A Communication Foundation: Building Blocks for Lifelong Literacy

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Nov 1, 2019
In the US....

The National Assessment of Educational Progress reports that ....

- More than 80% of 3rd graders from low-income families will not be reading at grade 3 in grade 3

- At least half of the school achievement gap between rich and poor kids starts before kindergarten

The National Governor’s Association recognizes that strong language skills are critical if we are to build strong reading skills!
In fact, on October 30th...

The New York Times

Reading Scores on National Exam Decline in Half the States

The results of the test, which assesses a sample of fourth- and eighth-grade students, will inevitably prompt demands for policy change.
Yet Scarborough shows us

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.)

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

WORD RECOGNITION

PHONOLOGICAL AWARENESS
(syllables, phonemes, etc.)

DECODING (alphabetical principle, spelling-sound correspondences)

SIGHT RECOGNITION
(of familiar words)

increasingly strategic

increasingly automatic
In her terms, most of our curricular attempts to remedy the problem focus on word recognition or “code” skills and on vocabulary drill.

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

And they are critical for learning to read.
And while important, these interventions alone are not really working

- A systematic review of 31 well-cited interventions revealed that children generally learn less than 25% of taught words following interventions lasting 2 or more weeks (Wasik et al., 2016)

- Another meta-analysis examining curriculum interventions produced a small and nonsignificant effect size of 0.07 on children’s vocabulary (Darrow, 2009)

- And, those programs that have targeted specific vocabulary lists generally find that children cannot generalize these words to new contexts Kaiser et al., 2011.
Maybe we need to spend more time supporting broader language skills.

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SKILLED READING: Fluent execution and coordination of word recognition and text comprehension.
The Scientific Data show both direct and indirect relationships between language and reading

Indeed, our recent secondary analyses of the NICHD Child Care data suggests...

• That language at school entry is the single best predictor school outcomes (reading, math, social skills, later language) in grades 1 and 3

• And of gains in outcomes scores from Grades 1 to 3; 3 to 5

Pace, Alper, Burchinal, Hirsh-Pasek & Golinkoff, (2018)
And recent work by DeHaene (2018) suggests that learning to read consists in establishing a new visual interface into language -- connecting it to brain areas coding for speech sounds and meaning.
Further, mountains of behavioral data suggest that children from under-resourced environments have poorer general language skills than their more privileged peers (see also Hoff, 2002, 2003, 2013; Rowe et al., 2013, 2017; Golinkoff et al., 2017; Huttenlocher et al., 2010; Pancsofar & Vernon-Feagans, 2010, but see Sperry et al. 2018; Golinkoff et al., 2019).

In 1995, Hart & Risley
In their classic (but oft criticized) study, Hart and Risley find...

Number of words heard per hour by children in each group:

**Welfare** - 616

**Working Class** – 1,251

**Professional** - 2,153
And this has real significance?

- 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 (Dale & O’Rourke, 1981)
So today, let’s talk about how we can create high quality language environments for all children so that they are prepared to learn reading and learning to learn skills as they enter formal schooling.

- 6 Evidence-based principles of language learning that support reading
- Implications and outreach
A Talk in 2 parts

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Distilling from the scientific literature,

I take a twist on traditional science. Rather than asking what we have left to learn, I would like to focus on **what we actually know** about language learning.

I **boldly** suggest 6 principles of language learning that can be used to enhance language outcomes and the foundation for learning for both monolingual and dual language learners.

See Harris, Hirsh-Pasek et al. (2011) for a review; Konishi, et. al. (2014); Alper, Hirsh-Pasek et al., 2019
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
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Amount matters
  • Hart & Risley (1995)

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)
The amount of language you hear matters because babies do statistical learning on the input they hear to find patterns of sounds and words!
Fernald (2009): Amount matters because it increases processing speed!

Enter “looking while listening”

Looking-while-Listening procedure

Fernald, Zangi, Portillo, & Marchman (2008)

18 months: Distracter-to-Target shift

24 months: Distracter-to-Target shift

See also Weisleder and Fernald (2013)
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)
Perhaps...

