

This Week's Citation Classic

Ferster C B & Skinner B F. *Schedules of Reinforcement.* Englewood Cliffs, NJ: Prentice-Hall, 1957, 741 p.
[Indiana Univ. Med. Ctr., Bloomington, IN and Harvard Univ., Cambridge, MA]

Intermittent reinforcement, an important condition of action, was studied by altering the schedule by which a pigeon's peck at an illuminated disc produces brief access to food. Far from falling short of the ideal of inevitable reinforcement, it constitutes an important condition of action. The control proved to be orderly and systematic, demonstrable in the individual and a highly reproducible baseline for the study of other biological variables. [The *Science Citation Index*® (SCI®) and the *Social Sciences Citation Index*™ (SSCI™) indicate that this paper has been cited over 1180 times since 1961.]

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"The research was a playful experience. No thought was given to publication during its first three years, major energy going into the discoveries of orderliness and control which fortunately came in an abundant harvest almost weekly. When a variable was altered the results were visible in the individual organism without elaborate statistical processing. The cumulative recorder which processed the data in visual summary form was crucial, allowing us to see the overall pattern and details of rate changes over a 10-hour day experimental session at a glance. Until a recorder was designed which could operate reliably for thousands of hours and millions of pecks, a considerable portion of my time was spent servicing them. Eventually, almost a billion pecks were recorded.

"We opposed the, then, current emphasis on formally designed experiments, theory

testing, and statistics. Yet the results were reliable and reproducible because we repeated the experiments, implicitly in systematic replications. We avoided theoretical discussion, in the sense of hypothetical accounts. The end result was a highly theoretical statement, imbedded in the classification system that ordered the hundreds of schedules we studied and the myriads of systematic relations among them. Each successive experiment became a starting point for another, so that by the end of the 5-year program, the basic types of schedule control had been replicated over and over again in multiple, mixed, tandem, chained, and concurrent schedules. Instrumentation, an important contributor to the level of control and the novel experimental arrangement, was achieved easily and naturally because the laboratory had its own small shop and a custom of stocking parts and gadgets from the war surplus catalogues that were prevalent then. We purchased good quality relays at 25 cents each. Skinner served as a model for my own instincts to gadgeteering and the Harvard machine shop, with its skilled staff, stood behind us. Perhaps the workable conception of instrumentation, reliable enough to carry out a large number of experiments concurrently, automatically, and reliably, was as crucial a factor in the research program as any other.

"We discovered that the magnitude of control that exposed our phenomena was of the order of 6-12 hour experimental sessions as compared with the much briefer periods previously used. The availability of a predictable, steady stream of behavior, representing fundamental psychological processes, provided baselines for evaluating variables of interest to neighboring fields of biology such as, physiology, neurochemistry, pharmacology nutrition, and even exploration of outer space."