



School districts put neuroscience research into action for their youngest learners

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Introduction

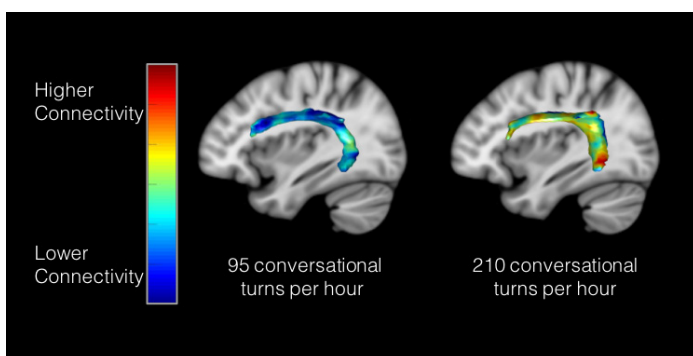
School districts around the country are implementing initiatives designed to boost conversation between adults and children in an attempt to leverage new neuroscience studies which show that talk is a critical factor in early brain development.

This field of inquiry was initially born out of [Hart and Risley's now-famous 1995 study](#), which estimated that children from more affluent backgrounds may hear 30 million more words than children from lower-income backgrounds by the time they turn three (Hart & Risley, 1995). While the original study had limitations, it opened an entirely new field of inquiry into the relationship between adult-child talk and development during the first few years of life.

In the two decades since that first revelation, [dozens of studies](#) have documented a relationship between early talk and early brain development. We now know that the language a child is exposed to in the first few years of life is related to their brain processing speed (Weisleder & Fernald, 2013; Fernald, 2009), their verbal abilities over time (Marchman & Fernald, 2008; Saffran, Aslin, & Newport, 1996), and their kindergarten readiness (Morgan, et. al, 2015; Pace, et. al, 2019).

And that's just the tip of the iceberg! New neuroscience research conducted within the last three years is shedding light into the exact neural mechanisms by which conversation fuels the growth of the brain and boosts cognitive functioning. We're learning that conversations are more important for brain development than the sheer number of words spoken to a child.

[In 2018](#), a team at Harvard and MIT found that children who were exposed to more language — specifically, back-and-forth conversation, rather than just adult words — showed increased activation in Broca's area of the brain, a well-known language center, and had more advanced verbal skills (Romeo, et. al, 2018a).



The amount of adult-child conversational turns that young children experience is related to the strength of white matter connections between two key language regions in the brain, as represented by the colored brain regions from two study participants. Although both children are the same age and gender, and from the same socioeconomic background, they differ in the number of conversational turns experienced, which relates to the strength of white matter connectivity in these pathways.

“Conversation provides the sort of feedback loop between adult and child where the child learns to adapt their speech to the adult model, and the adult learns how to talk to the child in the optimum way to advance their speech, but also so the child can understand,” Dr. Rachel Romeo, lead author on the paper, explained.

The team also found [structural changes](#) in the brains of children who experienced more conversation. Children who heard the most conversation had more white matter in their brains, meaning that their “information highways” were forming stronger connections between different regions of the brain (Romeo, et. al, 2018b).

“This research suggests that when there’s more conversational turns, the whole brain works together better,” Romeo said.

Notably, these findings were independent of socioeconomic status, meaning conversation appeared to play a larger role in the development of children’s language and verbal skills than did their parents’ education or income level.

As MIT professor of brain and cognitive sciences and senior study author Dr. John Gabrieli put it, “It’s almost magical how parental conversation appears to influence the biological growth of the brain.”

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The evidence continues to build as new research is conducted. A [2018 study](#) by LENA followed children for 10 years and found that those who experienced more conversation between 18-24 months of age had higher IQs and stronger language and verbal abilities in adolescence (Gilkerson, et. al, 2018). A [2019 study](#) from Teachers College, Columbia University discovered that 5- to 9-year-olds who experienced more conversational turns had greater cortical surface area, and in turn, better reading skills (Merz, et. al, 2019).

“These results suggest that improving children’s language exposure via prevention and intervention programs may benefit their structural brain development,” the Teachers College study concluded. “...These findings reinforce the importance of programs and policies supporting parents in providing high-quality language experiences to their children.”

Brains must be built from the ground up

Yet despite growing knowledge of the importance of interacting and talking with young children, there is still significant disparity in how much access to language children get, both at home and in educational settings.

