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Dyslexia and Giftedness: Myths versus Science

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Introduction

Despite concerns about the definition of dyslexia [1] and even questions about its existence [2], dyslexia is a specific learning disability [3] with neurobiological origins (International Dyslexia Association [4] and which manifests across different languages and different types of alphabet systems [5] causing difficulties in reading and spelling. Though dyslexia can significantly hamper academic achievement, some have described it as a gift, citing superior visual-spatial skills, problem solving abilities, and/or creativity. Regardless of whether dyslexia is associated with special gifts or talents, there is a small but arguably important subset of individuals with dyslexia who also meet criteria for intellectual giftedness. That is, these learners' general reasoning and/or cognitive abilities fall well above average, but they struggle significantly to read and spell. Gifted students with dyslexia are a subset of a larger population of twice exceptional learners (e.g., gifted with specific learning disability, gifted with attention deficit hyperactivity disorder; gifted with a physical disability). The purpose of this manuscript is to critically examine the notion of dyslexia as a gift and to disentangle this notion from the construct of twice-exceptionality. The article begins with an historical review of twice-exceptionality (i.e., intersection of dyslexia and intellectual giftedness) and related educational policies [6]. Next, myths are examined, followed by discussion of validated practices for screening and identification, and evidence-based intervention, and acceleration practices. The paper concludes by addressing research and practices that are necessary for early identification of dyslexia in children who are gifted and of high ability, particularly in under-served populations (e.g., children who are Black and Hispanic) who are often overlooked for gifted services (e.g., Ford, 2012) and addresses the role of educator preparation.

Historical Overview of Twice-Exceptionality: Disability Under Debate

Both the fields of intellectual giftedness and specific learning disabilities historically have been hampered by lack of consensus on definitions and identification processes and both have seen evolution in thinking, based on both research and sociocultural considerations [7,8]. Being gifted and having a disability were initially seen as discrete, nonoverlapping categories or characteristics. Gallagher [9] is credited with being among the first to use the term twice- exceptional (2e), drawing needed attention to those learners who are gifted but also have a disability. However, settling on a definition for 2e learners is not an easy endeavor. Trail ([10], p. 12) defined 2e learners as individuals who have the characteristics of gifted students and students with disabilities. They have the potential for exceptional performance in one or more areas of expression, which includes general areas such as creativity or leadership, or specific areas such as math, science or music. These students have an accompanying disability in one or more categories defined by IDEA.

In 2014, the National 2e Community of Practice (COP) developed a definition of 2e learners [11]:

Twice-exceptional individuals evidence exceptional ability and disability, which results in a unique set of circumstances. Their exceptional ability may dominate, hiding their disability; their disability may dominate, hiding their exceptional ability; each may mask the other so that neither is recognized or addressed.

These definitions point out the dichotomy in students' performance, which is exceptionally strong in some respects but

significantly challenged in others, confusing students, teachers, and parents. Lovett and Sparks [12] examined the validity of the notion that some students are both intellectually gifted and have a specific learning disability (LD). Reviewing 46 articles, they cited significant variability in how gifted/LD students were identified and concluded that giftedness can equate to high ability and the learning disability can be demonstrated by low academic achievement. Further, they urged in future studies for better, more consistent identification criteria (e.g., IQ score > 120; achievement score < 90), stated that the achievement score must be below average (though some disagree, e.g., [13]), and concluded that the notion of 2e (specifically gifted with LD) is valid.

In 2008, Gilger and Hynd [14] proposed a framework for thinking about 2e learners (and specifically of those who exhibit giftedness and dyslexia) based on neurodevelopmental considerations and the idea of comorbidity of two exceptionalities. In reviewing relevant literature, they estimated the prevalence of 2e (specifically gifted with reading disability) at 1-3% of the general population, which, though low, "is still a relatively high rate in practice or in the classroom" (p. 218). IDA (2020) estimated the prevalence of giftedness with dyslexia as 2-5% of the general population, listing the following as common characteristics of 2e individuals with dyslexia:

a) Superior oral vocabulary

b) Advanced ideas and opinions

c) High levels of creativity and problem-solving ability

d) Extremely curious, imaginative, and questioning

e) Discrepant verbal and performance skills

f) Clear peaks and valleys in cognitive test profile

g) Wide range of interests not related to school

h) Specific talent or consuming interest area

i) Sophisticated sense of humor

Given the lack of consensus on definitions of both giftedness and LD across the United States, it is little wonder that twice-exceptionality is difficult to identify and often may be overlooked [15] even though it is a valid construct [7]. In the next section we address some common myths followed by relevant scientific evidence to shed light on popularized misconceptions of dyslexic and 2e learners.

