

Specific Learning Disability Assessment and Interpretation: NIMHANS SLD Battery and Beyond

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ABSTRACT

To diagnose Specific Learning Disability (SLD) in India, only 'NIMHANS Specific Learning Disability Battery (NSB)' is accepted for assessment and certification of disability. Earlier editions of the NSB used 'functioning at three standards below the current class of the child' to arrive at a diagnosis of SLD, and was simple to administer and interpret. Given these, majority of psychologists used it in their routine assessments, and in most of the cases, it was relatively easy to diagnose SLD with this battery. A major limitation faced when using the NSB was that it had test items only till the 7th grade. In the updated NSB, there are test items till the 10th grade, which is definitely a big upgrade. However, as the battery is relatively concise and does not clearly describe the nuances of assessment and interpretation in marginal and complex scenarios, some young psychologists and research scholars might find it difficult to diagnose SLD. Some of these scenarios are, when the child shows problems in academics but does not exactly fulfil the NSB criteria; when the child is having problems with second language instead of the first language; when the child is from an international curriculum; when the child is studying in a class higher than grade 10; when comprehension appears to be impaired; and/or the issue of whether or not to have so many subtypes of SLD. This article highlights some of these issues, discusses and attempts to provide possible solutions with respect to assessment and interpretation.

Key words: Bhatia's Battery of Performance Tests of Intelligence, intelligence, IQ, performance test, battery.

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INTRODUCTION

In the Gazette of India notification [1], Department of Empowerment of Persons with Disabilities, guidelines for evaluation and procedure for certification of Specific Learning Disability (SLD) has been suggested. In the guidelines, the only test suggested as the diagnostic tool for the assessment of Specific Learning Disability is the 'NIMHANS Index of Specific Learning Disability' [2]. 'NIMHANS Index of Specific Learning Disability', popularly known as 'NIMHANS SLD Battery (NSB)', is used by a significant number of psychologists across India and in a few neighbouring countries as well. There are different criteria to diagnose specific learning disability, which varies according to the country or region. For example, 'Response-to-Intervention' framework is recommended in the United States [3-4], while on the other hand, NSB uses 'norms with academic curriculum difference/lag' criteria to diagnose SLD [2]. According to the NIMHANS SLD Battery (henceforth, it will be referred to as NSB or simply as the battery) a child is considered as having SLD when her/his performance is 'functioning at 3 standards below the current class of the child'. For example, if the child is currently studying in the 6th grade, and on the battery, his/her performance is at 3rd grade level, then the child is considered to have SLD. The

apparent simplicity of this criteria and the ease of administration as well as interpretation has contributed immensely to the success of the battery among professionals.

When a child has clear and significant degree of academic difficulties, it is sufficient to use the battery as it is. However, where the degree of learning disability is in question, when there are inconsistencies in the test findings, and in a few other instances (listed below) one has to look at the nuances of the test results and has to go beyond what is given in NSB. This article discusses such scenarios and issues, with possible solutions.

ISSUES AND CONCERNS

1. The Concept of 'Disability', in Specific Learning Disability

Many postgraduate students/scholars and young professionals in psychology are to a great extent aware about the kind of issues that are seen in children with SLD. When asked, they usually report that 'it is a problem (grade inappropriate ability) with reading, writing and/or mathematics'. However, a substantial number of them do not know the difference between 'difficulty', 'impairment' and 'disability'. The concept of 'disability' has a totally different meaning and should not be used lightly. When administering the battery, one needs to have a clear understanding of all the above terminologies. A problem in an aspect can be of varying gradation. For example, if we consider walking, then,

- If one experiences pain after walking for more than two kilometres, then one can say that s/he has 'difficulty' in walking long distances; or if one gasps for breath initially while climbing a small hillock, then it can be considered that s/he has 'difficulty' in walking on an inclined surface. However, the above issues while walking is only a 'difficulty', and this difficulty is not and cannot be confused with 'impairment' or with 'disability'.
- If one meets with an accident and breaks a bone in a leg and is not able to walk, then the leg-bone injury is considered as an 'impairment'. This can be either temporary if the injury heals or permanent if the injury does not heal. If it is permanent, then the consequence of this impairment might be that s/he is not able to walk or might have restrictions in their movement. This is considered as a 'disability'. If this disability, that is inability to walk or restriction in movement, leads to one not being able to perform her/his routine duties or affects their livelihood adversely then it is considered as an 'handicap'.
- Having significant problems in reading, spelling/written expression and/or mathematics is an 'impairment'. Because of this the child will not be able to perform adequately in school/exam/academics and this might affect/alter the future of the child. The child might have to choose a profession which does not depend excessively on reading, spelling/written expression and/or mathematics. Therefore, this becomes a 'disability'.

It is common for psychologists to encounter a scenario, where a child with the diagnosis of SLD (diagnosed at 3rd standard) in reading and written expression comes for re-assessment, mainly for certification purpose, to avail benefits for the 8th standard (or higher) exams. Re-assessment might reveal improvement in reading and written expression, except that the adolescent still takes more time. The academic performances, also reveal the same, where the child who used to obtain 'D' or 'E' in earlier classes, is obtaining 'B' or 'C' grade in exams now. Superficially, this might indicate that the child is out of the disability range. This scenario can lead to conflicts where one might have to decide between the technicality of the diagnosis aspect and the welfare of the child, in terms of academics. There is evidence that intensive remediation for a long time can reduce SLD symptoms [5] to a great extent ('disability level' to 'difficulty level'), therefore, it can create a dilemma when one has to decide whether the child still can be considered as having 'disability'.

However, a psychologist has to keep in mind that, marks or grades in tests/exams alone does not tell everything. A non-SLD child getting 'B' grade may not be equal to an SLD child getting 'B' grade in exams. In some cases where such improvement is observed in SLD children, when the child and their parents were interviewed, they report that the improved performance has been attained with great effort,

with great cost and/or after several attempts. Children with SLD would have gone through multiple, repetitive, extensive as well as intensive hours of training and practice in school curriculum to get the improved grades. Often times, this would have been at the cost of forgoing all play activities, extracurricular interests, hobbies, participation in sociocultural events and programs. Hence, whether this improvement (achieved with extreme effort) in grades nullifies the diagnosis of 'disability' and/or downgrades the severity from 'disability' to 'difficulty', is the question. Any decision on this requires discussion with mental health professionals (psychologists, psychiatrists and psychiatric social workers), special educators, parents, children with SLD and other stake holders to arrive at a consensus.

2. Phonological processing

Level 1 of the battery [2] briefly mentions 'reading of alphabets' and 'giving dictation of alphabets' and 'knowledge of sound of alphabets and vowels. However, many trainees usually omit this part, because there are no guidelines given as to how to go about assessing these. Research has clearly indicated that SLD is primarily a disorder of phonological processing [6-8]. Phonological processing or phonics can be crudely explained as the processes that are involved in 'letter-sound correspondence', That is (i) a 'letter-to-sound' correspondence, and (ii) 'sound-to-letter' correspondence.

Given this, a psychologist should assess the above with sufficient examples. For example, to assess 'letter-to-sound' correspondence, the examiner should randomly show (as well as recite) at least a minimum of 15 alphabets (vowels and consonants) to the child, and the child should tell the corresponding sound for those alphabets. For example, when the examiner shows/tells 'S', the child has to tell its sound '|Sa|'. Similarly, to assess 'sound-to-letter' correspondence, the examiner should randomly articulate/speak at least a minimum of 15 sounds of alphabets to the child, and the child should tell the corresponding letter. For example, when the examiner says '|Ra|', the child has to tell (or write) the letter 'R'. Here, the examiner has to remember that each vowel has more than one sound, and vice versa. For example, 'i' can be pronounced as '|e|' / '|i|' / '|ie|' / '|y|' and so on. It is also good to assess whether the child knows that a particular letter (especially vowel) has more than one sound associated with it. In addition, if the child can write alphabets on command when random letters are asked but makes (significant and consistent) mistakes when writing 'a to z' (either in capitals or in smaller case), it might indicate cognitive deficits, such as deficits in sequential processing/learning.

In addition to assessing 'letter – sound correspondence', it is better to assess whether the child can (i) 'blend' two or more letters and phonemes, and (ii) 'segregate' a word into separate parts. For example, to test 'blending', a child can be asked how it sounds when '|d|' and '|r|' are joined. Similarly, to assess the 'segregating' ability, the child can be asked to segregate individual sounds from the word 'cat'. Further, the child should be given few simple 'pronounceable non-words' to read as well as to spell (Eg. 'kar', 'nat', 'dit', 'ren', and 'seg'). Similarly, the examiner can vocalize the sounds of these non-words and ask the child to write/tell the spelling for the same. This will indicate whether the child knows the additional steps necessary for phonological processing after having adequate 'letter – sound correspondence'. It should be remembered that 'blending', 'segregating' and reading/writing spelling of 'pronounceable non-words' should be assessed only if the child has adequate 'letter – sound correspondence'.

Phonetics or phonological processing ability acts as the building block or foundation for later learning [9-13]. It becomes very difficult or rather impossible for the child to master reading and spelling without learning adequate letter-sound correspondence [14 -15]. Rote learning (without the use of phonetic cues) might help in earlier years, however, as the syllabus increases according to the grade level, a child without adequate knowledge of letter-sound correspondence will find it extremely difficult to maintain adequate performance in academics [16].

