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**Handouts for Talk Presented at the
Emergent Literacy Development
Conference**

Niagara Falls, Ontario

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**Development & Promotion of
Emergent Literacy:
An Evidence-Based Perspective**

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The Importance of Reading

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The Importance of Reading

Reading skills provide the foundation for
children's academic success

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The Importance of Reading

- Children who read well read more.
- They acquire more knowledge in numerous domains.

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The Importance of Reading

- Nagy and Anderson (1984, p. 328) estimated that the number of words read in a year by a middle-school child who is an avid reader might approach 10,000,000, compared to 100,000 for the least motivated middle-school reader.

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The Importance of Reading

Children who lag behind in their reading skills...

- receive less practice in reading than other children
- miss opportunities to develop reading comprehension strategies
- often encounter reading material that is too advanced for their skills
- acquire negative attitudes about reading itself.

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The Importance of Reading

This may lead to what Stanovich (1986) termed a "Matthew effect," (i.e., the rich get richer while the poor get poorer).

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The Importance of Reading

Matthew Effect

Children with poor reading skills fall further and further behind their more literate peers in reading as well as in other academic areas, which become increasingly dependent on reading across the school years.

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The Importance of Reading

- Children with limited reading-related skills rarely catch-up to their peers without intensive intervention.
- Many continue to experience difficulties throughout their school years and into adulthood.

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The Importance of Reading

- Juel (1988) reported that the probability that children would remain poor readers at the end of the fourth grade if they were poor readers at the end of the first grade was .88.

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The Importance of Reading

- Children who are poor readers are frequently referred to special education classes.
- Of those who experience the most serious reading problems, 10 to 15% drop out of high school, and only 2% complete a 4-year college program.

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The Importance of Reading

Emergent Literacy

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What is Emergent Literacy?

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Emergent Literacy

Emergent literacy involves the skills, knowledge, and attitudes that are developmental precursors to conventional forms of reading and writing (Whitehurst & Lonigan, 1998).

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Emergent Literacy

Emergent literacy skills are the basic building blocks for learning to read and write.

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Emergent Literacy

Emergent literacy skills begin developing in early infancy and early childhood through participation with adults in meaningful activities involving talking and print.

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Emergent Literacy

Interventions in the preschool period need to focus on emergent literacy skills because children are not yet engaging in convention forms of literacy.

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Emergent Literacy

Questions that need to be answered about emergent literacy interventions:

- What skills constitute the domain of emergent literacy?
- What are effective ways to intervene on those skills?
- Are these skills necessary to develop conventional literacy skills (if not, why not just teach conventional literacy skills)?

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Emergent Literacy

What skills constitute the domain of conventional literacy skills?

- Receptively
 - Decoding (accuracy and fluency)
 - Reading Comprehension

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Emergent Literacy

What skills constitute the domain of conventional literacy skills?

- Although decoding is not all there is to skilled reading, it is a critical component.
 - You can decode what you cannot comprehend, but...
 - you cannot comprehend what you cannot decode.

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Emergent Literacy

What skills constitute the domain of conventional literacy skills?

- Expressively
 - Spelling
 - Composition

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Emergent Literacy

How to define emergent literacy

- Two conditions need to be satisfied for something to be considered an emergent literacy skill:
 - (a) Must come before conventional literacy skills.
 - (b) Must be related to (i.e., predictive of) conventional literacy skills.

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Emergent Literacy

**Identifying Emergent Literacy Skills:
The Evidence**

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Identifying Emergent Literacy Skills

- Many candidate emergent literacy skills have been suggested, including
 - oral language
 - concepts about print
 - environmental print
 - alphabet knowledge
 - phonological processing skills
 - visual-perceptual skills
 - emergent (pretend) reading
 - emergent (pretend) writing

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Identifying Emergent Literacy Skills

The National Early Literacy Panel (NELP) conducted a meta-analytic review of published studies to identify potential variables that were predictive of later conventional literacy.

