

Scandura J M. Deterministic theorizing in structural learning: three levels of empiricism. *J. Struct. Learn.* 3:21-53, 1971.

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This article describes a deterministic theory of structural learning designed to explain and predict the behavior of individuals in specific situations. It includes three increasingly precise partial theories: (1) structured knowledge—tested via generative adequacy, (2) idealized behavior—tested under memory-free conditions, and (3) non-idealized behavior—including memory and processing capacity. [The *SSCI*® indicates that this article is the most-cited paper for this journal.]

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This paper grew out of a long-term concern: specifically, the inability of then-current theory and methods to accommodate both generalized psychological considerations and specific knowledge. Moreover, my own empirical research kept showing that predicting human behavior on complex tasks was primarily a matter of knowing exactly what it was that the learner did and did not know.

My theoretical concerns, initially, centered on how to represent human knowledge (something that has become the cornerstone of both cognitive psychology and artificial intelligence [AI]) and how to assess it (i.e., how to find out what the individual knows). In several papers, for example, I challenged the use of stimulus-response (S-R) representations (and hence theories) as inadequate.

At an invited meeting in Philadelphia in 1968, Jim Greeno¹ and Merle Wittrock^{2,3} argued that construct itself was inadequate—that unlike S-R theory, there was no theory behind my conceptualizations. This motivated me to deal with these issues in presentations shortly

thereafter at Psychonomics and the American Psychological Association.

In 1970 I gave an invited address at the American Educational Research Association based on a draft of my paper with Wittrock as discussant. It covered everything from rationale and methodology to comprehensive theory and empirical data, my first overall presentation of what has come to be known as the "Structural Learning Theory." I felt it was a tour de force, and I had put a tremendous amount of working energy into it.

Nonetheless, both Wittrock's formal reaction and the following questions were sobering: the significance of what I was trying to say simply was not getting across. Subsequent submission of the formal paper to the *Psychological Review* fared no better even though I considered it superior to a paper I had published in that journal the previous year.⁴ "What is Scandura talking about?" is a reasonable paraphrase.

Happily (for me), reaction at one of our first structural learning conferences (that included philosophers, mathematicians, computer scientists working with AI, and linguists, as well as cognitive and instructional psychologists) differed sharply. Rejected by the establishment and given the obvious enthusiasm at the conference, I submitted my paper to the then-new, relatively low-circulation *Journal of Structural Learning*. Founded by the gifted mathematician and mathematics educator, Z.P. Dienes, this journal fortunately stressed ideas over orthodoxy.

Since my article appeared I have continued to publish; one of my most recent summary updates is a 1985 paper from the *Journal of Structural Learning*⁵ of which I am now the editor. However, I believe my 1971 paper is still cited occasionally because it represents a good introduction to the field.

1. Greeno J. Psychological representation of structured knowledge. (Scandura J M, ed.) *Structural learning II: issues and approaches*. New York: Gordon and Breach, 1976. p. 73-95.
2. Wittrock M C. Comments on Scandura's approach to rule-governed behavior. (Scandura J M, ed.) *Structural learning II: issues and approaches*. New York: Gordon and Breach, 1976. p. 65-7.
3. Scandura J M. A reply to Wittrock. (Scandura J M, ed.) *Structural learning II: issues and approaches*. New York: Gordon and Breach, 1976. p. 69-70. (Cited 10 times.)
4. ———. Role of rules in behavior: toward an operational definition of what (rule) is learned. *Psychol. Rev.* 77:516-33, 1970. (Cited 50 times.)
5. ———. System issues in problem solving research. *J. Struct. Learn.* 9:1-13, 1985.