CAN PICTURES DISTRACT STUDENTS FROM
THE PRINTED WORD: A REBUTTAL

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Some published research should never have seen the light of day. The Montare, Elman, and Cohen article (1977) "Words and pictures: a test of Samuels' findings" is an example. Before the reader thinks that this is a kneejerk reaction to any article critical of my work let me dispel this view immediately. I fully understand and support the notion that theories must be tested and changed in light of new evidence and scientific findings survive only until disproven.

What I object to in the Montare, et al., article is the use of an incorrect model of learning to analyze my research, the citation of irrelevant and poorly done research in their literature review to support the Montare position, and what appears to me to be the too hasty publication of a study which probably contains a Type 1 experimental error. Their study is being used to discredit a piece of research which has been successfully replicated and gets the same results as the more theoretical laboratory based studies on cue selection in paired associate learning.

For those who may not recall my study of the effect of pictures on learning to recognize words (Samuels, 1967) allow me to describe it briefly. About 10 years ago I observed a beginning reader as he used his hand to cover the picture on a page. When asked why he did this he answered that he did so for two reasons. First, he kept losing his place in the text because he liked to look at the picture. Second, when he did not know a word, he looked at the picture for a clue to the unknown word, as suggested by his teacher.

This incident with the student reminded me of the literature on cue selection in verbal learning. According to Underwood, et al. (1962), cue selection occurs when only a part of a compound stimulus becomes the functional stimulus. For example, if the numbers zero through nine are each printed in a distinct color and the task is to learn their names, a student may learn to associate the verbal

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response "one, two, three, . . ." with the color rather than the visual form. For this student, color has become the functional stimulus. If the color cue is removed, the student is unable to name the digit. Underwood's principle of least effort may be used to explain what happens in a picture-word situation. Underwood's principle states that given a nominal stimulus which can be fractionated, the more meaningful component will become the functional stimulus. My 1967 study of pictures and words was an application of the principle of least effort to the area of word recognition. A compound stimulus was present in the form of pictures and words and we studied rate of learning to read the words under several conditions. In experiment one, I had students learning to recognize words under three conditions, a no-picture condition where only a word was on a card, a simple-picture condition in which a picture and a word were on the card, and a complex-picture condition, in which a more elaborate picture and a word were on the card. During learning trials, if a student could not say the word on the card, help was given. On the test trials, only the word was on the card, and no help was given. In experiment two, students learned to read the words in a story either with a picture or no picture present.

The results of experiment one showed that on test trials the no-picture group excelled. In experiment two, where students read a story, there was no difference between picture and no-picture for the better readers, but for the poorer readers, the students in the no-picture condition learned more words. These results fall neatly in line with a theory of cue selection and the principle of least effort. In experiment one, with a picture and a word present, the student selected the picture as the cue since it is the more meaningful component. When the picture cue is removed, as in the test, the student is unable to give the correct response.

In experiment two the results are again explainable in terms of the principle of least effort. The teachers had been telling their students to look at the picture for a clue to the identity of a word when the students encountered a word they could not decode. The poorer readers were using this strategy finding picture information easier to use than graphemic information from the word. The better readers, on the other hand, found graphemic information to be superior.

Now, let us examine the criticisms of my work by Montare, et al. They used a classical conditioning paradigm to analyze my research. They state "Our major theoretical premise is that the results of the present study and those reported by Samuels (1967) reflect associative learning processes that occurred within each treatment group as a consequence of classical conditioning." While I am aware that it is possible to use this paradigm to analyze the acquisition of word recognition responses, it reflects a sufficiently grave error in knowledge about when it is appropriate to use the operant conditioning and when to use the classical conditioning model that I would send a student who made this error.
back to psychology one. Generally speaking, the classical conditioning model is useful for explaining how a previously neutral stimulus such as a tone may come to elicit emotional responses such as anxiety or physiological responses such as secretion of saliva. In the experiment which I did the appropriate learning model is the operant and not the classical conditioning model.

My second criticism of the Montare, et al. work has to do with the citations they use. Although Montare, et al. replicated my acquisition data in experiment one, they failed to replicate my crucial transfer test data. To support their no difference finding between picture and no-picture conditions, Montare cites a number of studies which supposedly have not found pictures to be distracting. Biemiller (1970) is cited, but I should point out that in his study it was not pictures, but the use of graphic and contextual information which was of concern. However, Biemiller did state "... that the encouragement of the early use of contextual and picture cues, as now recommended in most basal reader series, may well be ill-advised (p. 94-95)". The Rohwer, et al. (1967) study was not relevant because he was comparing speed of paired-associate learning when pictures or words were used as stimuli. The Hartly Study (1970) was unable to come to any conclusion about the relative effectiveness of pictures and words. In fact, there were a sufficient number of problems in that study that rather than write a criticism of it, Dr. Harry Singer and I decided to do a similar study (Singer, Samuels, and Spiroff, 1973) which would test rate of word learning under context and no-context conditions with pictures or no-pictures present. This study, I might add, found pictures to be detrimental to word acquisition. The one appropriate study cited by Montare which showed that pictures could help in word learning was by King and Muehl (1965). Under certain conditions in which the auditory and visual aspects of words are similar, as in "ball" — "bowl", pictures may indeed help the student.

The final point I would like to make relates to the responsibility researchers have in being reasonably certain the results of a study are replicable. Some years ago I began an investigation to discover what it was about letter name knowledge which led to significant correlations with reading achievement. In my experimental study, a group which got letter-name knowledge was no better in learning words than a control group. Fearful that my no-difference finding might reflect a Type 2 experimental error, I replicated three times before publishing my results. It seems to me that Montare, et al. might have exhibited similar caution before publishing their results. My picture word study has been replicated by Braun (1969), Harris (1967), and Singer, et al. (1973). Furthermore, the findings showing that in a picture-word situation, the student selects the picture as the functional stimulus fits well within a theoretical framework. The burden of proof, it seems to me, falls on Montare, Elman, and Cohen, and so far as I am concerned I remain unconvinced regarding the reproducibility of their findings.
REFERENCES

BIEMILLER, A. The development of the use of graphic and contextual information as children learn to read. *Reading Research Quarterly*, 1970, 6, 75-96.


