

# THE ROLE OF FINGERS IN PRESCHOOLERS' MATHEMATICAL PROBLEM SOLVING

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In our efforts to understand how three- and four-year-old children deal with problem situations where one or two items are added to or removed from a small set (Hunting, in press), we have observed finger sets used spontaneously as physical presentations for unavailable sets. These observations were made in the context of studies conducted in the spring and autumn of 2002 with two groups of 14 children. The *Bugs in the Rain* game, including variations, was presented in story form to each child 3 or 4 times over 5 weeks, in order to investigate young children's part-whole reasoning involving small numbers of items. In the basic form of the game, a whole was partitioned into two co-varying subsets—one visible, the other hidden. It allowed a detailed examination of interactions between preschoolers' emerging counting knowledge, cardinal conceptions of small discrete quantities, based on spatial patterns and subitizing, and informal addition and subtraction operations provoked by transformations of subsets when perceptual information was unavailable for one or both subsets.

Are finger sets used to represent visualized material, or simply used as a standard symbol set because visualization alone was too great a cognitive task? Production of finger sets provides the benefit of both visual and kinesthetic feedback. Co-production of finger sets with oral utterances, favored by most children in this study, increases modes of sensory feedback one more. Many of these children seemed able to visualize, not just static configurations, but sequences of actions, when outcomes of such actions were hidden from view. Success enumerating hidden items depended either on an ability to keep track of successive levels of outcome, unless perceptual feedback was needed by virtue of a peek, or make sophisticated deductions based on coordination of visible parts and the original whole. Finger sets seemed to be used as a perceptual aid in re-presenting events past, or were an artifact of impressive mental abilities, where critical operations had already been enacted.

## References

Hunting, R. P. (in press). Part-whole number knowledge in preschool children. *Journal of Mathematical Behavior*.