A TECHNIQUE FOR RECORDING HEART-RATE IN MOVING RATS¹

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The method described permits the stable recording of heart-rate from moving rats for experimental periods of a few weeks. This technique is especially useful in certain conditioning situations where interference from movement is high.

Heart-rate was recorded from two Grass silver plate electrodes 8 mm in diameter. Insulated wires approximately 7.5 cm in length ran from the electrodes to an Amphenol "Subminax" connector (#27-9). The electrodes were inserted through a sagittal incision made in the scalp while the animal was anesthetized.

The electrodes were then pushed through the incision under the skin to a position on the rib cage, one on each side of the body. The Amphenol connector was firmly cemented to the skull, and the dental cement "cap" kept in place by three stainless steel screws. During recording, the connector was attached to a

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Fig. 1. Heart-rate records for a single rat; the duration of the CS and UCS are indicated by solid bars. A—an escape trial; B—an avoidance trial.

lead-in cable by an Amphenol "Subminax" #27-7 connector.

Examples of heart-rate records on two trials for a single rat obtained in a one-way Miller-box avoidance situation are shown in Fig. 1. The running response occurred at CS termination. Record A is an example of an escape trial on which the rat failed to avoid shock. The interference during shock presentation and subsequent to it occurred because the grid floor was not employed as a ground when the rat was being shocked. Record B is an example of an avoidance trial.

This technique is also being used for recording in the Estes-Skinner conditioned emotional response situation (Estes and Skinner, 1941). Since in this case the animals have to spend lengthy periods in the Skinner-box, a mercury swivel system similar to the one described by Sutton and Miller (1963) is employed to avoid twisting and breaking the wires coming from the rat's head.

This method has certain advantages over those in which surface electrodes are strapped to the rat (Malmo, 1963; Ferraro, Silver, and

Snapper, 1965). There is less interference with the movements involved in making the operant response, and the rat does not require a long period to adapt to the electrodes and harness. Furthermore, recording is not influenced by changes in skin resistance caused by the drying of electrode paste. The technique may be of special value for experimenters employing brain electrode implants who wish to monitor cardiac function without using separate leads.

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