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The SPEAK CAT & Feedback Tool: Assessing and Promoting Knowledge of Child Development

Early Childhood Innovation Summit, June 2023

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tmwcenter.org

Misconceptions about Child Development

"Kids get lost in long sentences. It can overload their brain."

"Watching TV is more helpful than harmful. The more sources of information children get, the better."

"You should use a stern voice when an infant is crying. They are more apt to know you're serious and not playing around."

"Talking to babies in a playful, exaggerated voice can keep them from developing advanced skills."

"When the child says the word wrong ["baba" for bottle], it's best not to answer."

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Parent Knowledge Impacts Child Outcomes

- **Inputs in the earliest years** of children's lives are critical for their **life-long trajectories.**
  - Wide variation in these inputs (e.g., Hart & Risley, 1995; Romeo et al., 2018)

- **What parents know matters**: what parents know about early child development is predictive of how they interact with their children (Leung & Suskind, 2020).

- Knowledge is **measurable** and **malleable.**
  - Yet, pre-existing measures (e.g., KIDI; MacPhee, 1971) only give clinicians and researchers broad information about parents' knowledge and do not place a strong focus on language skills.

Problem:

Huge **variability** in parent knowledge. Touchpoints for parents do not assess knowledge or attempt to fill in gaps in knowledge.

Solution:

Create a **brief, accessible, validated measure** of knowledge of early child development.

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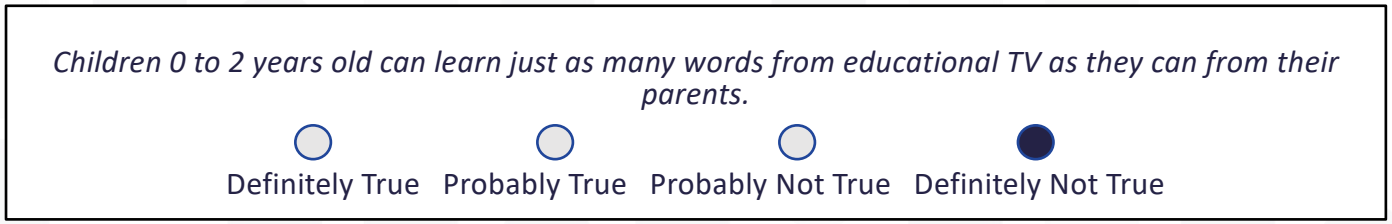
History of the SPEAK

SPEAK – **S**urvey of **P**arent/**P**rovider **E**xpectations **A**nd **K**nowledge

- Instrument developed to assess parents' knowledge and beliefs related to children's cognitive and language development
- Designed to be used at baseline and post-intervention to evaluate intervention efficacy
- Multiple fixed-length versions of the SPEAK currently used throughout TMW interventions and shared with collaborators
- Available in English and Spanish



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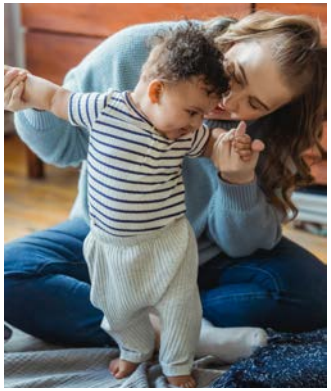
Leung & Suskind, 2020; List Pernaudet, & Suskind, 2021; Suskind et al., 2017

Findings from the Original SPEAK (Leung & Suskind, 2020)

1 week (newborn): **SPEAK** administered

9 months later…



Parents who initially had higher SPEAK scores were:

- More **responsive/sensitive** to cues
- More likely to foster **social emotional growth** (warm, positive tone)
- More likely to foster **cognitive growth** (promote learning experiences)

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Creating a Computer Adaptive Version of the SPEAK

- Items are drawn from large "**item banks**" that have been calibrated using modern psychometric methods.
- Items are **adaptively selected and administered** so that they quickly converge on a score with high precision of measurement.
    - Questions appear **one at a time** on a computer screen
    - First item is a **medium-difficulty** item
    - Test progresses with different **questions of varying difficulty levels** depending on how well the person performs on earlier questions

