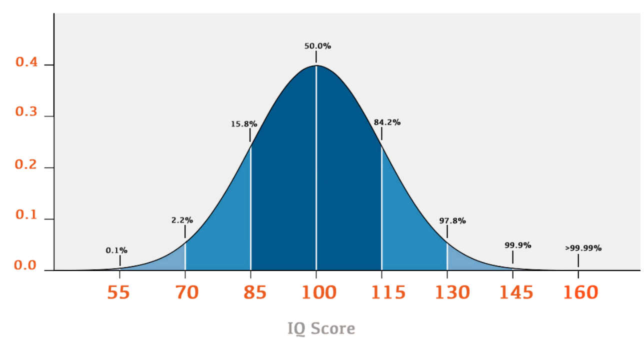
Genius as Neurodiversity in Practice: Theoretical Foundations and a Case Study of the Highly Gifted.



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Abstract

This paper explores current research on genius through the lens of neurodiversity, emphasizing the integration of neuroscience, genetics, creativity studies, and educational psychology. It examines contemporary research on neurodiversity by applying it to the profile of a highly gifted Black woman mathematician, identified with a Stanford–Binet Fourth Edition (SB4) composite score of 155 in 1986. By situating genius within the broader category of neurodiversity, this article highlights both the distinct neural-cognitive architectures associated with exceptional ability and the socio-cultural factors that influence how such potential is realized.

Emphasis is placed on how racial tensions and gendered biases shape educational and professional trajectory, and how self-generated thought processes, hallmarks of high giftedness, function both as adaptive strategies and potential vulnerabilities.

A Note about the SB4 and SB5
The Stanford–Binet Fourth Edition (SB4) and Fifth Edition (SB5) differ primarily in their normative data, subtest composition, and scaling methods. SB5, published in 2003, updated the normative sample to better reflect contemporary populations and expanded nonverbal reasoning tasks to reduce cultural and language bias. It also refined the measurement of working memory and fluid reasoning, resulting in slightly higher ceilings and more precise differentiation among the extremely gifted. While the SB4 score of 155 (1986 norms) still represents performance well above the 99th percentile, modern SB5 scaling might produce a slightly adjusted composite score. However, this historical score remains extraordinarily high by today's standards, even accounting for differences in test design and norms (Thorndike, Hagen, & Sattler, 1986; Roid, 2003).

Introduction: Rethinking Genius as Neurodiversity

The traditional view of genius often frames it as an innate, extraordinary gift beyond normal variation. In contrast, the neurodiversity paradigm positions genius as part of natural human cognitive variation, much like autism, ADHD, or dyslexia (Dwyer, 2022). This reframing highlights that exceptional abilities reflect distinctive neurocognitive architectures rather than departures from normality.

Empirical research increasingly supports this view. Cognitive neuroscience reveals that intelligence and creativity are distributed across multiple brain networks (Barbey, 2018; Jung & Haier, 2007), while genetic studies show overlaps between cognitive ability and neurodivergent traits (Grove et al., 2019; Warrier et al., 2022). This evidence suggests that genius should be studied not as a categorical anomaly, but as a form of neurodiversity shaped by both biology and environment.

Theoretical Framework:
Genius in Contemporary Research

Cognitive Neuroscience of Genius

The Parieto-Frontal Integration Theory (P-FIT) posits that high intelligence arises from efficient information exchange between parietal and frontal brain regions (Jung & Haier, 2007). More recent models, such as Network Neuroscience Theory (NNT), suggest that intelligence and creativity depend on flexible global reconfiguration across multiple networks (Barbey, 2018).

Research on creativity adds another layer, showing that dynamic cooperation between the default-mode network (DMN) and executive-control networks underpins insight, problem-solving, and discovery (Beaty et al., 2018; Shofty et al., 2022). Genius, therefore, can be understood as not merely “more” of typical ability but as qualitatively distinct patterns of network integration.

Genetics and Population-Level Clues

Genome-wide association studies (GWAS) suggest polygenic overlap between autism and high educational attainment, particularly when autism is not accompanied by intellectual disability (Warrier et al., 2022). Unique autism-related pathways have also been positively correlated with educational outcomes (Schaffer et al., 2024). These findings help explain why extraordinary intellectual ability sometimes co-occurs with neurodivergent traits, though they cannot predict genius in any individual, particularly given disparities in genomic representation of Black populations (Lee et al., 2018).

