



Perseverative responding in a violation-of-expectation task in 6.5-month-old infants

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Abstract

In the present research, 6.5-month-old infants perseverated in a violation-of-expectation task designed to examine their reasoning about width information in containment events. After watching a familiarization event in which a ball was lowered into a wide container, the infants failed to detect the violation in a test event in which the same ball was lowered into a container only half as wide as the ball (narrow-container test event). This negative result (which was replicated in another experiment) was interpreted in terms of a recent problem-solving account of infants' perseverative errors in various means-end tasks (Aguiar, A., & Baillargeon, R. (2000). Perseveration and problem solving in infancy. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 27, pp. 135–180). San Diego, CA: Academic Press). It was assumed that the infants in the present experiments (1) did not attend to the relative widths of the ball and container in their initial analysis of the narrow-container test event, (2) categorized the event as similar to the familiarization event shown on the preceding trials, and (3) retrieved the expectation they had formed for that event (“the ball will fit into the container”), resulting in a perseverative error. This interpretation was supported by additional experiments in which different modifications were introduced that led to non-perseverative responding, indicating that 6.5-month-old infants could detect the violation in the narrow-container test event. The present findings are important for several reasons. First, they provide the first demonstration of perseverative responding in a violation-of-expectation task. Second, they make clear the breadth and usefulness of the problem-solving account mentioned above. Finally, they add to the evidence for some degree of continuity between infants' and adults' problem-solving abilities. © 2003 Elsevier Science B.V. All rights reserved.

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1. Introduction

As adults, we often solve problems by relying on familiar solutions. This ability to retrieve past solutions from memory makes us very efficient as problem solvers: in most cases, less time and effort are needed to retrieve as opposed to recompute solutions. To illustrate, consider a subject in an experiment who is asked to solve the problem “ 11×122 ”. The subject mentally computes the problem’s solution and eventually answers “1342”. On the next trial, the subject is again given the problem “ 11×122 ”. This time, rather than laboriously recomputing the problem’s solution, the subject swiftly retrieves it from memory – a clear demonstration of efficient problem solving.

Despite its obvious advantages, our ability to retrieve familiar solutions from memory has at least one potential pitfall. Past solutions can be helpful only if they are indeed appropriate for the problems at hand. Consider what would happen if the subject in our hypothetical experiment was given the problem “ 11×132 ” in a later trial and mistakenly assumed that this was the same problem as before. The solution “1342” would once again be retrieved, resulting in a perseverative error. In the present research, *perseveration* is defined as the retrieval of a familiar solution in a context in which a significant change has been introduced that renders the solution inappropriate; for the problem to be solved, a novel solution must be computed.

Infants, like adults, produce perseverative errors, and developmental researchers have long been interested in understanding the various roots of these errors. The present experiments examined infants’ tendency to perseverate in a task designed to assess their reasoning about width information in containment events. The central perspective of our work, as illustrated in the opening paragraphs, is that perseveration in such tasks is best understood as efficient problem solving gone awry: a familiar solution is retrieved where a novel solution should have been computed, because a critical change in the problem has gone unnoticed.

In the following sections, we first review prior research on infants’ perseverative errors. We then present the problem-solving account we have recently developed to explain some of these errors. Finally, we introduce the present research, which helped confirm and extend this account.

1.1. *Prior research on perseveration in infancy*

1.1.1. *Memory-and-motor tasks*

Most of the research on infant perseveration has focused on tasks that require infants (1) to update and remember information and (2) to use this information to select an appropriate motor response. For ease of description, we will refer to tasks with this dual requirement as “memory-and-motor” (ME-MO) tasks.

The first ME-MO task was developed by Piaget (1954) and examined infants’ ability to search for a toy hidden in one of two locations. This task has since been used extensively by developmental researchers (for reviews, see Bremner, 1985; Diamond, 1985; Harris, 1987; Sophian, 1984; Wellman, Cross, & Bartsch, 1986). For example, in a classic longitudinal study, Diamond (1985) tested infants every 2 weeks from 6 to 12 months of age. On each trial, a toy was hidden in one of two identical wells, which were then covered with

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