Article

Accessibility and Exhibit Safety: The Importance of Sensory Maps

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Abstract

Museum accessibility, through audio description services, sighted guides, sensory maps/guides/social narratives, and more, is an essential part of exhibit safety and design. In the past decade, more museums recognize the importance of trigger warnings (a trigger being a sensory experience that may cause mental or physical discomfort, overload, or breakdown) for flashing lights, noise content, and movement to ensure visitors with epilepsy, tinnitus (ringing in the ears), PTSD, and mobility devices remain safe. But while more museums are developing resources and programming for neurodiverse individuals, including Autism Spectrum Disorder (ASD), many still do not understand how sensory maps, an inclusive and easy-to-create resource, are critical to visitor safety. A sensory map is an annotated layout of an exhibit, gallery, or entire museum that identifies areas with high and low sensory stimulation and the type of stimulation. Sensory overload/overstimulation can put visitors, staff, and collections at risk; sensory maps alleviate this risk by allowing visitors to self-select in or out of experiences, and in doing so, prioritize their own mental and bodily wellbeing. Highlighting how sensory maps are critical for visitor, staff, and object safety encourages museum boards of directors to allocate funding to create these resources and to seek out more funding for tailored programming and exhibit experiences. I met with accessibility professionals from the Metropolitan Museum of Art, the International Spy Museum, the Houston Museum of Art, and others to share their insights about how to create accessible sensory maps (physical and digital versions) and reach out to disabled communities.

Keywords

access, case study, exhibition, collections, social engagement, research and topics, equity, research and topics, visitor engagement, profession

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Introduction

In April 2011, Access Smithsonian began hosting its "Morning at the Museum" programs. These free, sensory-friendly events for children, teenagers, and young adults who are neurodivergent[1] and their families are held at various Smithsonian museums. Adults register their children early and arrive on a Saturday or Sunday morning, before the museum officially opens to the public (Access Smithsonian n.d.). To help prepare for their visit, parents receive "pre-visit" materials, including narratives, sensory maps, visual schedules, and tip sheets for what activities and spaces are available. Families and children are encouraged to explore the museum at their own pace, with freedom to stim[2] and engage how they feel comfortable. The Smithsonian Institution was one of the first organizations to develop sensory-friendly programming for children (Shrikant 2018), which have now expanded to Mount Vernon, Port Discovery Children's Museum, International Spy Museum, B&O Railroad Museum, Virginia Museum of History and Culture, and Walters Art Museum among others in the DMV (District of Columbia, Maryland, and Virginia). These programs recognize first and foremost that not all people with ASD struggle going to museums; each person responds differently to the noise, lighting, and movement in a gallery, but many can benefit from programs with less stimuli (including fewer crowds, dimmed lights, and low noises) (Freed-Brown 2010).

I first learned about this program through another program, "Morning on the Mall," orchestrated as part of the 2022 Smithsonian Folklife Festival. After two years without in-person Folklife Festivals due to the COVID-19 pandemic, the Festival and Access Smithsonian hosted "Morning at the Mall" events again in 2022 (Smithsonian Folklife Festival n.d.). It was also the first year that Accessibility Services at the Festival developed a full sensory guide, including narrative sensory information and a map. I served as the Acting Accessibility Coordinator for the 2022 Festival and put together this sensory guide. As part of the process, I consulted with accessibility services at the International Spy Museum, the Metropolitan Museum of Art (The Met), the Franklin Institute, and others, who have also agreed to share their insights in this article. I found that the two "Morning at the Mall" events were my favorite part of the entire Festival, and along with the sensory guide, allowed me to curate my own experiences, based on

1. Access Smithsonian did not begin to use the term "neurodivergent" until this past year. Up until that point, it described this program as open to ''children with cognitive and neurodevelopmental disabilities and sensory sensitivities." This change reflects growing inclusive language in neurodiverse communities.
2. Stim refers to "self-stimulation," often in the form of repetitive movements of the body or objects or repeated phrases or noises. Stimming is associated with over and under-stimulation, but it is also a self-soothing behavior that neurodiverse individuals may feel attracts attention from other visitors and security guards in the space.

what level or type of stimulation I was seeking or avoiding for the day. In fact, these two events and the guide helped me to understand myself as autistic, or neurodivergent.[3] As someone who selected a career in museums for its low stimulating environment, I found community and belonging through "Morning at the Museum" events and Access Smithsonian's Senior Program Specialist Ashley Grady.

