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PET DATA ANALYSIS SATELLITE SYSTEM(U) ARIZONA UNIV
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AFOSR-87-0003

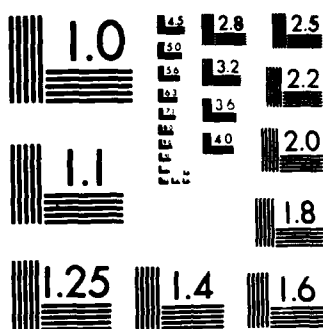
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AFOSR 87-0003

FINAL REPORT

October 1, 1986 - September 30, 1987

URIP EQUIPMENT GRANT
PET DATA ANALYSIS SATELLITE SYSTEM

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PURCHASES

→ This system was requested to duplicate hardware used in analyzing data collected at the Positron Emission Tomography (PET) Laboratory at Mallinckrodt Institute of Radiology, Washington University at St. Louis. The PI worked in that laboratory from 1981-1985 collecting a library of 28 data files representing normal young adult human subjects scanned under a variety of auditory test conditions. The St. Louis laboratory offered to provide copies of both the relevant image-analysis software and the 28 data files to the PI on the condition that the necessary hardware be purchased.

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As of the final date of this grant, all equipment had been installed on site at the University of Arizona. In addition, one image-display program and one data file from the Washington University library had been received, and were used to demonstrate the system during a site visit by the Program Manager in July 1987. We are now awaiting arrival of the additional software and data files from St. Louis, in order to begin work with the system analyzing the 28 previously collected subject files.



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PROPOSED STUDIES

Two graduate students have been recruited to assist with data analysis. A number of studies have been planned for analyzing the currently available data files:

Comparison of the amount of regional cerebral blood flow (rCBF) in
auditory vs. visual cortex under rest conditions

Individual differences in rCBF topography under rest conditions

Individual differences in rCBF topography and quantitative changes
comparing rest vs. stimulation with different sound types (e.g.,
pure tones, noise bursts, tone patterns)

Changes in rCBF patterns as a function of stimulus characteristics
(data for a number of characteristics are available: e.g., pure-tone
frequency, click rate, sound level, ear of presentation)

Simultaneous activation of several levels of the auditory central nervous
system in response to the same stimulus: separate studies of
different types of sounds, ranging from pure tones to syllables

Asymmetries in rCBF response as a function of: type of sound (e.g., pure
tones, clicks at different rates, syllables), and level of auditory
CNS (e.g., thalamus vs. cortex)

OTHER RESEARCH

In addition to use in analyzing the current data library, this system will serve as part of the instrumentation base supporting the "Coordinated Noninvasive Studies (CNS) Project" (proposal to be submitted). This is a multi-site, collaborative project which seeks to bring together all the currently available noninvasive means for studying human brain anatomy and physiology in a coordinated study of structural and functional correlates of behaviorally-defined human performance. Noninvasive methods to be represented include: Electroencephalography (via computer-based data collection and analysis, e.g., Brain Electrical Activity Mapping BEAM, and Evoked Potentials EPs), Magnetoencephalography (MEG), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography (PET).

The Project's initial focus will be on asymmetries in complex-sound processing. A performance metric (e.g., ear advantages for two different sounds) will be defined for individual subjects using computer-controlled psychophysical testing, and then each subject will be examined using each of the noninvasive methods, to identify and quantify structural and functional correlates of the behaviorally-defined asymmetries.

The PET Data Analysis Satellite System will not only support analysis of the new PET results collected as a part of this research, but we will explore the feasibility of exploiting the system's data-analysis, image-processing, and image-capture capabilities to develop new algorithms for analyzing and displaying data collected on some of the other noninvasive devices, e.g., sequence comparison routines for evoked-potential waveforms, and image-display software for magnetoencephalograph data.

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