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ABSTRACT

The mnemonic consequences of semantic, acoustic, and orthographic encoding and the relationships between encoding and retrieval cues were investigated in an incidental-learning experiment involving 24 first-, third-, and fifth-grade pupils. Each child was asked one orienting question for each of 18 words; the questions differed in the type of encoding intended and in the congruity between the word and the associated question. The presentation was followed by a 90-second free recall period for the 18 words and then by a retrieval cue for each word. There were three main findings: semantic was superior to nonsemantic encoding in both free and cued recall; a congruous relationship between the target word and the orienting question yielded better free recall for third and fifth graders and better cued recall at all three grades; and congruity between the retrieval cue and the target word was more important as a determinant of a cue's mnemonic value than experimental contiguity. (AA)

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Congruity of Encoding in Children's Redintegrative Memory

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Recent conceptualizations of human memory are characterized by a shift in emphasis from the structural aspects of the memory system to the types of control or encoding processes that determine how information is represented within the memory system. Encoding refers to the perceiver's transformation of external stimulus information into an internal representation or functional stimulus. Within the levels-of-processing approach, the memory trace of an event is regarded as the by-product of the perceptual-encoding operations performed on the event by the individual. The availability and/or accessibility of the resulting trace is considered to be directly related to the degree to which semantic analysis and elaboration occur during the encoding process. That is, memorability is said to depend upon the nature of the encoding operation, with encoding operations that result in the extraction of meaning being greater in mnemonic value than encoding operations that result in the extraction of sensory features; i.e., content is better remembered than structure (Schulman, 1975).

To assess the mnemonic consequences of various types of encoding, investigators must be able to control or to constrain the subject's encoding operations. Within the adult memory literature, the modal research strategy for constraining encoding has involved the manipulation of orienting tasks within an incidental memory paradigm. The rationale behind this research strategy is twofold. First, the performance of a given type of orienting task is assumed to constrain the subject to encode the material in a manner qualitatively consistent with the nominal requirements of the orienting task. Second, because the subjects are unaware that memory for the material will be tested, they should be unlikely to engage in optional, strategy-

based types of encoding that go beyond the type of encoding that is made obligatory by the orienting task. Thus, nominally semantic orienting tasks, such as requiring the subject to rate the to-be-remembered words on a pleasantness scale, to generate synonyms of the words, or to determine whether the words fit logically into sentence frames, are considered to yield rather pristine estimates of the mnemonic consequences of semantic encoding operations. Likewise, nominally nonsemantic tasks, such as requiring the subject to determine whether the words contain a given letter, to count the number of letters, or to generate rhymes, are considered to yield estimates of the mnemonic consequences of sensory encoding operations.

In an earlier study, Geis and Hall (1976) reported that constrained semantic encoding yielded better incidental free recall than constrained acoustic or orthographic encoding in first, third, and fifth-grade children. These results agree with the levels-of-processing prediction that content or meaning is better remembered than structure and are consistent with findings in the adult memory literature.

The present research was designed to replicate the previous experiment with different word lists and orienting questions, and to extend the research into issues concerning the relationship between encoding and the efficacy of retrieval cues. In the experiment reported here, orienting tasks similar to those used by Geis and Hall (1976) were again employed; and, both free and cued recall were assessed.

The children in the experiment were 24 first-, third-, and fifth-graders. Each child was asked one orienting question for each of 18 words. Each word was presented on a separate card, and the card remained exposed for the amount of time that was required for the child to answer the question about the word. Six of the questions constrained a semantic encoding, six constrained an acoustic encoding, and six constrained an orthographic encoding. For each of the three types of encoding,

half of the questions had yes as the correct answer, and half of the questions had no as the correct answer. Let me briefly illustrate. Say the target word on the card was ROOF. A particular child would have been asked one and only one of the following questions for the word ROOF:

Semantic-yes:	Is it part of a house?
Semantic-no:	Is it something you sing?
Acoustic-yes:	Does it sound like goof?
Acoustic-no:	Does it sound like cigarette?
Orthographic-yes:	Does it have the letter F in it?
Orthographic-no:	Does it have the letter Z in it?