As I discovered while creating the Festival's 2022 guide, it's important to clarify terminology and separate sensory guides and sensory maps from one another. Guides include a written narrative with detailed sensory information (such as which spices are used near the kitchen in Emirati cooking and stages with magnified sound) preceding a map with sensory icons (Race et al. 2021). Guides are resources for adults and families with children providing them with the information to self-select into or out of experiences, a critical skill for children's museums which often incorporate multiple senses throughout exhibits (Children's Museum of Indianapolis n.d.). Sensory maps, on the other hand, are just this latter portion—a map of the museum overlaid with sensory icons indicating high or low stimulus areas in each room, hallway, or gallery space, ensuring that it is developmentally appropriate, provides options for a structured visit, and encouraged self curation (Fletcher et al. 2018). This article will focus exclusively on sensory maps as a low-cost option requiring limited design skills but representing the first step in creating relationships with local neurodiverse communities.[4] Creating a sensory map, the Sensory Trust[5] notes, can also strengthen museum design and visitor engagement by ensuring that exhibit design is made with input from visitors seeking or avoiding specific sensory input. Inclusive exhibits must require the intentional inclusion of disabled people, from the development process to ongoing access for all. Doing so ensures that sensory levels are consistent with the general tone of the gallery, coordinate pause points, volunteer and docent placement, and seating.

3. I am a queer woman and part of a growing group of women and queer femme and masc individuals who were not diagnosed in their childhood for not fitting an autistic profile that is markedly male, cis, and white. For more information, see: Belcher, Hannah L., Sharon Morein-Zamir, Steven D. Stagg, and Ruth M. Ford. "Shining a Light on a Hidden Population: Social Functioning and Mental Health in Women Reporting Autistic Traits but Lacking Diagnosis." *Journal of Autism and Developmental Disorders*, 53, no. 8 (2023): 3118–32.
4. Please note that I utilize mostly person-first language throughout this article, as I identify is a disabled person. While some phrasing has been amended for readability, my choice to use person-first language is grounded in the autonomy and identity of a disabled person.
5. The Sensory Trust is a grassroots organization and charity in sensory-friendly design based in the United Kingdom. With over twenty-five years of inclusive, interdisciplinary action, the Sensory Trust offers consultations, trainings, and free resources. The Trust utilizes a multi-sensory approach to connect people with natural spaces (including nature preserves and teaching institutions, including museums).

The Accessibility Service team members at the Folklife Festival also highlighted how sensory maps themselves can enhance visitor's experiences. Museums can provide trigger warning labels for certain sensory experiences, like the sounds of gunshots, sirens, lightning, or small, cramped dark spaces that may cause a visitor with ASD, epilepsy, PTSD, tinnitus, or other neurological disorders pain, a seizure, panic attack, or bodily shutdown. Through signage around a museum, especially throughout a gallery space, and/or a written guide alerting visitors to these experiences throughout the museum, visitors can engage with exhibits in more targeted ways. As art critic and curator at the Hayward Gallery Hettie Judah explains, warning labels help make museums more accessible by allowing visitors to make informed decisions about potentially triggering art or exhibit experiences (Judah 2022). Content warnings themselves have a complicated history (Halberstam 2017), but accessibility and inclusion start with the informed consent of visitors who are aware of any intense or triggering sensory stimulation.

In the spirit of this issue of *Collections*, I argue that sensory maps are key components of exhibit safety. Most galleries today have trigger warnings for flashing lights and specific loud noises for individuals with epilepsy, tinnitus, and PTSD because failing to do so puts visitors at risk of seizures, tinnitus aggravation, and panic attacks. In the same way, galleries mark emergency exits for quick evacuations and accessible pathways through which mobility device users can navigate. But even with more information and awareness about neurodiversity, many museums still do not provide sensory maps for visitors. Sadly, this is often because museums do not prioritize accessibility or do not allocate time, funding, or other resources to go above and beyond compliance with the American Disabilities Act. Failing to do so puts people at risk of sensory overload, with symptoms including panic attacks, restlessness, irritability, dissociation, and emotional distress (Strömberg et al. 2022). Sensory overload puts the safety of neurodiverse individuals, museum staff, and objects at risk, and fails to provide a safe and equitable experience for all visitors (Sorokin and Kiseleva n.d.). Highlighting how sensory maps are critical for visitor, staff, and object safety encourages museum board of directors to allocate funding to create these resources and to seek out more funding for tailored programming and exhibit experiences. With this in mind, this article provides a step-by-step guide of how to create a sensory map, from connecting with communities to evaluation.

Designing a Sensory Guide

Before Beginning, Educate Yourself and Museum Staff

While none of the access providers with whom I spoke could provide an estimate on how long it took to develop their sensory guides, Lucy Stirn, Director of Youth Education at the International Spy Museum, and Matti Wallin, Accessibility Programs

Manager at the Houston Museum of Natural Science, did note that the bulk of their time was spent learning about sensory sensitivities and educating staff, marketing accessibility to executive staff, and creating sustainable relationships with local disabled communities. These three areas are the focus of the article's first three sections. As Lucy Stirn explained, the first step for the people creating the sensory map is to educate themselves about what neurodiverse visitors want and need to enjoy an equitable experience. There are multiple programs, including the Leadership Exchange in Arts and Disability (LEAD) Conference hosted by the Kennedy Center and accessibility consultants. While it is critical to involve disabled communities (focus groups and advisory boards) in creating the resource, it is not the responsibility of disabled visitors or staff to educate those creating this resource about anti-ableist action[6] and accessibility urgency. Self-advocates or disabled staff members can point out gaps in access or equity, but this is dependent on museum staff creating a safe and affirming environment and recognizing that disabled staff and visitors consistently face pushback, anger, and potential harm for voicing these needs.

