

Prior-Task Interference Following a Switch from a Compound Task

Curtis Pollard II & Mark Faust
University of North Carolina - Charlotte

Background

- Switching to a new task requires effortful inhibition of the prior task rules (Rogers & Monsell, 1995).
- Once inhibited, prior task rules can be reactivated by **involuntary memory retrieval** processes invoked by a stimulus event appropriate for the prior task, leading to interference from the prior task.
- Prior-task interference effects appear to be relatively automatic, but may interact with effortful cognitive control processes.
- To test this idea we added an effortful cognitive control requirement to the switch between tasks by using a **compound prior-task**.
 - Target item is conjunction of color & category dimensions (e.g., **red-animal**, **green-object**)
 - Switch to single dimension task where target is defined by category (e.g., **animal**, **object**)
 - Color dimension become irrelevant
 - Category dimension remains relevant, but may require effortful switch to target selection based on other category (e.g., **red-animal** → **object**)

Question

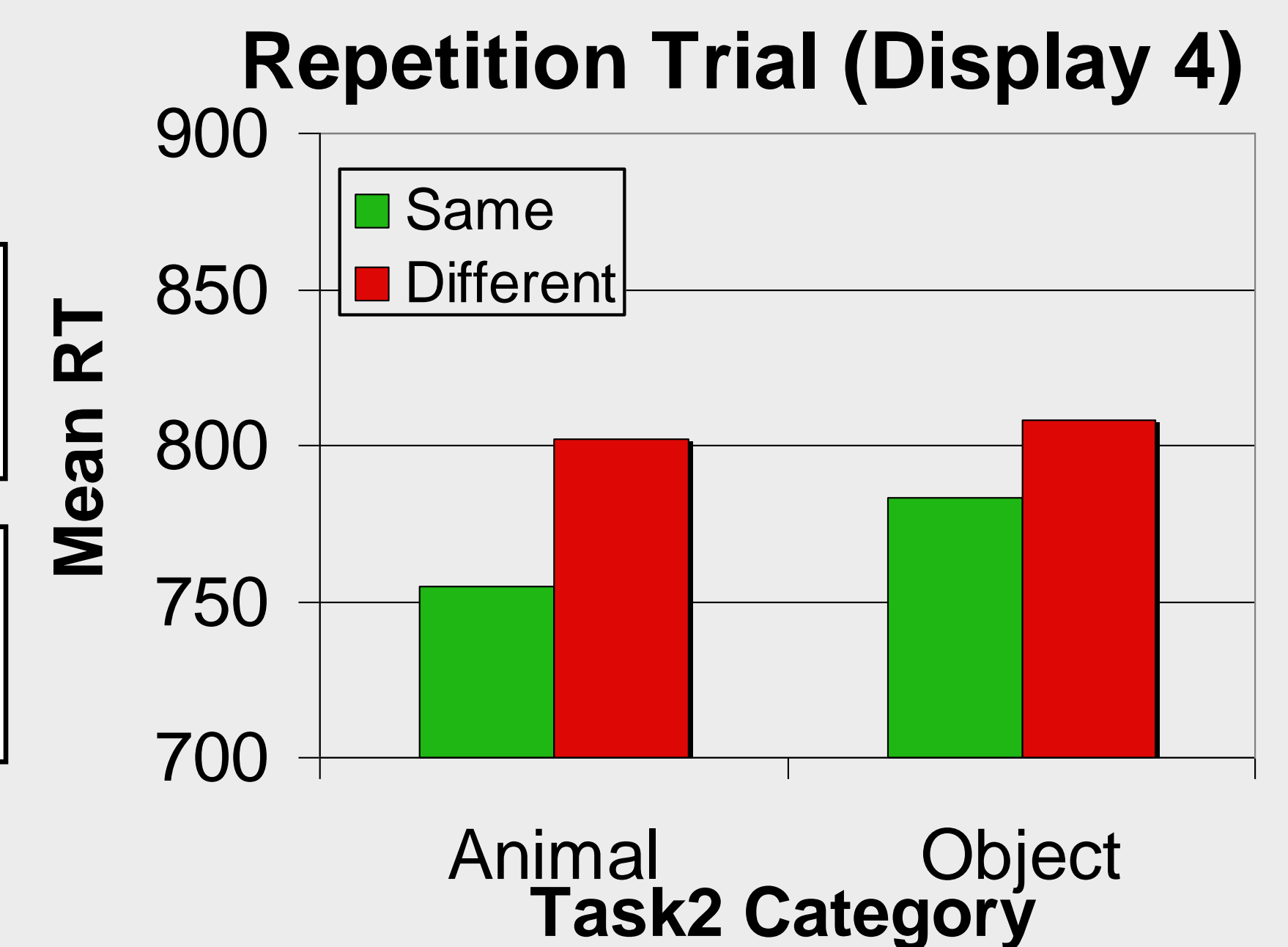
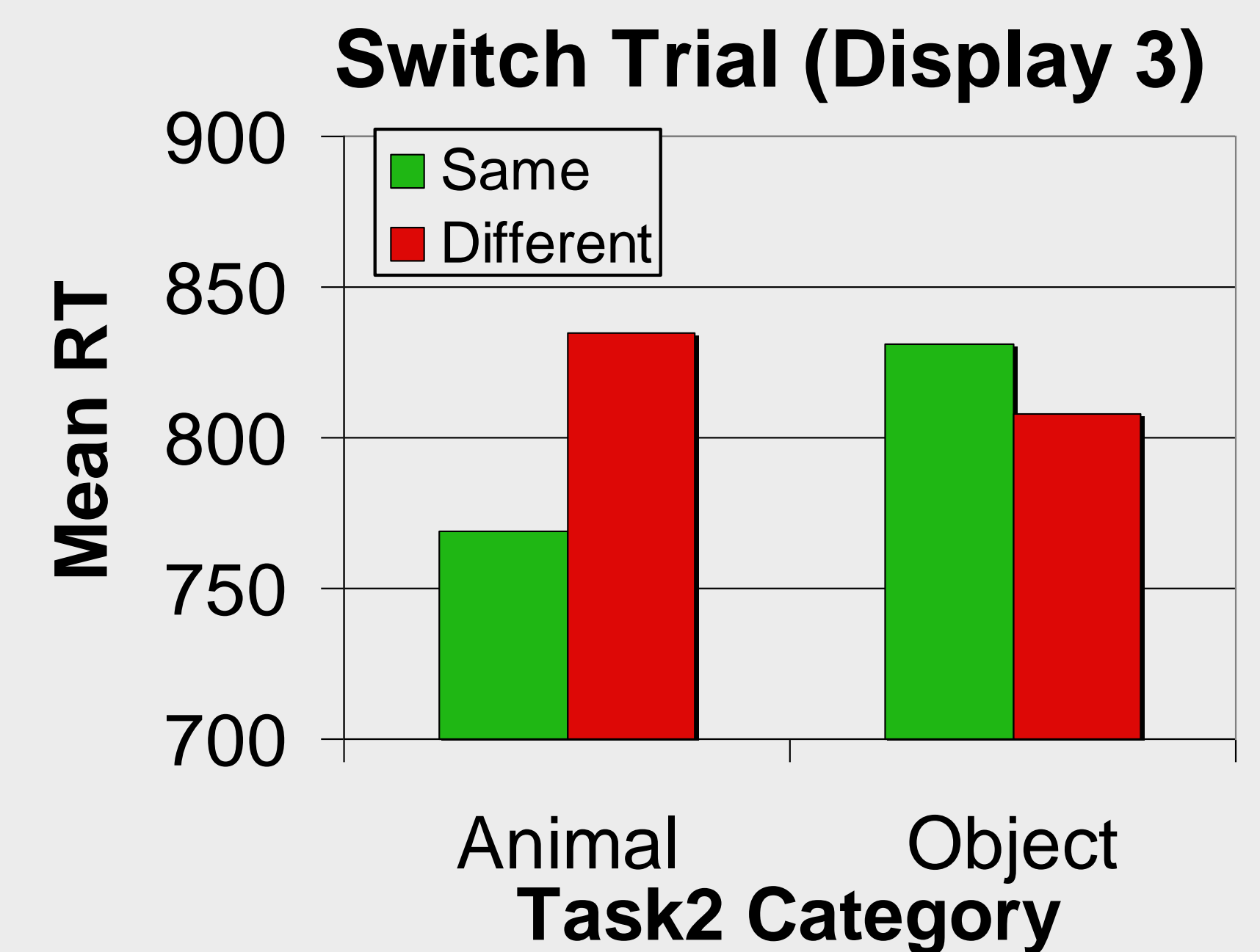
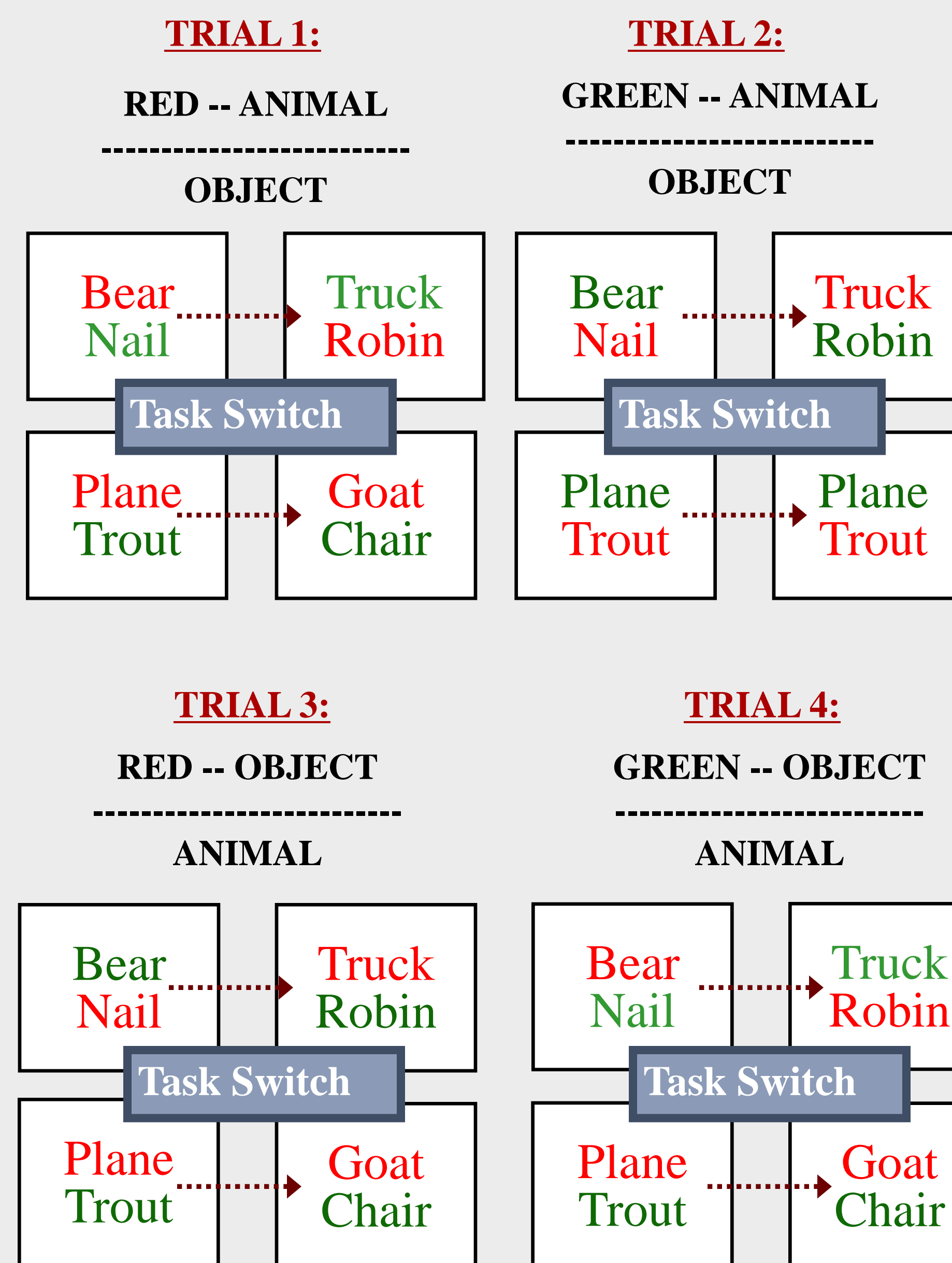
Will prior-task interference be disrupted by addition of a requirement to shift target category during the switch between tasks?

