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Introduction:
Advances in the early detection of reading risk

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As we write the prologue to this Special Issue of the Journal of Learning Disabilities, *Advances in the early detection of reading risk,* the U.S. National Early Literacy Panel has recently released its report, "Developing Early Literacy" (National Early Literacy Panel, 2008). A chapter of the report is devoted to reviewing studies that attempt to identify the most accurate preschool and kindergarten predictors of later outcomes in reading and spelling. The report is affirmative of an emerging consensus that the very early status of skills directly related to literacy: alphabet knowledge, phonological awareness, rapid automatic naming (RAN), phonological memory and early writing, is highly correlated to early progress in reading, spelling and writing.

Yet the report also highlights how far we are from fully understanding the early development of literacy. As the authors point out, despite the scope of the analysis being from birth to 5-years-old, the initial age of children in most of the studies available was 4 years of age or older and outcome variables generally did not go beyond second grade, with many studies restricting their focus to within-kindergarten relationships. In this way, the findings are highly influenced by proximity effects, i.e. skills measurable immediately at the onset of literacy instruction yield the highest correlations to early literacy through both their cognitive and temporal proximity to early reading measures. Another somewhat surprising finding was the inconsistent predictive value of oral language once alphabetic knowledge and phonological awareness were controlled and further the observation that more complex oral language skills, such as grammar, definitional vocabulary, and listening comprehension, had stronger relationships with both decoding and reading comprehension compared to basic measures of vocabulary production/understanding. The report calls for studies that help elucidate a more nuanced and dynamic understanding of the role of oral language in literacy development.

In the collection of papers here we set out to add meaningfully to the body of evidence summarized by the NELP report in several key ways. The first contribution is adding to the number of studies that go beyond the highly-studied kindergarten to second grade period. Understanding associations between success in literacy acquisition and skills measured significantly before literacy emerges may be a more complex task than finding relationships with contiguous skills; however early intervention really can not be early enough unless we better understand trajectories of risk observable within the earliest stages of language learning. In *An exploratory study of the development of early syllable structure in reading-impaired children*, Lambrecht Smith, Roberts, Locke and Tozer report speech production data from the first longitudinal study to look in depth at babbling development between the ages of 8-19 months in a sample of children at genetic risk of reading difficulties. The findings are suggestive of phonological vulnerability in at risk children from English-speaking families even from 8 months of age, with children later identified as reading disabled having a lower proportion of canonical babbling (containing true consonant and vowel combinations), as well as reduced syllable complexity within ca-

nonical babbling. In *Language development, literacy skills and predictive connections to reading in Finnish children with and without familial risk of dyslexia,* Torppa, Lyytinen, Erskine, Eklund & Lyytinen (this edition) also expand our knowledge of very early predictors of literacy skills, within the context of the highly transparent Finnish orthography. In another longitudinal study of infants at genetic risk of reading difficulties, the study characterizes language skills from 1½-years-old onwards. At 2 years of age, group differences and predictive relationships to reading difficulties at the end of second grade were found within the domains of expressive language and maximum sentence length (although in contrast to Lambrecht-Smith et al., this study did not look at speech measures directly). From 2½-years-old, all measures *except* expressive language differentiated the group with dyslexia from the typically-reading control group. The study also found that while significant group differences in receptive language were observed at these early ages, the predictive power of the measures in relation to reading was indirect. Receptive language measured at 2-2½ years contributed most to subsequent development, however this was via inflectional morphology. Torppa et al. also conclude that, "predictors of literacy skills were more similar than different among Finnish- and English-speaking children" p.XX, which is an important observation given the difference in the depths of these orthographies (i.e., English is more opaque than Finnish). The final paper looking at pre-kindergarten predictors of later literacy is *Early oral language markers of poor reading performance in Hong Kong Chinese children* by Lui, McBride-Chang, Wong, Tardif, Stokes, Fletcher, & Shu, which provides evidence from a non-alphabetic linguistic context. In a prospective study of Hong Kong Chinese children that examines the relationship between oral language skills at the ages of 2-4-years-old and reading at 7-years-old Lui et al., similarly to Torppa et al., found that at each assessment time point, the strongest predictor of reading was different: parental report of vocabulary knowledge was the strongest predictor at 2-years-old, Cantonese articulation was the strongest predictor at 3-years-old while sentence imitation emerged as the strongest predictor at 4-years-old.