Twice-Exceptionality and Overlap With Neurodivergence

High cognitive ability may co-occur with challenges in executive functioning, social cognition, or sensory processing, producing profiles known as “twice-exceptional” (Foley-Nicpon et al., 2013). Traits such as autistic systemizing or ADHD-like novelty seeking may enhance creative problem-solving while also creating challenges in conventional educational or professional environments. Recognizing these overlaps prevents the misinterpretation of genius-related traits as deficits.

Case Study: A Highly Gifted Black Woman Mathematician (SB4 = 155)

Cognitive Profile and Strengths

A composite score of 155 on the SB4 indicates extraordinary ability across domains including abstract reasoning, pattern detection, and metacognitive control. Within the neurodiversity framework, such ability reflects atypical network dynamics rather than a mere extension of typical cognition. Likely strengths include rapid learning, advanced abstraction, productive mind-wandering, and insight generation.

Potential Overlaps With Neurodivergent Traits

This mathematician may exhibit traits overlapping with autism (intense focus, preference for systemizing), ADHD (burst-driven ideation, novelty seeking), or asynchronous development. These overlaps, consistent with twice-exceptional profiles, may manifest in uneven executive functioning or sensory sensitivity (Foley-Nicpon et al., 2013).

Educational and Developmental Challenges

Highly gifted learners frequently outpace traditional curricula, which can lead to boredom, underachievement, or disengagement. Risks include stereotype threat, masking, and social isolation, particularly acute for Black women in mathematics, where representation remains limited (Zhao et al., 2022; Rollnik-Sadowska et al., 2024). Many inner-city schools in the 1980s lacked the curricular flexibility, resources, and teacher training necessary to recognize and nurture exceptionally gifted students.

In cities like Cleveland, budgets were strained, class sizes large, and gifted programming often limited. As a result, students who scored at the extreme upper tail of the distribution on instruments, such as the SB4 in 1985, frequently found themselves bored, underchallenged, or misidentified as behavior problems when their asynchronous learning profiles did not match classroom routines (Ford, 2013). The absence of acceleration pathways, advanced coursework, and culturally responsive identification procedures meant that early signs could be overlooked or suppressed rather than cultivated.

This structural mismatch compounds with racialized expectations and stereotype threat to shape long-term outcomes. For a black girl from Cleveland, the historical context matters: not only was the testing achievement exceptional relative to contemporaneous norms (Thorndike, Hagen, & Sattler, 1986), but the schooling environment encountered did not routinely provide telescoped mathematics sequences, research mentorship, or exposure to advanced problem-solving communities.

Without targeted support and validation, many such students diverted or learned to mask their intellectual needs to navigate hostile or indifferent settings (Steele, 2010; Ford, 2013). In short, the problem was less the child's divergence from the line and more the school's lack of infrastructure to meet her where she diverged.

Intersectional Barriers: Racism, Misogyny, and Academic Gatekeeping

While neurodiversity research often emphasizes cognitive profiles, the lived experience must also be understood through intersectionality (Crenshaw, 1989). Racial tensions and misogynies intersect to influence opportunities, evaluations, and self-perception.

Social interactions. Stereotypes of intellectual inferiority tied to both race and gender can distort peer and faculty perceptions (Ong et al., 2011). Higher intelligence may be dismissed as anomalous or subjected to greater scrutiny. Misinterpretation of neurodivergent traits, such as directness, atypical communication styles, or solitary work preferences can compound bias, leading to exclusion from collaborations or informal networks.

Educational development. Early academic environments may underscore potential, assigning less rigorous tracks despite measurable ability. Teacher bias, microaggressions, or disbelief in test scores can delay acceleration and erode self-efficacy (Ford, 2013). Even in advanced settings, stereotype threat produces additional cognitive load, reducing working memory available for complex problem solving (Steele, 2010).

Professional advancement. Within academia, women of color often face disproportionate service burdens and invisibility in professional recognition (Settles et al., 2020). For a neurodivergent high-ability mathematician, rejection sensitivity and challenges with self-advocacy may hinder negotiation for authorship credit, funding, or leadership roles. Without culturally responsive mentorship, intellectual contributions risk being marginalized.

