

Talking with babies: Infant directed speech and the role of early educators



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Temple University
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BROOKINGS



Everyone is talking about...

- The 30 million word gap
- The grade level reading campaign
- Universal pre-school



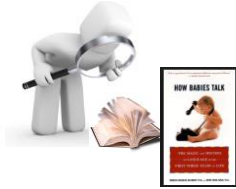
What unites each of these initiatives?

Hmmm



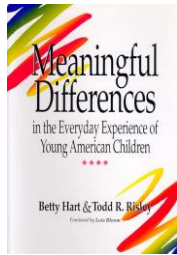
The answer in this presentation??

Each of these initiatives focuses on and relies upon developing strong language skills.



And those language skills come from having high quality language environments where adults and children engage in conversation on a shared topic of interest

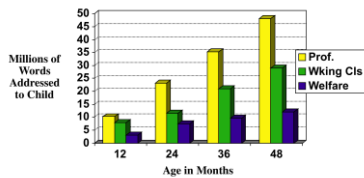
Let me show you why: The 30-million word gap



In 1995, Hart & Risley
Examined language input to children
from...
Welfare
Working class
Professional families

(see also Hoff, 2002, 2003, 2013; Rowe et al., 2013; Pansofar & Vernon-Feagans, 2010; but see Sperry et al., 2018; Golinkoff et al., 2018)

Results?

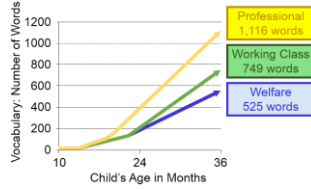


Number of words heard per hour by children in each group:

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

Significance?

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



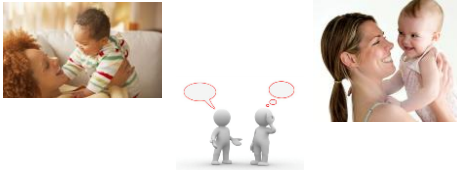
•Vocabulary assessed at age 3 predicted PPVT scores at age 9-10 ($r = .58$) and TOLD (more comprehensive) $r = .72$

•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 (Dale & O'Rourke, 1981)

They suggested and many have suggested since

That the amount of language spoken to the child coupled with the kind of language (the quality or what they called **“the dance”**) can change that trajectory!



BUT MANY HAVE FORGOTTEN ABOUT THE QUALITY MESSAGE AND ONLY REMEMBERED THE QUANTITY OF TALK MESSAGE.

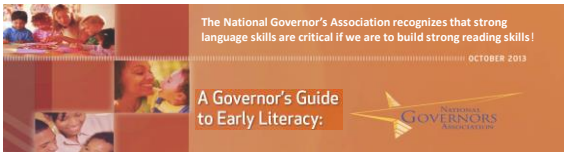
See Cartmill et al. (2013); Rowe (2013); Goldin-Meadow et al. (2014); Hirsh-Pasek et al. (2015)

What about the campaign for grade level reading?



The Casey Foundation 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
- 42 states across the US have started campaigns to reverse this trend



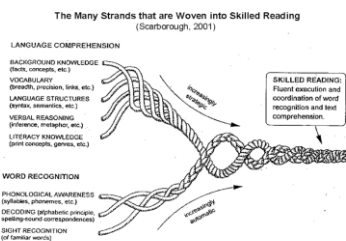
Let me show you why.

