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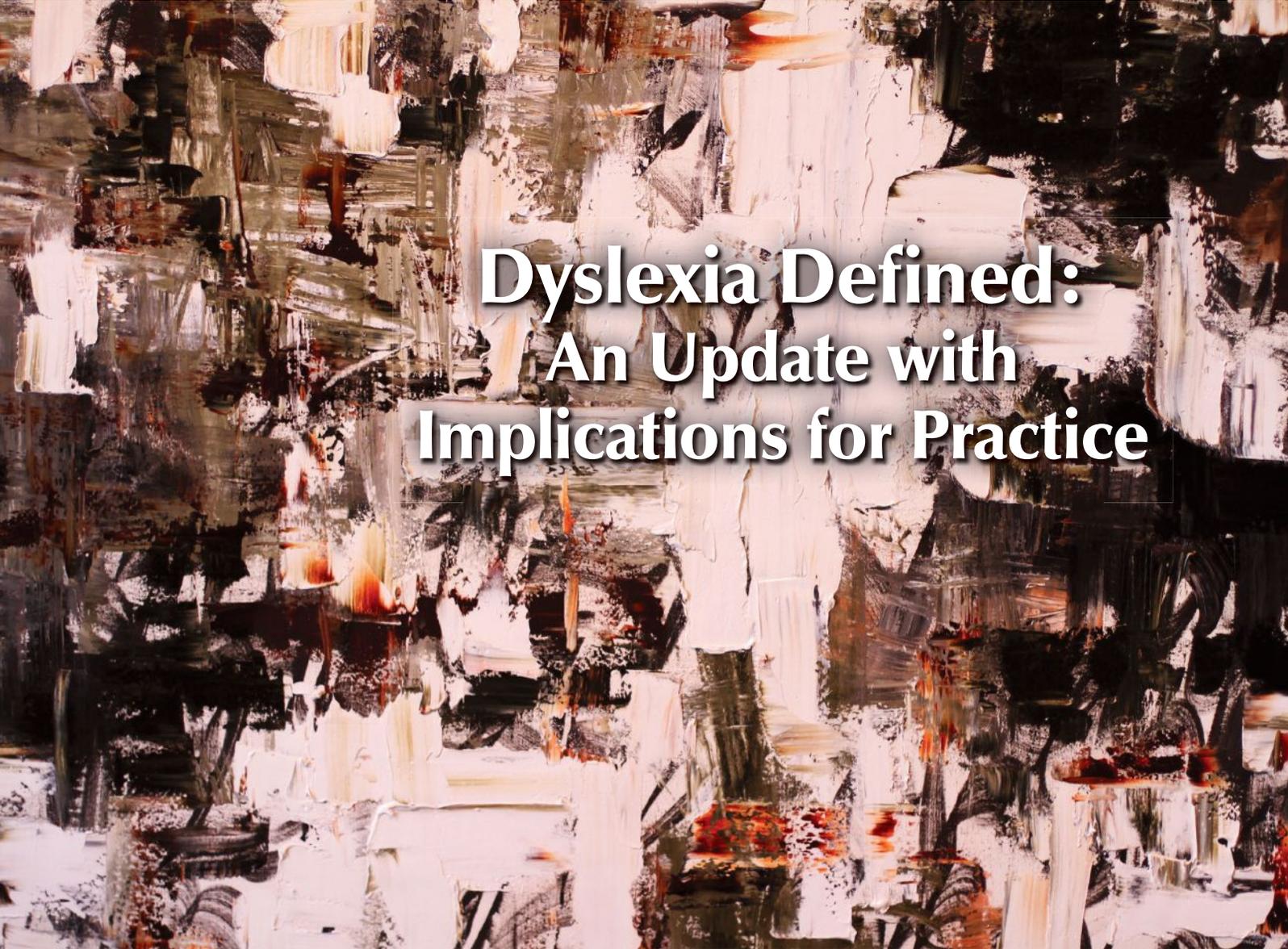
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PERSPECTIVES

ON LANGUAGE AND LITERACY

A Quarterly Publication of the International Dyslexia Association

Volume 45, No. 1



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PERSPECTIVES

ON LANGUAGE AND LITERACY

A Quarterly Publication of the International Dyslexia Association

Volume 45, No. 1

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The International Dyslexia Association (IDA) is a 501(c)(3) non-profit, scientific and educational organization dedicated exclusively to the study and treatment of the specific language disability known as dyslexia. We have been serving individuals with dyslexia, their families, and professionals in the field for over 70 years. IDA was first established to continue the pioneering work of Samuel T. Orton, M.D., in the study and treatment of dyslexia.

IDA members include people with dyslexia and their families, educators, diagnosticians, physicians, and other professionals in the field. IDA's home office, 45 branches in the United States and Canada, and 26 Global Partners provide educator training, publications, information, and support to help struggling readers around the world. IDA's Annual Conference attracts thousands of outstanding researchers, clinicians, parents, teachers, psychologists, educational therapists, and people with dyslexia.

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ON THE COVER: Oil painting by Austen Segal.

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Understanding the Definition of Dyslexia

Scientific understanding and progress depend on having precise definitions of the phenomena in question. This discussion of definitions may sound irrelevant to some stakeholders but consider just one practical application. If there are laws mandating recognition of, and hopefully, intervention for dyslexia, then it is important to agree on what we are talking about. The articles in this issue not only recognize the research that has clarified and enhanced our understanding of dyslexia but also propose solutions for the definition and assessment of dyslexia.

We are close to reaching a consensus about the definition of dyslexia. Most researchers agree that the discrepancy definition of dyslexia should be buried. However, it is the “zombie” definition; it refuses to die. Instead we propose a definition based on significantly low achievement at the level of word processing. Many other processes, such as language comprehension, vocabulary, morphology, and syntactic awareness are important but at the heart of dyslexia are problems at the word reading and decoding level.

Most researchers also agree that the assessment of dyslexia should consist, at a minimum, of reading and spelling tests and an analysis of successes and errors. There is evidence that assessment of various cognitive processes, with certain exceptions, does not change the intervention that might be required. Phonemic awareness, that is the ability to perceive sounds in words and to manipulate these sounds, is a critical skill for learning to read, even in non-alphabetic languages.

There are important social issues concerning the definition of dyslexia. If interventions and accommodations require dyslexia classification based

on an IQ test and extensive psychoeducational testing, then we are failing to provide for large numbers of people who cannot afford access to these tests.

For the sake of all who struggle with reading, it is important to reach a consensus about the definition and assessment of dyslexia.



Oil painting by Austen Segal. Ms. Segal is a San Diego-based, abstract artist who creates utilizing an ever changing diversity of mediums including painting, sculpture and mixed media.

Linda S. Siegel, Ph.D.
Editor-in-Chief

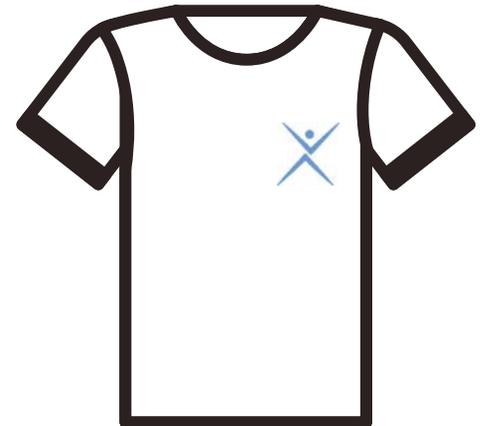
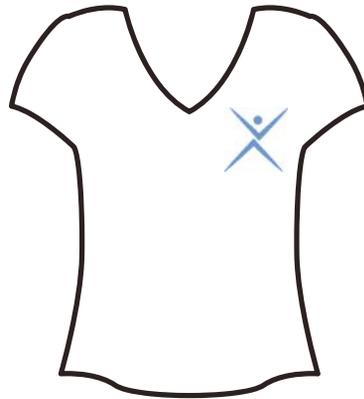
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Dyslexia Defined: An Update with Implications for Practice

by Timothy N. Odegard

Youth is a daunting experience. Children are small, relatively new to life, and thrust into an environment in which they are constantly experiencing new things. In this world, there are clear expectations for children. They are to stay out of trouble, go to school, and most importantly, they are to learn. The concept of dyslexia within this context is simple. When it comes down to it, there are children who stay out of trouble, go to school, pay attention, do what they are told, yet they struggle to read, write, and spell. And these abilities are among the basic building blocks of literacy. Dyslexia in its purest form is eerily Kafkaesque. No matter how hard the child works. No matter how much she attends to the lessons. No matter how many times she copies the blasted spelling words. She is still one of the worst performing children in the class. But what sin has she committed? None.

When the reading underachievement of this group of children is conceptualized in this way, it should come as no surprise to learn that there is a large community of well-meaning adults devoted to helping these children appreciate their worth. These adults want to help them to refocus their efforts in a way that will allow them to break free of the obstacles buried deep within the fabric of their genetic makeup, as it expresses itself in the pathways that twist and turn through their brains, and manifests as thought processes that are intertwined across the different components of language. But to help children with dyslexia we must find them, and to find them we must have a clear, concise way to define the nature of their deficits.

This issue of *Perspectives* provides an update on advances made in our collective understanding of dyslexia since the adoption of the definition by the International Dyslexia Association (IDA) in 2002.

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

The definition has aided efforts to meet the needs of individuals with dyslexia, with other groups adopting it and states across the U.S. incorporating it in legislation to address various aspects of dyslexia (e.g., screening, instruction, awareness, in-service teacher training, pre-service teacher training; see a recent issue of *Perspectives* for a summary of these legislative efforts, Vol. 41, No. 4).

Each article in the current issue focuses on a key aspect of the definition by summarizing new findings pertaining to it and outlining implications for practice. In doing so, the aim is

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to aid educators in gaining a richer appreciation of the implications of the components of the definition.

Why Provide an Update on the Components of the Definition?

First, knowledge is not static. Rather, it evolves in response to exploration, and the study of reading development and dyslexia has continued to be a hotbed of scientific inquiry. Over the past 15 years, the potential of research to inform our understanding of dyslexia, its identification and the remediation of the written language deficits characteristic of it has been advanced. The use of rigorous methodologies to explore reading development has capitalized on advanced statistical modeling, advanced behavioral methodologies, and multi-modal brain imaging techniques to test more complex and complete theoretical models of dyslexia and reading underachievement more generally. Thus, advances made in the empirically derived knowledge base of dyslexia and reading underachievement motivate a translation of these findings as they pertain to the major components of the current definition of dyslexia.

Second, there is a practical need to supplement the definition by enumerating its implications. Recently, an expert panel was polled about the relevance of the current definition and the need for its revision based on scientific advances since its adoption. The consensus was that, although advances have been made in the scientific understanding of dyslexia, the current definition is still both useful and scientifically valid. We would point the reader to a piece written by a past IDA president, Emerson Dickman: "*Do we need a new definition of dyslexia?*" (Dickman, 2017).