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Identifying Emergent Literacy Skills

Study Selection

- Using a list of search terms in nine categories, electronic searches in both PsychINFO and ERIC were conducted
- 6700 citations were generated

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Identifying Emergent Literacy Skills

- These 6700 publications were screened against initial criteria
 - Published in English
 - Published in a referred journal
 - Empirical research
 - Include children between the ages of 0 and 5 or kindergarten children

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Identifying Emergent Literacy Skills

- 1825 studies passed this initial screening and abstracts were reviewed for relevance.
- 685 studies passed this second screen and full text articles reviewed for relevance.

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Identifying Emergent Literacy Skills

- 275 passed the full text review.
 - 41 of the 275 were later rejected because of insufficient information to code.
- All effect sizes in these 234 studies were coded and summarized.

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Identifying Emergent Literacy Skills

Each of these 234 studies involved a predictive relation between a skill measured during preschool (or kindergarten) and a convention literacy outcome measured at some later point in time (i.e., from kindergarten forward).

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Identifying Emergent Literacy Skills

Resulting in...

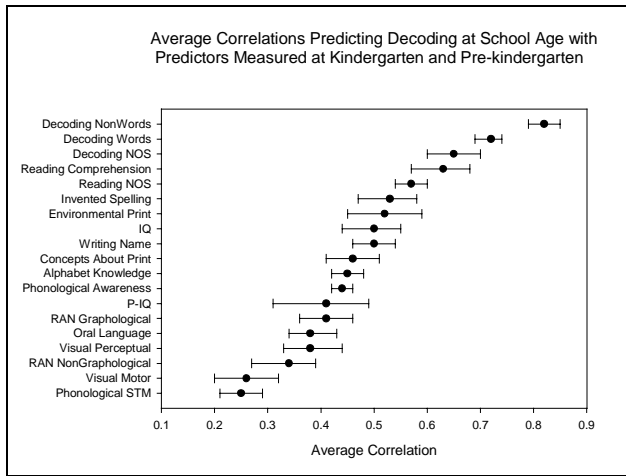
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Univariate Predictive Relations between Preschool Variables and Decoding			
Predictor Variable	Average Correlation	Number of Studies	Number of Subjects
Decoding NonWords	.82	5	493
Decoding Words	.72	11	1,211
Decoding NOS	.65	3	460
Reading Comprehension	.63	4	492
Reading NOS	.57	3	1,739
Invented Spelling	.53	9	625
Environmental Print	.52	4	394
Writing Name	.50	8	1,388
IQ	.50	9	808

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More Univariate Predictive Relations between Preschool Variables and Decoding			
Predictor Variable	Average Correlation	Number of Studies	Number of Subjects
Concepts About Print	.46	9	1,090
Alphabet Knowledge	.45	26	2,826
Phonological Awareness	.44	47	4,334
RAN Graphological	.41	8	1,029
P-IQ	.41	6	346
Visual Perceptual	.38	10	946
Oral Language	.38	12	1,578
RAN NonGraphological	.34	8	861
Visual Motor	.26	9	843
Phonological STM	.25	21	2,384

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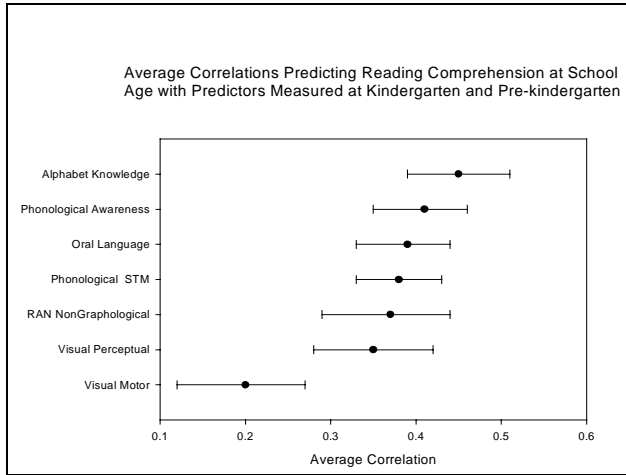


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Univariate Predictive Relations between Preschool Variables and Reading Comprehension