Together the studies of Lambrecht et al., Torppa et al. and Lui et al. attest to the consistent evidence of relationships between a range of pre-school oral language skills and literacy skills in the early school years. In *Kindergarten predictors of second vs. eighth grade reading comprehension impairments*, Adlof, Catts and Lee examine longitudinal relationships into the later school years, exploring kindergarten predictors of second and eighth grade reading comprehension, respectively. A similarly dynamic pattern of relationships emerges, with the kindergarten measures of sentence imitation and letter identification most salient for second grade prediction, with the combination of phoneme deletion, grammatical completion, sentence imitation, nonverbal IQ, mother's education level &/or RAN providing the strongest predictive model of reading comprehension at eighth grade. The latter finding also underscores the complexity of the reading acquisition process – by attempting to predict skill growth over longer time frames, increasing numbers of factors must be considered.

The collective findings of these four longitudinal articles make it easy to see why in a meta-analysis language has an unclear association with later reading: the pattern of most predictive language skills changes rapidly. As aptly described by Speece (2005) in relation to early reading skills, finding the optimal predictors is akin to trying to hit a 'moving target'. The issue of changing interdependencies between component language and literacy skills is further confounded by the ability of assessment instruments and even individual test items to sensitively measure a skill at any one time. Understanding these interactions is particularly critical as initiatives such as Response to Intervention (RTI; for review see Fuchs, Fuchs, Zumeta & Grigorenko, 2008) in the U.S. become more widespread. RTI is a tiered system that uses regular assessment to make instructional decisions about the intensity and nature of intervention that a child at risk of, or diagnosed with learning disability, should get. Accurate assessment, whether through screening at Tier 1 or more in-depth diagnostic assessment at Tier 3 is a lynchpin in the approach and so the availability of reliable, valid multiple, age-sensitive tools is clear.

When contemplating the sensitivity of assessment tools, it is also important to remember that while the strong correlations between phonological awareness and early literacy are incontrovertible, current phonological awareness assessments still suffer from high rates of over- and under-identification of children at risk of reading difficulties (Scarborough, 1998). Furthermore, the developmental mechanism through which phonological awareness becomes compromised is not yet fully understood. Therefore, rather than assuming the phonological awareness story is a closed book, a further contribution of this special issue is the application to the preschool population of emerging insights into phonological representation that have been investigated with older children and adults. In *A short report: Word-level phonological and lexical characteristics interact to influence phoneme awareness*, Hogan addresses the issue of the sensitivity and specificity of phonological awareness measures. Using a phoneme-based odd-one-out task, the study reports significant differences in

children's test item performance depending upon the phonological characteristics (sound-contrast similarity) as well as lexical characteristics (neighborhood density) of the trial items. In *Assessing component language deficits in the early detection of reading difficulty risk*, Van der Lely and Marshall also report on a new language screening tool for children between 3½ and 6½ years of age, the GAPS test, which is constructed with unique consideration of the hierarchical complexity of aspects of phonology, morphology and syntax. The authors also provide tentative evidence that more fine-grained analysis of these linguistic elements may provide new opportunities for distinguishing between the early phonological profile of children at risk of specific reading difficulties, such as dyslexia, vs. children with specific language impairment. The findings of Hogan and van der Lely and Marshall are the tip of an iceberg in terms of the extensive work needed to fully understand the role of phonological and linguistic factors on test performance. However they also offer great promise for the possibility of detecting factors that when more systematically controlled, will allow assessments to provide more accurate markers of risk. Turning to developmental precursors of phonological awareness, in *Auditory processing and early skills in a preschool and kindergarten population*, Corriveau, Goswami and Thomson consider the additional predictive utility these antecedents may offer in detecting risk of later reading difficulties. The authors focus specifically on a component of auditory perception, rise time sensitivity, which is associated with perception of speech rhythm and syllable boundaries and thus the earliest manifestations of phonological awareness. The findings support the potential value of such measures, with rise time sensitivity able to predict both concurrent levels of skill in reading pre-cursors such as rhyme awareness, as well as *growth* in these skills in a population of 3-6-year-old children.

In sum, the research reported in this special issue adds to the recent NELP report in several meaningful ways. The first contribution is adding studies that examine the association between infant, toddler, and preschool language and pre-reading measures to early reading development. In this vein, results converge to show that early language is related to early reading but the relationships are not straightforward. The second contribution is adding to the notion that predicting reading at later time points will likely require a combination of predictors to capture distal relations. The final contribution is adding to work aimed at improving test sensitive and specificity to reading risk by exploring item characteristics, increasing differential predictions by poor reader subgroups, and understanding pre-cursors to phonological awareness.

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