After the child answered the appropriate question about each word, he or she was asked to free recall as many of the words on the cards as possible. After this 90 second free recall period, the experimenter told the child a retrieval cue for each word. The child received 20 seconds to respond to a given cue before the next cue was presented. Half of the children at each grade received cue method 1, while the remaining children received cue method 2. In cue method 1, the key word from each orienting question that was asked of a child was given as a retrieval cue. For example, for the target word ROOF, if a child were asked "Is it part of a house?" the retrieval cue would be house. If the child were asked "Is it something you sing?" the word sing would be given as a retrieval cue for the target word roof. Cue method 2 will be described later. Unless specifically stated otherwise, "cued recall" will be used to refer to cue method 1.

There are three main questions that can be answered in the present experiment. First, does semantic encoding yield better free and cued recall than acoustic or orthographic encoding, as was found earlier by Geis and Hall (1976)? Second, are free and cued recall better when the orienting question and target word form a congruous unit than when they form an incongruous unit? Third, which factor primarily determines the mnemonic value of a retrieval cue--contiguity with the target in the

experimental situation or pre-experimental congruity with the target?

The answer to the first question is yes. For both free and cued recall, semantic encoding yielded better memory performance than acoustic or orthographic encoding. This result is consistent with the earlier Geis and Hall results and agrees with the levels-of-processing notion that meaning is better remembered than structure.

With regard to the second question, it is possible to examine the effects of congruous and incongruous relationships on free and cued recall. A congruous relationship exists when the target word and the orienting question that is asked about that target word are meaningfully related or are acoustically similar. In other words, when the correct answer to the orienting question is yes. For example, the target word ROOF and the orienting question "Is it part of a house?" form a congruous, meaningfully related unit. If part of this congruous unit is remembered, the remainder of the unit is often redintegrated. Thus, memory for the orienting question "Is it part of a house?" can enhance redintegrative memory for the target word ROOF. When there is an incongruous relationship between the target word and the orienting question, that is, when the correct answer to the orienting question is no, remembering the orienting question may not lead to redintegration of the target word. Thus, "Is it something you sing?" may not enhance memory for the word ROOF. In cued recall, cuing with one part of a congruous unit should be more likely to redintegrate the remainder of the unit than cuing with part of an incongruous unit. For example, the word house should be better than the word sing as a retrieval cue for the target word roof, because house and roof form a congruous unit and sing and roof form an incongruous unit.

This line of reasoning was supported for third and fifth-graders. Both free and cued recall of target words were better when the target word and orienting question formed a congruous unit, that is, when the correct answer to the orienting question was yes. However, the pattern of results was different for the

younger children. Retrieval cues from a congruous unit facilitated first-graders' cued recall relative to retrieval cues from an incongruous unit. But, in free recall, congruous and incongruous units are equally well or poorly remembered by first-graders. First-graders apparently do not adopt spontaneously the indirect retrieval strategy of remembering part of a congruous unit to help reintegrate the other part.

Third- and fifth-graders can perhaps generate retrieval cues (or engage in some type of redintegrative retrieval strategy) and can readily use congruous retrieval cues when they are given.

The third question, whether experimental contiguity or pre-experimental congruity is more important in determining the mnemonic value of a retrieval cue, can be answered by comparing cue method 1 and cue method 2. In cue method 1, the retrieval cue had always accompanied the target word at encoding, whether the cue was congruous or incongruous with the target. In cue method 2, a congruous cue was always given, whether or not it had accompanied the target at encoding. Thus, there are three different conditions of interest: (1) the condition in which the retrieval cue was congruous with the target and was present at encoding, (2) the condition in which the retrieval cue was congruous with the target but was <u>not</u> present at encoding, and (3) the condition in which the retrieval cue was incongruous with the target but was present at encoding. For first-, third-, and fifth-graders, congruity was the primary determinant of a retrieval cue's effectiveness. Even when incongruous cues were present at encoding, they did little to enhance cued recall.

To summarize, the three main results are: First, the superiority of semantic over nonsemantic encoding found in an earlier study was replicated for free recall and extended to cued recall. Second, a congruous relation between the target word and the orienting task yielded better free recall than an incongruous relation for third- and fifth-graders, but not for first-graders, while congruous relations yielded better cued recall than incongruous relations for children at all three grades.

It is argued that first-graders may not spontaneously engage

in indirect retrieval processes in free recall, but that they can reintegrate a target word in cued recall when the experimenter gives them a congruous retrieval cue. Third, it is apparent that words do not have to be present at encoding to be effective retrieval cues. In fact, congruity between the retrieval cue and the target word is relatively more important as a determinant of a cue's mnemonic value than is experimental contiguity.

References

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