The Relationship of Oral Language
to Subgroups of Learning Disabilities in Reading and Writing

Sung Hee Lee, Ph.D.
Youngstown State University

Abstract

A close relationship exists between children's reading and writing learning disabilities due to their nature as language-based disabilities. Reviews of the research, however, generally focus on either the relationship of language to reading disabilities or to writing disabilities, and few reviews have combined those two elements in a comprehensive manner. This article describes the relationship of the oral language difficulties that underlie different types of learning disabilities in the area of reading and writing. A theoretical framework, that synchronizes the Simple View of Reading and Writing models, is also introduced. Within the framework, it is described how individual differences in various language aspects are linked to subgroups of learning disabilities. Educational implications are also discussed.

Keywords: learning disabilities, reading, writing, dyslexia, comprehension

Introduction

Approximately 40% of the school-aged children who receive special education have a learning disability (LD), and at least 80% of the students with LD experience serious problems with reading and language-based difficulties, including poor written expression (Kavale & Forness, 1995; National Center for Education Statistics, 2012). Reading and writing are language-based skills and there is a close relationship between children's oral (spoken) language and their reading and writing development (Kamhi & Catts, 2005). However, most discussion concerning oral language skills and reading disabilities has focused on the links between phonology (i.e., sound structure) and word reading difficulties. The potential importance of other language aspects (e.g., semantics, morphology, syntax, and discussion) to reading and writing disabilities has been less well documented. More importantly, few attempts have been made to synthesize the existing literature concerning how oral language and various groups of reading-writing LDs are interconnected. Therefore, the purpose of this review of the literature is to: (a) describe how reading and writing are theoretically related to oral language; (b) clarify how the underlying language profiles are linked to the reading and writing subgroups of LDs by contrasting literacy profiles of students with dyslexia and those with specific poor comprehension (SPC); and (c) provide instructional suggestions for the reading and writing subgroups of LDs.

Theoretical Relationships between Oral Language and Reading and Writing Disabilities

Hoover and Gough's (1990) Simple View of Reading provides a framework for differentiating various reading disabilities and portrays reading ability as a product of two language-based processes: decoding (word recognition) and language comprehension. The Simple View of Reading suggests that three types of reading disabilities exist with different etiologies that are uniquely related to their reading difficulties. First, the deficient reading performance of students with dyslexia stems from their weakness in decoding, and not from a weakness in language comprehension. In contrast, the poor reading comprehension of students with SPC stems from their weakness in language comprehension but not in decoding. Students with generally poor reading skills have weaknesses in decoding *and* in language comprehension.

In the area of writing, the Simple View of Writing model was proposed by Berninger and her colleagues. In the model, transcription (e.g., handwriting, spelling) and executive functions (e.g., planning, reviewing) form the foundational base that contributes to text generation within a working memory environment (Berninger, Abbott, Abbott, Graham, & Richards, 2002). In this framework, spelling-level transcription and text generation (composition such as idea generation and structure) are two language-relevant processes (Berninger, 2000). Thus, the framework of the Simple View of Writing suggests that language-based writing deficits can occur due to spelling difficulties, text generation difficulties, or both.

When the language components of the Simple View of Reading and Writing models are combined, both learning to decode and learning to spell require that students come to understand how the oral language is composed and how written words can be decoded. Thus, both decoding and spelling are learning processes of breaking the codes of language. In contrast, both learning to understand and to generate text are forms of meaning-based language. However, the code-based and meaning-based language dimensions are not mutually exclusive; successful reading requires an orchestrated function of various abilities (e.g., decoding and language comprehension), as does successful writing. Neither successful reading nor writing can be accomplished if one skill is missing. This conceptual framework is depicted in Figure 1.

