Different Professionals' Interpretation of a Decoding Deficit in Reading Skills

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An educational profile of a fictitious child with a decoding deficit in reading skills was distributed by mail to audiology, speech-language pathology, and reading specialty professionals throughout the United States. Each participant was asked to review the profile and complete a questionnaire. The survey asked open-ended questions concerning the professional's interpretation of what may be the basis of the child's learning difficulties and the assessment tools needed for an evaluation. This study reviewed each professional's analysis of the possible origin of the learning difficulty and determined if a common response theme emerged from the different professional groups.

The lack of development in auditory discrimination of speech sounds plus the inability to process complex phonological information are common characteristics between dyslexia, a (central) auditory processing disorder ([C]APD), and a phonological awareness deficit. Although these disorders have common characteristics, each may be diagnosed differently depending on the professional who examines the child. For example, a child who has difficulty discriminating speech sounds may be assessed for deficits in (central) auditory processing by an audiologist. If the same child was referred to a speech-language pathologist, testing may concentrate on phonemic awareness abilities or receptive language skills. On the other hand, a reading specialist may suspect dyslexia as the cause. Even though all these professions are looking at the same characteristics, different techniques may likely be used for assessment; therefore, different intervention strategies may be implemented.

In order to understand how speech-language pathologists, audiologists, or reading specialists might assess and treat a child with a decoding deficit, it is important to investigate common characteristics and relationships that phonological awareness and (central) auditory processing may have with dyslexia. It is also important to understand the different approaches that these three professional groups may have when evaluating and treating a child with a decoding deficit.

Dyslexia and the Reading Specialist

Learning disorders and developmental reading disabilities, in particular, are a major educational problem in the United States. Dyslexia is a language disability that not only affects the ability to learn to read, write, and spell by conventional methods, but also affects the ability to communicate in more subtle ways, such as pronouncing words clearly or fully understanding what others say (Gillon, 2004). According to the International Dyslexia Association (IDA, 2000), "dyslexia refers to a cluster of symptoms, which result in people having difficulties with specific language skills, particularly reading" (pg. 1). As a result, dyslexic individuals may have problems in reading comprehension and have an overall reduced ability to relate printed symbols with corresponding auditory properties (Snyder and Mortimer, 1969). Reading problems can interfere dramatically with academic achievement. Snowling (1998) estimated that more than 10% of school-age children experience reading difficulties, with half of these children possibly being dyslexic. Children with dyslexia do not exhibit deficits in intelligence, peripheral hearing, or peripheral vision; rather, they lack sufficiency in the processing of language (Moncrieff, 2005).

As with any other skill deficit, the earlier a child is identified with dyslexia, the better the prognosis he or she will have for developing learning strategies, thereby raising school achievement. Snyder and Mortimer (1969) recommend that a child should be evaluated for dyslexia if his or her reading and writing skills are significantly below grade level in

the beginning of second grade. Testing is usually completed by an educational psychologist or a reading specialist. A basic test battery that is productive in identifying dyslexia involves (White, 1983): (a) a case history where the psychologist or reading specialist asks the parents questions directly, (b) administration of an intelligence scale for children, (c) reading and spelling tests, and (d) laterality tests. An example of an intelligence scale would be the Wechsler Intelligence Scale for Children – Revised (WISC-R; Wechsler, 1991). This examination includes (but is not limited to) the subtests of picture completion, picture arrangement, vocabulary, object assembly, comprehension, coding, and digit span. The educational psychologist or reading specialist must also obtain information concerning the technique used by the child to interpret unfamiliar vocabulary words, errors involved while producing those words and comprehension of the material read (White, 1983). Dyslexia cannot be diagnosed based on symptomology alone. Testing must be completed by qualified professionals in order to make a reliable diagnosis (IDA, 2000).

Upon completion of the testing and interpretation of the results, schools can implement academic modifications and interventions to help students with dyslexia succeed (IDA, 2000). Examples of effective modifications would include giving students extra time to complete tasks, allowing students to use taped tests, and providing students help with note taking. Furthermore, a combination of correcting errors in reading, reducing pressure upon the child for academic success, and understanding the child's problem would be a successful approach during treatment (IDA, 2000).

(Central) Auditory Processing and the Audiologist

A (central) auditory processing disorder, as defined by the American Speech-Language-Hearing Association (ASHA; 2005, p. 2), is described as "difficulties in the processing of auditory information in the central nervous system (CNS) as demonstrated by poor performance in one or more of the following skills: sound localization and lateralization; auditory discrimination; auditory pattern recognition; temporal aspects of audition, including temporal integration, temporal discrimination, temporal ordering, and temporal masking; auditory performance in competing acoustic signals; and auditory performance with degraded acoustic signals." Children diagnosed with an auditory processing disorder may present characteristics, such as (a) poor expressive and receptive language abilities, (b) poor reading, writing, and spelling, (c) poor phonemic awareness, or (d) behavioral, psychological, and/or social problems as a result of poor language and academic skills. Not all of these characteristics need to be present in order to indicate a (C)APD, but they do provide reason to suspect a disorder in the central auditory nervous system.

