Relations between children's metamemory and strategic performance: Time-varying covariates in early elementary school

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ABSTRACT

Although much is known about the development of memory strategies and metamemory during childhood, evidence for linkages between these memory skills, either concurrently or over time, has been limited. Drawing from a longitudinal investigation of the development of memory, repeated assessments of children's ($N = 107$) strategy use and declarative metamemory were made to examine the development of these skills and the relations between them over time. Latent curve models were used first to estimate the trajectories of children's strategy use and metamemory and then to examine predictors of children's performance in each of these domains. Children's metamemory at the beginning of Grade 1 was linked to child- and home-level factors, whereas the development of both skills was related to maternal education level. Additional modeling of the longitudinal relations between strategic sorting and metacognitive knowledge indicated that metamemory at earlier time points was predictive of subsequent strategy use.

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Introduction

A salient feature of the cognitive development literature is the finding that with increases in age and experience in school, children undergo a systematic transition from the use of relatively inactive techniques of remembering to more active ones (Ornstein, Haden, & Elischberger, 2006; Schneider & Pressley, 1997). These changes in the deployment of a set of deliberate memory strategies, such as re-

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hearsal and organization, are paralleled to some extent by corresponding changes in children's met-amnemonic understanding of the processes involved in storing and retrieving information (Schneider & Pressley, 1997). Indeed, one assumption underlying much work in the area of metamemory is that what children (and adults, for that matter) know about the operation of memory is likely to be quite important for the deployment of various mnemonic techniques as well as for developmental changes in the use of these strategies (Pressley & Hilden, 2006).

This assumption notwithstanding, evidence for conclusive linkages between children's strategy use and their metamnemonic understanding, either concurrently or over time, has been quite limited. For example, it is possible that (a) strategy use and metamemory develop simultaneously, such that gains in one set of skills do not proceed in advance of the other; (b) strategic sorting ability develops in advance of, and contributes to, future increases in metacognitive knowledge; or (c) knowledge of declarative metamemory develops in advance of strategy use, and gains in metamemory contribute to future strategic success. Although subtle, the distinctions among these three models are meaningful when considering the development of these skills longitudinally. Indeed, whereas cross-sectional evidence has provided snapshots of the relations between children's metamemory and strategic behavior at individual ages, the underlying development that occurs as children acquire these related skills remains uncharacterized. To explore these important developmental issues, we make use of latent curve models (Bollen & Curran, 2006) to test these three equally plausible models of potential linkages between strategy use and metamemory using data drawn from a larger longitudinal investigation, conducted in our laboratory, of children's developing memory skills as they are followed across the first and second grades of elementary school.

Developmental changes in the use of mnemonic strategies

Over the course of the elementary school years, children become increasingly skilled at using a group of deliberate strategies for remembering sets of words, objects, and pictures (Schneider & Pressley, 1997). Simply put, there are dramatic changes during this time period in what children do when confronted with tasks that involve remembering, as can be revealed in their use of organizational (e.g., Lange, 1978), rehearsal (e.g., Ornstein & Naus, 1978), and elaboration (e.g., Rohwer, 1973) strategies. Moreover, as can be readily illustrated with children's deployment of organizational techniques, to a considerable extent these changes involve learning to make deliberate use of information that is already known in the service of a memory goal. For example, within the context of a sort–recall task with categorically related items, remembering is facilitated to the extent to which children form groups during the study period that reflect the taxonomic structure of the materials. In these situations, what seems to be changing with increases in age and experience is not so much children's understanding of the taxonomic organization of the items but rather their ability to make efficient use of that knowledge to establish a meaning-based grouping strategy. Indeed, for the most part, young children do not spontaneously organize to-be-remembered items on a semantic basis, but they can respond effectively to instructions to group according to meaning (Bjorklund, Ornstein, & Haig, 1977; Corsale & Ornstein, 1980). These findings indicate clearly that children in the early grades have the basic underlying knowledge to group semantically but that they just do not use this knowledge to form strategies for remembering. Yet within a few years, these semantic grouping techniques are used spontaneously on a routine basis, and with increases in age and experience, children's organizational strategies become increasingly effective in mediating their recall performance (Ornstein et al., 2006; Schneider & Bjorklund, 1998).

Given these age differences in the use of organizational techniques, what can be said about the course of strategy development as children progress through the elementary school years? The impression derived from the literature is one of gradual acquisition of mnemonic skill, but it is difficult to make statements about developmental change within individual children on the basis of the cross-sectional research designs that have been used in the bulk of the published reports of children's memory. Although these studies, on average, may present a picture of relatively smooth trajectories over time, individual children often show fairly abrupt qualitative changes over short periods of time (Kron-Sperl, Schneider, & Hasselhorn, 2008). Indeed, the few longitudinal studies that have been reported suggest a more complicated picture of development, with some children making rapid transi-