



HHS Public Access

Author manuscript

Perspect ASHA Spec Interest Groups. Author manuscript; available in PMC 2018 August 01.

Published in final edited form as:

Perspect ASHA Spec Interest Groups. 2017 August ; 2: 71–77. doi:10.1044/persp2.SIG1.71.

Understanding Word Reading Difficulties in Children With SLI

Suzanne M. Adlof

Department of Communication Sciences and Disorders, University of South Carolina Columbia, SC

Abstract

Children with specific language impairment (SLI) often show considerable reading difficulties. Research has revealed two primary reading profiles among children with SLI: (a) one of poor word reading and decoding skills and associated reading comprehension difficulties, and (b) one involving relatively strong word reading skills but poor comprehension. This article reviews studies characterizing these two subtypes of SLI, discusses their current clinical implications, and suggests important directions for future study.

The American Speech-Language-Hearing Association (ASHA) has long recognized the relationship between oral and written language skills, as well as the role of speech-language pathologists (SLPs) in preventing, identifying, and providing intervention for reading and writing difficulties. The “Roles and Responsibilities of Speech Language Pathologists within Respect to Reading and Writing in Children and Adolescents” position statement (ASHA, 2001) was published nearly two decades ago, motivated, in part, by numerous studies documenting oral language weaknesses in children with reading difficulties, and reading and writing difficulties in children with language impairment (e.g., Catts, Fey, Zhang, & Tomblin, 1999; Snow, Burns, & Griffin, 1998; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). However, reading difficulties in children with language impairment are not one-size-fits-all. In this paper, I describe two primary reading profiles observed in children with specific language impairment (SLI), those with relatively good word reading skills (SLI-only), and those with difficulties in word reading that also meet criteria for a dyslexia diagnosis (SLI+DYS). I review studies aimed at characterizing these groups and understanding their similarities and differences, discuss their current clinical implications, and suggest important directions for future study.

Defining SLI and Dyslexia

Language difficulties may be associated with a variety of causes, including for example, hearing impairment, genetic syndromes, general cognitive delay, or traumatic brain injury. Children with SLI present with significant language difficulties that may negatively impact educational or social functioning, yet have no apparent cause (Leonard, 2014). The prevalence of SLI among kindergarten students has been estimated to be 7.4% (Tomblin et al., 1997). Currently, there is a lack of agreement about the underlying mechanisms of SLI,

Nonfinancial: Suzanne Adlof has no relevant nonfinancial interests to disclose.

but a variety of theories have been proposed, implicating for example, specific deficits in linguistic knowledge, auditory or verbal processing deficits, and more general cognitive processing deficits (see Leonard, 2014, for a review).

In comparison, dyslexia is characterized by “difficulties with accurate and/or fluent word recognition and by poor spelling and decoding disabilities [that are] often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction” (Lyon, Shaywitz, & Shaywitz, 2003, p. 2). The predominant theory is that core deficits in the phonological domain of language are at the root of word reading difficulties for most individuals with dyslexia (Lyon et al., 2003). These phonological deficits are thought to interfere with children’s ability to learn the alphabetic principle and letter-sound correspondence. Estimates of the prevalence of dyslexia generally range between 5–10% (Catts, Adlof, Hogan, & Ellis Weismer, 2005; Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). In this paper, the term “SLI” is used to maintain an explicit link to prior studies; however, it should also be noted that the term “developmental language disorder” has recently been proposed as a replacement for “SLI” (see Bishop, Snowling, Thompson, Greenhalgh, & CATALISE-2, 2017).

