

# **Disability, mathematics, and the Goldilocks conundrum: Implications for mathematics education**

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Mathematics and disability have a long and complicated relationship. On one hand, students who struggle with mathematics have been pathologized and labeled as learning disabled (Watson & Gable, 2013). On the other hand, many famous mathematicians are portrayed as insane and troubled geniuses (e.g., Capps, 2011). This Goldilocks conundrum creates a tenuous situation for many people as far as mathematics is concerned. A person needs to have a relationship with mathematics that is “just right” to be seen as normal and normative. In this essay, I aim to move beyond tropes of disability as deficit or superpower and explore potential implications for mathematics education.

I write this essay from my own positioning as a disabled mathematics educator. In my own experiences of mathematics learning and teaching, I recognize that disability leads to complex embodied experiences, which can create both challenges and opportunities. It is from this lived reality that I reflect on societal views of disability and mathematics and argue that a reconceptualization could be a productive way forward for advancing disability justice and mathematics learning.

## **Background**

A growing body of research focuses on mathematics learning disabilities. Typically, students who score below a designated cutoff on a standardized test are labeled as disabled (Watson & Gable, 2013). Although such a designation ostensibly aims to help students by garnering additional support, in fact, stigma from the learning disability label can lead to further marginalization (Artiles, 2019). For example, racially minoritized students are labeled as learning disabled as a form of discipline and control, which reifies structural racism and ableism in schools (Reid & Knight, 2006). Similar tactics were used in the eugenics movement, when mathematics was used as a justification for eliminating racially-minoritized populations that were labeled as “feeble-minded” (Baker, 2002). This history shows that mathematics can be a powerful tool for labeling what is “normal,” and oppressing non-normative bodyminds.

People who are “too good” at mathematics are also stigmatized. For example, both Newton and Einstein, notable historical figures who were stereotyped as odd geniuses, are suspected to be autistic (James, 2003). In this way, historical accounts do not reflect what is now understood about non-neurotypical behavior. It was misunderstood and simply labeled as *odd*. Other mathematicians have had mental illness or depression, like John Nash (Capps, 2011) or Georg Cantor (Dauben, 1978). Tropes about these mathematicians tend to follow a narrative of the mad scientist, or mathematicians who were successful *despite* their disabilities. These mathematicians were so good at mathematics, that they could not be viewed as “normal enough.”

In reality, disability is a complex embodied experience (Lambert, 2019; Siebers, 2008). Different bodyminds have different ways of experiencing mathematics, which can lead to new insights. For example, blind mathematicians may have exceptional visualization skills; Euler provides a historical example of a mathematician who made many discoveries after he was blind (Jackson, 2002), but was then referred to by the pejorative “cyclops.” Similarly, mathematicians who are neurodiverse think about mathematics differently, and a logical autistic mind can be a huge asset in making mathematical discoveries. It is clear that disability is not purely a deficit or an asset, but rather it is a normal part of the variety of human experiences. Disabled mathematicians navigate a complex web of embodied experiences just like everyone else.

I now turn to insights from the disability justice movement and their potential to provide a path forward for a more humanizing and empowering form of mathematics education.

### **Disability Culture and Justice**

Disability justice as a movement recognizes the complex embodiment of human experience and the intersections between disability, race, gender, and other identities (Sins Invalid, 2019). Disability justice centers the experiences of those who are multiply marginalized, particularly disabled people of color and queer/nonbinary disabled people. Activists in this movement problematize the notion of a normal or normative bodymind as a social construction. From a disability justice perspective, all bodies are unique, they have their own histories and lived experiences, and their own access needs.

Disability justice is important for disabled people as it allows us to reclaim our own histories and identities. In popular culture, the education system, and in mathematics classrooms, those who are disabled are undervalued and are seen as anomalies. Even successful disabled mathematicians are pathologized. These deficit perspectives only further harm disabled people on top of the barriers that already exist. In contrast, a disability justice perspective centers disabled embodied experience as a valid and normal part of human existence. By analogy, ethnic studies has been important for racially-minoritized students to learn about their own histories of resistance and joy. Similarly, disability justice moves towards a more empowering telling of disability history and contemporary culture. This is particularly important for disabled people who might be multiply marginalized, as disability justice centers those multiple identities in a holistic way. Mathematics educators can also benefit from the lessons from disability justice, as I now elaborate.

