Latency variability in the components of the auditory event-related potential in dementing illness. Although the P3 wave of the event-related potential (ERP) has been used to index the cognitive changes accompanying dementing illnesses, measures of the ERP are not considered sufficiently sensitive for routine clinical use. One feature of the ERP that may provide additional useful information, but is masked by conventional averaging procedures, is the variability of component latency. The diminished attentional and processing capacity of the impaired individual may be reflected as an increase in ERP variation. We examined component variation based on a single trial analysis in three groups of individuals to test whether measures of variability separated those with dementing illness from controls.

Auditory ERPs were collected in an oddball paradigm from a group of demented individuals (X age = 71.9 yrs, n = 15), age-equivalent controls (n = 15), and younger controls (X age = 34.6 yrs, n = 12). Subjects detected rare (20%) high frequency tones interspersed among a series of frequent (80%) low frequency tones. Reaction times to rare target tones were measured. Scalp potentials were recorded from midline sites Fz, Cz, and Pz referenced to linked earlobes. The single trial analysis of targets used a correlational-template procedure to identify N1, P2, N2, and P3 peaks of the ERP and estimate the latencies of each component. Measures of component variability were derived from the single trial peak latencies.

Results from analysis of variance indicated that P3 latency variability was significantly larger for the demented group than either of the control groups; differences
in component variability between older and younger controls were not significant. P3 latencies measured from conventional averages were significantly longer in the demented group than either of the control groups; P3 was also longer in the older than younger controls. Variability of N2 paralleled the results for P3 but differences did not attain significant levels. N1 and P2 variability tended to be larger in the demented than in the control groups, but differences among the groups were small and significant only for N1. These findings suggest that measures of component variability, especially for the P3 component, may complement conventional measures of the ERP and add useful information in the classification of dementing processes.

(Supported by NIMH Grant MH35367)