

This Week's Citation Classic

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Paivio A. Mental imagery in associative learning and memory.
Psychol. Rev. 76:241-63, 1969.
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Imagery and verbal symbolic processes are operationally distinguished in terms of stimulus attributes and experimental procedures, and their effects considered in relation to associative learning and memory. Imagery was manipulated by varying the image-evoking value of memory material and by instructions to use imagery as a mediator; verbal processes, by varying verbal meaningfulness of items and instructions to use verbal mediators. Experimental tests substantiated the explanatory and heuristic value of the imagery concept. [The Science Citation Index® (SCI®) and the Social Sciences Citation Index™ (SSCI™) indicate that this paper has been cited over 300 times since 1969.]

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"This paper summarized an experimental-theoretical research program that had a very specific and personal beginning. Around 1950, before returning to graduate studies in psychology, I became familiar with mnemonic techniques that made use of overlearned 'memory pegs' and visual imagery as memory aids. The idea was introduced, without reference to imagery, in a co-authored paper in 1956, which reported asymmetrical order effects in the learning of sequences of English adjectives and nouns.¹ Nouns seemed to function as good 'conceptual pegs' for their modifiers. In the early 1960s, I began to explore the role of imagery in such learning and progressively expanded the research to include other tasks. The informal theoretical ideas developed gradually into a general theory of memory and cognition in which both imagery and verbal mechanisms assume equal importance. The approach was first reported in an invited address to the

Canadian Psychological Association in 1967. The 1969 article grew out of that talk and was motivated partly by the positive response from some of my colleagues and partly by my own feeling that such a report might be timely. Accordingly, I devoted much of my writing time during the ensuing months to the paper. I have always been grateful that I did so because research in the areas it covered moved so quickly that it would not have attained whatever influence it had as part of the evolving *Zeitgeist*.

"The frequent citations may reflect the fact that the research approach contrasted successfully with an orientation that had dominated certain areas of psychology for several decades. As a result of the rote memory tradition that began in Germany and the behavioristic revolution in North America, higher mental phenomena tended to be interpreted primarily in terms of verbal processes. The argument was that perceptual information must be quickly translated into a linguistic code or it will be forgotten, that associative verbal learning involves the formation of direct or indirect (verbally mediated) connections between words, and that thinking similarly goes on mainly in the form of inner speech. Ignored and even suppressed during that era was the much older idea that learning, memory, and thought might go on in a nonlinguistic form, sometimes experienced as visual imagery.

"The 1969 article re-emphasized the theoretical importance of imagery, and showed how the concept could be experimentally manipulated so that its effects could be distinguished from those of verbal mechanisms. The empirical approach adapted the operational procedures of the verbal tradition to concepts and phenomena that seemed to be more relevant to the emerging cognitive psychology of the 1960s. The success and relevance of the research program, impinging perhaps on a persistent though suppressed fascination with the mentalistic concept of imagery, may be among the reasons why the article has been cited as often as it has."

REFERENCE

1. Lambert W E & Paivio A. The influence of noun-adjective order on learning. *Can J. Psychol.* 10:9-12, 1956.