# Disabled Dimensionality

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**Abstract:**

*The world expects us as humans to interact as fully functional 3D manipulators who can observe, manipulate, and act in three spatial dimensions. Ableism defaults people with the assumption that disabled people are inferior at manipulation, imagining, and navigating the world. Our experiences and the narratives we integrate from other disabled people speak to this as limited imagination and consideration. In this theoretical contribution, we go over the normative dimensional assumptions built into our environment and media and analyze the consequences of ableism in how spaces — digital, physical, imaginary — operate in how we think about the material and virtual world. We situate this ableism against disability-led technology design and disability futurity that imagines a very different world of space, manipulation, and possibility.*

**Keywords:** Disability studies; crip space; spatialities; cripistemology

The authors are named in alphabetical order.

## Section 1: Introduction

The world expects us as humans to interact as fully functional 3D manipulators who can observe, manipulate, and act in three spatial dimensions. Ableism defaults people with the assumption that disabled people are inferior at manipulation, imagining, and navigating the world. Our experiences and the narratives we integrate from other disabled people speak to this as limited imagination and consideration. In this theoretical contribution, we situate the ableism instantiated in programs and spaces against disability-led technology design and disability futurity that imagines a very different world of space, manipulation, and possibility. We analyze the consequences of ableism in how spaces — digital, physical, imaginary in science fiction, present in practice and material configuration — operate in how we think about the material and virtual world.

We initially discuss how dimensionality impacts our lives as disabled people, from our point of view as disabled researchers and in conjunction with narratives we read from other disability community members. We consider how normative assumptions[1] are built into how we are supposed to navigate the world or consume media — and how these assumptions shape and limit our possibilities. We go over assumptions that ignore the variability in our ability to experience 3D space, how media experiences are flattened when disabled bodyminds[2] are assumed (such as with screenreading software) and how cultural conventions shape our abilities to be comfortably at home in the world.

We then engage with theories in philosophy of technology about how to think about human, technology, and world. The dimensional experiences of disabled people offer testimony against current constructions and representations of the world that compress experience. We must elevate disabled knowers and expertise when it comes to considering both the layouts and the representations of the world.

We conclude by talking about disabled bodies as good bodies to have, imagine, and expect in the future. We consider artistic and creative expression of disabled people engaged in thinking about the future — and in thinking about community and disability cultures. We knit together work on spaces (both physical and virtual) with work from the disability community on our movement, existence, and resistance to dominant narratives of space.

## Section 2: Assumptions in Space and in Practice

When it comes to disabled dimensionalities, the first and most general assumption involves our degrees of freedom, to use mechanical terminology[3], and manifests in two different ways.

The first is that spaces are generally created and organised with the unquestioned idea that humans move fully freely in two dimensions, with some additional freedom on the third dimension. This is what allows

[1] Only the choice of assumptions — and their normative power — is put into question here. Some assumptions are probably necessary, as humans generally require simplifying assumptions to understand and interact with the world.
[2] Bodyminds is a term used in disability studies and indicates the ways in which our bodies and minds are a connected whole, bound together, and that impacts on body impact mind, and vice versa (Price, 2011; Schalk, 2018).
[3] In this context, the degrees of freedom correspond to the number of independent motions the body can perform.

most bipeds[4] to sidestep any minor obstacle — including steps. The end result is that any irregularities — from litter on the floor to slight slopes — are generally disregarded as irrelevant. However, wheelchair users (or wheelies) are often stuck to a 2D plane when it comes to moving around. More precisely, they are confined to a collection of flat areas, linked together by ramps and elevators[5]. This does not just affect people with reduced mobility. Some blind people can also feel lost in a wide open space with no indication on the ground or walls to keep track of their position. The spaces that feel comfortable can then be strongly reduced, as is also the case for people with difficulties orienting themselves.

The assumed irrelevance of dimensionality's most visible manifestations happen on a macroscopic scale, from the capacity to move around to the possibility of reaching whatever is inside a tall cupboard. This is one of the main causes of ableist architecture. One particular example is the Hunter's Point Library in New York City. A significant fraction of the building is built around its massive stairway, with multiple stops between the different floors (see Figure 1). Although it was designed and built in the 21st century, a significant fraction of this space is only accessible to people for whom stairs are not an issue[6]. The reasoning proposed by its architects was that disabled users could always ask for assistance to obtain anything that was not directly accessible — discounting how this reduces autonomy and creates new costs for everyone involved, and seems to preclude wheelchair users from employment there (Stone, 2019).