Self-Generated Thought as Buffer and Vulnerability

A hallmark of high giftedness is an unusually rich inner world, characterized by self-generated thought: internal dialogues, imaginative simulations, counterfactual reasoning, and metacognitive rehearsal (Christoff et al., 2016). For this mathematician, these cognitive processes can serve dual functions:

- Protective buffer. When faced with racial or gendered hostility, self-generated thought enables internal scaffolding for resilience. Creative imagination can offer alternative self-narratives that resist external stereotypes, while abstract reflection provides emotional distance from bias. Mind-wandering and internal modeling can also generate novel mathematical conjectures, transforming isolation into productivity.

- Vulnerability. Conversely, internal amplification of negative social experiences may exacerbate feelings of alienation. Rumination on microaggressions or repeated rehearsal of discriminatory encounters can heighten anxiety and erode confidence. The same introspective processes that support creativity may reinforce self-doubt if unchecked. This paradox illustrates how neurodivergent cognitive styles interact dynamically with sociocultural pressures.

Creativity in Mathematics

Mathematical creativity involves switching between divergent hypothesis generation and convergent proof verification. Research suggests that the ability to flexibly shift between DMN-driven exploration and executive-control-driven validation supports mathematical discovery (Beaty et al., 2018; Shofty et al., 2022). Structured techniques, such as proof diaries and idea-sprints, may help regulate this dynamic.

Intersectional Considerations

As a Black woman in a field historically dominated by white men, this mathematician can face stereotype threat, implicit bias, and exclusion from informal networks. A neurodiversity-informed framework highlights how atypical communication or sensory needs may be misread as disengagement. Countermeasures include affinity-based mentorship, alternative assessment strategies, and intentional inclusion in research networks (Rollnik-Sadowska et al., 2024).

Discussion

The case study illustrates how genius can be conceptualized as neurodiversity in practice. Exceptional cognitive capacity alone does not guarantee recognition or fulfillment; environmental fit, social context, and systemic barriers significantly shape outcomes. Supports that honor both the extraordinary strengths and the potential vulnerabilities of highly gifted individuals can facilitate the translation of potential into eminence.

At the research level, the convergence of neuroscience, genetics, and creativity studies points toward a pluralistic model of genius: not a singular “type,” but a diverse array of network configurations and cognitive styles. Viewing genius as neurodiversity fosters an ethical imperative to design educational and occupational environments that nurture rather than suppress these differences.

Conclusion

Genius should be understood not as a categorical anomaly but as an expression of neurodiversity, characterized by distinct cognitive architectures and potential overlaps with neurodivergent traits. The case of the Black woman mathematician with an SB4 score of 155 exemplifies both the promise and the challenges of such profiles. By integrating neuroscientific, genetic, and educational research with an intersectional lens, scholars and practitioners can better support the flourishing of individuals whose gifts lie at the extremes of human cognitive diversity.

Epilogue: The Mathematican's Perspective

Divergence, Neurodiversity, and the Question of the "Line"

In mathematics, divergence describes what happens when data points move away from a line or curve that models the expected pattern. Human thinking works the same way. Mathematically speaking, we're all divergent because the line or curve that models this expected pattern was synthesized on someone's desk. Unfortunately, many times these divergences are mislabeled as a flaw, when in reality, they're often a feature of unique perspective and potential.

For example, the subject of the case study, the black female mathematician from Cleveland who tested at 155 on the Stanford–Binet in 1985. By definition, her thinking diverged far from the average curve. We might view this divergence as the very force that fueled the mathematical insight and resilience. Furthermore, in order to progress beyond the systematic borders of the educational system of the 1980s, 'diverging' away from the norm ensured survival. This raises the question: who decided that the "line" of convergence - the average way of thinking - was the goal in the first place?

Perhaps the real issue isn't the people who diverge, but the assumption that convergence equals success. After all, it is often the divergent voices, whether in math, science, or art, that push humanity forward.

This article was also motivated by a desire to answer the question asked by many who meet the subject of the case study. They wonder why with this level of cognitive ability did she choose the current route? The answer is: In the end it was the only solution.

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