Although there may not be a need for a new definition at this time, there is a need to assist educators, policy makers and stakeholder groups in translating the implications of the definition and the science that motivates it to practice. This issue of *Perspectives* provides an accessible and concisely written set of articles to serve as a reference. Priority is placed on the implications of the definition for practice. The contributors address pressing questions that surround dyslexia. Some of these are perennial questions, but others emerged due to updates made to how dyslexia is conceptualized in the 2002 definition.

In the first article, I provide a brief overview of the history of dyslexia and some of the critical points that shifted in the 2002 definition. In the next piece, Susan Brady addresses the aspect of the definition implicating phonological processing deficits. She highlights the reality that too much weight has been placed on these aspects of language in the definition, which has been to the detriment of children. Next, Linda Siegel and David Hurford tackle the issue of what constitutes unexpected underachievement. In doing so, they highlight limitations of using discrepancy and profile models to determine who does and does not qualify to receive additional educational services. Elsa Cardenas-Hagan then addresses the role that response to instruction and intervention can play in identifying children in need of supplemental reading instruction and intervention

services. She highlights that it is an imperative that quality empirically validated reading instruction is in place in the general education setting for all children to better identify those in need of sustained, intensive reading intervention.

Across these articles, we are presented with a complex picture of reading underachievement and dyslexia that was emerging when the current definition was drafted. From this complexity, three overarching conclusions emerge.

First, there are prototypical children struggling to read as the result of intrinsic factors that we would label dyslexic. At the same time, there are also children who have compounding factors that likely exacerbate deficits they experience in how they process language. It is no more just to deny these children reading instruction than it is to deny reading instruction to children who receive the label of dyslexic. This compels us to grapple with who does and does not qualify to receive additional reading support and which mechanisms can be used to ensure that *all* children struggling to read receive intervention.

Second, we must work to ensure that *all* children receive quality empirically validated reading instruction in a general education setting, and use this as the basis to guide who receives more intensive sustained reading interventions. It is now clear that we will continue to struggle to find those children who need more intensive, sustained reading intervention as long as we fail to provide quality core reading instruction to *all* children.

Third, the delivery of quality empirically validated reading instruction to *all* children requires professionals who are highly knowledgeable in what constitutes quality instruction that addresses all areas of literacy and how to deliver it.

Revisiting the 2002 definition of dyslexia through the lens of the latest research and the implications of this research for practice can inform and improve our goal to reach and teach *all* students to read. Doing so can better equip us in our efforts to identify and support those children who struggle to read as the result of the multifactor, complex condition that is called dyslexia. Research implicates multiple genes that impact the development of the brain, which interacts with a child's environment to give rise to differences in how he or she acquires written language skills. However, being a complex multifactor condition does not invalidate a construct, and it seems mind-boggling that to this day there are educators, parents, policy makers and some researchers perplexed to rediscover that some children experience such profound difficulties learning to read. They are the pervasively poor responders. They are real, and we call them dyslexic.

With that said, the biggest challenge is that in many instances it is impossible to truly differentiate garden variety poor readers from those children with dyslexia, given the educational systems currently in place. And it is a certainty that we will continue to be unable to do so until we help to establish solid core reading instruction in all classrooms for every child. Because it is the word reading, spelling deficits, **and** a profoundly slow response to empirically validated reading instruction that are the core characteristics of dyslexia. We can

improve on the definition as much as we want. But that will not help us find children with dyslexia until we address the lack of empirically validated reading instruction for all children. The current definition is sufficient given the current state of the educational systems around the world.

As such, there may be a research justification for a new definition. However, there is a much bigger need to support a thoughtful, clear plan to elevate the level of reading instruction for *all* children. This is because true north goes through every classroom, and we must never return to a day in which we blame the children struggling to read for the shortcomings of adults to provide them with the instruction and the support they need.

A focus on the needs of *all* children has long been the larger focus of IDA, even before it was the International Dyslexia Association. In a monograph published in 1987 and gifted to my predecessor Diane Sawyer by Sylvia Richardson, Rosemary F. Bowler wrote (Orton Dyslexia Society, 1987):

The Orton Dyslexia Society recognizes the critical role of teacher education in the teaching of language. While the Society is particularly interested in teaching methods that open doors for the learning disabled, its broader concern is for success in language for all children.

The research published since this prescient text was written reaffirms and further documents how very true this statement was all those years ago.

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Tim Odegard, Ph.D., CALP, is a professor of psychology and holds the Katherine Davis Murfree Chair of Excellence in Dyslexic Studies at Middle Tennessee State University, leading the efforts of the Tennessee Center for the Study and Treatment of Dyslexia. His research in the area of reading strives to identify factors that predict the response of individuals with dyslexia and related specific reading disabilities to intensive interventions and leverage this information to improve intervention efforts. He serves as the Associate Editor of *Annals of Dyslexia* and on the editorial board of *Perspectives on Language and Literacy*. He has worked with students with reading disabilities, having completed a two-year dyslexia specialist training program at Texas Scottish Rite Hospital for Children in Dallas during his postdoctoral fellowship.

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Dyslexia Defined: Historical Trends and the Current Reality

by Timothy N. Odegard

The Challenge of Dyslexia

Once it became common for large numbers of children from diverse backgrounds to receive formal reading instruction, people began to appreciate that not all children develop into proficient readers with the same degree of ease. Indeed, some children experience profound difficulties acquiring even the most basic level of proficiency with written language. Given that these children receive formal reading instruction, they raise an all too familiar question. Why are these children struggling to develop the capacity to read in spite of receiving the same formal reading instruction as their peers? Sadly, often the answer to this question is that the child is not trying hard enough or is incapable of learning to read. Regardless of which of these answers is given, their ramifications for the child are dire. Either the child is berated for being lazy and compelled to try harder, or the child is classified as an educational misfit unable to learn one of the most fundamental life skills that a citizen of the world in the 21st century needs to acquire to succeed.

Efforts to equip individuals with dyslexia with this life skill will amount to little if they are not framed and implemented with an understanding of the interplay between effective reading instruction and a child's response to this instruction. This is because, due to advances made by the efforts of many, we have moved well beyond needing to answer the questions: "Is dyslexia real?" and "Can individuals with dyslexia learn to read?" (e.g., Lovett et al., 1994). The answer to these questions is a resounding yes. We now have sufficient evidence that what is needed is sustained intensive, direct instruction in the components of effective reading instruction. Moreover, the impact of this instruction is enhanced when provided by highly knowledgeable educators with the resource of time and the support needed to implement instruction with fidelity (Foorman & Moats, 2004).

Understanding Dyslexia

During the early portion of the 20th century, a number of reported cases of unexpected reading underachievement found their way to the pages of medical journals. Each case presented a similar behavioral profile. The child exhibited a profound difficulty learning to read but in all other ways appeared capable of learning, making the challenges with reading unexpected. A trend also emerged as to the reported causes of these reading difficulties. Individuals reporting these cases pointed to a brain basis to explain why these children struggled to read. They came to this conclusion through inference. They made a connection between these children and literate adults who had suffered brain injury and lost the capacity to read. They concluded that these children must have a developmental form of impairment to brain regions, similar to those injured in the adults who had acquired a reading impairment.

Although these cases seemed compelling on the surface, they provided neither the evidence nor the information needed to develop a well-informed identification and classification model of dyslexia. Indeed, the conclusions drawn from these cases and limited clinical samples were that these children had brain differences that impeded their ability to visually process words, which hindered their ability to read. These conclusions emerged as a result of the limitations of case study as a methodology. The reports were based on behavioral profiles not grounded in theories of reading development established through systematic empirical studies. Rather, conceptual models of dyslexia were based on the observations of individuals reporting on a limited number of cases. The limitations of this approach led us astray. Several of the most prominent individuals reporting on such cases seized on the visual reversals of letters and words in writing samples as well as the visual confusion of letters exhibited by children in their reports. Influential early theories of dyslexia focused on how words and letters are visually processed, which in turn led to the pervasive fallacy that individuals with dyslexia see letters and words backwards.

Influential early theories of dyslexia focused on how words and letters are visually processed, which in turn led to the pervasive fallacy that individuals with dyslexia see letters and words backwards.

Thankfully, the empirical basis for dyslexia does not hinge on a handful of case studies or a relatively small clinic referral sample of children. Furthermore, our current understanding of dyslexia is not based on theoretical models predicated on an understanding of brain function derived predominately from adults who sustained brain injuries. In the latter part of the 20th century, a more formal, systematic, empirical approach was adopted to investigate characteristics of dyslexia and to construct a model for its classification and identification. These efforts helped establish a variety of well supported developmental models of reading, as well as a more refined understanding of language function in the brain. More important to this issue of *Perspectives*, we have a far better grasp of dyslexia: what it is and what it is not. For example, we now know that dyslexia is *not* caused by problems with visually processing words. Individuals with dyslexia do not see letters and words backwards.

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Current Definition

The current definition of dyslexia represents the culmination of research efforts at the time of its adoption (Lyon, Shaywitz, & Shaywitz, 2003).

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

The adoption of this definition by the IDA and the United States National Institute of Child Health and Human Development was a watershed moment. It represented a turning away from identification models of learning disabilities primarily based on what they are not (i.e., exclusionary criteria) towards an identification model primarily based on what they are (i.e., inclusionary criteria). The definition was made possible by a critical amount of empirical data that had amassed, allowing for a research-informed definition to be drafted (Fletcher, 2009).

Dyslexia is a Specific Form of a Reading Disability

Rather than lumping all aspects of reading into a single category, the definition was written to acknowledge what at the time had been empirically documented. Extracting meaning from written language is a higher level human ability that must be taught. Various breakdowns in the skills that support this ability can result in different manifestations of a reading disability. The group who drafted the definition found it both warranted and prudent to clearly specify that the bulk of the evidence pointed to a language basis to dyslexia. These language-based deficits were likely the result of neurobiological differences that influence how individuals with dyslexia acquire and process language.

By highlighting the characteristics of dyslexia, the definition was a powerful shift towards specificity that was not present in earlier definitions of learning disability. Instead of being an umbrella term that captures any learning difference that is not the result of a laundry list of exclusionary criteria, the definition characterizes a specific form of a reading disability. Specified within the definition are the hallmark deficits characteristic of individuals with dyslexia: deficits in word recognition and spelling. It highlights that the word recognition deficits can manifest as inaccuracy and/or inefficiency. It goes on to implicate phonological decoding, which is a reading skill that supports word recognition, as commonly being deficient. It also implicates the role that phonological processing deficits can have in the manifestation of dyslexia. This specificity is grounded in an empirically derived understanding of how reading develops and the role that these language-based processes can have in supporting its development.

