Helping Children See Patterns: Visual Support as a Tool to Understanding Repeating Patterns
Camille Msaill, Jamie Klingenber, & Bethany Rittle-Johnson
Vanderbilt University

Background

• Perceptual information is helpful to cue learners to pay attention to the specific relevant features in a mathematics problem (Alibali, Crooks, & McNeil, 2018; Flynn, Guba, & Fyfe, 2020; Jiang, Cooper, & Alibali, 2014; Landy & Goldstone, 2010; Yeo et al., 2018).
• However, past research has focused on school-age children and limited to operations and algebraic thinking.
• Repeating pattern knowledge is an early math concept foundational to later math learning (Fyfe, Evans, Matz, Hunt, & Alibali, 2017; Rittle-Johnson, Fyfe, Hofer, & Farran, 2017; Rittle-Johnson, Zippert, & Boice, 2019).
• The current study examined whether adding visual support helped preschoolers understand repeating patterns.

Questions

• Does adding a visual support (via a frame) help preschoolers understand repeating patterns?
• Does adding a visual support (via a frame) effect the incorrect response options preschoolers choose?
• The primary dependent variables are 1) children’s accuracy on training trials, 2) children’s accuracy on posttest trials.

Participants

• 64 four- and five-year-olds (M=4.3 years, SD=0.57, 50% female) were recruited from local preschools & a research database.
• Most were enrolled in a pre-K program (59%), White (69%) and did not receive financial assistance (89%) or early intervention services (91%).

Method

• Randomly assigned control condition with no visual support or a frame condition with visual support.
• Adapted version of the Early Pattern Assessment Online Repeating Subscale (Rittle-Johnson, Douglas, Zipper, & Özel, 2020).
• 13 multiple choice items: 3 baseline items; 10 training items; 6 post-test items.
• Data was collected on a synchronous zoom session lasting 20-30 minutes with parent present.

For more information, please contact Camille Msaill: c.msaill@vanderbilt.edu

Abstract

Background

Visual support helps preschoolers understand repeating patterns under math learning framework (Fyfe, Evans, Matz, Hunt, & Alibali, 2017; Rittle-Johnson, Fyfe, Hofer, & Farran, 2017; Rittle-Johnson, Zippert, & Boice, 2019). The current study examined the effect of adding a visual support (via a frame) in understanding repeating patterns.

Participants

• 64 four- and five-year-olds (M=4.3 years, SD=0.57, 50% female) were recruited from local preschools & a research database.
• Most were enrolled in a pre-K program (59%), White (69%) and did not receive financial assistance (89%) or early intervention services (91%).

Method

• Randomly assigned control condition with no visual support or a frame condition with visual support.
• Adapted version of the Early Pattern Assessment Online Repeating Subscale (Rittle-Johnson, Douglas, Zipper, & Özel, 2020). 13 multiple choice items: 3 baseline items; 10 training items; 6 post-test items.
• Data was collected on a synchronous zoom session lasting 20-30 minutes with parent present.

Results

• Baseline performance correlated with training and posttest performance.
• Age correlated with accuracy on each trial.
• Given these results, we used baseline performance and age (in months) as covariates for subsequent analyses.
• Baseline performance did not differ by condition (t(59) = -2.55, p = .06).

Discussion

• The frame condition did not improve the participant’s performance on any of the patterning trials, although there was an effect of age.
• Type of incorrect response options chosen by participants was not affected by condition or item type.
• Future research is needed to better understand which perceptual supports are best for preschoolers learning patterns.
• Based on these null results, the frame condition may have been visually confusing for participants, specifically since previous research tended to change existing information (e.g., color, spacing) and not adding extra information.
• Alternate visual supports should explore::
  - Spacing between the pattern unit
  - Animating the pattern unit to appear one by one

References


Acknowledgements: the Children's Learning Lab at Vanderbilt University.