Predictor Variable	Average Correlation	Number of Studies	Number of Subjects
Alphabet Knowledge	.45	6	668
Phonological Awareness	.41	13	1,007
Oral Language	.39	10	1,024
Phonological STM	.38	8	1,260
RAN NonGraphological	.37	4	509
Visual Perceptual	.35	4	659
Visual Motor	.20	4	670

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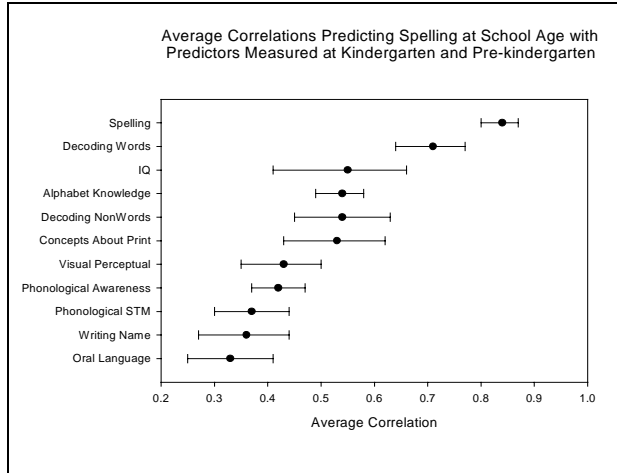


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Univariate Predictive Relations between Preschool Variables and Spelling

Predictor Variable	Average Correlation	Number of Studies	Number of Subjects
Spelling	.84	4	284
Decoding Words	.71	3	260
IQ	.55	3	129
Decoding NonWords	.54	3	246
Alphabet Knowledge	.54	9	873
Concepts About Print	.53	3	217
Visual Perceptual	.43	3	434
Phonological Awareness	.42	14	1,225
Phonological STM	.37	6	661
Writing Name	.36	3	397
Oral Language	.33	5	488

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Identifying Emergent Literacy Skills

- Within meta-analyses, there must be a minimum of three studies contributing an effect size to allow interpretation.
- Correlations of .30 or higher mean that at least 9 percent of the variance in a conventional literacy outcome can be predicted from the emergent literacy variable.

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Identifying Emergent Literacy Skills

A number of variables have strong and consistent relations with later convention literacy outcomes in a relatively large number of studies with a relatively large number of children (meaning they are sizable, reliable, and stable):

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Identifying Emergent Literacy Skills

Strong Predictors:

- Alphabet Knowledge
- Concepts About Print
- Phonological Sensitivity
- Invented Spelling
- RAN Graphological (Rapid Automatic Naming/Lexical Access)

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Identifying Emergent Literacy Skills

Other variables have a smaller effect or have been examined in fewer studies with fewer children:

- Environmental Print
- Visual Memory
- Visual Perceptual Skills

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Identifying Emergent Literacy Skills

- Variables that likely reflect oral language skills seem to have a stronger relation with reading comprehension than with decoding skills.
- Variables that are not in the table have not yet been demonstrated to be predictive of later conventional literacy skills.

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Identifying Emergent Literacy Skills

- A very important interpretive caution for these findings is that these values reflect zero-order correlations.
 - Correlations may reflect third variables.
 - Variables may share predictive variance.

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Identifying Emergent Literacy Skills

- Greater confidence of the importance of a variable would be obtained if that variable contributed unique predictive variance to an outcome once other important variables were controlled.
- For example, does a variable predict a reading outcome above and beyond variance shared with IQ or language skill?

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Identifying Emergent Literacy Skills

- Examination of multivariate studies (i.e., studies in which the predictive utility of variables is examined in the context of other variables) indicates that several of these univariate predictors provide independent predictive information.

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Identifying Emergent Literacy Skills

Example

- One-year longitudinal study
- 100 4- and 5-year-old children attending preschool
- From middle-SES backgrounds

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Identifying Emergent Literacy Skills

- Measured phonological sensitivity, letter knowledge, environmental print, and concepts about print (CAP) at Time 1 and phonological sensitivity, letter knowledge, CAP, and decoding at Time 2 (12-months later).