The illustrated framework also clarifies how different types of reading and writing difficulties fall under the categories of code-based and meaning-based language. In terms of reading and the Simple View of Reading, dyslexia can be understood as a type of code-based reading difficulty whereas students with SPC have some form of meaning-based reading difficulties. Similarly, students with spelling difficulties are considered to have a type of code-based writing difficulty while students with text generation difficulties have a type of meaning-based writing difficulty, based on the conceptual framework of the Simple View of Writing.
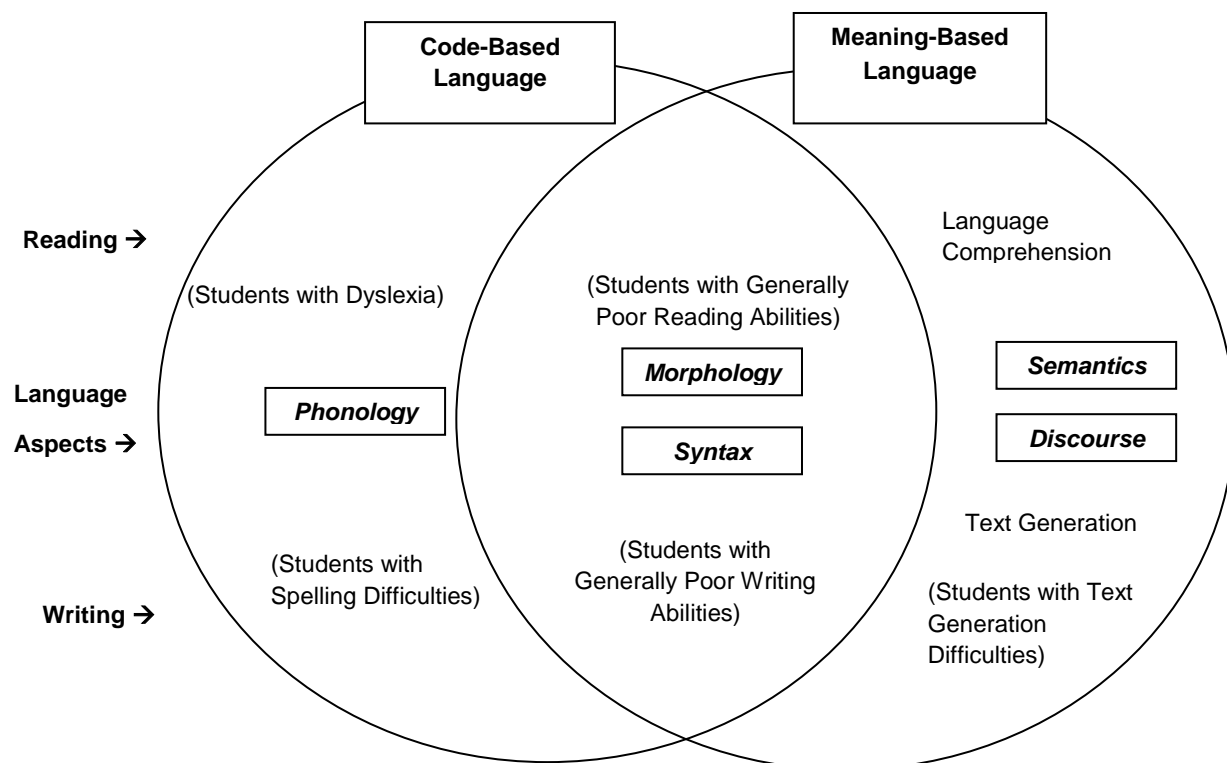
Figure 1. Overall framework of reading and writing based on code-based and meaning-based language and the relationships of the five language aspects to reading and writing learning disabilities.

The Relationship of Oral Language to Different Types of Reading and Writing Disabilities

Oral and written language are interconnected, in that they share several aspects of oral language such as phonology (sounds), morphology (morphemes), syntax (grammar), semantics (meaning), and discourse (story structure). Yet, it remains less clear how each component of oral language is related to the code-based and meaning-based language dimensions, as well as how each component is linked to different types of reading and writing LDs.