The second step is for a trained accessibility professional, preferably a disabled and/or neurodivergent individual, to train other museum staff. This step is critical, even before creating a sensory map, so that staff know how to address accessibility concerns on the floor (possibly as a trained sighted guide, ASL interpreter, or audio describer), are emboldened to be anti-ableist ambassadors for the museum, and to alert education and accessibility staff about problem areas that should be noted on the map. As Lucy Stirn remarked, "you can do as much prep work, as much training, sensory guides, communication guides, maps, flooring. You can do it all, but yet the physical space has limitations, and that's out of your control" (Stirn 2023). That's when museum staff can resolve or document these gaps. Also, from my experience as a disabled, neurodivergent museum worker, many disabled individuals are especially uncomfortable around security guards, who they feel are policing their behavior and may call them out, get them in trouble, or force them to leave due to behavior, such as physical and vocal stimming, that falls outside of "conventional" museum behavior.

Market the Sensory Map to Your Executive Staff or Board of Directors

Once all museum staff have been trained in serving as access providers, the next step is convincing executive staff and boards of directors that a sensory guide is mission

6. Ableism refers to how people with physical or non-physical ability with institutional power hold and act ability-based prejudice, discrimination, exclusion, and violence. Disabled individuals can be ableist as well, reinforcing the social, political, and economic superiority of able-bodied individuals. Anti-ableism action refers to steps taken to challenge and dismantle ableism, such as creating sensory guides for neurodiverse museum visitors.

critical to the museum and to visitor, staff, and object safety. The leadership at some museums understand this importance and allocate funding, but others resist providing funding for access, seeing it as not serving most visitors or compromising the authentic or historical experience of the visitor (Milonas 2023). "It goes back to why do you do school programs," Lucy Stirn says, "why do you do curator talks. It shouldn't be a 'why this group'. It's doing it for everyone" (Stirn 2023). These responses come from a framework of ableism couched in efficiency and capital profit; but if this is what motivates executives, accessibility is very much a numbers game.

According to the 2012 Survey of Public Participation in the Arts conducted by the National Endowment for the Arts, disabled adults represent only seven percent of all adults attending an arts event or visiting an art museum, and only eleven percent of disabled adults ever visited an art gallery (Bienvenu 2015). Disabled individuals, however, represent a sizable minority in the United States–about 42.5 million Americans with disabilities or thirteen percent of the American population according to Census Bureau's 2021 American Community Survey (Leppert and Schaeffer 2023). Disabled Americans are therefore a large and viable group to welcome into museums. As Caroline Braden explained in 2016, reaching out to disabled members of the public and providing accessibility services are critical to ensure museums meet the needs of interested audiences (Braden 2016, 13). It brings in critical revenue and positive press, and prevents accidents or injury.

Part of this process also means arguing for accessibility conversations from day one of the exhibit design process. When access concerns, such as mobility device usage, seating, low/high sensory spaces, audio described content, illuminated pathways, accessible restrooms, and more, are brought up during initial exhibit design, the museum is saving money by avoiding retroactive changes needed to provide an equitable experience and liability for inaccessibility or injury (Deng 2017; Hladik et al. 2022). Involving access in initial exhibit design also ensures that disabled advisory groups see their needs reflected in museum development (a key part of anti-ableist action in museums), bottlenecks or sensory triggers are noted through signage and there are accessible pathways to avoid them, and that an accurate sensory map is ready the day an exhibit opens. For Matti Wallin, at the Houston Museum of Natural Science, she and her colleagues contribute from the blueprint stage onwards and walk through an initial mockup of the exhibit to flag issues before the exhibit ever even opens to the public (Wallin 2023b).

For a museum who has never considered accessibility, even if a museum is not fortunate enough to have funding, staff can still start small and explore creating a sensory map as a strong first step (Stirn 2023) and a way to show commitment to accessibility. Matti Wallin developed her institution's sensory guide with two salaried employees who took on the project on top of their full-time roles. Creating a sensory map and a "Know Before You Go" video may be good first steps that education, visitor

services, and/or curatorial staff can create. Once the museum creates and shares a sensory map, staff can look for grant funding for accessibility programs, including for example the National Leadership Grants for Museums and Inspire! Grants through the Institute of Museum and Library Services. A great resource is the National Endowment for the Arts' Office of Accessibility, which can initiate cooperative projects with other federal agencies and assist applicants with finding grants and developing programs. The most important first step, and argument for funding and board support, is thinking critically about what a neurodivergent individual faces before they step foot in the museum's building. "And you can't step into their shoes. There's no way for you to fully understand that, but if you can alleviate the stress" through a sensory guide, it shows intentional action towards accessibility (Stirn 2023).