Amount of input from a particular speaker or groups of speakers will also turn out to be critical for the prediction of word meaning from a sample distribution a la Christophe’s work.
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The Evidence?
Children learn words for things and events that interest them

- L. Bloom’s Principle of Relevance

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

- Evidence from babies and toddlers in joint attention
  - Akhtar, Dunham & Dunham (1991); Tomasello & Farrar (1986)

- Intervention evidence when you label what kids are interested in, they learn better
  - McGillion et al. 2017

- In the classroom, reading books that have relevance helps children gain interest and see themselves as readers.
  - Ward 2012
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What counts as sensitive and responsive interactions?

- Talking *with* not talking *at*
- Expanding on what the child says and does
- Noticing what the child finds interesting and commenting
- Using a label that goes with what you are looking at
- Asking questions rather than just making demands

See Tamis LeMonda et al. (2014)
Learning from 10-week old Ellie
Evidence 1: Back to Hart and Risley

Encouragements
(Praising, Affirmations)

Discouragements
(Prohibitions, negative evaluations)

There is wide variability in the sensitivity and responsivity parents show to child language
Evidence 2: Examining the quality of a Foundation for Communication during parent-child interaction

Quality =
1) Symbol infused joint engagement (gesture and words)
2) Fluid and connected exchanges (verbal and non-verbal)
3) Playful routines and rituals

Quantity = number of mother’s words per minute

Hirsh-Pasek, Adamson, Bakeman, Owen, Golinkoff, Pace, Yust, & Suma (2015); see also Cartmill et al., 2013.
Findings and Implications

1. Quantity of input (amount) and Quality of Foundation for Communication are both important for language growth but “communication foundation” matters more.

2. In our study, it’s not about poverty.

3. Fluid and connected conversations – “Conversational duets” require serve and return, and return and return and return. …it can’t be a solo performance.

4. It’s “filling the gap” + “building the foundation” – a new metaphor for intervention

See Cartmill et al. (2013) for related findings
Evidence 3: Focus on Hirsh-Pasek & Burchinal (2005) using the NICHD ECCRN Database

The type of sensitivity pattern children experienced over time related to 54 month outcomes in language and in academic achievement (e.g., reading).
Evidence 4: Video chats vs. TV

Roseberry, Hirsh-Pasek and Golinkoff (2014)

Word learning in 24- to 30-month-olds using:

- **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 5: The cell phone study

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

Reed, Hirsh-Pasek & Golinkoff (2017)
The interruption condition
Results?

Note: ** p < 0.01. Only the uninterrupted teaching condition is significantly different from chance, $t(36) = 4.56, p < 0.001.$
And new data continues to flow in on the importance of contingency....

...language input from peers was positively related to children’s in-class language use, both in-the-moment and over the course of each day, as were the number of conversational turns in which children and teachers engaged. Both peer input and conversational turns with teachers were also positively related to children’s language development rates, as indexed by increases in vocabulary size.
In fact, this new data suggests that conversations (contingency) are critical for brain growth!

- New data by Romeo et al. (2018) shows that contingent interactions (but not the quantity of interactions) actually changes brain activation in Broca’s area for 4 to 6 year olds.
And that...

Kim Noble

- Early conversations at home for 5 to 7 year olds partially explained disparities in language supporting brain structure and in turn in reading skills.

Merz, et al. 2019
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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

Children learn richer vocabulary in playful learning where the information is meaningful than they do in direct instruction methods devoid of meaningful engagement.

