Language and literacy:

Why third grade reading starts at birth

Leading for Literacy Meeting
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Kathy Hirsh-Pasek, Ph.D.
Temple University
Reading is complex

One second in the mind of a reader

From processing visual print
To decoding sights to sounds (B-O-Y = boy)
To infusing text with meaning
In Scarborough’s terms

The Many Strands that are Woven into Skilled Reading
(Scarborough, 2001)

LANGUAGE COMPREHENSION

BACKGROUND KNOWLEDGE
(facts, concepts, etc.)

VOCABULARY
(breadth, precision, links, etc.)

LANGUAGE STRUCTURES
(syntax, semantics, etc.)

VERBAL REASONING
(inference, metaphor, etc.)

LITERACY KNOWLEDGE
(print concepts, genres, etc.)

WORD RECOGNITION

PHONOLOGICAL AWARENESS
(syllables, phonemes, etc.)

DECODING (alphabetic principle,
spelling-sound correspondences)

SIGHT RECOGNITION
(of familiar words)

SKILLED READING:
Fluent execution and
coordination of word
recognition and text
comprehension.

increasingly
strategic

increasingly
automatic
We know a tremendous amount about the word recognition or “code” skills and they are critical for learning to read.
But code skills are not enough!

You have to translate print into meaning!
And we know much less about how to support language for reading.

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(Scarborough, 2001)

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- DECODING (alphabetic principle, spelling-sound correspondences)
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SKILLED READING: Fluent execution and coordination of word recognition and text comprehension.

Increasingly strategic

Increasingly automatic
A Talk in 3 parts

• Language is a critical foundation for reading

• 6 Evidence-based principles of language learning that support reading

• Implications and Policy recommendations
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• Implications and Policy recommendations
The Evidence

* Early language abilities are **directly** related to later reading abilities
  * Direct effects (NICHD ECCRN, 2002; Dickinson & Tabors, 2001)
    * 1137 diverse sample from 3 years to 1st and 3rd grade
    * Lee, 2011 (N=1073; early language relates to language and reading achievement up to 5th grade)
    * Grissmer, 2011 (language and attention in K predict 4th grade reading better than does reading at K)

* Early language abilities are **indirectly** related to reading through code skills like phonemic awareness; to finding the “b-sound” in “boy.” These code skills are then related to reading. (Munson et al; 2004,2005; Storkel, 2001, 2003; Whitehurst & Lonigan, 1998, 2001; Silven et al., 2007)
  * Indirect effects (Storch & Whitehurst, 2002)
    * 626 low-income children, 4 yrs to 4th grade

* Language skills become relatively more important than code skills for reading over time. The shift from *learning to read* to *reading to learn*. (Storch & Whitehurst, 2002; Catts et al., 2006; Vellutino et al, 2007).
More recently…

* Reviews of the relationship between language and reading show a persistent, strong and significant role of early language on reading…

* Harris, Golinkoff and Hirsh-Pasek, 2011
* See Marulis & Neuman, 2011 for a review
Despite these facts,

Most instruction in early school and most of our policy recommendations are focused on code skills rather than on the language skills that support reading.

Goodson, Layzer, Simon, & Dwyer, 2009
And for low income children this can have dire consequences

The research suggests that children from low income environments do not have the basic language skills that will directly and indirectly support reading success.

Further,

“learning minority” learners who entered kindergarten with limited English proficiency had large persistent deficiencies in English reading achievement...Even the students who acquired English most rapidly, in the course of a year of kindergarten, continued to lag behind the national average for native English speakers by more than .33 standard deviation in 3rd and 5th grade.

p. 865, Kieffer, 2008
1995: Hart and Risley

Examines language input to children from...

- Welfare
- Working class
- Professional families

(see also Hoff, 2002, 2003; Pancsofar & Vernon-Feagans, 2010)
Number of words heard per hour by children in each group:

Welfare - 616
Working Class - 1,251
Professional - 2,153
Significance?

Children’s vocabulary scores reflect the achievement gap by age 3!