3. Visual discrimination

Visual discrimination is an important aspect of an academic process. Reading requires adequate differentiation among various types of letters, digits and symbols. Impaired visual discrimination affects reading ability. The battery has eight items to test whether or not a child has difficulty with visual

discrimination. Here the child is required to identify/show the same item that looks like the first one. All the eight items are in large font sizes making it easy for the child to distinguish, and majority of the children do relatively well on this test. The battery says that three or more errors suggest difficulty with visual discrimination for children aged five and above. However, there might be a situation where the child has two errors, the performance is delayed, and/or shows trial and error approach. In these situations, the examiner need to evaluate further. This is especially because, though there are eight items in this test, all the items are not the same. Out of the eight items in large font, three of them have single letters, one has single digit, three have words in capital font and one has an abstract design. Except one letter in a small font, everything is in capital font (excluding the abstract designs). Therefore, it does not adequately test the actual difficulties that the children might encounter in identifying/recognizing letters. If the child's performance indicates difficulties, then it is strongly recommended to create additional items (or use the ones given in figure 1), in a font size that matches the child's textbooks, and to see whether the child still makes mistakes if mistakes are there, and what these types of mistakes are. If the child has visual discrimination difficulties, in addition to difficulties seen in NSB, it will show up in further testing as well. However, the examiner has to also rule out mistakes which might have been caused by hyperactivity-inattention in a child. *Kindly note: in the examples given in figure 1, two of them does not have a match, so here the child has to say there are no matching items.* If the child has visual processing deficits, then a thorough neuropsychological and neurological assessment needs to be done, along with remediation for the deficits.

Figure 1: Additional items to test visual discrimination difficulties

d		B	g	d	6
9		7	P	6	0
6		B	6	d	h
h		H	d	g	b
go		yo	9o	jo	po
if		of	fi	ef	if
big		bid	big	dig	brg
dad		dad	dab	bad	bab
boat		baot	beat	boat	beet
MIND		NINE	MINE	MIND	MING

4. Auditory discrimination

Auditory discrimination is one of the important brain processes that helps in spelling and written expression, in addition to reading [17]. A child should be able to clearly identify as well as discriminate similar as well as different sounds that s/he hears during the course of learning [18-19]. Without adequate development of this brain function, the child won't be able to discern words such as 'Spain', 'pain', or 'pen'. Only when the child hears the word without distortion, s/he will be able to clearly transcode it into letters (sound-to-letter correspondence). Level 1 of the battery assesses this function with the help of paired words. For example, after hearing the word-pairs, eg. shine-sign, pine-pine, the child has to indicate that the words in the pair are same or different. The subtest has 20 word-pairs, where 7 pairs contain same words as pairs, and 13 pairs contain different words as pairs.

It was observed that many trainees and professionals only consider the total correct out of the 20 pairs. However, 'same-word pairs' should be differentiated from 'different-word pairs' while interpreting. This is because, to some extent, it can be understood that the child might be having problems with auditory discrimination, if the child's responds as 'same' for 'different-word pair' ('same-for-different' error). For example, if the child says 'same' for 'mob – mop', it can be understood that the child is not able to differentiate the sounds of 'mob – mop' as different (thus having auditory discrimination issues). However, if the child says 'different' for 'same-word pair' ('different-for-same' error), it might indicate problems with attention [20]. For example, the words 'and – and', sound similar. For the child to hear them as different, there should be a greater abnormality in the brain, which can be more than that of auditory discrimination. However, unless otherwise proven or unless there is substantial neurological

evidence, if the latter ('different-for- same' error) happens it should be considered as merely an 'attentional' issue. Nevertheless, the examiner has to analyze how many of this 'different-for-same' errors have occurred. It becomes significant only when this error is more in number. If auditory processing deficits were observed, then the child should be referred to speech and audiology and/or ENT specialist for further evaluation.

5. Comprehension

Comprehension is one of the important cognitive functions, along with attention and concentration to consider while assessing any psychological functions. Without adequate comprehension of the testing processes the validity of the test results itself becomes questionable. Problems in comprehension during assessment can be due to several factors, such as inadequate and inappropriate test instructions, incompatible language or accent, task being too complex, attentional issues, short working memory capacity, and/or impaired brain processes/areas responsible for comprehension [21-23]. The examiner performing SLD assessment has to minimize the impact of the above aspects on comprehension as much as possible. For example, keeping the instructions simple, short, clear, and using language that the child understands.

When we talk of problems with comprehension, especially with respect to SLD, we can crudely differentiate among, 'general comprehension', 'comprehension of test instructions', and 'reading comprehension'. If the child has 'general comprehension' issues, it would be impractical to conduct SLD assessment, as the child may not understand what is being said. For example, for questions "did you have breakfast?" or "what is the colour of clouds?", the child might give a completely unrelated or irrelevant answer s or the child might not answer at all. This type of difficulty though is rarely encountered in SLD assessment. If encountered, it might indicate various factors such as significantly low intelligence or neuropsychological deficits.

Table 1: Different ways the concept of 'comprehension' has been referred to in the battery

	General comprehension	Comprehension of test instruction	Reading comprehension	Listening comprehension
Problems in	All aspects of speech	Test instructions	What is read	What is listened to or what is heard
Probable cause	Brain lesion or very low IQ	Low IQ; complex task; or improper instruction	Poor working memory; inattention; poor vocabulary and semantic knowledge; lack of sufficient exposure in that particular language; or as a correlate or the outcome of SLD	Poor knowledge of that language; inattention

With respect to 'comprehension related to test instruction', the child might find it difficult to understand what s/he is supposed to do. In this scenario, sometimes the child can understand simple instruction with simple task demands, but might have difficulty in understanding complex instructions with (or without) complex task demands. For example, if the examiner says "add 2 + 2", the child might understand it and can tell the correct answer. However, if the examiner says "add 2 + 2 and subtract the total from 4 + 6", the child might not know what s/he is supposed to do. If the child has problems in understanding the complex test instructions, then examiner has to keep the test instructions simple, repeat it and can even provide examples, which would help in comprehension.

When referring to as 'reading comprehension', it usually refers to understanding what has been read. The reading comprehension can be tested for a 'word', 'sentence/statement', 'question' and/or 'passage/paragraph'. Performance with respect to reading comprehension varies depending on the type of

material used, where for example, it is easier to comprehend something which is in a passage format [24]. This is because passage provides context to material and is thus easier to comprehend.

When some professionals hear the phrase 'problems with reading comprehension', they get confused and erroneously classify/diagnose it as '**disability** in comprehension'. As explained above, the phrase of 'disability in comprehension' is a misnomer with respect to SLD assessment, because it is a general phrase/category, which does not specify clearly what the problem is (refer table 1). A trainee or professional has to always remember that,

- 'Problem-in-comprehension' is *not* the same as 'problem-in-reading comprehension'.
- 'Problem-in-reading comprehension' is *not* the same as 'disability-in-reading comprehension'.

Though there are only few differences among the various types of SLDs, usually to avoid ambiguities, in clinical settings and to assess the presence/absence of 'disability', mainly 3 types of SLDs are diagnosed, which are Dyslexia, Dysgraphia and Dyscalculia [25-26]. The same are also observed in ICD and DSM classification systems [27-29]. Therefore, it is better to adhere to these three subtypes of specific learning disabilities. A few professionals go beyond these three main subtypes of SLD. They include 'disability in listening comprehension', 'disability in reading comprehension', 'disability in writing-copying', and/or 'disability in written expression'. The following paragraphs discuss the reasons as to why diagnosing these additional categories are extremely difficult due to several reasons. Due to several difficulties and ambiguities present in the literature with respect to these additional subtypes of SLD, readers are advised to go through the material presented in this article and elsewhere, weigh in the pros and cons, and decide for themselves as to what is an appropriate and what is not an appropriate practice.

5a. Reading Comprehension

The usual phenomenon observed when testing children with dyslexia (SLD in reading), is that the child has to read the sentences (sometimes long) from a paragraph. Further, usually testing material that are in the passages provided, contain both familiar and unfamiliar words. Once the child (with dyslexia) completes reading (with whatever difficulty), the child is asked a few questions about what s/he read, s/he might find it difficult to answer (at least for some of the questions). When such a scenario happens, it does not always mean that the child has 'disability-in-reading comprehension'. Because, in the above example, not able to answer what is read, can indicate something very different. This can be explained with the help of an analogy. For example, when one has a viral infection, one gets fever. So here, 'fever' is just one of the symptoms, but it is not the main diagnosis. The viral infection is the diagnosis. Similarly, in the above example, problem in understanding what is being read can indicate something else, or some other higher-level problem, such as dyslexia (difficulty to read). Therefore, like in almost every viral infection, one can get fever; similarly, when the child has dyslexia, s/he cannot comprehend what is being read. Research clearly suggests that deficits in word-decoding usually present with problem with reading comprehension [30].

The reason for this 'difficulty-comprehending-what-is-being-read' can be due to and/or a correlate of 'poor decoding/reading ability' [15,31]. This can be explained with the help of concepts in cognitive psychology/neuropsychology that explain how an information is learned and remembered. As the child becomes adept at reading, letter-by-letter (alphabetic) reading leads to word (orthographic) reading, where the child reads the entire word as one chunk, and this leads to reading becoming automatic [15, 32]. To comprehend any text, such as an average sentence, what is being read has to be in the working memory of the child. It is commonly believed that the working memory capacity is 7 ± 2 bits of information. Therefore, children without dyslexia are able to understand/comprehend what they have read, because, the text or sentence will still be there in their working memory by the time they finish reading the sentence. However, for children with dyslexia, reading is laborious and takes more time. This is due to the fact that they read letter-by-letter and with errors (such as, mispronunciation, substituting wrong phonemes, guessing at words, and omitting words). Given the working memory capacity (7 ± 2 bits of information), by the time they join letter-by-letter and/or try to decipher words and reach the middle/end of the sentence, it would have taken significant time and they would have forgotten what they read at the beginning of the sentence [33-34]. For example, let us analyse the following sentence, '*Chanakya, the author*

of *Arthashastra*, was the minister in Chandragupta Maurya's court'. Here, the child with dyslexia, might take up too much time in deciphering the words 'Chanakya', 'author', 'Arthashastra', and there are high chances that the child would forget it by the time s/he tries to read 'Chandragupta', and 'Maurya'. Therefore, when the examiner asks questions (to test reading comprehension) like, 'who wrote what?', 'who was Chanakya?', and 'what was he in Chandragupta's court?', the child might not be able to answer. This does not mean that the child has problem/disability in comprehension.