Clinical Overlap of SLI and Dyslexia

Traditionally, SLI and dyslexia were studied separately. However, over time, evidence of similarities in their profiles began to accumulate. For example, several studies noted that in addition to problems with word reading, many children with dyslexia also showed weakness in other aspects of oral language, including vocabulary, grammar, and discourse, often before the onset of formal reading instruction (e.g., Catts et al., 1999; Scarborough, 1990; Snowling, Gallagher, & Frith, 2003). Likewise, other studies noted high rates of reading difficulties within samples of children with SLI (e.g., Catts, Fey, Tomblin, & Zhang, 2002; Conti-Ramsden, Botting, Simkin, & Knox, 2001; Stothard et al., 1998). McArthur, Hogben, Edwards, Heath, and Mengler (2000) examined the extent to which children receiving services for SLI or dyslexia would meet standard diagnostic criteria for both labels. After pooling samples from several previous studies, they found that 55% of children with dyslexia could be classified as having SLI, and all but 10% of children with dyslexia scored below average on standardized language assessments. Likewise, 51% of children with SLI could be classified as having dyslexia, and all but 20% of children with SLI scored below average on standardized reading assessments. Findings such as these raised questions about whether SLI and dyslexia were truly distinct disorders, or rather different manifestations of the same disorder (Bishop & Snowling, 2004; Catts et al., 2005).

In addition to similarities in the clinical diagnostic profiles, similarities in potential cognitive factors underlying SLI and dyslexia were also noted, specifically in the phonological domain of language. For example, on the basis of group comparisons to typically developing (TD) children, it appeared that both children with SLI and children with dyslexia displayed significant difficulties with phonological processing tasks, including measures of phonological awareness and nonword repetition (e.g., Brady, Shankweiler, & Mann, 1983; Dollaghan & Campbell, 1998). In a 2004 review of the literature, Bishop and Snowling argued that a *partial* distinction between SLI and dyslexia should be maintained, stating, “it

is important to distinguish children with relatively pure phonologically based reading problems from those with more global oral language impairments” (p. 862). They proposed a two-by-two model crossing phonological deficits against broader, non-phonological language skills (e.g., morphology, semantics, and syntax). According to Bishop and Snowling’s (2004) hypothesis, both dyslexia and SLI were characterized by phonological deficits. However, they proposed that children with SLI would show additional deficits in non-phonological language skills, whereas those skills would be relatively intact for children with dyslexia. Thus, in Bishop and Snowling’s (2004) model, most children with SLI should have dyslexia, due to presumed underlying phonological deficits, but not all children with dyslexia would have SLI.

How Distinct are SLI and Dyslexia?

A study by Catts and colleagues (2005) tested Bishop and Snowling’s (2004) partial distinction hypothesis against two competing hypotheses. One hypothesis, the “severity” hypothesis, posited that phonological deficits underlie both SLI and dyslexia, but they are more severe in SLI, leading to a broader range of language deficits. Under the severity hypothesis, all children with SLI should have phonological deficits and dyslexia. The other hypothesis posited that SLI and dyslexia are *fully* distinct disorders that happen to frequently co-occur, with dyslexia characterized by phonological deficits and SLI characterized by deficits outside the phonological domain. This third hypothesis differed from Bishop and Snowling’s (2004) proposal because it suggested that some children with SLI (those without comorbid dyslexia) would present with intact phonological skills.

Catts et al. (2005) addressed two important limitations of past studies. First, most past studies had involved clinically referred samples, which likely included participants with more severe deficits and thus potentially more overlap between SLI and dyslexia. Second, many studies had examined a single time point, making it difficult to disentangle language problems that may have been caused by reading difficulties. In contrast, the Catts et al. (2005) study involved a population-based sample of over 500 children, and it assessed reading and language skills from kindergarten through eighth grades. The SLI diagnosis was made on the basis of kindergarten language scores, and children meeting the criteria for dyslexia were identified at second, fourth, and eighth grades. Results showed that 17–36% of children with kindergarten SLI also met criteria for dyslexia in second through eighth grades, whereas 14–19% of children with dyslexia in second through eighth grades also met the criteria for SLI. Although the rates of overlap were significantly higher than would be expected by chance, they were considerably lower than the rates of overlap that had been reported in prior studies involving clinically referred or convenience samples. In fact, in this population-based sample, the majority of children with SLI did not have dyslexia, and the majority of children with dyslexia did not have SLI. In follow-up analyses, Catts et al. (2005) found that the language deficits of children in the SLI-only group were just as severe as those of children in the SLI+DYS group, but children in the SLI+DYS group were more likely to have received clinical services in the primary grades.

