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ABSTRACT

A relationship has been hypothesized between metamemory (the self-knowledge of memory processes that an individual can verbalize) and actual memory performance. To explore this relationship, a study was conducted, in partial replication of earlier studies, using the strategy choice paradigm for paired-associate learning (PAL) on a metamemory questionnaire. Metamemory subtests were administered to second graders (N=66) at the beginning of each session. Three PAL trials followed with each list comprising 10 known pairs presented over one study-test trial. The first two trials familiarized subjects with an effective sentence elaboration strategy and an ineffective rote repetition strategy. In the third trial, Choice, subjects freely selected a learning strategy. The results revealed that Elaborators (N=44) on the Choice-trial learned three times more material than did Repeaters (N=22). The metamemorial knowledge of Elaborators concerning the acquisition process was significantly greater than that of Repeaters, while scores on metamemory subtests related to retrieval processes were comparable for Elaborators and Repeaters. These results suggest that a fair test of the metamemory-memory connection requires an explicit definition of the metamemory construct in terms of its functional relation to either acquisition or retrieval skills, and that effective tests of the metamemory-memory connection require the maintenance or transfer of elaborative strategies rather than the spontaneous use of familiar learning strategies. (Author/NB)

Searching for the Metamemory-memory Connection

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Abstract

In partial replication of two earlier studies the strategy choice paradigm for paired-associate learning was used in conjunction with a metamemory questionnaire. It was found that second graders who elaborated on the Choice-trial learned three times more material than children who preferred rote repetition. Moreover, the metamemorial knowledge of Elaborators concerning the acquisition process was significantly greater than that of Repeaters. However, scores on metamemory subtests related to retrieval processes were comparable for Elaborators and Repeaters. This pattern of results indicates that a fair test of the metamemory-memory connection requires an explicit definition of the metamemory construct in terms of its functional relation to either acquisition or retreival skills. The data also suggest that effective tests of the metamemory-memory connection require the maintenance or transfer of elaborative strategies rather than the spontaneous use of familiar learning strategies.

Searching for the Metamemory-memory Connection

Metamemory can be defined as the self-knowledge of memory processes that an individual is capable of verbalizing (Flavell, 1971). Piaget (1976) developed the related concept of abstraction reflechie while the terms metacognition and memory-monitoring have also been used to describe the process whereby learners may evaluate their cognitive strengths and weaknesses (Flavell, 1971, Hart, 1967). According to this view metamemorial skills provide the necessary "means-end analysis" required to optimize one's cognitive endeavors (Paris, 1978). Therefore, strategy choice and subsequent performance outcomes hinge upon the application of one's metamemory. Given its role as a cognitive control process many theorists have speculated that memory development may in fact be the development of metamemory (Flavell, 1971, 1978; Brown & DeLoache, 1978).

Despite the theorized relationship between metamemory and memory performance, the search for connections between the two has been problematic. For instance, Cavanaugh & Borkowski (1980) concluded that "no support was found for the concept that good metamemory is necessary for good memory" (p. 451). Other investigators have also reported disappointingly weak or nonexistent correlations between measures of metamemory and actual performance (see Cavanaugh

& Perlmutter, 1982 for a critical review).

However, there may be at least two important reasons why this hypothesized "connection" has been elusive (Schneider, 1985). First, due to the lack of precise models concerning the metamemory-memory relationship, previous tests of metamemory may have had little correspondence with the cognitive activities they were evaluated against. This may indicate a basic problem of construct validity. For instance, one should not expect to find a strong metamemory-memory connection when metacognitive tests on retrieval knowledge are evaluated against measures of acquisition performance.

A second reason why the evidence concerning the metamemory-memory connection has been problematic might be the conditions under which learning is typically assessed. Perhaps sensitive tests of the metamemory-memory connection require the maintenance or transfer of metamemorial knowledge across tasks rather than proficiency at a single task or strategy. In other words, sensitive tests of learning ability should challenge the learner's skill at deciding when an acquisition strategy should or should not be used. Therefore, optimal conditions for demonstrating such a connection might require learners to make decisions regarding strategy effectiveness. Hence, previous studies which required children to use familiar strategies such as rote repetition may not have been sensitive enough to distinguish those having good from poor metamemory.

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Slide 1

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The present study attempted to maximize the opportunity for obtaining the metamemory-memory connection by addressing these two issues. Several metamemory subtests possessing high test reliability and validity were used (Kurtz, Reid, Borkowski & Cavanaugh, 1982). One set of subtests assessed a variety of metamemorial knowledge related to the effect of acquisition strategies on performance. Other subtests measured children's knowledge concerning the retrieval process. In addition, the strategy-choice paradigm (Lodico, Ghatala, Levin, Pressley, & Bell, 1983) was used to elicit strategic decisions on the part of second-graders regarding the relative effectiveness of elaboration versus rote repetition. According to the logic of this paradigm, strategic learning requires the ability to engage one's metamemory when confronting a choice of strategies. Consequently, performance on paired-associate learning (PAL) tasks would depend upon the degree to which a child monitors and evaluates the relative success of various acquisition strategies.