One second in the mind of a reader

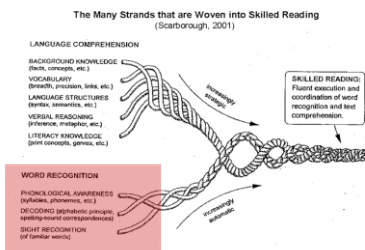


- From processing visual print
- To decoding sights to sounds (B-O-Y = boy)
- To infusing text with meaning

In Scarborough's terms

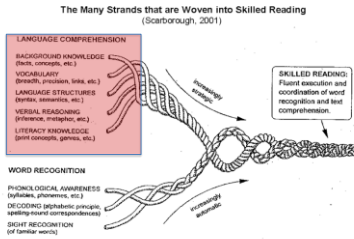


We know a tremendous amount about the word recognition or "code" skills



And they are critical for learning to read

We know far less about how to support language for reading



The Scientific Data show both direct and indirect relationships between language and reading

(NICHD ECCRN, 2002; Dickinson & Tabors, 2001; Lee, 2011; Grissmer, 2011, Munson et al; 2004, 2005; Storkel, 2001, 2003; Whitehurst & Lonigan, 1998, 2001; Silven et al., 2007; Dickinson, Golinkoff & Hirsh-Pasek, 2013)

Thus, as in the 30-million word gap

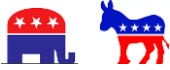
- Strong language builds strong reading
- And our science has taught us how to build strong language!



And finally, what about Universal Preschool or “Preschool for All” ?

- **Huge push nationally for universal Pre-K**
– GA, FLA, NJ, OK, IL + cities across the nation including NY, Chicago, Washington...

- **Most of America WANTS high quality preschool**

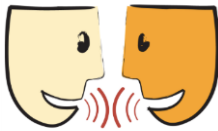


- **But we must ensure high quality preschool – which includes high quality talk.**

- **And currently, teachers spend less than 19% of their time in high quality talk!**
• Dickinson et al. 2004, 2013

Our new secondary analyses of the NICHD Child Care data set 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)

So today, let’s talk about how to create high quality language environments for young children: A talk in 2 parts

- **6 Evidence-based principles of language learning that support reading**
- **Implications and outreach**

A Talk in 2 parts

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

• Implications and outreach



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 for both monolingual and dual language learners

See Harris, Hirsh-Pasek et al. (2011) for a review; Konishi, et. al. (2014)

The 6 principles

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

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1
Children learn what they hear most

The Evidence

- **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)

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!



Fernald (2009): Amount matters because it increases processing speed!

See also Weisteder and Fernald (2013)

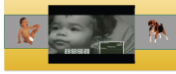
Enter "looking while listening"

Looking-while-Listening procedure



Fernald, Gang, Padden, & McArthur (2008)

18 months: Distractor-to-Target shift



24 months: Distractor-to-Target shift



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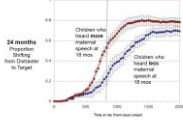
The amount of input also affects processing efficiency!

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)

Macken, Macken, & Fernald (2008)

Results: Input affects uptake!



Macken, Macken, & Fernald (2008)

Horizontal lines for notes.

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Horizontal lines for notes.

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)

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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

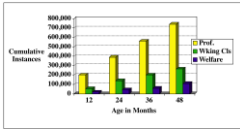
See Tamis LeMonda et al. (2014)

Learning from 10-week old Ellie

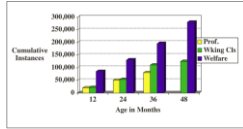


Evidence 1: Back to Hart and Risley

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

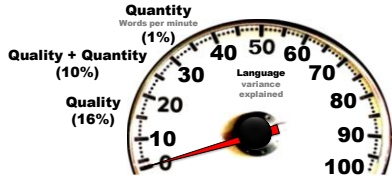


- Quality =
- 1) Symbol infused joint engagement (gesture and words)
 - 2) Fluid and connected exchanges (verbal and non-verbal)
 - 3) Playful routines and rituals

Quantity = number of mother's words per minute

Hirsh-Pasek, Adamson, Bakeman, Owen, Golinkoff, Pace, Yust, & Suma (2015).