To examine the extent of phonological processing deficits in dyslexia and/or SLI, Catts et al. (2005) focused on four subgroups defined by fourth grade reading status and kindergarten

language status: SLI+DYS, SLI-only, dyslexia but not SLI (DYS-only), and TD. Measures of phonological processing included a nonword repetition task administered in second grade and eighth grade, and a phoneme deletion task administered in kindergarten, second, fourth, and eighth grades. Results for the nonword repetition task showed that, across time points, the SLI-only and TD groups performed significantly better than the SLI+DYS and DYS-only groups, the SLI-only and TD groups' means were generally not significantly different from each other, and the DYS-only and SLI+DYS groups' means were not significantly different from each other. Results for the phoneme deletion task showed a slightly different pattern. In kindergarten, the TD group significantly outperformed all other groups, which did not differ from each other. In second grade, the TD group significantly outperformed the SLI-only group, which in turn significantly outperformed the DYS-only and SLI+DYS groups who did not differ from each other. In fourth and eighth grades, results matched those of the nonword repetition task, such that the TD and SLI-only groups scored significantly higher than the DYS-only and SLI+DYS groups, and no other group differences were significant. In summary, children with DYS-only and SLI+DYS consistently showed phonological processing deficits across tasks and time points, whereas children with SLI-only showed performance similar to that of the TD group, except for the two earliest time points for the phoneme deletion task. Taken together, these results indicated that phonological processing deficits were more closely associated with dyslexia than with SLI.

Considering the three hypotheses for the frequent overlap between children meeting criteria for SLI and dyslexia, Catts et al. (2005) argued that the evidence best supported the hypothesis that the two disorders are fully distinct, but frequently comorbid. The severity hypothesis was ruled out by the existence of the SLI-only group. The fact that children with dyslexia (SLI+DYS and DYS-only) consistently showed difficulty with the phonemic awareness and nonword repetition tasks, whereas the SLI-only group showed relatively mild and transient difficulties was contrary to the predictions of Bishop and Snowling's (2004) partial distinction hypothesis.

Subsequent studies have provided converging evidence for the existence of SLI+DYS and SLI-only subgroups (Baird, Slonims, Simonoff, & Dworzynski, 2011; Bishop, McDonald, Bird, & Hayiou-Thomas, 2009; De Groot, Van den Bos, Van der Meulen, & Minnaert, 2015; Eisenmajer, Ross, & Pratt, 2005; Fraser, Goswami, & Conti-Ramsden, 2010; Kelso, Fletcher, & Lee, 2007; McArthur & Castles, 2013; Ramus, Marshall, Rosen, & van der Lely, 2013). Most of the studies included participants with a wide range of chronological ages (e.g., 7–12 years or 6–16 years of age), and with the exception of Bishop et al. (2009), all of these studies involved clinically-referred or convenience samples and only one assessment time point. Across these studies, children with SLI displayed a range of word reading abilities. Some children with SLI exhibited severe word reading deficits consistent with a diagnosis of dyslexia, whereas others showed average or above-average word reading skills, similar to their TD peers. In three studies that measured reading comprehension, children with SLI generally showed deficits in reading comprehension, regardless of their word reading abilities (both SLI-only and SLI+DYS groups showed difficulty with reading comprehension; Bishop et al., 2009; Kelso et al., 2007; Ramus et al., 2013).

These studies have further provided clear evidence that children with SLI+DYS display deficits in phonological skills, using tasks measuring phonological awareness, nonword repetition, and rapid automatized naming (RAN), among others (Baird et al., 2011; Bishop et al., 2009; De Groot et al., 2015; Eisenmajer et al., 2005; Fraser et al., 2010; Kelso et al., 2007; McArthur & Castles, 2013; Ramus et al., 2013). However, the evidence remains somewhat mixed regarding the status of phonological processing skills for children with SLI-only. With regard to phonological awareness measures, specifically, Eisenmajer et al. (2005) found that children with SLI-only scored on par with TD peers and significantly better than children with SLI+DYS. Kelso et al. (2007) also found that SLI-only demonstrated significantly better phonological awareness than SLI+DYS, but their study did not include a TD control group. Three studies (De Groot et al., 2015; Fraser et al. 2010; Ramus et al., 2013) found that children with SLI-only displayed mean scores that were significantly better than children with SLI+DYS but significantly worse than TD children. Similarly, mixed results were observed across studies for nonword repetition and RAN tasks. Overall, the results of these studies examining phonological processing converge to show that phonological processing is more impaired in children with SLI+DYS than in children with SLI-only, who sometimes, but not always, show lower levels of performance than TD peers.