Myth: Dyslexia is a Gift. All dyslexic students are bright and creative

There is a longstanding notion that individuals with dyslexia have special talents or gifts. Popular media periodically cultivates this view by promulgating lists of famous celebrities, artists, or inventors who purportedly had learning disabilities, and often specifically dyslexia. In The Gift of Dyslexia, Davis [16], self-described as dyslexic, proclaimed uniquely special abilities associated with dyslexia. Prominent scholar Mary Ann Wolf alluded to brain-based differences that characterize dyslexia as associated with unique visual-spatial talents in her 2007 book Proust and the Squid. In the second edition of Overcoming Dyslexia [17], Shaywitz and Shaywitz asserted "yes, your child may struggle to decipher written words, but at the same time she is also likely to be an out-of-the box, creative thinker" (p. 94).

Science

Despite numerous references in popular press to well-known scholars, artists and celebrities who have dyslexia, the scientific answer to the question, is dyslexia a gift? is not straightforward. In Language at the Speed of Sight [18] cognitive scientist Mark Seidenberg, concluded "no," dyslexia is not a gift. However, there is a mixed body of evidence on this topic. Chamberlain et al. [19] noted that "conflicting empirical and theoretical accounts suggest that dyslexia is associated with either average, enhanced, or impoverished high-level visuo-spatial processing relative to controls" (p. 1). To gain clarity, the authors calculated effect sizes for 114 different analyses (36 sets of independent participants in 28 studies) for a total sample of 956 individuals with dyslexia and 909 typical readers. They found that dyslexia was actually associated with a lower mean performance on visual-spatial tasks but also that the dyslexic sample demonstrated greater variability in performance; that is individuals with dyslexia may be overrepresented at both the high and low ends of visual-spatial capabilities. The authors noted that their findings are consistent with several other studies [20].

Using functional magnetic resonance imaging (FMRI) technology, Gilger & Olulade [21] compared students who were gifted (IQ > 125) on visual-spatial intelligence tests with and without reading disabilities and found that the groups differed in brain functioning when completing both reading and visual-spatial tasks, favoring the nondyslexic gifted students. Though their findings were with college-age adults, they noted that similar conclusions apply to younger learners (also see [6,22,23]. Regardless, they called for additional brain imaging research on young 2e individuals.

Erbeli et al. [24] conducted a meta-analysis of 20 studies and examined performance on tasks assessing creativity but found no significant differences in visual/figural creativity except in adults with dyslexia who scored higher than typically reading adults. Further, they found that the dyslexic sample performed significantly weaker than those without dyslexia on verbal creativity. They provided preliminary evidence that the relation between creativity and dyslexia may be enhanced in females versus males and concluded that if compensatory mechanisms "turn on" [20] later in life, this manifests as greater variability in creativity of the adults with dyslexia. Majeed and colleagues [25] conducted a meta-analysis of 9 studies of creativity and dyslexia across different alphabetic languages. Similar to Erbeli et al. they found no significant differences in creativity except in adults

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with dyslexia who significantly outperformed controls. However, Majeed and colleagues posited their results are somewhat supportive of the early choice hypothesis (described by Bigozzi et al. [26]; Tafti et al. [27]), "that higher levels of creativity among those with dyslexia are due to practice effects form the use of non-typical methods to process information early in childhood" (p. 197).

Geschwind & Galaburda [28] suggested that giftedness appears to be overrepresented in the population of individuals with reading disabilities. Gilger & Hynd [14] like many others [3] indicated that genetically determined brain differences are a significant cause of reading disabilities. However, there is consensus that multiple genes are associated with dyslexia, and that they appear to act together to increase its likelihood [29]. Thus, it is not the case that a difference in functioning in a single area of the brain causes a specific type of reading difficulty.

