

# The 2003 IDA Definition of Dyslexia: A Call for Changes

by Susan Brady

**D**efinition 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.

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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.

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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.

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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).

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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).

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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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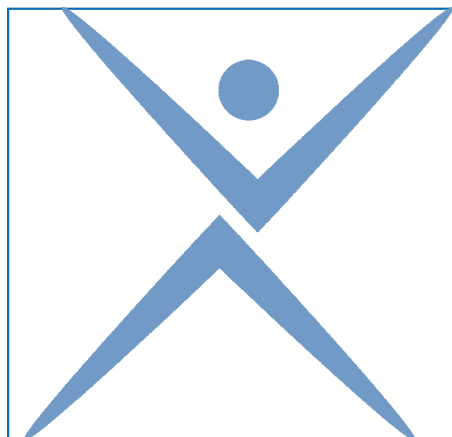
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