

Board 419: Untangling 'Neurodiversity' and 'Neurodivergence': Implications for Research Practice in Engineering and STEM Contexts

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Arash E. Zaghi is a Professor in the Department of Civil and Environmental Engineering at the University of Connecticut. In 2009, he received his PhD in Civil Engineering from the University of Nevada, Reno. After he was diagnosed with attention deficit hyperactivity disorder (ADHD) at age 33, he began engineering education research aimed at highlighting the importance of neurodiversity for the creativity of our nation's engineering workforce by promoting a fundamentally strength-based perspective toward diversity. He started his engineering education research endeavor through an NSF RIGEE grant in 2014. The promising findings of this research and the encouraging feedback of the student community motivated him to pursue this line of research in his NSF CAREER award in 2017. Since then, he has built a coalition within the university to expand this work through multiple NSF-funded research grants including IUSE/PFE: RED titled "Innovation Beyond Accommodation: Leveraging Neurodiversity for Engineering Innovation". Because of the importance of neurodiversity at all levels of education, he expanded his work to graduate STEM education through an NSF IGE grant. In addition, he recently received his Mid-CAREER award through which, in a radically novel approach, he will take on ambitious, transdisciplinary research integrating artificial intelligence, neuroscience, and education research to advance a personalized tool to enhance the participation of middle-school students with dyslexia in STEM disciplines. His efforts on promoting neurodiversity in engineering has been twice recognized by Prism Magazine of the American Society of Engineering Education.

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Abstract

With growing awareness of and interest in neurodiversity and neurodivergence among members of the general public and within academia, there has been a surge in scholarly publications that make use of this terminology. This paper undertakes a critical review and exploration of the current uses of 'neurodiversity' and 'neurodivergence,' looking to untangle these terms and discuss their implications in research and practice. As engineering education researchers who have personal experiences with ADHD, anxiety, and/or dyslexia, we are particularly interested in the implications of language usage in relation to neurodiversity research within the STEM context. Drawing on a review of recent literature, we explore the power of language to shape understandings of neurodiversity in an emerging field of study. Specifically, we aim to unpack the ways in which neurodiversity/neurodivergence language may either challenge normative assumptions about neurocognitive function or further reinforce marginalizing and deficit-based assumptions about individuals with neurodiversity-related diagnoses. Finally, this paper explores the implications for engineering and STEM research contexts. We argue that researchers' language usage in relation to neurodiversity has the potential to either reinforce the overarching norms embedded in STEM academic cultures by reinforcing rigid understandings of "normality," or, alternatively, to deconstruct these norms to make way for a more inclusive understanding of cognitive diversity.

Introduction

In recent years, the neurodiversity paradigm has garnered significant attention, particularly in engineering and more broadly STEM [1-17]. Additionally, this is evidenced by a notable rise in the popularity of the terms "neurodiversity" and "neurodivergent". Specifically, during the pandemic, "neurodivergent" experienced a remarkable surge surpassing "neurodiversity" in search frequency [18]. This rapidly increasing interest has not only been noted in the public sphere, but has also precipitated a wave of academic inquiry, seen in the increasing frequency of scholarly works focusing on various aspects of neurodiversity. Publications have delved into its implications within higher education and theoretical explorations of the concept, showcasing a diversity of terminological use that sometimes conflates or ambiguously employs "neurodiversity" and "neurodivergence" without fully addressing their distinct implications.

This escalating discourse is underscored by recent scholarly contributions such as "Language matters for neuroinclusivity," [19] and "From neurodiversity to neurodivergence: the role of epistemic and cognitive marginalization" [20]. These works highlight the transformative power of language in challenging conventional perceptions of neurodiversity as a deviation from "normal" and advocating for societal structural changes to embrace cognitive diversity. In the context of this evolving dialogue, our paper seeks to dissect how language frames and influences our comprehension of neurodiversity and directs the trajectory of future research. We pose that the language surrounding neurodiversity is significant, carrying the capacity to either question and reshape entrenched normative views of neurocognitive functioning or to perpetuate existing marginalization and deficit-oriented narratives.

