Very Brief Interruptions Result in Resumption Cost

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Introduction

Recent research suggests that the disruptive effects of interruptions arise from decay of the activation associated with the primary goal while attending to the interrupting task (Altmann & Trafton, 2002; Monk, Boehm-Davis, & Trafton, in press; Trafton et al., 2003). This disruption is seen in the additional time required to resume a task after it has been interrupted; that is, in the reaction time (RT) from the onset of a display after an interruption until the first keypress is made (this RT is called the *resumption lag*). The purpose of this study was to test this interpretation by looking at the resumption costs associated with very brief interruptions, where the model predicts minimal goal decay.

Method

Twelve undergraduates from the George Mason University psychology subject pool participated for course credit. The experiment was a single factor within-subjects design with three interruption lengths (1/4 s, 1 s, and 5 s) and an uninterrupted condition. The dependent measure was the post-interruption *resumption lag*, which was the reaction time from the onset of the VCR display (after an interruption) to the first click on a VCR button.

The primary task was to program a simulated VCR, which consisted of four subtasks: entering the show's start-time, end-time, day of week, and channel number. The screen was blank during the interruptions (there was no task) and the participant was required to wait until the VCR was displayed again before resuming the programming task. The target information was posted next to the monitor on a 3x5-index card at all times.

The experimenter trained the participants through demonstration and practice of uninterrupted and interrupted trials. Each participant completed 20 experimental trials (five trials for each of four conditions). For each interruption trial, participants began with the VCR task and were interrupted every five seconds until the VCR program entry was completed.

Results and Discussion

The time between keypresses (*lag*) was measured every five seconds in the uninterrupted condition to provide a baseline comparison for the resumption lags in the interruption conditions. Figure 1 shows the mean resumption lags and confirms a significant main effect of interruption condition, $F(3, 33) = 48.88$, $p < .001$, $MSE = 7{,}190$. Paired comparisons showed that the 5-second interruption condition ($M = 1115$ ms, $SD = 129$) took significantly longer than the other three conditions, and the uninterrupted condition ($M = 706$ ms, $SD = 80$) was significantly shorter than each of the interrupted conditions. The resumption lags for the 1/4 s ($M = 974$ ms, $SD = 79$) and 1 s conditions ($M = 974$ ms, $SD = 107$) were not reliably different.

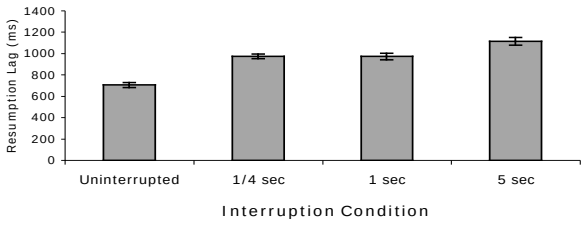

Figure 1. Mean resumption lags.

The difference between the interrupted and uninterrupted conditions confirms the prediction from the goal-activation model (Altmann & Trafton, 2002). Further, the presence of a resumption cost for both the 1/4 s and 1 s interruption conditions shows that goals decay quite rapidly. Even for the briefest interruptions, there is a penalty to be paid when resuming the primary task.

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References

Altmann, E. M., & Trafton, J. G. (2002). Memory for goals: an activation-based model. *Cognitive Science*, *26*, 39-83.

Monk, C. A., Boehm-Davis, D. A., & Trafton, J. G. (in press). Recovery from interruptions: implications for driver distraction research. *Human Factors*.

Trafton, J. G., Altmann, E. M., Brock, D. P., & Mintz, F. (2003). Preparing to resume an interrupted task: effects of prospective goal encoding and retrospective rehearsal. *International Journal of Human-Computer Studies, 58,* 583-603.