On the other hand, comprehension largely depends on the vocabulary and semantic knowledge that the child has in a particular language. If the child is not familiar with word meanings, and/or not well versed with a particular language, then there are chances that the child might not comprehend what is being read [35-36]. For example, the examiner asks a 3rd or 4th grade student, who may be studying in English medium but whose mother tongue is Hindi, to read the sentence "plague is a type of pandemic caused by pest infestation". Even though the child can read the sentence, it might be difficult for the child to understand the sentence, because, the words 'plague', 'pandemic', 'infestation', might be unfamiliar to the child. Further, when the child does not understand what is being read, it is difficult to remember the same, resulting in failing to answer the questions.

Therefore, due to various the above-mentioned reasons, the 'not-able-to-answer' or 'inability-to-answer' such questions, can be wrongly attributed to 'problems with comprehension'. As mentioned above, in this case not-able-to-answer questions after reading, indicates 'symptoms of and/or correlates of dyslexia' (like having fever due to viral infection). The better approach to test reading comprehension would be to test the passage reading comprehension rather than sentence/statement reading comprehension [37]. This can be further substantiated in cases where young children can join letters and read English, but may not be able to speak in English. Due to this, they often have difficulty in understanding. However, when they learn to speak, the problems with understanding decreases. The battery allows for the independent diagnosis of 'disability of reading comprehension', but specifies that 'severity of reading comprehension to be rated only when there is no disability in reading'. This specification/condition in the battery is a welcome move. However, as it still allows for the diagnosis of disability in reading comprehension if one does not answer particular questions, there is a chance that it can be inadequately/inappropriately implemented. Hence, due to the reasons mentioned above, diagnosing 'disability in reading comprehension' with or without 'severity rating' is a very complex issue and might be erroneous if carried out. If the problem is really suspected, then a thorough, elaborate and additional assessment would be required.

5b. Listening comprehension

A professional has to first know how to differentiate between 'reading comprehension' and 'listening comprehension' difficulties. The best way to do this is, first the child reads the text, then immediately thereafter, few questions are asked to assess the child's comprehension of what is being read. If the child is able to provide correct information (after reading), it is assumed that the reading comprehension is adequate. On the other hand, if the child is not able to give correct information, the examiner should read the same/similar text and the child listens to it. After this, questions are asked to the child. If the child provides correct information (after listening to what the examiner has read), then it indicates that "the child's comprehension is adequate". The latter can be summarized as, "the child has adequate *listening comprehension*, but his/her *reading comprehension* is affected, which might be due to him/her having dyslexia". Apart from the above, whenever there is any difficulty with comprehension, it is always good to evaluate further, as to why the child is not able to provide adequate / appropriate answers. The possible hypothesis the examiner has to check are inattention, complex text, poor vocabulary, poor knowledge of the language, inadequate familiarity with the spoken language, and/or different accent of the examiner. One common thing seen in India, especially smaller cities, towns and villages is, though the students study in English medium schools/syllabus, substantial number of them are not able to speak English and/or feel uncomfortable when somebody speaks to them in English. This is because, understanding conversational English is not easy for a substantial number of people from the above regions. This can be seen commonly (in India) among many TV or online content streaming platforms, where English movies and serials are automatically provided with subtitles.

The battery provides an option to independently diagnose 'disability in listening comprehension' with 'two levels of severity rating'. However, *it has not provided any kind of normative data* to ascertain how one should diagnose listening comprehension and/or how to decide the severity level. On the whole, given the above-mentioned issues, *one should not diagnose disability in listening comprehension, irrespective of the severity levels*, unless extensive further testing on this aspect is carried out.

6. Issues with handwriting when diagnosing dysgraphia

Dysgraphia is currently a common umbrella term that encompasses difficulties in 'writing', due to spelling (phonological processing) errors, letter reversals, distorted handwriting, inadequate letter/word spacing, punctuation errors and inability to express thoughts into words. However, some trainees and psychologists give more importance to distorted handwriting and punctuation errors than the phonological processing - spelling issues. This might be due to earlier definitions of dysgraphia, which focussed mainly on illegible and/or slow handwriting, which might be due to poor fine-motor coordination [38-39]; and/or poor spacing of letters / drawing ability, which might be due to impaired visuospatial perception [40]. In diagnosing dysgraphia, though all the above-mentioned errors should be considered, the main criteria should be spelling difficulties [41-42]. Other conditions such as punctuation errors, poor word spacing and poor handwriting (copying) are to be considered as supporting factors in addition to spelling difficulties. Generally, in the absence of spelling difficulties, it is incorrect to diagnose a child as having dysgraphia. However, there are children who do not show much problem with spelling but show illegible handwriting even in their high school. This might indicate neurological issues and hence should be referred to neurologists for evaluation. The analogy given at the end of section seven explains these issues clearly.

7. Issues with considering writing/copying as a separate category of learning disability

This section is an extension of the earlier section that discussed the role of poor hand-writing in diagnosing dysgraphia. The question here is, should a psychologist consider problem with writing/copying as a separate category of learning disability? The question has become prominent after the battery provides an option to do so. This section discusses the possible difficulties of diagnosing it.

Though rare, few children do show problem with handwriting, such as crooked/distorted letters that are difficult to read/understand without the contextual text. Examples of such writing can be (i) *uneven sized letters*, where some letters are written in small font size and some in bigger font size; (ii) *variation in slants*, where sometimes the letters slant left, sometimes vertical and sometimes right; (iii) *variation in spacing*, where some words are more elongated compared to other words and/or gap between words; (iv) *variation in horizontal alignment* of the text on the page. If *majority of the above* are present, then the psychologist has to do a thorough evaluation including neuropsychological evaluation. In such a scenario it is always good to take opinion from neurologists. Because, if the problem is only with distorted handwriting, the cause might be due to impairments in fine motor coordination and/or visuospatial abilities. In such cases, a team comprising child psychologist, neuropsychologist and neurologists should evaluate the child/adolescent. In terms of exemptions, benefits and facilities provided to the child, in the absence of other associated difficulties (spelling, reading, dyscalculia) these children can be provided with 'Scribe' facility in examinations.

The battery talks about this as a separate category and lists numerical values as norms to support this separate category. However, the normative data provided does not actually help in diagnosing this particular category of disability. This is because of two reasons, (i) the *type of errors considered for the norms are inappropriate*, and (ii) the *obtained norms itself*. Under the first reason, that is the '*type of errors considered for the norms*' are 'spelling errors, omissions, grammatical errors, improper usage of upper and lower case, punctuation mistakes and letter reversal'. These errors do not fall into any particular unified theoretical model and/or does not fall into any one clear area/domain in terms of brain function/processes. Further, most of these errors does not assess handwriting per se. 'Spelling errors' might be due to phonological processing deficits; 'omissions' might be due to inattention-hyperactivity; 'grammar and punctuation

mistakes' might be due to poor exposure to language; and 'improper usage of upper and lower case' might be due to inattention, lack of adequate practice and/or not being too particular in copying the material exactly as it is. The second reason, that is the '*obtained norms itself*' does not allow the examiner to easily categorize writing/copying disability. At every grade level, the scores show very high ceiling effect with very small extent of deviation from the mean, and for grade 8th the mean is the highest value achievable, where automatically SD will be zero. Hence, these values show extreme 'negative skewness' (peak lumped on the right side) in the distribution curve. If these values are considered as normative value to diagnose disability, then even marginally small number of errors might be considered as indicative of disability. For example, if a 9th grader scores 109 (out of 110) on 8th grade material, score 40 (out of 44) in 7th grade material, and score 65 (out of 67) on 6th grade material, then the child has to be considered as having disability according to the reported norms. However, the child has actually scored more than 90% in all three above mentioned (8th, 7th and 6th) grades, and scores of above 90% cannot be considered as having disability. Given the above two important reasons (that is, '*type of errors considered for the norms*' and '*obtained norms itself*'), it is *technically and conceptually not a good thing to diagnose disability in copying/writing*. However, if the problem is genuine, in addition to the norms, one has to go beyond the battery to diagnose the disability in writing/copying. For this, one should obtain information about the history of the problem, letters from the school/teachers, classwork/notes/assignments of current and earlier grades, and marksheet/report cards of few years, in addition to observing errors such as, 'illegible text, uneven size letters, variation in slants, and spacing and horizontal alignment'. Further, this needs to be discussed with the board as suggested above, before arriving at the final diagnosis of disability in handwriting/copying. An analogy given at the end of section eight clarifies these issues.

8. Issues with considering 'Written expression' as a separate category of learning disability

As mentioned above, dysgraphia is generally considered a broader-umbrella term under which several difficulties, such as spelling mistakes, inappropriate grammar, poor handwriting, punctuation errors and trouble in written expression exist. If one has difficulties with written expression, it implies problems with '*conceptual aspects of writing*' that involves problems with organizing and expressing thoughts in writing. Correct and actual examples of the errors in written expression can be, 'wrong use of words, basic grammar mistakes, sentences that do not make sense, missing details and facts, disorganized concepts, very simple sentences compared to their age and maturation, excessive repetition of few words, and/or incomplete written work'.

According to the battery, each child is asked to write an essay/few sentences on the topic of 'my school' within a time limit of 15 minutes. The norms provided from grade 1st to 9th for this domain of written expression is '**correct** number of words written'. It is not mentioned how the correct numbers are arrived at. However, it provides additional norms for the 'errors in written expression'. Therefore, it can be assumed that 'the **correct** number of words' represents words written after subtracting the 'errors in written expression'. Further, the errors considered under this category are 'errors in spelling, omission, grammar, capital vs. small letters, punctuation and reversal' (which are the same type of errors considered under the writing/copying category – see section seven). Given the above, two main questions arise, (a) 'if at all one considers having a separate disability in written expression category, do the norms given in the battery facilitate this diagnosis?' and (b) 'should we have a separate category of disability of written expression?' The answer to both of the above two questions are '*no, we cannot*'. The reasons are discussed in detail below and also explained through an analogy.

