SOURCES OF MEMORY AND METAMEMORY DEVELOPMENT: SOCIETAL, PARENTAL, AND EDUCATIONAL INFLUENCES

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ABSTRACT

This project had two goals: (1) to examine the impact of strategy training on memory performance in German and American children, and (2) to search for environmental correlates of individual differences in cognitive processes. Following pretesting, 437 children were divided into training and control groups, with the former receiving training in clustering strategies. Trained children showed sizable strategy maintenance and transfer effects two weeks and six months later. Parents and teachers completed questionnaires about the teaching of strategies and their attributional beliefs about children's academic successes and failures. The differences in strategic behavior and attributions of German and American children were due, in part, to differences in strategy-enriched environments.

The improvement of learning skill is an important goal of formal and informal education. Psychologists and educators will be able to help children become better learners when we (1) have improved and experimentally validated theories of memory and cognitive development, including the roles of environmental factors, and (2) have developed effective, theoretically-based instructional packages that improve cognitive processing. The first goal of this project was to examine the immediate and long-term benefits of a strategy instructional procedure with young German and American children. A second goal was to search for causes of individual differences in learning skills which influence memory performance. In particular, we examined the effects of teacher and parent characteristics on children's cognitive abilities and beliefs in two cultural settings.

In an initial investigation of German and American third graders, metamemory and an appropriately applied learning strategy were the proximal causes of efficient memory performance for children from both countries (Schneider, Borkowski, Kurtz, & Kerwin, 1986). However, interesting differences emerged in the performances of the two groups. First, German children were more strategic and showed higher recall than the Americans, particularly prior to training. Second, the American children were more likely to attri-

bute their academic outcomes to effort. That is, when asked the specific reasons for their academic successes and failures, American children were more likely to select effort as a causal factor than German children, who selected ability, luck, or task characteristics with equal probability. We hypothesized that these differences in performance and beliefs are caused by different societal, parental, and educational influences in the two countries.

The present study examined the effects of a strategy instructional package, the durability and generality of training effects, and the role of parent and teacher variables in mediating the attributional and strategic differences previously found between American and German children. Because the Schneider et al. (1986) study had investigated third graders, we elected to use second graders in this study in order to better define the differing emergence of strategic behaviors and metacognitive knowledge in German and American children. Thus subjects were tested in the middle of grade 2, and six months later at the beginning of grade 3. 437 second graders from Munich, West Germany, and South Bend, Indiana, participated in the study.

In Session 1, children were tested on a Sort Recall task, a self-concept questionnaire, and verbal and nonverbal measures of intelligence. Materials for the Sort Recall task included 20 pictures of common objects that could be clustered in four groups. In Session 2, children's metacognitive knowledge and attributional beliefs were measured. The metacognitive battery included three components: knowledge about reading, knowledge about clustering, and a more general component that inquired about retrieval and study strategies.

At this juncture, children were divided into experimental and control groups. Experimental children received training on a cluster-rehearsal strategy in Sessions 3 and 4, while control children performed neutral activities. Training focused on the value of clustering, and a four-step strategy that could be used to improve recall. The four steps were: (1) group the objects into categories, (2) name each group, (3) study the items within groups using rehearsal, and (4) cluster the items while recalling them (cf. Gelzheiser, 1984). In Session 5, all children were tested on strategy maintenance and transfer, using sentences as stimuli for the far-transfer task, and a new set of 20 clusterable pictures for the maintenance task. Sessions were separated by one-week intervals except Sessions 4 and 5, which were two weeks apart.

At the conclusion of Phase 1, parents completed a questionnaire that measured fostering of metacognitive development in the home, and six German and seven U. S. teachers completed a Metacognitive Teaching Style questionnaire. The metacognitive scale for parents was composed of eight items that measured parental monitoring and checking of children's schoolwork; parental instruction of study skills and strategies, related both to play and schoolwork; and parental beliefs about the reasons for their child's academic successes and failures. The metacognitive scale for teachers asked about the instruction of specific study skills and strategies, response to impulsive behaviors, reaction to the failure of students to check their work, and beliefs about why students succeed and fail academically. Six months later, metacognition and long-term mainten-

ance on the Sort Recall task were assessed.

Analyses of Sort Recall strategy and accuracy scores, controlling for pretraining performance, showed significant effects attributable to experimental training at both maintenance and far-transfer. Further, analysis of the long-term follow-up data showed instructed children to be more strategic and to recall more items than control children six months later. Means and standard deviations of study strategy and recall scores are displayed in Table 1 as a function of country and experimental group. Significant Country x Condition interactions at maintenance and long-term maintenance reflected the superiority of the German children, particularly German control children. This finding is consistent with the data from Schneider et al. (1986), who reported greater spontaneous strategic behavior by German third graders than their American peers.

We hypothesized that systematic differences in the strategic behavior and attributional beliefs of German and American children are due in part to contrasting parent and teacher attitudes, or to differential formal classroom instruction in the two countries. To test this hypothesis, results from the parent and teacher questionnaires were divided according to items that measured attributional beliefs, and those that inquired about the teaching of strategies and checking of children's work. Comparisons among the parent attribution and strategy scores showed significant differences between the two countries for both variables. Parental beliefs and behavior conformed to that of their children: American parents showed a stronger belief in the importance of effort than did German parents, whereas Germans reported more direct instruction of strategies, checking of children's work, and possession of games that required strategic thinking.