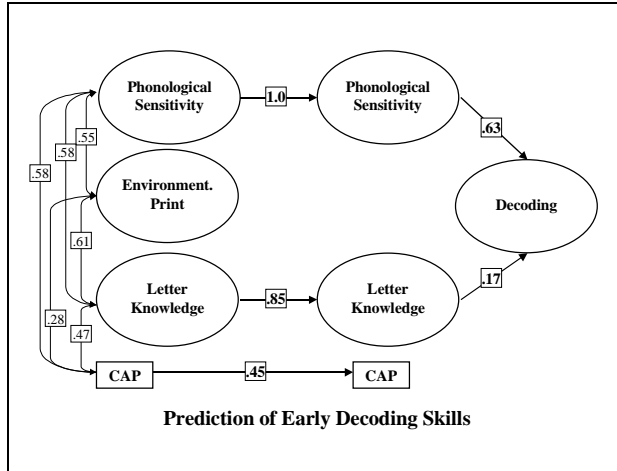
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Significance of Preschool Phonological Sensitivity

Zero-order Correlations between Time 1 Emergent Literacy Skills and Time 2 Emergent Literacy and Reading Skills

	Time 2 Variables			
	Phonological Sensitivity	Letter Knowledge	Reading	Concepts of Print
Phonological Sensitivity	1.00***	.48***	.60***	.44***
Environmental Print	.59***	.42***	.51**	.18
Letter Knowledge	.64***	.80***	.51***	.37**
Concepts of Print	.60***	.35***	.40***	.62***

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Emergent Literacy

Consistent evidence that there are three primary domains of emergent literacy skills that are related to later (conventional) reading and writing.

- o Oral Language
- o Print Knowledge
- o Phonological Processing

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Emergent Literacy

These three skills are the foundation for how easily, quickly, and well children learn to read and write once they begin kindergarten and first grade.

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Emergent Literacy

Research shows that these three skills, measured when children are in preschool, predict how well the children will be reading in the first grade.

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Oral Language Skills

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Reading-Related Oral Language Skills

Vocabulary Knowledge

Syntactic Knowledge

Narrative Understanding

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Reading-Related Oral Language Skills

Why are oral language skills important to literacy?

- Knowing words is key to learning to read.
- Reading is a different way of communicating.
- Difficult to learn to read words if you do not know words (i.e., what they mean; what they represent).

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Reading-Related Oral Language Skills

Different oral language skills have larger and smaller influences at different points in the process of reading development

- Vocabulary has some role early in the process (e.g., decoding)
- More complex oral language skills are most important later in the process of learning to read. They help children understand what is being read.

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Print Knowledge

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Print Knowledge

- Understanding that it is the print that reflects the words and not other parts of books, like the pictures or the spaces between words.
- Understanding that there are 26 different letters in English and that letters can look different and still be the same letter, as is the case for upper and lower case letters (or different print styles).

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Print Knowledge

- Children need to learn that there are different sounds associated with each letter.
- This task is difficult because sometimes each letter can represent multiple sounds (e.g., g and s), or the same sound can be associated with different letters (e.g., c and k)!

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Phonological Processing Skills

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Phonological Processing Skills

- Alphabetic languages represent language at the phoneme level (i.e., letters typically correspond to phonemes in words).
- Almost all poor readers have a problem with phonological processing.

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Phonological Processing Skills

Phonological Memory

Phonological Access

Phonological Sensitivity

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Phonological Processing Skills

Better phonological memory--the ability to hold sound-based information in immediate memory--may increase the likelihood that the phonemes associated with the letters of a word can be maintained in memory while decoding, freeing more cognitive resources for decoding and comprehension.

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Phonological Processing Skills

Better phonological access--the retrieval of sound-based codes from memory-- may increase the ease of retrieval of phonological codes associated with letters, word segments, and whole words from memory, making it more likely that they can be used in decoding.

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Phonological Processing Skills

Better phonological sensitivity (i.e., the ability to apprehend and/or manipulate smaller and smaller units of sound) facilitates the connection between letters and the sounds they represent in words.

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Phonological Processing Skills

Almost all research on phonological processing skills in preschool children has examined phonological sensitivity.

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Phonological Sensitivity

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Phonological Sensitivity

... involves understanding that words are made up of smaller sounds, like...