The answer to the first question, (a) '*that, if at all one considers having a separate disability in written expression category, do the norms given in the battery facilitate this diagnosis?*' is 'NO, it does not'. That is, *it does not assist in diagnosing disability in written expression*. There are three reasons because of which the norms are incorrect/inadequate in this regard. *First*: the norms consider only the 'correct number of words written'. Written expression is not just any words correctly written. For example, assume that when asked to write about school, a 3rd grade child writes this:

I like school	I like bus	I like ground	I like play
I like play ball bat	I like Miss Meena	Miss Rita	Miss Safina

It is not uncommon to see this type of writing among young children with SLD. In the above write-up, the grade three child has correctly written 25 words, so going by norms, it might suggest that the child has good written expression. However, one can clearly see in the above example, that the written expression is not adequate. *Second:* As mentioned in the earlier paragraph, except 'grammar' the other errors considered as 'errors-in-written-expression' in the norms (eg. spelling errors, inappropriate capital vs. small letters, punctuation mistakes, reversals) cannot be considered as appropriate to score under written expression. On the contrary, a child might want to use small instead of capital letter and/or change in punctuation to emphasize a point or as a writing style, which cannot be considered as an error. But if one goes by norms, it might be taken as an error. *Third:* It can be hypothesized that, as the 'errors-in-written-expression' considered for the norms were incorrect, then automatically it would have affected the 'correct number of words written'; because while developing the norms, the incorrect/errors scores would have been subtracted from the 'correct number of words written', thereby affecting the actual scores/norms. This is an assumption, because the norms do not specify 'what are actually the 'correct words?'

To understand it better, let us assume that a psychologist wants to develop norms for the 'number of fruit names written in 5 minutes'. As is usual in many psychological/ neuropsychological tests, psychologists could also consider having norms for the error scores. Given this, one gets two scores/norms, that is, 'number of fruits names written' and 'number of errors'. If it is only this, then there will not be any problem. However, the psychologist adds the word 'correct'. Therefore, the norms will not just be for the 'number of fruit names written', but it will be the 'correct number of fruit names written'. However, the psychologist does not indicate anywhere about what 'correct' means. Given this ambiguity, it can be hypothesized and would be logical to assume that the psychologist has subtracted the 'number of errors' before arriving at the 'correct number'. One should remember that, there is nothing wrong in subtracting the 'error scores' before arriving at the 'correct number'. However, it would be wrong if the error score norms actually do not contain any errors. In the above example, while writing the names of fruits, if the child writes the names of vegetables, plants and trees, it might be considered as errors. But if the child, 'uses only capital letters', 'gives too much gap between fruit names', 'incorrectly spells the fruit name', and/or 'does not use capital letters for the first letter of the word', then these mistakes cannot be considered as 'error scores', especially when the goal is to develop norms for the 'number of fruit names written'. Therefore, if the psychologist considers these above grammatical mistakes as errors in writing fruit names, and goes on to subtract these error scores to get the 'correct number of fruit names written', then the norms will not be correct.

The answer to the second question, (b) 'Should we have/diagnose a separate category of disability of written expression?' is, it depends on whether one can prove beyond doubt that the problem is only with the actual 'written expression' as defined in the first paragraph of this section. In this case, the examiner has to primarily rule out 'poor knowledge of the language', 'inadequate familiarity with the language', and 'ignorance of the topic'. Further, the examiner has to additionally rule out the 'phonological processing-spelling difficulties and associated lack of motivation to write'.

That is, to write/express about something, a person first should have adequate information/material to write/express. For example, if a primary and middle school child is asked to write about 'nuclear fusion' or 'merits of democracy', s/he might not be able to write much (However, this issue might not arise with respect to the battery because, the topic s/he is asked to write about is 'school'). Further, how much a child writes also depends on the command a child has in that language. In addition, if the child has disability in spelling, then automatically there might be a tendency for the child to use only short, simple and familiar words while constructing the sentences, because the child might have problem with spelling of longer, complex and unfamiliar words. The corollary of having long standing problems with spelling, and associated unpleasant experiences at school and/or at home is that, whenever a child is asked to write something like a paragraph, some children usually show significant lack of motivation and cooperation to write anything, and even if they write, it will be very few lines. Therefore, to answer the above question

whether one can diagnose 'disability in written expression', is 'usually not possible or very difficult in an Indian setting, but can be done only with extreme caution and only when all the above contributory factors are ruled out'.

Another important reason for not being able to diagnose 'disability in written expression' is that, one cannot have both the diagnoses of 'dysgraphia' as well as 'disability in written expression', because the 'problems with written expression' is actually a part of 'dysgraphia', and/or the problems with written expression supplements/supports the diagnosis of dysgraphia. In addition, if we consider what actually is 'written expression' (as given above in the first paragraph under this section), then, it becomes difficult to have any criteria or norms to diagnose it. For example, what constitutes a simple sentence or a complex sentence is a subjective opinion. So, it will be difficult to have norms to say, 'this is a simple sentence', and/or 'this is a complex sentence'.

Further, one needs to actually look at the associated fundamental question which is: is having a separate category of diagnosis of 'disability in written expression' in addition to having 'dysgraphia' warranted? That is, 'can having problems with written expression per se, that is not able to express in writing format, be considered as 'disability'? For example, a child of 4th grade studying in English medium in a semi-urban area might have problems in expressing in English. However, if this child shifts to English medium residential school for 5th grade in an urban setting, s/he might be able to learn to express adequately in English after few months. In this context, if the child would have been diagnosed as having 'disability', then the disability would have disappeared within few months or years. Rarely the diagnosis of 'disability' is used for short term difficulties. However, it is beyond the scope of this current article to deliberate on this.

An analogy

If one considers the whole 'dysgraphia' as 'movement/mobility', then 'knowledge of how to move/walk' and 'ability to show how to move/walk' can be roughly equated with 'spelling'. Similarly, 'copying how others walk/move' can be equated with 'copying/writing' aspect. Then 'dancing' can be equated with 'written expression'. Given this, usually a person is said to have disability mainly if s/he does not know how to walk. Rarely one is considered disabled, if s/he can walk, but cannot exactly copy others movements and/or if s/he cannot dance. Ability to copy others' movement and/or ability to dance are required if one considers the whole movement/mobility per se. But, on its own, 'inability to copy others movements' and/or 'inability to dance' are rarely considered as having disability in mobility. Given the above, it is not recommended to diagnose 'disability in copying or disability in written expression' based on the norms of the battery.

9. Issues with the diagnosis of spelling disability using the battery

In the earlier edition, the battery had few words at each grade level till 7th grade, which were dictated to the subjects and the subjects needed to write the spelling of those words. The criterion was to correctly spell about two-thirds (number) of those words to pass the particular grade level. The updated version involves the Schonell's Spelling Test of 100 words, and the battery has indicated two ways to score it: (i) the grade appropriate norms which is easy to understand and use, and (ii) the scoring formula version to arrive at 'spelling age', which can be confusing to some young professionals. It is advisable to use the grade appropriate norms rather than the formula. This is because,

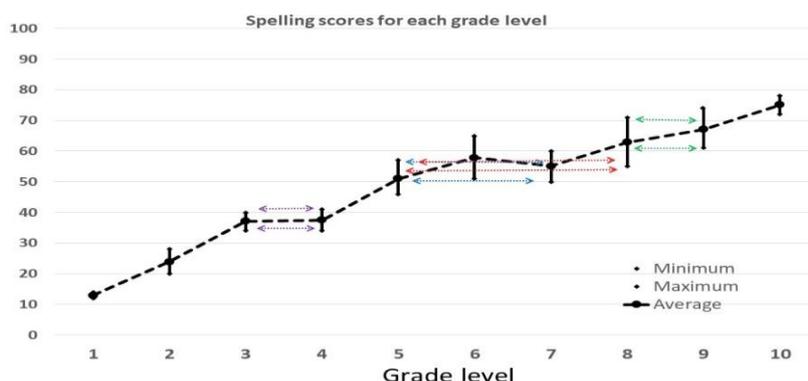
- It was devised several decades ago for the children in Australia
- Calculation (by this author) of spelling age with the mean score obtained in the battery, showed that the performance of the normative group does not match the spelling age grade equivalence. For e.g., the correctly spelled score mean of 8th graders, should approximately match with spelling age of 12 – 14 years (i.e. 7th – 9th graders). However, the norms show spelling age to grade equivalence till grade 5th. From grade 5th to 10th, the spelling age (and corresponding grade) showed lesser corresponding grade level. For e.g., 6th and 7th graders (in the normative group) were at the 5th grade level; 8th and 9th graders were at the 6th grade level; and 10th graders were at the 7th grade level (in terms of spelling age).

Few things to consider while administering this test. It is best to administer as many words as possible. Because, although there is increase in the difficulty level of the words arranged in the list, it does not do so linearly. That is, some are familiar-frequent words that are interspersed among difficult words. If sufficient number of words are not administered then there are chances that one might obtain a low score. This especially applies to the situation when the child has scored lower than the pass score.

Few issues that might create significant confusion among the examiners are some trends observed in the norms. Figure 2 shows the performance of the children on spelling across grades one to 10. Though on the whole, the average performance shows upward going curve as the grade level increases, the increase is not continuous/linear. Further there are significant exceptions, such as, performance (average as well as range scores) is almost the same for children who are 3rd and 4th grade (purple dotted line); the average is lower for 7th grade compared to 6th grade; significant overlap of the range ($\pm 2SE$) among different grades. For eg., grade 5th to grade 7th (blue dotted line), 8th and 9th (green dotted line) and even a small overlap from grade 5th to grade 8th (red dotted line); and the magnitude of the difference between minimum (-2SE) and maximum (+2SE) is significantly higher in grades 5th to 9th, with the difference reaching 16 words for grade 8th. [This type of results is expected when anybody collects just the performance (number of correct) norms for the material developed in another time and culture. However, the best approach would have been to develop and standardize a new test, where the words align linearly (with less overlap) according to the increasing grade level]. Due to this overlap of the range of scores, examiners could find it difficult to interpret some of the results, such as, when the 8th (or 9th or 10th) grade child scores 56. Here the range might indicate that this score falls within the $\pm 2SE$ of all the grades from 5th to 8th. Similarly, if a 9th grade child scores 60, the performance is within the range of acceptable performance of children from grade 6th to grade 8th. It is natural that when an examiner is cautious in order to avoid Type 1 error (to avoid 'false positive', i.e., to avoid falsely diagnosing somebody who does not have SLD as having SLD), a score of 60 can be interpreted as the child being at 8th grade level. Doing so, can be considered as appropriate. However, similar interpretation might be erroneous, if applied without considering other aspects. For example, when a child with above average intelligence studying in the 9th grade gets a score of 51, which is within the $\pm 2SE$ range scores from 5th to 7th grade. Here, saying that the child's spelling is at 7th grade (which is just 2 grades lower) and hence, this child does not qualify for the disability certification, might actually be erroneous.

