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AMERICAN COCHLEAR IMPLANT ALLIANCE

Leveraging New Technology to Help Parents Foster Rich Language Environments, in partnership with American Cochlear Implant Alliance

Dana L. Suskind, MD

@drdanasuskind

Why another organization in hearing health?

- Membership organization focused on cochlear implantation and access to care
- Members are audiologists, physicians, speech pathologists, educators and others on CI teams + consumers/parents, advocates, hearing aid specialists

Website designed for those in and out of CI
Highly collaborative with other organizations
Welcome your involvement!

www.acialliance.org

<https://www.facebook.com/ACIALLIANCE.ORG/>

Twitter@acialliance



American Cochlear Implant Alliance

- Mission: Advance access to the gift of hearing provided by cochlear implantation through research, advocacy and awareness
- Address factors contributing to underutilization of cochlear implants
- Improve awareness regarding candidacy and outcomes

Why this topic is critical now

- **Hearing loss in children has changed**
 - Opportunity to intervene with early identification
 - Technology routinely fit at 2 weeks of age
- **Parents are a child's best first teachers**
- **Language of the home allows integration into the fabric of the family**
 - “Language Nutrition” encouraged for all children
 - *30 Million Words* elevated awareness of talking and interacting at home for life-time achievement
 - Parents already have the tools

Listening – Language – Literacy

- High priority for ACI Alliance
- Families of children with all levels of hearing loss can foster literacy when they are comfortable talking and interacting
- Benefits for social/emotional well being
- Hearing sounds of language facilitates reading and writing

Leveraging New Technology to Help Parents Foster Rich Language Environments, in partnership with American Cochlear Implant Alliance

Dana L. Suskind, MD
@drdanasuskind



Dana Suskind, MD

Dana Suskind, MD, is Founder and Co-Director of the TMW Center for Early Learning + Public Health, Director of the Pediatric Cochlear Implant Program, and Professor of Surgery, Pediatrics, and Public Policy (affiliated) at the University of Chicago. A recognized thought leader on the national stage, Dana has dedicated her research and clinical life to optimizing foundational brain development and preventing early cognitive disparities and their lifelong impact. Her work is focused in particular on helping parents leverage their power as brain architects.

Disclosures

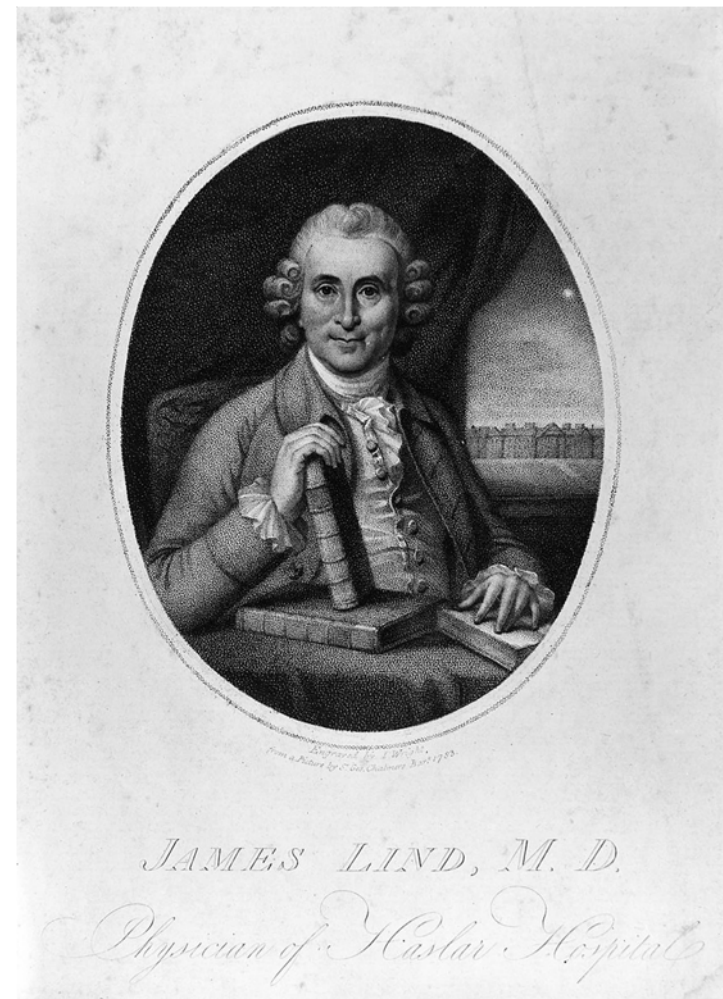
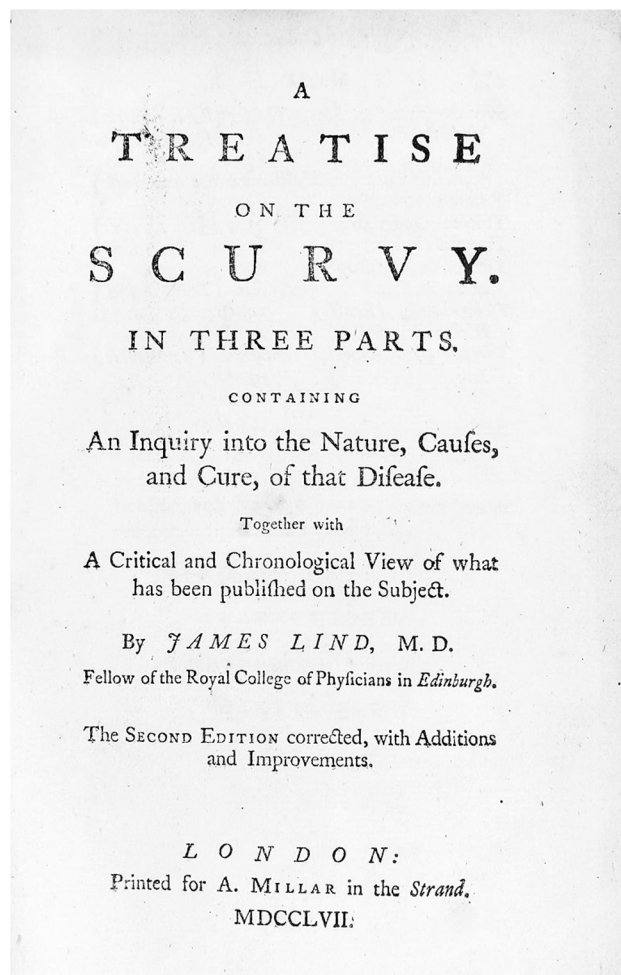
- **Presenter Disclosure:** Financial: Dana Suskind is the Founder and Co-Director of the TMW Center for Early Learning + Public Health, Director of the Pediatric Cochlear Implant Program, and Professor of Surgery, Pediatrics, and Public Policy (affiliated) at the University of Chicago. She received an honorarium for this presentation. Non-financial: Dana Suskind has no relevant non-financial relationships to disclose.
- **Content Disclosure:** This learning event does not focus exclusively on any specific product or service.
- **Sponsor Disclosure:** This course is presented by AudiologyOnline in partnership with the American Cochlear Implant Alliance.