- syllables (i.e., the natural breaks in spoken words, like "but" "er" "fly" in the word "butterfly")
- phonemes (i.e., the smallest speech sounds; sounds typically depicted by letters; e.g., the sound of the letter B, is the first phoneme in the word "bat")

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Phonological Sensitivity

Understanding that words are made up of smaller sounds helps children break "the code" between written language (the letters) and spoken language (the sounds).

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Phonological Sensitivity

Developing phonological sensitivity is hard
(you all know this!)

- Phonemes do not really exist!
- We co-articulate the phonemes in words when we speak.

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Development of Phonological Sensitivity

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Development of Phonological Sensitivity

Phonological sensitivity develops in a progressive fashion with sensitivity to smaller and smaller units of sound across the preschool period

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Development of Phonological Sensitivity

o Words

batman = "bat" + "man"

cowboy = "cow" + "boy"

o Syllables

candy = "can" + "dee"

donut = "doe" + "nut"

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Development of Phonological Sensitivity

o Onset - Rime

cat = /k/ + "at"

man = /m/ + "an"

o Phonemes

cat = /k/ + /a/ + /t/

fast = /f/ + /ae/ + /s/ + /t/

mop = /m/ + /o/ + /p/

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Modularity of Emergent Literacy Skills

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Modularity of Emergent Literacy Skills

- Several recent multivariate studies involving the prediction of the development of reading skills indicate that emergent literacy skills are modular.

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Modularity of Emergent Literacy Skills

- Oral language has no direct effect on decoding.
- Vocabulary, however, may be partially responsible for the development of phonological sensitivity.

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Modularity of Emergent Literacy Skills

- Several theories suggest that increasing vocabulary development forces increasingly segmental representation of the lexicon (or sharpens the boundaries between phonological representations).
- Oral language is significantly correlated with phonological sensitivity.

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Modularity of Emergent Literacy Skills

- In a recent intervention study, our results indicated that an effective preschool oral language intervention also resulted in an increase in phonological sensitivity.
- In contrast, an effective preschool phonological sensitivity intervention did not result in an increase in oral language skills.

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Modularity of Emergent Literacy Skills

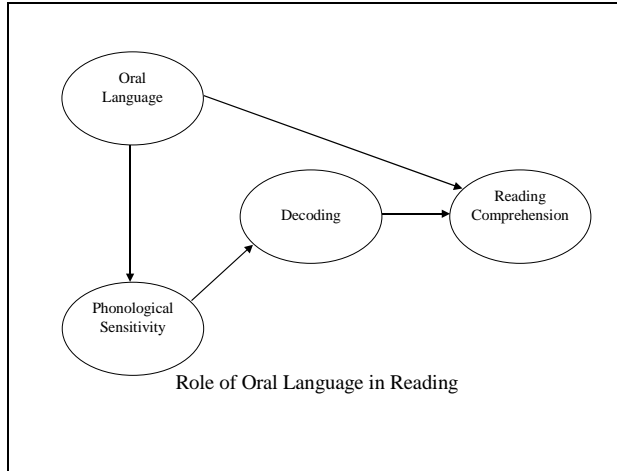
- The resulting model that emerges from these studies has implications for interventions designed to improve the later reading outcomes of preschool children.

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Modularity of Emergent Literacy Skills

A Model of the Development of Reading

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Children At-Risk of Reading Difficulties

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Children At-Risk of Reading Difficulties

Many studies indicate that children who are at-risk of later problems in learning to read score significantly lower in these three emergent literacy domains than children who are not at-risk of later reading difficulties.

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Children At-Risk of Reading Difficulties

- One group of children with significant risk for later reading difficulties is children from economically disadvantaged families.
- In general, these children have less well developed oral language skills and they experience less growth in their language skills during the preschool period (Hart & Risley, 1996).