In such scenarios where confusion could arise, it is advisable to look at other factors. One of the factors is the analysis of the errors committed. The battery has not provided any information regarding the type of spelling errors. However, the norms collected were from non-SLD children, and the spelling mistakes by them might not provide full insights into the type of errors committed by children with SLD. Notwithstanding this fact, it is advisable to look at the type of errors, such as *phonological mistakes, inadequate use of etymological rules, mistakes in using past tense rule 'ed', and/or inappropriate use of suffixes* [43-44]. Other things that can be done is to check the class notebooks of the child, marks/grades obtained in previous years, and to get a spelling report from the school teachers.

Figure 2: Showing the minimum (-2SE), maximum (+2SE) and the average correct spelling score for each grade level



10. Issues with the diagnosis of reading disability (dyslexia)

Dyslexia is one of the three core types of specific learning disabilities. The battery assesses 'dyslexia' through the reading of passages for each grade level from grade 1st to 9th. Each grade has separate passages that seemingly match the grade level, that is, lower grades has relatively easier words and sentences compared to the higher grades. The children are asked to read the passages aloud and the examiner is supposed to note down the number as well as the types of errors committed. The battery lists eight type of errors that the candidate can commit which the examiner needs to score. They are 'reads word by word', 'ignores punctuation', 'adds words', 'omits words', 'can't use phonetic cues', 'spells out words', 'guesses at words', and 'reversals'.

Some of these are easy to understand, such as 'reads word by word'. However, students and professionals might get confused between 'can't use phonetic cues' and 'guesses at words', because both seem to be referring to the same type of mistakes. The following few examples shows how to differentiate between the two. If the child reads 'lower' as 'lover', then more likely it might indicate 'not able to use phonetic cues' than 'guessing'. On the other hand, when a child reads 'lower' as 'lesser', then it is more of 'guessing' than 'not able to use phonetic cues'. There is no information or any examples provided about error 'reversals'. Even though there are eight types of errors listed, in another place of the battery, it states that the frequently made errors were "guessing, addition of a letter, and inability to use phonetic cue". It appears that 'addition of a letter' is a typo, and it should be considered as 'adds words'. Apart from the above mentioned eight types of errors, the profile analysis table also expects the examiner to note down the 'time taken' to read the passage. However, the battery does not have any norms in this regard. Please refer to section 12 for the discussion on the importance of noting down the time taken.

In terms of objective norms to diagnose 'reading disability', usually two types of quantitative scores are required, which are 'number of errors' and 'time taken to read'. In addition to or to corroborate the quantitative scores, one can look at the qualitative aspects, such as the type of errors. As already mentioned above, the battery does not provide norms with regard to the time aspect. However, it does provide errors scores, but the way the error norms have been reported are inappropriate and sometimes adversely affects the ease of diagnosis. The issues in this regard are listed below.

- The norms do not follow uniformity. It has been conceptualized and/or reported in three different ways, i.e., grades 1st and 2nd, grades 3rd to 5th, and grades 6th to 9th have different representations.
- For grades 1st and 2nd, norms are given for 'adequate', 'few errors', 'inadequate', 'mean errors (SD)' and 'range'. However, what constitutes 'adequate' is not clearly mentioned? How much is/are 'few errors'? How much is 'inadequate'? 'Mean errors and range' provide some solution in arriving at a decision. One can try to arrive at a significant deficit/disability score based on the 'mean, SD and range' values. A usually followed practice in terms of 'diagnostic cut-off' to be considered as 'deficit/disability' is values less than 2 Standard Deviations (SD). However, in this case as the scores are 'error scores', more than 1.5 or 2 SD can be considered for disability. Therefore, going purely by the 'mean, SD and range' values, it can be assumed that more than 3 errors in reading (separately for grades 1st and 2nd) will have to be considered as having deficit/disability. But the battery makes it impossible to use even the 'mean and SD', because it also provides values for 'few errors' and 'inadequate'. Without knowing how much are 'few errors' and how much score is 'inadequate', it becomes impossible to arrive at a clear decision about the deficit/disability.
- For grades 3rd and 5th, the norms provided are for 'adequate' and 'inadequate'. As mentioned, in the above paragraph, here too it does not say how many errors are considered as 'adequate' and/or 'inadequate'. Without this information, as mentioned above, it becomes impossible to arrive at a clear diagnosis of the disability.
- Almost similarly, for grades 6th to 9th, the norms list only the 'adequate' performance. Compared to the norms for grades 1st to 5th, here 'adequate' performance is considered as the performance that has between '2 to 7 mistakes'. It does not mention whether the 2 to 7 mistakes are the 'range', and if so whether the range is between $\pm 1SD$ or $\pm 2SDs$, or it is $\pm 2SEs$. Further, it was better to

put it as ‘up to 7 mistakes’ (rather than 2 to 7 mistakes) as adequate, because ‘zero and one mistake’ are adequate performances.

- Another significant issue is the extent of the ‘inadequate’ percentage. The norms indicate that 20% in grades 7 and 9, 21% in grade 3, 30% in grade 8 and to an astonishing extent, 51% of children in grade 5 have shown inadequate performances. These percentages are significantly on the higher side and difficult to consider them for the diagnosis of disability. Though the battery does not provide reasons for these higher percentages, one can only hypothesize that it might have been probably due to (i) fixing the number of errors as 2 to 7, and then reporting whoever scored more than 7 errors as inadequate, (ii) consideration of different and/or every type of the errors for scoring, and (iii) lesser sample size taken for the development of the norms in higher grades.
- According to the battery, grade 5 showed exceptionally high number of students (that is 51%) having inadequate performance. This high number of errors might make one think that the text used for this grade might be relatively more unfamiliar/difficult. However, summary of the reading difficulty level as assessed by various matrices (Flesch-Kincaid readability and grade level method [45] and Gunning Fog Index [46]), indicate that, it is equal to that of “5th to 6th grade level and fairly easy to read”. On the other hand, grade 4 did not have any children with inadequate performance. Both high number of inadequate and fully adequate pose difficulty in arriving at a decision. Therefore, the examiner needs to be careful while interpreting and considering the results of/for grades 4th and 5th.
- The battery briefly mentions that frequently committed types of errors are, guessing, adding letters (words), and inability to use phonetic cues. However, it does not separately specify the number for the different types of errors. Without this, it becomes difficult to diagnose, because not all types of errors are the same. Some errors have to be given more weightage compared to other type of errors in diagnosing dyslexia.
- The battery has different texts to read at each grade level. Each text is different in terms of the nature of the content, familiarity level and number of words. In addition, children sampled for developing the norms were all from different grade levels. That is, it can be assumed that 5th grade student read the 5th grade normative text, 6th grade student read the 6th grade normative text and so on. Given this, the performance for each grade should have been different, especially with respect to the number and types of errors. However, the battery does not separately mention the number (or the type) of errors for each grade. It mentions only a fixed number of errors, which is ‘2 to 7 mistakes’ as the standard (e.g., from grade 6th to 9th).
- It is usually expected that the normative text should usually match the grade level of the student in terms of difficulty of reading, and accordingly, the difficulty level of the text should vary according to the grade level. For example, 4th grade text should be relatively suitable to use between 3rd to 5th graders, similarly, 8th grade text for 7th to 9th graders. However, the text used in the battery does not adequately vary in the readability level, and some grades have text that, are too simple. The following table provides the reading grade level for the text used. It is based on the summary of the reading difficulty level as assessed by Flesch-Kincaid readability, Flesch-Kincaid grade level method [45], Gunning Fog Index [46], and few other matrices. Though these grade level values are derived on a US sample, the scores provide some indications about readability level of the text used in the battery.

Table no. 2: Readability grade level for the text used in the battery

Battery norms text grade	No. of words	Reading Grade level	Reading age (graders)
2	64	2	7 – 8 years (2 nd – 3 rd)
3	115	5	10 – 11 years (5 th – 6 th)
4	133	5	10 – 11 years (5 th – 6 th)
5	157	6	10 – 11 years (5 th – 6 th)
6	185	3	8 – 9 years (3 rd – 4 th)

7	177	7	11 – 13 years (6 th – 7 th)
8	174	10	14 – 15 years (9 th – 10 th)
9	116	3	8 – 9 years (3 rd – 4 th)

The table 2 shows that for texts used in battery for grades 2nd, 5th, and 7th are grade appropriate. Texts used for grade 4th and 8th are of one grade level higher in terms of reading. Text used for grade 3rd is two grades level higher in readability. On the other hand, text used in the battery for grade 6th and 9th are at the readability level of grade 3rd, which is too easy for these levels. Given these variations (non-linear pattern) in the difficulty level, an examiner needs to be cautious in few scenarios, those are

- when 9th grader shows relatively intact performance on 9th grade text, but shows impaired performance on text of 8th grade;
- when 6th grader reads the 6th text without errors, but commits more errors while reading 5th grade text.
- If one has a choice, it is not advisable to use the 9th grade text given in the battery because, it has significantly lower number of words, and the readability level is at the 3rd grade level.

One of the serious flaws in the way the norms were reported is in the use of 'percentage of children who scored adequate or inadequate'. Diagnostic norms usually are in the nature of 'number of correct performance', 'number of errors' and/or the 'time taken to complete'. However, norms are never about how much percentage of people have shown adequate or inadequate performance. Because of this error, the entire norms of/for reading ability becomes less useful for diagnostic purpose, especially when the performance of the child is on the marginal/borderline category. An analogy in this regard will explain this better.

