

The Epic and the Tragedy: Narratives of a Disabled Physics Student

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In this paper, we present a case study with a disabled physics student to draw attention to his experiences in the physics community, and the barriers and supports that he experienced as he advanced through his physics career. Using a methodology of narrative analysis, we identify themes and genres within the stories told by the participant. Narratives are often created to explain the unexpected and to solve a problem. In the physics community, disabled students find their “differences” (i.e., disability/impairments) are often positioned as unexpected and a problem to be solved. We use narrative analysis to humanize disabled physics students and to highlight their lived experiences of progressing through the physics community over their perceived deviation from the physics “norm.” From this, we create resources for physics mentors to increase their knowledge of disabled physics students’ experiences and how to support accessibility and inclusion in the physics community.

I. INTRODUCTION

Disabled students are enrolling in postsecondary education; approximately 20% of the current student body is disabled students [1,2]. However, studies show that STEM faculty hold more negative views about disability than their peers in other academic disciplines [3]. A recent study also shows that physicists tend to lack knowledge about the lived experiences of disabled students and disability [4]. It is important to increase physicists' knowledge of disability without placing the burden on disabled students to educate others, which could happen if disabled students are placed in environments not ready to support them.

In this study, we use a narrative analysis methodology to highlight the lived experiences of a disabled physics student in physics learning and research environments. Narrative analysis positions the participant as the narrator of their own story, with plot lines, genres, and lessons to be learned by the physics community [5]. We analyze stories provided by one disabled physics student to demonstrate how narrative analysis can produce knowledge to counter ableism and the marginalization of disabled voices in physics.

II. POSITIONALITY AND LANGUAGE

Our identities impact how we conduct research and interact with participants. In the context of narrative analysis, our prior knowledge and social location influence how outside narratives are transcribed and analyzed, just as the reader's knowledge and identity influences how the narratives are understood [6, 7]. The narratives were transcribed and interpreted by a researcher whose identity status is constantly changing. The first author (they/them) identifies as a white, queer, assigned male at birth (amab), nonbinary person diagnosed with anxiety, depression, degenerative hearing loss, late-onset epilepsy, and chronic back pain. The second and third authors (she/her) both identify as a white cisgender woman with migraines, anxiety, and depression.

Usage of person-first (e.g., person with disability) and identity-first (e.g., disabled person) language varies depending on the context and the person within the disability community [5,8]. The first author's preferred identity label is Dis., due to its separation of the concept of ability from the author's identity. However, participants also have their own preferences regarding language about their identity. Thus, we will use Aaron's preferred language when discussing their stories and interviews but will use "Dis." elsewhere.

III. METHODOLOGY

A. Interview Process

We constructed a semi-structured interview protocol to interview Dis. students about their experiences in physics

learning and research environments. First, we asked about the disabilities they identified with, their experiences of those disabilities, and the relationship between disability and their identity. Then, we asked about supports and barriers that they faced within the physics environment and from mentors in the field. Next, we focused on their ability to access accommodations from their institution's Office of Disability Services (ODS) and from their instructors and mentors. Finally, we discussed what they believe an inclusive physics class would feel like and what they would like instructors and mentors to know about supporting them.

We recruited volunteers for pilot interviews through personal contacts. Participants shared demographic information via an online survey before the interview and indicated their choice of interview format (a single one-hour interview, two one-hour interviews, or one two-hour interview). Participants were invited to share access needs, such as requesting a sign language interpreter or an asynchronous interview format. Thus far, all interviews were conducted virtually by the first author over Zoom. Participants were provided a gift card valued at \$25 for a one-hour interview and \$50 for two-hours of interview.

We recognize that recruiting from personal contacts may have biased our pilot sample. Our personal contacts are likely more familiar with PER, more vocal about their impairments, and may be more knowledgeable about disability theory. In the next phase of interviews, we will recruit from the broader physics community.

B. Participant Description

In this paper, we focus on two one-hour interviews with a single participant, who selected the pseudonym Aaron. We chose to present Aaron because we identified his stories to have enough detail to support a case study. We strive to attend to the participant's intersecting identities, while at the same time providing them privacy. Thus, throughout the analysis we will sometimes use general terms to describe specifics of Aaron's identity and experiences. Aaron completed an undergraduate degree in physics and is pursuing a graduate degree in physics; Aaron switched physics research sub-disciplines during graduate school. Aaron presents with multiple privileged and marginalized identities including being disabled. Aaron is neurodiverse and has a hearing impairment.

C. Narrative Analysis

Narrative analysis takes the experiences of the interviewee and treats them as a story. Using Labov's narrative analysis model, a fully formed narrative contains the abstract (a summary of the incident), the orientation (e.g., who, when, and where), a complicating action ('what happened'), a resolution (summary of the main point), an evaluation (explanation of the purpose), and a coda (signaling the story's end) [5, 8]. Here, we analyze stories

shared by Aaron and demonstrate that his stories exhibit two narrative genres: Epic and Tragedy.