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Children At-Risk of Reading Difficulties

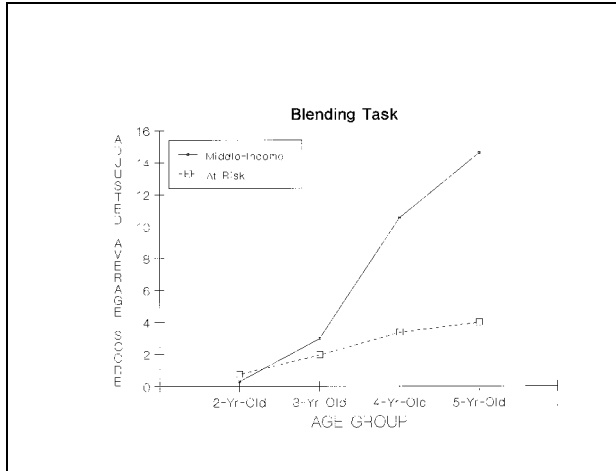
- We examined potential difference in phonological sensitivity in children from higher and lower SES backgrounds (Lonigan et al., 1998).
- Cross-sectional study comparing the performance of 250 children from higher income families to 170 children from lower income families.

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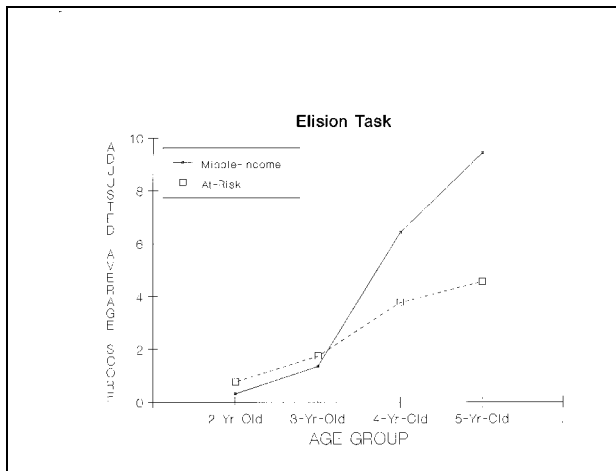
Children At-Risk of Reading Difficulties

- Children were between two- and five-years of age.
- All children completed four tests of phonological sensitivity that assessed their ability to detect, blend, or elide onset-rimes, syllables, or phonemes.
- Children also completed several oral language measures (e.g., PPVT, EOWPVT).

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Children At-Risk of Reading Difficulties

- Children from lower SES backgrounds have significantly less well developed phonological sensitivity.
- Children from lower SES backgrounds appear to experience significantly less growth in these skills during the preschool years compared to their higher SES counterparts.
- Extends downward findings concerning SES differences.

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Promotion of Emergent Literacy Skills

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Promotion of Emergent Literacy Skills

Given the predictive significance of emergent literacy skills, it is clear that children who are at-risk of later difficulties in learning to read can be identified before they experience problems in kindergarten and first grade, when formal reading instruction commences.

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Promotion of Emergent Literacy Skills

- Children with identified weaknesses in the areas of oral language, phonological sensitivity, and print knowledge are candidates for emergent literacy interventions.

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Promotion of Emergent Literacy Skills

- Strong evidence of the efficacy of emergent literacy interventions would come from studies that intervened in any of these three areas during the preschool period and found evidence of a later effect on reading skills.

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Oral Language Interventions

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Oral Language Interventions

- Numerous studies on the efficacy of oral language interventions.
- However, few have followed children to the point where effects could be seen on reading outcome variables.

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Oral Language Interventions

- Domain of studies that have examined the efficacy of various oral language interventions is large.
- This summary is restricted to those interventions that have focused on a literacy context.

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Oral Language Interventions

- All forms of interactive shared reading interventions produce positive effects on children's oral language skills as measured by standardized tests and more natural language samples.
- These interventions require children to respond and incorporate a scaffolding approach.

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Oral Language Interventions

- Effective agents of intervention can be teachers, parents, community volunteers, or teacher aides.
- Effects are obtained with children selected for risk status and unselected children.

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Oral Language Interventions

- Notably, the single study that followed children into the first grade did not find any impact of the successful oral language intervention on children's decoding skills--highlighting the modularity of emergent literacy skills.

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Phonological Sensitivity Interventions

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Phonological Sensitivity Interventions

There is a large literature on the effects of teaching phonological sensitivity to children and its impact on reading skills.