Myth: Dyslexia Just Means Difficulty with Reading

Some experts [30,31] have recommended against using the term dyslexia because of perceived difficulties with identification and definition. Elliott and Grigorenko [32] suggested using the term "learning disability" instead [33].

Science

Dyslexia is unexpected, in relation to other abilities and skills of the individual [29]. A constellation of strengths and weaknesses associated with dyslexia can occur across the range of human intelligence [34] Thus, what separates dyslexia from general reading difficulties is its unexpectedness. In fact, it may be in part the notion of unexpectedness that leads to an impression of individuals with dyslexia having unique gifts. The notion that dyslexia is unexpected has been a key feature in early descriptions of the disability [35]. Despite being unexpected, dyslexia often co-occurs (is co-morbid) with other disorders [29,34] particularly developmental language disorders and attentional difficulties [36].

The unexpectedness of dyslexia is prominent in Shaywitzs' "sea of strengths model" (2003; 2020). Shaywitz & Shaywitz [17] listed potential areas of strength for younger (preschool-grade 1) learners that include curiosity, great imagination, ability to problem solve, getting the gist of things, grasping new concepts, maturity, wide vocabulary, enjoyment and skill at solving puzzles and building models. In contrast, a significant early clue to dyslexia is delayed language skills (e.g., in preschool trouble learning nursery rhymes, failure to recognize/recall letters; and, in Kindergarten and grade 1, not understanding that words can be segmented; failure to associate letters and sounds).

In older learners, strengths may include ability to form concepts, reasoning, imaginative and abstract thinking; strong listening vocabulary and listening comprehension; and excellence in non-related subjects or pursuits. Difficulties may include difficulty with speaking (e.g., difficulty remembering isolated verbal information); "disastrous" spelling; overreliance on context; difficulty completing reading/writing tasks on time, and aversion to reading aloud). Learners with dyslexia may also have difficulty memorizing math facts (though not with math concepts) and difficulty with directions [17].

Myth: Lack of Exposure to Wide-Reading Causes Dyslexia

There is a notion that learners who are dyslexic must have had limited environmental exposure to reading and literacy experiences. This myth is based on research showing that lack of exposure to early literacy experiences is associated with lower literacy outcomes [37].

Science

Dyslexia is neurobiologically based. Lack of exposure to reading and lack of access to and experiences with print are risk factors but dyslexia is neurobiological in origin and some children with strong dyslexia characteristics struggle with reading despite extensive exposure to reading at home. Numerous FMRI studies have demonstrated differences in brain functioning for individuals with and without dyslexia. For example, Shaywitz and colleagues [38] found that individuals with dyslexia experience a disruption/decrease (in metabolic activity) in the posterior part of the left hemisphere (the left visual word forming area) associated with skilled and fluent reading and an overactivation of the left and right anterior systems and the right visual word-forming area, creating inefficiencies in producing skilled reading (see Authors, in press for more on brain research and dyslexia). Per Catts and Petscher, "research shows that multiple neurological, biological, behavioral, and environmental factors are associated with dyslexia" (2021; p. 2), and it is the interaction of these factors that ultimately influence how one's reading skills develop. Difficulty in phonological processing is a strong predictor of dyslexia, but Catts and Petscher noted that some children with early phonological skills tend to eventually follow a typical reading trajectory while some without these early phonological difficulties eventually follow a dyslexia trajectory. Other well-documented predictors include weaknesses in rapid automatic naming (RAN) [39,40] and working memory (Authors, 2006). Also, children with dyslexia often have difficulty mastering the orthography (visual representation of letters, letter patterns and words) of their language. However, though children with dyslexia may reverse and/or transpose letters and numbers, reversals in spelling do not indicate dyslexia is a visual problem and children without dyslexia also sometimes make these types of errors. See [41] for a comprehensive review of reading and related spelling difficulties in individuals with dyslexia).

