

Top-Down Expectancy & Prior-Task Interference During Task Switching



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Cognitive Control & Task Switching

- ◆ Focus on
 - *Endogenous* processes that
 - Reconfigure task set (i.e., representations and processing pathways associated with performance of a task)
- ◆ Two types of reconfiguration:
 - Forward-looking: Activation of new task set
 - Backward-looking: Deactivation of the prior task set (Allport, Styles, & Hsieh, 1994; Rogers & Monsell, 1995).

Prior-Task Interference (PTI)

- ◆ *Exogenously-driven* inhibitory control over prior-task processes may be under appreciated with focus on task switch costs (Wylie & Allport, 2000).
- ◆ PTI: Interference from prior-task processes
 - Stimuli allow performance of both tasks
 - Stimulus-driven *task set reactivation*
 - Requires inhibitory control over prior-task processes (Faust & Sanow, 2003; Waszak, Hommel, & Allport, 2003; Wylie & Allport, 2000).
- ◆ Interference from *previously-relevant stimulus dimensions* (e.g., **color of a word**) during performance of a switched-to task (e.g., **category of a word**) can provide information regarding cognitive control above and beyond task switch costs (Faust & Sanow, 2003; Faust & Wilkins III, 1999).

Current Questions

- Is PTI sensitive to switch difficulty?
- Is PTI sensitive to expectation of interference?

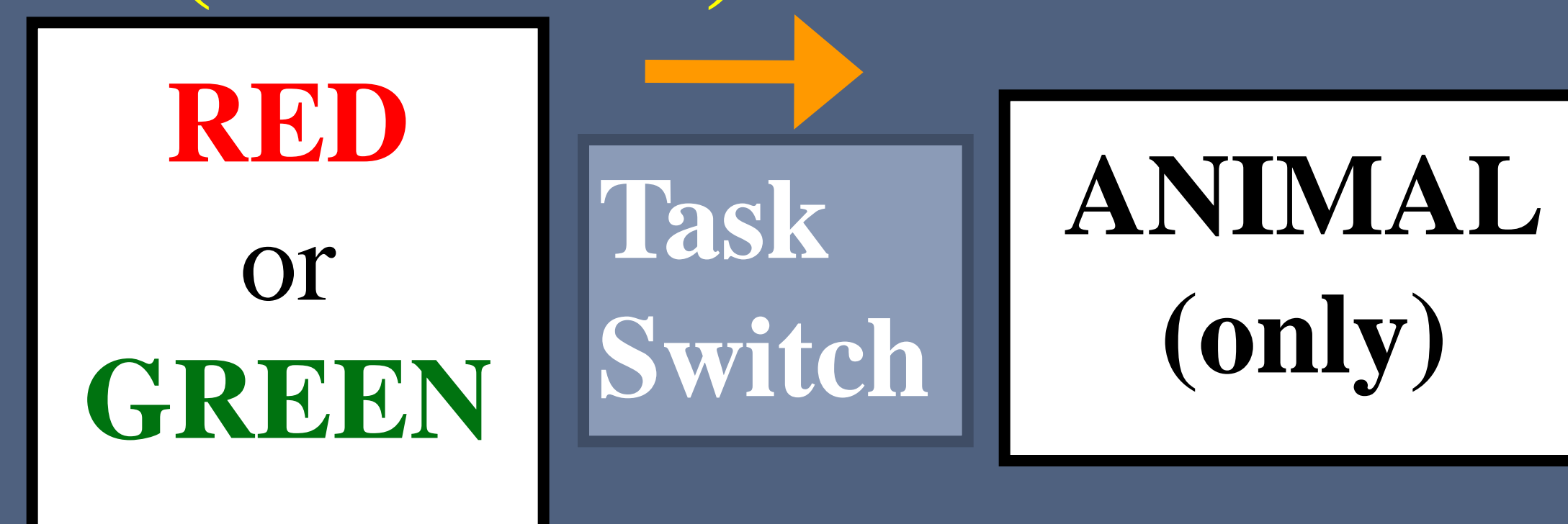
4 Word Naming Tasks

- *Color Selection: Name RED Word*
- *Color Selection: Name GREEN Word*
- *Category Selection: Name ANIMAL Word*
- *Color Selection: Name OBJECT Word*