- These data indicate that training phonological skills is effective and has a significant impact on decoding skills. Indeed, these data indicate that phonological skills are causally related to reading skills.

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Phonological Sensitivity Interventions

- The majority of these data, however, come from studies of children in the first grade or older.
- A search of the published evidence yielded approximately 55 studies of phonological sensitivity interventions with children who were in kindergarten or preschool.
- Of these, only 6 studies included primarily children who were preschool age.

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Phonological Sensitivity Interventions

- Byrne and Fielding-Barnsley have reported the most comprehensive examination of a preschool phonological sensitivity intervention.
- Their intervention involved teaching children to identify initial phonemes in words by matching words on the basis of initial sounds.

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Phonological Sensitivity Interventions

- Approximately 6 hours of exposure to this program, conducted by the experimenters, resulted in effects on reading skills that persisted for 6 years.
- A trial of the same program, but implemented by preschool teachers, also yielded positive immediate results; however, the overall size of the effect was not as large as that obtained in the experimenter implemented program.

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Phonological Sensitivity Interventions

- Bryant and Bradley
- Another set of studies have evaluated the impact of using computers to teach children phonological sensitivity.

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Phonological Sensitivity Interventions

- Foster et al. (1994) examined the impact of using a computer to teach children to recognize words that rhyme, recognize words with the same beginning, middle, or ending sound, blend sounds to form a word, and count the number of sounds in words.
- The program lasted for 20 sessions of 20 to 25 minutes each.

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Phonological Sensitivity Interventions

- Older preschool children ($n = 12$) exposed to this program (Daisy Quest) outperformed a group of control children ($n = 15$) who received only their typical pre-k activities.
- We have also evaluated this computer program with a group of children attending Head Start.

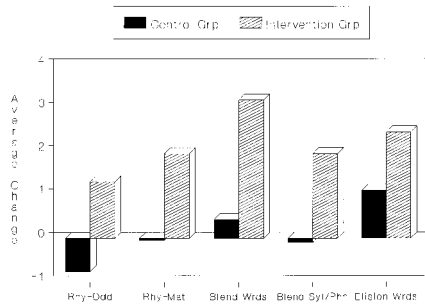
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Phonological Sensitivity Interventions

- 41 children received either 15 minutes of computer exposure per day for 10 weeks or just their typical Head Start activities.
- Analyses of pre- to posttest differences across a variety of phonological sensitivity tasks revealed greater gains in the children exposed to the computer program.

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Significant Pre- to Posttest Difference Scores for Head Start CAI Study



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Phonological Sensitivity Interventions

- Unlike Foster et al., however, we found that many children needed a lot of assistance from an adult to successfully interact with the program.
- Our results suggest that this particular program may be at too high a level for children with limited phonological skills or limited prior exposure to computers.

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Print Knowledge Interventions

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Print Knowledge Interventions

- There are relatively few studies examining the effect of training children in print knowledge.
- In her review of the literature, Adams (1990) noted that there was little evidence that teaching children the alphabet had an impact on later reading.
- Perhaps this conclusion has limited investigations of the impact of print knowledge interventions.

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Print Knowledge Interventions

- The majority of studies involving the teaching of letters have been done in the context of training phonological sensitivity with older children (i.e., Kindergarten or above).
- Data from these studies provide evidence that training children in both phonological sensitivity and letter knowledge is more effective than training in phonological sensitivity alone

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Print Knowledge Interventions

- One recent short-term study did find an effect on reading of training letter knowledge.
- Children trained to recognize letter names were more able to decode phonetically spelled words than children exposed to a comprehension training.
- However, the letter group also received PA training.

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Print Knowledge Interventions

- Additionally, Laura Justice and colleagues have reported a number of studies on the impact of teaching preschoolers what they term "written language skills."
- Positive effects are obtained on measures similar to environmental print and word locating, but not on alphabet knowledge or concepts of print.