Therefore, it was hypothesized that children who choose to elaborate would have relatively high metamemory scores on subtests related to strategic learning and acquisition. In contrast, a different pattern of results would be expected for the metamemory subtests of retrieval knowledge. To the extent that children's metamemory for the processes of acquisition and retrieval are relatively distinct, elaborators and rote repeaters might not be expected to differ on metamemory subtests of the retrieval process.

Method

Metamemory subtests were administered at the beginning of each experimental session. These subtests you have already seen in the first slide. Three PAL trials then followed in accordance with the paradigm devised by Lodico and her colleagues (1983). Each list comprised ten different noun pairs presented over one study-test trial. The first two trials familiarized children with an effective strategy of sentence elaboration and the relatively ineffective learning strategy of rote repetition. Strategy order was counterbalanced across subjects and no feedback or prompting was provided at any point during acquisition. Finally, the critical "Choice" PAL trial was given in which subjects were allowed the opportunity to freely select a learning strategy of their own choice.

Sixty-six second graders with a mean age of 89 mos. were tested individually in periods of about 45 mins. There were 34 males and 32 females.

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Slide 2

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Results

The second slide shows mean metamemory subtest scores as a function of Choice-trial strategy. Forty-four children preferred the strategy of elaboration, while 22 children chose rote repetition on the Choice-trial. The rightmost column displays the results of separate, independent *t*-tests with their significance levels indicated below. Notice that children who chose to elaborate had higher total metamemory scores than rote repeaters. However, this result appears largely due to the two subtests related to strategic learning and acquisition: Preparation Object and Rote Paraphrase. Group scores related to retrieval were comparable. In fact, the group means were identical on the Retrieval Event subtest.

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The next slide shows acquisition performance as a function of strategy used on the choice-trial. Remember that all children were treated identically on the first two PAL trials and that strategy order was counterbalanced. As expected, PAL performance was comparable when both groups were required to rote repeat on Trial 1 or Trial 2. Interestingly, children who subsequently elaborated on the Choice-trial displayed significantly higher performance than rote repeaters when both groups were asked to elaborate on the first two trials. Evidently, children who recognized elaboration as an effective strategy were initially more proficient in its application than children who preferred rote repetition.

The data on Choice-trial performance appear to corroborate the results of the first two PAL trials. Overall, elaborators acquired three times more material than rote repeaters. This finding also corresponds with previous evidence concerning the pronounced superiority of interactive strategies over rote rehearsal (Lodico, et al., 1983; Wang & RiCharde, 1987).

Discussion

The general pattern of results suggests that when the circumstances for demonstrating the metamemory-memory connection are fair, a strong and reliable relationship can be expected. The following evidence may be garnered in support of this interpretation:

First, children who recognized elaboration as a superior strategy also possessed more substantial metamemories than children who preferred rote repetition. This was especially true for metamemorial knowledge related to the acquisition process.

Second, metamemory subtests not directly related to the acquisition process yielded comparable scores for elaborators and rote repeaters. This suggests that more explicit models of the metamemory-memory connection are needed in order to specify the conditions under which such a relationship can be found.

Finally, let us consider the initially high learning scores of elaborators engaged in an elaborative strategy on the first two learning trials. Perhaps a certain level of metamemory is required for the skillful application of an acquisition strategy. Earlier research suggests that individual differences in learning ability are due to the <u>type</u> or <u>quality</u> of elaborators that are generated during the acquisition process (Wang, 1983). Therefore, children with high levels of metamemory may have a heightened sensitivity for specific mediators and their consequence for learning performance.

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Slide 1

Metamemory Subtests*

STORY LIST
PREPARATION OBJECT
ROTE PARAPHRASE

RETRIEVAL OBJECT
RETRIEVAL EVENT

PREDICTED RECALL
ACTUAL RECALL
MEMO RECALL
FUTURE RECALL

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* taken from
Kurtz, Reid, Borkowski & Cavanaugh (1982)

Slide 2

Mea.: Metamemory Subtest Scores

for Elaborators and Rote Repeaters

	Group Means		
Subtest	Elaborators	Repeaters	t
Story List	2.02	1.64	1.71
Preparation Object	2.45	1.64	3.09**
Retrieval Object	2.72	2.18	1.69
Retrieval Event	1.55	1.55	0.00
Rote Paraphrase	4.27	3.27	2.44*
Total Score	13.01	10.28	2.85**
Predicted Recall	9.34	7.64	1.07
Actual Recall	5.07	4.55	1.14
MEMO Recall	4.68	4.86	.38
Future Recall	6.57	7.59	.78

*$p<.05$. **$p<.01$, two-tailed.

Slide 3

Mean Paired-associate Learning Scores for Elaborators and Rote Repeaters

	Group Means		
Trial	Elaborators	Repeaters	t
TRIAL1			
Elaboration	7.90 (20)	6.67 (12)	2.36*
Repetition	3.29 (24)	3.40 (10)	.13
TRIAL2			
Elaboration	8.16 (24)	5.70 (10)	3.35**
Repetition	2.95 (20)	2.67 (12)	.29
CHOICE-TRIAL	7.73 (44)	2.45 (22)	9.45**

*$p<.05$. **$p<.01$.