Data from LENA [“talk pedometer” technology](#) — which measures how much language children are exposed to and was used in the studies mentioned earlier — has revealed that more than a third of children in infant and toddler classrooms may be spending their day in language isolation, experiencing just four or fewer interactions with a caregiver per hour, according to analysis of an exploratory subset of infant and toddler classrooms (Hannon, 2019).

That means that children are missing out on the crucial [“serve and return” interactions](#) that the Center on the Developing Child at Harvard University has identified as one of the most important activities adults can do with children to help them develop executive function, self-regulation, and resilience (National Scientific Council on the Developing Child, 2004). Since thousands of children spend the majority of their waking hours between the ages of 0-5 in child care, better understanding the typical home and early childhood classroom language environments is crucial.

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What is a serve and return interaction?

Serve and return interactions shape brain architecture. When an infant or young child babbles, gestures, or cries, and an adult responds appropriately with eye contact, words, or a hug, neural connections are built and strengthened in the child’s brain that support the development of communication and social skills. Much like a lively game of tennis, volleyball, or Ping-Pong, this back-and-forth is both fun and capacity-building. When caregivers are sensitive and responsive to a young child’s signals and needs, they provide an environment rich in serve and return experiences.

Source: Center on the Developing Child at Harvard University

“We were absolutely stunned when we got our LENA data back,” said Cindy Jurie, Director of Research and Special Projects at the Early Learning Coalition of Orange County, Florida. “In one of our programs that was considered a very high-level program, the infant room conversation was extremely low. That was kind of a wake-up call to why coaching teachers on this is important, because all children need to have teachers who are talking with them, who are engaging them in that back-and-forth conversation. We assumed that was happening because this was a high-quality program, and in fact, our eyes were opened.”

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School districts put research into action

A growing number of educational leaders are connecting these early experiences to students’ later academic outcomes and taking action before children formally enter school. Studies show that children’s early vocabulary predicts their language and reading skills at ages 8-10, about the time they’re finishing third grade (Marchman & Fernald, 2008). In turn, third grade reading scores strongly predict high school graduation rates ([Hernandez, 2011](#)).

At LENA, we’ve pioneered programs that use our “talk pedometer” technology to objectively measure back-and-forth conversations and provide [feedback-based](#)

[coaching](#) to parents and teachers on how to boost interactive talk with children. We work with school districts and other trusted community organizations nationwide to offer classes for parents and caregivers and professional development for early childhood teachers.

Dr. Barbara Cooper, director of the Office of School Readiness for the Alabama Department of Early Childhood Education, helped to spearhead the launch of [LENA Start parent-group classes in Huntsville, Alabama](#), during her tenure as assistant superintendent of Huntsville City Schools.



Huntsville City Schools has served about 400 families through LENA Start and maintained an 83 percent program graduation rate.

“Offering these classes gives us an opportunity to reach students before they even become students,” Dr. Cooper said.

Early longitudinal results show that children whose parents graduated from the program in Huntsville are demonstrating higher literacy skills than their peers more than two years later as they enter pre-K ([“Initial longitudinal results”, 2019](#)).

“This program is definitely cost-saving. We can either catch children at the beginning of their academic career, and give them the basic building blocks in advance so that they’ll have the skills to scaffold as they move through grade school, or try to remediate later,” Anthony Davison, School Readiness Specialist at Huntsville City Schools said.

Program data show the LENA Start graduates in Huntsville have increased both adult words and conversational turns with their children, and reported reading more than three times as much with their children compared to at the start of the program.

CLASS Scores From Fort Worth ISD Pilot

| CLASS Dimension | Before LENA Grow | After LENA Grow | Percent Change |
|------------------------|------------------|-----------------|----------------|
| Conceptual Development | 3.063 | 3.500 | 14% |
| Quality Feedback | 2.938 | 4.313 | 47% |
| Language Modeling | 3.250 | 4.188 | 29% |

In nearby Texas, Fort Worth Independent School District is experimenting with using LENA Grow, an experiential PD program for early childhood teachers, to boost classroom language interactions. An initial pilot with four classrooms in 2019 found that the rooms using LENA Grow

increased scores in key infant and toddler CLASS domains compared to classrooms that didn’t use the program, according to a pre-post evaluation ([“Early Learning Classrooms”, 2019](#)).

“Because the LENA Grow reports provided instant results that teachers could see, they gained more of an understanding of some of the CLASS dimensions and indicators,” said Lisa Austin, a coach who worked with teachers during the program. “So teachers gained a better understanding of what a high-quality, interactive classroom looks like.”