Labov's methodology to identify a narrative helps illuminate the experience, but also acts as a tool to pull out the main structure and argument of the narrative as well as reinforce that the story is, in fact, a narrative and can be analyzed. Identification also improves reliability/peer review process by allowing the reader to see how we analyzed and interpreted the data [5, 8].

1. Transcribing Experience

Transcribing verbal interviews into written word requires decisions about what is transcribed and how, as it is impossible to perfectly represent a spoken conversation. For this paper, we signal verbal emphasis with bolded text and designate silences by a time-marker detailing the length of the silence (e.g., (2s)). Timestamps are provided to represent the time spoken during the interview. These choices can affect how the reader interacts with the story [5]. We also include the narrative components in underlines throughout the transcripts to demonstrate our analysis. We used Zoom's automatic transcription and captioning service during the live interview. Then, the first author listened to the interview and corrected the autogenerated transcript.

2. Analyzing Experience

Analyzing experiences also involves conscious choices by the researcher about what to focus on. Since narratives are treated as stories, researchers must make "decisions about form, ordering, style of presentation," [5] and which experiences are to be included. Using Labov's analysis as described above, we identify how the story is structured to reveal the central events of the story and underline the components of Labov's model within the transcripts. While the reliability of the story's authenticity (e.g., is the interviewee telling the truth) and the analysis done by the researcher is a limitation of narrative analysis, we followed an established method of narrative research with Labov's model, included verbatim sections of the transcript to allow the reader to draw their own conclusions, and included our coding of the transcript via the narrative components in order to increase the trustworthiness of our interpretations for the reader.

Narrative analysis allows us to focus on the experiences of the marginalized. By doing so, we bring power to their experiences and engage in counter storytelling and combat dominant stereotypes by deciding whose voice is centered [5, 8]. While we are unable to outline a complete narrative analysis, our focus on genre foregrounds the type of experiences of Dis. people are familiar with, both positive (Epic) and negative (Tragedy). For a more complete description of narrative analysis, see Riessman's work [5, 8]

Each chosen genre highlights different aspects of an interviewee's story and contains its own affective impact. We selected specific genres to spotlight aspects of Aaron's

stories, but this does not preclude the applicability of other genres to these stories. The Epic presented the positive victories of the Dis. student, and their journey, filled with both highs and lows. Contrarily, the Tragedy is a representation of the ableism and struggles that Dis. students regularly face within the physics culture.

IV. FINDINGS AND DISCUSSION: AARON'S EPIC

The Epic genre is rooted in the Greek Epic and has four traits: 1) Epics center people with exemplary qualities; 2) Epics' settings are universal and easily relatable, which allows them to explore ideas over a range of human experiences; 3) Epics invoke deities and the supernatural; 4) Epics represent the culture itself [11]. Epic was chosen to frame one of Aaron's stories due to connections to three of the four listed traits, excluding the supernatural, which is likely due to the realistic nature of Aaron's narrative. For future analysis, we will explore whether the systemic nature of ableism could be classified as "supernatural". Aaron's narratives are set in the relatable setting of physics research and learning environments, and we distill lessons about how to improve physics culture. Aaron's narratives center people with exemplary qualities by describing his ability to persevere and succeed despite ableist attitudes. Additionally, Epic emphasizes the journey and positive moments that Aaron encountered.

Due to the long-form nature of an Epic, Aaron's stories will be ordered chronologically through his experiences with separate moods in each portion of his life. The Epic will start neutrally, detailing his start with identifying as a disabled person, and the encouraging, small positive experiences. Next, the story will move into the Tragedy, showing the conflicts that Aaron has faced. Finally, we will move past the Tragedy toward Aaron's current environment, ending with personal character growth and a happy ending.

A. The Beginning

The dominant societal view of disability is defined through a medical model [12, 13]. It comes from "deeply rooted beliefs about health, productivity, beauty and the value of human life" [14, 15]. However, due to personal experiences, Aaron describes his relationship with his own disability as something neutral, if not positive. The orientation of this story is a younger Aaron's interactions with his friends and his mom. When asked about his relationship with the idea of being disabled, Aaron stated:

(1:44:17-1:45:31) - **Aaron**

Abstract: *I totally am one. Umm, **but** uh, my relationship is **interesting** because, uh, I, like my mom is also disabled? and she's been disabled my entire life.*

Complicating Action: *Her. she she has a bum knee where she's like, just **doesn't** have a knee and umm, so that - it was always like a very **upfront** thing. Umm, in my life that anytime we'd have like the Relay for Life walk [fundraising event for the American Cancer Society], my mom would*

come and like hang out, **and** she would do like, she would walk with a bunch of kids, but she has like a **very clear** knee brace when she wears shorts,

Resolution: uh, and so (1s) I never had a like 'disability is a bad thing' (1s) sort of thing, because like all my friends were just like 'yo your **mom's** a robot that's sick **as fuck**' uh, and so (1s) like, none of **that**. Really, when it came to me being hard of hearing my **mom** at the time was also, uh, studying to be a sign language interpreter, uh, just kind of a happy little accident.