Learning Outcomes

After this course, participants will be able to:

- Explain the relationship between a child's early language environment (particularly the presence of serve and return interactions) and their future skill formation, success in school, and lifelong abilities.
- Recognize the importance of being able to identify the mechanisms responsible for causal relationships, including the mechanisms responsible for the relationship between the early language environment and later skill formation and school success.
- Identify several potential positive impacts and several potential risks associated with artificial intelligence (AI) applications in early childhood.

The First Medical Trial



Even Silver Bullets Have Voltage Drops



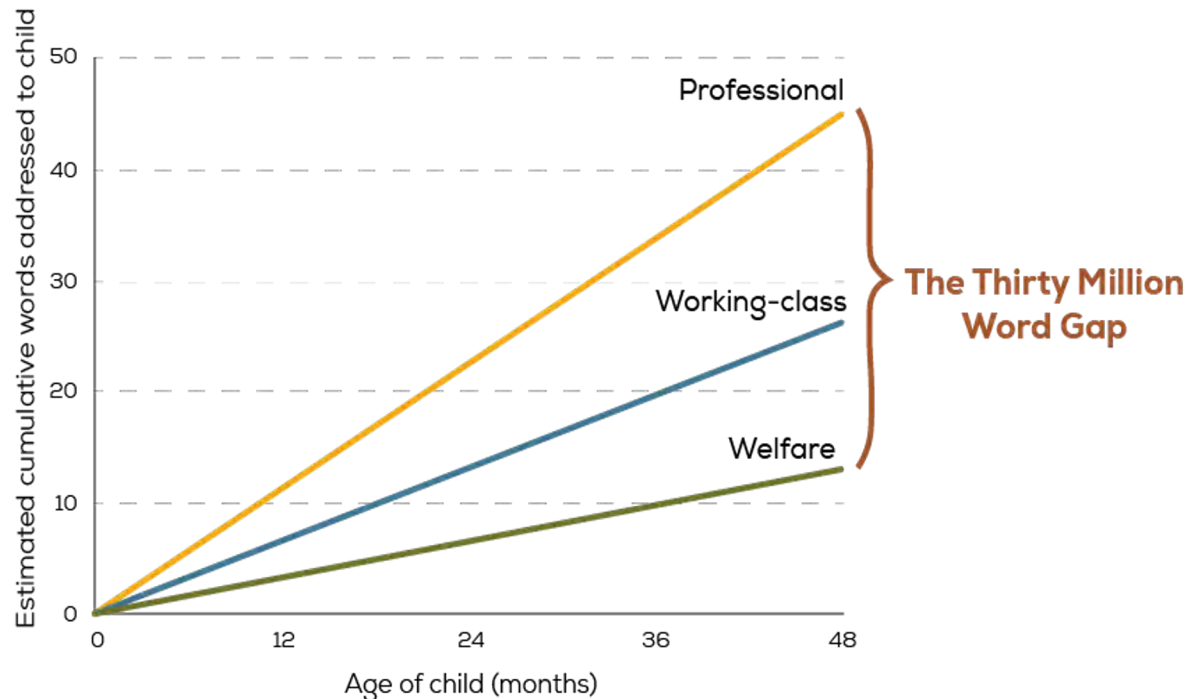
The Importance of Mechanisms





The 30 Million Word Gap

Number of Words Heard by Children Differs Across Income Groups



- Initial finding comes from 1995 Hart & Risley's study
- Research is far from perfect, criticisms of methodology and deficit framing are warranted

Beyond the 30-Million-Word Gap: Children's Conversational Exposure Is Associated With Language-Related Brain Function

Number of Words Heard by Children Differs Across Income Groups

Why the way we talk to children really matters

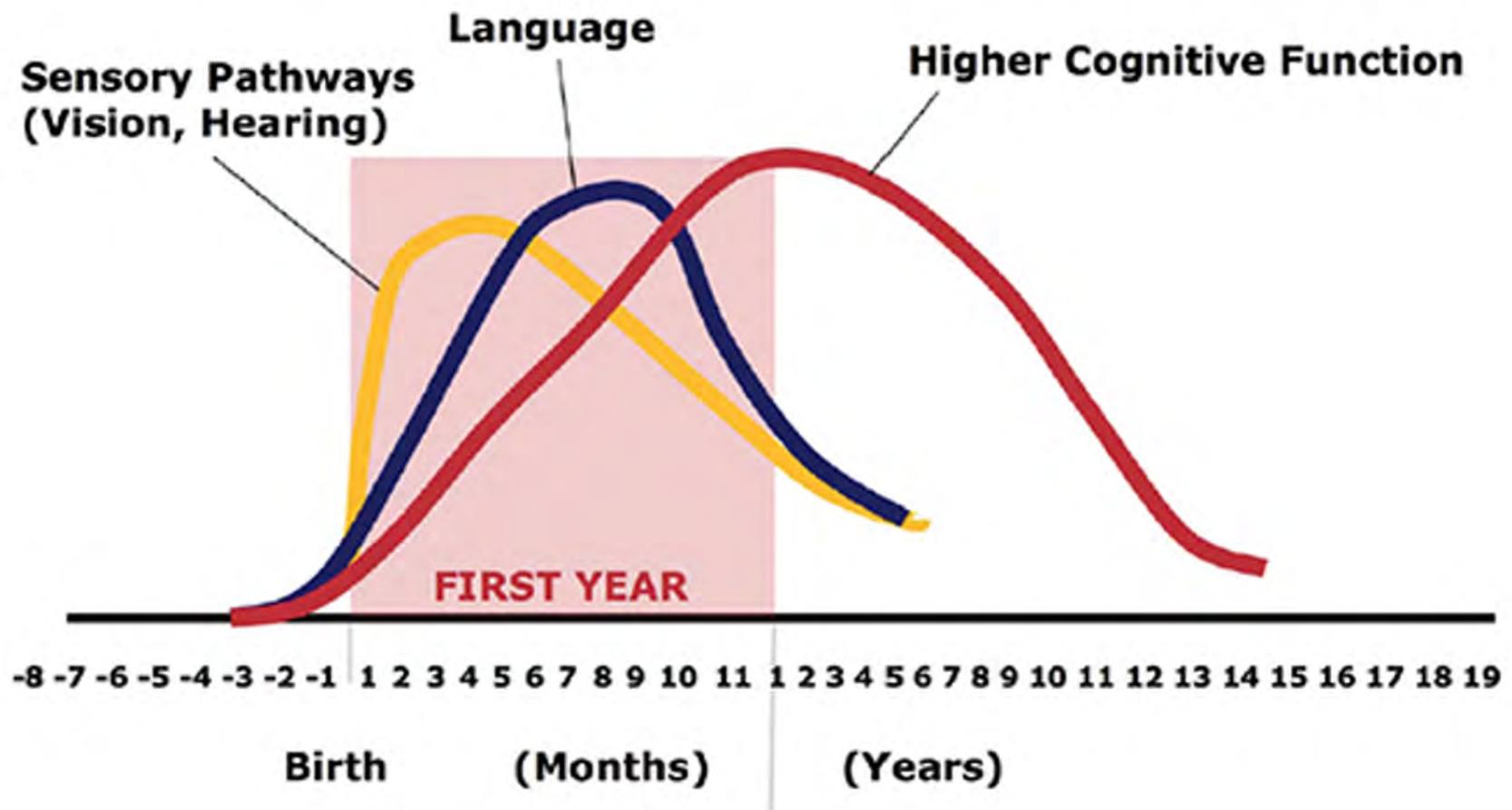
the early years provided parents results in huge and consequential differences in "learning opportunities" over the