Unexpected Underachievement

The current definition contains language that harkens back to why dyslexia emerged historically. It is conceptualized as an unexpected deficit in reading. Today, exceptionality is flagged in two ways. First, a child with dyslexia has a profound lack of ability to develop proficiency in word recognition and spelling in spite of demonstrating a capacity to learn. Second, the child does not respond to effective reading instruction. Thus, based on the conceptualization of dyslexia in the current definition, an individual with dyslexia fails to acquire proficiency with word recognition (either in accuracy and/or efficiency) and spelling in spite of demonstrating the capacity to learn and having received empirically validated reading instruction.

Grappling with Reading Comprehension

The definition clearly specifies dyslexia as impacting word reading and spelling abilities. Word recognition is one of the higher-level skills that supports an individual's ability to derive meaning from written language. Yet, it is well documented that some individuals who struggle to recognize words accurately or efficiently can perform at a level of proficiency on measures of reading comprehension that would not flag concerns and initiate educational intervention. Put simply, such students would not be identified as having any reading deficits and provided additional instructional support to teach them to recognize words with accuracy. The practical need to identify and remediate deficits in word recognition highlights one of the enduring benefits of the current definition. It motivates due diligence on the part of educators to confirm that a child has developed proficiency with recognizing and spelling words. A failure to follow through in this regard will limit the identification of individuals who struggle with these skills (Phillips & Odegard, 2017).

One of the enduring benefits of the current definition is that it motivates due diligence on the part of educators to confirm that a child has developed proficiency with recognizing and spelling words.

The reasons why children with dyslexia at times do well on measures of reading comprehension are multifaceted. One reason is that the skills undergirding comprehension of language are related to but independent of the skills that directly support word recognition. This results in the reading deficits associated with specific reading disabilities taking different forms. Whereas children can exhibit the hallmark deficits characteristic of dyslexia, (i.e., difficulty with word recognition and spelling), they may not have any learning differences that impair their ability to acquire oral vocabulary and the host of language skills (e.g., inference making, discourse processing)

and background knowledge acquisition that supports comprehension of spoken language (see IDA Fact Sheet *Oral Language Impairment and Dyslexia* written by Hugh Catts and Elsa Cárdenas-Hagan, and the 2016 Spring issue of *Perspectives* edited by Kate Cain).

Parents and educators desperately want a single measure that can be administered to make the call of dyslexia. But such a measure does not exist.

Thus, it is possible for some children to experience a specific reading disability in comprehension, and other children to experience a specific reading disability in word recognition (i.e., dyslexia). Research published subsequent to the adoption of the 2002 definition reinforces the interrelatedness of word recognition and comprehension, but also continues to validate the independence of the systems supporting these aspects of language and reading development. This body of research supports the subdivision of reading disability into different forms that is a hallmark of the current definition of dyslexia. Although these forms of reading disability are independent, they can co-occur. Thus, it is possible for a child to have learning differences that impede the development of word recognition and spelling and also to have language impairments that impede the development of comprehension. The work of Laurie Cutting and others using under-the-skin methods (i.e., brain imaging) to dissociate these systems has been and will continue to be critically important in advancing our collective understanding of the relationships between these forms of reading disability and how they relate to other systems critical for goal-oriented behavior (e.g., extracting information from written language to perform a task; Hudson, Scheff, Tarsha, & Cutting, 2016).

In addition to there being different types of reading disabilities, the extent to which a measure of reading comprehension is text dependent varies. Janice Keenan provided an excellent summary of this concept in a past issue of *Perspectives* (Keenan, 2016). The notion of text dependence simply means that the need to accurately recognize the words in a text passage to successfully answer corresponding comprehension questions varies from one measure of reading comprehension to the next. These conclusions drawn from research likely come as no surprise to anyone who has spent time testing children and working with them instructionally. At times, a child who struggles to accurately read the words within a text passage can answer comprehension questions derived from it. In reality, it is unremarkable for a child with dyslexia to perform well on some tests of reading comprehension, especially for a child with considerable background knowledge of the topics covered in the text. This reality stresses the role that protective factors can play in aiding individuals with dyslexia to succeed in spite of deficits in word recognition. An insightful piece that highlights this reality was written by Stephanie Haft and Fumiko Hoeft (2016), *What Protective Factors Lead to Resilience in Students with Dyslexia*.

Dyslexia Falls along a Continuum of Severity

One of the most fundamental shifts that has emerged based on continued empirical study of identification and classification models of dyslexia is that **dyslexia cannot be categorically defined.** Even though this aspect of dyslexia is not explicitly stated in the definition, we must address it given its importance to the conceptualization of dyslexia. Parents and educators desperately want a single measure that can be administered to make the call of dyslexia. They want a genetic test, a brain scan, a single measure of a child's reading ability. But such a measure does not exist, and there is not a clear demarcation of a test score that signals a child as being "dyslexic." This is because dyslexia is analogous to conditions that fall along a continuum of severity. For example, there is a constellation of characteristics that signify forms of heart disease, but without cutting open a major artery, a person has to progress to the point of having a heart attack to be certain that they have heart disease. Of course, medical doctors *do not* cut open an artery to confirm the presence or absence of plaque buildup. Thus, there must be a catastrophic failure of the cardiovascular system to definitively signal certain forms of heart disease, if we force this condition to fit an all-or-none deterministic categorical model. Yet, did the person have heart disease before he or she suffered a heart attack? Of course. But the severity of the condition had not escalated to the point of a catastrophic failure. Given the nature of the condition and its implications for the well-being of an individual, it is more optimal and humane to adopt a different model for identifying, intervening and managing heart disease than a categorical model.

The clear reality based on an overwhelming amount of empirical research is that dyslexia falls along a continuum of severity. An appreciation of this point is critical to translating the empirically derived knowledge of reading development and dyslexia into practice. The identification of dyslexia *could be* based on a catastrophic failure to read and spell words. Yet, we would be forced to wait until a child is developmentally to the point when he or she would be expected to be able to read and spell. This model also forces us to set arbitrary cut points that represent black and white demarcations. In doing so, we turn a blind eye to the reality of dyslexia and adopt practices that give rise to a wait-to-fail model predicated on cut-points drawn on a normal distribution of test scores. We forfeit the opportunity to provide children who are at risk of future reading failure characteristic of dyslexia with more intensive reading instruction to prevent future reading failure. Some of these children will readily respond to these efforts. In contrast, other children will require more intensive sustained intervention for them to achieve reading proficiency. It is this second group of children who we would triage for more intensive, sustained intervention and who are likely struggling to read due to something intrinsic (i.e., dyslexia).

This is a critical point for educators to understand conceptually and to appreciate in terms of the practical implications. As educators, we choose to teach children, and some of the children we strive to teach will require more time and instruction than others to become proficient readers. We must endeavor to implement informed systems that allow for such instruction

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to be provided in a timely fashion with appropriate levels of intensity. The progress toward defining dyslexia helps make that goal attainable.

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The 2003 IDA Definition of Dyslexia: A Call for Changes

by Susan Brady

Definition of Dyslexia (Lyon, Shaywitz, & Shaywitz, 2003); Adopted by the International Dyslexia Association (IDA) Board of Directors, Nov. 12, 2002:

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

In 2003, a modified version of the first IDA Definition of Dyslexia (Lyon, 1995) was published (Lyon, Shaywitz, & Shaywitz, 2003). As one of the members of the working group of researchers and IDA members who reviewed and modified the first IDA definition, I have been asked to critique whether the 2003 published definition remains current and adequate. I was requested to concentrate, at least in part, on phonological factors in dyslexia.

Some Historical Context

The 1995 and 2003 definitions of dyslexia constituted major improvements over prior vague, unspecific, and nonvalidated hypotheses and definitions. Several of the previous definitions had incorporated IQ-achievement discrepancy formulas that without merit focused on the lack of an IQ-achievement discrepancy as an exclusionary criterion (Fletcher, Lyon, Fuchs, & Barnes, 2019).

Building on quality research, a number of guidelines had been set for the formulation of IDA definitions (Lyon, 1995). Importantly, they were to specify positive identifiable features for dyslexia, avoiding the weaknesses of exclusionary approaches that only list what dyslexia is not. Thus the 2003 definition states that dyslexia “*is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities*” (p. 2). Other guidelines were that “*the definition must be theory driven, supported by a substantial body of convergent research and clinical information, (with) clear indications of how to identify whether a person is dyslexic*” (see Lyon (1995), pages 7–8, for the full list of guidelines).

As the 1995 and 2003 articles reflect, the group members writing each of the two versions endeavored to adhere to these guidelines as much as possible.

The larger goal is to steadily advance toward a better understanding of reading difficulties and to be better able to serve all students, improving identification and intervention, and in turn minimizing inequities regarding which children receive assistance.

Since 2003, a substantial amount of research on dyslexia and word-level reading difficulties has been conducted. Do the accrued findings and theoretical perspectives contributed in the intervening years have implications pertinent to the content of the IDA definition of dyslexia? I think they do, as one would hope. The larger goal is to steadily advance toward a better understanding of reading difficulties and to be better able to serve all students, improving identification and intervention, and in turn minimizing inequities regarding which children receive assistance. When approving the 1995 definition, the IDA Board of Directors sensibly included the caveat that it was a “*working definition*,” recognizing that “*the definition may need to be, and probably will be, altered in light of continuing advances in research and clinical knowledge*” (Lyon, pg. 8). Such openness to modifying definitions to align with growing bodies of evidence is essential to scientific progress and to fostering best practices.

What follows addresses a number of points germane to the existing definition, discussing issues that, in light of the current state of knowledge, suggest the need for changes and extensions in IDA documents. Given space limitations, representative references are cited to provide examples of pertinent resources. Some proposed changes and/or implications are included in each section. In the final section, recommended alterations to the 2003 definition are summarized and further possible steps are noted.

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Abbreviations

ADD: Attention deficit disorder
ADHD: Attention deficit with hyperactivity disorder

IDA: International Dyslexia Association
SLI: Specific language impairment

Points of Concern Regarding the 2003 IDA Definition

The definition generally is true but lacks specificity.

Drawing on available research, the working group correctly listed difficulties with accurate and/or fluent word recognition, decoding, and spelling abilities as the hallmarks of dyslexia. However, we were unable to address the requisite question as to what extent of difficulties with each is required for identification of an individual as dyslexic. Despite the constructive elements in the definition (e.g., “...*neurobiological origin, ... possible secondary effects*”), I since have come to the conclusion that the lack of specified performance criteria seriously undercuts the adequacy of the definition, essentially failing the necessary requirement to be able to categorize children with a particular disorder (in this case, dyslexia) into those who do and do not have the disorder. Thus, it is not a definition per se, but a more general statement about characteristics of dyslexia.

The inability to pinpoint criteria exists because of the well-documented finding that word-level reading skills fall on a continuum with dyslexia at the far end of that continuum (e.g., Pennington & Lefly, 2001), as recognized by Samuel Orton in 1939. Consequently, the cutoff point for dyslexia is arbitrary, whether limited to a small portion of the lower end of the continuum or including a wider spectrum of students. Regardless of the cutoff choice, what is designated as dyslexia only differs in degree from less severe word-level reading difficulties. Hence many students who are assessed and found to be above the criterion are likely to be in need of the same kinds of increased explicit and systematic instruction that would benefit those who are below, presuming such remediation is available through their local educational system. Restricting access to intervention may satisfy the aim to limit school resources allocated for these purposes, but it is not the kind of equitable and adequate system one would want.