Evaluation/Coda: Um, and so that **nothing** was inherently shameful about that.

Aaron shares that his mother's relationship with her own disability, his friends' response to his mother's disability, and his mother's interest and skill in sign language created an early disability experience that was free from shame.

B. The Tragedy

Tragedy as a genre is generally defined as a drama that accounts sorrowful events encountered by the protagonist [16]. Regarding the personal nature of this narrative, we will use Williams' definition by outlining the Tragedy of the social and the personal. Social Tragedy can refer to a metaphorical sickness that exists within a society's foundations (e.g., oppression), while personal Tragedy refers to misfortune that befalls an individual (e.g., death) [17]. Aaron shared tragic experiences in both his classes and research experiences.

1. Aaron's Classes

The orientation of the first story is an email conversation between Aaron and a professor for a graduate physics course at the start of the year, and then at the end of the year.

(0:11:33-0:11:59) - **Aaron**

Abstract: Why I'm now doing [new research concentration] – Uh, the first one was my [physics] professor, uh.

Complicating Action: I, I emailed him was like 'Hey I'm autistic, (1s) help? Uh, like do better.' Um, and he was like 'okay cool I'll read a little bit about autism. I've never heard of uh, ADS' - oh, ASD, Autism Spectrum Disorder. **Um**, but like 'yeah, I'll see what I can do' and then immediately responding with,

Resolution: (2s) 'Oh, sorry, uh, nothing I can do about that, umm, without like formal ODS [Office of Disability Services] stuff' umm. And having to go have a back and forth. but being like hey? ODS doesn't help me very much. Umm

[Aaron discussed the specific accommodations he would need during the semester, and the professor's polite but dismissive response to his needs]

(0:13:10-0:13:39) **A:** I think it was something akin to like you 'I know you've had intellectual troubles, uh, this, uh, semester and I was fully ready to just let you, uh, move through, uh.

Evaluation: But uh, I couldn't in good faith (2s), uh, absolve what you did at the beginning of the semester of, uh (1s), not

doing well at the beginning of semester. Yes, you improved, uh, but not enough to my liking. And, uh, So I, I'm going to give you a C+ and come back next year',

Coda: uh, which was (2s) **rude**.

Aaron describes his physics instructor as dismissive of his request for help and reliant on a medical model of disability, where external experts had to sanction supports for Aaron, resulting in Aaron needing to repeat the course.

2. Aaron's Research

The orientation of the second story is several interactions between Aaron and his first graduate research advisor.

(0:13:47-0:15:02) - **Aaron**

Abstract: But, umm, so there's that, uh, and, then the reason I don't do [original research concentration, RC1] anymore. Is uh, asking a lot for help from my old advisor, uh.

Complicating Action: Because (2s) the textbooks that I was (1s) **using** to understand how to do, how to like, learn what, uh, computer language, uh, we were using, were not (2s) - were not helpful. They were written for people who already had (1s) a, at least a rudimentary knowledge of, uh, okay, what (3s) I forget what code, it was like block code but worse. Umm, but whereas, but they had already a rudimentary knowledge of how this style of coding works, and uh, upon going to ask for help, uh, I would repeatedly, 'Yeah, well, that's part of doing a PhD. Uh, just suffer through it a little bit, and you'll be fine.'

Resolution: Uh, and then I suffered through it for a while, and **no**, nothing, nothing improved, and then having to go and uh, give a, uh, presentation on it, uh immediately to have a like 'well, why didn't you? Why didn't you come see me when you were having trouble'?

Evaluation: when I **did**, uh, that doesn't help, uh, rejection sensitive dysphoria?

Coda: Y'know?

Aaron reveals that his first research advisor trivialized his request for help to learn a new coding language. After Aaron struggled in a research presentation, the professor acted like Aaron had not asked for help. Afterward, Aaron described how his neurodiversity, which includes Rejection Sensitive Dysphoria, an intense emotional response to what other's think about or say to a person, made it difficult to work in his first research concentration.

C. Happily Ever After?

Aaron found new positive experiences with his final research advisor. Instead of a mentor/mentee relationship, a dialogue was created acknowledging Aaron's expertise with his own disability. While the new mentor did still make mistakes, she acknowledged mistakes and a desire to learn. The orientation is a conversation between Aaron and his current research advisor.