PRESCHOOL
Let's Stop Talking About The '30 Million Word Gap'

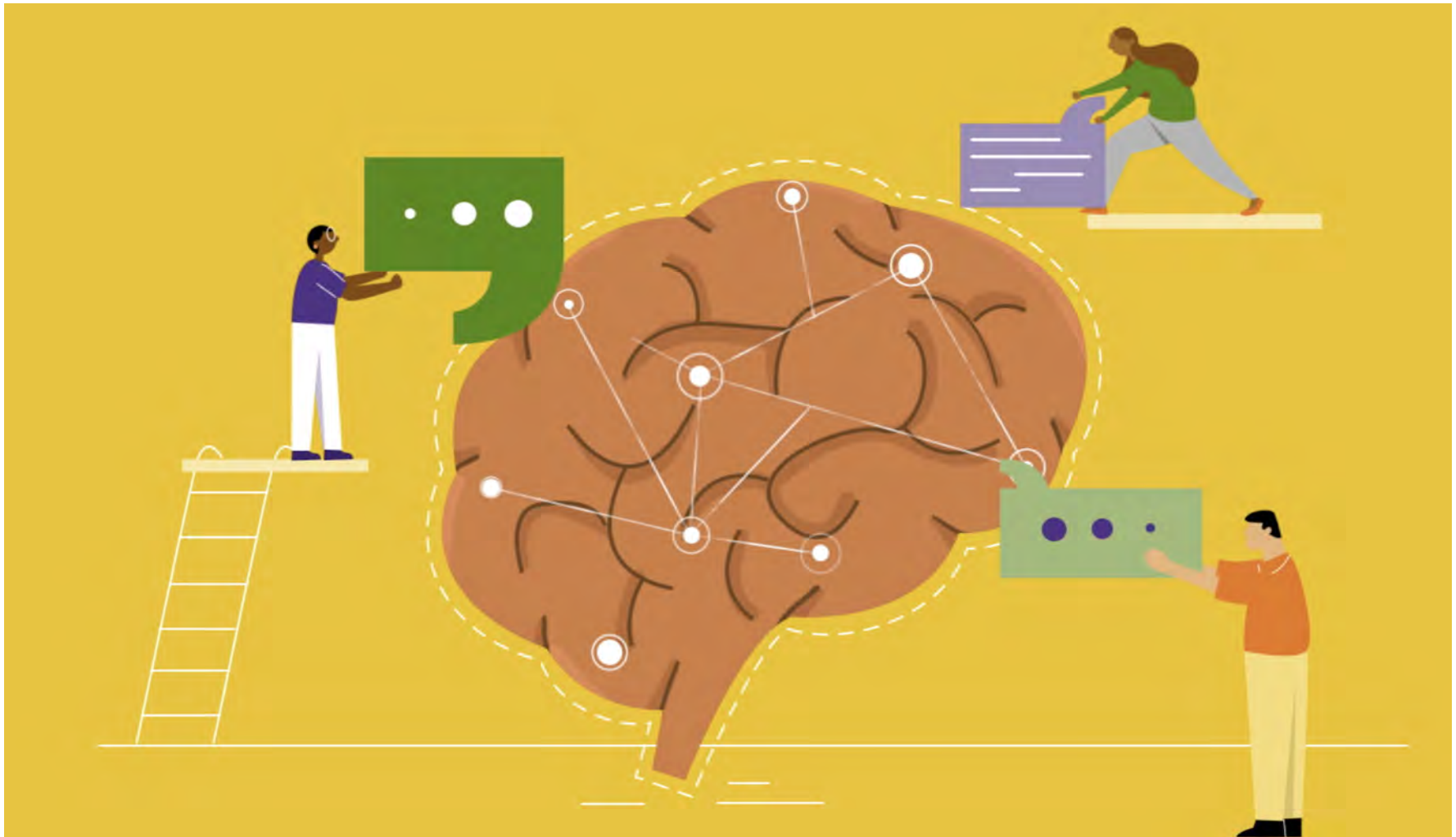
EARLY CHILDHOOD EDUCATION
New Research Ignites Debate on the '30 Million Word Gap'

The Thirty Million Word Gap

Early Childhood Brain Development



Serve and Return



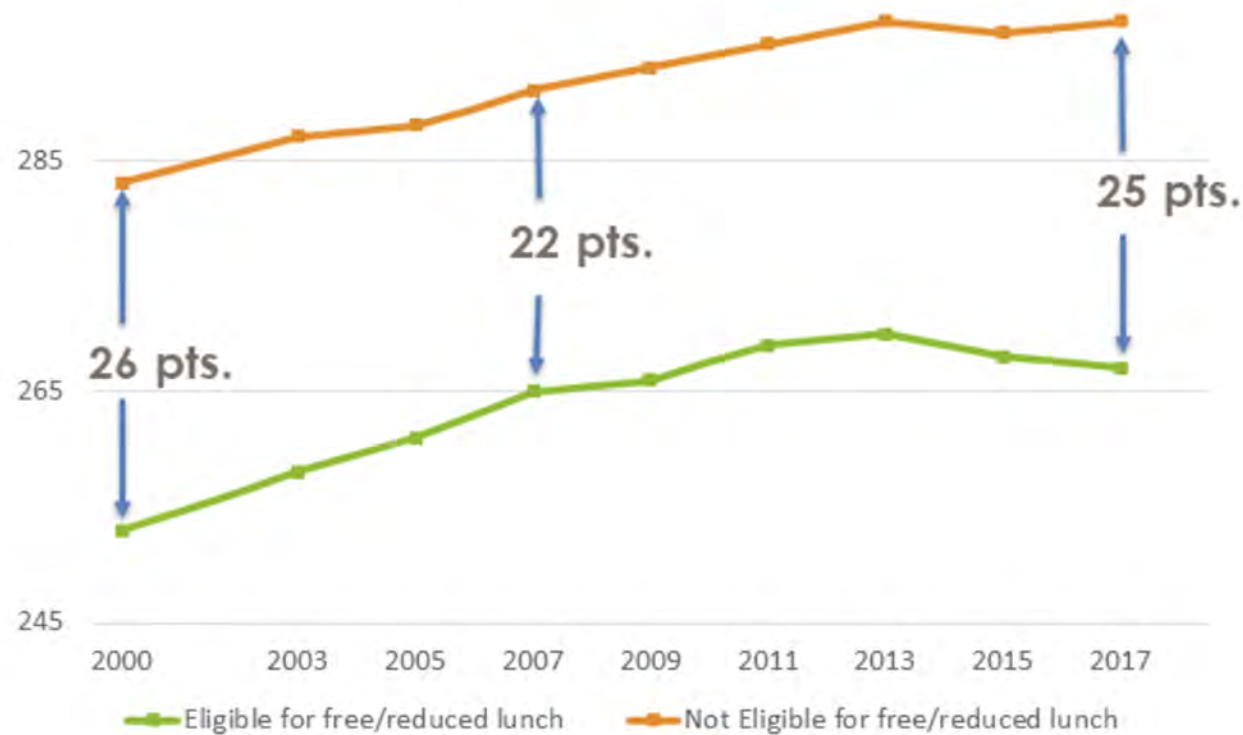
How Talk & Interaction Build the Brain



Romeo, R. R., et. al. (2021). Neuroplasticity associated with changes in conversational turn-taking following a family-based intervention. *Developmental cognitive neuroscience*, 49, 100967.