A child must be able to sound out words in order to read fluently, a skill referred to as decoding, or word-attack abilities (Bellis, 2002). A child may be diagnosed with a (C)APD that is characterized by problems with decoding, or word-attack skills, and impact reading abilities. This is described as a decoding deficit and is characterized by a weakness in the ability to discriminate and analyze phonemes (Bellis & Ferre, 1999). This child may experience difficulty auditorily distinguishing phonemic segments within a speech signal, which later may lead to problems making associations between phonemes and graphemes (Richard, 2007). A child with a decoding deficit will spend a great deal of time and effort trying to analyze each letter and word. Therefore, by the end of the sentence, the child may have forgotten what the sentence was about because he or she was devoting time and energy to the decoding process. Thus, reading comprehension may also be affected by (C)APD (Bellis, 2002).

(C)APD can only be formally diagnosed by an audiologist because of the characteristics of the test tools used (ASHA, 2005). A child that is suspected of a (central) auditory processing disorder may complete an evaluation that is designed to tax the auditory system. Therefore, a child should be at least seven years of age and have normal peripheral hearing before a (central) auditory processing evaluation is administered (Johnson, Bellis, & Billiet, 2007). Bellis (2002) recommends that the test battery consists of a case history report and auditory tests including dichotic listening, low-redundancy speech tasks, temporal processing tasks, and perception of nonverbal auditory stimuli. If the scores indicate that the individual exhibits characteristics of a (central) auditory processing deficit, results should be used to determine how that disorder contributes to the difficulties the child may be experiencing at school and home. However, the (C)AP assessment should be part of a multidisciplinary evaluation with a team of educational professionals and should not be the initial or only procedure used when diagnosing a (C)APD (Johnson, Bellis, & Billiet, 2007).

Treatment for a (C)APD may incorporate ways to manage the listening environment and/or specific therapy techniques. Moreover, the appropriate management strategies vary depending on the nature of the (C)APD (Bellis, 2003). For example, children who experience a decoding deficit may have difficulty

with low-redundancy speech. These children may benefit from enhancement of the auditory signal through changes in the environment (such as reducing background noise or using a personal or sound field FM system in the classroom). Direct therapy techniques may include auditory discrimination training. Richard (2007) recommends that an hierarchy for auditory processing be considered when determining a treatment protocol for a child with a (C)APD. Treatment and management strategies should include goals for acoustic processing, phonemic processing, and language processing. Acoustic goals would incorporate direct auditory training and signal enhancement strategies. The development of the discrimination of phonemes and their association with graphemes would be utilized to enhance phonemic processing skills. For language processing, the focus would be making connections between auditory information and language.

Phonological Awareness and the Speech-Language Pathologist

Phonemes are the basic units of sounds contained within each word, and therefore, understanding phonemes is a critical part in learning to read successfully (Liberman & Liberman, 1990). In order to associate letters to meanings, phonemic awareness should be intact. While in school, children are introduced to the idea that letters of the alphabet stand for speech segments or sounds (phonics). However, the development of phonics may be impaired without the awareness of these speech sounds (phonological awareness). Without this connection between the basic unit of sounds and their representation to letters, reading cannot occur (Liberman & Liberman, 1990). However, children with deficits in the development of phonological awareness have trouble retrieving this basic phonological representation from their memory. Phonological awareness refers to the ability to understand how speech sounds are used in words. Abilities that rely on phonological awareness include, but are not limited to, phonological manipulation, segmentation, and sound blending (Bellis, 2002). Phonological manipulation involves the ability to manipulate the order of the sounds in a word and determine what the new word would be. Segmentation is the ability to separate out speech sounds in a word, and sound blending is the ability to take separate speech sounds and connect them meaningfully to make a word (Torgesen & Mathes, 2000).

The purpose of testing for phonological awareness is to determine a child's knowledge about spoken sounds in words. Successful reading skills in the early school years have been linked to the development of phonological awareness skills in preschool and first grade (Lonigan, Burgess, & Anthony, 2000). This is why it is important to assess phonological skills early during preschool and kindergarten. A speech-language pathologist has extensive training in phonetics and phonological disorders and would play a key role in the assessment and treatment of delays in phonological awareness (Catts, 1991).

Deficits in phonological awareness result in difficulty performing the tasks described above, and for this reason, teachers need to be aware of educational activities that can help their students recognize phonemes before receiving formal reading training. Once beginning readers have acquired phonemic awareness, further reading instruction will enhance their awareness of language (Liberman & Liberman, 1990). Therefore, phonological awareness is both a requirement for and a consequence of learning to read. It has also been argued that phonological awareness may be improved by the ability to read (Dale, Crain-Thoresen & Robinson, 1995). According to Stackhouse (1997), phonological awareness progresses along a range from implicit to explicit. Syllable segmentation and rhyming are found at the implicit end, while sound segmentation and manipulation are found at the explicit end. Most young children begin developing phonological awareness skills in the implicit end of the continuum before having knowledge of the alphabet (Stackhouse, 1997).