Rather than restricting reading intervention to the most impaired cases, it would be preferable to have a broad preventive framework and to target all students demonstrating weaknesses in word-level reading skills.

The fact that word-level reading skills occur on a continuum means that dyslexia, unlike diseases such as mumps that one either does or does not have, is more like hypertension (i.e., high blood pressure)—a medically recognized condition that occurs on a blood pressure continuum. In this case, the high end of the blood pressure continuum is associated with certain medical problems; the occurrence of such health problems diminishes at less extreme levels of elevated blood pressure. The cutoff criterion for acute concern about hypertension has

shifted over the years as a result of new research results, but an important component of hypertension treatment is that blood pressure scores in a range below what is deemed as serious nonetheless are interpreted as indications of risk and also qualify for treatment. In a similar fashion, rather than restricting reading intervention to the most impaired cases, it would be preferable to have a broad preventive framework and to target all students demonstrating weaknesses in word-level reading skills, with the duration and intensity of remedial instruction varying according to individual student need.

What is challenging for the learner depends on the cognitive demands of the orthography.

Scrutiny of writing systems from around the world has led to the conclusion that a necessary feature of a system is that it must represent the speech sounds in spoken words. This has been described as a “universal phonologic principle” (Perfetti, 2003; Shankweiler & Fowler, in press), although which kinds of speech sounds are conveyed is not a constant. In alphabetic systems that are described as shallow orthographies, there is a straightforward correspondence between symbols and consonant and vowel phonemes (e.g., Spanish, Turkish, Serbo-Croatian, Finnish, Korean). For orthographies such as these, teachers readily appreciate the value of teaching letter/sound patterns and, in turn, most children learn to decode and spell words fairly quickly, although those experiencing more difficulty tend to be less fluent as readers. For more complex, or deeper, alphabetic orthographies such as English and French, morphological information also is conveyed in spelling patterns (e.g., the word ‘cats’ includes two morphemes, one about domestic felines and the second regarding plurality) (see Henry (2010) and Moats (1995) for further explication of English spelling patterns). Not infrequently, articulatory constraints result in partial variations in pronunciation of some graphemes for a written word contributing to spelling and decoding difficulty (e.g., the plural ‘s’ in dogs sounds like /z/), but notably preserves the morpheme (i.e., in this case, the plural marker ‘s’). The more complex interweaving of language elements in deeper forms of alphabets is linked with slower reading acquisition and a higher incidence of spelling and decoding difficulties, along with fluency challenges. However, development of morphological awareness for students with dyslexia benefits both word reading and reading comprehension (e.g., Cavalli, Duncan, Elbro, El Ahmadi, & Colé, 2017). For typically developing readers, morphological awareness also appears to enhance skilled reading (e.g., Perfetti, Landi, & Oakhill, 2005).

Other types of writing systems have relied on larger speech sound units. For example, the Japanese Kana orthography is a syllabic system, feasible because Japanese has a small number of possible syllable patterns. Written Chinese is morphosyllabic, representing phonological information at the syllable level along with morphological units.

These variations in orthographic elements are associated with varying sources of difficulty for learners. For alphabetic systems, phonological awareness is the strongest predictor of

later reading achievement for young students in pre-K, kindergarten, and first grade (e.g., Scarborough, 1998). Further, in shallower alphabetic orthographies with more consistent mappings, children at the lower end of the word-reading distribution have a much lower incidence of problems with decoding accuracy and spelling than do children learning to read English and other more complex alphabetic orthographies (Wimmer, 1993). On the other hand, difficulties with fluency of word or text reading appear to be more similar across variations in alphabetic orthographies (e.g., Seymour et al., 2003). In a very different writing system, such as Chinese, the relevant level of phonological awareness may be at the level of the syllable rather than the phoneme (e.g., McBride-Chang & Kail, 2002). However, the more substantial challenge for beginners appears to be mastering the huge number of characters in Chinese, many comprised of numerous strokes, requiring extensive time practicing writing and recognizing the characters and tapping different skills, including visual-motor abilities. For example, Tan, Spinks, Eden, Perfetti and Siok (2005) documented that ability to copy pseudocharacters was correlated with beginning reading scores for Chinese students. (See Pugh and Verhoeven (2018) and the rest of the first issue in 2018 of the journal *Scientific Studies of Reading* for further analyses of the symptoms of dyslexia across languages and writing systems.)

The diversity of patterns of difficulty associated with reading development and reading problems both within the category of alphabetic systems and across other types of writing systems reveals that the IDA definition of dyslexia was unwittingly Anglocentric. At the least, the claims regarding the accuracy of word recognition, decoding and spelling difficulties should be stipulated as pertaining to English.

Potential confusions regarding the meaning of phonological terms: A cautionary note.

Misunderstandings and misuses of phonological terminology are fairly common, perhaps not a surprise given the number of terms and the abstractness of many (see Scarborough & Brady (2002) for a glossary of “phon” words).

The phonological constructs fall into two groups. One set refers to underlying (unconscious) phonological processes entailed in speech perception and production, in phonetic coding in verbal working memory, and in storing and accessing phonological representations of words during speaking, listening, and reading. The underlying phonological processes also are the underpinnings for the second set of constructs: performance of conscious, explicit abilities to think about and carry out activities with the sound structures in spoken words. These are encompassed by a broad, umbrella term: phonological awareness. This concept has been subdivided to include phonological sensitivity (i.e., the ability to be aware of larger, more salient units of speech sounds including rhymes, syllables and onsets) and phoneme awareness (i.e., the ability to be consciously aware of the individual phonemes in spoken words).

Awareness of phonemes in spoken words provides a key component for understanding the nature of alphabetic writing systems: that letters (or graphemes) represent phonemes. Deficiencies in phoneme awareness consequently impede learning to sound out and spell words. Indeed, as noted

earlier, performance on phonological awareness tasks for young children learning to read English predicts word reading performance better than all other linguistic and nonlinguistic measures that have been administered (e.g., Scarborough, 1998). Of the various phonological abilities, phoneme awareness performance in the early grades has proven to be the strongest predictor of subsequent reading achievement (e.g., Muter, Hulme, Snowling, & Taylor, 1998). Fortunately, phoneme awareness, as a metalinguistic ability, can be fostered by instruction and discovery activities, with benefits for reading development, as many studies have documented (Ehri, 2004). At an applied level, at least some attention to teaching phoneme awareness is increasingly common.

The emphasis on phoneme awareness and the abstractness of phonological processing terminology may have contributed to a misunderstanding that assessing phoneme awareness is sufficient for diagnosing dyslexia.

Yet, the emphasis on phoneme awareness and the abstractness of phonological processing terminology may have contributed to a misunderstanding that assessing phoneme awareness is sufficient for diagnosing dyslexia. Perhaps of relevance, in the section of the Lyon et al. (2003) article discussing the role of the phonological component of language, the authors elaborated on phonological awareness, but not on phonological processes more broadly. Whatever the reason, some schools unfortunately have established performance on a phonological awareness measure (often including both phonological sensitivity and phoneme awareness tasks) as the sole determinant of classification for dyslexia.

Delving into why it is inappropriate to limit diagnosis of dyslexia to assessment of phoneme awareness, consider the fact that dyslexia is a developmental disorder. As such, how a student with dyslexia performs across the range of essential reading and language components evolves over time, hopefully with expert guidance. However, the underlying weakness(es) that may have been manifested as poor phoneme awareness in the earliest grades are still present, even though the student now may be having a hard time mastering more complicated orthographic patterns, and not necessarily with awareness tasks.

A study by Byrne, Fielding-Barnsley, and Ashley (2000) illustrates this progression. Students who had been trained in phoneme identity in their kindergarten year were studied six years later when in the fifth grade. Some of the children had become poor readers by grade 5; those students had taken a longer time to achieve phoneme awareness in kindergarten than their peers who had become good readers. How long it had taken related to their subsequent reading achievement, a result that won't surprise dyslexia tutors: students with dyslexia

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generally take longer to go through the phases progressing to skilled word reading. The implication is that the classification of a students' reading problems cannot rest solely on assessment of early precursors of word reading that they may have mastered, but needs to be evaluated with reference to grade-level skills as well. Notably, Pennington et al. (2012) examined two samples of individual cases of dyslexia. In one, only 55% (46/83) of the students were found to have a phoneme awareness deficit as at least part of their cognitive profile, in the other only 43% (35/82) had a phoneme awareness problem. A further finding is that not all students who are identified as having dyslexia in elementary school had demonstrated earlier deficits in phoneme awareness (e.g., Fuchs, Compton, Fuchs, Bryant, & Davis, 2008). In short, excluding students from dyslexia services solely based on a lack of phoneme awareness difficulties is likely to leave out a large number who should receive such services.

Research on phonological factors involved in reading since 2003 has not solely targeted the conscious, explicit abilities tapped by phonological awareness measures. In fact, a substantial body of research has been focused on investigating underlying phonological abilities in the context of cognitive, neurobiological, and genetic factors involved in reading development, reading disabilities, and skilled reading. (See Pugh and McCardle (2009) and Shankweiler and Fowler (in press.)) Examples of the research topics explored include studying the quality of implicit phonological representations in individuals with dyslexia (e.g., Boada & Pennington, 2006), the role of orthographic learning in word reading (e.g., Mimeau, Ricketts, & Deacon, 2018), and the neurocognitive characteristics of students who respond less well to reading intervention (e.g., Frijters et al. (2011)).

In sum, *"the phonological component of language"* in the 2003 definition represents a complex portion of the language system that has multiple functions both at the conscious level and in the underlying cognitive systems that carry out language and reading tasks. Accordingly, researchers and practitioners need to use terms as specifically as possible to avoid confusing matters. This caution likewise holds for IDA documents where it also will be helpful to provide sufficient explanation of the meanings of terms used.

Difficulties associated with dyslexia are not limited to phonological deficits.

In 2003, based on a large body of research, there was a strong consensus that readers struggling with the word-level requirements of skilled reading had phonological weaknesses. Evidence continues to indicate that the strongest link between word-level reading and cognitive processes is with phonological abilities, and most often with phoneme awareness. At the same time, the results garnered up to the present clearly show variability in cognitive profiles for students with dyslexia; the view that one can identify a single cause of dyslexia is seen as outdated and wrong (Fletcher et al., 2019). That is, rather than a single cognitive profile that fits all students, multiple differing

profiles have been linked with word-level reading problems (e.g., Catts, McIlraith, Bridges, & Nielsen, 2017; Pennington et al., 2012; Ring & Black, 2018.) (See Elliott and Grigorenko (2014) and Seidenberg (2017) for overviews of the cognitive and behavioral research on individual differences in reading ability.) Overall, the substantial variability in the individual profiles is striking. Similarly, the genetic etiology also is multifactorial, with multiple genes having been identified as candidate genes for dyslexia (Peterson & Pennington, 2012).

