Age-Related Differences in Sequential Stroop Effects

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INTRODUCTION

- The hypothesis that healthy aging results in declines in inhibitory control has driven much research in cognitive aging (Hasher, Zacks, & May, 1999).

- Stroop interference is the "Gold Standard" inhibitory control measure (MacLeod, 1991).

- Older adults produce larger Stroop interference effects than young adults do; these have been attributed to a breakdown in control over task-irrelevant word information during the naming of colors (Spieler, Balota, & Faust, 1996).

- However, a recent meta-analysis of this literature suggests that increased Stroop effects in older adults can be attributed to a general slowing of responses in speeded tasks (Verhaeghen & de Meersman, 1998).

- There is increased interest in dynamic control processes that act to "reset" inhibitory control over task-irrelevant information dynamically, on a trial-by-trial basis, modulating size of Stroop effect for different sequences of types of trials (Notebaert, Gevers, Verbruggen, & Liefooghe, 2006).
  - **Trial N-1 Congruent:** Robust Stroop effect on trial N
  - **Trial N-1 Conflict:** Reduced Stroop effect on trial N

- Magnitude of Stroop modulation varies with temporal delay between trials, and with details of sequence of stimulus items (Notebaert et al., 2006).
  - **Repetition:** Same Color or Same Word (across trials)
  - **Alternation:** Different Color & Word (across trials)

Present Study

➢ Are there age-related differences in dynamic control of sequential Stroop effects?

➢ Will age-related differences in dynamic control still be present after correction for general slowing?

METHOD

Participants: 30 young (18-21 years) & 28 older (64-79 years) adults

Procedure: 3 color (Red, Green, Blue) button-press response Stroop task. 50% congruent, 50% conflict trials. Fast block (RSI = 50 ms) & slow block (RSI = 250 ms), order counterbalanced across participants within each age group.

References

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Figure 1: RT in ms

Figure 1: RT in ms — Repetitions / Alternations. Mean Interference (ms) by Age Group / RSI (Yng50, Yng250, Old50, Old250), Congruent vs Conflict.

Figure 2: z-scores

Figure 2: z-scores — Repetitions / Alternations. Mean Interference (z) by Age Group / RSI (Yng50, Yng250, Old50, Old250), Congruent vs Conflict.

