Exploring the Generality of Transient Cognitive Control

Conflict Adaptation Effects Across Task-Switching and Non-Task-Switching Trial Sequences

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INTRODUCTION

- Task-irrelevant information is a source of conflict (Faust & Balota, 2007) that has been proposed to trigger general transient cognitive control processes (Botvinick, et al., 2001) to prepare for expected future conflict.
- Congruency effects (e.g., slowed color naming for **BLUE** than for **RED**) have been found to be reduced following an incongruent (conflict) trial in relation to following a congruent trial (i.e., ***Conflict Adaptation***, Notebaert et al., 2006).
- Conflict adaptation effects (i.e., transient reduction of congruency effects following a conflict trial) is consistent with cognitive control processes (Botvinick et al., 2001), but may also be due, at least in part, to repetition priming of the distractor/target across successive trials (e.g., **BLUE** then **GREEN** on successive trials, Mayr, Awh, & Laurey, 2003).
- It is therefore important that conflict adaptation effects be assessed separately for trial sequences where distractors/targets repeat (***Repetitions***), and do not repeat (***Alternations***, Notebaert et al., 2006).
- Moreover, recent reports that conflict adaptation effects may disappear for trial sequences where the task switches across two successive trials has resulted in a questioning of the generality of cognitive control processes associated with conflict adaptation effects (Funes, Lupiáñez, & Humphreys, 2010).
- The present study examines the generality of conflict adaptation by searching for the boundary conditions for conflict adaptation across tasks.

Tasks

- A manual Stroop color identification task (Notebaert et al., 2006) and a matching Eriksen flanker task (Eriksen & Eriksen, 1974) were used.
- 3 colors and names (Red, Green, Blue), 200 ms RSI between trials.
- **2 Trial Sequence Types:**
  - **Alternation Sequences:** Target & distractor do not repeat
  - **Repetition Sequences:** Target and/or distractor repeat
- **Example Stimuli Experiment 1**: Overlapping vs. Non-overlapping Distractors
  - —Stroop: Incongruent= GREEN Congruent= RED
  - —Flanker: Incongruent= GREEN / GREEN Congruent= RED / RED
- **Example Stimuli Experiment 2**: Targets & Distractors Vary Across Tasks
  - —Stroop: Incongruent= GREEN Congruent= RED
  - —Flanker: Incongruent= GREEN / RED / GREEN Congruent= RED / RED / RED
  - —***Congruency/Interference Effect*** = Incongruent RT – Congruent RT.

Questions

- Will conflict adaptation be observed when tasks change across successive trials?
- Under what types of task changes will conflict adaption continue to be observed as aspects of the task switches across successive trials?

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RESULTS

Basic Conflict Adaptation: Reduced interference following an incongruent (conflict) trial in comparison to following a congruent (non-conflict) trial, i.e., a sig. difference in paired light/dark colored bars in Figures.

Experiment 1: Variation of Distractor Locations

Alternations: No Distractor Match/Switch x Prior Trial Type interaction (p =.397), and Prior Trial Type significant with and without switch in distractor locations (p=.005, .024, respectively). Equivalent conflict adaptation regardless of match/switch in distractor locations.

Repetitions: Distractor Match/Switch x Prior Trial Type interaction (p =.001), and Prior Trial Type significant with and without switch in distractor locations (p<.001, .001, respectively). Less conflict adaptation with a switch in distractor locations, but conflict adaptation found regardless of match/switch in distractor locations.

Experiment 2: Stroop vs. Flanker Tasks

Alternations: Task Match/Switch x Prior Trial Type interaction (p =.003), and Prior Trial Type significant with task repetition, but NOT with task switch (p<.001, p=.649, respectively). Conflict adaptation observed when task remained constant across trials.

Repetitions: Significant 3-way Current Task x Task Match/Switch x Prior Trial Type interaction (p =.001), and Prior Trial Type significant in all cases (all p's< .001). Less conflict adaptation with a task switch for Stroop, but full conflict adaptation with task switch when current task was Flanker.

