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FUNCTIONAL-ANALYSIS - ALTERNATIVE TO LATENCY ADJUSTMENT OF ERP

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Isenhardt, R., & Sandman, C.A. (University of California, Irvine, and Fairview Hospital) Functional analysis: Alternative to latency adjustment of ERP. The Fast Fourier Transform and mathematics performed in the domain of complex numbers provide computational elegance and enable us to represent multi-dimensional information. Several areas of application are being pursued in our laboratory. First, all zero (moment), first order (linear), and second order (nonlinear) correlation functions are calculated for all parallel input functions (EEG, blood volume, respiration) and across all conditions in an experimental paradigm. The auto-correlation function is a first order function and the other type of correlation is represented by the convolution integral. It has been demonstrated that the averaged correlations of repeated sample functions become very stable and are the most reliable descriptors of actual physical functioning. Second, a phase normalization technique has been developed to enhance information in transient or event-related data. As opposed to the often arbitrary decisions required in latency adjustment methods, this direct manipulation of data generates an estimate of the sample function which is "normalized" with respect to random phase variation of frequency response or to time domain factors (patterns). The coefficients of frequency transformed sample data functions are manipulated such that phase variability is set to zero. The program allows one to proceed from a straightforward mathematical algorithm. Other areas to be discussed include the utility of n^{th} order convolution analysis for describing physical systems.