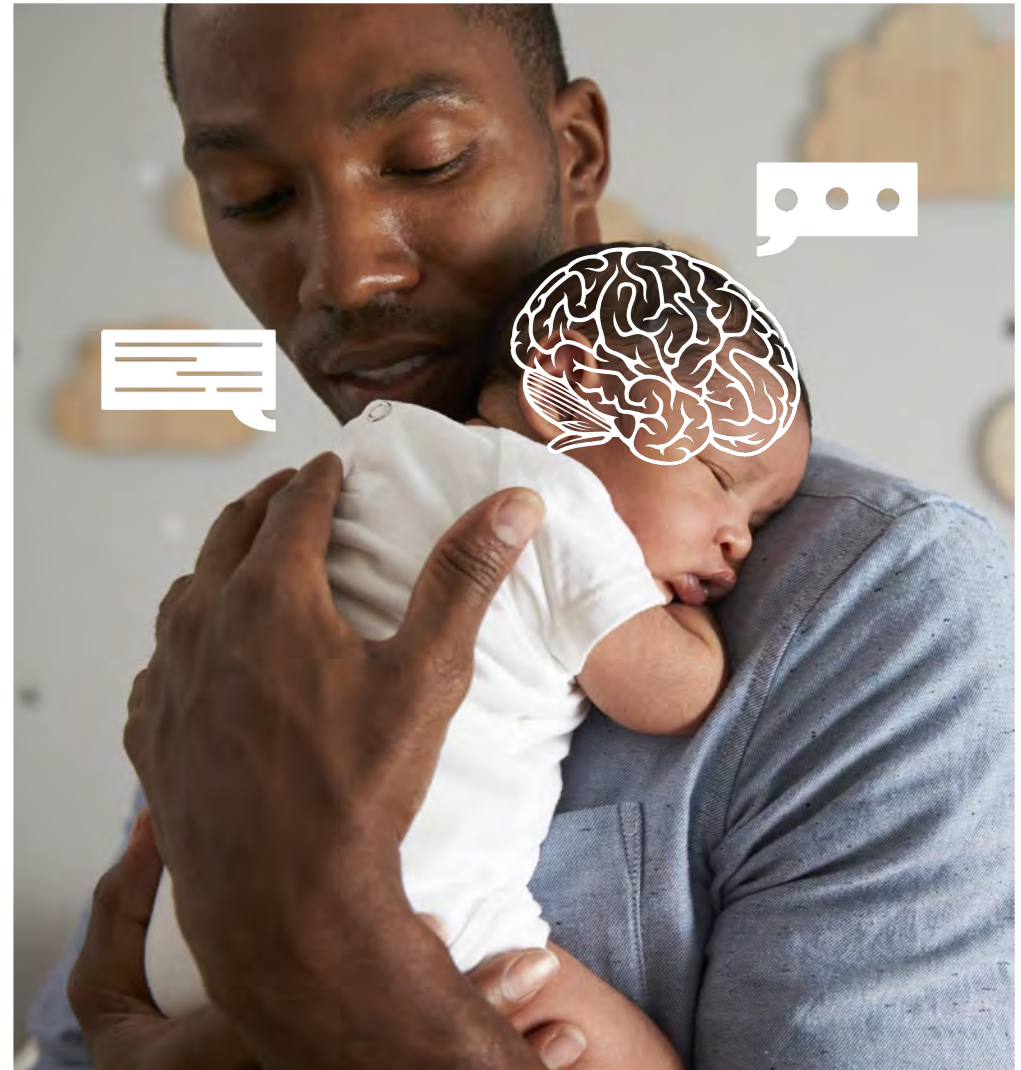
Mirroring the Population at Large

United States fourth-grade math scores, by income



Two Realizations

- We need to start much earlier in life if every child is to have a chance to thrive.
- All parents possess the power to shape their children's foundational brain development. But, in far too many cases, that potential is untapped.



The TMW Center



Our Programs

- We have introduced our programs (in English and Spanish) to thousands of families—in their homes, at birthing hospitals, in pediatricians' offices, through group programs—giving parents and caregivers the tools they need to build kids' brains.
- They are designed to be embedded into existing health and social service systems—to meet parents where they are.