Our perspective is shaped by our personal and professional journeys as researchers diagnosed with ADHD, anxiety, and/or dyslexia. Our lived experiences impact our approach to rhetorical choices, aiming to use language that acknowledges and validates our experiences while fostering inclusivity in higher education and advocating for a departure from pathologizing perspectives in research. This paper is informed by our collective efforts in researching neurodiversity and navigating the publication landscape, where we have sometimes contested traditional grammatical norms to align our language with our emphasis on diversity and inclusion. Specifically, we have preferred the term “neurodiverse” over “neurodivergent” to emphasize diversity rather than deviation from a norm, despite debates over grammatical correctness. Our linguistic choices have evolved in response to the rising prominence of “neurodivergence” and our engagement with the peer review process, which plays a crucial role in normalizing language within the academic community. Through this discussion, we aim to clarify our stance on neurodiversity language, reflecting on its implications for higher education and research.

The Neurodiversity vs. Neurodivergent Dilemma: Challenging the Concept of Normal

The introduction of the term 'neurodiversity' by sociologist Judy Singer in the 1990s marked a paradigm shift in how society perceives neurological variations. Singer challenged the pathologizing views that labeled these variations as disorders, criticizing the stigmatizing binary of "able" vs "disabled" and advocating for a more nuanced understanding [21]. Yet, despite its revolutionary origin, the term 'neurodiversity' remains ambiguously defined, leading to diverse interpretations ranging from acknowledging cognitive variations as a natural aspect of human diversity [22] to defining it as an encompassing term for neurological differences traditionally viewed as disorders or disabilities [23].

This broad understanding of neurodiversity inherently challenges the very notion of a "normal" human brain by disputing the idealized standards often derived from statistical analyses. The recognition of the immense variation in brain structure and function across human populations highlights the problematic nature of defining 'normal', advocating instead that cognitive differences should be seen as resulting from natural evolutionary processes [24, 25].

A pivotal cultural shift towards embracing these neurological differences has been signified by the explosion in use of the term 'neurodivergent' in the early 2020s, propelled by increased online media engagement. Neurodivergence, as fostered by neurodiversity activists like Kassiane Asasumasu [26], offers a reclaiming of atypical neurological variations as integral to individual identity. This term encompasses a broad range of cognitive differences, including but not limited to, ADHD, autism, learning disabilities, and mental illnesses. Many see adoption of this term as an act of solidarity against societal and educational marginalization [20].

The distinction between 'neurodiversity' and 'neurodivergence' becomes clear in the acknowledgment of neurodivergence as diverging from societal norms. This divergence is not inherently negative; however, societal stigma has often cast these differences in a disparaging light. The discourse on neurodivergence calls attention to the problematic nature of labeling deviations from the norm as 'abnormal', and points toward the transformative potential of the neurodiversity paradigm in questioning the existence of 'normal' itself. Through this lens, the neurodiversity vs. neurodivergent dilemma transcends linguistic semantics to confront

underlying societal biases, advocating for a more inclusive and compassionate understanding of human cognitive variation.

Broader Implications

The nuanced distinctions between 'neurodiversity' and 'neurodivergent' bear significant implications across academic and research settings, embodying broader challenges and opportunities for fostering inclusive environments. As observed by Coghill & Coghill [27], higher education institutions have begun recognizing neurodivergent students as a unique identity group. This emergent recognition, however, is mired in complexities around language preferences (e.g., identity-first vs. person-first language) and the association with disability identities, revealing a layered landscape of self-identification and collective acknowledgment.

The interchangeable utilization of 'neurodiversity' and 'neurodivergent' in academic contexts often reflects a wider discomfort with neurological variations, inadvertently risking the perpetuation of stigmatizing norms. This dilemma underscores an urgent need for universities to transcend superficial linguistic practices and genuinely integrate principles of inclusivity and acceptance within their structures, thereby challenging entrenched notions of normalcy and valuing the diverse neurological experiences of their community members.

Research endeavors are equally impacted by the terminological choices surrounding neurodiversity. The prevalence of a deficit-oriented perspective in neurodiversity research, criticized by scholars like Dinishak [28] for its pathologizing tendencies, calls for a decisive shift towards appreciating neurological differences as integral to human diversity. Such a shift necessitates a conscious reflection on the use of 'neurodiversity' and 'neurodivergent' within scholarly investigations, aiming not to reinforce existing stigmas but to question and dismantle the binary of normal/abnormal, thereby uncovering the societal contributions and potentials embedded in neurodivergent identities.