Because most of the studies since Catts et al. (2005) included a wide age range of participants and one assessment time point, it is difficult to determine the extent to which poorer performance on phonological processing tasks for children with SLI precedes or follows poor word reading abilities. However, Bishop et al. (2009) examined a longitudinal dataset, whereby SLI+DYS and SLI-only classifications were determined based on test scores at age 9–10 years, and phonological processing skills were examined both concurrently at age 9–10 years and retrospectively at 4 years and 6 years of age. At age nine, children with SLI-only significantly outperformed children with SLI+DYS and didn't significantly differ from TD children on rapid naming and nonword repetition tasks. However, at four and six years of age, both the SLI+DYS and SLI-only groups performed significantly worse than the TD group on phonological awareness and nonword repetition tasks, and they did not significantly differ from each other. At age 4 years, the only significant difference between the SLI+DYS and SLI-only groups was found on an articulation task, where children with SLI-only outperformed children with SLI+DYS. At age six years, the SLI+DYS group showed significantly lower performance on measures of vocabulary, sentence comprehension, and verbal memory than the SLI-only group. These results converged with Catts et al. (2005) to show that SLI+DYS and SLI-only can be distinguished after the SLI+DYS group demonstrates difficulty with word reading, but it is difficult to distinguish them earlier, at least based on the phonological processing measures that have been tried to date. In other words, it is difficult to determine in the preschool and early elementary years which children with SLI will turn out to have word reading difficulties, and which children will show relative strengths in word reading. Furthermore, it seems plausible that the process of learning to read words itself helps improve the phonological processing skills of some children with SLI.

Clinical Implications and Remaining Questions

Although many questions remain to be answered, the findings just reviewed have important, direct clinical implications. First, when considering the literacy needs of children on their caseload, SLPs should be aware that some children with SLI (those meeting the SLI+DYS profile) will require targeted treatment to address their word reading and spelling difficulties. These children will benefit from explicit, systematic, and intensive instruction in phoneme-grapheme (sound-letter) correspondences as well as frequent practice and feedback to build automaticity in word reading (Ehri, Nunes, Stahl, & Willows, 2001; Gersten et al., 2008). As a foundation of basic decoding skills is built, these children may also benefit from explicit instruction in morphology and complex syllable shapes to attack unfamiliar multisyllabic words (Bowers, Kirby, & Deacon, 2010). The remaining articles in this *Perspectives* provide examples of evidence-based word reading instruction at multiple developmental levels.

Second, all children with SLI (SLI+DYS and SLI-only) will need targeted intervention in the broader language areas that support reading comprehension, including vocabulary, syntax, and discourse-level language skills. Third, children meeting the SLI-only profile may be more likely than children with SLI+DYS to “fly under the radar” and not be identified for clinical services, despite having equally severe oral language weakness (Adlof, Scoggins, Brazendale, Babb, & Petscher, under review; Catts et al., 2005). It is important that SLPs are aware of these children and pursue methods to ensure that they do not fall through the cracks. Because this *Perspectives* is specifically focused on addressing word reading skills and difficulties, we refer readers to other resources addressing these broader language skills (Clarke, Snowling, Truelove, & Hulme, 2010; Elleman & Compton, 2017; Hogan, Adlof, & Alonzo, 2014; Language and Reading Research Consortium, 2015).

Additionally, more research is needed to improve our understanding of the factors—including child and environmental factors—that lead to better reading outcomes for children with SLI. As previously reviewed, it is difficult to differentiate good SLI+DYS from SLI-only on the basis of phonological awareness prior to formal reading instruction (Bishop et al., 2009; Catts et al., 2005). Bishop et al. (2009) noted two potentially promising indicators, early articulation skills (which differed between SLI-only and SLI+DYS at age four years) and RAN (which differed between SLI-only and SLI+DYS at age nine years was not assessed prior). Longitudinal studies investigating these and other cognitive measures may be useful for identifying child-level factors that best predict word reading outcomes. However, the potential role of environmental factors in determining outcomes should not be ignored. It is possible that instructional and experiential factors play an important role in determining which children with SLI have word reading difficulties, and which develop age-appropriate word reading skills. Toward this end, a recent study by Tambyraja, Farquharson, Logan, and Justice (2015) examined child and environmental factors that predicted decoding skills in a clinical sample of kindergarten and first grade students with SLI. Tambyraja et al. (2015) examined two measures of phonological processing (phonological awareness, verbal short-term memory, and RAN) and two measures of classroom quality (emotional support and instructional support). Results indicated that phonological awareness and classroom emotional support were unique predictors of spring decoding skills after controlling for fall decoding skills. The results regarding classroom quality are especially interesting given that