Relationship Between Dyslexia, (C)APD, and Phonological Awareness

The relation between dyslexia, (C)APD, and phonological awareness has been discussed by various sources. Past research provides evidence that the quality of a child's phonological awareness skills has a direct impact on the progression of reading abilities (e.g., Landerl, Wimmer, & Frith, 1997; Porpodas, 1999; Torgesen, Wagner & Rashotte, 1994). Weakness in phonological awareness skills has been seen in children with dyslexia. However, the relationship between (central) auditory processing skills and dyslexia has been more controversial. Tallal, Miller, Jenkins and Merzenich (1997) theorized that a weakness in phonological awareness skills in children with dyslexia is due to an inability to accurately process rapidly changing acoustic signals (such as speech sounds). In short, a deficit in phonological awareness may be more related to a deficit in auditory processing skills (Farmer & Klein, 1995). This has led to more recent theories, such as the temporal processing deficit hypothesis. This theory suggests that children with dyslexia show a general impairment in the processing of rapid auditory stimuli (Hood & Conlon, 2004). Hood and Conlon (2004) assessed temporal order judgment (TOJ) tasks in children to

support this theory. TOJ refers to the ability to judge the order of two rapidly presented stimuli, either of auditory or visual nature, which can be verbal or nonverbal (Hood & Conlon, 2004). Visual temporal processing is said to be important in perceiving word formation and encoding letter position, while auditory temporal processing is thought to be necessary for the progression of phonological processing and reading (Hood & Conlon, 2004). Using auditory TOJ tasks for nonverbal tones, Tallal (1980) studied 20 children with dyslexia and 12 children without reading difficulties. It was reported that children with dyslexia were less accurate than children without reading difficulties (controls) for the identification of two brief (75 ms) complex tones for short (8-305 ms) inter-stimulus interval (ISI) trials. Heiervang, Stevenson and Hugdahl (2002) administered a computerized version of Tallal's tone-test, but included trials with longer tone durations (250 ms) and with an increased number of observations for each condition. Their results revealed that children with dyslexia were below the children in the control group when correctly identifying complex tones of short duration presented in rapid succession. Therefore, these results support the findings that there is an auditory processing deficit for the identification of rapid stimuli in children with dyslexia.

Marshall, Snowling, and Bailey (2001) reported that auditory processing deficits contribute to poor phonological ability found in children with reading deficits. It is believed that if poor reading is linked to a deficit in auditory processing, then it may be difficult to distinguish speech sounds and the acoustic changes that occur within those sounds. With well-developed phonological awareness, children are able to generalize from the meanings of words, attend to critical sounds, and as a consequence, understand that letters are the written components of their spoken language (Marshall et al., 2001).

Schulte-Korne, Deimel, Bartling, and Remschmidt (1999) proposed a four-level model of auditory and phonological processing (see Table 1), which incorporates the temporal order/gap detection theory. Their model depicts that phonological processing is the most complex level in linguistic processing.

Therefore, while speech perception directly influences phonological awareness, phonological processing directly influences reading and spelling.

Differences in Assessment Procedures used by Each Profession

As stated previously, common characteristics between dyslexia, a (C)APD, and a phonological awareness deficit are seen in the lack of development of auditory discrimination of speech sounds and in the processing of complex phonological information. Even though there is an association between dyslexia, (C)APD, and phonological awareness, these disorders may be assessed by different professionals who may use dissimilar approaches to diagnose the problem. For example, while auditory processing disorders are commonly assessed by audiologists, dyslexia may be diagnosed by various professionals with knowledge in the areas of psychology, reading, language, and education (IDA, 2000). Phonological awareness is commonly assessed by speech-language pathologists, due to their extensive training in the development of the sound structure of language. Speech-language pathologists typically make sound comparisons in different words and have children experiment with phonemes, which includes counting, deleting or adding sounds. Each professional working with a child that has difficulty learning to reading will use a variety of tests in order to make a specific diagnosis. Different professionals analyze and examine children with decoding deficits in different ways. The way that different professionals assess and treat these children can be influenced by the biases of their fields.

Current literature lacks information on the incidence of collaborative efforts between professionals when diagnosing a child with a reading disability. The International Dyslexia Association does promote a comprehensive evaluative process when assessing a child suspected of having dyslexia (Sawyer & Jones, 2008). This approach includes testing for the areas of intelligence, oral language skills, word recognition, decoding, spelling, phonological processing, fluency skills, reading comprehension, and vocabulary knowledge (Sawyer & Jones, 2008).

Table 1. Hierarchical model of different auditory processing levels in reading and spelling development (Schulte-Korne et al., 1999). *Printed with permission from T. Tschech, Springer Publishing.*

	Processing Level	Paradigm and Measures
Level 1	Pre-attentive and automatic processing of auditory stimuli	Passive oddball paradigm, mismatch negativity
Level 2	Conscious processing of auditory stimuli	Gap detection. Tone and speech discrimination
Level 3	Conscious and cognitive (phonological) processing	Phonological awareness; phoneme counting
Level 4	Spelling and reading	Writing to dictation, word reading

However, IDA does not specify which professional groups should be involved when evaluating each of these areas. ASHA also endorses a comprehensive approach for assessing literacy skills, but goes further to clearly define the need for collaboration with other professionals. ASHA states (ASHA, 2002) that, "roles and responsibilities related to reading and writing in children and adolescents are essentially collaborative in nature. No one discipline owns them. SLPs work collaboratively with families, teachers, and other professionals to meet the literacy learning needs of infants, toddlers, children, and adolescents with and without disabilities" (pg. 2). The Educational Audiology Association (EAA) also encourages audiologists to be part of a multidisciplinary team when evaluating any child suspected of having a (C)APD that may be affecting learning in the classroom (EAA, 1997). The significance of pooling resources when addressing a child with a reading disability is evident when reviewing professional guidelines for reading specialists, audiologists, and speech-language pathologists. However, the extent to which individuals in each of the professions collaborates with other specialists is still unknown.

