

## Introduction

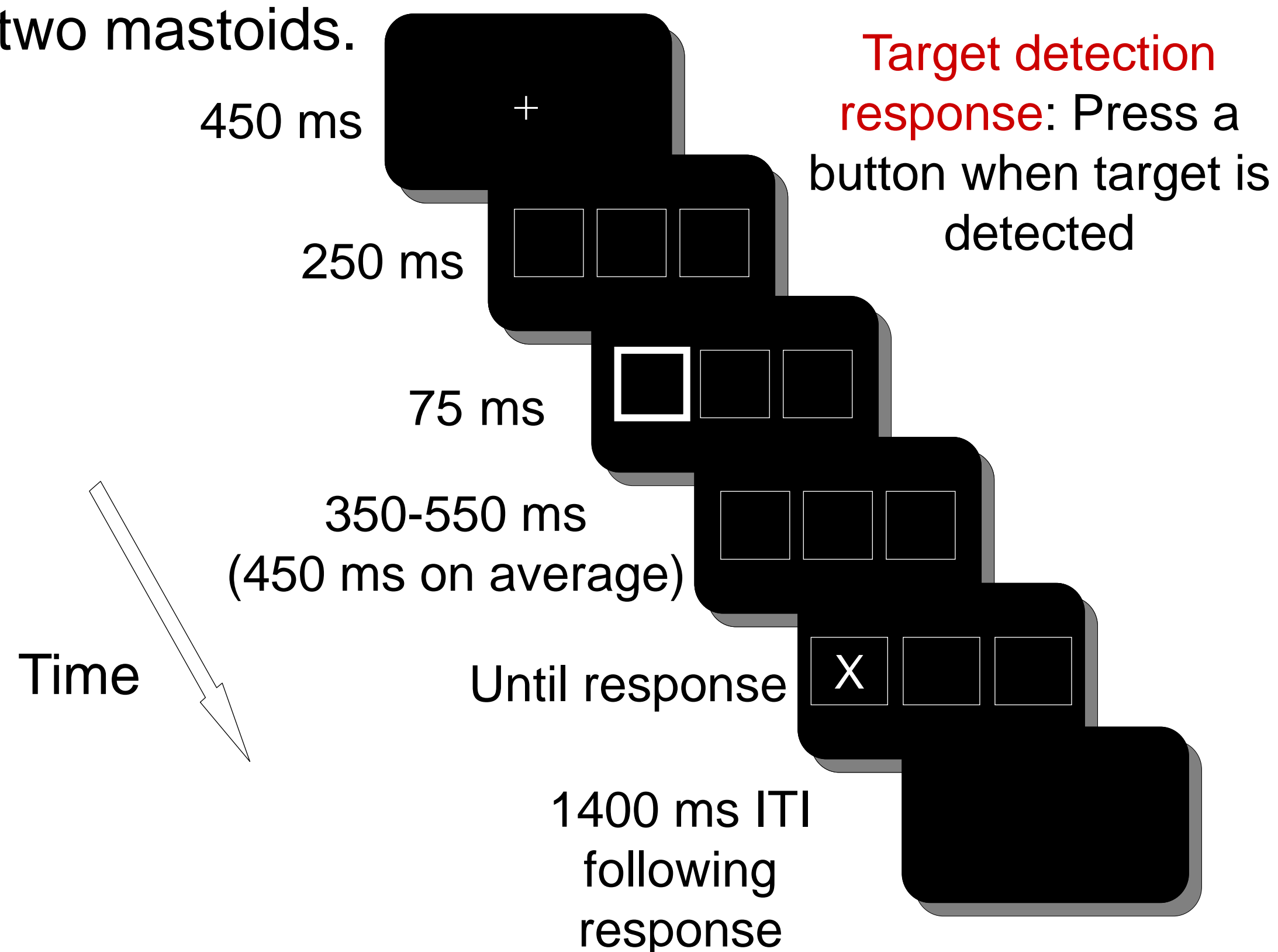
The purpose of this experiment was to examine age differences in the electrophysiological effects associated with inhibition of return (IOR). IOR is an attentional orienting phenomenon that is thought to bias attention towards novel locations (Klein, 2000); it is indexed by slower reaction times (RTs) to targets presented at previously attended locations (Posner & Cohen, 1984). In an event related potential (ERP) study, McDonald and colleagues (1999) found a negative enhancement of cued targets at the N1 latency stage. A P2 reduction to targets at the cued location was thought to represent IOR. A P3 enhancement was thought to be a reduced expectation for targets at the attended location. In this study, we predicted that younger adults would replicate the findings of McDonald et al. (1999). Older adults were predicted to have behavioral patterns similar to younger adults (Faust & Balota, 1997; Hartley & Kieley, 1995; Langley et al., 2005), but ERP wave patterns would show longer latencies and reduced amplitude.

