

Time Well Spent: Phonemic awareness training or paired associate learning for children with language impairments?

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Abstract

This paper addresses several inconsistencies in the phonological deficit theory of dyslexia in relation to children with language impairments. Results from studies in the reading and language literature inform readers of the critical elements of phonemic awareness that predict later reading success. These elements combined with explicit instruction of paired associations of phoneme-grapheme symbols are critical to generating reading curriculum that is efficacious and parsimonious for children with language impairments.

Introduction

Special Education Teacher to Class: *“Ok, now everyone take out your safety pencil and a circle of paper. This week I hope we can finish our work on the letter A.*

Bart: *“Let me get this straight. We’re behind the rest of our class and we’re going to catch up to them by going slower than they are? Cuckoo, Cuckoo, Cuckoo!” (The Simpsons Episode #155-802, Production Code: 3F23, “You Only Move Twice”).*

The wisdom of Bart Simpson evokes a smile and a chuckle from many of us, but it also makes us stop and think; perhaps he has a point. More and more children are coming to school with limited literacy experiences and those that exhibit language impairments are at even greater risk for later reading problems. For these children, learning to break the alphabetic code of our English writing system is critically important to becoming proficient readers. Fortunately, there exists a substantial body of research that predicts prereaders’ later reading success with phoneme awareness. But as Bart so aptly reminds us, time is of the essence. Is our time well spent training phonemic awareness tasks to children with language impairments or is there a more efficient way to advance their language and literacy skills?

Language Disorders and Reading Problems

The connection between language disorders and reading problems (i.e. dyslexia) is well documented in the reading research. In fact, the term, dyslexia once described as a visual deficit (i.e. word blindness) has been redefined as "...a specific language-based disorder of constitutional origin characterized by difficulties in single word decoding, usually reflecting insufficient phonological processing abilities (Lyon 1995). However, confusion remains within the scholarly community as to the nature of a phonological processing disorder. For reading researchers, a phonological processing disorder is defined as the speed and accuracy of the phonological processor to map a phonemic unit to an orthographic pattern (Adams 1994). A child who has difficulty representing, storing or retrieving phonemes will have problems with grapheme phoneme correspondences which are fundamental to reading alphabetic systems (Bradley and Bryant 1983; Brady, Shankweiler, and Mann 1983; Snowling , Bowlby, and Howell 1986; Vellutino 1979). Moreover, researchers in language development define the term, *phonological processing* deficit as the inability to produce speech rather than to hear phonological segments in speech (McGuinness 2005). Researchers in neuroscience view a phonological deficit as a secondary condition to a primary auditory deficit that involves misperceptions of short or rapidly varying sounds (Tallal 1980; Tallal, Miller, and Fitch 1993). Given the specific rhetoric of these separate fields of study and the immense amount of new information related to dyslexia, it is not surprising that many teachers and researchers alike hold varying assumptions about the nature and the treatment of reading problems.

The Development of Phonemic Awareness

An analysis of reading research studies conducted by the National Reading Panel (2000) revealed the critical role of phonemic awareness in later reading success. Phonemic awareness is

the ability to understand that phonemes exist as elements of language that can be manipulated and abstracted from the language stream. Stanovich (1992) prefers the term, *phonological sensitivity* to describe a continuum of sensitivity from larger phonological units to smaller ones. This definition views phonemic awareness or phonological sensitivity as a developmental trait whereby children are initially sensitive to larger phoneme units such as syllables and gradually acquire sensitivity to individual phonemes. Reading researchers indicate that poor readers demonstrated extreme difficulty with phonemic awareness tasks such as rhyming, segmenting and blending (Bradley and Bryant 1985; Goswami and Bryant 1990; Yopp and Singer 1985; Goldstein 1974; Roswell and Chall 1997) that are critical to decoding our alphabetic writing system. The inability to decode the alphabetic writing system will further impact students' reading comprehension and fluency. Difficulties in the development of phonemic awareness are also linked to another area of research on rapid automatized naming and its relationship to memory for processing phonological units.

Rapid Automatized Naming (RAN), IQ and Expressive Language Impairments

A number of researchers report that there are significant correlations between naming speed and reading test scores (Wolf and Katzir-Kohen 2001; Denckla and Rudel 1974; Spring and Davis 1988; Wolf 1986). These researchers suggest that a deficit phonological processing ability measured by automatized naming speed results in low rates of reading fluency. The reasoning behind this centers on the notion that a delay in the sound/symbol association and recalling a word in stored memory will lead to inaccurate decoding.