With This Knowledge, Make Sustainable and Authentic Relationships With Disabled Communities and Uplift Self-Advocates and Disabled Museum Workers

The museum field has been increasingly pressured to engage in community consultation and community co-curation to create inclusive and accessible spaces in partnership with the people who will use them. Engaging with disability communities is especially important to sensory guides. Senior Managing Educator in Accessibility at the Met, Rebecca McGinnis, explained to me the history of the Met's communication and partnership with ASD-focused organizations. Ten years ago, the Met's accessibility team member Mary Jaharis, reached out to Autism-Friendly Spaces, a small, local organization, to do a sensory audit of the galleries (McGinnis and Adda 2023). This resulted in two leaders within the local organization providing training for educators and volunteers, as well as co-creating the first social narrative and rudimentary sensory map focused on natural versus artificial light, noise, and crowd levels.

As Matti Wallin explained, the Houston Museum of Natural Science used multiple different types of focus groups to measure sensory levels throughout the museum, including autistic adults, parents of autistic children, school groups supporting disabled students, and a licensed psychologist. Recognizing that there are advocacy groups that can provide input is critical; Matti Wallin reached out to various contacts for collaboration on creating their sensory-friendly resources, including Exploration Planner, Visual Vocab Cards, and Sensory Guide. The Houston Museum of Natural Science also reached out to advocacy groups local to Houston included Autism Rescue Angels, a parent of a scout with a disability, and the Mayor's Office for People with Disabilities.

Director of Access Initiatives at the Intrepid Museum, Charlotte Martin, noted that with the goal of creating a concise guide that addressed the biggest challenges of the space, the categories that the Intrepid Museum's Access team shared with the Autism

Advisory Council (comprised of parents of children with autism and neurodiverse adult self-advocates) were:

(1) the names of spaces on the ship are not the same as in ordinary buildings, so images of each space are included and the names of these spaces match those on the visitor map;
(2) sound levels can vary a great deal so museum staff and the council agreed on a meter graphic rather than colors for this section to avoid confusion with color blindness and in recognition that some visitors may want to avoid sound, but others may seek them out;
(3) touch and no-touch icons were added to denote where touch is encouraged and where it is not;
(4) the map included information on where visitors are permitted to eat indoors and outside;
(5) the guide makes clear which parts of the museum are wheelchair accessible; and
(6) if and where bathrooms are located is noted on the top of each page (Martin 2023).

The Council provided several rounds of feedback during the process.

The Museum of Modern Art (MOMA) also collaborated with neurodiverse communities. As Lara Schweller at MOMA noted, "we created the advisory group because when we're developing resources, we want to involve the community. We also had to work within the museum's constraints for maps. What could be put in or taken out . . . we could make a map of public spaces (low/light, natural light, spaces with tactile engagement, a little more room to move around, high public traffic spaces), we could not map specific exhibits" (Rodewald and Schweller 2023). This advisory group was founded in December 2015 and has continued to work on updating the sensory guide.

Community consultation is also vital in advertising this resource and making sure it is usable by communities. As Rebecca McGinnis explained, individuals may make language choices based on different scenarios. For all museums, the symbol used for sensory-friendly resources and experiences, as well as the terms used to describe the communities for whom these maps may have value, must be determined by the audience. These consultations can ensure that language and symbols are accessible to all visitors, to ensure their safety through concise and accurate descriptions of experiences. This does not mean that it is the responsibility of disabled communities or individuals to create these resources, nor to educate museum professionals about their chosen language and needs. It is instead to affirm that building meaningful relationships with disabled communities is equally as important as reaching out to any other museum stakeholder for their input in the exhibit development process.

Create an Initial Draft of Your Sensory Map

Sensory guides have been utilized as a museum resource for just under ten years. MOMA started working on the sensory map in 2015 (Rodewald and Schweller 2023). The Houston Museum of Natural Sciences created their outline one year later (Wallin 2023a), the same year as the International Spy Museum and the Intrepid Museum. The International Spy Museum released their sensory map alongside their first sensory morning program (*Access to SPY: Opening our Doors to the Autistic Community).* According to these museums and other science, history, natural history, and art institutions across the country, it's important before starting the sensory guide development process to look at what other institutions are doing, both for field-wide standardization of colors and icons to increase accessibility as well as assess how a sensory guide may benefit the institution.

Matti Wallin, Accessibility Programs Manager at the Houston Museum of Natural Sciences, noted that her institution modeled their guide off the Pacific Center's Sensory Guide (Wallin 2023a). Similarly, Stirn noted that she read through several other sensory maps and used those as inspiration and to identify simple and clear icons used in most guides (Stirn 2022).[7] Icons needed to be easily readable, clean looking, and not cluttered. Doing so helped her identify field-wide trends, such as the need for simple but clear icons that make the map readable and uncluttered. Matti Wallin and the Houston Museum of Natural Sciences modeled their guide off of the Pacific Science Center's Sensory Guide. One issue is the variability of one institution to another. Currently, there are no museum field-wide standards for sensory guide icons, color gradients, or organization, requiring someone visiting a museum to relearn a new system each time they visit a museum. Additionally, color blindness is also an issue with using color variants as indicators of sensory levels, although many museums have avoided this issue by adding in visual icons on a color background. Often, the museum will then overlay colored icons (hands, nose, eyes, etc.) or color in a gallery, tent, or room on a floorplan of the museum indicating if the area contains low/bright light, is quiet/loud, has strong/spicy/light smells, has flashing lights/simulated lightning, contains tactile opportunities, or has spaces to move.

