interrupted. It is necessary to depress the pushbutton switch momentarily each time the power supply is turned on. If this is not done, both photocells stay actuated and the circuit is, therefore, nonfunctional.

The photocells themselves should be enclosed in a 0.25-in.-diam, 0.50- to 1.00-in.-deep tunnel and mounted 1.5 in. above the grid floor. These precautions render the circuit insensitive to ambient light changes and minimize circuit activation by the rat's tail.

The components indicated in Fig. 1 are not critical, and a great deal of substitution is possible. The photocell should be a low-resistance type (approximately 1,000 ohms at 100 fc) with a light-dark resistance ratio of 1,000:1 or better.

A number of these devices have been used in our laboratory and have proven to be reliable and fully compatible with conventional electromechanical programming equipment.

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Apparatus for determining cage tilt thresholds in small animals

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Studies concerning the feedback effects of animals' own movements upon their visual and auditory discrimination and generalization capabilities (e.g., Halpern & Lyon, 1966; Thomas & Lyons, 1968) have employed a tilt cage which is under the control of the E. Apparently, no studies have yet described the situation where the animal has *active* control over the lateral angular movement of the test cage. This note describes an apparatus, a tilting cage, which we are using to study lateral cage-tilt thresholds in rats. With slight modifications of the manipulanda, feeder, and intelligence panels in the test cage, the device is appropriate for studying thresholds and sensory-tonic interactions in other small animals, e.g., the pigeon. The type of data which may be collected with the apparatus (Fig. 1) is a series of tracking curves of the animals' behavior as it alternates responses between the left lever

and the right lever, causing counterclockwise and clockwise tilts, respectively, of the test cage on its axis.

A third lever may be added between the

left and right levers to serve as the critical or criterion response manipulandum when the animal "judges" the cage to be at the horizontal level position. Intermittent

Fig. 1. Photograph of cage tilt apparatus and experimental cubicles. Symbols denote the following: (A) cumulative recorder, LVE Model 1516, with felt-tip pen recording stylus; (B) small animal test cage with dipper, LVE Model 1417 and Model 1351, mounted on pipe axis; (C) adjustable close-down motor (override limit) switch; (D) sample set of threshold curves for two rats during early training (two top curves) and late training (two bottom curves); (E) cage axis stabilizer; (F) solid-state multischedule programmer, BRS Model 2901; (G) modified motor control box; and (H) reversible motor, Cornell-Dubilier Model AR-22R, fitted with cage axis.

Fig. 2. Schematic diagram of circuit for modified motor control box and reversible motor: C_1 —4 MFD, 450-V electrolytic capacitor. C_2 —140 MFD, 50-V electrolytic capacitor. CRL (CRL_1 , CRL_2); CRR (CRR_1 , CRR_2)—Control relay left lever; control relay right lever; 17B key telephone unit (KTU) switching relays, Bell, 518-112-412; contact interlocks at CRL_2 and CRR_2 . D—1N4383 diode. F—2-A fuse. LP—GE47 lamp. LS_1 , LS_2 —SPST limit pressure switches normally open, left and right levers, test cage. LS_3 , LS_4 —SPST override limit pressure switches, axis-mounted contacts. S_1 —SPST on-off switch. S_2 —SPDT on-off-on switch, manual rotation control. T_1 —110-V/30-V transformer.

reinforcement (variable-ratio schedules) and/or motor close-down are made contingent upon level (horizontal, 0-deg tilt) adjustments of the cage when using only two levers. The motor is activated for as long as a lever, right or left, is depressed. A recording stylus made either from a 2.5-cc ink-filled syringe or a felt-tip pen is firmly attached to the base of the test cage at midline and used to track the lateral movements of the cage. In any experimental session, an adjustable close-down motor switch is set by the E to regulate the animals' control over the cage; in this way, the angle of maximum lateral tilt of the cage up to 90 deg left or right of the horizontal position may be determined. In the training phases for our rats in the tilting cage, low-level grid shocks (30-40 V on a LVE Model 1643) were used successfully to orient the animals toward the manipulanda. The lateral-to-horizontal tracking behavior of the rat, obtained through the use of a cumulative recorder with the tilting cage, has enabled us to observe and record behavior which is similar methodologically to that described by Blough (1958, 1966) for visual processes of the pigeon and to that described by Wright and Meyer (1969) for temperature regulation of the rat. Difference thresholds of 5 deg of lateral tilt have been found for our animals with our reversible motor.