the assessment of classroom quality did not always coincide with decoding-related instruction time. Thus, more research is needed to examine both the content and quality of reading instruction and how it impacts the word reading outcomes of children with SLI.

Acknowledgments

I am grateful to Alison Hendricks and Joanna Scoggins for feedback on an earlier version of this manuscript.

Disclosures

Financial: The research reported in this manuscript was supported, in part, by a grant from the National Institute of Deafness and Other Communication Disorders (R03DC013399). The content is solely the responsibility of the author and does not necessarily represent the official views of the National Institutes of Health.

References

- Adlof SM, Scoggins J, Brazendale A, Babb S, Petscher Y. Identifying children at risk for language impairment or dyslexia with group administered measures. under review.
- American Speech-Language-Hearing Association. Roles and responsibilities of speech-language pathologists with respect to reading and writing in children and adolescents [Position Statement]. 2001. Available from www.asha.org/policy
- Baird G, Slonims V, Siminoff E, Dworzynski K. Impairment in non-word repetition: A marker for language impairment or reading impairment? *Developmental Medicine & Child Neurology*. 2011; 53:711–716. [PubMed: 21585364]
- Bishop DVM, McDonald D, Bird S, Hayiou-Thomas M. Children who read words accurately despite language impairment: Who are they and how do they do it? *Child Development*. 2009; 80:593–605. [PubMed: 19467013]
- Bishop DV, Snowling MJ. Developmental dyslexia and specific language impairment: Same or different? *Psychological Bulletin*. 2004; 130(6):858. [PubMed: 15535741]
- Bishop, DV., Snowling, MJ., Thompson, PA., Greenhalgh, T., CATALISE-2. Phase 2 of CATALISE: A multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *Journal of Child Psychology and Psychiatry*. 2017. <https://doi.org/10.1111/jcpp.12721>
- Bowers PN, Kirby JR, Deacon SH. The effects of morphological instruction on literacy skills: A systematic review of the literature. *Review of Educational Research*. 2010; 80(2):144–179.
- Brady S, Shankweiler D, Mann V. Speech perception and memory coding in relation to reading ability. *Journal of Experimental Child Psychology*. 1983; 35(2):345–367. [PubMed: 6842131]
- Catts HW, Adlof SM, Hogan TP, Ellis Weismer S. Are specific language impairment and dyslexia distinct disorders? *Journal of Speech, Language, and Hearing Research*. 2005; 48:1378–96.
- Catts HW, Fey ME, Tomblin JB, Zhang X. A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research*. 2002; 45(6):1142–1157.
- Catts HW, Fey ME, Zhang X, Tomblin JB. Language basis of reading and reading disabilities: Evidence from a longitudinal investigation. *Scientific Studies of Reading*. 1999; 3(4):331–361.
- Clarke PJ, Snowling MJ, Truelove E, Hulme C. Ameliorating children's reading-comprehension difficulties a randomized controlled trial. *Psychological Science*. 2010; 21(8):1106–1116. [PubMed: 20585051]
- Conti-Ramsden G, Botting N, Simkin Z, Knox E. Follow-up of children attending infant language units: Outcomes at 11 years of age. *International Journal of Language & Communication Disorders*. 2001; 36(2):207–219. [PubMed: 11344595]
- De Groot BJ, Van den Bos KP, Van der Meulen BF, Minnaert AE. Rapid naming and phonemic awareness in children with reading disabilities and/or specific language impairment: Differentiating processes? *Journal of Speech, Language, and Hearing Research*. 2015; 58(5):1538–1548.