DISCUSSION

1. The present results suggest that conflict adaptation effects are more general than proposed by Funes et al. (2010).
2. For Alternation Sequences, variation of distractor location across successive trials reduced, but did not eliminate, conflict adaption (see left side of Expt. 1 figure).
3. However, conflict adaptation was eliminated for Alternation Sequences when distractor location and target dimension (word identity vs. color) were varied (see left side of Expt. 2 figure).
4. Conflict adaptation continues to be observed for Repetition Sequences under conditions where they have disappeared from Alternation Sequences (see right side of Expt. 2 figure).

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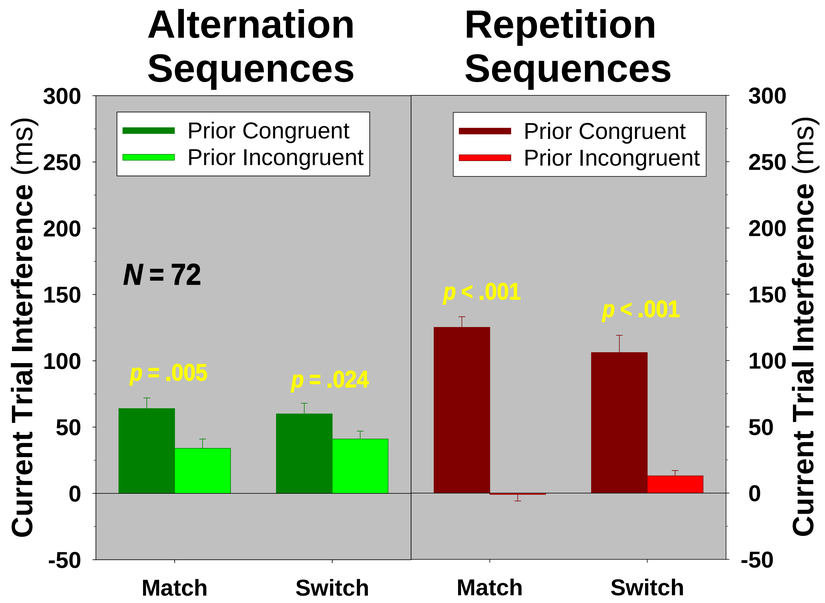
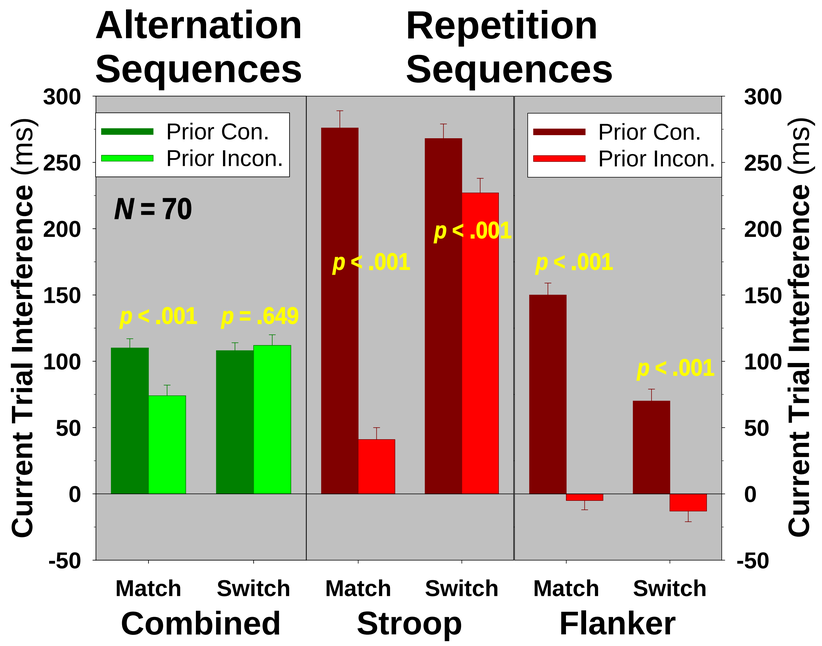
Experiment 1: Color Patches/Words



Experiment 2: Stroop/Flanker



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