Rather than a single cognitive profile that fits all students with dyslexia, multiple differing profiles have been linked with word-level reading problems.

In terms of the current IDA definition, it states that, *"These difficulties typically result from a deficit in the phonological component of language."* In light of the extensive divergence in the patterns of underlying weakness(es) for readers with dyslexia, the wording in IDA documents about dyslexia needs to change to underscore the commonality of phonological deficits, but also to acknowledge the widely multifactorial nature of cognitive profiles as well. This would bring IDA into alignment with research published since the adoption of the 2003 definition, better informing policy and practice.

Risk and resilience factors: Predictors are probabilistic not deterministic.

An important corollary of the previous topic is that although certain early phonological and other abilities have been documented to be associated with later word-level reading, the association is probabilistic, not deterministic. In other words, if a young student demonstrates difficulty performing phoneme awareness measures (or other pertinent tasks), that child definitely has a higher probability of struggling with reading acquisition, but this may not occur (e.g., Catts et al., 2017). Such cases are referred to as false positives (i.e., determinations that children were at risk at an earlier point but who did not develop reading problems later), estimated to occur 20% or more of the time (Torgesen, 2002). Conversely, when a child performs adequately on screening measures but later has reading deficits, these are termed false negatives (occurring 10% or more of the time). Of course, early screening is another setting in which choice of cutoff scores influences the numbers identified in either category, with a wider net for at-risk students being preferable from an intervention perspective. However, the central point here is that early scores do not inexorably indicate how a student will do later. Using response to instruction in kindergarten and first grade appears to be more effective at distinguishing between children no longer at risk and students at ongoing risk (e.g., Vellutino, Scanlon, Zhang, & Schatschneider, 2008).

Early scores do not inexorably indicate how a student will do later. Using response to instruction in kindergarten and first grade appears to be more effective at distinguishing between children no longer at risk and students at ongoing risk.

Second, and relevant to the probabilistic likelihood of future reading achievement, several general risk and resilience factors have been identified that may influence how individual students will progress in reading, suggesting potential ways to ameliorate outcomes. In terms of risk factors, co-morbid conditions exist that increase or complicate the challenges of learning to read. One is a language disorder known as specific language impairment (SLI). SLI is characterized by significant delays in oral language development in vocabulary, grammatical, and pragmatic processes. These oral language weaknesses are associated with risk of reading comprehension impairments (Snowling, 2011). However, there are two subgroups of children with SLI: those with SLI plus dyslexia and those with SLI alone. Based on a large, longitudinal study of children with language impairments (Tomblin et al., 1997), Catts and Adloff (2011) reported that for children with SLI in kindergarten, there were as many with word reading problems in the fourth grade as there were good word readers. From a different starting position, Nash, Hulme, Gooch, and Snowling (2013) examined the language skills of preschoolers who were at familial risk of dyslexia and found that one third of these children met the diagnostic criteria for both SLI and phonological weaknesses. (Others had only phonological difficulties and some were developing typically.) There are three implications of these findings that are pertinent here:

1. SLI in young children indicates a potential risk for word-reading problems, including dyslexia. Therefore the presence of SLI in young children warrants careful monitoring and early intervention in phoneme awareness and word-level reading if needed (i.e., if the child is weak in letter knowledge, phonological awareness, rapid serial naming, and/or nonword repetition (see Catts & Adloff (2011) for discussion.)) Here again, the oral language and word reading problems occur on continua, so the difficulties in each can range from minor to severe.
2. Conversely, children with dyslexia may have undiagnosed oral language weaknesses that also should be addressed. Consequently, screening for deficits in oral language would be prudent for all pupils with dyslexia in order to identify potential instructional needs in that domain.
3. The student with a combined SLI and dyslexia profile will require intervention in oral language skills, reading comprehension strategies, and word reading, an obvious point, but one that needs to be recognized in

educational settings. All too often, the set of critical components requiring intervention for individual students either is not recognized or is not fully treated.

A second common comorbid condition with dyslexia is attention deficit disorder either with or without hyperactivity (ADD or ADHD). In 2011, McGrath et al. reported that between 25–40% of students with one of these disorders (i.e., dyslexia or ADHD) also qualified as meeting the criteria for the other. Additional studies have indicated that the co-occurrence is more common for children with the inattentive classification of attention problems rather than for the hyperactive form (e.g., Chhabildas, Pennington, & Willcutt, 2001). Again this means that the risk for word-reading problems can be recognized and acted upon early, as needed, for young children with attention difficulties.

As noted above, another risk factor for dyslexia is familial risk; if close relatives have been diagnosed with dyslexia there is a genetic risk for a child to develop dyslexia (Pennington & Olson, 2005). On the other hand, from an environmental perspective, disruptive early life experiences resulting from stress, poverty, and low levels of parental education also place children at risk for language and literacy deficits (Hartas, 2011; Herbers et al., 2012). Further, there is increasing evidence that socioeconomic disadvantages can affect children's brain development (e.g., Noble, Farah, & McCandliss, 2006). Despite the differences in origin, it is not possible at the individual level to distinguish between the characteristics of cases of biologically based and environmentally induced dyslexia (Fletcher et al., 2019), and of course a child may have both sources of problems. From the perspective of treatment, diagnosed reading and language weaknesses require the same kinds of interventions regardless of the mix of biological or environmental causes.

On an encouraging note, there is growing attention to resiliency factors that moderate and modulate the effects of word-reading problems, including dyslexia. Haft, Myers, and Hoeft (2016) target two categories of protective factors, cognitive resiliency and socioemotional resiliency. Cognitive resiliency in word reading is characterized by the lack of deficits, for example with decoding words, despite being at risk (e.g., genetically or having had phoneme awareness deficits) (e.g., Ozernov-Palchik, Yu, Wang & Gaab, 2016). Haft et al. (2016) suggest that oral language skills including vocabulary are critical for cognitive resiliency, and that executive functions (e.g., strong verbal working memory) and additional language skills such as morphological knowledge appear to help students with word-reading problems decode words. Socioemotional resiliency, or positive psychosocial adjustment, also influences a child and can be protective by boosting self-esteem, increasing adaptive coping strategies, increasing school engagement, and fostering a growth mindset (i.e., a child's belief that his or her intelligence is malleable). In addition, family-level factors, peer relations, and teacher attitudes help foster socioemotional resiliency. This line of study suggests a supplemental approach to helping students with dyslexia, in addition to early intervention and remediation.

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Revisiting IDA's Definition

The research gains of the past decade and a half have increased and clarified what is known about the characteristics and needs of children who have dyslexia and other reading problems. Confirmation that the word-level reading skills of children with dyslexia are at the low end of a continuum with normal word-reading skills underscores their need for early intervention, as well as for students with less extreme risk factors, akin to the analogy with hypertension presented earlier. Further, evidence has accrued that, despite the commonality of phonological deficits, the cognitive profiles of children with dyslexia are widely multifactorial. In addition, the comorbid conditions and/or environmental factors experienced by many children with dyslexia point to the value of informing practitioners about associated risks, of advising them to conduct early screening for those risks, and of recommending that broader interventions be provided when indicated. Finally, growing awareness of resilience factors that help reduce the effects of dyslexia suggests the merit both of cognitive/linguistic means (e.g., teaching morphological concepts) and of socio-emotional approaches (e.g., fostering a growth mindset) to improve outcomes.

Regarding the question of the implications of the body of research for the IDA definition, based on what is now known it would be appropriate to make changes to the IDA definition in at least two ways:

1. Changing the title to “Characteristics of Dyslexia in English,” or perhaps “Characteristics of Dyslexia in Writing Systems with Deep Orthographies (e.g., English).” This would eliminate the overreaching claim of definition and the unintended implication that the content describes the observable characteristics of dyslexia in all written languages.
2. Expanding the statement about why word-level difficulties occur, noting that deficits in the phonological component of language very often are present, but that many different cognitive profiles have been documented.

IDA also could undertake creating a set of descriptions of “characteristics of dyslexia” in specific orthographies or types of writing systems. The goal would be to provide accurate and helpful descriptions of the variations in observable characteristics of word-level reading problems as they are manifested in different kinds of writing systems (e.g., shallow alphabetic orthographies, deep alphabetic orthographies, syllabaries, morpho-syllabic writing systems), despite commonalities in underlying neurological and cognitive factors (e.g., Hoeft, McCardle, & Pugh (2015)). These summaries of “characteristics” for specific orthographies are likely to be beneficial for practitioners and parents in those written language settings, just as the identification of key characteristics of dyslexia in English has been valuable in locations where children learn to read and write in English.

In sum, continuing to meet the IDA aim to integrate current research with practice enhances the potential to fully identify

and address the literacy needs of students around the world. Presently, the interventions for children who have dyslexia too often insufficiently treat their central difficulty with word-level skills, and/or are incomplete by not ameliorating other concurrent language and literacy challenges. Scientific gains require that we expand our thinking about dyslexia and can help us improve recognition of the needs of children with dyslexia and delivery of adequate services.

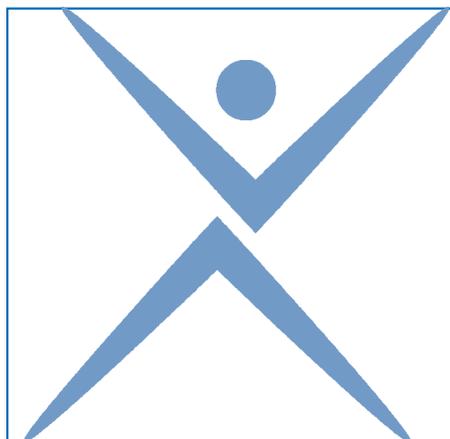
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The Case Against Discrepancy Models in the Evaluation of Dyslexia

by Linda S. Siegel and David P. Hurford

Dyslexia is a neurobiological learning difference that is characterized by deficient decoding abilities, lacking or inefficient word reading skills, and poor spelling abilities. These difficulties often result in inadequate reading comprehension, a delay of vocabulary growth, and challenges for learning and knowledge development.

In the International Dyslexia Association (IDA) definition of dyslexia, reading difficulties are “often unexpected in relation to other cognitive abilities.” This definition indicates that difficulties in achievement, particularly reading, are unexpected in relation to general cognitive abilities. This unexpectedness is often interpreted in relation to intelligence as defined by a score on an IQ test. This strategy of identifying dyslexia, referred to as the discrepancy definition of dyslexia, is archaic and inappropriate. By this method, in order to be considered dyslexic, the individual must have a significant difference, or discrepancy, between his or her IQ and reading score.