Figure 1: The main stairway of Hunters Point library, and some of the levels only reachable by it. Photography reprinted with permission from Jake Dobkin / Gothamist.

[4] Over the course of this article, biped will denote any individual who can explore space on their two — potentially inorganic — legs. This is the counterpart to wheelie — for wheelchair/scooter user (even if the use is temporary).
[5] Some wheelies can manage steps (at least going down), but that generally requires manoeuvering in any case.
[6] A lawsuit has since been filed by the Center for Independence of the Disabled New York against the library's alleged violations of the American with Disabilities Act.

Beyond the macroscopic scale, the assumptions concerning our degrees of freedom are more subtle but still pervasive. Designers do not simply hypothesise that the body is able to move around in space, it must also bend and fold itself into a variety of configurations. Almost anyone who has had their leg in a full cast has shared the experience of being unable to sit comfortably under a desk. The normative aspect of the enforced use of chairs and desks in a given way has already been a point of contention, notably in fat studies (Hetrick and Attig, 2009).

These degrees of freedom also apply to how we perceive the world. The ability to vary the position of one's head (especially along the vertical axis) is crucial to participate in certain public spaces — from cinemas to supermarkets. However, this degree of freedom can be strictly limited for certain disabled people (from little people to wheelies), in which case the head's position can be restricted to a single plane (Blanchard, 2020). Museums are a typical example of a place where it is assumed that visitors have the ability to perceive from multiple physical points of views (and at the very least from a common height). On top of being often located in old and poorly accessible buildings, museums often optimise the visitor's experience for a particular kind of visitor. The power of the unsaid assumptions can be seen by the extreme rarity of exhibits tailored for disabled bodyminds, even when artists themselves reflect on the normativity of an embodied museum experience (O'Connor, 2019).

This allows us to make a curious parallel between the people designing the spaces we live in and videogame developers. The latter often have to make simplifications in what to show the players, and how to compute everything at the smallest cost possible, and the restrictions were only stronger a few decades ago. One simplification that was frequently used was that the player would have a single "optimal" viewpoint from which to see the game. Although objects technically appeared to be in 3D, the forced viewpoint meant that a single perspective had to be computed, greatly simplifying the computations. Let us go further using examples from Ryzom, a massively multiplayer online role playing game that initially came out in 2004 and is still active[7]. The game was apparently fully in 3D — as was starting to be the norm at the time — but the collision system had been coded differently. Instead of simulating and computing 3D collisions for every object (including player characters), the players evolved on a flat 2D map — or a collection of flat areas linked together. It also meant that players could not jump over small objects on the ground and did not know in advance whether they would be able to above a small obstacle. This generated some frustration among the players who had to wander around to find an accessible path — not unlike the wheelie experience.

This brings us to a second set of assumptions, related to how people perceive and experience media. If we return to architectural practice, the standard medium to present is still a collection of floorplans. This is a 2D representation of a 3D object, which naturally leads to representing only a very limited set of features, in which 3D aspects are most often discarded or poorly visible — such as single lines to indicate steps of arbitrary height. Except for some standard furniture — tables, chairs, cupboards — the potential obstacles are not fully shown (or how they would prevent someone from moving around, beyond the question of floor clearance).

[7] The information in this paragraph comes from interviews with Xavier Antoviaque, who was a community manager in the initial development team.

These floorplans also create a new set of problems: for many blind people, they are not directly accessible as a representation of space. This is not just an issue for blind architects, but for anyone who wants to autonomously orient themself in an unfamiliar space — such as a library or a mall — although finding the map can already be difficult. Tactile maps have recently started being used in select locations, but they are still a novelty (Bliss, 2015). A large proportion of our interactions with media happens in more than one dimension. Looking at maps or pictures requires vision and the ability to process 2D, and video is more demanding — often requiring both vision and the ability to correlate it with sound. Reading initially seems 1-dimensional but is not truly so: achieving any decent speed requires the ability to perceive more than just the next word. Scanning a document for a specific passage can be done with very high speed thanks to visual pattern recognition.