## Method

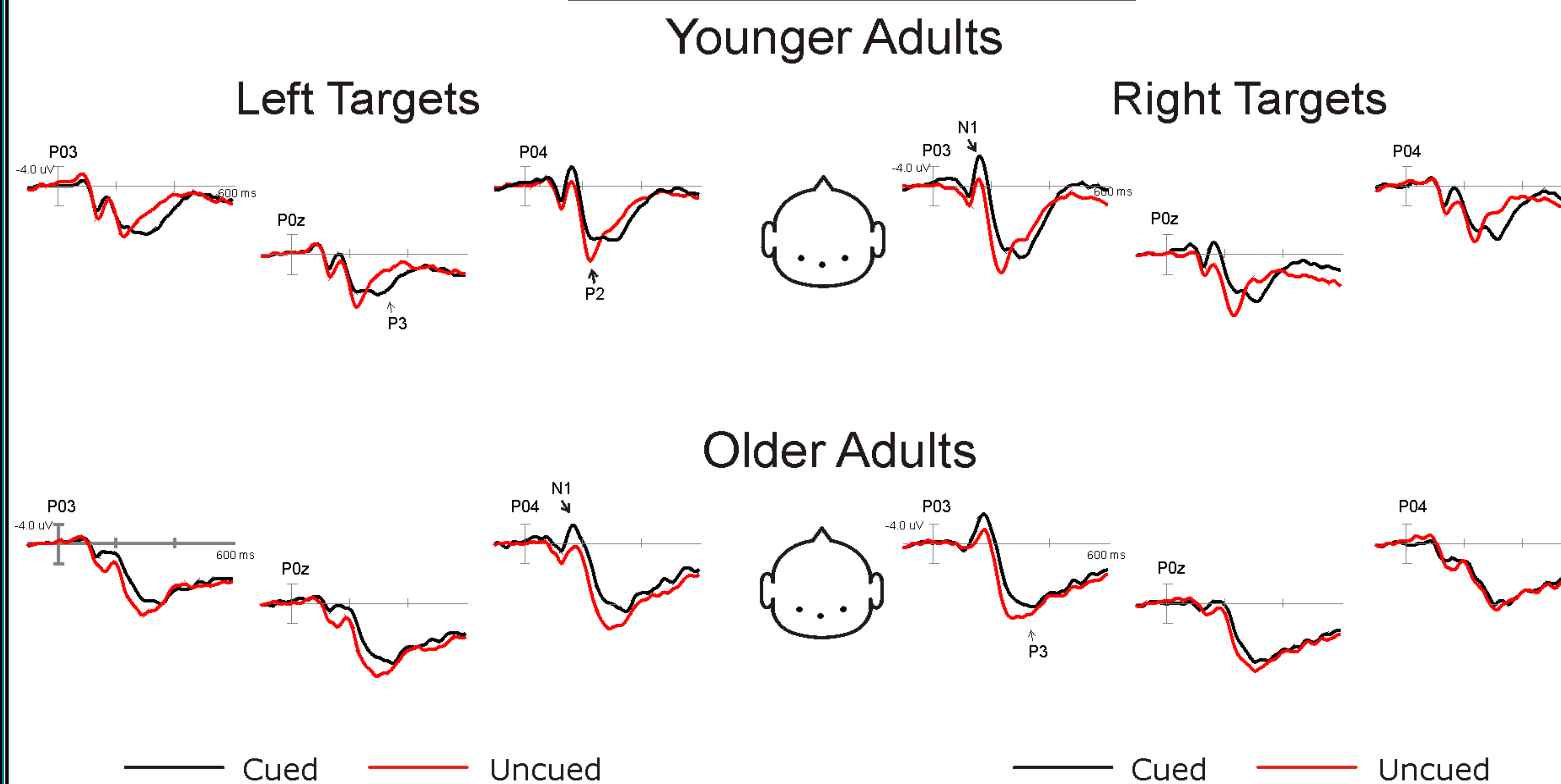
**Participants:** 12 younger adults (18-22 years); 11 older adults (60-81 years)

**Stimuli and Task:** A peripheral cue directed attention away from fixation. After a jittered stimulus onset asynchrony (SOA), a white X appeared in one of two peripheral locations. A detection response was made to the X.

**Recordings:** Multichannel EEG was recorded with 162 scalp electrodes. Eye movements were recorded with 6 additional channels (positioned above, below, and at the outer canthi of each eye). The EEG sample rate was 512 Hz (bandwidth: 0-120 Hz). The ERP data were referenced off-line to the average of the two mastoids.



