, public space assessment methods should support both real-time and post-hoc interactions. One way to support this could also be by encouraging ND people to create multimedia artifacts of their experience in a space (e.g., photos and videos) to reflect upon later.

- For asynchronous evaluations, participants need to use hardware that they already have (e.g., mobile phones) but can access digital designs and online research instruments. For synchronous evaluations, researchers may provide additional technology or ways to engage, but we advise against including too many new elements as that may not be representative of a ND person's authentic experience navigating through this public space.
- The disability rights saying, "nothing about us without us," continues to ring true when working with neurodivergent communities. We encourage designers and researchers to partner with ND people, or organizations that are led by ND people, to actively work with the neurodivergent community rather than speaking on behalf of them.
- Methods should be iterable and malleable in case there are additional pieces of feedback from neurodivergent end users. Involving neurodivergent community members throughout all stages of the design process as codesigners (or even researchers) can help mitigate some issues stemming from assumptions about ND people's preferences. Regardless, we recommend piloting designs or research instruments to evaluate them in real-world contexts and integrate feedback prior to a broader deployment.
- Lastly, and most importantly, researchers and designers must consider participant consent to sharing this information. While creating a repository of participant responses can help others preemptively assess the accessibility of a space, participants must actively opt in to having their insights into such a database and should be able to retract their responses at any time if they choose. Consent processes should be legible and accessible to ND people.

Software engineers can also support efforts for assessing public space accessibility. When developing platforms, we suggest ensuring that they are robust and scalable to support potential crowdsourcing applications. We also recommend supporting both desktop and mobile user interfaces in case people wish to use these systems while physically at a public space (and therefore likely on a mobile device) or on a screen that may be more comfortable or accessible to navigate (likely a laptop or desktop computer). Additionally, it is important that systems can support multimodal data entry (e.g., photos, videos, audio recordings, etc.) and multiple types of data representations (e.g., maps, bar charts, CSVs, etc.).



Conclusion

Ultimately, neurodivergent community members are not, and should not, be the only people who work towards more accessible public spaces. Researchers and designers also should not be the only ones who are involved in this area. Anybody who is interested in public spaces, as a visitor or a steward, should understand the importance of improving neuroinclusivity. As a PiTech Impact Fellow in 2024, I aimed to synthesize diverse perspectives across Design Trust partners, neurodivergent advisory committee members, and human-computer interaction research to design and assess technologies for public space evaluation.

Our exploration of neurodivergent access in public spaces reaffirms the importance of centering neurodivergent people and their preferences in determining appropriate technological integrations. By defining design dimensions for future evaluation tools, and by designing and piloting our survey, we aimed to better capture the varied experiences of neurodivergent people in public spaces as well as provide tools for future researchers, designers, and policymakers. Ultimately, this work contributes to our understanding of how technology can support public space accessibility, and highlights that there is still much to be done before fully accessible public spaces.



Lucy with the Design Trust team