

This Week's Citation Classic

Baum W M & Rachlin H C. Choice as time allocation. *J. Exp. Anal. Behav.* 12:861-74, 1969; and **Baum W M.** On two types of deviation from the matching law: bias and undermatching. *J. Exp. Anal. Behav.* 22:231-42, 1974. [Harvard University, Cambridge, MA]

Since behavior takes time, choice can be seen as allocation of time among activities. The matching relation describes this time allocation. Quantitative analysis of choice examines time or behavior ratios as a function of reinforcement ratios in logarithmic coordinates. [The *SCI*[®] and the *SSCI*[®] indicate that these papers have been cited in more than 250 and 320 publications, respectively.]

Toward a Paradigm for Behavior Analysis

William M. Baum
 Department of Psychology
 University of New Hampshire
 Durham, NH 03824-3567

September 6, 1990

It happens sometimes by chance or for explicable reasons that a group of talented researchers comes together for a certain time in a certain place, and the members of this group stimulate one another in such a way that collectively they produce experiments and theories that otherwise never would have occurred. These two papers resulted from such a group, one that greatly affected the development of behavior analysis as a science.

In the decade from 1962 to 1972, an unusually large number of talented researchers collected in the operant behavior laboratory at Harvard University, with R.J. Herrnstein as their mentor. Many later became leaders in behavior analysis: Fantino, Hinson, Killeen, Neuringer, Rachlin, and Staddon, for example. No doubt the launching of *Sputnik* had something to do with it, and the absence of attractive alternatives in the department, but timing was important because Herrnstein

had just published in 1961 his paper announcing the matching relation.¹

The two papers under discussion were cited a lot because they helped to establish the matching relation as a phenomenon and as a norm against which to discuss operant behavior in general. The earlier one (with Rachlin) aimed to establish the generality of the matching law by arguing that all behavior could be measured on the common scale of time and all reinforcers on the common scale of value, with the result that choice could be considered a fundamental property of operant behavior. The later one described a method for analyzing choice, treating behavior ratios as a function of reinforcement ratios in logarithmic coordinates. It also pre- saged the problematic observation that choice often deviates systematically from the matching relation.²

A great deal has happened since. Theory about the matching law abounded, especially theory based on melioration.³ Gradually interest has turned more toward optimality theory, which is a broader framework that incorporates melioration as a special case.⁴

In retrospect, the two target papers represent steps toward establishing a new paradigm for behavior analysis, one in which choice is fundamental and in which the view of behavior and environment is molar, rather than molecular—that is, conceived to exist over spans of time rather than at moments in time. This new paradigm not only underlies many journal articles, but is represented in textbooks.⁵ Eventually, it will supplant molecular notions based on conditioning and nineteenth-century connectionism, which allow only qualitative accounts of behavior and depend on intervening variables. The molar move makes behavior analysis a theoretically sound and quantitative science.⁶

- Herrnstein R J. Relative and absolute strength of response as a function of frequency of reinforcement. *J. Exp. Anal. Behav.* 4:267-72, 1961. (Cited 395 times.)
- Baum W M. Matching, undermatching, and overmatching in studies of choice. *J. Exp. Anal. Behav.* 32:269-81, 1979. (Cited 120 times.)
- Herrnstein R J & Vaughan W. Melioration and behavioral allocation. (Staddon J E R, ed.) *Limits to action*. New York: Academic Press, 1980. p. 143-76. (Cited 50 times.)
- Rachlin H, Battalio R C, Kagel J H & Green L. Maximization theory in behavioral psychology. *Behav. Brain Sci.* 4:371-417, 1981. (Cited 80 times.)
- Rachlin H. *Introduction to modern behaviorism*. San Francisco, CA: Freeman, 1990.
- Baum W M. Quantitative prediction and molar description of the environment. *Behav. Anal.* 12:167-76, 1989.