**Participants:**
- 45; healthy, cognitively intact

**Measures:**
- Event-related potentials (ERPs)
  - 64-channel EEG system
  - F3, Fz, and F4 fronto-central electrodes
  - N200: peak 100-350ms, selective attention
  - ERP amplitude IIV = SD of single-trial peak amplitude

- Brand Names Task
  - The experimental materials comprised 60 real and 60 fake brands
  - Real Names: 20 Remote, 20 Recent, and 20 Enduring brands
  - Participants responded by pressing any button on the keyboard

**Methods**

**Purpose**
- There has been considerable interest in the ability to diagnose cognitive decline at the earliest possible stage of onset, thus discriminating healthy aging from early-stage deterioration
- Further examine trial-to-trial N200 amplitude intraindividual variability (IIV) in ε4+ individuals
  - We expect greater IIV activation in the Remote and Recent brand conditions

**IIV**
- IIV is defined as the trial-to-trial participant differences collected in event-related potential (ERP) data sets
- Previous studies demonstrate that IIV increases with advancing age
  - Variability in processing speed increases as a compensatory function of normal aging
  - Patients with dementia, specifically Alzheimer’s disease, exhibit more variability in performance than normal elderly
  - N200 amplitude: reflects the cognitive process in which the subject evaluates the stimulus
  - Research on ERP IIV is minimal, despite ability to provide direct insight into neural processing

**Gene Status**
- APOE ε4 carriers are at increased risk for dementia disorders, including Alzheimer’s (AD)
  - The mechanism by which APOE contributes to disease expression remains unknown
  - Neurological changes identified with AD begin decades before symptom onset, making biomarkers of early risk especially important
- Evidence that variability is significantly greater in APOE ε4+ individuals when compared to a control group
- APOE ε 4 allele displayed greater activation in response to famous names relative to unfamiliar names at baseline than non-carriers

**Results**

- **Fig 1. Task Performance**
  - A 2 (gene status) x 3 (electrode) x 4 (stimulus type) ANOVA revealed a possible interaction (p = 0.070) in Gene Status * StimType * Electrode in the Fake brand condition at the Fz electrode
  - Possible Gene Status * StimType * Electrode interaction (p = 0.090) in the Recent Condition at the Fz electrode
  - Task performance measures were comparable between groups

**Fig 2. IIV in each Brand Condition**

- **Enduring Brand IIV**
  - e4+ (N = 20)
  - e4- (N = 25)

**Fig 3. IIV in each Brand Condition**

- **Recent Brand IIV**
  - e4+ (N = 20)
  - e4- (N = 25)

**Discussion**

- The current study supports the utility of examining intraindividual variability as a precursor to cognitive deterioration, especially in relation to APOE ε4+ gene status.
- Numerous mechanisms may contribute to increased IIV, including the speed of neural transmission, functioning of neurotransmitter systems, synchronicity of neural activity, fatigue, stress, and practice/learning
- Future research implications include examining the Enduring brand condition further and using a larger ε4+ sample. It also would be worthwhile to consider other waves beyond N200, including P300.