3Ts
NEWBORN



3Ts
WELL BABY



3Ts
HOME VISITING



3Ts
EC EDUCATOR



3Ts
LET'S TALK



3Ts
LET'S TALK DADS

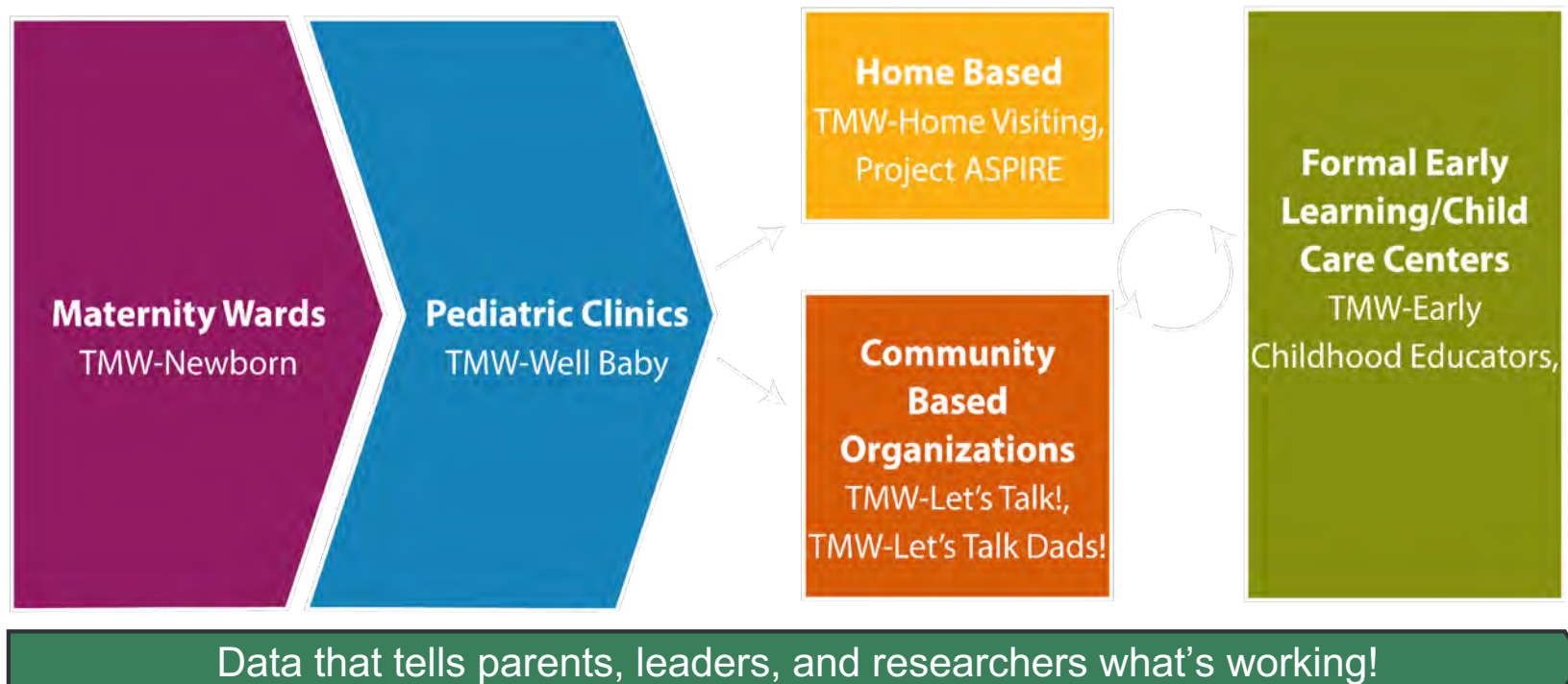


the3Ts.org



COG-X

Parent-Centered Approach to Early Learning



Home Visiting RCT Results

Through observing the interactions between TMW parents and their toddlers, we found that when compared to control group parents, TMW Parents used more praise, explanations and open-ended questions and less criticism, physical control and intrusiveness.



More

Praise
Explanations
Open-ended questions



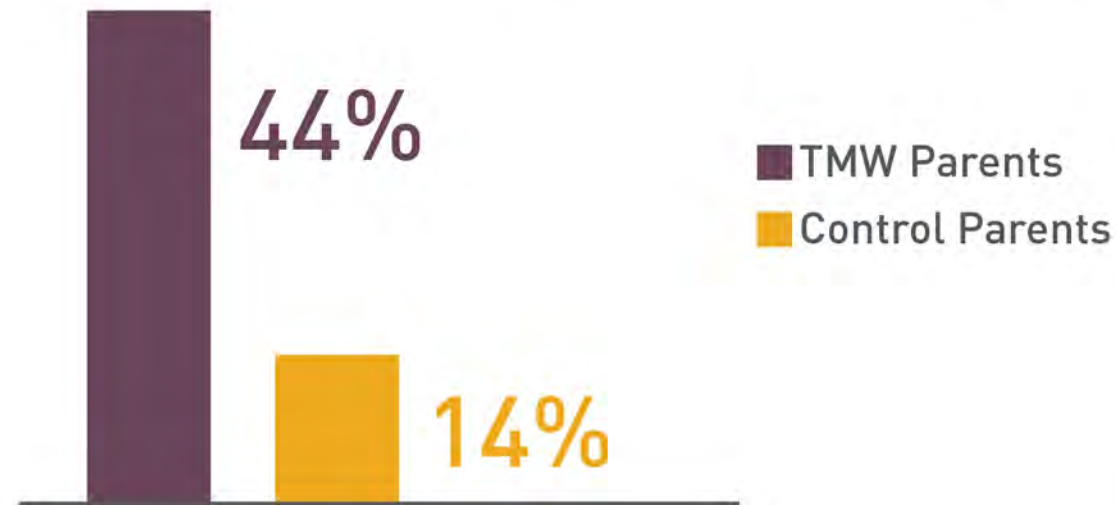
Less

Criticism
Physical control
Intrusiveness

Home Visiting RCT Results

Parent-Child Conversation

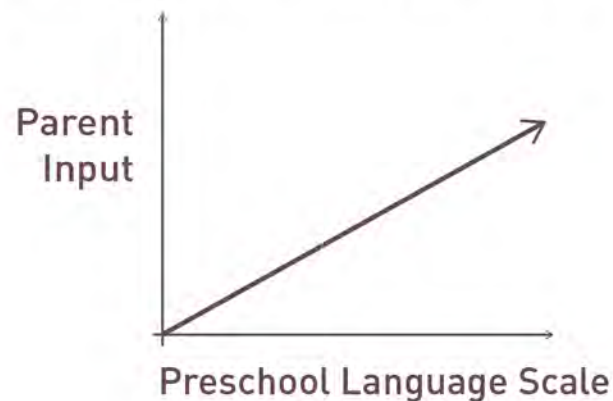
Parents participating in TMW-Home Visiting showed an average increase of 44% in conversational turns with their children compared to a 14% increase among parents in the control group.



Home Visiting RCT Results

Child Language Skills: 1 Year Later

Both TMW and Control families revealed that increases in parent-child conversational interactions right after intervention positively predicted these children's language skills one year after the intervention. Results measured by the Preschool Language Scale (PLS).