Parents' strategic activities influenced strategy and recall performance for the trained samples in both countries. The strategic behavior of U. S. parents correlated with long-term recall in the trained group, $r(38) = .36$. Similarly, the strategic instruction of German parents correlated with their children's use of clustering strategies at maintenance, $r(68) = .30$, and at long-term recall, $r = .32$. Attributional beliefs of parents did not correlate with strategy or recall performance in the training condition; however, the correlations between metacognition at long-term measurement and parental attributional beliefs were significant for both American and German children, $r(70) = .43$, and $r(88) = .36$, respectively. Parental strategy instruction was also related to children's metacognitive knowledge for both the Americans and Germans, $r(70) = .25$ and $r(88) = .31$, respectively.

Responses to the attribution items on the teacher questionnaire corresponded to the parent and child data. American teachers named effort expenditure as the most important reason for their pupils' successes and failures on 43% of the items, and designated it as the second most important reason on an additional 50% of the items. In contrast, 20% of the German responses indicated amount of effort as most responsible for academic outcomes; an additional 40% named it as the second most important causal factor. German teachers reported more direct instruction of strategies and executive processes, such as monitoring, than did the American teachers (M =

5.8 and 4.9, respectively), but the small cell sizes prevented a meaningful statistical comparison of the data.

In summary, strategy training on the Sort Recall task was highly successful. Children in the trained group not only showed superior strategy use and recall scores at maintenance, but also used the instructed strategy effectively on a far-transfer task, and six months later on a long-term follow-up. A thorn in the side of instructionl research has been the difficulty of obtaining strategy transfer across time and settings (Campione, Brown, & Ferrara, 1982). Therefore, it is important to note that in this study, both German and American trained children showed improved strategy use on the far-transfer task, and Americans showed improved recall. These results are especially impressive given that training consisted of only two half-hour sessions, conducted in group settings. The transfer task differed both in mode (written stimuli versus pictured stimuli) and complexity (entire sentences versus single words or objects) from pretest and training materials.

As in the Schneider et al. (1986) study of third graders, our German children in both training conditions were more strategic than Americans at all measurement points. The strategic superiority of the Germans was particularly evident for the control group at maintenance and long-term follow-up.

Results of the parent and teacher questionnaires supported our hypothesis that the strategy and attributional differences found between German and American children are linked to differential strategy instruction and to the inclination of attributional beliefs both in the home and in the school. We obtained dual confirmation of the relationship between parent and teacher actions and beliefs on the one hand, and children's performance on the other. First, adult instruction and beliefs paralleled the between-country differences in strategic behavior and attributional beliefs identified earlier. Second, parental strategy instruction was related to children's use of strategies in both countries. Significantly, parental strategies were also related to metacognitive knowledge levels in children from both countries.

Strategy training programs may be most effective if the beliefs and behaviors of teachers and parents can be modified. Programs that attempt to change the cognitive, metacognitive, or attributional beliefs of children operate against the background of apparently strong messages from teachers and parents. The attributional beliefs of parents and teachers manifest themselves directly, through explicit instruction in the school or home, and indirectly, through implicit attitudes and beliefs about the reasons for academic success and failure. Thus differences in cognitive and metacognitive developments seem deeply embedded in cultural values and expectations.

REFERENCES

Campione, J.C., Brown, A.L., and Ferrara, R.A. (1984). 'Mental retardation and intelligence', in Handbook of human intelligence (Ed. R.J. Sternberg), Cambridge University Press, New York.

Gelzheiser, L. (1984). 'Generalization from categorical memory

tasks to prose by learning disabled adolescents', Journal of Educational Psychology, 76, 1128-1139.

Schneider, W., Borkowski, J.G., Kurtz, B.E., and Kerwin, K. (1986). 'Metamemory and motivation: A comparison of strategy use and performance in German and American children', Journal of Cross-Cultural Psychology, 17, 315-336.

Table 1. Recall and Study ARC scores on the Sort Recall task as a function of country and experimental condition.

	Pretraining Recall		Pretraining Study ARC	
	trained	control	trained	control
USA	7.50 (2.59)* n = 109	7.94 (2.41) n = 54	.04 (.26)	.11 (.28)
FRG	8.00 (2.57) n = 133	8.18 (2.87) n = 56	.17 (.40)	.22 (.46)
	Maintenance Recall		**Maintenance Study ARC**	
	trained	control	trained	control
USA	11.63 (3.71) n = 107	10.48 (4.35) n = 54	.66 (.46)	.25 (.45)
FRG	11.75 (3.48) n = 132	10.83 (3.56) n = 52	.71 (.44)	.68 (.46)
	Generalization Recall (%)		**Generalization Study ARC**	
	trained	control	trained	control
USA	62.3 (22.0) n = 109	53.6 (23.5) n = 54	.44 (.49)	.21 (.44)
FRG	68.8 (19.4) n = 130	67.2 (21.5) n = 51	.54 (.49)	.30 (.48)
	Longterm Recall		**Longterm Study ARC**	
	trained	control	trained	control
USA	12.35 (3.47) n = 62	9.66 (3.25) n = 32	.48 (.50)	.13 (.40)
FRG	12.71 (3.39) n = 133	12.45 (2.90) n = 56	.66 (.46)	.64 (.46)

* Standard deviations appear in parentheses