Conversely, the accessible versions of these activities are nearly always stuck in 1D. Reading in braille requires sensing with one's fingers, and moving them — slower than the eyes can move. In practice, Braille reading speeds are often two to three times slower than average visual reading speeds (Bola et al., 2016), and do not allow easy scanning. Instead of Braille, audio transcription is often used — as it can reach speeds comparable or even above visual reading — but this medium is also linear. This linearity is most visible when navigating the Internet, as screen-readers cannot always prioritise the correct content, and getting to the relevant section can take an arbitrarily long time — even when the website follows good accessibility practices. Audiobooks benefit from being a more linear medium, but can still have some branching structures (footnotes, captions, references), for which there is not necessarily a good solution[8]. The frustration people can feel — and the time spent — when dealing with automated call center systems are an example of a more widely shared similar experience. Thus, the "accessible" version of non-linear media (and interaction systems) suffers from being stuck in 1D.

The lower dimensionality when consuming media affects more than just blind people — although they are a central case. For example, virtual reality can be the source of two issues related to dimensionality. First, many VR systems assume that users have the usual degrees of freedom to interact with the system, and can be uncalibrated — or even unusable — by people with more restricted motions[9]. Many VR games also require the user to identify the source of audio stimuli — which cannot be done when deaf in one ear, the user then going from 1D or 2D information to 0D. The ability to locate the physical origin of sounds is thankfully rarely required (until now), as the corresponding disability is extremely frequent in the general population.

One last assumption concerns our perception of time, which most expect to be linear — if not uniform. However, the ability to perceive one's life as a coherent linear progression — including both one's past and one's imagined future — is not universally shared. In people with multiple selves, this perception can vary, transforming that 1-dimensional line into a set of unlinkable segments and dots (Ribáry et al., 2017).

[8] Some audiobooks include the footnotes, many don't, but the worst issue is when the audio version not only lacks the footnote information, but does not indicate that this information is not present.

[9] For example, the authors of this paper met at a large human-computer interaction conference featuring demos of such VR systems, none of which were directly usable from a wheelchair.

**Section 3: Reconfiguring Dimensionality**

We encounter the world embodyminded: memoir and narrative personal essay play fundamental roles in disability studies scholarship and *we theorize with the bodyminds we are in.* Here we highlight how disability narrative gives us a "way in" to reconsider dimensionality — one that emphasizes disabled people are experts when it comes to disabled ways of knowing and being in the world.

Disabled people in particular experience the world in ways that make prominent different structures that may be invisible to others. Aimi Hamraie (2017) writes of the "frictioned negotiations of access and privilege" that face disabled people entering even spaces designed as "universal". The expectations on how people stand, move and operate are reflected not only in the built environment but comes out in our language. We might talk about people who are upstanding citizens, or we might prefer those who "stand tall" for moral principles and "stand up" for what they believe in. Being the opposite of these things might indicate that you are *crooked* or *lame*, or any one of a number of negative descriptors derived from terminology for disabled people's bodies and minds.[10]

Much of the emphasis of design for disability has become *a response* to the built environment, whether recognized or not. We are surrounded by stories about exoskeletons, echolocating white cane improvements, and wheelchairs that negotiate stairs or raise people up to "eye-level". Much of the media enthusiasm in accessible design lies modifying bodies to address hostile design in the built world. Exoskeletons and wheelchairs that raise their users are "solutions" only when wheelchair use is made to seem like a "shitty, subpar option" (Nicholson, quoted in Peace 2014).

We figure out our own dimensionalities — often meeting the built world through lifehacks (Jackson, 2018), creative inspiration from others in the community (Young, 2014), assistive technologies — as well as figure our sense of time (Samuels 2017), movement, and space (de Leve, 2017). Sam de Leve explains:

> I was navigating a friend's kitchen in my wheelchair, holding a bowl of spaghetti in one hand and pushing off of countertops and refrigerators with another. My chair would glide across the stone floor, momentum keeping its wheels rolling until I stopped myself by pushing against some other object. I have always felt connected to the physics of my wheelchair, but in that moment I had a vivid image of astronauts navigating the International Space Station: pulling themselves along railings, and walls, gliding, grabbing nearby objects to stop themselves… my experience in a chair gave me a more intuitive understanding…

De Leve's experience in reflection on movement in their chair points to this difference in navigation and environmental focus. Disabled embodiments and movement give life to different ideas and configurations of space. This is true for wheelchair users, as well as those of use who use scooters, rolling walkers, crutches, and more.