Myth: Dyslexic Students are Unmotivated or Unengaged and Don't Put Forth Effort

This notion stems from the practical belief that some children just do not enjoy reading; learning takes effort. Teachers and parents sometimes say, "he can read; he just doesn't want to."

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Science

Motivation matters, particularly self-efficacy beliefs [42]. When learners experience success, belief in their own ability to be successful increases, and they are more likely to engage in similar and more challenging tasks. However, when learners encounter repeated difficulty and are not provided with guidance and systematic instruction addressing challenges, motivation declines. Students who are 2e have strong cognitive abilities and may be able to flourish in environments that provide appropriate academic and emotional support. Twice-exceptional students' academic performance can be inhibited because of difficulty with executive functioning and mastering certain skills, resulting in stress, depression, and lack of motivation [43]. Consequently, students' self-efficacy may be negatively affected influencing in turn their will to engage in academic tasks and to take risks that can advance their learning. Strategies that build on learners' strengths and interests can motivate and challenge them [44], while services that help build academic competence can improve self-efficacy [45] diminishing negative self-concept.

Validated Practices for Screening, Identification, and Instruction

Gilger & Hynd [14] cautioned that individuals with unusual learning abilities (such as 2e) may not receive appropriate services, and that learning needs of gifted children are too often "neglected." Gilger & Olulade [21] surmised that the gifted college-age students with reading disabilities in their study likely had not been identified accurately and failed to receive appropriate educational services for both their "gift and LD" and, consequently, failed to realize some of their early potential. Anecdotally these 2e students reported that "their deficits were a lifelong focus in school and there was limited opportunity to explore strengths academically." (p. 250).

What do experts recommend in terms of identification and services for students who are 2e?

Response to Intervention (RtI) which, since codified into law in the Individuals with Disabilities Education Act [46] increasingly is used in the process of identifying learning disabilities, though now most states also have laws requiring screening of students specifically for dyslexia (National Center on Improving Literacy, [47]). Many states require screening in phonemic awareness, rapid automatic naming, real and nonsense word decoding, and reading fluency, which is a significant positive step that results in early intervention without special education eligibility. However, as noted by Authors (2013) and Reynolds & Shaywitz [48], many districts set low performance (e.g., below the 25th percentile) in RtI and dyslexic screening processes for students to receive intervention. Gifted students with dyslexia may struggle but still perform above the cut-off and thus be missed. Ironically, it is their less-than-gifted performance in reading that also may preclude them from being identified as gifted. Van Vierson et al. [49] in a study of 121 Dutch children found that phonology skills are relatively weak for gifted children with dyslexia, but that working memory, grammar, and vocabulary moderate the effects. They noted the importance of raising awareness of how dyslexia might manifest in gifted children.

For gifted students with dyslexia, their disability may mask their strengths and overall giftedness and their strengths may mask their disability [50]. Thus, identification of their needs and provision of services is complicated [51]. Foley-Nicpon and Assouline [52], synthesized and formulated some implications for identification and serving 2e students, noting the first step is proper identification and stating that students with disabilities are being denied access to gifted education services, citing Peters et al. [53]. Consistent with Authors (2013) and Reynolds & Shaywitz [48], they cautioned against reliance on pure RtI models because gifted students with dyslexia may not score low enough to qualify for intervention. They also noted problems with pure ability-achievement discrepancy models (in part because ability measures often assess constructs that are related to dyslexia) and instead urged the use of comprehensive assessment methods [54].

Once identified, what instructional approaches are appropriate for 2e learners?

Per IDA [46] 2e learners with dyslexia need a "dually differentiated program": "one that nurtures gifts and talents while providing appropriate instruction, accommodations, and services for addressing weaknesses. Unfortunately, research-based, well-defined, and prescribed practices for 2e student with dyslexia are hard to find, and current practices vary widely" (p. 3). Instruction that develops higher-level cognitive functioning and develops areas of challenge (basic reading and writing skills) using a structured literacy (explicit and systematic) approach is recommended by IDA. Hughes [55] referred to "double differentiation." Reis et al. [13] commented on the need for differentiated instruction, accommodations in the curriculum and modifications and for opportunities to cultivate talents. Further, they stated that 2e students need either an individual education plan or 504 accommodation plan outlining goals and approaches that address talent development, compensation strategies and social-emotional development.