The education department being unhappy with a particular school's performance asks them to provide the number of students who have 'failed' in grade 7th to 9th and the average marks they got in each subject. The principal asks a teacher Ms. Galathi to prepare the list. She prepares the list that says 80% of 7th graders, 70% of 8th graders and 50% of 9th graders scored between 30 to 80 marks. The clerk of the school sends the list to the education department. When the officer at the education department checks the list, s/he could be shocked as the list does not in any way indicate how many students have actually 'failed' in grade 7th to 9th.

Due to the above difficulties, one has to go beyond what is given in the battery. In addition to the norms provided, one has to specifically look at the number of errors as well as the type of errors committed. Inability and wrong use of phonetic cues, guessing and omitting words should be given more weightage compared to ignoring punctuation mistakes. One has to consider whether the mistakes committed were for familiar/frequent or unfamiliar/infrequent words. Further, though there are norms provided, it is advisable to consider the time taken to read the passage. Too much time taken to read indicate dyslexia. On the whole, one has to look at the overall reading performance, along with the history of school performance and teacher's report.

11. A relook at the 'at three standards below the current class of the child' criteria

Child's 'functioning at three standards below the current class of the child' (henceforth will be mentioned as 'three grades lower') is the main criteria followed to diagnose SLD in the battery. In majority of the cases, this criterion is sufficient to diagnose. However, there will be situations where rigidly applying this 'three grades lower' method proves detrimental to the child. These situations are, when the child is in 1st or 2nd grade; when the child is studying in 9th or 10th, and/or when the child's performance exactly doesn't adhere to the above criteria but they nevertheless have great difficulty in academics. The problem gets complicated if the child is studying in ICSE or any other international curriculum.

When the examiner strictly adheres to the 'three grades lower' method, s/he is not considering the fact that the actual causal deficits observed in children with SLD are mainly in the areas of phonological processing, visuospatial and cognitive functions [20, 30]. These are the brain processes that are usually said to be compromised in SLD, and these processes has to be evaluated. The Persons with Disability Act India [1] states that a child should be screened for SLD at 8 years (about 3rd grade). Therefore, there are chances

that psychologists can assume that SLD cannot be diagnosed till 8 years/3rd grade, and defer the assessment till the child reaches 8 years/3rd grade. However, SLD does not suddenly appear in 3rd grade. Therefore, waiting for a child to reach 3rd grade to diagnose will do great injustice to the child who shows clear symptoms of SLD far earlier than 3rd grade. It is well known that if children are identified early and provided with remediation early, there are less chances of them having learning disability. Research says that as early as 1st grade, children show symptoms of learning disability [47]. Hence, the right time to identify academic difficulty is in the first grade or even earlier in some children who show severe deficits in learning [48]. Identifying during the first grade or even earlier gives better chances for remediation and gives sufficient time for the child to learn and master academic skills by the time s/he comes to 3rd grade. In this regard, education department of the US has even issued a statement that assessment for learning disability should not be delayed till 3rd grade [49]. This is also what is usually followed in 'response-to-intervention' criteria method.

One way to circumvent the problem with age criteria for diagnosis, is to diagnose as "At risk for developing SLD". This type of diagnosis does not harm the child in any way, and remediation can be provided. Substantial number of psychologists are aware about this and follow the above method. However, the main contention is that, among these psychologists, majority still go by 'three grades lower' criteria to even diagnose 'at risk for SLD', which is incorrect. This is because, in elementary grades (Upper Kindergarten, 1st or 2nd grade) the academic demands placed on children are not high. Therefore, it can so happen that the child with average or higher intelligence but otherwise has SLD, do not make enough mistakes so as to consider them as having SLD.

Similar situation presents when the child is studying in ICSE/international curriculum, where the children learn and know higher level concepts than the test material used in the battery. In the above situations, if an examiner adheres strictly to the 'three grades lower' criteria, s/he might commit the mistake of 'false negative', where the child might not be diagnosed as having LD despite s/he having it.

Another important fact one has to remember is that when the child is in elementary grade, for example grade 1 or grade 2, one cannot apply the exact criteria of 'three grades lower' method, because, if it is applied, the performance should be at or lower than 'Kindergarten' level. Children in lower kindergarten rarely would have started to read and write and at this juncture it is nearly impossible to diagnose learning disability. One has to always remember that the difference between each year in early grades is far greater than in later grades. For e.g., the progression/complexity of the learning material and the demands placed on the brain is far higher 'between UKG and 1st grade', compared to 'between 8th and 9th grade. Given this, a child who is in 2nd grade but whose performance is at the 1st grade level, has more learning difficulty, compared to a child who is in 8th grade, but whose performance is at the 7th grade level.

A psychologist in either of the above scenarios should go beyond the 'three grades lower' criteria and analyse the types of errors committed, such as problems in letter-sound correspondence, joining syllables/phonemes, usage of phonetic cues, left-right reversals, single-double letter confusions, and/or omission of silent letters in spelling. One has to remember that SLD is not a dichotomous problem of present or absent, but a dimensional one, where the academic difficulties faced by children vary from mild to severe. Given this, if a less strict criterion is followed, majority of the children will be considered as having SLD and on the other hand, if we adopt strict criteria only few children will be diagnosed with SLD.

Quite often, referrals were made for SLD assessment for adolescents who are around or over 18 years of age (11th or 12th grade / pre-university level or higher). Given this, some psychologists might think that they can use the current battery and if the performance is at the 9th or 10th grade level (which in this example, might be three grades lower), then they can diagnose the adolescent as having SLD. Though this way of deciding might appear technically correct, but conceptually it might be wrong because of at least two reasons. First reason, reading, spelling and arithmetic all have a certain ceiling level. Second reason, performing at 9th or 10th grade (whether or not it is three or more grades lower) may itself cannot be considered as 'disability' (refer to section one). Two simple analogies might make the above issue clear.

Analogy one: Ms. Beth and Ms. Lee decide to have a 'mixed martial arts' fighting competition. They decide on 12 rounds with each round consisting of 3 minutes and only knock-out as the deciding factor to

win. Lee is a better fighter than Beth and throughout the match she fights better than Beth. However, only in the 9th round could Lee knock-out Beth to win the match.

Analogy two: Tesla wants to recruit electrical engineers for its new office at Bengaluru. Thousands of people apply for the post as the salary and perks announced are extremely good. Because of so many applicants Tesla decides to have about 10 rounds of tests and interviews. Test/interview rounds will be elimination rounds. Only about 200 will remain for round eight and one among them will be Ms. Elli. However, she could not clear round eight.

In the first analogy, though Ms. Lee is a better fighter than Ms. Beth, we cannot say that Beth does not know fighting or that she is a 'pathetic fighter' (read 'disability'). Beth reached till 9th round, which in itself is a good achievement. Similarly, Ms. Elli cleared all the tests and interviews till the 8th round. Despite her not getting the job, one cannot consider that she has poor knowledge of electrical engineering (read 'disability'). The same thing can apply in the assessment of SLD. However, as this is a larger issue and concerns thousands of children with academic difficulties, as mentioned above, it is advisable for all the stake holders to discuss and arrive at a consensus.

12. The importance of time

One of the hallmarks of children with SLD is that even though they struggle to read/spell/calculate, a substantial number of children will eventually read/spell correctly, however, they might take more time to do so [50]. Research has shown that the majority of children with learning disability show impairment in processing speed with respect to academics such as reading, spelling or writing [51-52]. These children's reading/spelling can have errors (of phonetics, guesses and/or omission), but they can read/spell relatively correctly if given sufficient time. This is due to the fact that children with SLD take more time to, *decipher/separate/decode, blend/join letters to words, sort out any confusion in their mind about letter-sound correspondence, scan through various similar/confusing information mentally before selecting the correct one, as well as to calculate and verify information before arriving at the correct solution* [50,53]. However, due to the relatively short and fixed duration of the class (period), large number of students in a given class, and pressure on the teacher to complete the syllabus within a specified time, a child with SLD in school, rarely gets sufficient time to read/write/solve and complete academic tasks. When the child is not able to complete reading/writing the text (what is on the board/textbook), the child may not be able to understand, remember and/or express what is being taught. Similarly, when there is no sufficient time to read and understand the questions, and/or to write/calculate in tests or exams, the child might get less marks. This might be one of the main reasons as to why the education/exam boards provides SLD children with a reader, scribe and/or additional time to complete the exams.

Hence, it is good to record the time taken for almost all the activities, such as reading, written work and calculations. When the time factor is ignored, there is a high chance that the psychologist might erroneously consider a child with SLD as not having SLD (false negative – type II error). Further, knowledge of the amount of time taken provides important information about the child's abilities, which helps in psychoeducation/counselling about the future and career planning for the child. For example, Brijesh, who can manage to read/spell to nearly expected grade level with extra time, can have nearly *equal prospects* in academics, compared to Raghu, who is a child without SLD. Similarly, Brijesh can have *better prospects* in academics, compared to Rukma, a child who cannot manage adequately even with extra time.

In line with the above processing speed deficits, few schools (in India) with different national and international curriculums expect the psychologist to specify the number of words a child is able to read per minute, and number of words a child is able to copy/write per minute. This requires the psychologist to note down the time taken for the above activities to arrive at the 'per minute' values. The value is arrived at by dividing the total number of words read/written with the time taken in minutes. For example, the paragraph had 400 words, and the child took 3 minutes 30 seconds to read/write the same. Therefore, 400 is divided by 3.5. This will result in 114 words per minute (*kindly note: as 60 seconds equals 1 minute, 30 seconds equals to 0.5 minute. Similarly, 15 seconds equals to 0.25 minute*). Though the battery does not address

the issue of time, this information is important and mandatory to report in some countries and in some educational/examination boards to determine whether the child can be qualified for the diagnosis of SLD. Another important factor one needs to consider is that 'delayed time' supports the diagnosis of SLD. On its own, delayed time cannot be a sole criterion for diagnosing SLD.