- Vocabulary assessed at age 3 predicted PPVT scores at age 9-10 ($r = .58$) and TOLD (more comprehensive) $r = .72$

- Vocabulary at age 3 correlated with reading comprehension scores on Comprehensive Test of Basic Skills $r = .56$

- By second grade middle class children have 6000 root words; lower income 4000 -- 2 grade levels behind (E. Dale & O’Rourke, 1981)
The amount of language you hear matters because babies do statistical learning on the input they hear to find patterns of sounds and words!
2009: Fernald finds

That the amount of language a child hears also affects processing speed and hence later acquisition of vocabulary – findings that hold in English and Spanish.

And early vocabulary is one of the best predictors of later reading ability!
2010: Hackman & Farah

SES is an important predictor of neuro-cognitive performance, particularly of language and executive function, and that SES differences are found in neural processing even when performance levels are equal.

See also Raizada et al., 2008:
These findings suggest that the weaker language skills of low-SES children are related to reduced underlying neural specialisation, and that these neural problems go beyond what is revealed by behavioural tests alone. (p. 1392)
These findings are particularly important for those learning English as a second language

- As lower SES families, they will have depressed input even in their first language

- Spanish speaking low-income parents are unlikely to offer much input at all in their new “foreign” language

  - Among English Language Learning children:
    - 65.9% - lower-income households
    - 40.8% come from families with less than a high-school degree
If reading is parasitic on language and not just on decoding, the question before us is how we can strengthen the language outcomes that children will need for reading.
A Talk in 3 parts

• Language is a critical foundation for reading

• 6 Evidence-based principles of language learning that support reading

• Implications and Policy recommendations
Distilling from the literature, we boldly (or was that tentatively) suggest 6 principles of language learning that can be used to enhance language outcomes and the foundation for reading.
The 6 principles

1. Children learn what they hear most-- frequency matters
2. Children learn words for things and events that interest them
3. Interactive and responsive environments build language learning
4. Children learn best in meaningful contexts
5. Children need to hear diverse examples of words and language structures
6. Vocabulary and grammatical development are reciprocal processes
1. Children learn what they hear most--frequency matters

- Amount of speech is important for statistical learning (Saffran et al., 1996)
- Amount of speech is important for speed of processing (Fernald, 2009)
A closer look at Fernald (2009): Amount matters because it increases processing speed!

Enter “looking while listening”

[Images showing the looking-while-listening procedure at 18 and 24 months, with captions: "18 months: Distracter-to-Target shift" and "24 months: Distracter-to-Target shift".]

Fernald, Zangi, Portillo, & Marchman (2008)
Results over time for English (n=76) and Spanish (n=50) children

And this processing speed relates to language and cognitive outcomes (e.g. reading) at age 5 years!
The **amount** of input also affects processing efficiency!

Does input affect *processing efficiency* as well as vocabulary growth?

- Children of mothers who talked with them more heard:
  - 7 times more words
  - 3 times more different words
  - Sentences twice as long

- Children of mothers who talked more at 18 mo had **larger vocabularies at 24 mo** AND *increased more in processing speed*
  [controlling for differences in CDI & RT at 18 mo]

Results: Input affects uptake!

Hurtado, Marchman, & Fernald (2008)
The 6 principles

1. Children learn what they hear most

2. **Children learn words for things and events that interest them**

3. Interactive and Responsive environments build language learning

4. Children learn best in meaningful contexts

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6. Vocabulary and grammatical development are reciprocal processes
The evidence?
Children learn words for things and events that interest them

* L. Bloom’s Principle of Relevance
  “Language learning is enhanced when the words a child hears bear upon and are pertinent to the objects of engagement, interest and feelings…” (p. 19)

* Babies attach labels to interesting not boring objects
  Pruden, Hirsh-Pasek, Golinkoff & Hennon, 2006

* Evidence from babies and toddlers in joint attention: talk about what baby is looking at and examining and baby is more likely to learn a word than if you try and change the child’s focus of attention
  Akhtar, Dunham & Dunham, 1991; Tomasello & Farrar, 1986
Introducing the 6 principles

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The evidence: Interactive and responsive environments build language learning

- What counts as sensitive and responsive language?

