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PHASE-LOCKED RELATIONSHIPS BETWEEN CARDIOVASCULAR EVENTS AND THE BRAIN

Permalink

<https://escholarship.org/uc/item/7tp4s67v>

Journal

PSYCHOPHYSIOLOGY, 18(2)

ISSN

0048-5772

Authors

SANDMAN, CA
SWANSON, JM
BERKA, C
[et al.](#)

Publication Date

1981

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Peer reviewed

15a. Sandman, C. A., Swanson, J. M., Berka, C., & Isenhardt, R. (University of California, Irvine, and Fair-view Hospital) **Phase-locked relationships between car-diovascular events and the brain.** Recent reports indicate that visual and auditory evoked potentials are differen-tially influenced when stimuli are presented during either systole or diastole of the carotid pulse pressure. The cur-rent report extends this phenomenon in two different directions.

In the first study, depressed, hypertensive and hyperac-tive patients were presented tones (200-msec duration) synchronized with either systole or diastole of the carotid pulse. The AEP was averaged for 500 msec with a sam-pling rate of 1000 Hz on-line by a PDP 11/34 computer. Two interesting phenomena were observed: 1) In hyper-tensive patients the AEP was dramatically attenuated during stimuli synchronized with the systolic pulse. In one patient with a long history of hypertension, there was a complete absence of an AEP during systole; 2) Hyperac-tive children showed augmented AEPs during systole (reverse of the normal pattern). However, effective treatment with Ritalin normalized this pattern.

In the second study, identical procedures were employed except the external stimulus was omitted. In normal subjects (N=12) a reliable positive peak ($5\mu\text{V}$) occurred within 50 msec when sampling was initiated during diastole. During systole a negative response was recorded. In some depressed and hyperactive patients a rhythmical 8-9 Hz *averaged* response was recorded. Thus, instead of averaging to zero (as during random presentation of stimuli or in normal subjects), some patients evidence an EEG frequency phase-locked with cardiovascular dynamics. The diagnostic significance of this phenomenon is uncertain. The results may relate to the electromechanical theories of Kennedy (1959) and Bering (1955).