How procedural mastery affects counting trajectory

Sarah Sommer[1], Gabriella Morales[1], Emily Sanford[1], and Steven Piantadosi[1]

[1]University of California, Berkeley

Abstract

One surprising aspect of children's extended trajectory to mastery of the counting process is that, in other domains, children are remarkably adept at acquiring new lexical meanings. Mastery of counting, however, is a years-long process from first learning number words at age 2, to correctly counting around age 4. Previous research has posited that this extended trajectory is due to the difficulty of acquiring the concept of number, a years-long process involving conceptual restructuring. While children must acquire the concept of number, children also need to master the counting procedure. Specifically, counting requires tracking a set of objects, sequentially selecting and individuating each element, maintaining a representation of which items have already been counted, and synchronizing these operations with the verbal count list.The present studies are designed to isolate mastery of the counting procedure from acquisition of the number concept. By isolating non-numerical iterative processes that mirror the algorithmic structure of counting, we test whether procedural competence differs from concept mastery. We present results from a study demonstrating that children can successfully perform simple iterative list tasks before they show full mastery of counting. However, children are only able to perform more complex, theoretically analogous, iterative tasks once they have achieved counting mastery. Together, these findings support a theory in which the extended developmental trajectory of counting arises from the algorithmic demands of iterating through complex lists, as opposed to only conceptual restructuring.

In G. Boleda, I. Dautriche, M. Maldonado, C. Saldana and T. Torrent (Eds.), *Proceedings of the 48th Annual Conference of the Cognitive Science Society*