### **Implications for Mathematics Education**

In this section, I offer three possible implications for mathematics education to move forward regarding the Goldilocks conundrum as it relates to disability.

#### **Centering Embodiment**

In contrast to commonsense notions that mathematics is entirely logical or disembodied, research shows how mathematics is an embodied experience (Lakoff & Núñez, 2000). For example, research connects student gestures and their mathematics learning (Goldin-Meadow et al., 2009). However, students beyond elementary grades rarely experience mathematics as an embodied experience. Explicit talk around embodiment and valuing embodied experiences in

mathematics could be used as a productive first step to normalizing different bodyminds in mathematics learning. This creates space for exploring a variety of different ways of thinking, exploring, and solving problems, and allows for deeper conceptual connections by exploring multiple approaches. A focus on embodiment is also a step forward to a broader framing of mathematics as a historical, cultural, and evolving set of practices, as emphasized from an ethnomathematics perspective (D'Ambrosio, 1985). In framing mathematics as a human activity, there are direct opportunities to include the full range and complexity of human embodied experience, both disabled and nondisabled.

### **Normalizing Access Talk**

Disability justice draws attention to the importance of access and the various access needs that individuals may have (Sins Invalid, 2019). Often these needs are thought of in terms of access to ASL interpretation, image captions, or gender-neutral bathrooms. But access needs also relate to the types of language or visual representations used, or the way students interact throughout the learning process. Although autistic people are often portrayed as “mathematical geniuses,” in fact, certain communication styles or active learning environments may actually be less accessible for autistic folks (Gin et al., 2020). In general, throughout school mathematics it is communicated that there is *one way*, or a *right way* to learn mathematics. This rigidity rarely applies to other subjects of learning. This rigidity can be challenged by normalizing *access talk*. What do students need to access a space? What would be most supportive of their learning? What would help them do their best work? Rather than speaking for students, we can give them more of a role in self-advocacy in the learning environment. Rather than trying to fit all students into a single, non-accessible mold, we can expand the boundaries of what we consider mathematics thinking, learning, and teaching.

### **Embracing Disability Culture**

Finally, I argue that mathematics educators could go a long way towards improving mathematics education – especially for those who are considered disabled – by developing a better understanding of disability culture and incorporating into their classes. Because mathematics classrooms are often a site in which students are marginalized and labeled as disabled, they can also be a powerful site for resistance. For example, by teaching students about famous disabled mathematicians in a non-pathologizing way, it challenges the notion of disability as problematic, or that there is a single normative bodymind. Similarly, it provides role models for disabled students that they can aspire to. Given the interconnections between ableism, racism, sexism, and so forth, this is also an important site for challenging intersectional oppression. Beyond supporting disabled students, practices from disability justice (like a focus on access, wholeness, and working sustainably) are ostensibly good for *all* students and teachers alike.

### **Discussion**

The current state of affairs in mathematics is a reality in which disabled mathematicians can rarely win. We are either too good, or not good enough, at mathematics to be seen as normal and normative. Yet, given the strong connections between mathematics and disability, both

historically and today, mathematics classrooms are a powerful site for reconceptualizing disability. By embracing disability proactively, rather than pathologizing it, mathematics educators can go a long way to empowering their disabled students. Mathematics has long had a troubled relationship with ableism, intertwined with racism, sexism, and other oppressive system, and a focus on disability justice can go a long way towards ameliorating it.

Reconceptualizing disability in mathematics education is important not only for future generations of mathematics learners, but also those of us who are disabled in the mathematics community today. Although disability is pathologized, one of the great ironies is that nearly all people will become disabled at some point in their lives. The status quo communicates that such people no longer have an important role to play in mathematics and mathematics education. By embracing disability in a more proactive and positive way, we can move beyond pathologizing to empowerment.

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