Another example comes from Charlotte Martin, who explained that she and her teammates at the Intrepid Museum looked for examples of sensory guides at other museums and thought about how those examples could be adjusted for the unique challenges of their space. While these guides were helpful references and format examples to follow, the team needed to add in specific elements. For example, some areas of the museum allow visitors to touch objects while others do not, and it is not obvious. Her team wanted to provide visitors this specialized guidance in each gallery.

7. This article includes a list of useful sensory guides in Appendix A for reader's reference to get a sense of field-wide models.

Charlotte Martin liked sensory guides that were integrated into the museum's general map but realized this would be confusing and too much information, so they settled on a sensory table (Martin 2023). Drafts of this table were continually reviewed by the Autism Advisory Council.

With several example sensory maps in hand, museum professionals can start developing a sensory guide. It may be helpful to compare between different resources, see: the Sensory Resources Guide for Museums (New York University n.d.) and the Sensory Trust (n.d.). At this point, the person or team creating this map has established an authentic relationship with local disabled communities and heard firsthand what resources those community members need to have an equitable, safe experience. The next step is to print out a copy of the museum's layout and go into each gallery space, hallway, lobby, or cafeteria and assess for sound, sight, smell, and touch. This is a great opportunity for any neurodiverse staff members to contribute to this resource, if they feel comfortable sharing their experiences, or using tools that can provide solid numbers, such as a lux meter (a tool for measuring light, may already be used by exhibit, collections, or conservation staff to prevent light damage) or sound level data logger. It's a good idea to do this step before deciding on a scale of low and high stimuli, so you are not biased and know maximum/minimum levels of noise in each gallery. Next, with this quantitative or qualitative data from various staff members, staff can create a scale of minimum to maximum sensory levels and decide what qualifies as high or low. This may also be a good time to loop in local neurodiverse communities for help in assessing sensory levels (if comfortable and compensated) or to indicate which levels should be labeled high or low.

With an adaptability, sliding scale of sensory levels and indicators where galleries, hallways, or lobbies should be marked, decide on sensory icons—whether it be an image of a hand, ear, nose, or eye (more common universal examples)—and layer these icons overtop the printed map, as stickers or marker drawings. Before receiving feedback from neurodiverse visitors and staff at the museum on this initial draft, ask the following questions:

- How did the museum assess sensory levels? Who assessed what and how? Were they self advocates and/or neurodiverse staff, or accessibility professionals? What are their ages and backgrounds (to ensure they represent a diverse cross-section of museum visitors)?
- Did the museum use any devices to assess light, sound, smell, or touch? If so, how did the museum standardize or create a relative scale from low/high sensitivity? Was this scaled by sensory gradient or a categorized list from low to high?
- How did the museum rate sensory stimulation, and how did it decide that it is low or high? A good resource for this is other sensory maps as examples or academic ASD research resources (Cascio et al. 2016; Michel et al. 2023).

- What symbols/images is the museum using for sensory icons? A good resource to explore are Universal Access Symbols, created by the Graphic Artist Guild and are free to download (Arts Access Victoria n.d.).
- Are these sensory icons color-coded? If so, are they color-coded by type of sense (touch, sound, smell, sight), by stimuli level (low, medium, high), or another way? Is this information communicated in other ways (either written, by texture, or by pattern)?
- If the icons are color-coded, how is the map accessible to colorblind individuals? Most museums will avoid red-green colors because of common red-green vision deficiency.

This temporary, initial draft of the sensory map should be kept on record by the museum, but the next step is reaching out to the people who asked for or need this resource to see what questions, comments, or amendments they prefer to make it more accessible and effective.

Receive Feedback From Disabled Visitors of All Ages and Make Revisions

Museum staff that focus on access, or all museum staff for that matter, need to recognize that accessibility is an ongoing initiative. Lucy Stirn notes that the first time a museum develops a sensory map, disabled people should come through and test it. Matti Wallin at the Houston Museum of Natural Science explained that she and her colleagues hosted focus groups to assess the initial printed sensory guide (Wallin 2023b). Matti Wallin had buy-in from the beginning. Multiple members of the museum's board had children with ASD and brought up this issue, and so she and her team reached out to contacts who had already approached the museum with a need for this resource. There were several school groups for disabled children that routinely came to the museum and understood the museum's layout. Schools were compensated, an essential part of acknowledging the emotional, mental, and physical labor required for reviewing the resource, with discounted or free tickets for their trip. Matti Wallin admits this was not best practice for a focus group. They didn't bring in people who had never encountered the museum before. Reaching out to local visitors who the museum assumed would be returning ensured the sensory map was effectively and culturally responsive for the museum's communities.

