Title
TEMPORAL RELATIONSHIPS OF THE COMPONENTS OF THE AUDITORY EVENT-RELATED POTENTIAL

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ships of the components of the auditory event-related potential. The components comprising the event-related potential (ERP) are assumed to reflect factors such as stimulus registration, attention, and stimulus evaluation. The appearance of the normal ERP waveform suggests a series (N1, P2, N2, and P3) of temporally linked components and processing stages. Little is known, however, about the temporal coupling between ERP peaks. For instance, does a delayed N1 have an effect on the subsequent latency of P2? Or does the same delayed N1 have any consequences for the latency of P3? In the study outlined below, we attempted to investigate component relationships on a trial-by-trial basis in order to examine the dynamic properties between the peaks of the ERP during a target detection task.

ERPs were collected from a group of normal adults (n = 12) during an auditory oddball paradigm. Individuals listened to a series of tones to detect an occasional (20%) high-frequency tone interspersed among frequent (80%) low-frequency tones. Scalp potentials were recorded from F_z, C_z, and P_z sites referenced to linked mastoids. Conventional averages to targets (n = 60) were computed and served as a source of template shapes used in the single trial analysis. A correlational-template procedure was used to scan the EEG record of each target trial and estimate component latencies for N1, P2, N2, and P3. The derived template latencies for each component were entered into a series of multiple regression analyses to examine the contribution of preceding peaks to the prediction of latencies for following peaks. Predictors for P3, for example, included N1, P2, and N2. A similar analysis strategy was employed for other component combinations.

Results indicated that N2 accounted for approximately 55% to 61% of the variability of P3, whereas N1 and P2 contributed relatively little to the overall prediction of P3 latency. For the prediction of N2 latencies, P2 accounted for 9% to 16% of the N2 variance, with N1 accounting for only 1%. For the prediction of P2 latencies, N1 accounted for 8% to 12% of the variance in P2 latency. These findings suggest that the earlier N1 and P2 components are relatively independent of the later N2 and P3 components of the ERP and lend support for the separate processing stages represented by the components of the ERP.

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