References

- Allport, A., Styles, E. A., & Hsieh, S. (1994). Shifting intentional set: Exploring the dynamic control of tasks. In C. Umiltà, & M. Moscovitch (Eds.), *Attention and performance XV* (pp. 421-452). Cambridge, MA: MIT Press.
- Faust, M.E., & Wilkins, J. P. III (1999). Inhibitory control and task switching. Poster presented at the 40th Annual Meeting of the Psychonomic Society, November 18-21, Los Angeles, CA.
- Faust, M.E., & Sanow S. (2003). Inhibitory control over selective attention during switching of selection criteria. Poster presented at the 44th Annual Meeting of the Psychonomic Society, November 6-9, 2003, in Vancouver, BC.
- Rogers, R. D., & Monsell, S. (1995). Consts of a predictable switch between simple cognitive tasks. *Journal of Experimental Psychology: General*, 124, 207-231.
- Waszak, F., Hommel, B., & Allport, A. (2003). Task-switching and long-term priming: Role of episodic stimulus-task bindings in task-shift costs. *Cognitive Psychology*, 46, 361-413.
- Wylie, G. & Allport, A. (2000). Task switching and the measurement of "switch costs." *Psychological Research*, 63, 212-233.

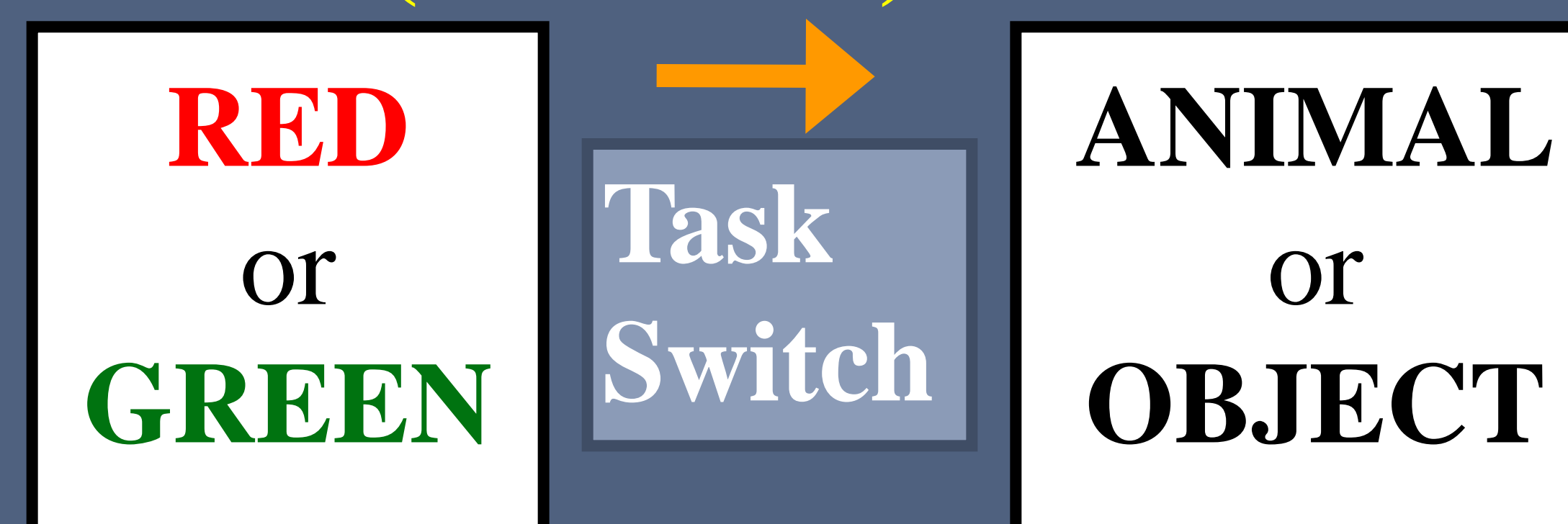
Experiment 1: Easy (Constant) Task Switch