Local focus groups can also catch gaps in the maps. For example, Matti Wallin heard from groups that her team had used the term "children" many times in their materials in the narrative part accompanying the sensory map. In response, as Matti Wallin and her team developed an app version of the research with the Infiniteach program, they are working to develop an advanced version of the guide for older teens

and adults along with the basic version for children. Like Lucy Stirn, Matti Wallin explains that there is a serious lack of resources and events for autistic teens and adults. Sometimes because people who were diagnosed young have effective coping mechanisms or people who are undiagnosed mask to hide their experiences, but this does not mean they do not need these resources. "As people with autism grow," Matti Wallin explains, "they learn coping skills and so it's not as evident that they would need a resource even though they still do, and it would be helpful to them" (Wallin 2023b). This is why a sensory map is a great first step for museums without much written text and just color-coded icons, it is useful for children, teens, and adults and does not make assumptions about knowledge or social experience. Also, color-coded icons can help overcome language barriers. Versions that are in other languages than English, in braille, audio recorded, and sensory reader friendly for blind and low-vision individuals should also be created, as explained below.

Along with focus groups, Matti Wallin at the Houston Museum of Natural Science brought in a nonprofit called Autism Rescue Angels that connected her with several behavioral therapists in the area. The therapists were then able to assess the effectiveness of the sensory guides. Matti Wallin explained that she and her colleagues hosted an informational meeting after creating the first version of the sensory map so that staff knew that this guide existed and understood the guide's purpose and could watch out for any areas with unexpected sensory stimulation or pass on any questions from visitors about sensory needs. Creating a sensory map like this is an ongoing process, and will require updating regularly, especially as temporary or special exhibitions are rotated in and out of galleries. Matti Wallin addresses this by marking special exhibition spaces on the printed map available at the visitor services area but provides more detailed and updated information for each exhibition in the online guide version. This also means that language may change, as Lucy Stirn says, "there's no right word in a way, but I keep going back and forth between neurodivergent, and I'm sure I'll get an email, 'this isn't the right use,' and I'll change it again" (Stirn 2023). Lucy Stirn acknowledged that the Spy Museum is switching from the term "sensory friendly" to "neurodiverse," just like the Access Smithsonian office.

This language preference comes from visitors who explicitly reach out to museum staff, and so they offer the best window into how the guide is used and how effective it is. All access providers I spoke to also mentioned that they are open to user feedback. Lucy Stirn allows feedback via email. Matti Wallin also receives comments and questions through the museum's access programming email address or via comment forms at the visitor services desk. Museums need to have easy and responsive ways to reach out to staff members if there is an issue, or if there is a piece of feedback to contribute. As Lucy Stirn said above, self-advocates are going to be key contributors to the sensory map's development, its success, and awareness via word of mouth, sharing the map with local advocacy or social groups, and at museum conferences like LEAD.

Explore Print and Digital Options, Spanish Language Options, and Screen Reader/Braille Access

As an accessible resource, map creators need to ensure that their sensory guides are accessible online and in person, as well as accessible to individuals with multiple disabilities. Lucy Stirn noted that the Spy Museum's sensory map is available on their website for visitors to download and print out prior to their visit (Stirn 2022). Additional printed copies are available onsite. Now, the museum has two sensory maps, one exclusively for *Access to SPY* programs and one on the museum's website that can be used during normal operating hours. Over the years, the museum has also strengthened their sensory maps with social narratives, gallery activity systems, visual schedules, and communication cards that people can use when they visit the museum.

Similarly, the Houston Museum of Natural Science provides printed sensory guides in sensory backpacks that can be checked out from visitor services, but also on their digital app through Infinitreach (Wallin 2023b). They also have a digital sensory guide on their website; they are partnering with a company called Abler and their website accessibility consultants, to ensure that the sensory guide and all accessibility resources adhere to best guidelines for web accessibility. For web accessibility, museums need to ensure that their websites, apps, and any interactive maps or PDF or Word versions of maps are in compliance with the Section 508 (American Disabilities Act) or WCAG (Web Content Accessibility Guidelines). It's good to start with a Section 508/WCAG checklist or audit service.

As Rebecca McGinnis explained, PDF and Word files can be inflexible and inaccessible formats for neurodiverse individuals because of background/text contrast and font, screen reader access and alt text for sensory icons. As a result, her team wanted to think about digital and interactive guides. With the goal of "living maps," Rebecca McGinnis explained, "our aspiration is to be able to then add to that ability to create your own route, to kind of plan that route, but then overlap additional sensory information" (McGinnis and Adda 2023). To that end, the Met has been working on creating an app that actively monitors sensory levels in spaces, providing accessible routes as a form of sensory wayfinding. One example is Eveilty, an indoor GPS navigation system published by Akenia Digital used currently in subways, but which can be adapted to museums with additional content like audio description.

While audio description and screen reader compatibility merges into accessibility services for blind and low vision individuals, this article focuses on how digital sensory guide apps and programs are accessible to neurodiverse communities, although it should be noted that the disability community is an intersectional one with many overlaps. Another example of sensory maps in apps is Bloomberg, MOMA's new app where visitors can see specific accessibility information, specific exhibition layouts and trigger warnings (flashing lights, etc.) and notes about seating and lighting.

