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Capacity, strategies, and metamemory: Tests of a three-factor model of memory development

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Abstract

Multiple measures of three of the factors (capacity, strategies, and metamemory) hypothesized to cause improvements in memory with age were obtained from 179 children in kindergarten to second grade (younger: ages 5–8) or third and fourth grade (older: ages 8–11) during nine sessions of testing. Confirmatory factor analysis was computed separately for each age group. Results suggested that the fit of the three-factor model was statistically significantly better than a one-factor, general memory model for both age groups. However, the fit indices were borderline, and there was not sufficient evidence for a metamemory factor for younger children. The factors that influence memory performance may differ with age.

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Research related to memory development flourished following the 1971 landmark symposium organized by John Flavell for the biennial meeting of the Society for Research in Child Development (SRCD). The title of that symposium was “What is memory the development of?” For more than 30 years, four answers to the question, strategies, capacity, metamemory, and knowledge, have received the most research attention (see Kail, 1990; Schneider & Pressley, 1997; Siegler, 1998).

Despite the volume of memory research, there are two important limitations. First, until the 1990s, studies rarely included more than two of these factors within any single study. Second, researchers from various laboratories investigated memory

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using different tasks. Although it was an implicit assumption that these different laboratory tasks all measured children's performance on the same construct, empirical support has been lacking.

The present study included various types of memory tasks from different laboratories and multiple measures of three of the factors (capacity, strategies, and metamemory) hypothesized to cause improvements in memory with age. The fit of a three-factor model was compared with a one-factor, general memory model. Potential model and construct differences with age were investigated.

The following three sections contain summaries of the research related to three of the potential factors hypothesized to cause memory improvement with age: strategies, capacity, and metamemory.

Strategies

The answer to Flavell's 1971 symposium question, "What is memory the development of?" that received the greatest amount of research attention during the 1970s was "strategies." Theoretical models through the 1980s emphasized strategies (Ackerman, 1987). Improvements with age in strategies such as rehearsal (e.g., Flavell, Beach, & Chinsky, 1966; Ornstein, Naus, & Liberty, 1975); clustering (e.g., Moely, Olson, Halwes, & Flavell, 1969); selectivity (Miller & Weiss, 1981); elaboration (e.g., Pressley, Levin, & Bryant, 1983); and organization, which includes both sorting and clustering (e.g., Corsale & Ornstein, 1980; Kee & Bell, 1981), are well documented. In numerous studies, researchers investigated particular behaviors they claimed were strategies. Yet, during the 1970s and through the mid-1980s most researchers did not investigate several of these strategies within a single study to determine whether strategic behaviors were similar or different from one another. Studies designed to investigate the use of rehearsal, clustering, or selectivity, each of which was considered the "optimal strategy" for a particular task, were usually conducted in laboratories employing different types of memory tasks.

Until the late 1980s, researchers investigated the development of task-specific, "optimal" strategies. For example, sorting cards by physically placing members from the same category together to study (e.g., apple, peach, and banana together on one side and car, plane, and boat together on the other side of the table) and/or clustering members of categories consecutively when one is recalling the words (e.g., saying apple, peach and banana before saying car, plane, and boat), would be effective strategies for a sort-recall task with categorically related items. However, sorting or clustering would not be possible for a selective recall task (see Miller, Haynes, DeMarie-Dreblow, & Woody-Ramsey, 1986), for which one is asked to remember only a subset of items. Studying only those items one was told to remember, the selective strategy, would be an effective strategy for this type of task, but it would not be an appropriate strategy for a sort-recall task. Rehearsal can be performed on any of these tasks.

During the late 1980s and the 1990s, researchers discovered that children did not lack an optimal strategy and then suddenly use it exclusively (Siegler, 1994; Sodian & Schneider, 1999). For example, Siegler and Jenkins (1989) found that children use

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