We view the use of discrepancy in the definition in identifying learning differences as problematic. Although the discrepancy definition historically has been a part of an assessment of learning differences, the inclusion of a measure of intelligence is not supported by research and has excluded individuals from being identified as having a learning difference who have, in fact, had reading difficulties. (For a review of the evidence see Fletcher, Francis, Rourke, Shaywitz, & Shaywitz, 1992; Siegel, 1988, 1989, 1992.) As a result, the use of the discrepancy definition in any form has been and is detrimental to a great many individuals with learning differences.

In this article, we will briefly review the history of this discrepancy model and then discuss the problems with it from theoretical, empirical, and practical points of view. Once the theoretical and empirical shortcomings are identified, it will be evident that the use of the discrepancy model or IQ criteria to identify dyslexia and to determine the need for intervention is indefensible.

How Did Discrepancy Models Come into Being?

Rudolf Berlin, M.D., a German ophthalmologist, coined the term “dyslexia” in 1887 in a monograph entitled “Eine besondere Art der Wortblindheit (Dyslexie),” which translates to “A Special Kind of Word Blindness (Dyslexia).” Prior to that point and for some time thereafter, dyslexia/reading disabilities was referred to as “word blindness,” or the inability to read words. Interestingly, Berlin found that individuals with dyslexia did not have difficulties with vision and speculated that the origin of reading difficulties was neurological and predicted that a

“reading center” would be discovered that would explain dyslexia. Other early pioneers were Hinshelwood, Kerr, and Morgan, who not only examined “word blindness,” but also “congenital word blindness,” a condition that was seen to exist in children from birth. Although it took some time to become established, dyslexia has replaced the term congenital word blindness.

Samuel T. Orton, a neuropathologist, neurologist, pathologist, and psychiatrist in whose honor the International Dyslexia Association was established, discovered aspects of dyslexia that to a great extent have been upheld to the present. Like Berlin, he ascertained that dyslexia was not primarily a vision issue and that there was linkage between brain functioning and reading. He also maintained that appropriate interventions

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SAMUEL T. ORTON, M.D.

Abbreviations

IDA: International Dyslexia Association

MRI: Magnetic resonance imaging

resulted in remediation, and that reading failure was not associated with intelligence. After reading Hinshelwood's *Congenital Word Blindness*, Orton became very interested in Hinshelwood's discussion of very bright children who were experiencing reading failure. Orton created the first mobile health unit in Iowa where he met "M.P.," who had never learned to read and had been assessed to have an IQ of 71. Upon examining M.P., Orton believed that the estimate of M.P.'s intelligence was not based on M.P.'s abilities, but on the inadequacy of the measure of intelligence to evaluate M.P.'s abilities, a sentiment with which many parents of children with dyslexia would agree. Intelligence tests are generally very heavily loaded on language measures, now understood to be a common weakness for individuals with dyslexia. As a result, individuals with dyslexia are more likely to have their intellectual functioning underestimated.

Intelligence tests are generally very heavily loaded on language measures, now understood to be a common weakness for individuals with dyslexia. As a result, individuals with dyslexia are more likely to have their intellectual functioning underestimated.

Orton hypothesized that dyslexia was related to "faulty sound association." M.P., for example, knew letter names and could draw by copying very well, but did not know the corresponding sounds for those letters; his listening comprehension was quite good although his reading comprehension was very poor and he produced many decoding errors. Orton believed that dyslexia was a "specific language disability," a concept that is embraced today. Orton also discussed the child's strengths and weaknesses and that children such as M.P. could learn to read if provided with appropriate instruction.

Although a discrepancy in terms of reading "...in relation to other cognitive abilities" is a characteristic obviously witnessed in many individuals who have dyslexia, it is by no means a valid or relevant aspect of identification and should not be a criterion in the identification process.

The Discrepancy Model and Effects of Using It

The discrepancy model states that there must be a significant difference between the individual's achievement and what would be expected based upon his or her intellectual ability. If a student has at least average intelligence, why would he or she be performing at a reading level that is considerably lower than average? Specifically, the model requires that a discrepancy or gap exists at a predetermined extent or greater between achievement and ability, and stipulates that the deficit necessitates special education or relat-

ed services for the student to be able to benefit. In some schools, the gap required had to be as large as 1.5 standard deviations, a rather large discrepancy. That is, the difference between the person's IQ score and his or her achievement score would need to be 22 standard score points or more. For example, if an individual's IQ standard score was 100, his or her standard score in reading would have to be 78 or lower.

Historically, the discrepancy definition led to under-identification of students with dyslexia, excluding students from interventions that could have assisted them to become competent readers (Siegel, 1989). Research has substantiated these potential difficulties. For example, a number of studies have compared three reading groups: good readers, dyslexic students (who met the discrepancy definition) and intelligence commensurate readers (poor readers who did not meet the discrepancy definition). The results consistently documented that the two groups of poor readers performed significantly worse than the group of good readers, but not statistically different from each other (e.g., Fletcher, 1992; Hurford, Johnston et al., 1994; Hurford, Schauf, Blaich, Moore, & Bunce, 1994; Siegel, 1992; Stanovich, 1991, Tanaka et al., 2011; Vellutino, Scanlon, & Lyon, 2000). There are no differences between individuals with or without an ability achievement discrepancy on functional magnetic resonance imaging (MRI) (Tanaka et al., 2011).

In one study, 250 reading disabled and 719 nondisabled students were placed into IQ-level groups based on their performance on the Wechsler Intelligence Scale for Children-Revised test. Measures of reading, spelling, and understanding of syntax were better predicted by the presence or absence of a reading disability than by IQ test scores (Siegel, 1988). This research highlights the reality that poor readers, those individuals who had significantly poor reading skills (one standard deviation below the mean or more) read similarly regardless of their intellectual abilities. The most notable feature of the poor reading groups is that they are poor readers. The most important finding is that their reading performance could not be differentiated based upon measures of intelligence.

Regardless of their intellectual abilities, poor readers benefit from interventions at statistically identical levels. The major factor was whether or not the students were receiving interventions appropriate for the reading difficulties they were experiencing.

Under the discrepancy formula, it has been maintained that even though poor readers from different IQ group levels read comparably, the poor readers with higher levels of intelligence would benefit more from intervention. The data do not support this proposition. In fact, regardless of their intellectual abilities,

poor readers benefit from interventions at statistically identical levels. The major factor was whether or not the students were receiving interventions appropriate for the reading difficulties they were experiencing (e.g., Hurford, Johnson et al., 1994; Pogorzelski & Wheldall, 2002; Stage, Abbott, Jenkins, & Berninger, 2003; Weber, Marx, & Schneider, 2002).

Making the reliance on IQ even worse, the development of reading and literacy skills fosters the cognitive skills assessed with intelligence and aptitude tests. Not only are good readers becoming more competent readers as a function of applying and practicing their reading skills, but those skills are further developing their cognitive skills, yielding commensurate improvements in scores on cognitive and intelligence tests. The opposite would be true for poor readers. Consequently, poor readers are less likely to attain a large enough gap between measures of reading and their IQ score to warrant interventions, despite being in urgent need of intervention for their poorly developed reading skills. Siegel and Himel (1998) directly examined this issue and found an inverse relationship between the age of children with dyslexia and their IQ scores. That is, the older dyslexic children had lower IQ scores than the younger ones. This finding not only verifies that intelligence tests tap into the child with dyslexia's weak verbal abilities, which then leads to an underestimate of his or her intelligence, but it also highlights the consequences: This approach reduces the discrepancy gap, thus, lessening the students' chances of being eligible for intervention services. Stanovich (1986 p. 374) argued that "...the cognitive consequences of the acquisition of literacy may be profound." Poor readers have less experience reading and in turn gain fewer cognitive benefits from the process of reading, which then affects their development of knowledge, memory, and other cognitive abilities. Given these limitations, the use of discrepancy criteria is neither tenable nor ethical. Accordingly, it is inappropriate and unjust to deny a child educational services based on an empirically discredited method of identification.

The Patterns of Strengths and Weaknesses Models (Discrepancy Models 2.0)

Currently, an assessment for dyslexia or other learning disability often includes a number of tests of cognitive processes. The Wechsler Intelligence Scale for Children-Fifth Edition, for example, measures verbal comprehension, fluid reasoning (a cognitive ability that requires minimal prior knowledge to solve novel tasks), visual processing, processing speed, and working memory. Another assessment tool, the Woodcock-Johnson Tests of Cognitive Abilities, measures comprehension-knowledge, long-term retrieval, visual-spatial thinking, auditory processing, fluid reasoning, processing speed, and short-term memory. These tests, along with similar ones, were designed to examine several aspects of cognitive functioning and identify patterns in strengths and weaknesses in the individual being assessed. When used to identify dyslexia, though, the patterns of strengths and weaknesses model is essentially the discrepancy model lightly disguised. For determination of a disability, the patterns of strengths and weaknesses model requires the presence of irregular patterns among the various cognitive abilities and achievement scores, and that the individual's intellectual func-

tioning falls in the average range. The requirement that the individual's intelligence be in the average range is analogous to this requirement in the discrepancy model and, once again, will exclude individuals with reading difficulties who do not meet this requirement.

When used to identify dyslexia, though, the patterns of strengths and weaknesses model is essentially the discrepancy model lightly disguised.

There are several forms of the patterns of strengths and weaknesses model: the concordant/discordant model; the Cattell-Horn-Carroll Operational Model; the Discrepancy/Consistency Model; and the Hypothesis Testing Cattell-Horn-Carroll Operational model. The concordant/discordant model (Hale & Fiorello, 2004) identifies individuals with specific learning disabilities by providing evidence that a weakness in achievement is related to a weakness in cognitive ability. Evidence also must be presented that the cognitive abilities not related to the achievement weakness should not be weak. For example, a student has weaknesses in phonological/auditory processing that leads to weaknesses in the achievement areas of reading and spelling, but has no other weaknesses in processing or achievement.

The Cattell-Horn-Carroll Operational Model (Flanagan, Ortiz, & Alfonso, 2007) uses the Cattell-Horn-Carroll model of cognitive abilities to examine strengths and weaknesses through examination of the broad cognitive abilities (i.e., comprehension-knowledge, fluid reasoning, quantitative knowledge, reading and writing ability, short-term memory, long-term storage and retrieval, visual processing, auditory processing, and processing speed) and compares the relationships among these areas and corresponding areas of achievement. This model identifies individuals with specific learning disabilities based on evidence that a weakness in achievement is linked to a weakness in one of the broad cognitive abilities outlined above, and that the broad cognitive abilities not related to the achievement weakness are not weak.

The Discrepancy/Consistency Model (Naglieri, 1999) identifies specific learning disabilities by examining the variability of an individual's cognitive scores. If a particular score is significantly low compared to the individual's other cognitive scores and meets the threshold of significantly low based on predetermined values (e.g., less than a standard score of 85) then that area is determined to be a weakness. Strengths are identified in the same, but opposite manner (e.g., scores greater than a predetermined value). Flanagan, Ortiz, and Alfonso (2007) define a cognitive or academic weakness as a score lower than a standard score of 85 and a cognitive or academic strength as a standard score greater than 90. The Hypothesis Testing Cattell-Horn-Carroll model (Flanagan, Fiorello & Ortiz, 2010) combines aspects of the Cattell-Horn-Carroll and the concordant/discordant models.