The purpose of this study was to investigate how audiologists, speech-language pathologists, and reading specialists interpreted an educational profile on a fictitious child with a decoding deficit in reading. The study used a qualitative collective case study approach to examine whether a person's profession influenced how he or she interpreted a set of characteristics for a child with a decoding deficit. Data was reviewed to see if different professions had biases with how they viewed a set of learning difficulties presented about a child. It was thought that professionals' views on assessment and treatment are influenced by the training and experiences promoted by their field of study. The goals of this study were to reveal whether professionals in the fields of speech-language pathology, audiology, and reading specialty (1) are influenced by the philosophy of their professions and(2) would assess and diagnose differently a child with a reading disorder. The study also examined the tendency of those professionals to collaborate with other specialists in the assessment and diagnosis of this complex case study.

Method

Participants

A total of 150 professionals (50 audiologists, 50 speech-language pathologists, and 50 reading specialists) from 34 states were asked to voluntarily participate in this study. Of these, 12 audiologists, 18 speech-language pathologists, and 20 reading specialists completed the questionnaire, giving a 33% response rate. Names for participants from the field of audiology were acquired from the Educational Audiology Association. All of the audiologists held a master's degree or higher and were certified or licensed within their state to practice in their profession. Contact information for speech-language pathologists was obtained from ASHA. The speech-language pathologists who participated also held a master's degree or higher, a certificate of clinical competence with ASHA, and were practicing clinicians in an educational setting. Names of reading specialists were acquired through an internet search of school districts in the United States. Contact information for school districts were acquired through lists provided by each state board of education. Listing of personnel for individual school districts was reviewed and those listed as the district's reading specialist were mailed surveys. Surveys were also disbursed to individuals listed on the web as reading specialists. Credentials for the reading specialists varied with nine holding a master's degree and 13 holding a bachelor's degree. A majority of the reading specialists held a degree in the field of education (N=18), with the remaining two holding degrees in other areas, such as psychology. Two participants did not designate the field for their degree and were eliminated from the study.

Design and Measures

Qualitative methodology was selected for this investigation because of its unique appropriateness in meeting the purpose of this study (i.e., to explore and examine the perceptions of professionals regarding a child with a decoding deficit in reading skills). Miles and Huberman (1994) suggested that a characteristic of qualitative research methodology is that "the possibility for understanding latent, underlying, or nonobvious issues is strong" (p.10). Additionally, qualitative data has the features of richness and holism, which tend to reveal complexity. By analyzing data with a qualitative method, themes emerging from the opinions of various professional groups could be directly identified and compared.

The method used was the collective case study, as described by Stake (2000). A collective case study involves the study of more than one case in order to "investigate a phenomenon, population, or general condition" (p. 437). This approach assumes that investigating a number of cases will lead to better comprehension and better theorizing. Miles and Huberman (1994) contend that using collective case studies strengthens the "precision, the validity, and the stability of the findings" (p. 29).

Procedures

An educational profile (Appendix A) of a

fictitious child with a decoding deficit in reading skills was sent to randomly chosen professionals in the fields of speech-language pathology, audiology, and reading specialty. The profile was sent by mail to each recipient along with a letter stating that the questionnaires would be confidential and kept in a secure location. Participants could disclose their name and age; however, this was optional. Those who completed the questionnaire were asked demographic information, such as their professional title, degrees earned, and field of certification/licensure. Each participant was asked to review the profile and answer items on a questionnaire. Three open-ended questions were presented (see Appendix B). The first question focused on the professional's interpretation of his or her suspicion about the basis of the child's learning difficulties. The second question centered on the evaluation tools that each professional would consider when assessing this child for a suspected disorder. For the third question, participants were asked if they had any further recommendations. This was included to seek additional information concerning whether or not the professional would refer outside his/her field for further testing or consultation with professionals from other disciplines. A self-addressed, stamped envelope was provided for each participant to return the completed questionnaire.

Data Analysis

A cross-case analysis was used to analyze the data. Miles and Huberman (1994) described cross-case analysis as initially analyzing each individual case as a whole entity. A comparative analysis of all cases was then completed. Studying multiple cases reassures researchers that the events in only one case are not "wholly idiosyncratic" (p. 172). Furthermore, studying multiple cases allows researchers to see processes and outcomes across many cases and to develop a deeper understanding through more powerful descriptions and explanations. A cross-case analysis allowed these researchers to identify similarities and differences for each profession's perspective on how to test and manage a child with a decoding deficit.

Members of the research team reviewed the questionnaires using a coding process to review responses for all three questions. This technique allowed the researchers to merge the data into topics and label these topics with a code (Strauss & Corbin, 1990). Coding assisted researchers to stay close to each participant's views while continually studying the data (Charmaz, 2000). Once each researcher coded the questionnaires, group meetings were conducted to cross-check the coding strategies and interpret the data (Barbour, 2001). The researchers then developed categories across cases and met multiple times in order to refine, add, or delete categories. Once this process was complete, percentages of common response themes were computed based on frequency of their occurance. This method allowed for the emergence of specific and concrete patterns common to sets of cases. Use of this method yielded a rich description of professionals' perceptions from each of the specialized areas of audiology, speech-language pathology, and reading specialty.