There is a moment in the documentary *Fixed: The Science/Fiction of Human Enhancement* where chemist and bioethicist Gregor Wolbring, being interviewed in his home, saying "Walking is out, crawling is in," and crawls away quickly from the camera (Regan, 2013). Watching this renews one with hope about the

[10] The linguistic proximity between moral value and physical ability is not universal (and is not as present in French or Russian, for example). However, we note that the insults derived from descriptions of people with intellectual and developmental disabilities feature even more prominently and problematically in discourse in many languages.

possibility for celebration of even those modes of movement that are devalued and made shameful in wider society. Surprising to some outside the community, especially where "wheelchair-bound" and confined are used, some wheelchair users prefer to talk of their chairs and scooters as chariots of liberation, freedom, or independence. Although they mostly permit movement only in 2D (especially in the absence of elevators and ramps), this is liberating compared with alternatives (such as being stationary in 0D).

The built environment integrates unsaid narratives affecting or socialisations in these spaces. David Lapofsky, representing the Accessibility for Ontarians Disability Act Alliance, takes viewers on a tour of a new and celebrated building at Ryerson University, where he navigates the building with his white cane, showing myriad failures of accessible planning: difficulty finding an accessible door to enter the building, design failures that encourage users to block pathways, "hangout stairs" that mean you won't be including many disabled people in your hangout, poles in the middle of crooked stairways that pose serious impediments for blind people (AODA Alliance, 2017). All these silently express the desire to prevent disabled bodyminds from being present and visible.

We find that disabled bodyminds like ours are both attuned to finding the problems of a space or pacing for themselves and other users, as well as regularly encountering alienating reminders that the world is not "normed" or set for a default that includes them.

**Section 4: Human-Technology-World**

American philosopher of technology Don Ihde talks about four ways in which technologies mediate our experiences of the world (Ihde, 1990). The four types of human-technology relations in his schematization are:

- Embodiment relations: (human – technology) → world.
- Hermeneutic relations: human → (technology – world)
- Alterity relations: human → technology (world)
- Background relations: human (technology/world)

Ihde's postphenomenology — a blend of pragmatic recognition of the role of technology in human life with phenomenology — provides a lens through which we might consider the experiences of disabled humans as we negotiate technologies in technological environments. Things can fit into more than one category of relations at a given time, but these relations help us categorize the ways in which technologies are being used and understood.

Most often when disabled people emphasize the role of technology in their lives people think about embodiment relations: how assistive and augmentative tech work with the human as they encounter the world. We are people who use wheelchairs and prosthetic legs and Prozac and pacemakers and ostomy bags. We also sometimes experience ourselves in the world through technologies in a hermeneutic fashion: with blood-sugar testing and incentive spirometers and heart monitors, where the human is both the agent and the object of the analysis [human → (technology → human-self/world)]. Alterity relations have humans take technology as Other, projecting feelings. We think here of care-bots tested in nursing

homes (like Robear, Care-o-bot, and PARO), as well as non-human others that serve as support (animals arguably serving as technologies in non-trivial ways[11], see Pitt, 2016; Shew, 2017).

The background relations most take for granted — the technology/world around us — are often less blended, less backgrounded for disabled people. We don't experience the same smoothness or ease of movement/use. We see in the built environment many problems due to our positionalities. Beyond just movement, spaces with beeps and buzzes and other noise distractions also catch attention for those with sensory processing differences (whether hard-of-hearing, autistic, ADHD, PTSD, etc.). Indeed, where others experience technologies as background relations in the world, technologies, including built environments, pop out to make us experience the technology/world as Other.

We get new understandings and enactments of human, technology, and world read through disabled bodyminds and the lens provided by cripistemology. This term, coined by Lisa Duggan in 2010 (Johnson and McRuer, 2014), refers to "intellectual, political, and affective creativity" on the part of crips (a term reclaimed by some disabled people and derived from the word "cripple"). Indeed disabled people are often required to engage environments in creative ways in order to exist in them — or find alternate routes and spaces to meet goals. This is often outside (and sometimes in opposition to) the disability initiatives and infrastructure organized and monitored by nondisabled "experts" about disability — ones that hope to mold disabled people into upright citizens in a politics of respectability and worthiness where disability is correctly performed in order for supports to be won.

In response to a system that makes nondisabled people the experts about disability, we insist on disabled knowledge, disabled knowers, and disabled expertise when it comes to encountering the friction of unequal access, whatever the mode and composition. Our experiences of infrastructure and design often defy expectations: where others expect an embodiment relation when an amputee wears a prosthesis, the wearer knows that bodies and technologies don't always "ring true" or feel like a body part. Sometimes that leg is Other in an alterity relationship, and takes a whole focus away. The same is true of ramps and reading software. On the outside of most disability tech, there is an expectation of embodiment, when it's much more spotty than smooth. This expectation can also mean that newly disabled people are very much discouraged by the state of technology when so much has been promised. Encountering a world now-hostile and made Other, a newly disabled person negotiates alienation from that which they thought they knew.