The differentiation and application of these terms have far-reaching consequences in academia and research, demanding a critical examination of the underlying ideologies they convey. By engaging with these terminologies conscientiously, the academic and research communities can better advocate for the recognition, acceptance, and celebration of neurodiverse individuals. Moving towards a genuinely inclusive society hinges on our collective ability to navigate the complexities of neurodiversity terminology with care and intention, prioritizing the voices and experiences of neurodivergent individuals as guides toward fostering environments where every facet of human neurological variation is embraced and valued. This journey toward inclusivity not only enriches our academic and research practices but also mirrors the broader societal imperative to recognize and celebrate the full spectrum of human neurodiversity.

Our Take

In the evolving discourse surrounding neurodiversity and neurodivergent identities, our standpoint emphasizes the paramount importance of research in progressing our understanding of neurological variations and human experience. However, we assert that this research must be pursued with an equal commitment to open and honest dialogue with community members. Understanding the preferences and experiences of those directly impacted by these terms is

crucial; it ensures that our academic and scientific pursuits are grounded in respect, relevance, and responsiveness.

At the heart of our approach is the belief that terminology, while seemingly a matter of academic or clinical precision, carries profound implications for inclusion, identity, and perception within broader society. The language we use not only reflects our understanding but also shapes the social realities experienced by individuals that identify as neurodiverse or neurodivergent. As such, navigating the nuances of terms like 'neurodiversity' and 'neurodivergent' requires a conscientious balance between scientific accuracy and the lived realities of those described by these terms.

Central to our standpoint is a commitment to preventing the 'othering' of individuals based on neurological variations. The goal of our engagement with neurodiversity terminology is not to delineate boundaries between 'us' and 'them' but to foster a societal shift towards viewing neurological diversity as an integral and valued component of the human experience. This shift involves challenging and ultimately dismantling the stigmatizing notions of normality that have traditionally marginalized individuals. By promoting a more inclusive understanding, we hope to contribute to a broader societal appreciation for the rich tapestry of human cognition and behavior.

Conclusion

In the midst of an evolving conversation about neurodiversity and neurodivergence, it is imperative that we, as researchers and members of a broader societal fabric, critically examine the language and constructs that guide our understanding and interactions with neurological variations. Our society encompasses a rich tapestry of neurocognitive functions, challenging us to move beyond simplistic categories and binaries that suggest a 'normal' to be deviated from. The categorization of specific neurological variations under the banner of neurodivergence, while seeking to provide a sense of collective identity and recognition, inadvertently risks reinforcing the very normative frameworks it aims to critique.

Language, in this context, emerges not merely as a descriptive tool but as a powerful agent of change, capable of either perpetuating existing disparities or paving the way toward a more inclusive and equitable understanding of neurological diversity. The nuances of terms like 'neurodiversity' and 'neurodivergent' carry within them the weight of social experiences, identities, and potential for uniting varied groups in pursuit of common goals. As Legault et al. [20] remind us, the strategic grouping of diverse neurological variations under a unified category seeks to harness collective power for social and political advocacy, accentuating the need for thoughtful engagement with the language we employ.

Looking forward, the endeavor to navigate the complexities of neurodiversity language invites us to consider its profound implications. A neurodiversity framework empowers us to redefine our collective self-understanding, emphasizing the inherent value in each individual's unique neurological makeup. By challenging deficit-based narratives, dismantling binary constructs, and fostering an environment where neurological differences are not just accepted but celebrated, we contribute to the cultivation of a society that recognizes neurodiversity as a vital component of our shared human experience.

This calls for a conscious effort among researchers to engage with the nuances of neurodiversity terminology, ensuring that our scholarly pursuits do not inadvertently reinforce exclusionary ideals but rather contribute to a broader societal shift towards inclusivity and respect for diversity. Through continued dialogue, critical examination, and partnership with the neurodivergent community, we have the opportunity to shape the future trajectory of neurodiversity research and, by extension, our collective approach to embracing the full spectrum of neurological variations that enrich our society and world.

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