  Talking *with* not talking *at*
  Expanding on what the child says and does
  Noticing what the child finds interesting and commenting
  Asking questions rather than just making demands
Evidence 1: Back to Hart and Risley

**Encouragements**
(Affirmatives, praising)

**Discouragements**
(Prohibitions, negative evaluations)

There is wide variability in the sensitivity and responsivity parents show to child language.
Evidence 2: Focus on Hirsh-Pasek & Burchinal (2005) using the NICHD ECCRN Data Base

The type of sensitivity pattern children experienced over time related to 54 month outcomes in language and in academic achievement (e.g. reading).
Evidence 3: Video chats vs TV

Roseberry, Hirsh-Pasek and Golinkoff, in submitted

Tested word learning from 24- to 30-month-olds in one of three ways:

- Video Chat Training (responsive and contingent but 2D)
- Live Interaction Training (responsive and contingent 3D)
- Yoked Video Training (a pre-recorded video not responsive or contingent)
Results – How did children respond to video chats compared to live interactions?

Learning from video chats was more like LIVE than like TV
Example 4: The cell phone study

And what happens to word learning when we BREAK the interaction?

Reed, Hirsh-Pasek & Golinkoff, 2013
The 6 principles

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6. Vocabulary and grammatical development are reciprocal processes
The evidence: Children learn best in meaningful contexts

Recent studies from our lab suggest that children learn richer vocabulary in playful learning where the information is meaningful than they do in direct instruction methods devoid of meaningful engagement.

This has been found in…

* Studies on shape learning with 4-year-olds
  * Fisher, Hirsh-Pasek, Newcombe & Golinkoff, in press

* Spatial language through block play with 4-year-olds
  * Ferrara, Shallcross, Hirsh-Pasek, Newcombe & Golinkoff, 2011
The 6 principles

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5. **Children need to hear diverse examples of words and language structures**
6. Vocabulary and grammatical development are reciprocal processes
The Evidence: Children need to hear diverse examples of words and language structures

* Amount and diversity of verbal stimulation fosters early and rich language outcomes

* When fathers used a more diverse vocabulary in interactions with their infants at 6 months of age, their children developed more advanced communication skills at 15 months accounting for 7% of the variance.
  * Pancsofar & Vernon –Feagans, 2010

* Children’s vocabulary performance in kindergarten and later in second grade related more to the occurrence of sophisticated lexical items than to quantity of lexical amount of child's talk produced during the interactive settings, at age 5, predicted 50% of the variance in children's second grade vocabulary
  * Weizman & Snow (2000)
The 6 principles

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6. Vocabulary and grammatical development are reciprocal processes
The evidence:
Vocabulary and grammatical development are reciprocal processes

- Words and grammar are “developing in synchrony across the first few years of life” (Conboy & Thal, p.209)

- In a bilingual sample, the amount of English words predicts English grammar and amount of Spanish words predicts the onset of Spanish grammar (Conboy & Thal, 2006)

- There is a reciprocal relationship between words and grammar: sometimes grammar allows children to learn words (Naigles, 1990; Gillette, Gleitman, Gleitman & Lederer (1999) Imai, Li, Haryu, Hirsh-Pasek, Golinkoff, & Shigematsu (2008); Fisher & Song (2006))
Reprise: We can define language learning through 6 basic principles

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And these principles hold equally for children learning one or two languages!
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The practical challenge: The 6 Principles in practice

Three Mothers and an Eggplant
Foundation for Child Development (2009)
The 6 Language principles in two language styles

- Children learn what they hear most
- Children learn words for things and events that interest them
- Interactive and Responsive environments build language learning
- Children learn best in meaningful contexts
- Children need to hear diverse examples of words and language structures
- Vocabulary and grammatical development are reciprocal processes

<table>
<thead>
<tr>
<th>Principle</th>
<th>Mother 3</th>
<th>Mother 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children learn what they hear most</td>
<td>* yes</td>
<td>no</td>
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Can we train parents and teachers to be more like mother 3?
And current research suggests what will and won’t grow early language

What won’t work...

- Thinking of reading instruction *only* as drill in phonics and letter-word mapping – code skills

- Reading books with new words in them without contextualizing the words or helping children see the deeper meaning of the words! Exposure to words alone has mixed effectiveness (see Neuman, Newman & Dwyer, 2011 for a review)

- Teaching teachers that reading is about code skills devoid of foundational language skills

- Thinking of literacy as just a school activity!
A lesson from Massachusetts

- MA frequently outscores all other states on national tests.
- MA is #1 on the National Assessment of Educational Progress (NAEP) in 4th and 8th grade reading and math.
- MA 4-year high school graduation rate increased for the past five years.
  - 83.4% of the 74,307 students in the 2011 cohort
- So...what is the problem?
Focusing on “drill and kill” educational practices that start in kindergarten and are just in school will not do the trick!
What will work...