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

Figure 1: Child experienced maternal sensitivity trajectory groups

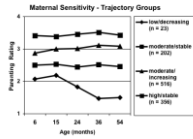
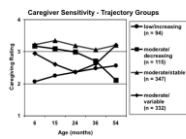


Figure 2: Child experienced caregiver sensitivity trajectory groups



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)

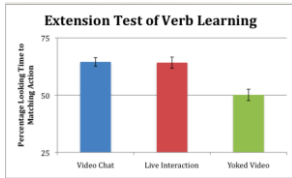
Word learning in 24- to 30-month-olds using:

- **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)



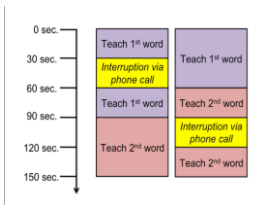
Results – How did children respond to video chats compared to live interactions?

Learning from video chats was more like LIVE than like TV



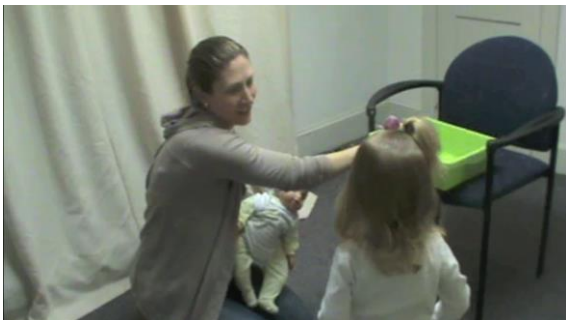
Example 5: The cell phone study

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



Reed, Hirsh-Pasek & Golinkoff (2017)

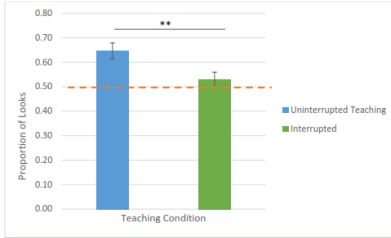
The interruption condition





Jessa Reed

Results?



Note: ** $p < 0.01$. Only the *uninterrupted teaching* condition is significantly different from chance, $t(36) = 4.56, p < 0.001$.

Contingency matters for language learning!



Romeo

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

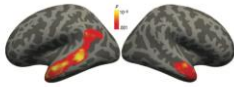


Fig. 6. Regions whose activation was significantly greater when learning to lexical words that featured speech contingencies of language. Children showed the areas of the left superior temporal gyrus and the anterior portion of the right superior temporal gyrus.

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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)



The 6 principles

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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); Golfin-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)
- 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)

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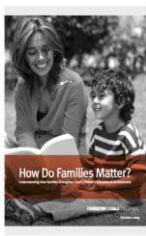
And these hold whether you are learning one language or two!

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)



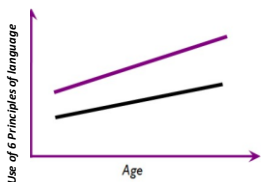
The 6 Language principles in two language styles

<ul style="list-style-type: none"> ✓ 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 	<p>Mother 3</p> <ul style="list-style-type: none"> • yes • yes • yes • yes • yes • yes 	<p>Mother 1</p> <ul style="list-style-type: none"> no maybe no no no maybe
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Can we help parents and teachers become more like mother 3?



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**

The Duet Project

EARLY ENGAGEMENT FUTURE SUCCESS

With...Lauren Adamson, Roger Bakeman, Margaret Owen, Roberta M. Golinkoff

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-_ula1gTtWYcjVv5Xg3NmdUSUU/view



Amy Pace



Rebecca Alper



Rufan Luo



Lillian Masek

DUET Mission and Goals

Mission:

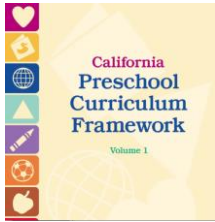
Strengthen the developing communication foundation to enhance and predict language learning and school readiness outcomes.

Goals:

1. Foster Awareness/Knowledge
2. Empower Caregivers
3. Increase Quality/Quantity of Interactions
4. Improve Outcomes – Language and School Readiness



The California Preschool Curricula allowed us to share these principles in the classroom





Our research also suggests ways that we can increase vocabulary learning as children learn to read.



