that animal, when measured by other techniques, may be considerably lower. While we have observed this sort of alternating response pattern only rarely during ICSS with rats, it is common enough with rhesus monkeys to confound "threshold" levels with "preferred" levels and therefore pose data interpretation difficulties.

Recently, we have circumvented this problem by means of a relatively straightforward change in the Stein and Ray (1960) threshold paradigm. This improvement consists of eliminating the secondary manipulandum and controlling the resetting of stimulus intensities to maximum value by means of a delay timer. This timer, similar to that used in a differential reinforcement of low rates (DRL) circuit, is connected to the primary manipulandum such that each depression of the manipulandum resets the timer to its starting position. When the animal stops responding on the manipulandum, the delay timer times out after a preset delay period and resets the electrical stimulus intensity to its maximum value.

Thus, in order to reset the stimulus level to maximum, the animal is forced to stop responding temporarily. Since most monkeys will work for brain stimulation that is even only marginally reinforcing rather than not

receive any stimulation at all, this technique effectively eliminates the perseverative alternation between primary and secondary manipulanda that we have encountered in our use of the Stein and Ray (1960) paradigm. Thus, it allows a substantially more accurate estimation of the threshold level for reinforcing brain stimulation.

Since the rhesus monkey exhibits considerable resistance to extinction for ICSS at anterior forebrain placements (Gardner, 1968; Brodie, Moreno, Malis, & Boren, 1960), delay periods of up to 5 sec may be safely utilized without jeopardizing the continuity of the self-stimulating behavior. In our experience, this procedure provides a reliable and effective behavioral paradigm for studying ICSS in the subhuman primate and constitutes an attractive alternative to other paradigms often used for such studies.

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The reliable detection of directional movement in small animals*

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A reliable method for the detection of directional movement in small animals is described. The technique involves the use of four red solid-state lamps and an equal number of photosensors.

Photosensors in combination with invisible (to S) light sources have not been applied frequently in learning and other psychological situations for the detection of the direction in which an animal is moving. In our particular case, we were interested in detecting animal movement through a small gate in a mouse shuttlebox which was encased in a sound- and lightproof chamber. The conventional toggle

floor, though absolute, appeared to be not entirely satisfactory and, for this reason, it was decided to use photosensitive equipment. Initially, two horizontally spaced photosensors were employed to determine the direction of motion through the gate. High sensitivity and fast response of the photosensors were required to detect fast running mice. However, tail movements sometimes confused the logic (solid state) designed to keep track of the animal's location.

This problem was solved by the use of four fast-acting photosensors (Clairex Type CL907HL) and by four red solid-state lamps (OPCOA OSL-3). The latter have an extremely long life expectancy when used at 2 V dc. The peak of spectral sensitivity of the cells (6,150 Å) matches that of the solid-state lamps (6,900 Å) satisfactorily. Presumably, mice and other rodents are relatively insensitive to light sources emitting from the red end of the spectrum. Figure 1 is a schematic diagram of the shuttlebox direction-determining circuit. The dual integrated circuit operational amplifier (Fairchild Type MA739C) is connected as two Schmitt trigger circuits to detect the interruption of

the light beam from the solid-state lamps to the photocells. Interruption of the light beams to both photocells on either side will cause the flip-flop (Texas Instruments S 7476) to indicate which cells are blocked. Interruption of the light to only one of the photocells on one side will not activate the Schmitt trigger. Interruption of the light to all four photocells will not cause a change in the flip-flop. Normal animal movement through the monitored area will first block one pair of cells, then all four, and then just the other pair of cells. The flip-flop will indicate the last pair of cells blocked.

The gate dimensions (see Fig. 2) are 3.8 x 3.2 cm. The gate is made out of Plexiglas (thickness 2.5 cm) and is painted black. The center of the lower lights is 0.8 cm above the grid floor, while the upper lights are 0.8 cm above the lower lights. The lights on either side are 1.3 cm apart. The sides and top of the gate (see Fig. 2) have been milled out so as to allow for easy installation of the lights, photosensors and wiring.

To switch the logic that controls the side at which the CS and UCS will be presented on any given trial, the

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Fig. 1. The circuit diagram employed in the detection of the direction in which the animal is moving.

Fig. 2. The shuttlebox gate with the solid-state lamps and photosensors.

mouse must simultaneously interrupt both the upper and lower beam on either side of the gate. Whichever combination of upper and lower beams is interrupted last determines the side at which the stimuli will be presented next. This arrangement

cannot be fooled by tail movements of the mouse. In addition, this device is very reliable for the detection of smaller mice (30 days of age) as well as older mice, and both albino and pigmented animals are detected equally well.