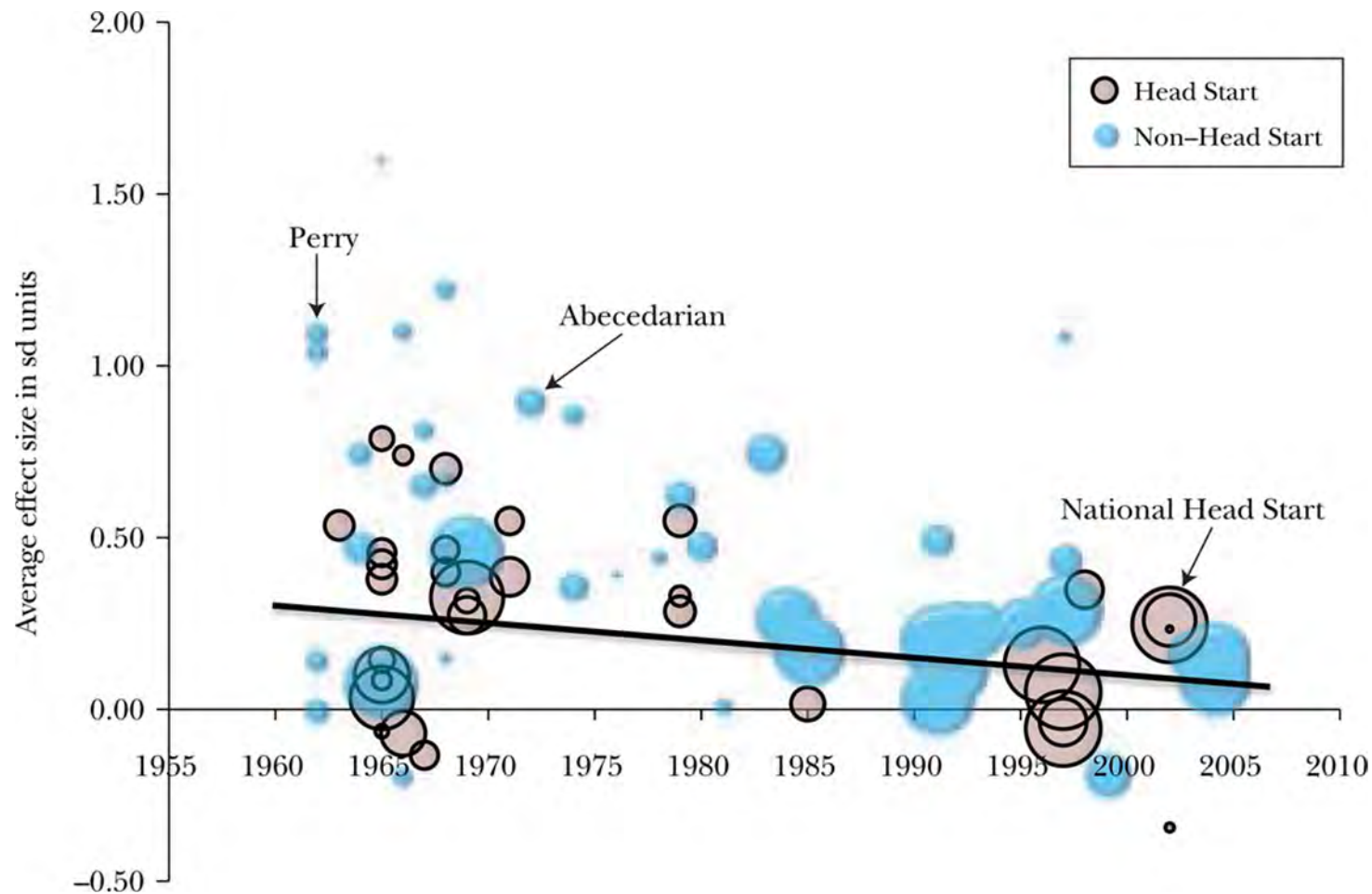
Intervention Impact

	Parent/Caregiver Knowledge	Parent/Caregiver Behavior	Child Outcomes
3Ts-Newborn	Increased	Learned strategies fostering infant secure attachment and language acquisition	Study focused on adult knowledge and behavior
3Ts-Well Baby	Increased	More likely to engage in positive, growth-fostering parenting behavior	Currently processing data related to child outcomes.
3Ts-Early Childhood Educator	Significantly increased, immediately and 3 months after intervention.	Research focused on educator knowledge. Educator behavior and child outcomes were not measured.	Research focused on educator knowledge. Educator behavior and child outcomes were not measured.

TMW Center Partnerships in the U.S.



The Challenges of Scaling



Technology-Based Scalable Solutions

Luet

Quantity and quality of early language interactions

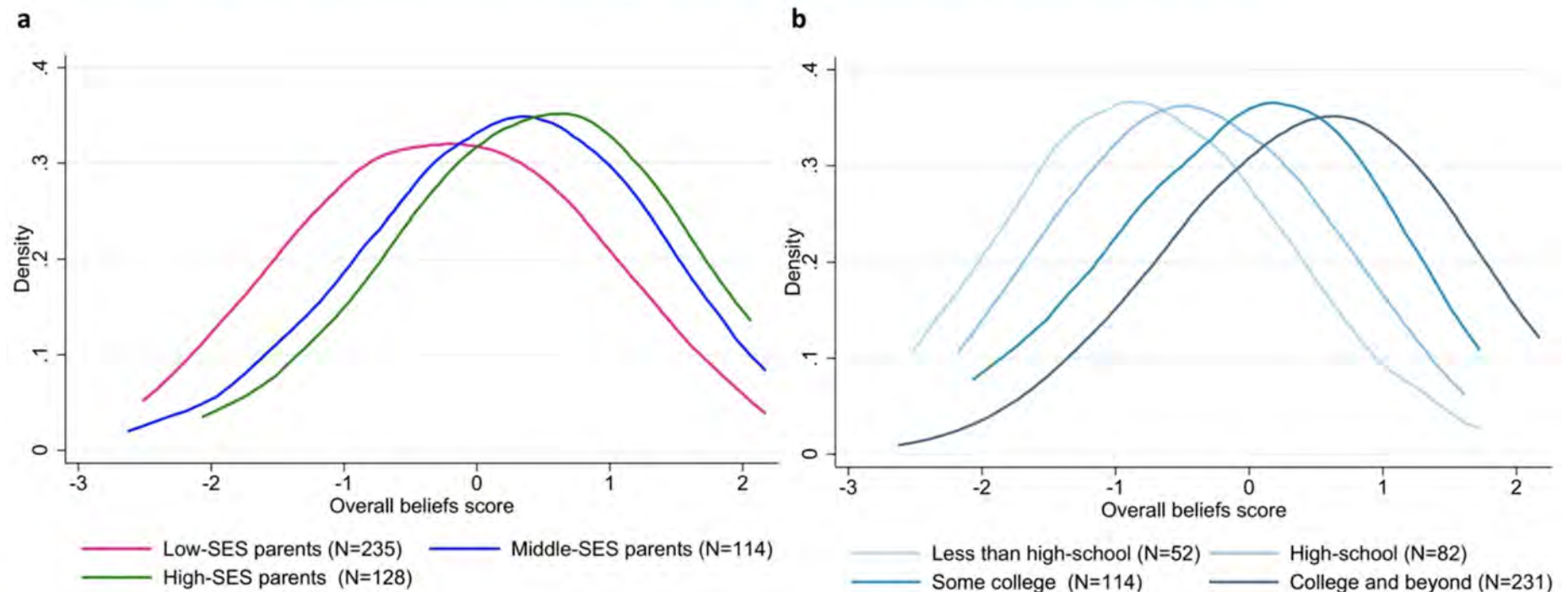
SPEAK CAT

Parent and provider knowledge of child development

What Parents Know Matters

Fig. 1: Disparities in parents' beliefs about how parental investments affect child skill formation.

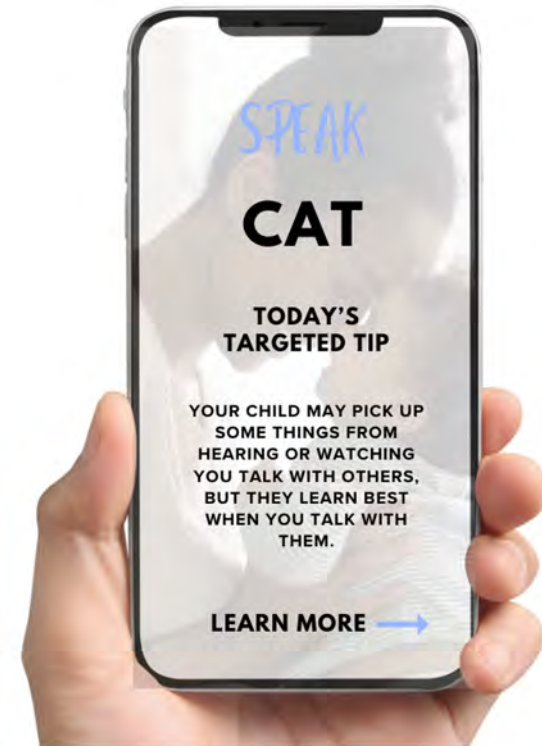
From: [Shifting parental beliefs about child development to foster parental investments and improve school readiness outcomes](#)



SPEAK CAT:

Measuring Awareness, Delivering Support

- A teacher, coach, and cheerleader all in one.
- A computer-adaptive, science-backed smart app that delivers personalized guidance and support directly to caregivers, with information and tips tailored to a child's age and stage of development—and to the user's own beliefs about early childhood development.