Adult reads children a book like *The Knight and the Dragon* while highlighting new words (e.g., galloping, shield)

Photo from Sheryl Ann Crawford



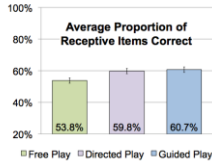
- Free play
- Directed play
- Guided play

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

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

Targeted focus with more open ended questions; adult initiated, child directed, meaning-making

Results?



Weisberg et al., 2015; Toub et al., in press

Children did better post than 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!

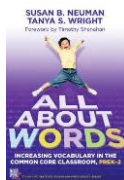
Bottom line? When there is a learning goal – adult supported play (guided or directed) helps children learn!

In our most recent findings....

- We used different play activities – singing, large and small group games, drama and digital.
- Our kids learned target vocabulary as well in all of the play condition as they did in the reading condition!

Our research and others suggests that teachers matter and can increase children’s language and gesture as they learn about....

- The world
 - *All About Words: Increasing Vocabulary in the Common Core Classroom, Pre-k Through Grade 2* (Teachers College Press, 2013)
- And about subjects like space and number:
 - Around, on top of...
 - 4, 12 or even “counting on”



Goldin-Meadow et al. (2014); Huttenlocher et al. (2002)

We are also create more quality talk by using the 6 principles to have conversations in the community





Example 1: The Ultimate Block Party

- 28 science inspired activities in Central Park, NY in 2010
- Over 10 million people reached; 50,000 at event itself!
- Results showed increase in parents' attitudes to the play-learning connection, which is a vital component in public awareness. (Grob, Schleisinger, Hirsh-Pasek & Golinkoff, 2017).



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Example 2: 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.



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Example 3: Urban Thinkscape



URBAN THINK SCAPE TRANSFORMING CITYSCAPES INTO OPPORTUNITIES FOR PLAYFUL LEARNING



Funding by:



Hassinger-Das, Bustamante, Hirsh-Pasek & Golinkoff, (in press), Hassinger-Das et al.

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Example 4 Parkopolis

- The Human Sized Board Game designed to foster early mathematical skills and scientific reasoning. Pilot conducted in Switzerland in the summer of 2017 resulting in more math talk!



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

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Example 5: Playbrary (Free Library Play and Learn)

- Can we even change a library to enhance playful learning and conversation? You bet.
- Initial results show increased interaction among adults and kids that is filled with number and spatial language, less looking at cell phones



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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

Golinkoff, Hirsh-Pasek, de Villiers, Iglesias & Wilson (2017)

Language Components Represented

	PRODUCT	PROCESS
VOCAB	KNOWN NOUNS	
	KNOWN VERBS	
	PREPOSITIONS	FAST MAPPING NOUNS
	CLAUSAL CONNECTORS	FAST MAPPING ADJECTIVES
SYNTAX	WH-QUESTIONS	SYNTACTIC BOOTSTRAPPING OF NOVEL VERBS
	PAST AUXILIARY AND COPULA	CONVERTING ACTIVE VERBS TO PASSIVE
	PREPOSITIONAL PHRASES	
	EMBEDDED CLAUSES	

In English and Spanish

“Show me the *hinge*.”



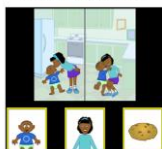
“The *fep* is blue. Show me the blue *fep*.”



“Show me another *fep*.”



“Who is kissing the baby?”



The bottom line?

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



We can:

- Reduce the 30-million word gap
- Help children be ready to read by age 5
- Increase the quality of the nation's preschools

And we can measure our progress!

As a starting point, we have to create environments that encourage folks to engage in language rich conversations



That is how high quality language primes high quality learning!

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Dr. Roberta Golinkoff



The parents and kids who made the research possible

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