Tasks (see Figure)

- Participants view a sequence of 4 displays and name target
- Each display contains 2 words (**red**, **green**) & (**animal**, **object**)
- Task switch between 2nd & 3rd displays
- Participants told what 2 tasks to use before each display sequence
- Task 1: **Red-Animal** OR **Green-Animal**
- Task 2: **Animal** OR **Object**

Measuring Prior-Task Interference

- Prior-task interference measured during performance of Task 2 (Display 3 & 4)
- Irrelevant color of category target either **same** or **different** than relevant color of Task 1.
- Prior-task interference is measured as a faster mean response time when the irrelevant color of Task2 is the same as the relevant color in Task1.



Results

- Significant 3 way interaction of Display (3 vs. 4), Task2 Category (Animal vs. Object), and Color Match (Same vs. Different), $p = .039$.
- Prior-task interference present when green bar is lower than red bar in bar graphs.
- Prior-task interference is always present when category remains constant when switching from Task1 to Task2 (left side of upper and lower panels)
- Prior-task interference disrupted when switch from Animal to Object category required when switching from Task1 to Task2 (right side of upper and lower panels)
- Prior-task interference most disrupted immediately following the task switch (Display 3, upper panel) as opposed to later (Display 4, lower panel)

Conclusion

Prior research (Faust & York, 2005) indicates that prior-task interference effects manifest in automatic, involuntary memory retrieval of prior-task rules. Our results suggest an interaction between effortful cognitive control processes and the control processes involved in limiting prior-task interference. Thus, supporting the idea that the cognitive control system is inherently hierarchical.

References

- Rogers, R. D., & Monsell, S. (1995). Constance of a predictable switch between simple cognitive tasks. *Journal of Experimental Psychology: General*, 124, 207-231.
- Faust, M.E., & York, A. (2005). Top-down expectancy and prior task interference during task switching. Poster presented at the 46th Annual Meeting of the Psychonomic Society, November 10-13, 2005, in Toronto, Canada.

Acknowledgments

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