

This Week's Citation Classic

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Falk J L. Production of polydipsia in normal rats by an intermittent food schedule. *Science* 133:195-6, 1961.

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Marked, chronic overdrinking (polydipsia) was produced in all rats reduced in body weight and receiving most of their daily food ration under a variable-interval one-minute schedule of food-pellet availability. [The *Science Citation Index*® (SCI®) and the *Social Sciences Citation Index*® (SSCI®) indicate that this paper has been cited over 270 times since 1961.]

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"In 1959, I was a National Institutes of Health postdoctoral fellow at the department of nutrition in the laboratory of Jean Mayer, who generously allowed me complete research freedom. I had begun a study to determine whether rats given bilateral, ventromedial hypothalamic lesions would increase their lever-pressing behavior when this behavior was reinforced intermittently by the delivery of food pellets. A possible change in the relation between food-pellet ingestion and water intake also was of interest, so drinking was measured by a lick-detecting drinkometer. To my surprise, before I had a chance to inflict the planned brain lesions, the rats all revealed a severe and persistent polydipsia (overdrinking) during each of their daily, intermittent feeding sessions. Fortunately, having done dissertation work in water balance with Lawrence I. O'Kelly at the University of Illinois, I knew that rats drinking one-half their body weights in water in about three hours every day was unprecedented. After all, they were

not deprived of water at any time, and the imposed constraint on food intake always decreases water intake in rats under other circumstances. It became evident that food-deprived animals obtaining small food portions spread out over time (within certain limits) is a sufficient condition for the production of polydipsia.

"While the article suggested that this curious behavioral effect might be useful for physiological studies in which a continuous, self-imposed diuresis needed to be maintained, it excited little technical or theoretical interest in water balance circles. The spectacle of an animal persistently self-administering loads of water far in excess of its requirements on a chronic basis is more than those with a theoretical commitment to equating ingestion with homeostatic function can bear. Research, however, was stimulated in those who used the technique to induce animals to ingest drug solutions in order to study the variables initiating and maintaining excessive drug intake.¹

"A second line of investigation has implications for behavior theory. Many studies have demonstrated not only that the polydipsia is not species specific, but that other kinds of behavior can become excessive under intermittent food-schedule conditions (e.g., aggression, activity, pica, escape).² Furthermore, intermittent schedules of commodities and activities other than food also can induce behavioral excesses.^{3,4} This research has given rise to the term 'schedule-induced behavior' or 'adjunctive behavior' to distinguish its source and maintenance as different from classically or operantly conditioned behavior. It is gratifying to see that a lucky observation of a postdoctoral fellow has grown into a vigorous area of inquiry.

"Citation of the paper has been frequent perhaps for three reasons: it presents a useful technique, an interdisciplinary theoretical puzzle, and an exemplar of the environmental roots of excessive behavior."

1. Gilbert R M. Schedule-induced self-administration of drugs. (Blackman DE & Sanger DJ, eds.)

Contemporary research in behavioral pharmacology. New York: Plenum Press, 1978. p. 289-323.

2. Falk J L. The nature and determinants of adjunctive behavior. *Physiol. Behav.* 6:577-88, 1971.

3. The origin and functions of adjunctive behavior. *Anim. Learn. Behav.* 5:325-35, 1977.

4. The environmental generation of excessive behavior. (Mullé S J, ed.)

Behavior in excess: a guide to the volitional disorders. New York: Free Press, 1981. p. 313-37.