TECHNICAL NOTE

*MODIFYING THE GERBRANDS CUMULATIVE RECORDER
TO PRODUCE HISTOGRAMS¹*

Often, a histogram provides a very readable display of operant data. A cumulative recorder can provide a record of this sort in trial situations where there is an intertrial interval of constant duration. The recorder's paper drive is turned off during each trial and the response pen is stepped by events such as time pulses or responses. During the intertrial interval,

the paper is allowed to feed and the pen is reset to baseline at the beginning of the next trial.

When discrete trials are not employed, or when the intertrial interval is variable in length, histograms cannot be produced in this manner. The present note describes how a Gerbrands (model C-3) recorder was modified to produce histograms in these situations.

First, the alternating current paper-drive motor and its associated gears were removed from the recorder. Next, a 5-cm diameter, 60-tooth gear was mounted on the shaft of the paper roller. Then, in place of the motor, the coil and drive mechanism of a 24-V dc

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Fig. 1. The coil and drive assembly from an Automatic Electric rotary stepping switch is shown installed on the side of the recorder. The pawl (A) has been ground back to admit the gear. The armature's stopping teeth (C) do not cleanly engage the gear and stopping is mainly accomplished by the friction of the armature against the gear. Each operation of the assembly advances the recorder approximately 0.6 cm.

Automatic Electric (type 44) rotary stepping switch was bolted to the outside of the recorder. In installing the stepper assembly it was necessary first to cut away a portion of its mounting bracket and grind back the armature so that the large gear could be accommodated. The assembly was positioned so that its pawl engaged the teeth of the gear, as illustrated in Figure 1.

The modification was accomplished in an afternoon and, although the design is a bit crude, the recorder has operated without any failures related to the paper-drive mechanism for about 2 yr and over 50,000 operations. In our laboratory, the recorder has been primarily used to record successive post reinforcement pauses generated by cyclic-interval schedules of reinforcement. The post-reinforcement pause histograms revealed a cyclic pattern much more clearly than did cumulative response records that were obtained concurrently.

Since either time pulses or any behavioral event can be used to step the response pen, the recorder has many operant applications. By making the recorder's associated control circuitry more complex, different types of histogram can be generated. For example, instead of the simple vertical lines presented in Figure 2, wide bars can be produced by advancing the paper both before and after reset of the response pen. Furthermore, the bars may be given 45° striations by operating the response pen's solenoid (rein-

Fig. 2. A record is shown in which pulses every 0.5 sec operated the response stepper. After a programmed number of such pulses the pen was reset and the paper-drive assembly was activated once. The next line in the histogram was then drawn by another succession of pulses to the response stepper. A sine function determined the length of time represented by each line of the histogram.

forcement marker) during its upward excursion. Successive bars could then be distinguished from one another by striating some and not others.

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