The Relationship of Phonology to Reading and Writing Competency

Among several phonology-related skills, phonemic awareness (i.e., the ability to focus and manipulate phonemes in spoken language) has been well documented to show its relationship to reading and writing success as well as disabilities, specifically for the code-breaking and code-generating process for alphabet-based written symbolic systems (Ehri & Roberts, 2006; Melby-Lervåg, Lyster, & Hulme, 2012; National Reading Panel, 2000; Plaza & Cohen, 2007). With LDs in reading and writing, poor phonemic awareness is among the most prominent characteristics of students with reading difficulties and those with spelling difficulties. With LDs in reading, strong correlations have been reported between a lack of phonemic awareness and problems in learning to read (Catts, Hogan, & Fey, 2003; Siegel & Ryan, 1984). When it comes to subgroups of reading disabilities, poor phonemic processing performance has mostly been observed in students with dyslexia. These students with dyslexia demonstrate poorer performances in associating sounds with printed letters relative to typical students (Siegel & Ryan, 1984), which indicates more fundamental problems with phonological skills. In contrast, phonological difficulties have not been observed as much in students without decoding difficulties, such as those with SPC (Nation & Snowling, 1998, 1999), indicating that phonological difficulties mainly cause poor code-breaking processing.

Under the premise of shared phonological processing for reading and writing, students with reading difficulties should also demonstrate writing difficulties, specifically in the area of spelling. Students with spelling difficulties generally have poor phonology-related skills and their spelling errors are mostly non-pronounceable spelling patterns, indicating that these students do not have intact phonological representation (Bruck & Treiman, 1990; Friend & Olson, 2008). Poor spelling has been also recognized as one of the main characteristics of students with dyslexia (Bourassa & Treiman, 2003; Carlisle, 1987). The dyslexic spelling patterns demonstrate more errors in spelling consonants in a cluster than when the same letter does not appear in a cluster (Bruck & Treiman, 1990). Nevertheless, one type of reading disability that is not characterized by spelling difficulties is SPC: students with SPC have age-appropriate spelling and phonological processing abilities (Cragg & Nation, 2006), which supports the idea that poor phonology mainly contributes to spelling difficulties.

The Relationship of Morphology to Reading and Writing Competency

English has many irregular words that one cannot successfully read and write by simply applying grapheme-phoneme correspondence rules. Instead, through experience with complex words, children learn to use morphemes (i.e., the smallest unit of meaning) as reusable blocks of words for the multisyllabic word reading, spelling, grammatically correct sentence production, and meaning information (Carlisle, 2007). Altogether, evidences from the existing literature suggest that morphology serves as a scaffold for the code-based and the meaning-based processes of language (Cunningham, 1998; Ku & Anderson, 2003; Nunes, Bryant, & Bindman, 2006).

Students with reading and writing difficulties have poor performances in various written and verbal morphology-related tasks, including oral and written morphological awareness tasks (Rubin, Patterson, & Kantor, 1991). When it comes to different types of reading and writing disabilities, morphology is more related to meaning-interpretation and generation than code-based language as evidenced by more difficulties exhibited in SPC than dyslexic literacy

performances. Few researchers have argued that poor morphology has causal links to decoding difficulties of students with dyslexia. Instead, research suggests that primary deficits of dyslexia presumably stem from phonology-related difficulties (Arnbak & Elbro, 2000). On the other hand, students with SPC demonstrate poor morphology (Nation, Snowling, & Clarke, 2005; Tong, Deacon, Kirby, Cain, & Parrila, 2011), indicating that poor reading comprehension partly stems from poor morphology (Tong et al., 2011).