Fueling Comprehensive Understanding of Child Development

- SPEAK CAT helps users explore their existing beliefs, learn new information, and develop deep understanding of early child development across eight domains. It also offers crucial insights into how individuals and communities understand these crucial drivers of healthy development:
 - Cognitive Development
 - Language Development
 - Literacy Development
 - Math/Spatial Skills Development
 - Social-Emotional Development
 - Brain Development
 - Dual Language Learning
 - Effects of Screen Media Use

Meet Luet

- Luet helps parents make the most the first five years of their children's learning and development. The name, a **combination of the words language and duet**, points to a harmonious joining of two voices, and to the crucial role that parents and caregivers play during this critical window of time.



Populating a New Data Consortium

Data from SPEAK CAT & Luet will:

- Provide policymakers the power to understand the sources of early inequalities and spot warning signs before disparities take root.
- Help identify the programs or practices that yield the greatest returns, allowing policymakers to invest more strategically in those, while reimagining others that fail to produce impacts.
- Help detect unmet needs and tailor services in a cost-effective way that optimizes the targeting and dosage of resources for every family.
- Help in the effective scaling of those evidence-based programs—by allowing all programs, from small to large-scale, to be evaluated with common metrics
- Uncover new biomarkers (or early predictors) for children's future success

What are Biomarkers and Surrogate Endpoints?

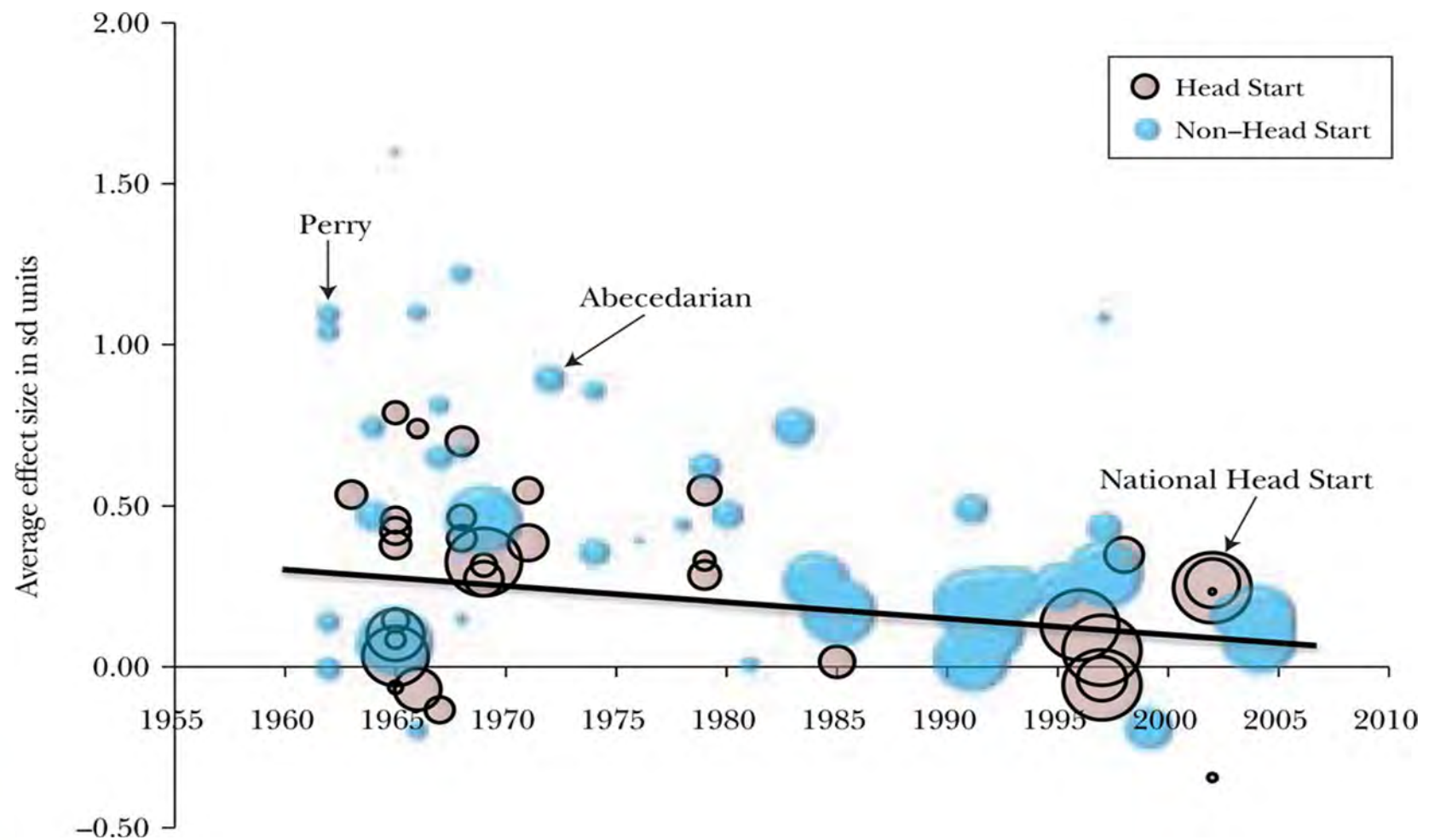
The term “biomarker,” a portmanteau of “biological marker”, refers to a broad subcategory of medical signs – that is, objective indications of medical state observed from outside the patient – which can be measured accurately and reproducibly.

- Strimbu K, Tavel JA, What are biomarkers?

A surrogate endpoint is a biomarker that is intended to substitute for a clinical endpoint. A surrogate endpoint is expected to predict clinical benefit (or harm or lack of benefit or harm) based on epidemiologic, therapeutic, pathophysiologic, or other scientific evidence.