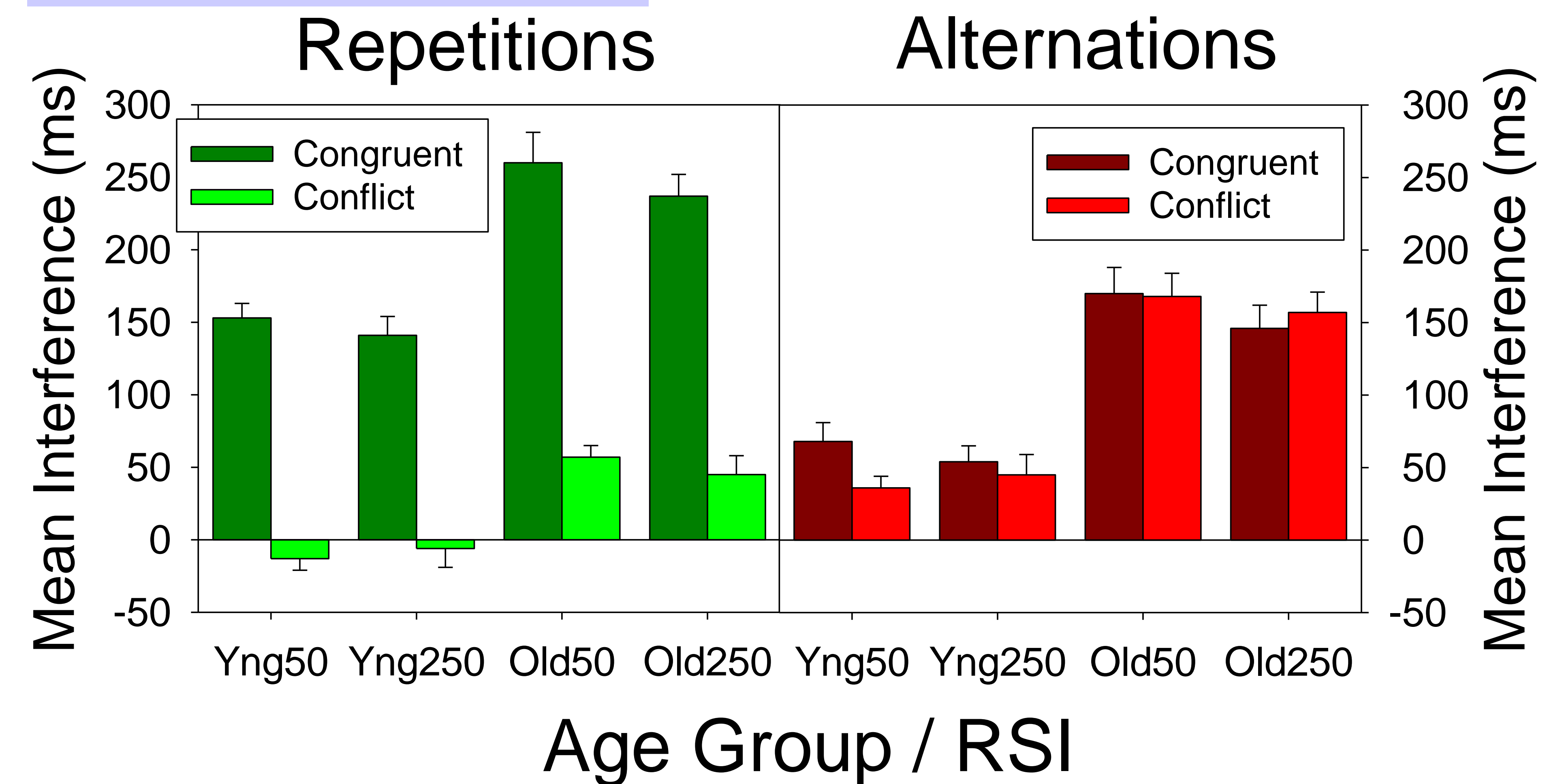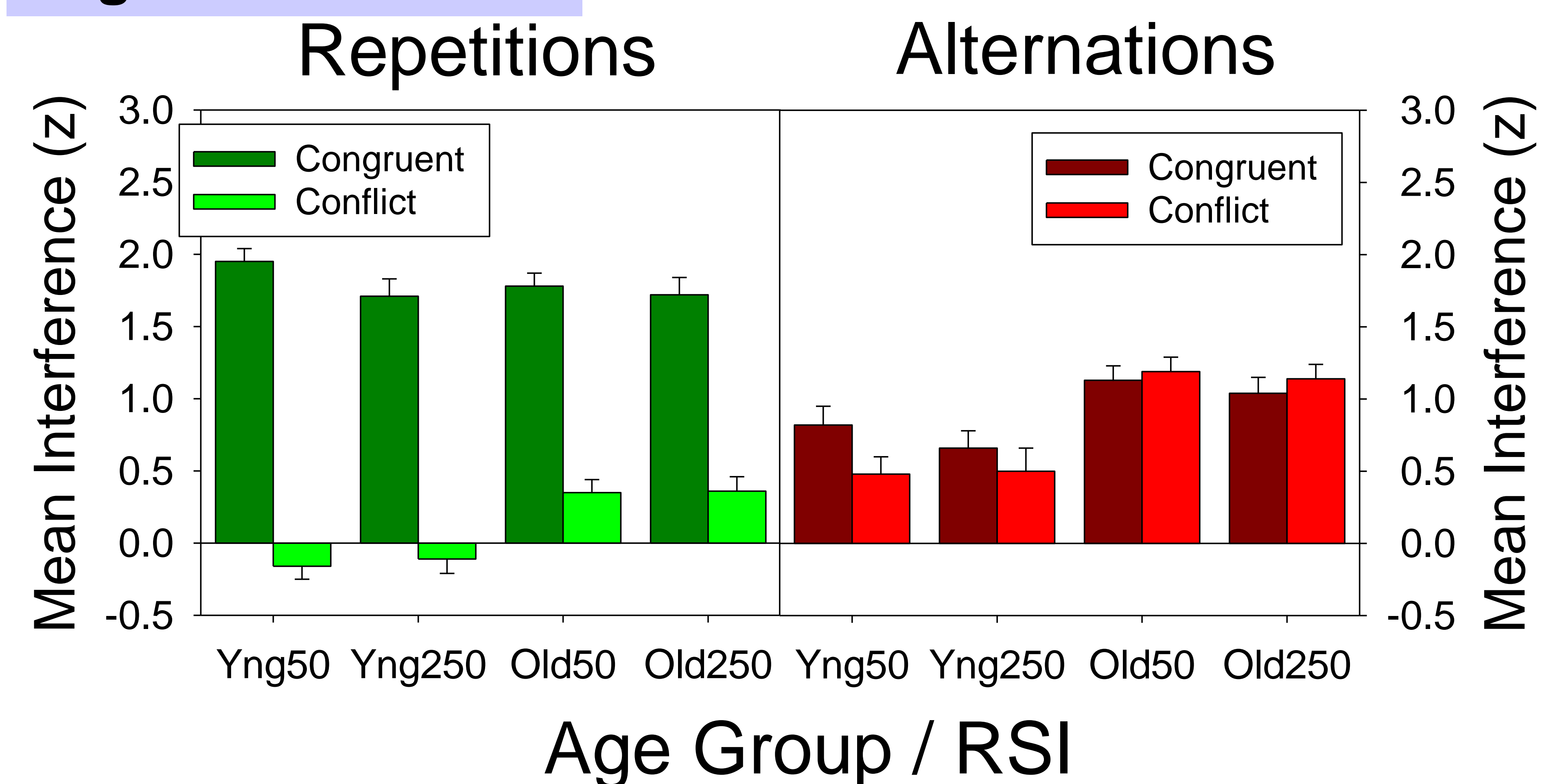## RESULTS

- Significant Age x Sequence x Prior Trial Type, *p* = .004 (**Figure 1**)

- Repetitions: Young adults completely eliminated the Stroop effect. Older adults reduced, but didn't eliminate it (*p* = .003, light green bars **Figure 1**).

- Alternations: Young adults significantly modulated the Stroop effect (*p* = .015) at 50 ms RSI, but older adults did not (red bars **Figure 1**).

- **Figure 2**: Same pattern for z-scores (correction for slowing, Faust et al., 1999).

CONCLUSIONS

- Unlike young adults, healthy older adults fail to completely eliminate Stroop effects on *easy* repetition sequences following conflict trials (n-1), and did not modulate Stroop effects at all on *difficult* alternation sequences.

- Results suggest that while age-related increases in Stroop effects may be attributable to general slowing with age, there are age-related declines in dynamic (trial-by-trial) resetting of inhibitory control processes that adaptively modulate of the size of the Stroop effect depending upon the immediately preceding trial event.