- Studies on shape learning with 4-year-olds
  - Fisher, Hirsh-Pasek, Newcombe & Golinkoff (2013)

- Spatial language through block play with 4-year-olds
  - Ferrara, Hirsh-Pasek, Newcombe, Golinkoff, & Lam (2011)
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The Evidence: Children need to hear diverse examples of words and language structures

- **Amount and diversity of verbal stimulation (and gesture-gesture/gesture word combinations) fosters early and rich language outcomes**
  - Beebe, Jaffee & Lachman (1992); Snow (1986); Tamis-LeMonda & Song (2012); Rowe (2012); Goldin-Meadow et al. (2014)

- **Children’s vocabulary performance in kindergarten and later in second grade related to occurrence of sophisticated lexical items at age 5, predicted 50% of the variance in children's second grade vocabulary**
  - Weizman & Snow (2000); Huttenlocher et al. (2002)
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The Evidence: Vocabulary and grammatical development are reciprocal

- Words and grammar are “developing in synchrony across the first few years of life”
  • (Conboy & Thal, 2006; 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; Levine et al., in press)

- 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; Levine et al., in press)
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And these hold whether you are learning one language or two!
A Talk in 2 parts

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

• Implications and outreach
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>
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The challenge is to help parents and teachers become more like mother 3 at home and at school?
We need to systematically manipulate the 6 principles, and change language trajectories for young children by starting early.

Language strategies are learnable and malleable!
(Dickinson, Hirsh-Pasek & Golinkoff, 2012)
Three examples of language change at the:

Family level
The Classroom level
The Community level
A Community-Based Participatory Research where we are working with the Maternity Care Coalition to design a new evidence-based intervention for families

https://drive.google.com/file/d/0B-_ula1gTtWYcjVvSXg3NmdUSUU/view
DUET Mission and Goals

Mission:
*Strengthen the developing communication foundation to enhance and predict language learning and school readiness outcomes.*

Goals:
1. Foster Awareness/Knowledge
2. Empower Caregivers
3. Increase Quality/Quantity of Interactions
4. Improve Outcomes – Language and School Readiness
What are you pointing at, Ashley?

Oatmeal!

You’re right, Ashley! These are all oatmeal. Oatmeal has so many different flavors. Which one would you like?

Oatmeal!

Ashley, show me which one you want.

That’s a bee. This is the honey flavor, because honey is made by bees. Say “bee”.

Bee
• **Study 1**: A very low income sample (27/41 earning less than 25K annually) with very low numbers (N= 15 control, 9 intervention) showed a 5.8 point increase in the Preschool Language Scale for those in the Experimental Group vs the Business- as-Usual Control Group (p <.01) after only 7 weeks of intervention once a week and increase talk to children and child talk using LENA. Promising. Similar progress was noted on the Ages and Stages (ASQ) Questionnaire.

• **Study 2**: 12 Early Head Start teachers from 6 classrooms (N= 7 experimental, 5 Control). Experimental teachers maintained high language use in classrooms. Control teachers did not and actually decrease language use in their classrooms.

Alper, Luo, Golinkoff & Hirsh-Pasek, submitted
The California Preschool Curricula allowed us to share these principles in the classroom

Stay tuned for whether this curriculum actually worked!
Our research is also testing whether we can enhance vocabulary through reading + playful dialogue in classrooms.

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

Photo from Sheryl Ann Crawford
Results?

Children did better post that pre in all conditions

Adult supported play was better than free play in all conditions!

Book reading + adult supported play was also better than book reading plus fun flash cards!

Bottom line? When there is a learning goal – adult supported play (guided or directed) helps children learn!

Weisberg et al., 2015; Toub et al., in press
In our most recent findings....

- We did a group reading followed by different play activities – singing, large and small group games, drama and digital. We compared control words to which the child was exposed, with test words embedded in the book reading and play conditions.

N=138 Head Start children (age 52mo) across two sites: Nashville, TN and Philadelphia, PA in 10 classrooms, 91% black.

Taught 20 words, each heard 4 times in read only, read + play or play only.
Results?

Children learn the words overall showing increases in both receptive and expressive language tests!

More impressively, they learn the words as well in play as they do in a reading condition!

Learning an average of 5 words of the 20 and retaining them over delay of 2 mo. with refresher.
It is interesting....

• That play environments in which we use and reinforce particular vocabulary in context, helps children master vocabulary –even for words that they have only rehearsed 4 times!