• Broadening teacher education to teach about the power of language learning for reading and about language development.

• Ensuring that teachers with strong language skills are working with our youngest children (e.g. placing Teach for America students who have these skills with preschoolers)

• Broadening the early school curricula to include content areas beyond reading (code learning) and math so that children learn a larger base of vocabulary and language skills

• Adopting curricular approaches that are evidence-based and that help children discover meaningful conceptual links between vocabulary, language and the content areas (e.g. semantic clustering as in Neuman’s WOW – World of Words program)

• Bridging learning from school to home (shared vocabulary lists)

• Involving the community and bringing language and literacy into the…
  • Pediatricians’ offices (e.g. The ReadBoston https://www.facebook.com/ReadBoston campaign); supermarkets, museums (Chicago Children’s Museum language exhibits), etc.
We need to systematically manipulate the 6 principles, and change language trajectories for young children by starting early.

Language for reading is malleable!
(Dickinson, Hirsh-Pasek & Golinkoff (2012))
Some examples of curricular changes
We also trained parents and caregivers in our work on the California Preschool Curricula

* The California Curricula
* The Goal: Building language to support reading and school outcomes
* The Design: Putting the 6 principles to work
* An example:

Armand finds a worm on the playground and gently carries it to show the teacher. A group of excited children follow him, eager to learn more about the worm. Ms. Krim asks, “What did you find there, Armand?” as she signals to others to join the conversation. “Is it alive?” one child asks. The teacher responds, “What do you think? How could we tell?”

Principles: interest, interactive and responsive, meaning, vocabulary and grammar
And from our current research with low income children using the 6 principles to bolster vocabulary and grammar in the context of book reading and playful learning.

Knights and Dragons

Ongoing research from the Read, Play and Promote Learning project (Vanderbilt, Temple University and The University of Delaware) supported by a grant from the Department of Education’s Institute of Education Sciences.
Adult reads children a book like the Knight and the Dragon while highlighting new words (e.g., galloping, shield)

Free play
- No focus, dialogue; meaning-making; child initiated and directed

Directed play
- Targeted focus with more closed questions; adult initiated and directed, meaning-making

Guided play
- Targeted focus with more open ended questions; adult initiated, child directed, meaning-making
A sneak peek at preliminary results...

Stay tuned
And example of using the 6 principles in the wider community
Turning supermarkets into children’s museums

In collaboration with Fresh Grocer

Ridge, Ilgaz, Weisberg, Hirsh-Pasek & Golinkoff, in progress
In low income neighborhoods, we got a 33% increase in parent/child language when the signs were up.
We are also creating assessments to examine milestones in language growth for English and Spanish speaking children. The Computer-Administered Early Language Screener (CELS)

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Grammar</th>
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<td>Which one is the doorknob?</td>
<td>Show me a dog behind a black table</td>
</tr>
<tr>
<td>Can you find the blue fep?</td>
<td>Show me where the girl is frepping the boy.</td>
</tr>
</tbody>
</table>

IES grant to Golinkoff, Hirsh-Pasek, Iglesias, DeVilliers & Wilson
Reading outcomes will not be strong unless a child’s language is strong

Start early (4 years is too late)

Mandate professional development to link research and practice; language to reading

Use high teacher to child rations (so that children get enough direct input)...Perhaps working with Teach for America to place more language rich teachers in preschool and elementary classrooms

Ensure high quality language in – not TV, or mere exposure to words through book reading, but meaningful interactions with words
Policy implications cont??

- Use a curriculum that covers broader domains (social studies and science) and that goes beyond the classroom

- Ensure that teachers and parents use the curricula (assess through observation & process measures)

- Ask how the broader community of pediatricians and business people can reinforce what goes on in school

- Ensure that evidence based practice in preschool aligns with practice in higher grades

- Recognize that what is good for typically developing monolingual children is also good for second language learners!
In sum...

1. Reading is a complex process

1. We know about how to support code skills and less about language to support reading

1. Yet those who study language development in the crib have lessons for the classroom

1. Six principles of language learning can help us promote strong language for reading for all children

2. We can put these principles into practice now and can help every child build a foundation for reading
And to NSF, IES and NIH for funding research on these issues