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In all of the variations of the patterns of strengths and weaknesses models, there must be a weakness in a cognitive area for identification of a specific learning disability to occur. Unfortunately, "...experimental studies showed that cognitive profiles had limited diagnostic accuracy in identifying individuals with learning difficulties" (Beaujean, Benson, McGill, & Dombrowski, 2018, p. 2). Other researchers also have been critical of the patterns of strengths and weaknesses models (e.g., McGill & Busse, 2017; Miciak, Taylor, Denton, & Fletcher, 2015). In addition, one of the premises of all of the patterns of strengths and weaknesses models is that the individual who is being considered for a specific learning disability must possess "...at least an average level of general cognitive ability or intelligence." (Flanagan, Fiorello & Ortiz, 2010, p. 745). As noted above, there is no evidence that this should be the case. In the case of individuals with dyslexia/reading difficulties, demarcating groups by intelligence provides an artificial differentiation between those groups; groups that perform nearly identically on measures of reading and its subskills and groups that benefit equally from interventions.

A particular cognitive profile of strengths and weaknesses does not predict who will benefit from remediation or what particular intervention strategy should be employed. This is particularly the case for individuals with reading difficulties.

One of the assumptions of the patterns of strengths and weaknesses model is that the performance of individuals with learning disabilities will differ from that of typically achieving individuals. Yet, there is great individual variation using patterns of strengths and weaknesses analysis, and this difference between performance of students with and without learning disabilities is not always found. Therefore, the diagnostic utility and validity are questionable. In a simulation study examining various models of patterns of strengths and weaknesses, Stuebing, Fletcher, Branum-Martin, and Francis (2012) found that none of them was very useful in identifying students with learning disabilities. For example, D'Angiulli & Siegel (2003) found that patterns of performance on the IQ test were not different for students with a learning disability and those without one. Most importantly, a particular cognitive profile of strengths and weaknesses does not predict who will benefit from remediation or what particular intervention strategy should be employed. This is particularly the case for individuals with reading difficulties.

Assessing Dyslexia

As argued above, intelligence testing should not be included in the evaluation of dyslexia. Supporters of the patterns of

strengths and weaknesses model would contend that the overall IQ score is not an important aspect of the pattern. What then is necessary? To meet this definition and to understand the academic strengths and challenges of an individual, we need a variety of achievement tests whose subtests directly measure the potential deficiencies. Tests of reading are obviously essential. It is critical to measure two basic reading skills: word recognition and decoding. On word recognition tests (e.g., Wide Range Achievement Test, Letter and Word Identification on the Woodcock-Johnson Test of Achievement, the Wechsler Individual Achievement Test – III, etc.) the person reads words out loud that vary in difficulty and the individual's performance is scored and compared to other people of the same age.

Decoding skills involve the ability to associate sounds with letters such that letters are translated or decoded into their respective sounds. This ability is assessed by asking a person to read words and pseudowords (nonwords that are legal and pronounceable combinations of letters but not real words in the language in question). The use of pseudowords in these tasks is very useful because some struggling readers use strategies to memorize the visual representations of words. In these cases, it only appears that the individual has appropriately developed decoding skills. The use of pseudowords prevents the use of this strategy and provides a more accurate representation of the individual's ability to decode and read words as they have not encountered those pseudowords previously (e.g., "pum" or "nafotbil"). Pseudowords force the individual to engage in decoding.

Decoding is essential for reading acquisition and word recognition, which becomes automatic in skilled readers. The efficiency with which the processes occur is also important. If one takes considerable time to decode and read a word, then the time and effort involved in those tasks will consume cognitive effort that will then interfere with understanding the text. One test that measures the speed of reading words and pseudowords is the Test of Word Reading Efficiency, which measures how many words and pseudowords the person can read in 45 seconds.

Tests of accuracy and speed of word recognition and pseudoword reading are absolutely essential for understanding whether an individual is experiencing reading difficulties. It is possible to make a case for dyslexia just based on poor performance on any one of these tasks.

There are other tests that are useful for understanding academic performance. For example, learning about an individual's spelling of words is valuable. Spelling is evaluated by dictating a list of words to the person who then writes them (e.g., Spelling subtest of the Wechsler Individual Achievement Test). Additionally, measuring reading comprehension is important in understanding what meaning the person is able to get from the text. However, consideration should be given to the test passages, because reading comprehension depends at least in part on the background knowledge that is assumed as part of the reading of the passage. While decoding, vocabulary,

and knowledge very accurately predict reading comprehension, a lack of content knowledge likely will hamper reading comprehension whereas expert knowledge likely will enhance reading comprehension (e.g., Alfassi, 2004). In addition, good reading skills are related to vocabulary growth (Duff, Tomblin, & Catts, 2015). Lesaux, Pearson, and Siegel (2006) examined the reading comprehension ability of dyslexics to perform in two conditions: the typical condition in which individuals have a limited amount of time to complete the task and an unlimited amount of time to complete the task. Although the conditions had little effect on good readers, the dyslexics performed significantly better in the untimed condition.

When evaluating the reading skills of struggling readers, it is important to analyze the items on which they make errors and the types of errors that are made. Error and item analyses provide a clue as to the types of interventions that would be of most benefit.

Item Analysis to Identify Instructional Targets for Intervention

When evaluating the reading skills of struggling readers, it is important to analyze the items on which they make errors and the types of errors that are made. Error and item analyses provide a clue as to the types of interventions that would be of most benefit. For example, if someone is dictated the word “take” and spells it “tak,” this is a sign of a problem with understanding that the “final e” indicates that the vowel will likely be a long vowel rather than a short one. Examples of approaches that have used analyses of items and errors and have related it to intervention are Kern and Hosp (2018), Odegard, Cooper, Hirschmann, and Alexander (2017), and Steacy, Elleman, Lovett, and Compton (2016).

Even for tests of reading comprehension, we should consider not just the overall score, but ask whether or not the questions were answered correctly in the limited time. For example, if a person answers few questions but all the answers are correct, then he or she understands what has been read, but reads slowly. Or if the person taking the test was precluded from advancing on the comprehension questions due to poor reading fluency, as can be the case on the Grey Oral Reading Tests, reading comprehension is not being adequately tested. In addition, reading comprehension tests can place different demands on the respondent. Some items can be answered using verbatim information provided in the text, while other questions can only be answer by going beyond the explicitly stated information and making an inference.

A Focus on Meaningful Measures

The most appropriate model for the identification of a learning disability requires an evaluation of the specific nature of the difficulty. In the case of dyslexia/reading difficulties, specific

evaluation of the nature of the reading difficulty including phonological processing, sound-letter associations, decoding, synthesizing/blending, word and pseudo-reading, spelling, and comprehension is essential. Given the nature of dyslexia and the status of measures that examine cognitive abilities, it would seem prudent to identify reading difficulties based on reading and its subskills rather than relying on a model that requires a discrepancy between reading and cognitive abilities. We know what reading difficulties look like; why muddle the situation with measures that do not directly provide important information regarding the nature of the difficulty?

The patterns of strengths and weaknesses model is expensive and time consuming, does not have predictive validity, does not specifically or necessarily highlight the difficulties that the student is encountering, provides no insight as to remediation, is convoluted, esoteric, and unnecessary. The measures used to support this model are global and still rely on a discrepancy no matter how one defines discrepancy. There is little to no evidence that models of patterns of strengths and weaknesses will provide accurate identification of students in need of intervention, while simply assessing the areas in which the student is struggling is considerably more likely to result in academic benefits. Patterns of strengths and weaknesses models are not only unnecessary for the identification and remediation of dyslexia, but should be avoided. These models lack empirical evidence of effectiveness in the identification of learning disabilities, particularly dyslexia.

The appropriate way to identify children with dyslexia/reading difficulties is to evaluate their ability to engage in the skills known to be important for reading acquisition and development, which will be necessary once a student is identified with the patterns of strengths and weaknesses model anyway. It is time to stop fabricating complex systems for identification and use the strategies that are not only going to accurately identify struggling readers, but to develop the appropriate intervention based on the identification data. These resources would be better utilized to support the delivery of targeted instruction and intervention and monitor student progress.

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Dyslexia Identification Within a Response to Instruction and Intervention Model: Have We Fulfilled Our Promise?

by Elsa Cárdenas-Hagan

A Perpetual Challenge Impeding Reading for All

Globally, 750 million youth and adults cannot read and 250 million children fail to acquire basic literacy skills (UNESCO, 2018). These numbers are staggering, and they highlight the harsh reality we face. As a community, we encounter far too many students who struggle with reading, and these numbers have overwhelmed the capacity of our educational systems to address the needs of children striving to become proficient readers. For example, only 33% of students in the U.S. read at a proficient level (NCES, 2017). Although some of these children struggle because of dyslexia, deficits in literacy skills arise from a host of factors, leading to a diverse population of children who experience reading underachievement. Meeting the educational needs of all these children requires us to acknowledge and understand the factors that drive reading underachievement. Furthermore, it compels us to consider what practical steps can be taken to ensure that *all* children, including those who struggle to read due to dyslexia, develop the skills needed to comprehend written language.

Fortunately, factors that impede reading development have been identified and there is a research base documenting what constitutes effective reading instruction (e.g., Foorman et al., 2016; NICHD, 2000). Despite the research on effective reading instruction, far too often educators lack the in-depth knowledge necessary to implement these effective practices (Salinger et al., 2010; also see the 2016 Fall issue of *Perspectives* edited by Dorothy Morrison and Terri Hessler). Therefore, some reading difficulties may arise from a lack of quality core reading instruction provided in the general education classroom. This reality is a sobering reminder of the challenges that face individuals striving to identify children with dyslexia and other reading difficulties and intervene on their behalf. Without robust empirically validated instructional systems in place for all children, large numbers of children will continue to experience reading underachievement due to a lack of effective instruction. In addition, teachers will lack the school support they need to help those children struggling to read as the result of home, community, and academic environments that hinder their reading development. These failings as a society perpetuate our continued struggles to identify children with dyslexia and intervene. Let's be frank: As a society, *we are* struggling to find these children (Phillips & Odegard, 2017). This shortcoming arises in large part from a failure to realize the promise of Response to Instruction and Intervention (RTI²) when schools attempt to implement this complex data-driven approach

and experience difficulties (e.g., Fuchs & Fuchs, 2017).

The RTI² model provides children with empirically validated reading instruction differentiated to meet their needs. It begins with effective classroom instruction, which is referred to as Tier 1. Students in the general education classroom receive universal screenings at which time those at risk are identified and are placed into small group instruction known as Tier 2. In Tier 2, students ideally receive interventions for a minimum of 30 minutes per day and their progress is monitored on a more regular basis. After careful review of the data, it may be determined that students require a Tier 3 intervention. Tier 3 requires more frequent monitoring and specialized intervention in a clinical and diagnostic approach (Fletcher & Vaughn, 2009).