To complicate matters further, IQ scores tend to also predict later reading skill (Tunmer, Herriman, and Nesdale 1988). The reasoning here is that the analytical and logical abilities tapped by IQ tests underpin later success in reading achievement. Moreover, researchers (Bishop

and Adams 1990) found that severe language problems are almost synonymous with low verbal IQ scores in the early grades, or lead to low IQ as time goes on and that IQ scores are predictive of reading problems. All of these factors are part and parcel of the phonological deficit theory of dyslexia and have powerful implications for children who come to school with language impairments. As we examine these reading research findings in relationship to children with language problems a few inconsistencies begin to emerge.

Assumptions Underlying Phonological Deficit Theory

The first assumption of the phonological deficit theory is that the problem or deficit resides in the child's phonological processing abilities. Given this premise, reading researchers (Høien et al. 1995; Liberman et al. 1974; Lonigan et al. 1998) examined dyslexic readers' performance on phonemic awareness tasks and found that poor readers demonstrate poor performance on skills such as rhyming, blending, segmenting, phoneme deletion, and phoneme manipulation. Because phonemes are perceived to be difficult to disentangle from the speech stream, reading researchers theorized that phonemic awareness difficulties arise from a more comprehensive problem with speech perception.

While adults find phonemes difficult to mark in the language, (Friederici and Wessels 1993)) found that infants are quite capable of marking and isolating phonemes in the speech stream. Infants as young as 6 to 9 months mark words and deduce the probability of phonemic patterns phonemic cues. That is, they recognize legal consonant clusters that mark beginnings and endings of words. They also process and store legal and/or illegal phoneme sequences in order to recognize where to split up illegal phonemes in our language. For example, the phoneme /ng/ never begins a word and /h/ and /w/ never end a word (McGuinness 2005). If the infant couldn't hear the individual phonemes then she wouldn't be able to split up the words. So instead

of the child extracting and repeating the word, “doggie,” when she hears someone call, “Here doggie” we might just as likely hear her say, “eredo”. As adults we encounter difficulty with isolating phonemes only because we are not learning the language: our processing of sounds has become automatic. We don’t need to isolate the sounds. It is easier for us to mark words in utterances because they are meaningful units that help us make sense of speech. However, in the development of speech perception and language, infants hear and process at the phoneme unit level (Friederici and Wessels 1993; Mattys et al. 1999).

Researchers purporting to measure phonemic awareness also view phonemic skills as intermediate steps in the natural language development and have a direct impact on later reading ability. When McGuinness analyzed many of the actual studies, she found that these conclusions were not supported (2005). For example she reported that in Bradley and Bryant’s’ longitudinal study (1985), “...the alliteration score accounted for a greater amount of variance on the reading and spelling tests but predicted 9 percent of the variance on a standardized mathematics test also” (138). Bradley and Bryant theorized that when children engage in word play, they begin to categorize words using phonemes and this leads to phonemic awareness. Yet, there is no direct connection between being able to rhyme and using a phonemic code. In other words, one doesn’t need to know how to rhyme words to decode a word. It seems that what reading researchers are predicting with phonemic awareness tests is how well a student will learn to rhyme, manipulate phonemes and identify words that begin or end with the same sound but *not* later reading achievement.

Another assumption inherent within the phonological deficit theory is that children with expressive language impairments such as articulation problems will exhibit later reading difficulties. (Liberman and Liberman 1989) suggested that articulation problems are a marker for

later reading problems due to poor phonological development. However, the longitudinal studies of language researchers (Beitchman et al. 1994; Beitchman et al. 1996; Beitchman et al. 1986; Bishop and Adams 1990) studying children with speech and language problems found that speech-motor-problems without other language difficulties did not lead to low reading or spelling skills for children with speech problems. Children with poor articulation performed as well academically as children without language problems. McGuinness (2005) suggests that articulation and phonemic awareness tasks are independent, or the children had good speech therapy or perhaps the children just outgrew the problems.

Taking a Closer Look

Given the inconsistencies in the literature, we are pressed to consider the subtleties within phonemic awareness that might be critical and therefore a priority for children who have language impairments. What many of the reading studies clarify for us is that particular tasks (rhyming, alliteration, phoneme manipulation) when administered to young children *without teaching the alphabetic principle* do not relate to reading achievement. However when we examine studies that involved the direct instruction of the alphabetic principle (sounds can be mapped onto letters) to children *before* testing their phonemic awareness skills, children do much better.