However, Plucker & Callahan [8] noted that differentiation for gifted students in general classrooms is often not effective, citing more favorable evidence for acceleration and curriculum design approaches. Hughes recommended using Universal Design for Learning (UDL) principles that make learning more accessible for all learners. Increasingly, technology (e.g., text to speech software, speech to text software) allows high-ability students to access content (Author, in press b). Gifted learners with dyslexia require careful assessment, nuanced instruction and knowledgeable teachers to avoid a spiral of underachievement and decreased motivation.

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Students of color and students from lower income homes are historically under-represented in gifted education and over-represented in some special education eligibility categories (including specific learning disabilities) [56]. Debates around the role of intelligence testing and concerns about under-referral of children of color and who are culturally and linguistically diverse continue to influence and shape the field of gifted education [57,58]. Lack of teacher awareness on the intersection of race and dyslexia [59] can increase gaps in students' reading and their overall literacy performance. Increasingly, access to effective evidence-based instruction including for those with dyslexia is seen as a social justice issue [60]. Black students may face prejudice and challenges related to identification of dyslexia [61] and be labelled as "at risk." Thus, diagnosis may not be timely; a deficit perspective of their performance can lead to misdiagnosis or lack of diagnosis, failure to provide appropriate supports, low self-efficacy, and consequently negatively impacted academic performance [57]. Even though systematic instruction is effective for students of color, the implementation of culturally responsive pedagogy and practices [62], also is essential to ensure engagement as it connects cultural background with lived experience by valuing their assets [63].

The Role of Preservice Education

Unfortunately, often teachers are hesitant to refer students with disabilities for gifted services [64], failing to recognize that students who are gifted may also need specialized learning supports [65] and services that address their social-emotional needs [11]. Teachers may falsely believe that IDEA and its principles are not applicable to 2e students and to gifted learners generally [65]. Misconceptions and hesitancy to make referrals for 2e learners may in part result from inadequate training in teacher preparation programs [66].

Thus, teacher preparation programs should equip their teachers with knowledge and skills needed to identify profiles of 2e students [67] and act beyond popularized myths about dyslexia. Further, it will support them in using assessments to identify needs and patterns of contrasting performance (e.g., high cognitive skills and low engagement). Teacher preparation providers should prepare teachers in the implementation of interventions that address the complex social-emotional needs of 2e learners (e.g., bolstering both self-efficacy and self-esteem) and their cognitive skills building on and promoting their strengths as leverage for their development [68]. It is also essential that teacher candidates take part in clinical experiences and engage in collaborations with schools working directly with 2e learners. Finally, it is important to cultivate better understanding within educator preparation programs so there is collaboration across general and special education, gifted and reading education, and even school psychology and counseling on content, terminology and approaches related to 2e [69]. Collaboration can better address misconceptions on giftedness and disability and the binary view between the two that teacher candidates may develop [70-73].

Conclusion

Research on 2e students with dyslexia has thus far been rather siloed, with contributions by scholars from gifted education, special education, dyslexia, and reading with varied expertise (education, psychology, neuroscience). Relatively little research on dyslexia, particularly on exceptionally bright students with dyslexia, has been published to date in reading journals. There remain numerous unresolved issues regarding learners who are gifted and dyslexic; a few salient ones include the need for a clear research-based definition and process of identification that is sensitive to both masking and cultural bias; a more robust research base on what constitutes effective instruction that addresses strengths and challenges and that is culturally sustaining; and research that connects brain-based and behavioral findings to better understand both the nature of dyslexia and its intersection with certain types of giftedness and the effects of certain types of interventions and experiences. Future research should be informed by a more inclusive approach that recognizes, respects, and builds on contributions from across the disciplines to address unresolved issues toward better education for this unique group of learners. Meanwhile, because debate on dyslexia and on identification of students with dyslexia and of 2e learners is unlikely to end, the focus should be essentially on the learner. Thus, assessment should guide instruction and educators should be equipped to identify and effectively teach students with characteristics of dyslexia and intellectual giftedness, whose cognitive and academic skills are masked.

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