• Interesting....meaningful...dialogue/conversation
We are also creating more opportunities for quality talk in community settings
Example 1: The Supermarket Study
Ridge, Ilgaz, Weisberg, Hirsh-Pasek & Golinkoff (2015)

- Can the introduction of signs in a supermarket increase caregiver child language interactions?
- Signs up and signs down in middle and low income area supermarkets
- Results show a 33% increase in caregiver - child language when the signs were up in low income neighborhoods.

See also, Hanner et al., 2019 for a replication; and Neuman et al., 2019 using laundromats
Example 2: Urban Thinkscape

Transforming a bus stop into a playful learning space

4 activities to increase activity and conversation around:
• Spatial learning
• Language narrative
• Executive Function

RESULTS (N= 280)
> Parent-child interaction compared to control playground
  ➢ Adult and child language use
  ➢ Targeted spatial/numeric language from 2 to 36%

Funding by:

Example 3 Parkopolis

- The Human Sized Board Game designed to foster early mathematical skills and scientific reasoning. Compared observations to another STEM, rocket building, activity at the museum.

RESULTS (N= 111)
- Parent-child interaction compared to control
- Adult and child language use and question use
- Targeted spatial/numeric language and fraction language
- Physical activity

Thanks to Fei Xu, Silvia Bunge and all of our mathematic colleagues!

See also, fractionball
This project is designed to use our science to create more conversations through playful learning cities!

- With pilots now in Philadelphia, Seattle, Chicago, Tulsa and Johannesburg, South Africa

- We are testing a new kind of dissemination that can be used in public spaces and in "trapped spaces" like waiting rooms, supermarkets, laundromats, etc. Places where people wait and where we might increase the contingent conversations in ways that reduce the achievement gap

- All through playful learning that speaks to how families use the 80% of their child’s waking time when she is not in school or care.

https://player.vimeo.com/video/275917850
Finally, **accountability** is key.

A 15 minute, evidence-based, self-scoring computerized screener that examines known words and grammar, as well as how well children learn language! For children 3-5 – In English and Spanish!  [Quilscreener.com](http://Quilscreener.com)

**Golinkoff, Hirsh-Pasek, de Villiers, Iglesias & Wilson (2017)**
## Language Components Represented

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<th><strong>PRODUCT</strong></th>
<th><strong>PROCESS</strong></th>
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<td><strong>VOcab</strong></td>
<td>KNOWN NOUNS</td>
<td>FAST MAPPING NOUNS</td>
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<td>KNOWN VERBS</td>
<td>FAST MAPPING ADJECTIVES</td>
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<td>PREPOSITIONS</td>
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<td>CLAUSAL CONNECTORS</td>
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<td><strong>SyntaX</strong></td>
<td>WH-QUESTIONS</td>
<td>SYNTACTIC BOOTSTRAPPING OF NOVEL VERBS</td>
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<td>PAST AUXILIARY AND COPULA</td>
<td>CONVERTING ACTIVE VERBS TO PASSIVE</td>
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<td>PREPOSITIONAL PHRASES</td>
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<td>EMBEDDED CLAUSES</td>
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In English and Spanish

“Show me the hinge.”

“The fep is blue. Show me the blue fep.”

“Who is kissing the baby?”

“Show me another fep.”
Results to date suggest....

- It works! Showing beautiful progressions on language growth (N=673) for the monolingual test

- There are significant SES differences in both the products or outcomes of language learning (vocabulary and grammar) and in the processes of learning language (e.g., fast mapping).

- Vocabulary, syntax and process are linked across the course of development

- In the bilingual test (English/Spanish) Products are linked *within* but not *across* languages (N= 364) but Processes (how you learn) are linked across languages

Levine et al., in press
The bottom line?

We can build a strong foundation in language, by using the 6 principles in our homes, our classrooms and in our communities,

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
As a starting point, we have to start interventions early and create environments that encourage folks to engage in language rich conversations.

Increasing language proficiency might prove the single best way to enhance outcomes for all children over time!
Thanks to....

Funding from ....

The best lab ever

Dr. Roberta Golinkoff

The parents and kids who made the research possible
And a callout to my grandkids who keep my ideas fresh.... And to our twitter feed.

Follow us on twitter at: KathyandRo1