Figure 2 shows the circuit specifications for the tilting cage control box and motor in which small animals may be trained to control the lateral angle of their test cage.

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NOTES

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The Paradome: An outdoor laboratory for testing children¹

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Finding an available and appropriate room is a common problem facing Es who wish to test children individually in a school setting. Typically, the kind of room that is needed is one that is private, relatively quiet, free of interruptions, and maximally available for the intended research. In recent years, the acquisition of a mobile trailer laboratory has been one solution employed to solve this space problem. The cost of such a trailer, however, precludes this solution for many researchers. The problem is compounded when several space facilities are necessary and when their presence is simultaneously needed at different locations. The present note, therefore, describes a structure which can serve as a relatively inexpensive solution to the space problem.

The structure is a commercially available portable one called a Paradome.² The Paradome is a near-circular structure with a dome-shaped vinyl roof which sits atop an aluminum frame. The walls are constructed of framed screening, and a hinged spring-loaded door is provided. The interior of the structure is therefore protected from penetration by insects. No floor is provided; the structure is simply erected over the ground or some paved surface. Snap-in side panels made of fiberglass fabric are available as an accessory item, and we recommend their use in order to assure more privacy and protection from the elements. The Paradome is mostly preassembled, requiring no special tools for its erection. The manufacturer claims it can be set up in 30 min by just two people. We have found the number of personnel recommended to be adequate but, depending on their cognitive and motor skills, at least initially, erection time is apt to be somewhat longer. To dismantle the structure takes about as much time as its assembly. Fully erected, the Paradome somewhat resembles a colorful gazebo, upon which it is probably modeled. A major feature of the Paradome is the ability to dismantle it rapidly into a compact package which is then easily transportable to another location. A station wagon is the easiest means of transportation, but, if necessary, the dismantled Paradome can be tied to the roof of a car. The compact size to which the Paradome can be reduced is also an advantage when storage space is limited. Several models are available, ranging from

9 to 13 ft in diam, from 87 to 130 sq ft in floor area, and weighing from 78 to 127 lbs. The ceiling heights are all 7-8 ft, and the wall height is 6 ft. Any of the models is large enough to accommodate a few children simultaneously when such a procedure is desirable.

There are also some other advantages we have found in using the Paradome as an experimental room. Since the structure is placed outside the school building, all of the usual noises occurring within the building can be circumvented. Judicious placement may also minimize noises originating from playground activities. The colorful and novel appearance of the structure seems to appeal to children and increase their interest in participating in our research projects. Such interest can be further enhanced by decorating the structure with flags or streamers, introducing it as a circus tent, etc. The structure also seems to arouse the interest of the school staff and parents and thereby promote their cooperation.

There are also some precautions that should be considered in using the structure. (1) It is not appropriate for generally harsh climates or cold winters, since there is no practical inexpensive way to keep the interior uniformly heated. (2) We have typically left the Paradome in place for the entire duration of a project at a particular school. However, this may not be an advisable procedure in neighborhoods where vandalism is very prevalent. On the other hand, it is not very practical to dismantle and reassemble the structure each day in order to store it safely overnight. Whatever the school location, we do not recommend leaving equipment overnight in the Paradome. Even with a lock on the door, the structure can be penetrated by a diligent intruder. (3) We have found that after several assembly and dismantling operations, the spokes supporting the roof may become bent and nonfunctional. Fortunately, these, as well as all other parts of the Paradome, are replaceable by ordering them from the manufacturer.

We have been successfully using the Paradome for several years now with young children at a variety of schools. It provides a relatively inexpensive, portable structure, admirably providing those attributes typically desired in an experimental room for testing children at school. Its use is, of course, not limited to a school setting, and it may also fulfill a variety of space needs in other research circumstances.

NOTES

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2. Available from Avid Products, 2970