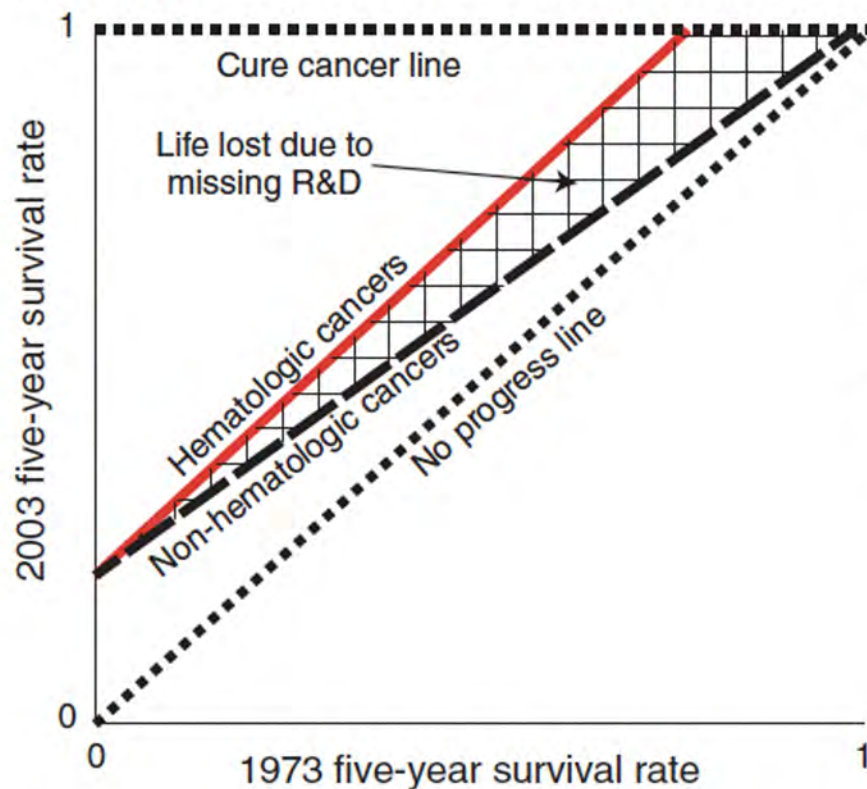
- Biomarkers Definitions Working Group

The Power of Biomarkers

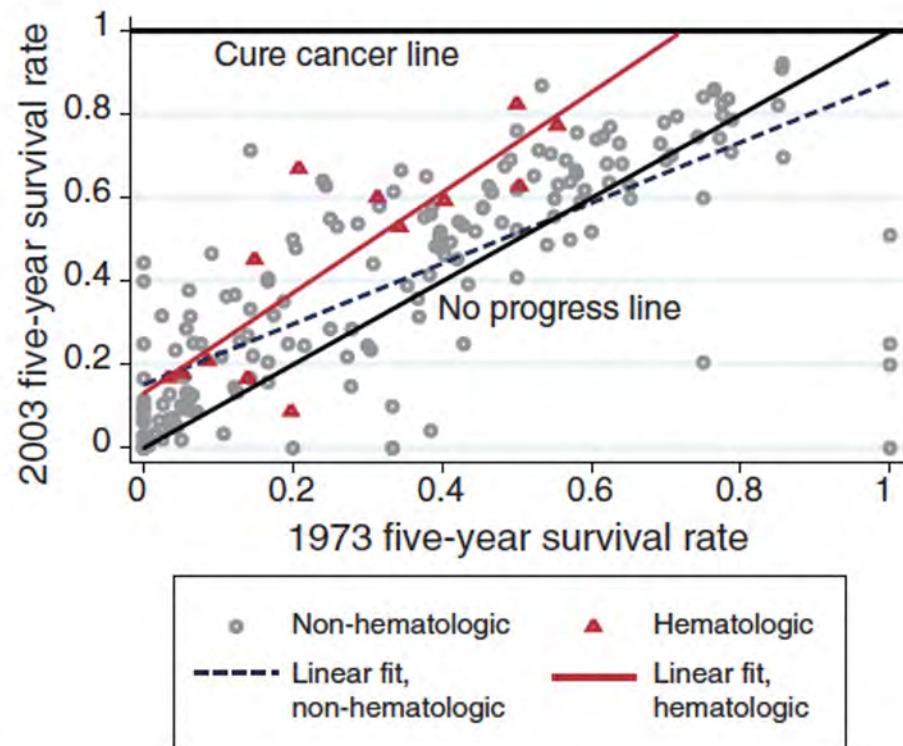


Power of Surrogate Endpoints

Panel A. Framework for analyzing survival gains, 1973–2003



Panel B. Observed survival gains, 1973–2003



Do Firms Underinvest in Long-Term Research? Evidence from Cancer Clinical Trials, AER,
By Eric Budish, Benjamin N. Roin, and Heidi Williams

New Research

“Leveraging AI to Generate New Observables in the Technology of Early Skill Formation : Evidence from Two Field Experiments”

Majid Ahmadi, Imrul Huda, John List, Arnoldo Muller-Molina, Julie Pernaudet, Dana Suskind

Presented at: Synapse Lab Seminar, 08-18-2023

Predictive Features of Parental Tone

Predictive of Lower Skills:

- Louder voice in very high pitch range
- More monotonous tone
- Features associated with sadness
- Narrower harmonic range

Predictive of Higher Skills:

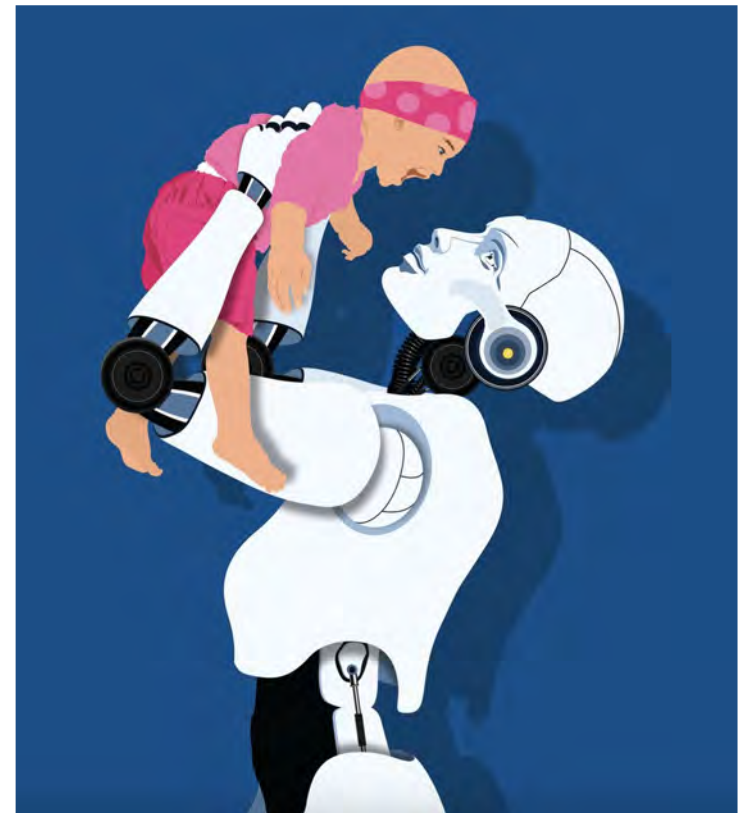
- Broader harmonic range
- Higher variation in pitch
- Higher clarity/contrast of voice
- Higher variation in loudness
- Brighter voice

Risks & Rewards of Artificial Intelligence

THE SATURDAY ESSAY

The AI Nanny in Your Baby's Future

Sophisticated artificial-intelligence helpers will relieve parents' burdens and give babies and toddlers the back-and-forth stimulation they need. But will there be a developmental cost?





Just as AI's rapid integration into life sciences is expected to accelerate advancements in medicine, it will advance our understanding of human development—so that we are not only better equipped to treat, but to prevent, a variety of cognitive delays and disparities.



Thank you!

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