This Week's Citation Classic®

Experiments were reported demonstrating that the attribute and rule components of a concept can be learned separately in procedures described as attribute identification (rule known, attributes unknown) and rule learning (attributes known, rule unknown). A preliminary rule-learning theory was described. [The *Social Sciences Citation Index®* (*SSCI®*) indicates that this paper has been cited in over 170 publications.]

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In 1961 Lyle Bourne went off to spend a year at Berkeley, while I stayed behind at Utah and worked as both graduate research assistant and on-site coordinator of his NIMH-sponsored research project. When Lyle returned from Berkeley, he was enthusiastic about a new project: to explore empirically the types of concepts Bruner, Goodnow, and Austin[1] had loosely grouped under the title "disjunctive." Although Lyle didn't realize it, I had just completed a course in mathematical logic as part of a projected math minor, so that rules based on binary connectives (conditional, biconditional, exclusive disjunction, etc.) were already old friends.

In the course of our analyses, we realized that every concept can be analyzed into two components—the defining (relevant) attributes and the rule by which these attributes are combined or related to form the concept. Thus it was clear that we could not only study the process by which subjects discover the relevant attributes (attribute identification), but also the process by which subjects acquire the relevant rule (rule learning). After a quick series of further analyses, we were ready to begin collecting data to compare an entire set of what we began calling "conceptual rules," and thus to establish an empirical basis for Bruner's ideas about disjunctive concepts.

In the midst of all this happy enthusiasm, a bombshell burst with the publication of Neisser and Weene's article[2] comparing different kinds of conceptual rules, which appeared to take all the wind from our sails. After two or three days of deep depression, we finally reviewed their article in great detail, with gradually improving spirits. The outcome was that the push provided by Neisser and Weene led to deeper analyses and insights that transformed what had originally been conceived as a purely empirical study (destined for the *Journal of Experimental Psychology*) into a methodological, quasitheoretical study ultimately accepted and published by the *Psychological Review*.

We have since expressed our gratitude to Neisser and Weene and have come to recognize that being caught up in the Zeitgeist is not always such a bad thing. One reason for the repeated citation of this article probably was that it appeared just as the interest in more complex concepts was growing, and it represented the only complete analysis of the array of concepts based on the rules (binary connectives) of symbolic logic.

My interests have changed over time. I am currently working in training research and have recently published on the use of secondary tasks in adaptive training.[3]

1. Bruner J S, Goodnow J J & Austin G A. *A study of thinking.* New York: Wiley, 1956. 330 p.
2. Neisser U & Weene P. Hierarchies in concept attainment. *J. Exp. Psychol.* 64:640-53, 1962. (Cited 70 times.)
3. Johnson S F & Haygood R C. The use of secondary tasks in adaptive training. *Hum. Factors* 26:105-8, 1984.