## ERP Grand Averages



## Results

### N1 (160-190 ms):

- A main effect of cue condition,  $F(1, 21) = 16.25, p < .01$ , was observed. Cued targets had larger amplitudes than uncued targets at early categorization and processing stages (McDonald et al, 1999).
- An Age Cue Condition Target Location interaction was found,  $F(1, 21) = 5.39, p < .05$ . Younger adults showed a cueing effect for left and right targets with the N1 to cued targets larger than to uncued. Older adults also showed a cueing effect, which was smaller for right targets.

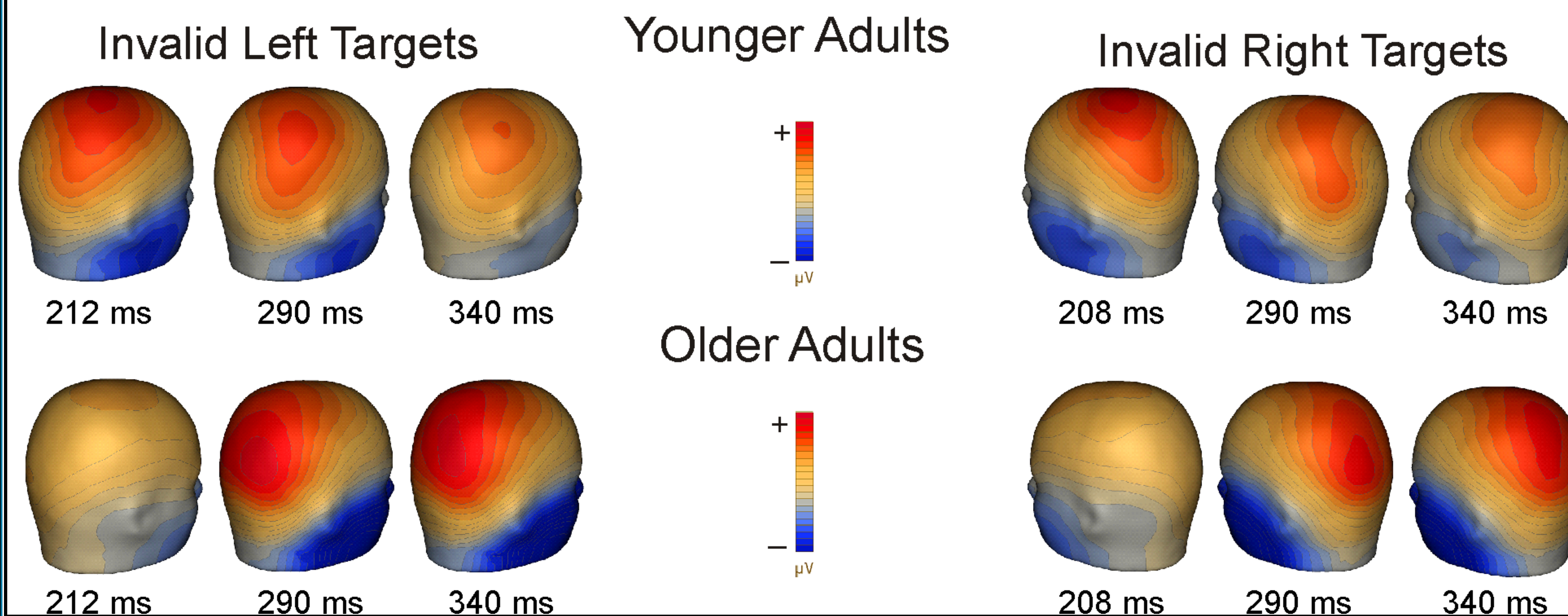
### P2 (200-260 ms):

- A main effect of cue condition,  $F(1, 21) = 25.17, p < .01$ , was found. Uncued targets had larger amplitudes than cued targets (McDonald et al. 1999).