This was the case in Yopp's study of over 100 kindergartners (1988). Yopp found that the best predictors for learning to read novel words were the tasks of phoneme isolation and segmenting, and blending. The tests measuring auditory discrimination, alliteration and rhyming showed no relation to learning rate. Yopp's study and others like it (Stanovich, Cunningham, and Cramer 1984; Wagner, Torgesen, and Rashote 1994; Nation and Hulme 1997; Schatschneider et al. 1999) substantiate the notion that phonemic awareness is correlated to reading and spelling

but rhyme and syllable splitting are not. It appears that the critical element for later reading success is not whether children can rhyme or manipulate phonemes strictly by ear, but if they can isolate phonemes, blend and segment phonemes *once they are taught the alphabetic principle*.

We also know from Bishop and Adam's work, (1990) that the children in their study with general language impairments demonstrated a pronounced slide in general IQ scores and academic performance that began after the age of 12. They found that children with low verbal comprehension and low receptive vocabulary had the most difficulty academically. Over 90% of the children with verbal comprehension problems had impairments in two or all three areas of language (semantics, syntax and/or speech production). It appears that our concern is a legitimate one for children with general language impairments primarily because general language impairments involve a number of elements within the language system. On the other hand, 33 percent of the children in their longitudinal study who had no indicators of language problems at age 5 developed serious language problems or articulation problems at age 12. Even more surprising was that IQ scores declined from ages 12-19 not only for the students with the most involved language impairments but for the control group as well.

The literature on language development suggests that children with articulation difficulties fair better than those with a general language impairment. Speech and language therapists in schools frequently use methods of instruction that pair phoneme/grapheme symbols in addition to focusing on the motoric features of sound articulation. Modeling correct phoneme articulation in conjunction with letters helps children make this connection. It is the explicit instruction and knowledge that sounds can be mapped onto letters that may help these children outgrow speech disorders. Perhaps, this explicit instruction accounts for better reading achievement in the absence of strong reading instruction in the primary grades.

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In terms of IQ scores, a general language impairment will manifest itself in performance on verbal IQ tests. Subtests on the verbal portion of the WISC-R primarily focus on expressive language, comprehension and vocabulary. Thus children who manifest a general language impairment encompassing several language areas (semantics, syntax, pragmatics, phonology) will naturally perform lower on verbal IQ tests. Furthermore, a decline in IQ scores for language impaired students and “normal” students might just as likely be a result of poor reading instruction. It may be that we are seeing the results of the “Mathew effect” where children who have reading problems tend to read less due to fluency and comprehension difficulties and miss important cultural information leading to a decrease in IQ scores (Stanovich, Nathan, and Vala-Rossi 1986). Poor reading fluency and comprehension are also of interest to researchers investigating automatized rapid naming (RAN) and viewed as highly connected to the phonological deficit theory.

A number of reading researchers report that there are significant correlations between naming speed and reading test scores (Wolf 1986; Wolf and Katzir-Kohen 2001). These researchers suggest that a deficit in phonological processing ability measured by naming speed results in low rates of reading fluency. The reasoning behind this centers on the notion that a delay in the sound/symbol association and recalling a word in stored memory will lead to inaccurate decoding. A study (Denckla and Rudel 1974; Tallal 1980) using rapid automatized naming tasks (RAN), with young children below the age of seven resulted in high variability rates suggesting that shared environmental factors may play a role in the rate of naming speed. Not all children come to school knowing number or letter names and that might account for poorer performance levels rather than actual processing speed. In another study by Blachman (1984) rapid naming of colors in kindergarten was strongly correlated to reading tests measuring

knowledge of letter shapes, letter names and sounds, and reading simple words. By first grade the color naming did not predict reading test scores but letter naming did. Thus, naming speed is not so important a factor in later reading as is the knowledge that children have about letter names or digits. Children's familiarity with reading symbols (rather than colors or objects) makes it easier for them to name the symbols on a RAN test.