(0:43:28-0:44:22) - **Aaron**

Abstract: And it's been **very fun** because I've also like had to sit down and be like, because I'm as you know,

Complicating Action: *I'm doing interviews as well, uh, and, uh I'm doing a [describes research study] looking at (1s) doing interviews with neurodivergent people*

Resolution: *and I've gotten a lot of like, 'uh, okay, but what if these people want to like (1s) to, express themselves in ways that **aren't** interviews'*

Evaluation: *and, uh, having to be like, 'no, no., we are still people, just still people don't, **don't** worry, we are not children.'*

Coda: *It's okay. But, (1s) and [Dr. Carrie's] very open to that. It was nice.*

Aaron's story about interacting with Dr. Carrie exhibits a positive interaction with research, where Aaron can act as the expert of his disability and his knowledge is respected.

V. TAKEAWAYS FROM AARON'S JOURNEY

We identify two main takeaways from Aaron's stories for physics instructors. First, Dis. people are the experts of their own experiences; we know best what we need for our impairments. As Aaron described in the Tragedy, his physics experiences suffered when his instructors and mentors did not respond to his personally identified needs. Aaron also described experiences with physics instructors and ODS staff that assumed they knew better.

The orientation is Aaron talking about one instance of a barrier in the physics community.

(0:38:13-0:39:13) - *Aaron*

Abstract: *A **big** barrier is professors just not knowing anything about, uh, autism spectrum disorder, (2s) and, uh, ADHD [attention deficit-hyperactivity disorder].*

Complicating Action: *Uh, just simply like professors, (2s) **not knowing** one, (1s) uh, or thinking that they can read a couple of papers,*

Resolution: *and that is the equivalent to my lived experience. (1s) Uh, (2s) slash, that they would know **more** about about that than about what I need than I do. Uh, (2s) and the same thing with ODS, thinking they know more than **I do** about my own lived experiences., Um, (4s) **Physicists specifically** like to do like a one-size fits all, I've noticed and that's just probably due to **training** as a physicist.*

Evaluation: *Uh, (2s) one-size fits all, if you've met one autistic person, you've met one autistic person,*

Coda: *y'know?*

Here, Aaron suggests that the culture of physics may make physicists less interested in the specifics of individuals' experiences. Second, as Aaron described in "The Beginning," encouragement and acknowledgement about disability in physics is essential. Later, when asked how the physics community can provide a safe place for students to discuss accessibility related issues, Aaron expands on the idea of acknowledgement, sharing:

(1:48:45-1:49:46) - *Aaron*

Abstract: *(5s) Um, that's a, **that's** a good question because I personally don't think that the **syllabus** thing particularly **helps** in any way. The like little addendum at the end.*

Complicating Action: *Uh, (3s) it would be **nice**, uh, I think, if - and this just kind of goes for like **broadly** for all minority, groups if like (2s) professors talked more about like (2s) people who were like me in uh, physics.*

Resolution: *it took me until talking with Dr. Carrie [pseudonym], to be like,*

Evaluation: *'Oh, there are **other** like hard of hearing and deaf physicists?' Um, (2s) So yeah, there's. **that** cause like the only thing I could think of when I was like, Yeah, disability in physics is like **pretty** interesting. and like ethnography is important in terms of these things. Was, uh, the example of I forget what Professor but she's a blind astrophysicist.*

Coda: *Uh, and so that's the only one **I** knew of that like had any sort of sensory disability.*

Aaron conveys that one method instructors can use to signal that their class is a safe space is to provide examples of representation in physics, either as minorities themselves or sharing outside examples. Extrapolating from the narratives highlighted by the genres of Epic and Tragedy, and the takeaways above, we posit several suggestions for mentors and educators.

First, instructors and mentors need to recognize that Dis. students are the experts of their own bodies. Instructors, mentors, and ODS staff should continue to learn about supporting access in postsecondary physics and implement the access practices they know are available ahead of time. These practices reduce the burden on Dis. individuals to inform instructors and mentors about their disability and accessible practices. Instructors, mentors, and ODS staff should also center Dis. students' needs and experiences by inviting (not requiring) students to share their access needs.

Situating the Dis. individual as the only source of disability knowledge burdens them with emotional labor and possibly aggravates existing disabilities such as anxiety and depression. Additionally, individuals may have undiagnosed impairments, resulting in unnoticed and unmet access needs. Individuals in power should recognize the labore required to share one's expertise by paying Dis. individuals for training.

Finally, as described in "The Tragedy", Aaron's first graduate research mentor expected him to function in the same way as neurotypical students, such as "suffering through" learning challenges and being persistent about asking for help. As mentors and instructors, it is necessary to strive for equity (equal outcomes) rather than equality (equal supports) between privileged and minoritized groups. As Aaron stated, Dis. students' needs and experiences vary, even when they share the same diagnosis. Accommodations should be matched to individual students' needs to create an equitable environment [18].

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