Results

Two topics from the questionnaires were analyzed. First, each professional's responses were examined to ascertain what they suspected as being the basis of this fictitious child's reading difficulties. Second, it was assessed whether each professional recommended further collaboration with other disciplines. When presented a description of a child with a decoding

Table 2. Examples of responses referencing the need for a collaborative approach.

Audiologist 1	• Team evaluation would be preferential. Audiologist: Pure tone air and bone conduction, tympanometry, word recognition in quiet and noise, screen for (C)APD. SLP: Language and vocabulary tests. Psych: WISC. LD Specialist: Woodcock-Johnson.
Audiologist 2	• I would want to rule out ADD, APD, or a specific learning disorder. There are many things in the case history that suggest APD. Additionally he may have some type of subtle language delays.
Audiologist 3	• A multi-disciplinary evaluation is in order. I want a full APD eval, rule out ADD, look at language disorders and perhaps executive function concerns. I'd want a psych eval for differences in verbal and performance IQ.
Speech-Language Pathologist 1	• Full evaluation for learning disabilities. Reading specialist evaluation. Audiology referral for full eval or ENT visit.
Speech-Language Pathologist 2	• Refer to Audiologist for a complete workup. Psycho-educational workup.
Speech Language Pathologist 3	• Refer for language testing by certified, licensed speech-language pathologist. See an audiologist if problems are apparent in the auditory processing realm.
Reading Specialist 1	• When I review the client history, I see symptoms that support the possibility of a few different learning difficulties. I would consider: developmental reading disorder, phonological processing disorder, central auditory processing disorder, ADD/ADHD, visual processing issues, and or dyslexia.
Reading Specialist 2	• Need psycho-educational battery. WISC, etc.
Reading Specialist 3	• See an educational diagnostician and have a Wechsler Individual Achievement test (WIAT-II), visual motor, written language test, and full battery of tests to compare strengths and weaknesses.

deficit, audiologists, speech-language pathologists, and reading specialists generally provided varied interpretations of the possible source of the child's learning problems. This diversity in opinions appeared to be related to each group's professional training and scope of practice. Also, there was a tendency for certain professionals, more than others, to pool other resources when evaluating a child with reading difficulties.

Audiologists

Of those surveys returned by the 12 audiologists, eight (66.6%) suspected a (central) auditory processing disorder. All eight audiologists who suspected a (central) auditory processing disorder also cited possible related conditions, such as learning disability or language delay. While all the audiologists recommended a comprehensive hearing evaluation, four (33.3%) did not recommend further testing to rule in/out a (C)APD. All but one audiologist (91.7%) recommended further consultation with multiple professionals from disciplines related to speech and language, educational psychology, reading specialty, learning disability specialty, and neuropsychology. The audiologist who did not recommend a multi-disciplinary approach requested further consultation with a speech-language pathologist. Most professionals in this field precisely recommended some type of comprehensive testing. Table 2 provides examples of statements given by each of the professions on the need for collaboration.

Speech-Language Pathologists

Although a majority of the speech-language pathologists (N=13; 72.2%) suspected some type of deficit in language skills, eight (44.4%) suspected that the child's learning difficulties may also have a (C)APD component. Only two (11.1%) speech-language pathologists inferred that a deficit may exist with phonological awareness/processing skills. Four (22.2%) speech-language pathologists suspected other learning disabilities along with a language disorder or delay. Only four (22.2%) speech-language pathologists surmised that the child may be experiencing a language impairment with no co-morbid conditions. Hearing loss was suspected as the basis of the child's difficulties by one (.94%) speech-language pathologist. Speech-language pathologists also varied in their responses concerning other disciplines that should be involved in the assessment process. Seven (38.9%) of those surveyed recommended a full case study with the involvement of an audiologist, reading specialist, and school psychologist. Nine (50.0%) made no reference to the inclusion of other professionals in the evaluation process for this case. It was suggested by two (11.1%) of the speech language pathologists that the child be seen by an audiologist for a hearing test, but by no other professionals. All but three of the speech-language pathologists (83.3%) recommended various evaluation tools to assess expressive and receptive language skills. Reading specialists' and speech-language pathologists' interpretations relating to the basis for the child's learning difficulties ranged from very explicit theories to a wide range of presumptions (See Table 3).

Reading Specialists

Nine (45.0%) of the 20 reading specialists reported dyslexic tendencies shown in the educational profile. Their descriptions of these tendencies varied from phonics problems to auditory confusion. Two

Table 3. Examples of professionals' interpretations of a child's learning difficulties.