13. Problems reported in the second and third languages, but not in first language

Learning disability is the result of deficits in the brain pertaining mainly to the information processing problems in phonological processing, grammar, number-value, calculations; processes involved in rapid naming; and also in some of the executive functions such as sequential learning, working memory and visuospatial functions [20, 30]. Therefore, the effect of these deficits, if observed should be visible for all languages (first, second and/or third languages) irrespective of the medium of instruction [54-56]. However, the magnitude varies depending on how many languages a child is required to study [57]. In addition, it also depends on the extent of the curriculum with respect to the second and third languages. Children are usually taught only one language in the earlier grades. Usually, second language and third language are introduced from the 1st and 4th grade respectively. Apart from the languages, all the subjects are mainly taught in the first language (medium of instruction) and hence a child would have received maximum training in that particular language. This is one of the reasons children have less difficulty in the first language (medium of instruction), compared to the second and/or third language. Further, compared to the second language, as the third language starts in later years, it is perceived to be more difficult, unless the complexity of the 3rd language curriculum is kept very simple.

On few occasions, a different phenomenon can be observed, where children perform relatively better in the second language as compared to the first language. They still might have difficulty in all the languages, except that the performance in the second language appears a little better than the first language. This is mainly observed when the first language (medium of instruction) is English and the second language is a vernacular/regional language. One of the reasons for such a condition might be that though the school might be 'English medium', classes are explained in the vernacular language, and children rarely have exposure to spoken English either at or outside the school environment.

Whenever a referral indicates that the child has difficulty mainly in second and/or third language and not in the first language, the examiner has to evaluate complete details about the child's performance, such as class work, homework, as well as the test and exam marks of all the subjects. Irrespective of what the above referral says, there will usually be some problems in all the languages. Sometimes, one of the reasons for this kind of referral might be the child's or parent's perception and attitude towards the marks obtained. For some students and/or their parents, getting passing marks (or marks in 30s out of 100) might be okay/sufficient or might not indicate any problem. On the contrary, they might chiefly consider marks as a problem, and that too only when the child fails in an exam or get marks in single digits. Given this, if the child gets marks in 30s or 40s in English, and get marks in 10s or 20s in second and/or third language, they might think that the problem lies only with the second and/or third language. On the other hand, sometimes, it might appear that the problem is only in the second and/or third language with intact ability (reading and spelling) in first language (medium of instruction). However, upon closer observation, one might realize that this kind of manifestation might be due to some other factors and may *not* be due to SLD. These other factors might be,

- Parents from one state (eg. child studying 2nd language - Bengali) getting transferred to other state with different language (eg. now child has to study different 2nd language - Marathi)
- Changes in the medium of instruction (eg. child studied in Hindi medium till 2nd grade, and was shifted to English medium in the 3rd grade)
- Adolescents joining pre-university colleges in different states or international students joining schools in India, with a different second language.

However, apart from the above reasons, there might be extreme cases where the problems are purely in the second/third language, with intact first language and without other confounding limitations. Given the situation in India, with many languages and dialects, wide socioeconomic conditions, differences in

curriculum, different teaching methods and varied exposure to English, it becomes extremely difficult to exclusively diagnose disability in second/third language. However, there is urgent need for extensive research in this area and to develop standardized tests and norms to evaluate this aspect. Given the above, irrespective of the issue, *SLD assessment has to be performed only in the 1st language (medium of instruction) of the child*. If the child is in English medium, then irrespective of the difficulties, SLD assessment should be done only in English (using materials that are in English). Similarly, if the child is in Hindi medium, SLD assessment has to be performed only with test materials in Hindi. The battery has norms for assessment in English language. For other languages, examiners have to explore other options.

14. Issues with arithmetic ability (Dyscalculia)

Determining or diagnosing dyscalculia is the most difficult task (compared to dyslexia or dysgraphia), especially if a psychologist solely relies on the battery. There is no unequivocal consensus about where to draw the line between difficulty and disability [58-59] and also what mathematical ability to consider to determine dyscalculia. That is, whether to consider only simple arithmetic sums (simple and graded addition, subtraction, multiplication and division), higher level of mathematics (graded fractions and complex sums that involve more numbers) or verbal and statement sums.

The battery has different tests with different norms for different grades. It clearly specifies that children in grade 5th and above are able to solve all arithmetic problems up to graded divisions, and grade 8th and 9th children can solve all the fraction sums which is placed at grade level 5th. Apart from this, the battery provides norms for fraction sums from grade 5th to 8th, which shows varied performance. Further, the battery has provided with 65 new problems that involve verbal, statement, geometrical, ratios, conversion type of problems that are not required formulas to solve the problems. *A very important thing here is that the answers for the above problems/sums given in the battery has several mistakes due to typos and/or other errors. Hence, the examiner has to be extremely careful in scoring.* Assuming that, during development of norms these typos did not play any role in influencing the normative scores, the performance by the normative sample on these 65 problems corroborate the global phenomenon of decreasing maths skills at almost all levels of education (it is not the scope of this article to discuss why maths skills are decreasing among students). The battery norms show that out of 65 problems, 8th and 9th grade children could get only [correct mean (SD) of] 10.2 (5.92) and 20.5 (9.56) respectively. Based on this mean and SD scores, the battery has derived '±2SE range' scores. Given this, the '±2SE range' for 8th grade is between 8 to 12, and for 9th grade it is between 17 to 24. On the whole, it shows that the performance of the normative group is relatively lower, indicating general relatively poor ability in mathematics, and hence one has to be extremely careful in diagnosing dyscalculia.

That apart, the given norms are relatively enough to arrive at the decision of dyscalculia in majority of the cases. However, in few cases it might be difficult, for example, due to excessive practice, revision and with difficulty few children will be able to do fractions, but they might have difficulty with slightly higher-level computation problems [60-63]. Given this, a psychologist has to look at other things that are not part of the battery criteria, such as, too much time taken to solve the problems, frequent corrections/erasing, excessive/constant use of fingers to count, not using standard way to solve problems and so on. If these things are observed, then it might indicate that the child has problem with maths [58].

To summarize, if a child knows grade appropriate concepts, procedures and steps clearly, till the level of different types of fractions and has adequate associated functions (eg. verbal sums, time and position sums), and does this without multiple corrections, then one can say with relative confidence that the child does not have dyscalculia. However, due to the lack of consensus about where to draw a line and/or what to consider as dyscalculia, there needs to be a discussion among the subject experts and other stake holders to arrive at a consensus.

CONCLUSIONS

To conclude, due to the above-mentioned reasons, psychologists whenever faced with difficult situations, should try to understand the intricacies of the child's condition and not merely restrict themselves to what is there in the battery. Whenever, possible, they should go beyond the 'three grades lower' criteria when assessing children to arrive at the diagnosis of SLD.

The assessment's goal should not merely be to arrive at a diagnosis, but it should be on 'how well I can understand the child's difficulty and how well I can help the child in this regard'. They should not depend only on the criteria of the number of correct performances, but should analyse the type of errors committed, time taken, behavioural phenomenon (e.g., frequent erasing) and the effort that went towards the performance. Whenever an examiner encounters any difficulty, it is advisable to do further tests with additional material and/or to check with the subject experts about how to solve particular dilemma.

Another very important thing to observe apart from scoring the current (number of) performance is the 'quality of the correct performance'. For e.g., writing correct spelling for a difficult word, or fluent reading of a rare word, carries much weight; and these correct performances should also be considered before deciding whether the child has learning disability. For example, if a child could correctly spell many difficult words (for her/his class/grade level), then the psychologist has to look at whether the child's mistakes are due to attentional / motivational / emotional issues or the child might have 'difficulty' rather than 'disability'.

Another thing a psychologist needs to consider is the 'age-grade level' match of the child. For example, it is commonly expected that a child who is in 1st grade is at least 5 years – 10 months old. However, sometimes some parents admit their child quite early (for example, at 5 years 4 months or even lesser). Usually for an above average IQ child, this might not pose much difficulty in academics. However, if the child has average and/or lower than average IQ, and/or if the child is in difficult curriculum (e.g., ICSE), then there might be significant problems with respect to academics. In latter scenario, if the child is facing difficulty or scoring lesser grades in academics, parents can be advised to shift the child to a lower/age-appropriate grade. When advised to shift to a lower grade, children usually oppose because it affects their self-esteem among peers in school and/or without neighbourhood friends/relatives. One way out of this problem is to change the school. Parents should be told that it is always easier to adjust to a lower grade in earlier years (primary school level) than in later years (middle school or higher secondary level).

Further, attention and motivation play a major role in a child's performance. It is well known that lack of attention might impair performance. A psychologist should judge whether the deficits are due to attention or due to SLD. Similarly, a child who has had many negative experiences with reading and writing in school or at home, might have developed dislike towards academics and may not be motivated to read and write in a testing situation. In this situation, the onus on putting the child at ease, developing rapport and creating interest/motivation in the child, giving enough breaks and appropriate neutralizing statements/facial expressions (by the clinician, when the child is not able to perform or commits mistakes) rests on the psychologist.

Every child is different and similarly every child's performance in terms of reading, spelling and writing can be different. Given this a psychologist should consider the uniqueness of the child and perform a holistic assessment towards diagnosing learning disability.

REFERENCES

1. India. Amended rules for persons of disability. The Rights of Persons with Disabilities Act, 2016. The Gazette of India (Extra-Ordinary). No.61: New Delhi: Published by Authority; 2018.
2. Hirisave U, Oommen A, Kapur M. Psychological Assessment of Children in the Clinical Setting. 4th ed. Bangalore: NIMHANS publication; 2020.
3. Fuchs D, Fuchs LS. Responsiveness-to-intervention: a blueprint for practitioners, policymakers and parents. *Teach Except Child* 2005;38:57–61.
4. Bjorn PM, Aro P, Koponen T, Fuchs LS, Fuchs D. Response-To-Intervention in Finland and the United States: Mathematics learning support as an example. *Front Psychol* 2018; 9:800.