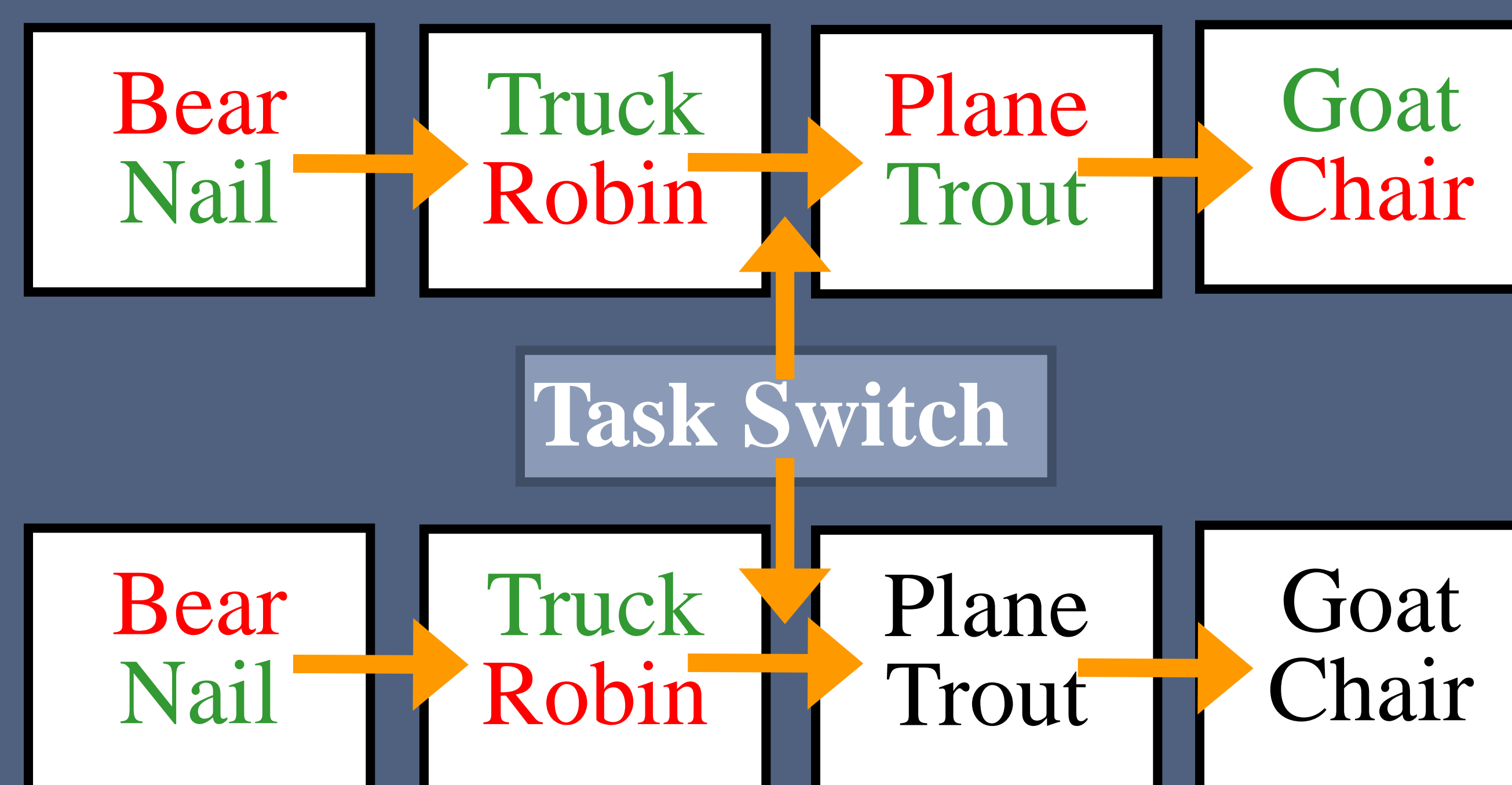
PTI Target Color for Category Task is Same/Different than in Preceding Color Selection Task.

* $p < .05$

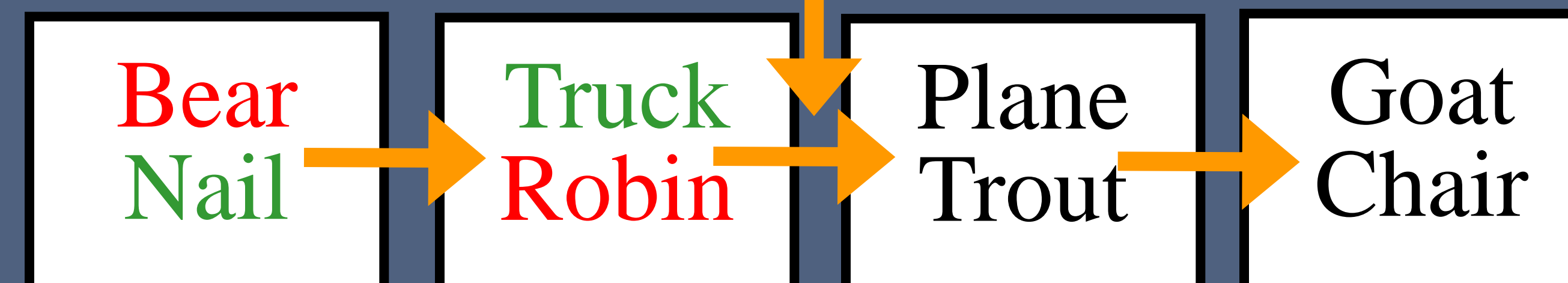
Experiments 2 & 3: Difficult (Variable) Switch