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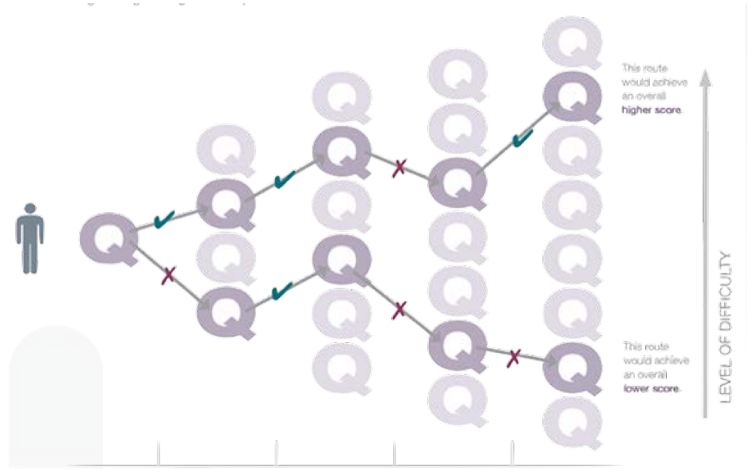
Advantages of a CAT over a fixed-length survey

- **Shorter** administration time
- **Higher precision and uniform precision** of measurement across participants
- **No response-set bias**
- CATs can be **continually updated**



Beiser, Vu, & Gibbons, 2016; Gibbons et al., 2016

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Goals of the SPEAK CAT

Build a quick, precise, and scalable CAT that measures knowledge of early child development	Adapt the tool for speakers of other languages	Embed the tool in regular delivery of TMW interventions
Aid researchers and educators in program development, monitoring, and evaluation	Provide tailored, individualized feedback to increase knowledge	Conduct analyses of communities/populations

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SPEAK CAT Content

Domains of Child Development:

- Language Development
- Social-Emotional Development
- Cognitive Development
- Brain Development
- Literacy Development
- Math/Spatial Development
- Screen Media Use
- Dual Language Learning

Areas of Knowledge Within Domains:

- Normative Development/Milestones
- Role of Environment/Caregiver Input
- Predicting Developmental Outcomes

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Sample Items

Talking with 4-year-olds about things that happened months ago (such as a party) helps them learn new words.

Definitely True	Probably True	Probably Not True	Definitely Not True
●	○	○	○

By the time children are 3 years old, their brain reaches more than 75% of its adult size.

Definitely True	Probably True	Probably Not True	Definitely Not True
●	○	○	○

Letting infants (0 to 12 months) play with books can teach them bad reading habits.

Definitely True	Probably True	Probably Not True	Definitely Not True
○	○	○	●

If 12-month-old infants are shy when they are in new places, it usually means they will have emotional problems.

Definitely True	Probably True	Probably Not True	Definitely Not True
○	○	○	●

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Completed Work

Literature reviews of over 1,500 articles

Item writing and revision of 560 total items

Cognitive interviewing of items: 556 interviews total

Content validity established with experts and clinicians

Item Testing to determine algorithm: over 1,000 diverse participants

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Ongoing Work

- Development of SPEAK CAT technology and algorithm
- SPEAK CAT user testing with parents, educators, and clinicians
- SPEAK CAT validity testing
- Feedback tool creation and testing
- Adaptations of SPEAK CAT – Spanish, Chinese, Portuguese, and beyond

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SPEAK CAT Feedback Tool

Proposed Framework

- Use SPEAK CAT results to identify areas of strength and opportunities for growth
- Respond with feedback prompts that both reinforce what caregivers already know and address gaps in understanding or misconceptions
- Being built for use in early childhood education, healthcare, and research settings (and more)

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SPEAK CAT Feedback Tool

Development Approach

- Organize domain items by
  - Subject
  - Age of child
- Write feedback prompts that both respond and reinforce to similarly grouped items
- Review feedback prompts with a variety of stakeholders

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SPEAK CAT Feedback Tool Development

- Goal is to better understand
  - How to craft feedback prompts for relatability, clarity, and accuracy
    - We ARE trying to support general understanding
    - We ARE NOT trying to teach specifics
  - Most efficient way to deliver feedback
    - Via provider, educator, electronically, print
- Stakeholders to be engaged
  - Early childhood educators (YOU!)
  - Early intervention providers
  - Healthcare providers
  - Families

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SPEAK CAT Sample Feedback Prompts

SPEAK CAT Item: Reading to infants (birth to 12 months) supports their brain development. (TRUE)

Feedback Prompt: It is never too early to read with your child. When they are very young, the sound of your voice and the feel of your touch strengthens the bond between the two of you and builds the foundation for a love of books.