- Dollaghan C, Campbell TF. Nonword repetition and child language impairment. *Journal of Speech, Language, and Hearing Research*. 1998; 41(5):1136–1146.
- Ehri LC, Nunes SR, Stahl SA, Willows DM. Systematic phonics instruction helps students learn to read: Evidence from the National Reading Panel's meta-analysis. *Review of Educational Research*. 2001; 71(3):393–447.
- Eisenmajer N, Ross N, Pratt C. Specificity and characteristics of learning disabilities. *Journal of Child Psychology and Psychiatry*. 2005; 46:1108–1115. [PubMed: 16178935]
- Elleman A, Compton D. Beyond comprehension strategy instruction: What's next? *Language Speech and Hearing Services in Schools*. 2017; 48:84–91.
- Fraser J, Goswami U, Conti-Ramsden G. Dyslexia and specific language impairment: The role of phonology and auditory processing. *Scientific Studies of Reading*. 2010; 14(1):8–29.
- Gersten, R., Compton, D., Connor, CM., Dimino, J., Santoro, L., Linan-Thompson, S., Tilly, WD. Assisting students struggling with reading: Response to Intervention and multi-tier intervention for reading in the primary grades. A practice guide. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education; 2008. NCEE 2009-4045 Retrieved from <http://ies.ed.gov/ncee/wwc/publications/practiceguides/>
- Hogan TP, Adlof SM, Alonzo C. On the importance of listening comprehension. *International Journal of Speech-Language Pathology*. 2014; 16:199–207. [PubMed: 24833426]
- Kelso K, Fletcher J, Lee P. Reading comprehension in children with specific language impairment: An examination of two subgroups. *International Journal of Language and Communication Disorders*. 2007; 42:39–57. [PubMed: 17365085]
- Language and Reading Research Consortium. Learning to read: Should we keep things simple? *Reading Research Quarterly*. 2015; 50(2):151–169.
- Leonard, LB. Children with specific language impairment. Cambridge, MA: The MIT Press; 2014.
- Lyon GR, Shaywitz SE, Shaywitz BA. A definition of dyslexia. *Annals of dyslexia*. 2003; 53(1):1–14.
- McArthur G, Castles A. Phonological processing deficits in specific reading disability and specific language impairment: same or different? *Journal of Research in Reading*. 2013; 36(3):280–302.
- McArthur GM, Hogben JH, Edwards VT, Heath SM, Mengler ED. On the “specifics” of specific reading disability and specific language impairment. *Journal of Child Psychology and Psychiatry*. 2000; 41(7):869–874. [PubMed: 11079429]
- Ramus F, Marshall CR, Rosen S, van der Lely HK. Phonological deficits in specific language impairment and developmental dyslexia: Towards a multidimensional model. *Brain*. 2013; 136(2): 630–645. [PubMed: 23413264]
- Scarborough HS. Very early language deficits in dyslexic children. *Child Development*. 1990; 61(6): 1728–1743. [PubMed: 2083495]
- Shaywitz SE, Shaywitz BA, Fletcher JM, Escobar MD. Prevalence of reading disability in boys and girls: Results of the Connecticut longitudinal study. *Journal of the American Medical Association*. 1990; 264(8):998–1002. [PubMed: 2376893]
- Snow, CE., Burns, MS., Griffin, P. Preventing reading difficulties in young children committee on the prevention of reading difficulties in young children. Washington, DC: National Academy Press; 1998.
- Snowling MJ, Gallagher A, Frith U. Family risk of dyslexia is continuous: Individual differences in the precursors of reading skill. *Child Development*. 2003; 74(2):358–373. [PubMed: 12705560]
- Stothard SE, Snowling MJ, Bishop DV, Chipchase BB, Kaplan CA. Language-impaired preschoolers: A follow-up into adolescence. *Journal of Speech, Language, and Hearing Research*. 1998; 41(2): 407–418.
- Tambyraja SR, Farquharson K, Logan JA, Justice LM. Decoding skills in children with language impairment: Contributions of phonological processing and classroom experiences. *American Journal of Speech-Language Pathology*. 2015; 24(2):177–188. [PubMed: 25835599]
- Tomblin JB, Records NL, Buckwalter P, Zhang X, Smith E, O'Brien M. Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*. 1997; 40(6):1245–1260.