

This Week's Citation Classic

Trabasso T, Bower G H & Gelman R. Attention in learning: theory and research. New York: Wiley, 1968. 268 p. [Univ. California, Los Angeles, and Stanford Univ., Stanford, CA]

A mathematical model for how we select and test various hypotheses about the categorization of objects is developed and tested. The model predicts the selective learning of attributes of objects where two or more attributes are relevant and redundant to the solution. This and other selective attention and learning effects are demonstrated. [The Science Citation Index® (SCI®) and the Social Sciences Citation Index® (SSCI®) indicate that this book has been cited over 275 times since 1968.]

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"In the 1960s there was a revival of interest in the psychological community in the process of attention. This issue had been addressed historically, notably by Lashley in his neurophysiological work in the 1930s and 1940s.¹ We revived Lashley's questions and provided a mathematical account for how one might selectively attend to and learn one stimulus aspect even though several were correlated with the identification of an object.

"In addition, learning theories which viewed the acquisition of associations as being gradual and continuous were undergoing a number of challenges, foremost among which were demonstrations that learning was abrupt, discontinuous, or 'all-or-none.' We had been successful in developing and testing a mathematical model for the learning of simple classifications which assumed all-or-none associations.

"Thirdly, the 1960s had witnessed a small explosion of stochastic models in psychology and the development of a subfield of mathematical psychology.

"Finally, the 1960s also witnessed the beginnings of cognitive psychology where complex mental operations were being studied with respect to, and as a result of, a growing acceptance of the computer both as a tool and as a metaphor. Our process assumptions stressed the human problem-solver as one who entertained and tested

hypotheses about the aspects underlying classification. We considered and formalized, following Frank Restle's pioneering work,² a variety of schemes for hypothesis selection and testing within the framework of an all-or-none learning model.

"My interest in attention arose in graduate school at Michigan State University in the 1950s, when various models for attention, selective attention and orienting reflex activity in animals, and neurophysiological discoveries on arousal came to my notice. Restle had developed an all-or-none learning model which I tested in a dissertation. At the same time, Gordon Bower,³ at Stanford University, independently developed an equivalent all-or-none learning model for simple associations. As I was writing my dissertation, Restle passed on chapters to Bower and a subsequent direct correspondence between Bower and me led to an extensive and productive postdoctoral collaboration.

"Near the end of my postdoctoral fellowship, we spent an evening speculating about selective learning effects. These speculations kept us up all night, generating intuitive ideas and formalizing them into models. The result was a 'position' paper which I carried with me to UCLA where I carried out a critical experiment on whether the likelihood of selectively learning one stimulus attribute or another or both could be predicted from knowledge of how fast learners learned on the basis of single attributes alone. The model yielded remarkably good quantitative predictions. Encouraged by this initial success, we explored the empirical implications of the model in detail, finding further confirmations.

"Rochel Gelman, a graduate student at UCLA, became a collaborative author as a result of her scholarship and contribution of original experiments to the book.

"The book's reception was immediate. Despite the fact that the concept of attention has broadened since our monograph's inception, the historical perspective contained in our book and its problem continue to be of interest, thus accounting for its high citation. For a source on recent work in the area of attention, the reader is referred to an annual series entitled *Attention and Performance*.⁴

1. Lashley K S. An examination of the continuity theory as applied to discrimination learning. *J. Gen. Psychol.* 26:241-65, 1942.
2. Restle F. The selection of strategies in cue learning. *Psychol. Rev.* 69:11-19, 1962.
3. Bower G H. Application of a model to paired-associate learning. *Psychometrika* 26:255-80, 1961.
4. *Attention and performance*. Hillsdale, NJ: Erlbaum, 1977-1981. Whole series.