### P3 (260-380 ms):

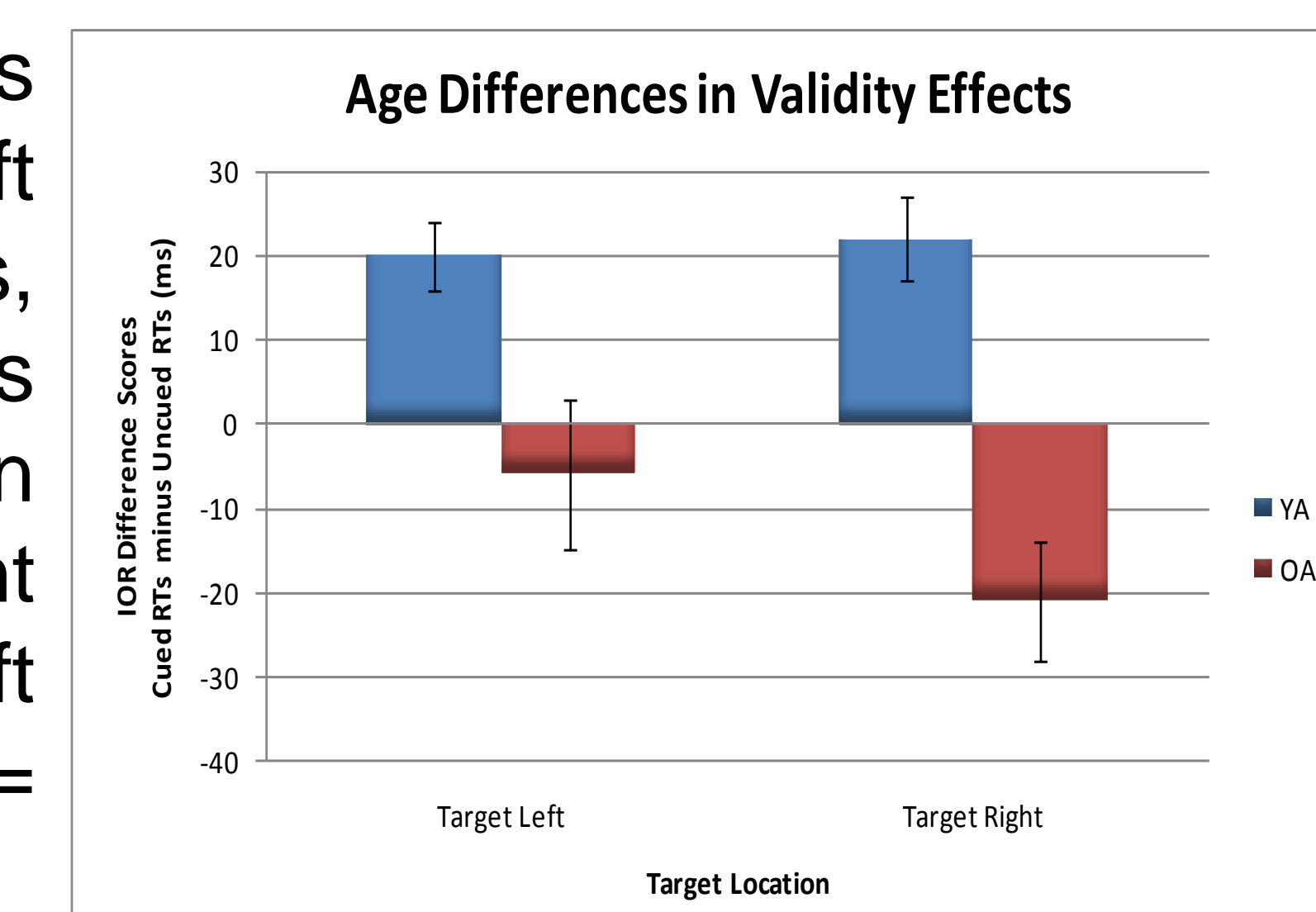
- An Age Cue Condition interaction was found,  $F(1, 21) = 31, p < .01$ . Older adults had larger P3 amplitudes for uncued targets than cued. Younger adults showed P3 amplitudes for cued targets but the latency of the positive deflection for the uncued targets had recovered by the P3 phase.
- An Age Target Location interaction was observed,  $F(1, 21) = 5.17, p < .05$ . Older adults had larger P3 amplitudes for left targets while younger adults had larger P3 amplitudes for right targets.

## Head Topographies



## Behavioral Results

- Younger adults showed IOR for left and right targets, while older adults showed facilitation effects for right targets, but not left targets,  $F(1, 21) = 9.63, p < .01$ .



## Conclusions

- Behaviorally, younger adults exhibited IOR. Older adults appear to be transitioning to inhibition of cued targets (i.e., IOR) at the chosen SOA (Castel et al., 2003). This effect is more apparent for left targets in our current study. In contrast, older adults are still showing significant facilitation for right targets.
- ERP results for younger adults replicate the findings of McDonald et al. (1999) at the N1 and P2 latencies. At the N1 latency of early categorization, younger adults show a typical enhancement for cued targets. At the P2 latency, which reflects relatively late attentional and categorizational processes, younger adults show a reduction for the cued targets, suggesting inhibition of attentional processes for the cued target location.
- Unlike younger adults, older adults did not show a P2 deflection for uncued targets. However, they show robust P3 deflections for both cued and uncued targets. Older adults show a larger P3 to uncued targets which indicates reduced expectation. Younger adults, however, show a larger P3 to cued targets, for which they have less expectation (i.e., IOR). This effect is in concordance with their behavioral results.