Theresa Rodewald, on the MOMA Access team, noted that the museum has switched from physical to digital maps, as well as updating the app with audio description (Rodewald and Schweller 2023).

Providing a sensory map in multiple formats, digital or printed, is part of making sure that accessibility resources are appropriate to a wide variety of people. As mentioned above, museum staff need to make sure that their digital sensory map, either in PDF, Word, or interactive format, follows Section 508/WCAG and their printed sensory maps are available in braille or audio recording, in languages other than English (currently no museum I spoke to have any available to the public). Pathways to this map, either digital links leading the sensory map or signage of where to pick up a guide, are accessible. When people pick up a sensory guide at the visitor desk or when they click on the link, staff can also track who is using the resource to make sure it is reaching a diverse audience. But as Matti Wallin notes, self-selecting to use this resource or walking up to and waiting at a visitor service desk may not be accessible, and as more museum professionals looking for examples click the link, this may skew data of who is using the guide. This makes collecting demographic data difficult.

The Future of Sensory Maps and Museum Accessibility

The museum accessibility service providers I spoke with have different views of what a museum accessible to neurodiverse communities will look like. All agree that sensory maps are only one specific type of resource to start meaningful conversations with neurodiverse visitors and advocate groups. Lee Anne Spear, a Disability Justice Advocate and Museum Studies master's degree recipient in Washington, D.C. explained, "I think a lot of museums assume just providing resources like sensory maps and social narratives are enough but that doesn't mean there isn't still the stress of being judged by neurotypical visitors, and it's also not the same as a direct invitation. Directly and intentionally inviting a community into your space removes, or at least minimizes, the fear of not belonging" (Spear 2023). Rebecca Adda, a 2022 Access and Inclusion Intern at the Met, noted that "everyone functions differently in their reception of public spaces, so having a robust set of resources for people to use to anticipate and navigate their museum visit" is vital (Adda 2023).

Both Spear and Adda agree that an accessible future is one where these resources are considered standard parts of visitor services, where accessibility services are viewed as part of general resources for the public. Rebecca Adda explained that digital sensory maps also can intersect with other accessibility services, such as visual descriptions, haptic feedback, and text alternatives. Acknowledging that as Adda says, "the style in which information is communicated on a map can be just as important for some as the information itself," engaging potential neurodiverse visitors, reaching out to self-advocates, frequent visitor groups, accessibility consultants or behavioral

therapists, and local advisory groups, is critical to gain a diverse set of perspectives surrounding language and terminology. It is key to making sure that a sensory map is tailored to the museum's publics, and for those looking at numbers, is created in the best way to bring a new group of visitors into the museum.

Appendix A

Sensory Guide Toolkit

As Stirn mentioned, the best way to start developing a sensory map is to look at other examples. This list includes examples of different museum locations, types, and layouts. Please note that some sensory maps (and guides, often museums use these terms interchangeably but they are not) use the terms "differently abled" or "diversely abled." Museums often use these terms to avoid the word "disabled," but "disabled" is not a bad word, and by not using this term, museums perpetuate systems of ableism that view disability as an unmentionable topic. Be vigilant for this language and push back on its usage, and also ask local neurodiverse communities what type of language they prefer or how they themselves identify.

Children's museums:

- Building for Kids Children's Museum, https://www.buildingforkids.org/wp-content/uploads/2021/04/Sensory-Map-01.png
- Children's Museum of Indianapolis: https://dktix1rrcd7mv.cloudfront.net/media/documents/accessibility/TCM-Sensory-Map_April-2023.pdf
- Eureka! The National Children's Museum, https://sensoryguide.eureka.org.uk/
- Lincoln Children's Museum, https://lincolnchildrensmuseum.org/hours-info/
- Mississippi Children's Museum, https://mschildrensmuseum.org/museum-updates/sensory-map/
- Scott Family Amazeum Sensory Friendly Map, https://www.amazeum.org/assets/Amazeum-Sensory-Friendly-Map-8.5x11-web.png

History museums:

- Auckland War Memorial Museum Tamaki Paenga Hira, https://assets-global.website-files.com/5f331facf064db70d4fa88ae/6296dcceec85c4050a4629af_62269410429def139df7829e_sensorymap.pdf
- Bodmin Keep, https://bodminkeep.org.uk/wp-content/uploads/2022/08/SENSORY_MAP_v10.pdf
- British Museum, https://www.britishmuseum.org/sites/default/files/2019-11/British-Museum-Sensory-Map-PDF-Download.pdf