Color Trial

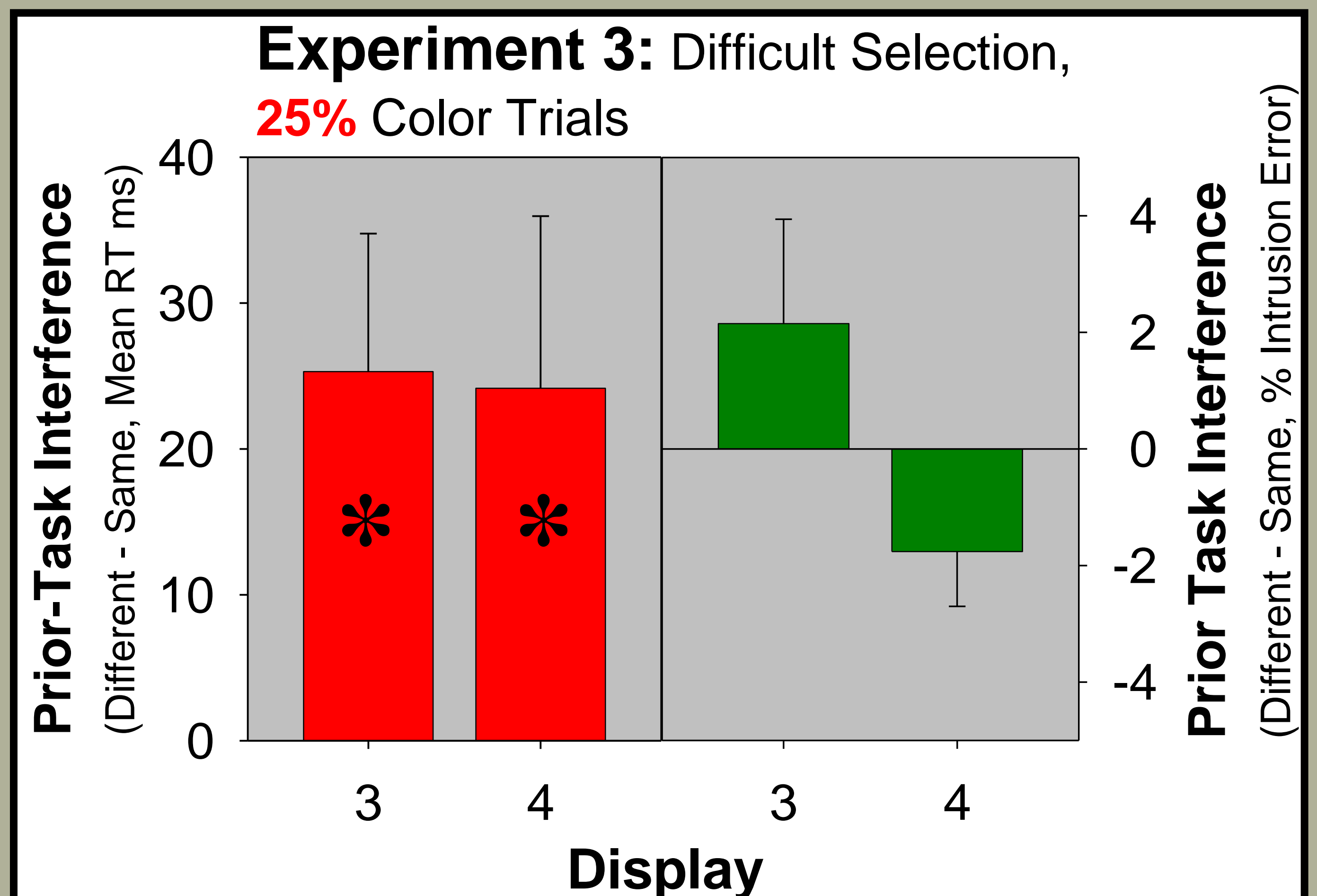
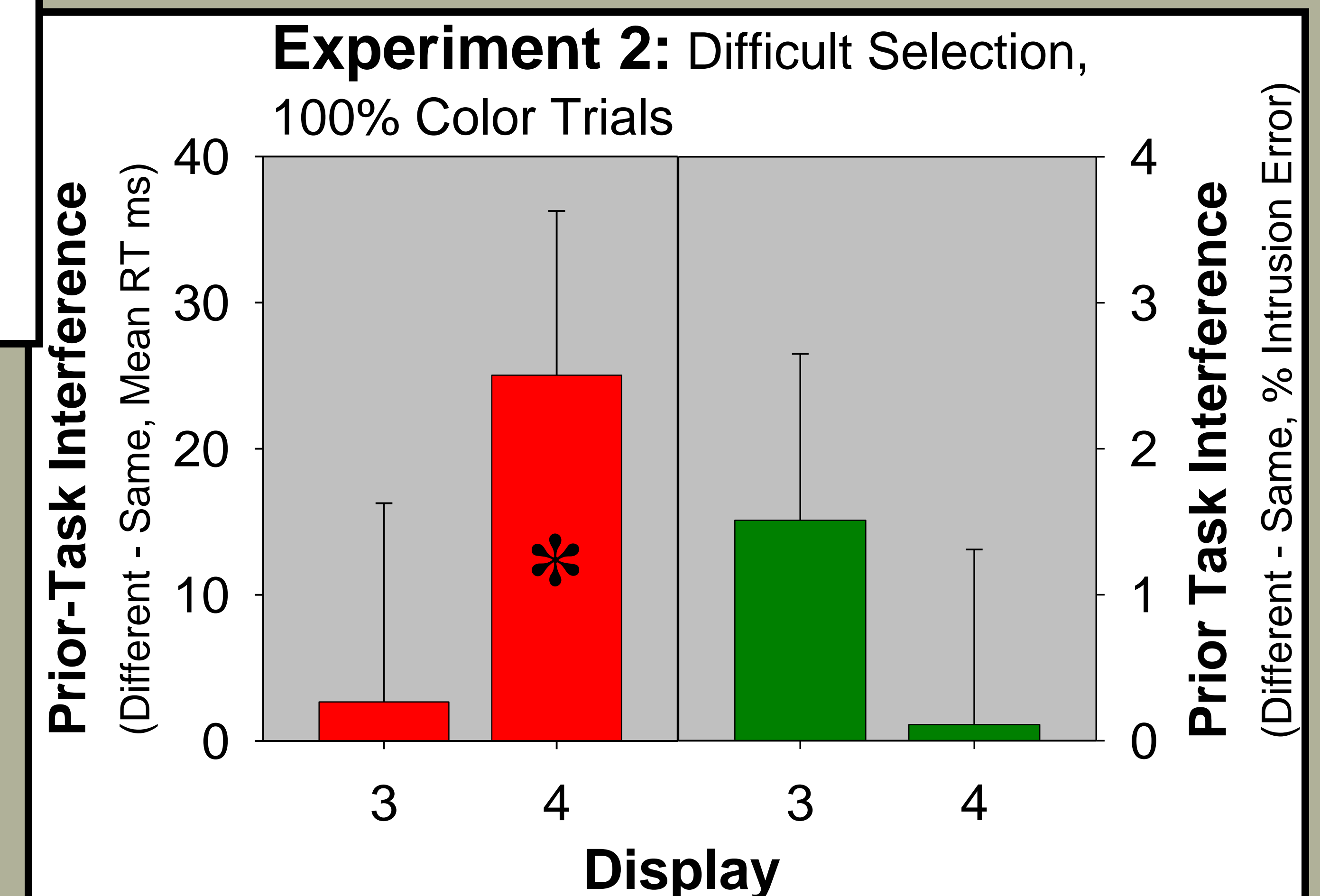
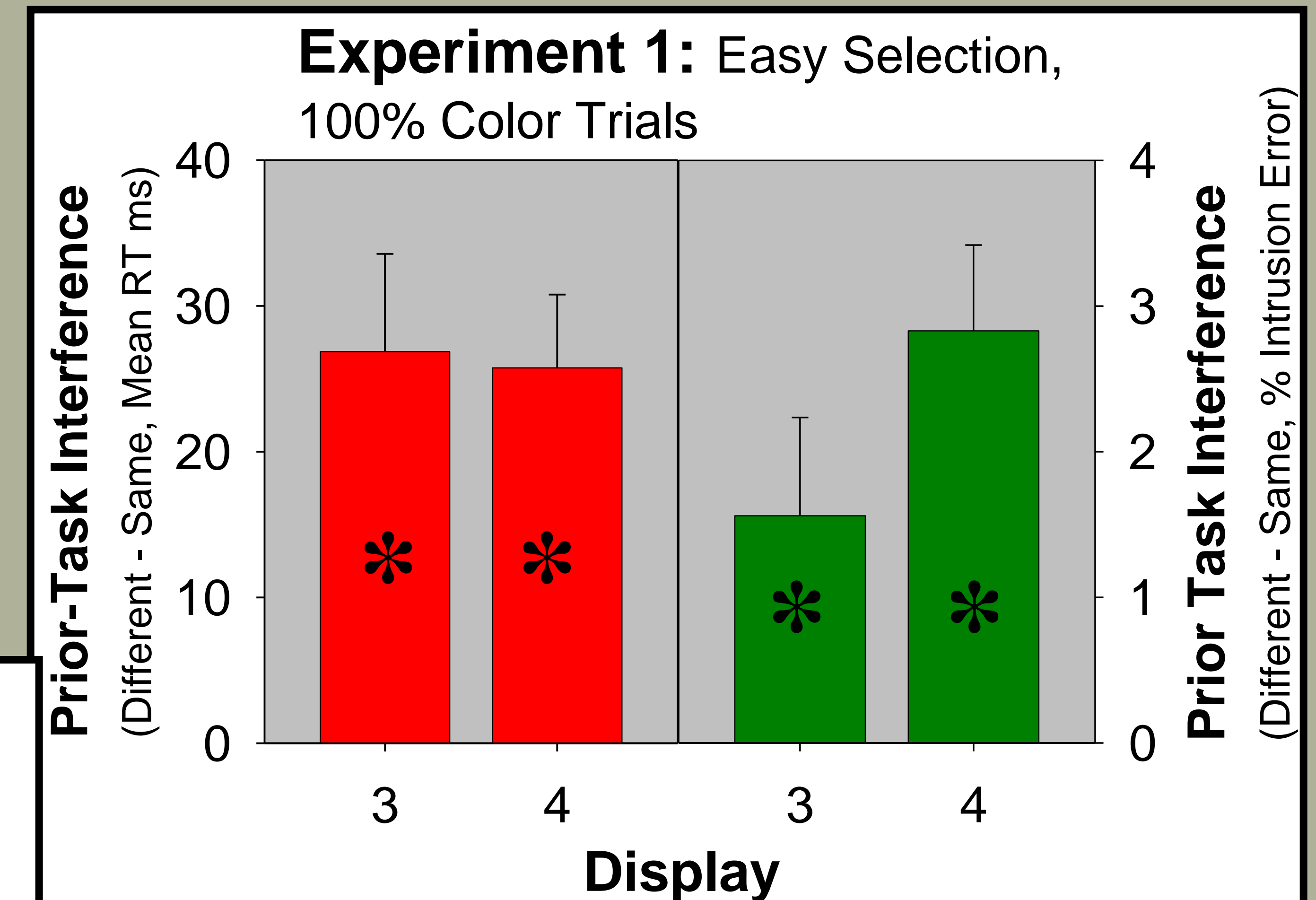


NonColor Trial



Discussion

- ◆ **PTI & Task Switch Difficulty** (Experiment 1 vs. 2)
 - Robust PTI in both RT & Intrusion Errors for easy switch
 - Reduction in PTI with *INCREASE* in switch difficulty
 - Increased switch effort may lead to increased control & reduction in PTI
- ◆ **PTI & Proportion Interference (Color) Trials** (Experiment 2 vs. 3)
 - PTI for first switch trial modulated by expectancy



- Trial 3 (switch) PTI *INCREASED* with low proportion color trials
- Results suggest a time-limited control process that inhibits interference from stimulus-driven reactivation of the prior task set (Expt. 1) immediately following a task switch, but not later. Decreased expectation of interference (lowered proportion color trials) leads to reduced control. Suggests interaction of endogenous & exogenous control processes.

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