5. Hulme C, Bowyer-Crane C, Carroll JM, Duff FJ, Snowling MJ. The causal role of phoneme awareness and letter-sound knowledge in learning to read: combining intervention studies with mediation analyses. *Psychol Sci* 2012;23:572-7.
6. Snowling MJ. Dyslexia: A hundred years on. *Br Med J* 1996;313:1096.
7. Snowling MJ, Goulandris N, Defty N. A longitudinal study of reading development in dyslexic children. *J Educ Psychol* 1996;88:653-69.
8. Goulandris NK, Snowling MJ, Walker I. Is dyslexia a form of specific language impairment? A comparison of dyslexic and language impaired children as adolescents. *Ann Dyslexia* 2000;50:103-20.
9. Byrne B, Fielding-Barnsley R. Phonemic awareness and letter knowledge in the child's acquisitions of the alphabetic principle. *J Educ Psychol* 1989;80:313-21.
10. Institute of Medicine and National Research Council. *Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation*. Washington, DC: The National Academies Press; 2015.
11. Snow CE, Burns MS, Griffin P. *Preventing reading difficulties in young children*. Washington, DC: National Academy Press; 1998.
12. Ball EW, Blachman BA. Does phoneme awareness training in kindergarten make a difference in early word recognition and developmental spelling? *Read Res Q* 1991;26:49-66.
13. Muter V, Hulme C, Snowling MJ, Stevenson J. Phonemes, rimes, vocabulary, and grammatical skills as foundations of early reading development: evidence from a longitudinal study. *Dev Psychol* 2004;40:665-81.
14. Tangel DM, Blachman BA. Effect of phoneme awareness instruction on kindergarten children's invented spelling. *J Lit Res* 1992;24:233-61.
15. Hulme C, Snowling MJ. Learning to read: What we know and what we need to understand better. *Child Dev Perspect* 2015;7:1-5.
16. Bowyer-Crane C, Snowling MJ, Duff FJ, Fieldsend E, Carroll JM, Miles J, Götz K, Hulme C. Improving early language and literacy skills: differential effects of an oral language versus a phonology with reading intervention. *J Child Psychol Psychiatry* 2008;49:422-32.
17. Finnegan SD. Auditory skills and word-calling ability. *Acad Ther* 1979;14:299-312.
18. Groff P. Reading ability and auditory discrimination: Are they related? *Read Teach* 1975;28:742-747.
19. Sadoussi C, Ahami A, Loukili A, Mammad K, Mrabet A. The importance of auditory discrimination in the acquisition of mental lexicon and reading automation in Arabic-speaking students in Kenitra (Morocco). *Open J Med Psychol* 2018;7:27-33.
20. Lewandowska M, Milner R, Ganc M, Włodarczyk E, Skarżyński H. Attention dysfunction subtypes of developmental dyslexia. *Med Sci Monit* 2014;20:2256-68.
21. Mehta PD, Foorman BR, Branum-Martin L, Taylor WP. Literacy as a unidimensional multilevel construct: Validation, sources of influence, and implications in a longitudinal study in grades 1 to 4. *Sci Stud Read* 2005;9:85-116.
22. Francis DJ, Snow CE, August D, Carlson CD, Miller J, Iglesias A. Measures of reading comprehension: A latent variable analysis of the diagnostic assessment of reading comprehension. *Sci Stud Read* 2006;10:301-22.
23. Keenan JM, Betjemann RS, Olson RK. Reading comprehension tests vary in the skills they assess: Differential dependence on decoding and oral comprehension. *Sci Stud Read* 2008;12:281-300.
24. Bowyer-Crane C, Snowling MJ. Assessing children's inference generation: What do tests of reading comprehension measure? *Br J Educ Psychol* 2005;75:189-201.
25. Carr A. *The Handbook of Child and Adolescent Clinical Psychology. A Contextual Approach*. 3rd ed. New York: Routledge; 2016.
26. Kohli A, Sharma S, Padhy SK. Specific learning disabilities: Issues that remain unanswered. *Indian J Psychol Med* 2018;40:399-405.
27. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 4th ed. Text Revision. Washington, DC: American Psychiatric Association; 2000.
28. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 5th Ed. Arlington, VA: American Psychiatric Association; 2013.
29. World Health Organization (WHO). *The ICD-10 Classification of mental and behavioural disorders*. World Health Organization, 1993.
30. Hulme C, Snowling MJ. Reading disorders and dyslexia. *Curr Opin Pediatr* 2016;28:731-5.
31. Shankweiler D. How problems of comprehension are related to difficulties in word reading. In: D. Shankweiler & I. Y. Liberman (eds.), *Phonology and reading disability: Solving the reading puzzle* (pp. 35-68). Ann Arbor, MI: University of Michigan Press; 1989.
32. Hulme C, Snowling MJ. Children's reading comprehension difficulties: Nature, causes and treatments. *Curr Dir Psychol Sci* 2011;20:139-42.
33. Cain K, Oakhill JV, Bryant PE. Phonological skills and comprehension failure: A test of the phonological processing deficit hypothesis. *Read Writ* 2000;13:31-56.
34. Kendeou P, Papadopoulos TC, Spanoudis G. Processing demands of reading comprehension tests in young readers. *Learn Instr* 2012;22(5):354-67.
35. Wagner RK, Ridgwell C. A Large-scale study of specific reading comprehension disability. *Perspect Lang Lit* 2009;35:27-31.

36. Wagner RK, Meros D. Vocabulary and reading comprehension: Direct, indirect, and reciprocal influences. *Focus Except Child* 2010;9:2010.
37. Keenan J M, Betjemann RS. Comprehending the Gray oral reading test without reading it: Why comprehension test should not include passage-independent items. *Sci Stud Read* 2006;10:363-80.
38. Tseng MH, Chow SM. Perceptual-motor function of school-age children with slow handwriting speed. *Am J Occup Ther* 2000;54:83-88.
39. del Castillo FMC, Belmonte MMJ, Rojas RML, Pino LMA, Verdú BJ, Rodríguez SJM. Cerebellum atrophy and development of a peripheral dysgraphia: A paediatric case. *Cerebellum* 2010;9:530-6.
40. Deuel RK. Developmental dysgraphia and motor skills disorders. *J Child Neurol* 1995;10:S6-8.
41. Berninger VW. Defining and differentiating Dysgraphia, Dyslexia, and Language Learning Disability within a working memory model. In: Mody, M. and Silliman, E.R. (eds). *Brain, Behavior, and Learning in Language and Reading Disorders*. New York: the Guilford Press; 2008.
42. Chung PJ, Patel DR, Nizami I. Disorder of written expression and dysgraphia: definition, diagnosis, and management. *Transl Pediatr* 2020;9:S46–54.
43. Andreou G, Baseki J. Phonological and spelling mistakes among dyslexic and non-dyslexic children learning two different languages: Greek vs English. *Psychol* 2012;3(8):595-600.
44. Bailet LL. Spelling rule usage among students with learning disabilities and normally achieving students. *J Learn Disabil*. 1990;23(2):121-8.
45. Kincaid JP, Fishburne RP, Rogers RL, Chissom BS. Derivation of new readability formulas (automated readability index, fog count, and flesch reading ease formula) for Navy enlisted personnel. *Research Branch Report 8–75*. Chief of Naval Technical Training: Naval Air Station Memphis; 1975.
46. DuBay WH. Judges Scold Lawyers for bad writing. *Plain language at work newsletter*. Impact Information 8: March 2004.
47. Ferrer E, Shaywitz BA, Holahan JM, Marchione KE, Michaels R, Shaywitz SE. Achievement gap in reading is present as early as first grade and persists through adolescence. *J Pediatr* 2015;167:1121-5.
48. Shields, KA, Cook KD, Greller S. How kindergarten entry assessments are used in public schools and how they correlate with spring assessments (REL 2017–182). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands; 2016.
49. Ryder R. A response to intervention process cannot be used to delay-deny an evaluation for preschool special education services under the Individuals with Disabilities Education Act. Washington, DC: U.S. Department of Education, Office of Special Education and Rehabilitative Services; 2016.
50. Lervåg A, Hulme C. Rapid naming (RAN) taps a basic constraint on the development of reading fluency. *Psychol Sci* 2009;20:1040–8.
51. Lorusso ML, Facoetti A, Molteni M. Hemispheric, attentional, and processing speed factors in the treatment of developmental dyslexia. *Brain Cogn* 2004;55:341-8.
52. Stoodley CJ, Stein JF. Processing speed deficit in dyslexic adults? Evidence from a peg-moving task. *Neurosci Lett* 2006;399:264-7.
53. Wimmer H, Mayringer H, Landerl K. The double-deficit hypothesis and difficulties in learning to read a regular orthography. *J Educ Psychol* 2000;92:668–80.
54. Bonifacci P, Canducci E, Gravagna G, Palladino P. English as a foreign language in bilingual language-minority children, children with dyslexia and monolingual typical readers. *Dyslexia* 2017;23:181-206.
55. Gorman BK. Cross-linguistic universals in reading acquisition with applications to English-language learners with reading disabilities. *Semin Speech Lang* 2009;30:246-60.
56. Joshi RM, Padakannaya P, Nishanimath S. Dyslexia and hyperlexia in bilinguals. *Dyslexia* 2010;16:99-118.
57. Chung KKH, Ho CS. Second language learning difficulties in Chinese children with dyslexia: What are the reading-related cognitive skills that contribute to English and Chinese word reading? *J Learn Disabil* 2010;43:195-211.
58. Haberstroh S, Schulte-Körne G. The diagnosis and treatment of Dyscalculia. *Dtsch Arztebl Int* 2019;116:107–14.
59. Kaufmann L, Mazzocco MM, Dowker A, von Aster M, Göbel SM, Grabner RH, Henik A, Jordan NC, Karmiloff-Smith AD, Kucian K, Rubinsten O, Szucs D, Shalev R, Nuerk H. Dyscalculia from a developmental and differential perspective. *Front Psychol* 2013;4:516.
60. Desoete A, Roeyers H, De Clercq A. Children with mathematics learning disabilities in Belgium. *J Learn Disabil* 2004;37:50-61.
61. Dowker A. Individual differences in numerical abilities in preschoolers. *Dev Sci* 2008;11:650-4.
62. Moeller K, Fischer U, Link T, Wasner M, Huber S, Cress U, Nuerk HC. Learning and development of embodied numerosity. *Cogn Process* 2012;13:S271-4.
63. Temple CM. Procedural dyscalculia and number fact dyscalculia: double dissociation in developmental dyscalculia. *Cogn Neuropsychol* 1991;8:155–76.

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