Audiologist 1	• Auditory processing. Language – word retrieval/organizational skills in language.
Audiologist 2	• Hearing loss cannot be ruled out, without comprehensive diagnostic evaluation. If hearing has not been monitored since age 3 – 4, given his history, it's possible a progressive hearing loss or unidentified hearing loss is a factor.
Audiologist 3	• This student's behavior makes him a central auditory disorders suspect with classic decoding symptoms, i.e. problems w/ auditory closure, listening/focusing in noise, hearing fine but not understanding, difficulty with sequential memory, speech-sound discrimination. In addition to decoding problems he may additionally have integration or associative deficits.
Speech-Language Pathologist 1	• Possibly language based learning disability, auditory processing, working memory weakness, or attention deficit disorder.
Speech-Language Pathologist 2	• Perhaps an auditory processing disorder, language delay due to otitis media or hearing loss, or LD for reading/writing.
Speech-Language Pathologist 3	• Suspect poor phonemic awareness skills and language processing delays characterized by difficulties with auditory skills such as memory and receptive language, and the organization of incoming linguistic information. This may account for his failure to remember linguistic units, because he may treat each word as an isolated unit, and therefore unaware of the rules (phonics) that govern their use.
Reading Specialist 1	• Auditory processing may be part of the issue since he has trouble retrieving words. Concentration may be part of the issue since he has trouble organizing his thoughts.
Reading Specialist 2	• This student has numerous difficulties indicating strong dyslexic tendencies. Dyslexics' primary mode of learning is kinesthetic or hands-on learning; therefore, it is natural they will excel in subjects like science and/or math. Due to their inaccurate perception of reality, they are unable to process visual and/or auditory information. This also affects their ability to process sounds which means speech difficulties, as well as an inability to process phonic-based programs.
Reading Specialist 3	• The child is probably a visual-spatial learner. Classes which are structured with less teacher-talk and more visual, experiential learning (such as science) appeal to his learning style and bypass his deficits. This child experienced hearing loss during a crucial language acquisition period, during the ages of 1-3 years. This is most likely a significant contributor to the auditory confusion that he still experiences.

reading specialists (10.0%) made reference to a suspected (C)APD as a possible source for difficulties with reading. Only one (5.0%) of these professionals recommended an evaluation for (C)AP, but there was no specific mention for having an audiologist complete the testing. Only two reading specialists (10.0%) suspected problems with phonological awareness/processing that inhibited reading skills. However, the inclusion of a speech-language pathologist was not mentioned for the assessment of these skills. When reading specialists questioned dyslexic tendencies, (C)APD, or a delay in phonological awareness as the basis of the decoding deficit, they often associated these disorders with having difficulty in auditory and/or visual processing. Two (10.0%) of the reading specialists referred specifically to the reading disability as a deficit in auditory and visual processing. Other suspicions were stated that the child may have problems with attention deficit disorder (20.0%) and that the child may be experiencing a language-based learning disability (5.0%). Only two reading specialists (10.0%) recommended an evaluation with a multi-disciplinary team. Reading specialists often mentioned the need for multiple evaluation tools, but made little reference to other professionals. Tests that were suggested included (but were not limited to) the Woodcock Reading Mastery Test, Rapid Automatized Naming, Gray Oral Reading, Wechsler Individual Achievement Test, Connor's Continuous Performance Test, and the Woodcock-Johnson Word Attack. Responses from the reading specialists, when compared to audiologists and speech-language pathologists, were often detailed and descriptive, especially when recommending specific test protocols (see Table 4).

Table 4. Examples of recommendations for specific testing

Audiologist 1	• Audiologist: Pure tone air & bone conduction. Tympanometry. Word recognition in quiet & noise. Screen for (C)APD with SCAN • SLP: Language & vocab tests • Psych: WISC • LD Specialist: Woodcock-Johnson
Audiologist 2	• Full diagnostic evaluation to assess peripheral hearing function based on his history of otitis media • Speech and language assessment to evaluate language competencies • WISC-R IV to look at discrepancies between verbal and non-verbal performance • APD screening assessment may be in order to determine candidacy for a diagnostic evaluation • If justification for a diagnostic evaluation for APD is determined, the clinician should choose a battery of tests based on individual complaints and other information provided for this child
Audiologist 3	• Auditory processing evaluation • Speech evaluation • Reading assessment
Speech-Language Pathologist 1	• TOLD-P – all subtests (including supplemental) • EOWPVT – one word picture vocab • TACT – auditory comprehension • Assessment of phonological awareness
Speech-Language Pathologist 2	• Hearing & vision screening • Audiologist to test for CAP-D • OWLS • TACL/TAPS • Cognitive testing w/school psychologist
Speech-Language Pathologist 3	• Audiological exam • The Word Test • Language Processing Test • Perhaps some auditory processing testing
Reading Specialist 1	• When I work with a child such as you described I am given the results from the Woodcock Reading Mastery Test, Rapid Automatized Naming, Woodcock-Johnson Word Attack, Gray Oral Reading, Wechsler Individual Achievement Test, Woodcock-Johnson Comprehension, Connors Continuous Performance Test.
Reading Specialist 2	• I would give an IQ test and look for his overall IQ in relation to his reading/writing performance in order to determine that he is capable of performing at grade level. I would also look at the subtests to determine strengths/weaknesses in sequential thinking versus spatial thinking. I would also give a language test that could identify sequential processing difficulties.
Reading Specialist 3	• Testing done by school psychologist to see if there is a big difference between IQ and academic ability. Send the child to a doctor to rule out any physical problems with the eyes or ears.