Without robust empirically validated instructional systems in place for all children, large numbers will continue to experience reading underachievement due to a lack of effective instruction.

Characteristics of Dyslexia and RTI²

To appreciate the necessity to address the educational requirement of all children when striving to meet the needs of children with dyslexia, we must first answer a fundamental question. What are the central defining characteristics of dyslexia, and how do they relate to RTI²? As highlighted in the current IDA definition, dyslexia is characterized by deficits in written language, specifically word recognition and spelling that can hinder reading comprehension as well as the development of vocabulary and background knowledge. A perennial challenge that has faced those trying to define dyslexia is determining what makes these deficits exceptional. Within the current IDA definition, exceptionality is defined as the capacity of the child to learn in a general sense and a failure to develop proficiency in word-level reading skills despite receiving "effective classroom instruction." This way of thinking of exceptionality is captured in the following excerpt from the definition:

"... that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction."

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Abbreviation

RTI²: Response to Instruction and Intervention

There was considerable discussion of this aspect of the definition when it was drafted (Lyon, Shaywitz, & Shaywitz, 2003), and the excerpt represents two approaches to the conceptualization of learning disabilities. One is predicated on an assumption that there are clear demarcations that allow us to categorize students into those who have and those who do not have a specific learning disability based on testing performed at a single point in time (Lichtenstein, 2014). The other is predicated on the understanding that RTI² holds the promise of differentiating between those children who experience subtle reading deficits that might arise from environmental factors and those who experience more pervasive reading deficits, driven by factors intrinsic to the child that are interacting with a child's environment. Although these perspectives are not completely incompatible with one another, they do represent two different ways of conceptualizing unexpected underachievement.

The first half of the excerpt is associated with a very specific approach to operationalizing exceptionality in support of identifying learning disabilities. Historically, "unexpected" was specified as a discrepancy between a child's potential, commonly conceptualized as I.Q., and the child's reading achievement. Another variation of this approach is to explore a child's profile of cognitive strengths and weaknesses relative to his or her reading achievement. As discussed by Siegel and Hurford in this issue, these models have not stood up against rigorous empirical studies testing their validity, and due to limitations inherent to both, they are difficult to implement in an equitable fashion. Similar concerns were raised in the article in this issue by Brady.

The best prognosis for individuals with learning differences such as dyslexia, is when their learning deficits are identified early, and evidence-based interventions are implemented with frequent monitoring of progress.

The second part of this excerpt, "provision of effective classroom instruction," was new to the 2003 definition and had not been included in an earlier working definition of dyslexia drafted in 1995 (Lyon et al., 2003). It was added because documentation of a student's instructional history is important in understanding the nature and basis of a child's reading difficulties. Research that emerged between 1995 and 2003 underscored the importance of understanding the needs of children who are at risk for future reading failure and pointed to a promising potential. Estimates of dyslexia range from 6%–17% of the population (Fletcher, 2009). Research supporting a prevention-based approach suggested that the extreme upper end of these prevalence estimates was likely due to children not

being provided with effective reading instruction (Torgesen, 2002; Vellutino et al., 1996).

Moreover, subsequent findings have continued to support the conclusion that the best prognosis for individuals with learning differences such as dyslexia, is when their learning deficits are identified early, and evidence-based interventions are implemented with frequent monitoring of progress. It is important to appreciate that dyslexia is not a result of problems with the provision of effective classroom instruction but that dyslexia's impact on the individual can be exacerbated by ineffective classroom instruction. One way to determine whether effective classroom instruction is adequate is by closely monitoring students' progress. Practically, this can be determined through an RTI² process. All too often, though, a child's response to instruction has become in part a systematic means of implementing one of the exclusionary criteria for receiving services through special education. This mindset is part of the current system that places the burden of proof on the part of a child or parent, raising barriers to children receiving proper instruction. It is a vicious example of circular logic.

A child did not receive proper instruction in her school. So, she does not qualify for services through other aspects of the educational system. Consequently, she is compelled to remain in the same inadequate educational environment that is exacerbating her reading deficits.

RTI² was intended in part to address the wait-to-fail nature of eligibility for extra reading instruction and intervention. But in some implementations, it has morphed into another layer of wait-to-fail. Instead of viewing this component of the definition as an exclusionary criterion, we should, instead, view it considering the seminal research that led to its incorporation into the definition in the first place (e.g., Vellutino et al., 1996). This body of research has established that the provision of quality core reading instruction must be in place for all children to ensure that a lack of response to instruction serves as the inclusionary criteria it was intended to be. This is because a lack of response to this instruction is a central characteristic of dyslexia. It is not just that teachers should do their best to provide all students with quality empirically validated core reading instruction, which they absolutely must do and we must help them to do so. It is imperative that quality core reading instruction be in place for *all* children. We must do this in order to identify those students who require more intensive, sustained, empirically validated intervention to address reading deficits arising from a fundamental difference in how the child processes language (i.e., dyslexia). One of the most consistent findings across researcher-led implementations of RTI² is that, despite their best efforts, not all children have their reading deficits remediated with short-term supplemental Tier 2 and Tier 3 reading instruction. A lack of response to empirically validated core reading instruction in the general education setting coupled with word reading deficits is the central defining set of characteristics of dyslexia.

One of the most consistent findings across researcher-led implementations of RTI² is that, despite their best efforts, not all children have their reading deficits remediated with short-term supplemental Tier 2 and Tier 3 reading instruction.

What does adopting this perspective and approach to understanding dyslexia represent for advocacy, motivation and investment of energies towards literacy and addressing the needs of individuals with dyslexia?

An RTI² perspective compels us to ensure that all children receive quality, research-informed instruction to address all areas of literacy development.

We must make it a reality for every student to receive evidence-based instruction. Sadly, this is not the world that we live in today. We must place our energies and resources into increasing awareness and ensuring that all children receive validated instruction addressing all areas of literacy within a general education setting. Structured Literacy™ is a term used to capture an overarching approach to the delivery of explicit instruction in all areas of literacy development coupled with structured opportunities to consolidate this learning through cumulative, distributed practice (Spear-Swerling, 2019).

Educators adopting a Structured Literacy™ approach emphasize the structure of language, which includes the speech sound system (phonology), the writing system (orthography), the structure of sentences (syntax), and the meaning system (semantics), including the meaningful parts of words (morphology). This Structured Literacy™ approach to instruction offers opportunities for cumulative practice and ongoing review of learning concepts across all areas of literacy. Additionally, this approach allows for a high level of student-teacher interactions that incorporate carefully chosen examples, and the provision of prompt, corrective feedback. Unfortunately, Structured Literacy™ is not widely implemented in schools today. This is despite evidence regarding instruction and interventions using Structured Literacy™ that has been found to be successful in developing reading proficiency for monolingual and bilingual students alike (e.g., Cirino et al., 2009).

This perspective compels us to ensure that this instruction is provided within a robust system that can differentiate instruction based on student needs within the general education setting.

RTI² is intended to establish a safety net constructed from multiple sources of student information that identifies those students who fall behind academically. The safety net is in place before students start their first day of school. It is used to continually match students with timely targeted instruction of varying levels of intensity to address each student's instructional needs.

When RTI² is implemented with fidelity, it allows for students with less severe forms of underachievement to be identified and to receive intervention within a general education setting. As such, RTI² represents a framework for servicing students who need extra support early in their academic years.

This perspective compels us to document student progress with timely developmentally appropriate measures of literacy skills that can drive the differentiation of core reading instruction and identify students in need of increased reading instruction in targeted areas.

In an RTI² system, all students are assessed for risk and their progress is monitored as part of the universal screening. Universal screening is a process that uses nationally normed measures of grade-level skills to help determine if a student is making sufficient progress to be successful academically. All students should take part in the universal screening process at multiple points in the academic year. Universal screening measures can provide data regarding students who are at risk for reading underachievement and dyslexia. It is also possible within the screening process to gather information regarding the familial incidence of dyslexia and reading difficulties, which can add value when striving to identify those children at risk for future reading failure.

When RTI² is implemented with fidelity, it allows for students with less severe forms of underachievement to be identified and to receive intervention within a general education setting.

In order to further refine the identification of students in need of supplemental instruction and intervention, a second stage of assessing literacy skills can further verify data for students not reading at grade level or those considered at risk for learning (Compton et al., 2010). This survey-level assessment process is engaged after a child is identified as at risk as part of the universal screening process. Additional testing is used to identify specific areas of skills deficits to subsequently differentiate instruction for each individual student and accurately monitor response to intervention. This may prevent the under or over identification of students at risk. This is especially true when the performance on the screening was inconsistent or other factors caused poor performance, such as lack of engagement in the universal screening.

Additionally, more frequent progress monitoring is necessary once a child begins receiving supplemental instruction and intervention through the higher levels of tiered support. Progress monitoring constitutes the regular, periodic assessment of a student's response to instruction and intervention. Information collected through routine progress monitoring includes student skill development, rate of improvement, and intervention effectiveness. Data collected through routine

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progress monitoring is crucial when planning and delivering instruction or intervention in each tier of support.

This perspective compels us to ensure that there are clear lines of communication between the different systems within a school devoted to monitoring and intervening with students.

Considerations for Dyslexia Identification Within RTI²

How can we fulfill our promise for early identification and remediation of dyslexia within RTI²? First, we must ensure that every educator understands the body of knowledge documenting empirically validated effective methods for teaching reading and can implement structured literacy with high reliability. This means that teachers need support and mentoring to provide high quality instruction.

Next, it is necessary to use validated screening measures to identify students at risk for reading underachievement, including those with dyslexia. Decision makers and test evaluators in the school must understand the core features of dyslexia and be able to recommend or administer a second-stage screening through a survey-level screening process. This second-stage screening can look in more depth at the areas of weakness, which would then inform the supplemental instruction and intervention efforts. In addition, gathering outside information such as the familial incidence of dyslexia can be helpful in determining a child's level of risk.

Furthermore, when the need arises, comprehensive evaluations of a child's literacy and language skills must be conducted by persons who understand the core and secondary features of dyslexia and how language and background experiences and opportunities can have an impact on the individual's performance (Hamayan, Marler, Sanchez Lopez, & Damico, 2013; Krashen & Terrell, 1983). They must also understand the components of dyslexia interventions to assist with the recommendations for intervention. Finally, students in Tier 3 instruction, must receive intense remediation for dyslexia. This means receiving a minimum of 45 minutes a day of intervention by a dyslexia specialist who can not only provide evidence-based interventions, but can scaffold instruction as necessary. Only then will we have fulfilled our promise for early identification and remediation of dyslexia.

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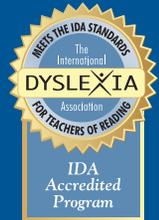
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