SPEAK CAT Item: Toddlers (1- to 2-year-olds) who often hear adults use numbers (such as "two trucks") tend to have good math skills at age 4. (TRUE)

Feedback Prompt: When your child hears lots of talk about shapes, sizes, and numbers when they are very young they will be better prepared to learn math in school.

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SPEAK CAT Sample Feedback: Video Component

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SPEAK CAT Feedback Tool Development Opportunities

- Where we go from here
  - Gather input on use-case, interface, and practical usability
  - Early testing with families and practitioners in the field
  - Implementation to understand how best to embed into practice
- Synchronous feedback prompt review
  - Reviewers eligible to participate in multiple 1-hour virtual sessions
  - Participants receive gift card compensation
- Asynchronous feedback prompt review
  - Content available virtually, on-demand
  - Participants receive gift card compensation

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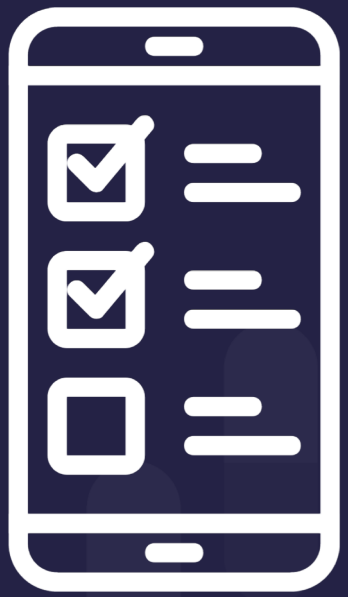
We want to hear from you!

Next steps:

- SPEAK CAT phone poll
- Feedback Prompts questionnaire



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SPEAK CAT Phone Poll

Visit:

PollEv.com/bethsuskind099

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Who do you think the SPEAK CAT would be useful for?

Teachers and parents

Teachers only

Parents only

None of the above

Do you realistically think that you would use the SPEAK CAT in your center?

Yes

No

Maybe

Rank the format of SPEAK CAT feedback you'd like to receive, from most preferred to least preferred.

Written feedback

Written feedback with images

Video-based feedback

In person, from another adult

Rank how you'd like to receive SPEAK CAT feedback, from most preferred to least preferred.

Paper handout

Text message

Email

Website

Discussion with a supervisor

Please share any additional comments about the SPEAK CAT.

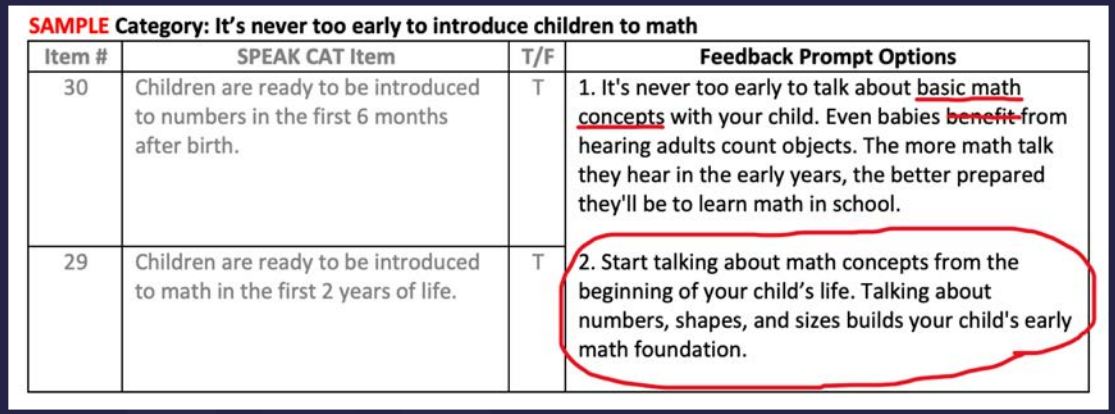
SPEAK CAT Feedback Prompts Questionnaire