By "honoring the friction of disability" (Jackson, 2019), we can see spaces and places not just as things that should meet an accessibility checklist, but places for which disabled people have important information and ideas, to recognize disabled expertise as something good to have in evaluation and understanding.

[11] Disabled people are more likely to experience care relations between nonhuman others than nondisabled people, whether in the form of emotional support animals, service animals, interdependent relationships of care, or even in the use of notebooks, computer applications, and timers that we might use to self-regulate.

**Section 5: Conclusions**

We require approaches that, to borrow and rework a phrase from Alison Kafer, *bend the world to meet our bodyminds, rather than bend our bodyminds to meet the world.* We find disabled approaches to dimensionality expressed in the creative arts and in disability futurity to be an answer to the limits and lack of 3D experience provided in current infrastructure. Projects like Kinetic Light, where artistic director and wheelchair dance Alice Shepphard (2016) designed a set surface for wheelchair dance performance where chair dancers use momentum and each other on the surface's curves for 3D movement, show creative possibility. Performances by groups like Sins Invalid showcase relationality to each other and the world, with a commitment to intersectional disability justice; they use multidisciplinary performance and workshops to promote social justice.

We also see an explosion of traditional ideals/biases about bodyminds in recent work on disabled people in space travel and exploration. The recent announcement by the European Space Agency of their feasibility study of disabled astronauts, recruiting in this feasibility assessment people of shorter stature and those with below-the-knee limb differences (amputees, but also those with club foot and other congenital disabilities or injuries), may seem radical to some (ESA, 2021). Following this announcement, SpaceX announced its first space traveler with an internal prosthesis, Hayley Arceneaux (Kramer, 2021). However, though less covered in history lessons, eleven congenitally Deaf men from Gallaudet University were used in US NASA testing (since they did not get seasick); the goal was to learn from these bodyminds that would fare better being rocked around in space capsules, though the Deaf men were never considered as potential astronauts themselves (Eveleth, 2019). We often think of space programs as recruiting for "the right stuff" where that stuff has never been disabled stuff before. But this hasn't stopped disabled people from thinking about space from their perspectives of movement and sense.

Sheri Wells-Jenson writes for *Scientific American* about how useful blind astronauts would be in an array of circumstances (Wells-Jenson 2018) and ends: "for the good of the overall mission, I would strongly urge that disabled candidates be given a slight preference." People with mobility disabilities have often thought about how what is experienced as limitation under the pull of gravity may be no more in space. Springboarding off of the viral Twitter hashtag from Sam de Leve, #CripsInSpace, a special issue of the literary magazine *The Deaf Poets Society* showcased disabled science fiction about space travel and the cosmos. And, of course, the notion of cyborg comes from speculation about technologized disabled bodyminds (Williams, 2019), and space travel itself will create and produce disabled people, even if it is not recruited for (Shew, 2018).

Imposed limits to disabled dimensionality are often created by circumstances of movement and of infrastructure, as well as assumptions about what bodyminds are supposed to exist, to be in a space. We posit disabled dimensionality as a way of acknowledging disabled knowledge of space and place. Dominant narratives about design, even when offering "universal" solutions, that fail to include disabled knowers as contributors will continue to exclude. If society is to value reflexions on varied dimensionalities, it should allow for spaces where the corresponding experiences and knowledge can be shared.

## References


AODA Alliance. 2017. “Accessibility Problems at Ryerson University Student Learning Centre (Long Version)”. *AODA Alliance Youtube Channel*, https://www.youtube.com/watch?v=uqUZ6gK9N9k

Blanchard, Enka. 2020. “Crip spatialities and temporalities I : discreet crips in a discrete world”. *EspacesTemps.net*. https://www.espacestemps.net/en/articles/discreet-crips-in-a-discrete-world-spatialities-and-temporalities-of-disability/

Bliss, Laura. 2015. “Maps That You Can Hear and Touch”. *Bloomberg Citylab.* https://www.bloomberg.com/news/articles/2015-01-15/maps-that-you-can-hear-and-touch

