

Moely B E, Olson F A, Halwes T G & Flavell J H. Production deficiency in young children's clustered recall. *Develop. Psychol.* 1:26-34, 1969.  
[Institute of Child Development, University of Minnesota, Minneapolis, MN]

Developmental changes in children's use of organization in recall were observed. Younger children showed a 'production deficiency,' whereby they failed to group items conceptually during study, although they were able to do so with simple training. By fifth grade, children employed a grouping strategy spontaneously. [The *Social Sciences Citation Index*® (SSCI®) indicates that this paper has been cited in over 130 publications since 1969.]

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"This research was conducted while Fran Olson, Terry Halwes, and I were graduate students working with John Flavell at the University of Minnesota. Learning-theory accounts of developmental change in children's learning, put forth in the 1960s, characterized the young child as showing a 'mediation deficiency' in that potentially available skills or knowledge would not be employed appropriately in learning tasks. Mediation was used as an intervening variable to represent unspecified and unobserved cognitive activities occurring prior to response and varying with age. Flavell moved beyond this model to propose that the child might fail to demonstrate a given skill for several reasons: a production deficiency might occur, in which the appropriate mediator was not produced in the task situation, or the child might show a mediational deficiency, in which the mediating activity occurred but failed to influence task performance.

"This perspective led us to an interest in observing children's activities as they stud-

ied in preparation for recall, a design feature we implemented by modifying the traditional method of presenting the task. A free recall task was used to assess strategy use because of our interest in children's conceptual abilities and also because of the influence of James J. Jenkins and his colleagues at Minnesota, who were concerned at that time with the organizational structures influencing language knowledge and use.

"Our study gave strong support to the production deficiency hypothesis, in that children who used an organizational strategy during study did well in recall, while those who did not, although they possessed knowledge about the conceptual categories comprising recall lists, recalled less information in a less organized fashion. With brief instruction, these younger children could be induced to organize and showed concomitant increases in recall performance. Three aspects of the study caused it to be of interest to researchers at the time. First, the study showed striking age differences that fit the production deficiency model. Second, simple training procedures were found to have notable effects on young children's study and recall. Third, the study presented new methods for observing and quantifying the child's spontaneous study activities that were informative and easy to use.

"Visibility of the study was affected by its presentation in two major reviews of memory development by Flavell<sup>1</sup> and Hagen.<sup>2</sup> Cronbach<sup>3</sup> mentioned the study in his arguments against Jensen's<sup>4</sup> proposed conceptualization of industrial differences in learning. Work done more recently has elaborated our picture of children's use of organization and other recall strategies,<sup>5</sup> described the acquisition of metamemory skills implied by our findings,<sup>6</sup> extended training efforts to affect not only other memory strategies but also higher-order metacognitive skills,<sup>7</sup> and described memory development in special populations of developmentally delayed children."

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