Deficient morphology also hinders both spelling and text-generation performances of students with various types of LD. Students with spelling disabilities showed poor performance in oral morphology tasks and make little use of morphological analogies in spelling (Carlisle, 1987), demonstrating that their weak underlying morphology skills may contribute to poor spelling performance. However, there are students with LDs who have comparable morphology-related spelling skills to those of their typical peers without disabilities: students with dyslexia. Students with dyslexia took advantage of morphological information when spelling complex words, like the students without disabilities, supporting the idea from reading research that morphology is not the primary difficulty of dyslexia (Bourassa, Treiman, & Kessler, 2006). Morphology performances in SPC and dyslexic writing have been mainly addressed in conjunction with syntax and will be discussed in the following section.

The Relationship of Syntax to Reading and Writing Competency

Syntax governs how words are combined into larger meaningful units of phrases, clauses, and sentences (Kamhi & Catts, 2005). In general, syntax is a type of supporter for the code-based and the meaning-based processes of language: the more sophisticated syntactic skills are acquired, the better a student can figure out the meaning of a sentence, a phrase, or a text by effectively using syntactic cues. In addition, syntactic knowledge is critical for correctly composing sentences and texts.

Poor syntax is one type of oral language disability that is frequently exhibited by students with reading and writing disabilities (Rispens & Been, 2007; Rispens, Roeleven, & Koster, 2004; Siegel & Ryan, 1984). Compared to typical students without disabilities, students with reading disabilities have greater difficulty understanding syntactically complex spoken sentences and are worse at distinguishing sentences that use different stress patterns and article positions (Mann, Shankweiler, & Smith, 1984; Smith, Mann, & Shankweiler, 1987). Considering different subgroups of students with reading and writing disabilities, syntax can be understood as a shared component of both code-based and meaning-based language dimensions even though its degree of relatedness is larger to the meaning-based than the code-based language dimension: students with SPC have more fundamental syntactic difficulties that may be linked to poor reading comprehension compared to students with dyslexia. Compared to typical peers without disabilities, students with SPC demonstrated poor performances in understanding syntactically complex sentences (e.g., passive sentences; Cain, Patson, & Andrews, 2005; Catts, Adolf, & Weismer, 2006; Nation & Snowling, 2000) and weak syntactic awareness (e.g., correct a scrambled word order; Isakson & Miller, 1976; Nation & Snowling, 2000).

Similarly, students with dyslexia demonstrate greater difficulties in understanding syntactic structure compared to typical peers (Rispens & Been, 2007; Rispens et al., 2004). Yet, findings generally indicate that their syntactic deficits are not one of their major linguistic difficulties because there is a subgroup of students with dyslexia who do not show poor syntactic performances (McArthur, Hogben, Edwards, Heath, & Mengler, 2000). More importantly, the students with dyslexia still had less severe syntactic difficulties compared to students with SPC (Catts et al., 2006) and those with specific language impairments (Rispens & Been, 2007). Thus, syntactic difficulty of students with dyslexia may be attributed to other difficulties, such as their well-known difficulties in phonology and/or processing-related difficulties (e.g., verbal working memory; Robertson & Joanisse, 2010; Smith et al., 1987).

Although writing and reading patterns should be similar to each other due to their sharing nature of language, existing yet limited findings suggest that poor syntax is more related to dyslexia than SPC writing, and thus the code-based language is more affected by poor syntax than the meaning-based language dimension. Several studies reported grammatical deficits in the oral and written production of children and adults with dyslexia, specifically when complex sentence production performances were compared to typical groups and those with language disabilities (Puranik, Lombardino, & Altmann, 2006; Sterling, Farmer, Riddick, Morgan, & Matthews, 1997). However, other studies reported no difference in several syntactic parameters, such as simple sentence production, mean length of T-units, and clause density, between written products from children with dyslexia and those from children without dyslexia (Puranik et al., 2006; Sterling et al., 1997).