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Combined Preschool Intervention

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Combined Preschool Intervention

Two Examples

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Combined Preschool Intervention

- Examined the impact of combinations of oral language intervention, phonological sensitivity intervention, and print knowledge intervention as a pull-out intervention for children attending the local school district's pre-k program.
- All children received the high quality pre-k curriculum that was implemented district-wide by teachers with BA and MA degrees.

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Combined Preschool Intervention

Oral language intervention contrasted Dialogic Reading with either typical shared reading or no-treatment.

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Combined Preschool Intervention

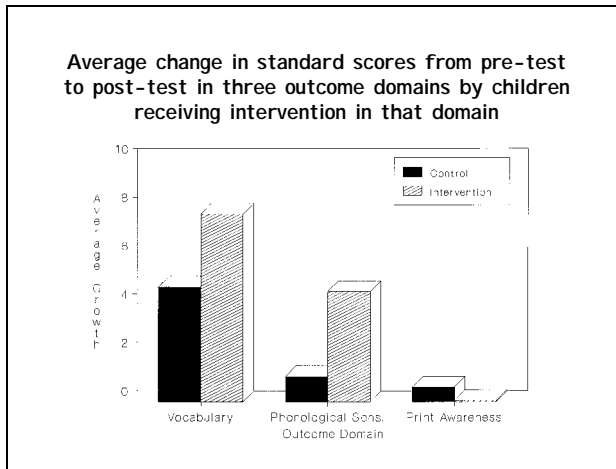
Phonological sensitivity intervention focused on teaching children blending and segmenting skills by making the abstract concept of word sounds concrete via use of puzzle games in which each piece of the puzzle represented a sound in the word.

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Combined Preschool Intervention

Print knowledge intervention focused on teaching children letter names and letter sounds.

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Combined Preschool Intervention

- All interventions had a significant impact in their respective outcome domain.

- These effects were achieved in the context of all children receiving a high-quality pre-k program administered by well-trained, degreed teachers.

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Combined Preschool Intervention

- There were no interaction effects within combined treatment groups suggesting that combining treatments did not have a synergistic effect across domains.

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**Combined Preschool Intervention:
Curriculum Evaluation**

- Combined preschool early literacy curriculum (“Literacy Express”), including
 - dialogic reading
 - small-group phonological sensitivity activities
 - small-group print knowledge activities
- 4-year-old children in 41 Head Start classes in Los Angeles, CA and Tallahassee, FL

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**Combined Preschool Intervention:
Curriculum Evaluation**

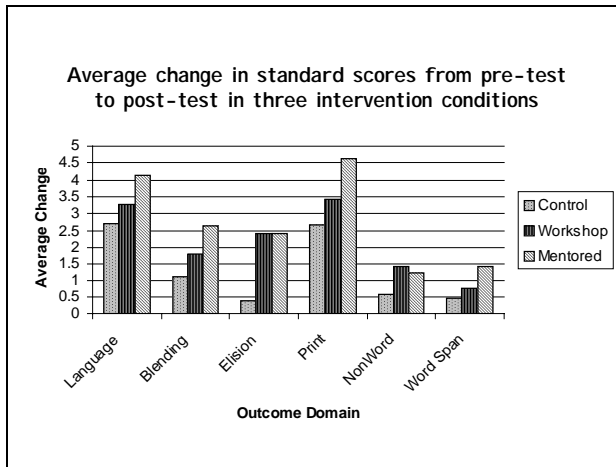
- Teachers trained either in a workshop model or a workshop plus in-class mentoring model (versus "business as usual")
- Children ($N = 570$) pre-tested in September and post-tested in May using the Preschool CTOPPP and PLS-IV

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**Combined Preschool Intervention:
Curriculum Evaluation**

- At preschool entry, the children had a mean age of 50.16 months ($SD = 5.70$) and were primarily Latino (49%) or African American (51%).

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**Combined Preschool Intervention:
Curriculum Evaluation**

- Substantial impact of a teacher-implemented emergent literacy curriculum.
- Professional development model did not have a substantial impact, although in-class mentoring tended to produce larger effects.

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**Combined Preschool Intervention:
Curriculum Evaluation**

- All three key emergent literacy domains can be impacted using developmentally appropriate activities.
- Both classroom and pull-out interventions are effective.

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