Discussion

Audiologists tended to suspect a (central) auditory processing disorder as the basis of the child's learning difficulties (see Figure 1). They also recommended a comprehensive hearing evaluation to rule out otitis media and hearing loss. A majority of the audiologists (91.7%) indicated the importance of referring to a multi-disciplinary team when assessing the educational needs of the child (see Figure 2). In the requests for a team approach, it was common for the audiologist to make a specific recommendation for an evaluation with a speech-language pathologist. However, no audiologist requested the assessment of phonological awareness skills.

Responses from professionals in the field of speech-language pathology were more varied. Speech-language pathologists who responded to the survey most commonly felt that a deficit in language skills may be related to the child's learning difficulties (see Figure 1). Almost half of those surveyed theorized that a (central) auditory processing disorder contributed to the child's academic problems (in conjunction with a language disorder). Since speech-language pathologists typically have

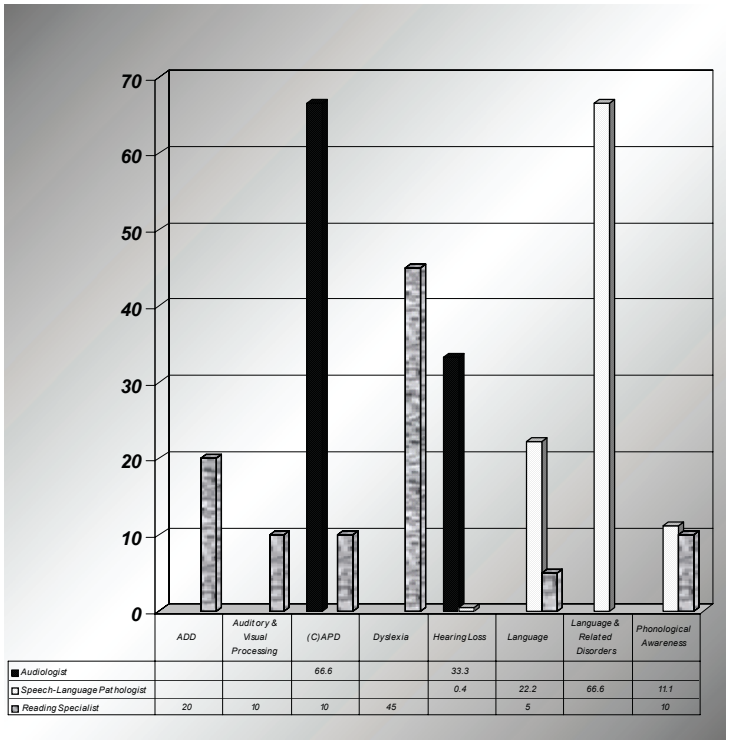

Figure 1. Primary suspected disability related to a deficit in decoding skills.

children experiment with phonemes in words (Torgeson & Mathes, 2000), it was surprising to find that only two of the speech-language pathologists recommended a test for phonological awareness. It is also interesting to note that half (nine) of the speech-language pathologists reported they would request further testing with other professionals while the other half made no reference to outside referrals. Of the half who made recommendations for testing with other disciplines, seven acknowledged the need for a multidisciplinary team (see Figure 2) and eight of the speech-language pathologists specifically included a request for an evaluation with an audiologist.

There were very few trends found in the responses from the reading specialists. Reading specialists had a wide range of theories to explain what contributed to the child's reading difficulties (see Figure 1). Less than half of the reading specialists stated that they suspect the child has some characteristics of dyslexia. This was the only trend noted in the responses of these professionals. Reading specialists were less likely than any other group in this survey to recommend assistance or testing from other professionals in educational-related disciplines (see Figure 2).

In conclusion, several themes were evident from the cross-case analysis. First of all, audiologists were inclined to suspect a (central) auditory processing deficit in this case. Speech-language pathologists did not readily suspect a phonological awareness deficit, but they did speculate that there may be some type of language disorder involved. Reading specialists were more varied in their responses, but generally (65.0%) attributed the learning difficulties to some type of visual and/or auditory processing difficulty.

Second, typical of the closeness of the professional relationship between speech-language pathologists and audiologists, there was a tendency toward cross referrals between these groups. Most audiologists were aware of the need for information concerning the speech and language skills of a child with learning difficulties. Likewise, a significant number of speech-language pathologists were sensitive to information that audiologists could provide when assessing the child; whether it was information about hearing acuity or (central) auditory processing abilities. On the other hand, a number of reading specialists were conservative when it came to collaborating with other professionals. The reading specialists had very specific test protocols for assessing a child with this profile, but there were few