In regard to SPC writing, only one study by Cragg and Nation (2006) investigated syntactic aspects in writings of 10 year-old students with SPC. Inconsistent with findings from reading research that showed poor syntactic performances in children with SPC (Cain et al., 2005; Catts et al., 2006; Isakson & Miller, 1976; Nation & Snowling, 2000), no differences were observed between children with SPC and typical children in syntactic complexity in a narratives writing task. Nevertheless, cautious interpretation is required for drawing general conclusions solely based on the findings by Cragg and Nation (2006) until future research addresses written syntactic performances of SPC students and can replicate these findings.

The Relationship of Semantics to Reading and Writing

Semantics (i.e., vocabulary) is a tool to understand and establish meaning. Vocabulary occupies an important position in learning to read and to write due to its high correlation with reading comprehension (National Reading Panel, 2000; Nation & Snowling, 1998) and a sizeable vocabulary allows a writer to translate a richness of thought onto paper (Baker, Gersten, & Graham, 2003). Generally speaking, semantics plays an important role in the meaning-interpretation and meaning-generation processes of language.

Poor semantics or vocabulary has been considered one of the major underlying deficits of students with LDs in reading and writing. Students with LDs speak, write, and understand fewer, less diverse, and less complex words compared to their typical peers without disabilities (Morris & Crump, 1982; Nation & Snowling, 1998). Evidences collectively confirm that semantics is mainly related to meaning-based language aspects of reading and writing because semantic difficulties are more related to students with SPC than those with dyslexia (Catts et al., 2006; Cain, Oakhill, & Elbro, 2003; Nation & Snowling, 1998; Nation, Snowling, & Clarke, 2007; Shaywitz, Morris, & Shaywitz, 2008; Siegel & Ryan, 1984). Poor semantics is the hallmark of SPC students and has been considered as the primary cause of their poor reading comprehension (Nation & Snowling, 1998, 1999). Students with SPC know fewer words (Catts et al., 2006; Nation & Snowling, 1998) and access and retrieve less efficiently the meaning of words than typical readers without reading difficulties. In addition, students with SPC have difficulty inferring the meaning of unknown words from the contextual information (Cain et al., 2003; Nation et al., 2005; Nation, Snowling, & Clarke, 2007). In contrast, vocabulary is intact for students with dyslexia (Shaywitz et al., 2008). In particular, students with dyslexia tend to have intact vocabulary knowledge and semantic processing skills compared to students with SPC (Catts et al., 2006; Nation & Snowling, 1998; Siegel & Ryan, 1984), suggesting that semantics is not the primary area of deficit of students with dyslexia.

Although little research exists, findings from SPC writing studies mirror results from SPC reading studies: students with SPC produced less various and appropriate words than those used by good comprehenders regardless of the differences in the modality of the prompt (pictorial and verbal) and the text genre (narrative and descriptive; Carretti, Re, & Arfè, 2013; Cragg & Nation, 2006). In dyslexic writing, students with dyslexia produced less variety of words compared to typical students without dyslexia but a lesser extent than students with

language impairment (Puranick et al., 2006). However, their lexical diversity was not different from controls matched chronological-age and spelling-skills (Connelly, Campbell, MacLean, & Barnes, 2006). Altogether, findings from research on SPC and dyslexia suggest that semantics is a part of the meaning-based language dimension.

The Relationship of Discourse to Reading and Writing

Discourse is a unit of language longer than a single sentence (e.g., story, conversation, or lecture; Kamhi & Catts, 2005). The relationship of discourse to reading and writing orchestrates all the necessary linguistic and cognitive skills in order to produce a meaningful representation of language, and thus to understand and express a meaningful text. However, the fundamental aspects of discourse fall under the meaning-based language dimension because discourse is the level of language in which an accurate representation about what a person reads is produced and what a person thinks is transcribed.

One of the important language-related discourse abilities is knowledge of text structure. A few studies demonstrated that the lack of text structure may be a source of deficient reading comprehension (e.g., story grammar; Montague, Maddux, & Dereshiwsky, 1990) and poor text composition (Englert & Thomas, 1987; Laughton & Morris, 1989). Due to their incomplete awareness of narrative prose, students with LD recall less of an ill-structured narrative text and recognize less inconsistencies in a text than typical students (Englert & Thomas, 1987; Montague et al., 1990).