Bola, Ł.; Siuda-Krzywicka, K.; Paplińska, M.; Sumera, E.; Hańczur, P. & Szwed, M. 2016. “Braille in the sighted: teaching tactile reading to sighted adults”. *PloS one, Public Library of Science.*

De Leve, Sam. 2017. “Pep Talk for the Crips in Space Issue (May 2017): Guest Editor Sam de Leve.” Deaf Poets Society Youtube Channel, https://www.youtube.com/watch?v=-SxY7NeyyQ4

European Space Agency. 2021. *Parastronaut Feasibility Project Announcement.* https://www.esa.int/About_Us/Careers_at_ESA/ESA_Astronaut_Selection/Parastronaut_feasibility_project

Eveleth, Rose. 2019. “It’s time to rethink who’s best suited for space travel”. *Wired*. https://www.wired.com/story/its-time-to-rethink-whos-best-suited-for-space-travel/

Hamraie, Aimi. 2017. *Building Access*. University of Minnesota Press.

Hetrick and Attig, 2009**.** “Sitting Pretty”. *The fat studies reader,* NYU Press.

Ihde, Don. 1990. *Technology and the Lifeworld*. Indiana University Press.

Jackson, Liz. 2018. “We Are the Original Lifehackers”. *New York Times*, May 30. https://www.nytimes.com/2018/05/30/opinion/disability-design-lifehacks.html

Jackson, Liz. 2019. “Honoring the Friction of Disability”. *AIGADesign*. https://www.youtube.com/watch?v=cZhiu-jGbdE

Johnson, Merri Lisa, and McRuer, Robert. 2014. “Cripistemologies: Introduction”. *Journal of Literary & Cultural Disability Studies* 8, no. 2 : 127-147. muse.jhu.edu/article/548847.

Kramer, Miriam. 2021. “An unlikely astronaut”. *Axios.* https://www.axios.com/hayley-arceneaux-inspiration4-astronaut-a3bcf555-5f42-4543-82aa-b4af5c5d9a7a.html

O'Connor, Ciara. 2019. Twitter thread. https://twitter.com/Cioconnor/status/1159895452118081536

Peace, William. 2014. “Walking is over rated” [blog]. http://badcripple.blogspot.com/2014/06/walking-is-over-rated.html

Pitt, Joseph C. 2016. “Pure Bred Technologies”. S*outheastern Ethics and Philosophy of Technology (SEPOT) Workshop*. Charlotte, NC. Sept 10, 2016.

Price, Margaret. 2011. *Mad at School.* University of Michigan Press.

Regan, Brashear. 2013. *Fixed: the Science/Fiction of Human Enhancement* [film]. Director: Regan Brashear. New Day Films.

Ribáry, G.; Lajtai, L.; Demetrovics, Z. & Maraz, A. 2017. "Multiplicity: An explorative interview study on personal experiences of people with multiple selves". *Frontiers in psychology, Frontiers, 8*, 938-947.

Samuels, Ellen. 2017. "Six Ways of Looking at Crip Time". *Disability Studies Quarterly,* 37(3).

Schalk, Sami. 2018. *Bodyminds Reimagined*. Duke University Press.

Sheppard, Alice, 2016. *Kinetic Light*: https://kineticlight.org/

Shew, Ashley. 2017. "Animals in Philosophy of Technology" in Joseph C. Pitt and Ashley Shew (eds.), *Spaces for the Future: A Companion to Philosophy of Technology*. Routledge.

Shew, Ashley. 2018. "Disabled People in Space" [blog post]. *Technology & Disability.* https://techanddisability.com/2018/10/14/disabled-people-in-space-becoming-interplanetary/

Stone, Leilah. 2019. Hunters Point Library called out over accessibility issues. *The Architect's Newspaper.* https://www.archpaper.com/2019/10/hunters-point-library-called-out-over-accessibility-issues/

Young, Stella. 2014. "I'm not your inspiration, thank you very much". *TEDxSydney*. https://www.ted.com/talks/stella_young_i_m_not_your_inspiration_thank_you_very_much

Wells-Jenson, Sheri. 2018. "The Case for Disabled Astronauts". *Scientific American.* https://blogs.scientificamerican.com/observations/the-case-for-disabled-astronauts/

Williams, Damien P.. 2019. "Heavenly Bodies: Why It Matters That Cyborgs Have Always Been About Disability, Mental Health, and Marginalization" (June 8, 2019). Available at SSRN: http://dx.doi.org/10.2139/ssrn.3401342