Learnings along the way

As LENA has rolled out these programs to school districts, child care centers, community organizations, and libraries around the country, we’ve learned a few things about what works well.

The most important finding we’ve had is that you can’t improve what you don’t measure. Most adults tend to overestimate how much they talk with children (Richards, Gilkerson, Xu, & Topping, 2017). Having objective data on what types of

activities boost talk and when conversation thrives are key to making sustainable behavior changes (Gilkerson, Richards, & Topping, 2017). Much like a Fitbit helps one to understand their activity levels, using LENA helps adults to understand and build motivation to increase their conversation levels.

Another key learning is that engaging trusted messengers within a new community will facilitate adoption of a program. Whether it's selecting an experienced, respected teacher as a coach for professional development or finding a parent champion to pitch a new program to the PTA, it matters who the message is coming from.

Finally, we've discovered that LENA data can be a valuable tool for helping program administrators and school leaders easily see results and areas for improvement, especially if they're tracking data to report for programs like Early Head Start or a large-scale quality initiative.

"We use LENA to help us make decisions on revisions to our school-readiness goals yearly as well as to help us plan for professional development for staff," TaWanda Randolph, an Education Specialist for Porter-Leath, a community resource center in Memphis, Tennessee, explained.

Takeaways for teachers and families

It can feel overwhelming to take an abstract concept like increasing conversations with children and translate it into concrete, actionable steps that lead to lasting behavior change. To help with this, we developed 14 Talking Tips specifically for parents and teachers. The tips are research-based strategies designed to facilitate conversation and interaction between adults and children. (These can be downloaded for free at info.lena.org/14-talking-tips.)

The tips are simple and can be incorporated into everyday activities. For example, "*Get down on their level*," helps adults to facilitate joint attention with children, which is one of the active ingredients in language learning.

We've seen the tips work best when adults post them in a highly visible place — like on a classroom bulletin board or a fridge — to serve as a daily reminder and behavioral nudge. Seeing them often sparks conversations with other adults, too, like ECE coach Deborah Pollack, from Georgia, relayed:

"A parent was picking up their child, and the child started talking to me. I immediately started answering what I thought they were saying. The child continued, and I continued, using a lot of expressions along with conversation. This went on for five minutes. After we were done, the parent just looked at me in awe and said 'Thank you so much.' It was a great moment for the child, parent, and a coaching experience for the teachers."

At their core, the Talking Tips are designed to create positive, responsive relationships between adults and children, which can serve as a protective factor for children experiencing adversity or trauma. As Child Trends reports:

“Research shows that the strongest protective factor linked with resilience to childhood trauma is the reliable presence of a sensitive, nurturing, and responsive adult. The presence of such a figure can help children by restoring a sense of safety, predictability, and control; giving them the feeling of safety; providing them a way to process traumatic events; protecting them from re-traumatization; supporting their development of self-regulation; and helping them heal ([Bartlett & Steber, 2019](#)).”

While they may seem simple, using the tips to build healthy relationships with children can have lasting protective effects throughout their lives.

The future of early talk

We’re excited that LENA’s work to equalize access to conversation is one of many initiatives emerging across the country focused on the importance of brain-building talk interactions in early childhood. The future is bright because of projects like these:

- Scientists at the **Temple University Infant and Child Lab** are studying how adding talk prompts in public places — like signs in grocery stores — change behavior. In a 2015 study, the team found that shoppers at supermarkets in low-income neighborhoods increased adult-child conversations by 33 percent when signs were up (Ridge, et. al, 2015).
- **Too Small to Fail**, an initiative of the Clinton Foundation, is partnering with Univision, the country’s largest Spanish-language media company, and with writers and producers in Hollywood to promote a public awareness and action campaign highlighting the importance of early brain and language development. Thousands of families have learned about the importance of talking, reading, and singing with children as a result of these initiatives.
- The nonprofit organization **First Book** is partnering with schools and communities nationwide to provide top-quality books to children at lower costs. Shared reading is one of the best ways for adults to boost conversations with children and having books at home and in the classroom encourages more reading time.

Part of our work at LENA is to stay abreast of the latest developments and research in early talk. This fall, we’ll be releasing our first ever “Early Talk Report.” We encourage you to download this resource to take a deeper dive into the research behind why talk matters and look for ways to boost brain-building conversation in your homes, classrooms, and school communities every day.

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