Studies have also reported that students with LD have been found to be less efficient than their peers without disabilities at organizing and producing written compositions that include the essential elements of narrative and expository text structures (Englert & Thomas, 1987; Laughton & Morris, 1989). In text generation, few research studies have reported the existence of a subgroup of writing disabilities whose main difficulties reside in composition-level problems without having poor spelling skills. Yet, findings from composition via dictation studies partly support the possible existence of students with specific text-generation difficulties (Graham, 1990; MacArthur & Graham, 1987). When given the option of dictation, students with LD produced more writings with a higher level of quality because dictation eliminates the transcription difficulties of writing (Graham, 1990; MacArthur & Graham, 1987), indicating that the text generation can be independent from transcription and that a subgroup of students with specific text generation difficulties may exist.

With regard to the relationship between discourse and different types of LDs in reading and writing, only a few studies investigated the discourse-level writing profile of students with dyslexia: written products of students with dyslexia did not differ from those of the controls without writing difficulties on the total number of ideas, organization of ideas, and the length of the text measured by the total words produced (Connelly et al., 2006; Puranik et al., 2006), demonstrating that producing and organizing ideas are not the main difficulties in dyslexic writing. On the other hand, a limited number of existing studies demonstrate that students with SPC produced less coherent and structured stories when given picture and verbal prompts: their writing samples simply describe a list of events without including complicated and advanced story structures such as causal-effect connections between the events (Cragg & Nation, 2006; Carretti et al., 2013). Consistent with the findings from written tasks, students with SPC produced less integrated events with fewer causally related main events in oral story production tasks (Cain, 2003; Cain & Oakhill, 1996). These results collectively suggest that students with SPC have weaknesses in the level of discourse of language while those with dyslexia do not.

Classroom Practices for Students with Reading and Writing Disabilities

Although reading and writing disabilities share common underlying linguistic difficulties (e.g., phonology, semantics, syntax etc.), few intervention studies examine the effects of

language-based intervention on writing performances of students with LD and most writing interventional studies are centered around higher-level cognitive strategy instruction. Nevertheless, this review finds good evidence that the common linguistic difficulties can be manifested into different types of writing difficulties of LDs. Thus, it is important to address language intervention that targets the specific linguistic difficulties of different types of LDs in reading and writing.

In regard to students with dyslexia, the findings from this review suggest that their main language difficulties reside in poor phonology within the code-based language dimension: their difficulties are not directly related to meaning-based language dimension such as semantics and discourse. Therefore, teachers should focus on phonology-based interventions for improving decoding and spelling performances of students with dyslexia. Two examples of the phonology-based instructional approaches are phonological awareness training (including phonemic awareness training) and phonics (National Reading Panel, 2000). More specifically, the phonological awareness training can be effective in increasing word recognition skills when (a) the letter knowledge training is included; and (b) the training is provided in a small group setting (National Reading Panel, 2000). Concerning phonics, systematic phonics instruction is recommended for students who demonstrate foundational level of phonological awareness. There is also a large body of evidence suggesting that, training in phonology can be most beneficial for improving the poor decoding and spelling performances of students with dyslexia (Alexander, Anderson, Heilman, Voeller, & Torgesen, 1991; Shaywitz et al., 2008; Swanson & Hoskyn, 1998).

