Making Story Books Count: Improving Math Learning at Home through a Parent-Delivered Intervention

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Erikson Institute Promising Math 2019
Scripting Math Input

- Parents are more likely to reinforce literacy (Cannon & Ginsburg 2008)
- Powerful way to introduce math learning into the home is through shared book reading
- Experimental evidence suggests semi-scripted input is beneficial (Berkowitz et al., 2015; Gibson, Gunderson, & Levine, under review)
What kinds of materials best support number learning?
Number Development

Wynn, 1992; Le Corre et al., 2006
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Number Development

- Counting is no longer perceived as a meaningless activity
- Fixed learning stages

Wynn, 1992; Le Corre et al., 2006
Number Development

Wynn, 1992; Le Corre et al., 2006
What kinds of materials best support number learning?

**Current Study:** Effect of the contextual presentation of number in counting books

- Presented in the illustrations
- Talked about in the text
six
tickly kisses on baby's dimpled chin

Ten Noisy Monsters were tucked in face-to-face.

“TWO beavers are building a dam.
They wave hello.”

One little monkey reads the recipe.
“Two cups of flour. Three teaspoons of baking powder.”

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“What’s your recipe?” asked the monkey.

“Two cups of flour. One teaspoon of salt,” replied the monkey.

“You need a bit more sugar,” said the monkey.
Bears!
There are four

Ramscar et al. 2011; Mix et al., 2012
Bears!
There are four
Current Study

• Comparing the effects of sparse vs. rich context on children’s number development through a parent-delivered intervention
Method

- 3-year-olds and their parents
- Pre-Mid-Post test
  - Sessions scheduled two weeks apart, for a total of four weeks of practice
- Parent-child dyads assigned to 1 of 3 practice conditions
  - Asked to practice with assigned books at home in between testing sessions
- Parents kept a log to measure frequency of practice
Book Interventions

- Counting Books
- Sparse
- Rich
- Color Book (Control)
Look at the cupcakes!

There are two!

Can you count the two cupcakes?
But Lucy does not have enough to share with all of her friends! She walks into the kitchen and finds cupcakes! Look at the cupcakes!

There are two.

Can you help Lucy count the two cupcakes?
But Lucy still wants to find something in her favorite color! She walks into the kitchen and finds a cupcake!

Look at the cupcake! What color is it?

It is pink!
Participants

- 71 3-year-olds (\(M = 36.52\) months, range = 34.46 – 39.97 months, 38 females)
- N per starting knower-level:

<table>
<thead>
<tr>
<th>0 knowers</th>
<th>1-2 knowers</th>
<th>3-4 knowers</th>
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<tbody>
<tr>
<td>23</td>
<td>26</td>
<td>22</td>
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Results
Cardinality

Proportion of Children who Improved

Control | Rich | Sparse

0.0 | 1.0 | 0.4
Counting Skill

![Graph showing counting skill over sessions for different conditions (Control, Rich, Sparse).]
Frequency of Book Reading

Numbers of Reads

- Control
- Rich
- Sparse
Frequency of Book Reading

![Bar chart showing the frequency of book reading across different groups and weeks. The chart compares 'Control', 'Rich', and 'Sparse' groups for Week 1-2 and Week 3-4. The y-axis represents the numbers of reads, ranging from 0 to 12. The chart indicates a higher frequency of readings for the 'Rich' group compared to 'Control' and 'Sparse' groups.](image-url)
Summary

• Positive effects for both number books
• Marked condition effects favoring the *rich counting books*
Bears!
There are four

TWO beavers are building a dam.
They wave hello.
Summary

- Positive effects for both number books
- Marked condition effects favoring the *rich counting books*
- Unanswered question of which features are driving children’s learning
  - Is the narrative just as effective without the rich scenes?
  - Does the narrative have to be centered on a number goal?
Thank You!

• To all the families who participated in the study

• Cognitive Development Lab at UChicago

• Our funding agencies: