A STUDENT LABORATORY FOR OPERANT CONDITIONING

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Since 1948, when Frick, Schoenfeld, and Keller described the new apparatus developed for the undergraduate laboratory at Columbia College, many laboratories have been set up for experiments in operant conditioning suitable for introductory and advanced courses in psychology. The purpose of this paper is to describe the equipment assembled for such a laboratory at Hamilton College over the last 5 years.²

With this apparatus, we have been able to replicate many of Skinner's (1938) classical experiments in the introductory course. Its versatility has permitted us to devise new experiments and modifications of experiments ranging from simple single-session acquisition studies to more complicated techniques such as multiple schedules and Sidman avoidance with shock. It is also used throughout the year by students in the advanced experimental course and by those engaged in independent research projects (honors work) in their senior year. The durability of this apparatus allows us to schedule its use for a 5- or 6-hr day throughout the college year.

The laboratory consists of 12 complete operant-conditioning units, centrally located low-voltage power supplies, and high-voltage supply and cam scrambler for the shock circuit. Each conditioning unit is mounted on a small table covered with a sloping plywood hood, lined with acoustic tile. A unit consists of an experimental chamber and liquid feeder mounted together; a control box; four-channel, waxed tape recorder; and a table relay rack

(Fig. 1A and 1B). Although the unit shown is set up for the introductory course, the addition of a few relays and timers makes it quite suitable for the most advanced undergraduate work.

In the introductory laboratory, however, programming and timing are not automatic, and the constant attention of the student is required. The subject's environment is modified entirely by switches on the control box. When experiments are performed with human subjects, a septum clamped to the table top separates the experimenter, with his control and recording instruments, from the subject. Stimulus lights, response keys, and other equipment needed by the subject are wired to a barrier strip on the rat box assembly.

The rat chamber (Fig. 1B-2) is constructed of stainless steel and Plexiglas, and has a floor of eight stainless rods wired for shock. The box contains two levers (one Gerbrands and one modified telegraph key); a light above each lever; and a lightweight chain, introduced as a third manipulandum in chaining experiments, which hangs from a microswitch through a hole in the chamber ceiling. Liquid reinforcements are delivered by a solenoid-operated dipper of simple design (Fig. 1B-1).

Experimental operations are performed by switches mounted in a small control box (Fig. 1B-3) connected by cable with one of the rack panels. Three push-button switches operate the dipper, shock relay, and events recorders; and two silent mercury switches control the lights in the rat chamber.

The four-channel recorder (Fig. 1B-4) is essentially the one already described by Frick, Schoenfeld, and Keller. Small styli attached to the coil armatures make continuous records on waxed tape.

The relay rack and its components (Fig. 1B-5 through 1B-13) provide for the necessary circuitry, timing, counting, and recording. Dis-

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Fig. 1A. A complete operant-conditioning unit.

tributing these functions among six small panels has achieved flexibility and ease of replacement in case of breakdown. An electric kitchen clock helps the student schedule temporal events with some accuracy. This year, a small cumulative recorder (Fig. 1B-6) is being added to each unit. It is equipped with hand, automatic, and remote reset; event and reinforcement markers, with ink writing pens of standard type; and it is designed to be clipped to the power rods of a standard rack. Power for shock is brought into the rack to a relay operated at the control box. A short power strip (Fig. 1B-13) supplies line voltage for the recorder motors, clock, and a small work light. Each unit is connected by cable, with wall outlets supplying the necessary voltages.³

³We can provide construction and circuit details of the apparatus described; and Scientific Prototype Mfg. Co., Inc., New York, can supply recorders and dippers.

We want to emphasize the important role of our undergraduate students in the development, construction, and maintenance of this laboratory. The students have made or assembled everything we have described except for the recording equipment and low-voltage power supplies. Some of these students have developed superior electrical and mechanical skills in the process. The equipment is almost

Fig. 1B. Components.

trouble-free, and student assistants take care of routine maintenance. The relatively low cost of this durable and reliable equipment suggests that fully adequate instrumentation may be within the budget of many colleges. Furthermore, we feel that effective and versatile equipment of the kind described permits a complexity of experimental design and an accuracy of data recording that is exciting and challenging to the student, and productive of

the kind of laboratory experience likely to turn good students into psychology majors.

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