- Columbia River Maritime Museum, https://www.crmm.org/museum-gallery-map.html
- Geevor Tin Mine, https://geevor.com/coloursofgeevor_final-2/
- Kalamazoo Valley Museum, https://kalamazoomuseum.org/images/visit/KVM_Sensory_Guide.pdf
- Leeds City Museum Sensory Guide, https://museumsandgalleries.leeds.gov.uk/wp-content/uploads/2019/02/Sensory-Map-of-Leeds-City-Museum.pdf
- Museum of the American Revolution, https://moar-media-production.s3.amazonaws.com/9ba1a588-8e1f-497d-b48a-f17786f08788/Document_032020_121619_Sensory_Guide-IBCCES_MuseumOfTheAmericanRevolution_0.pdf
- Museum of London, https://www.museumoflondon.org.uk/application/files/3515/3417/2482/18149_Sensory_Map_for_MoL.jpg
- Putnum Museum (maps in multiple languages)
- English: https://www.putnam.org/wp-content/uploads/2023/07/Putnam_Map_English_4-2023_Web.pdf
- Spanish: https://www.putnam.org/wp-content/uploads/2023/08/PutnamMap_spanish_2022.08.16-no-features.pdf
- The Gordon Highlanders Museum, https://www.gordonhighlanders.com/accessibility/
- The Hunt Museum, https://www.huntmuseum.com/visit/accessibility/
- The Museum of English Rural Life, https://merl.reading.ac.uk/wp-content/uploads/sites/20/2018/01/Autism-sensory-map.pdf
- WiltshireMuseum,https://www.wiltshiremuseum.org.uk/news-articles/creating-a-sensory-map-for-the-museum/

Science museums:

- Houston Museum of Natural Science, https://www.hmns.org/wp-content/uploads/2020/01/Sensory-Guide-Update-1.3.20.pdf
- Ingenium Canada, https://ingeniumcanada.org/sites/default/files/2022-04/Sensory-guide-cstm.pdf
- LibertyScienceCenter,https://lsc.org/news-and-social/news/lsc-debuts-new-sensory-map-just-in-time-for-special-needs-day
- Natural History Museum of Los Angeles, https://nhm.org/sites/default/files/2019-06/nhm_sensory_guide.pdf
- Science Museum, https://www.sciencemuseum.org.uk/sites/default/files/2022-07/Sensory-Map-Science-Museum-July-2022.pdf
- Science Museum Oklahoma, https://www.sciencemuseumok.org/sites/default/files/SMO_SensoryMap_06.19.pdf

- The Franklin Institute, https://www.fi.edu/resource/sensory-friendly-guide-electricity
- The Intrepid Museum: https://intrepidmuseum.org/sites/default/files/2023-10/EDU_RB_03_0723%20Sensory%20Guide%20%281%29.pdf
- The National Museum of Computing, https://static1.squarespace.com/static/5bf28ad6b98a7888bf3cdce5/t/5ce44e62a5afd400017df8a1/1558466148651/TNMOC+Sensory+Map.jpg

Art museums:

- Art Institute of Chicago, https://aic-web-cms-uploads.s3.us-east-2.amazonaws.com/null8bb43264-99ba-4232-94dc-d6eea67f4a2e/Sensory_Map_2021.pdf
- Cincinnati Art Museum, https://www.cincinnatiartmuseum.org/media/296347/accessibility-guide-web.pdf
- Harn Museum of Art, https://harn.ufl.edu/wp-content/uploads/2023/09/sensorymap-online.pdf
- Hastings Museum & Art Gallery, https://www.hmag.org.uk/sensory-map/
- Hunter Museum of American Art, https://www.huntermuseum.org/wp-content/uploads/2021/04/Hunter-Museum-Sensory-Friendly-Map.pdf
- Solomon R. Guggenheim Museum, https://www.guggenheim.org/wp-content/uploads/2023/04/guggenheim-for-all-sensory-map-20230411.pdf
- The Metropolitan Museum of Art, https://www.metmuseum.org/-/media/files/events/programs/progs-for-visitors-with-disabilities/sensory-friendly-map.pdf
- The Museum at Bethel Woods, https://www.bethelwoodscenter.org/sites/default/files/Bethel%20Woods%20Sensory-Friendly%20Map%202020.pdf
- The Museum of Modern Art, https://www.moma.org/momaorg/shared/pdfs/docs/visit/MoMA_Sensory_Map.pdf

Local/specialized museums/cultural heritage institutions:

- International Spy Museum: https://spy-museum.s3.amazonaws.com/files/resources/sensory-map-2021.pdf
- Museum of Brands, https://museumofbrands.com/wp-content/uploads/2023/07/Living-Brands-Accessibility-Sensory-Guide.pdf
- Museum of Pop Culture, https://www.mopop.org/media/12313/sfp_sensorymap_85x11_202304.pdf
- National Emergency Services Museum, https://www.visitnesm.org.uk/_files/ugd/a92b4c_62826ba042a34eceb5b8a943b429f548.pdf
- Please Touch Museum, https://www.pleasetouchmuseum.org/wp-content/uploads/2021/12/Sensory-Guide_2021-2.pdf

- R&A World Golf Museum, https://assets-us-01.kc-usercontent.com/c42c7bf4-dca7-00ea-4f2e-373223f80f76/84e98d3b-1cfa-4f18-815d-5c4d9a5c97f4/R%26A%20World%20Golf%20Museum%20Sensory%20Map.pdf
- Smithsonian Folklife Festival, https://folklife-media.si.edu/docs/festival/2022/Sensory-Guide.pdf

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