On the other hand, readers with SPC respond best to non-phonology based interventions (e.g., vocabulary, morpho-syntax intervention, and language comprehension intervention) in order to compensate for their limited meaning-based language difficulties in the areas of semantic, morpho-syntax, and discourse. Despite few available research studies, Clarke, Snowling, Truelove, and Hulme (2010) reported the effectiveness of language intervention on reading comprehension of students with SPC: their oral language (OL) intervention consists of non-phonological language instruction such as vocabulary, listening comprehension, figurative language, and narrative. The OL approach was more effective than other types of intervention (i.e., meta-cognitive training and the combined training of meta-cognition and oral language) even 11 months after the training. By combining findings from this review and those by Clarke et al. (2010), it is suggested that students with SPC benefit from non-phonology based language intervention that can collectively target several meaning-based language aspects.

In addition, among the meaning-based language aspects, semantics is considered as a major source for poor reading comprehension and text composition of students with SPC (Nation & Snowling, 1998, 1999). Thus, teachers should strive to provide an evidence-based vocabulary instruction for students with SPC. Although there is no one best method for vocabulary instruction (National Reading Panel, 2000), Robust Vocabulary Instruction (Beck, McKeown, & Kucan, 2002) is beneficial for improving limited vocabulary and reading comprehension of students with SPC. This vocabulary training approach stresses richness of semantic coding of word knowledge and has demonstrated its effectiveness for students with reading difficulties. In particular, students are provided student-friendly definitions and ample activity-based vocabulary practices. Thus, students with SPC would easily grasp the meaning of a target word and be given opportunities of remembering the word in meaningful contexts.

Conclusion

The purpose of this review is to synthesize the current literature to reveal the interconnected relationship between oral and written language (i.e., reading and writing) components in learning disabilities (LD). By combining the Simple View of Reading and Writing models, the complex processes of literacy can be grouped into the code-based (decoding and

spelling) and the meaning-based language (language comprehension and composition) dimensions (see Figure 1). As previously explained, these code and meaning-based language dimensions are not mutually exclusive and are interrelated to each other: the code-based language serves as a foundation for higher-level reading and writing processes, several of which are linked to the meaning-based language dimension.

By contrasting literacy and language profiles of students with dyslexia and those of students with SPC within the conceptual framework outlined in Figure 1, I can conclude that each of the five language aspects (phonology, morphology, syntax, semantics, and discourse) is linked to code-based and meaning-based language dimensions and to various subgroups of LD in different degrees and unique manners. First, poor phonology is mainly linked to code-based language deficits whereas weak semantics is connected to meaning-based language difficulties. Likewise, poor phonology is mainly related to poor decoding types of reading disabilities (dyslexia) and poor spelling performances. Second, poor semantic skills are connected to reading comprehension and text composition failures, both of which are meaning-based language processes: these patterns are mainly evidenced by poor vocabulary of students with SPC. Third, although a small number of research studies have been conducted, findings demonstrate that students with SPC have weaknesses in the level of discourse of language while those with dyslexia do not. Fourth, difficulties in morphology and syntax are related to both the code-based and the meaning-based language processes of reading and writing. Yet, existing but limited evidence demonstrates that poor morpho-syntax performances are more related to SPC than dyslexia in reading tasks but are more linked to dyslexia than SPC in writing tasks. Such different patterns may reflect performance characteristics from the elicited expression tasks (e.g., story writing and verbal story recall): although morpho-syntax knowledge in the oral domain should impact both reading and writing in a similar way, an individual can choose to write or say a simple and accurate sentence rather than producing a complex but inaccurate sentence in the production tasks. Maybe it is the former case for children with SPC in Cragg and Nation's (2006) study, and is partly the reason why their writing and story recall samples did not reflect their underlying morpho-syntactic difficulties. Thus, it is rather inconclusive how weak morpho-syntactic knowledge is related to code-based and meaning-based language.

In practice, teachers should address distinct types of language interventions for students whose diverse reading and writing difficulties are rooted in different types of linguistic weaknesses: classroom teachers should provide phonology-based language instruction for students with dyslexia whose decoding and spelling difficulties originated from the code-based language deficits. Non-phonology based language instruction should be implemented for students with SPC whose language comprehension and text generation difficulties stem from meaning-based language weaknesses.

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