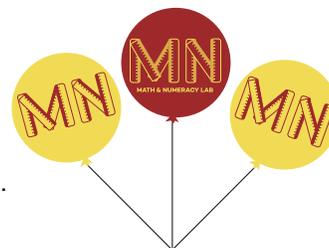


Why “number” matters in early childhood

Children benefit from having a good understanding of what numbers *are* and what number words *mean*. This knowledge provides a foundation for their later mathematics achievement. This means that children benefit from opportunities to learn about numbers before they enter school. In the Math and Numeracy Lab (MN Lab) at UMN, we study factors that may influence such learning opportunities.



Books as opportunities to promote early mathematical thinking

Shared reading is a fun and easy opportunity for math learning. Books are readily available at public libraries and can be borrowed for no cost, for use at home, preschool, and preK settings. When parents and caregivers read books with children, they may encounter math content even if the book is not a “math book” per se (such as *Goldilocks and the Three Bears*). In this study, we looked at existing counting books, and asked if these books differ in terms of whether they might support early math learning.

How do books differ from each other, and do these differences matter?

The learning opportunities provided by books might be affected by the quality of the *math* in the books, but also by the *features* of books themselves. At the MN Lab, we wanted to know if differences between books affect how well children learn about numbers, but we could not address this question without first understanding how books vary to begin with! So we systematically reviewed 120 counting books available at the Minneapolis public library, and coded key features detected in the books. We also asked whether those features are aligned with what we know about how children learn about number.

We found that **books vary a lot, on several dimensions**, including the following few examples:

- The objects to be counted might be scattered (Image 1) or lined up in a row (Image 2).
- The objects to be counted might be easy to differentiate or they might overlap (Image 1).
- The pages might have many distracting images, a few distractors, or no distractors (Image 2).
 - *These three features might pose challenges for some children who are just learning to count or who have difficulty tracking what they have already counted; on the other hand,*
 - *These three features may make counting more fun for children who know how to count and who may benefit from practice searching for or identifying sets of items.*
- The number of items on the page is not always the same as what is indicated by the text. For instance, the page might read, “three ducks,” but the picture might show 4 ducks (Image 3).
- Most books present numbers “in order,” from smallest to largest, but some follow a descending pattern and some follow no particular order.
 - *These two features may be confuse children who are still learning what number words mean or who are still learning the number word sequence.*
- Most counting books involve a story, but 20% of the books we reviewed had no story to them.
 - *This might affect parents’ and children’s engagement with the math content in a book.*

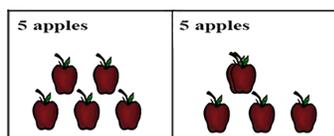


Image 1

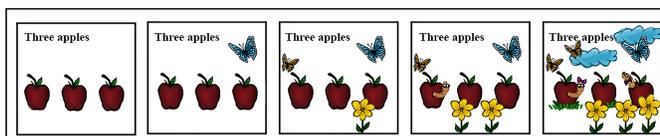


Image 2



Image 3

Implications. Although we showed that features of counting books vary, this study does not reveal how those features influence children’s learning. Our findings do inform us about what early counting books look like, and this information can heighten adults’ awareness of when explanations or other support may be warranted during shared reading (e.g., for Image 3, a parent may want to explain, “*There are four ducks on the page, but only three are baby ducks.*”) Our findings also inform researchers who study how books promote early math development, by identifying what book features are good targets for further study.

For further reading: Ward, Mazzocco, Bock, & Prokes, N. (2017). Are content and structural features of counting books aligned with research on numeracy development? *Early Childhood Research Quarterly*, 39, 47-63. <https://doi.org/10.1016/j.ecresq.2016.10.002>. This work was supported by the University of Minnesota and by the Heising-Simons Foundation DREME Network.