Language for literacy:

Preparing our children for 3rd grade reading

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A riddle for policy makers

What does the 30-million word gap have to do with the 3rd grade reading guarantee?
OR….Why did US kids still look terrible on the PISA scores released this week?

<table>
<thead>
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<th>Levels 5 and above</th>
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</table>

24th in line....
The answer in this presentation??

Reading performance depends on strong early language development! And many of our children start out with poor language skills.
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.
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!

Hebrew

בראשית בראש אֱלֹהֵינוּ אָתָּה 1
הָשְׁמַעְתָּ וְאָמַּרְתָּ אָלֵֽיךָ וּלְאֹרֵֽיךָ
הָאָרְרָךְ הָעָדָה וּבַהֲרָךְ וְלָקְטָלוּתָה
הָעָדָה וּרְוַי אֱלֹהֵינוּ מָרִיתֶהָ עַל פָּרְנָה
הָעָדָה: 3 וּמָאֲמַר אֱלֹהֵינוּ הָעָדָה: 4
וּזְהַר

Greek

Αυτή η αναφορά περιλαμβάνει σημαντικές πληροφορίες σχετικά με το πόσιμο νερό σας. Ζητήστε από κάποιον να σας τη μεταφράσει, ή μιλείστε με κάποιον που την καταλαβαίνει.

You have to translate print into meaning!
And we know much less about how to support language 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
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
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, 2013; Rowe et al., 2013; 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)
1996: Saffran, Aslin & Newport

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.

Gaps in the amount that children hear and in the processing speed are evident as early as 9 months of age

And early vocabulary is one of the best predictors of later reading ability!

See also Weisleder and Fernald, 2013
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)

And Kuhl, 2013 (White House Conference) for additional evidence in early brain growth
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; Weisleder & Fernald, 2013)
A closer look at Fernald (2009): Amount matters because it increases processing speed!

Enter “looking while listening”

Looking-while-Listening procedure

18 months: Distracter-to-Target shift

24 months: Distracter-to-Target shift

Fernald, Zangl, 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, & Ferland (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

5. Children need to hear diverse examples of words and language structures

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

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
5. Children need to hear diverse examples of words and language structures
6. Vocabulary and grammatical development are reciprocal processes
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, 2013

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?

**Graphs and Images:**
- A bar graph showing the proportion of time attending to target for interrupted and uninterrupted words.
- A timeline showing the sequence of teaching first and second words with interruption via phone call.

**Note:** N=29 (12 in interruption 1st & 17 in interruption 2nd)

Reed, Hirsh-Pasek & Golinkoff, 2013
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 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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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; Rowe et al. , 2004

- **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

1. Children learn what they hear most
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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)

Reprise: We can define language learning through 6 basic 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
5. Children need to hear diverse examples of words and language structures
6. Vocabulary and grammatical development are reciprocal processes

And these principles hold equally for children learning one or two languages!
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
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

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<th>Principle</th>
<th>Mother 3</th>
<th>Mother 1</th>
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<td>* yes</td>
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<tr>
<td>✓ Children learn words for things and events that interest them</td>
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<td>* yes</td>
<td>maybe</td>
</tr>
</tbody>
</table>
Can we train parents and teachers to be more like mother 3?
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)

Photo from Sheryl Ann Crawford

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

Receptive vocabulary
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 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>Products</th>
<th>Vocabulary</th>
<th>Grammar</th>
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<tbody>
<tr>
<td></td>
<td>Which one is the doorknob?</td>
<td>Show me a dog behind a black table</td>
</tr>
<tr>
<td>Process</td>
<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
Policy implications??

- Reading outcomes will not be strong unless a child’s language is strong.

- Start early: A large portion of Wisconsin’s children are in preschool which is great, but even 4 years of age is too late to groom great language skills.

- Mandate professional development to link research and practice; language to reading. So, in every document you write for early reading achievement add the word “language” when you see the word “literacy.”

- Demand 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 social interactions with words.
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)

Think beyond the classroom: 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. That is align the “speaking and listening” and literacy components of the Core and ask how preschool policy can feed into these benchmarks. NOTE, this does not mean merely spreading the core for K down into PreK.

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