

Categorization Training Improves Representations of Numerical Magnitude

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1 Introduction

Representations of numerical magnitude shift from logarithmic to linear with age (Booth & Siegler, 2006; Laski & Siegler, in press; Siegler & Opfer, 2003)

One learning strategy that may be used to form more advanced representations is "*Divide and Conquer*" (breaking up a learning task to make it manageable by attending to the most important components first and refining the details later).

Central Question:

Could subjective categorization of numbers be a means of implementing divide and conquer in the domain of numbers?

2 Method

- **40 kindergartners** – middle-to-high income public school
- **Two Conditions** – feedback & no-feedback; otherwise identical
- **Pre- and Posttests**
 - (1) numerical categorization ("is N a very small, small, medium, big, or very big number")
 - (2) number line estimation ("on this line with 0 and 100 at the ends, where does N go")
 - (3) magnitude comparison ("which number is larger, N or M")
- **Training Tasks** – promote division of numbers between 0-100 into 5 equal-sized categories
 - (1) sorting task – category midpoints
 - (2) sorting task – variable numbers
 - (3) triad task – a standard (the category midpoint), an incorrect choice, and a correct choice

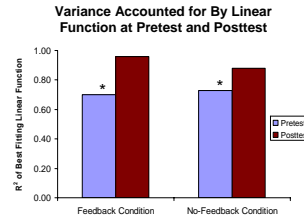


Materials for sorting task

3 Results

Numerical Categorization

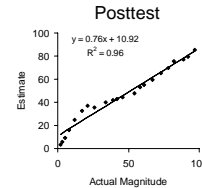
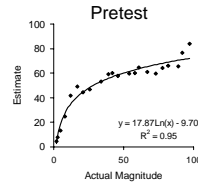
Performing the categorization training tasks, even in the absence of feedback, influenced performance on the posttest categorization task, though the effect was not as great as when feedback was provided.



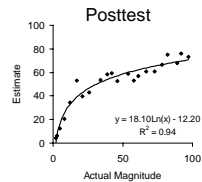
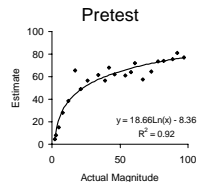
Number line Estimation

Only children who received feedback on their categorizations also generated more linear number line estimates.

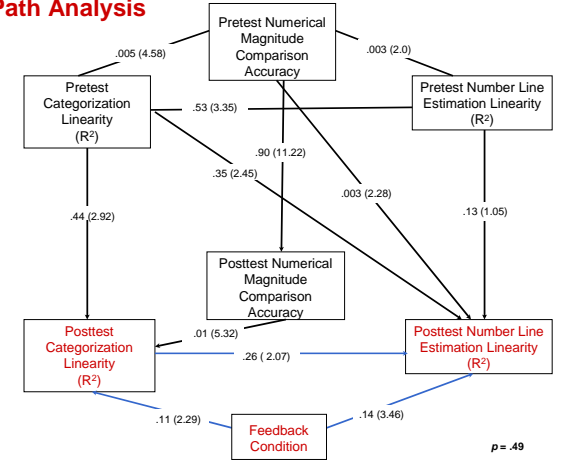
Feedback Condition



No-Feedback Condition



Path Analysis



4 Conclusions

Feedback on numerical categorization promotes more linear categorizations of numbers *and* more linear number line estimates

A "*Divide and Conquer*" approach – subjective categorization of numbers – provides a useful means for learning about unfamiliar numerical ranges

References

- Booth, J. L., & Siegler, R. S. (2006). Developmental and individual differences in pure numerical estimation. *Developmental Psychology*, 41, 189-201.
- Laski, E. V., & Siegler, R. S. (in press). Is 27 a big number? Correlational and causal connections among numerical categorization, number line estimation, and numerical magnitude comparison. To appear in *Child Development*.
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