For each category, please:

1. Circle the prompt in the *Feedback Prompt Options* column that you find most useful.

2. Underline any language that is unclear.

3. Strikethrough any words or phrases that may be too challenging for respondents.



SAMPLE Category: It's never too early to introduce children to math

Item #	SPEAK CAT Item	T/F	Feedback Prompt Options
30	Children are ready to be introduced to numbers in the first 6 months after birth.	T	1. It's never too early to talk about basic math concepts with your child. Even babies ~~benefit~~ from hearing adults count objects. The more math talk they hear in the early years, the better prepared they'll be to learn math in school.
29	Children are ready to be introduced to math in the first 2 years of life.	T	2. Start talking about math concepts from the beginning of your child's life. Talking about numbers, shapes, and sizes builds your child's early math foundation.

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THANK YOU!

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Extra Slides

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Cognitive Interviewing

- 556 interviews conducted with 296 participants
- Tested a diverse adult population
- Gained feedback and checked understanding of items

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Insights into Cognitive Interviewing

Variability in how adults think of **age ranges**

Difficulty understanding **"brain activity"** and other neural terms

A need for **cultural considerations**

Surprising **misconceptions** led to new items

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Item Revisions (Original Item)

What is a “logo?”

Teaching children letters from logos (the K in "Kraft") can help them learn those letters.

I’ve never heard of “Kraft” before.

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Item Revisions (Final Item)

Teaching 4-year-olds letters from brand labels (such as the "M" in McDonalds) helps them learn those letters.

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Content Validity

SPEAK CAT items were carefully reviewed by a panel of experts and clinicians including:

9 Domain Expert Researchers

3 Early Career Researchers

3 Pediatricians

5 Speech Pathologists

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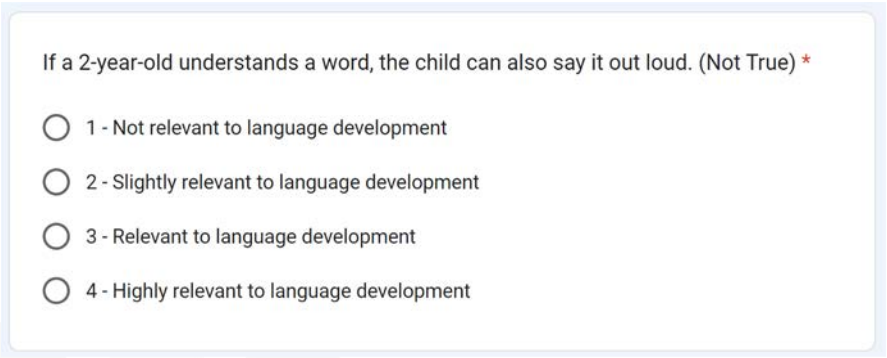
Content Validity

Early Career Researchers and Speech Language Pathologists rated items as relevant to domains; Index of Mean Content Validity (CVI) for Items [Threshold = .90], (SD)

- Language: 0.93 (0.12)
- Social-Emotional: 0.98 (0.10)
- Cognitive: 0.98 (0.08)
- Brain: 0.94 (0.13)
- Literacy: 0.98 (0.07)
- Math/Spatial: 1.00 (0.00)
- Screen Media: 0.94 (0.20)
- Dual Language: 1.00 (0.00)

Average CVI of all items (S-CVI) = .96 (.11)



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Item Testing

QUESTIONS THAT MOTIVATE ITEM TESTING

- Which items are easier? Which are harder?
- How many domains do these items measure?
- Which items best measure specific domains?
- Which items best measure child development knowledge overall?

PROCESS

Test SPEAK CAT item bank with sample of 1,000 participants.

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Answers After Item Testing

Item Parameters:

Difficulty levels of items

Factor Structure:

Number of domains

Domain Factor Loadings:

Which items fit in which domains

General Factor Loadings:

Which items fit in the SPEAK CAT overall

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