In summing up the research thus far, we find that several assumptions of the phonological deficit theory do not hold up to scrutiny. It is language that is developmental NOT phonemic awareness tasks. Infants can discriminate between phoneme units thus negating the notion that syllables are easier to recognize over individual sounds. Moreover, the ability to rhyme is not a precursor to phoneme segmentation nor are phonemic awareness tasks presented orally, predictive of later reading success. Only when children were taught the alphabetic principle and then tested on isolation/blending and segmenting did they achieve better test outcomes.

Even studies that attempted to look at naming speed as a function of phonological processing deficits are inconclusive because shared environmental factors were not accounted for when comparing low and higher SES families. This is compelling evidence that children coming from low SES families come to school with significantly less accumulated language experience compared to the working class or professional family (Hart and Risley 1995). Finally, children that we would most likely believe to be at greatest risk for insufficient decoding ability, those with articulation disorders, are actually the least likely to suffer from later reading problems than those with general language impairments.

What these studies tell us is that phoneme sensitivity is important to unlocking alphabetic writing systems and the tasks of phoneme isolation, blending and segmenting are most likely to impact reading success. Also, rapid naming of letter and digits show a clear connection to later

reading achievement while naming for objects and colors do not. Which means that trying to speed children's overall naming rates is not the issue; rather it is teaching children to rapidly associate sound to graphic symbols that will strengthen the neural pathways leading to automaticity in word recognition.

In a study of paired associate memory by Otto (1961) found that training results for memorization of nonsense names to five geometric shapes varied as a function of grade level and reading skill. For younger children, incorporating visual kinesthetic feedback improved their learning rate. It seems reasonable that focusing our time on teaching phoneme/letter associations through writing would enhance speed and accuracy of decoding. Notice that I did not suggest *rapid letter naming*, as recommended by the National Reading Panel and cited in Adams (1994). For some children, the cognitive load for identifying the letter name, mapping it onto the correct phoneme and then blending it skillfully can be overwhelming causing the system to shut down. Efficiency dictates that we pair the 40 phoneme and grapheme symbols in our alphabet first, allowing the child to begin decoding simple text and only later, teach letter names (McGuinness, 2005). While some argue that knowing letter names will cue the child to its associated phoneme this is not the case.

For example, the first sound in the several letter names is /e/ as in the letters; f, m, n, l, and x. Others have argued that meaning will enhance the rate of learning and therefore, if we teach letter names this will make the letters or concepts more meaningful resulting in better storage and retrieval processing. However, a letter name is an arbitrary one and letter names are just as nonsensical to children as sounds. If we want children to learn to decode quickly then, stopping to name the letter only increases the cognitive load and may cause even greater confusion because of the acoustical noise within the name (i.e. /e/ as in f). Furthermore, the

frequency of incorrect auditory feedback that the child receives from producing an incorrect phoneme-grapheme association, the more trials it will take to learn the correct one.

Summary

In this paper, I have tried to examine some of the inconsistencies in the phonological deficit theory of dyslexia while illuminating key findings that provide instructional guidance for teaching children with language disorders. Several assumptions of the phonological deficit theory do not hold up under close scrutiny. Phonological awareness while important to reading is not developmental and the tasks of rhyming, alliteration and manipulation of phonemes are not necessary precursors to learning to read. However, isolation of phonemes and blending, and segmenting when combined with paired associate learning of phoneme grapheme symbols *is* a necessary and critical step for decoding the alphabetic writing system. These tasks help to illuminate and develop an explicit understanding of the alphabetic principle. Without this understanding, children will find alternative strategies to make sense of texts and these strategies are often ineffective and deleterious for later reading achievement. Additionally, while general language impairments also impact IQ scores, poor reading instruction may actually cause IQ scores to drop as a result of the Mathew Effect. Finally, children with general language impairments are at greatest risk for reading problems due to shared environmental factors. The combination of low vocabulary rates, pre-literacy experiences and familial patterns of interaction especially for children of poverty predict later reading problems. Fortunately, children who exhibit articulation problems and are provided with motoric speech training in conjunction with sound-symbol associations have the best prognosis.

Conclusion

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An analysis of reading research studies in addition to language development research can help us determine the best and most efficient ways to teach reading to all children. However, for children who come to school with limited language from which teachers can build upon, our models of reading must be rigorous, effective and parsimonious. Waiting to teach the alphabetic principle or paired associate learning of sounds and letters until children master rhyme or alliteration only places these children farther behind in the race for academic success. Time is of the essence. As Bart reminded us earlier, these children can't afford to go slower to catch up!

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