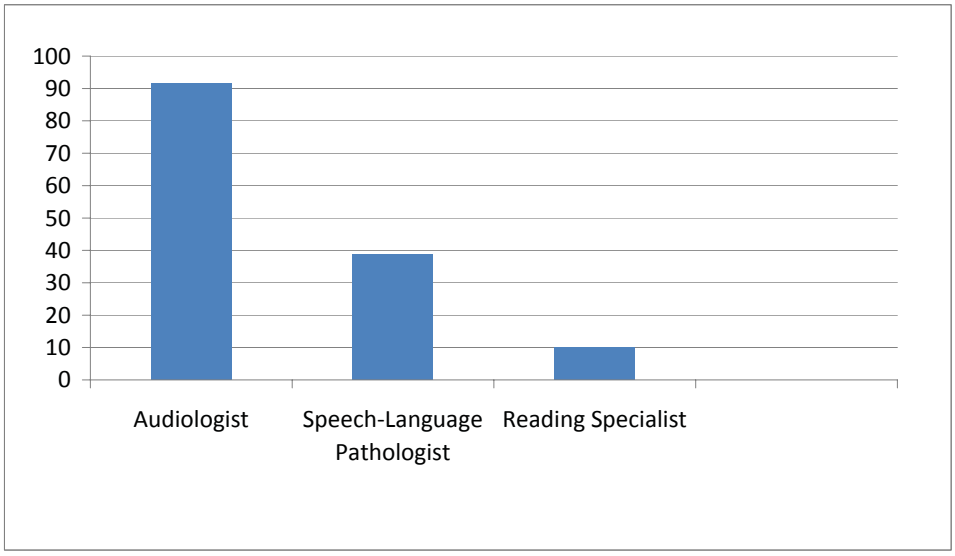

Figure 2. Percentage of professionals from each discipline that specifically indicated the need for a multidisciplinary team assessment.

referrals made to disciplines outside their own.

The fictitious profile of a child with a deficit in decoding skills was generally interpreted differently by each discipline. However, there was a definite trend for audiologists and speech- language pathologists to make referrals between the two disciplines. Reading specialists were least likely to elicit the assistance of other professionals, while audiologists were more ready to request the assistance of other professionals from a wide range of disciplines.

Conclusions and Implications

A collaborative approach is recommended for any child who may struggle with reading (Baran, 2007; Bellis, 2006; Gillon, 2004). This is the only way to delineate the true nature of a learning disability, especially since a child with a decoding deficit in reading skills may be assessed differently by professionals in unrelated fields. The assessment process should include formal and informal measures by an audiologist, educational psychologist, speech-language pathologist, reading specialist, physician, and other relevant educational personnel (Bellis, 2006). Not only should a multi-disciplinary approach be used for the assessment of children with learning difficulties, but a collaborative effort should be included in the treatment and management of these children.

The current study indicates that when given information on a child with a decoding deficit, professionals from different fields may interpret the diagnostic needs of the child differently depending on the biases of their profession. Professionals are influenced by the training and research in their areas and may not be informed about procedures or practices that address the same concerns in other disciplines. In this study, audiologists, speech-language pathologists, and reading specialists (on average) offered a different perspective on the possible cause of a decoding deficit in reading. Also, each group of professionals was inclined to recommend a different battery of tests for assessing the decoding deficit. However, educational audiologists, in general, had a good perspective on the need for a collaborative approach. If a multi-disciplinary approach is used when assessing a child with learning difficulties, then all areas of concern are addressed. Other professionals used in this study did not readily request assistance from other disciplines. Some of the participants in this study may have assumed that a multi-disciplinary approach was already in use with this child. However, this should not be taken for granted and a shared responsibility must be implemented when assessing and treating any child with educational difficulties.

There are inconsistencies in the way that some of these cases may be handled in schools, clinics, or private practices. The manner in which a child is assessed and treated for a learning disability may depend on the professional who sees that child first and whether that professional consults with specialists from other areas. It is imperative that all professional organizations continue to endorse a multidisciplinary approach whenever assessing or treating a child with any type of learning disability. This will insure that all children with educational needs are provided the highest quality services available.

More information is needed on the incidence of collaborative efforts between professionals in different disciplines. This is especially true for those disciplines that assess and treat reading and/or learning disabilities that have overlapping symptomologies. More insight could be given if professionals were asked to analyze and interpret multiple case studies. Specific information on the demographics (without revealing confidential identities) would add to the understanding of the professionals' opinions and practice procedures. Additionally, information on the type of job setting and caseload might show trends in varying work environments.

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Appendix A:

Please read the following information and answer the questions on the attached page.

History

Subject A is currently 8 years, 2 months in age. He attends third grade at a public elementary school. Parents and Teacher report that Subject A has problems following directions and paying attention in the classroom setting. Subject A will often state "I don't get it," when new information is presented for a lesson. The Teacher also reports academic problems with writing skills, word finding abilities, and reading (explaining that phonic skills taught in school are often easily forgotten). Subject A is described as having "good behavior" and is well liked by his peers at school.

Parents report that Subject A has some difficulty telling stories or describing things in a coherent manner. Subject A has some trouble finding appropriate words and keeping thoughts organized when giving a narrative.

Educational history shows that Subject A is working at grade level for mathematics, science, and spelling. It was noted that the science curriculum focused on many hands-on projects. Below average scores were documented for writing and reading.

Medical history was unremarkable with the exception of recurring otitis media (ear infections) from the ages of 1 to 3 years. At age 2, ventilating tubes were inserted which fell out after approximately 11 months. Parents stated that Subject A has not been treated recently for an ear infection. The frequency of the infections has subsided since kindergarten.

Developmental milestones were within the normal range. However, Subject A did not start combining two words phrases until 2 ½ years of age. Parents noted a significant increase in verbalizations once the tubes were inserted.

Appendix B

Questionnaire

Title: _____
Degree: _____
Field of Certification/Licensure: _____
Age (optional) _____

1. From the information presented, what do you "suspect" may be the basis of this child's learning difficulties?

2. What evaluations and specific tests would you recommend to be completed on this child?

3. If a deficit or delay was revealed from these tests, what further recommendations would you make?