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ONR TECHNICAL REPORT

Use of Telemetry to Compare dog ECGs under
Routine and Test Environments

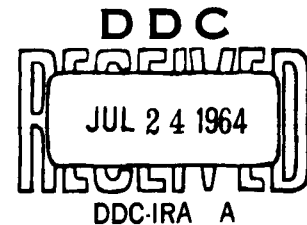
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Technical Report No. 6
Contract Nonr-2850(00)
Office of Naval Research,
Physiological Psychology Branch

Principal Investigator:
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Use of Telemetry to Compare Dog ECGs under
Routine and Test Environments^{1, 2}

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Abstract.--Use of telemetry to compare dog ECGs transmitted from routine and test environments in the laboratory is considered. Several technical telemetry problems relating to the procedure are noted and their solution described.

List of Figures

(The figures are attached in the following order at the end of the report).

Fig. 1. Modified chest harness with attached transmitter case.

Fig. 2. Schematic block diagram showing connections of antennas to FM receiver.

Experimental examination of autonomic responding is sometimes questioned on the ground that the test environment and apparatus per se as distinct from independent variables deliberately manipulated-- may generate changes in resting or baseline outputs of autonomic effectors. One might argue, for example, that electrocardiograms recorded from a dog in a Pavlov frame could reflect the restraining character of the device in a more rapid heart beat than usual. Working with dogs in a similarly confining apparatus, we developed a technique that permits at least some empirical investigation of this matter.

Focusing our interest on properties of the electrocardiogram, our approach is to compare (a) records telemetered from the dog restrained

in the laboratory test cubicle (Kaplan, 1964) with (b) those transmitted from its living cage -- the animal's more familiar environment, where it lives during most of its laboratory stay and is free to move about.

The telemetry system consists of a Metretel No. 1200 FM receiver and No. 1100 radio transmitter with battery pack. Figure 1 shows (a) a leather chest harness, modified with a broad crosspiece and extra buckles, and, as fastened to it when ECG signals are sent from the living cage, (b) a transmitter case, also fashioned from leather. For transmission from within the test cubicle, the case is buckled to a leather belt that is strapped about the rear of the dog's body when the animal is placed in the restraining apparatus (Kaplan, Campbell, Martin, Wulp, and Lipinski, 1962 Fig. 2). In both cases of transmitter placement, the radio's self-contained transmitting antenna faces outward and upward from the dog's back.

An increase in distance between the transmitter and the receiver antenna causes a decrease in amplitude of the ECG signal. Since the receiver test cubicle, and the dogs' living cages are located in different rooms -- control, test and vivarium respectively the original placement of the monopole receiving antenna was equidistant from the test cubicle and the living cage area. However, this arrangement was not suitable, because, in each case, the metal walls of the living cage interfered with transmission from within.

The solution depicted in Figure 2 is very satisfactory. Lead-in wire, LW, runs from the FM receiver in the control room to an antenna

switch in the test room, from which it makes connection with a monopole antenna, MA, either in the test cubicle or in one of the living cages of the vivarium. Each living cage antenna is a 34-in. length of $\frac{1}{4}$ -in. aluminum round rod, mounted horizontally on stand-off insulators along the right side, two inches below the ceiling of the cage. None has been damaged by the dogs. Transmission distance is virtually eliminated as a variable, and clear records can be obtained from each type of enclosure.

References

- Kaplan, M., Campbell, S.L., Martin, J.M., Wulp, D.G., and Lipinski, C.E. Jr. A restraining device for psychophysiological experimentation with dogs. J. exp. Anal. Behav., 1962, 5, 209-211.
- Kaplan, M. A compact laboratory facility for psychophysiological study of dogs. ONR Tech. Rep. No. 5, Summer, 1964.

Footnotes

¹This is Technical Report No. 6 describing developments in a program of "Research in Motor and Autonomic Response" under Contract Nonr-2850(00) with the Office of Naval Research, Physiological Psychology Branch.

²We wish to thank Richard Sparer for his preparation of the figures.

