CONFLICT ADAPTATION

- Conflict adaptation involves alterations in cognitive control to improve performance based on previous-trial conflict
  - Consecutive incongruent (iI) trials require less neural processing than a congruent trial followed by an incongruent trial (cI), marked by reduced RTs for iI vs. cI trials
  - Consecutive congruent trials (cC) result in faster RTs than incongruent followed by congruent trials (iC) due to task switching

- These cognitive control processes are related to activity in the ACC, dlPFC, vPFC and can be indexed using event-related potentials (ERPs)
  - N450: ERP responsive to the degree of current-trial conflict, generated in the ACC
  - Conflict slow-potential (conflict SP): associated with control adjustments based on previous- and current-trial congruencies, related to activity in the PFC

- Neural maturation may result in attenuated conflict adaptation effects in children relative to adults, leading to more reactive control, less specific brain activation, and reduced efficacy of neural communication

HYPOTHESIS

- Children will display reduced behavioral and electrophysiological conflict adaptation effects when compared to adults

METHOD

PARTICIPANTS

- 26 adults (Age: M=22.3, SD=2.7) 21 children (Age: M=9.7, SD=1.1)
- All participants were psychologically and neurologically healthy

EXPERIMENTAL TASK

- Modified single-trial color-naming Stroop task
  - 1000 trials (10 blocks of 100 trials); 50% congruent/50% incongruent
  - ITI 1,000 ms

EEG ACQUISITION AND ANALYSIS

- 128 channel sensor net
  - ERP data segmented 100ms pre-stimulus to 1000 ms post-stimulus
  - Baseline correction from 100ms to 0ms pre-stimulus
  - N450: mean amplitude from 350-550ms
  - Conflict SP: mean amplitude from 650-750ms
  - Analyses on trimmed means using the ERP PCA Toolkit according to current- and previous-trial congruency

RESULTS

BEHAVIORAL RESULTS

- RTs
  - Main effect of group; slower responses in children
- Error Rates
  - Main effect of group; more errors by children
  - Higher pooled error rates in children to incongruent trials
  - No group differences based on previous-trial congruency

- No significant interactions

CONFLICT SP

- Main effect of group; conflict SP amplitude more positive in children
  - No significant interactions

CONCLUSION

- Behavioral and conflict SP data suggest children use similar processes to regulate cognitive and behavioral conflict
  - Immature neural connections do not impair processing
  - Communication between the ACC and PFC may not be overburdened by conflict adaptation processes
  - Enhanced-amplitude ERPs in children suggest that they require greater overall neural activation to achieve similar gains as adults
  - These differences do not significantly alter conflict-processing

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