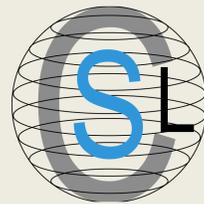


# Touchy Thinking: Interactivity Improves Planning



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The effects of interactivity and ego depletion on planning were investigated using a sequential-task paradigm. Participants completed a 16-part trip-planning task in either a high-interactivity condition—where cards corresponding to events could be moved—or low-interactivity condition—during which moves were dictated to the experimenter and participants kept their hands down. Before that, half of the participants undertook an ego-depletion task. Planning performance was significantly better in the high than in the low-interactivity conditions; the main effect of ego depletion was never significant. These results suggest that interactivity augments working memory resources.

## Introduction

Planning is an activity that is extended in space, often recruiting external resources in the process, configuring a transient extended cognitive system (TECS). Yet, planning activity is often studied in the absence of interactivity in laboratory conditions.

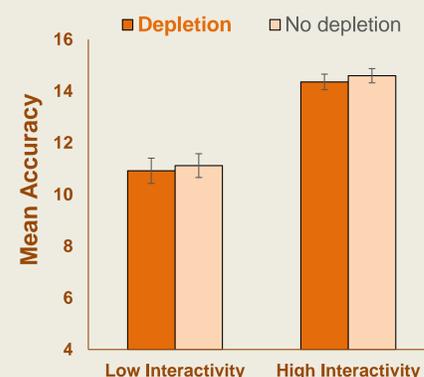
Ego-depletion refers to the idea that exerting self-control will temporarily reduce the capacity for subsequent self-control, therefore impairing executive function.

In this experiment, performance at a 16-part planning task was examined when participants could exploit a TECS in a high-interactivity condition, or when they could not. In addition, half the participants undertook an ego-depletion task beforehand, half did not.

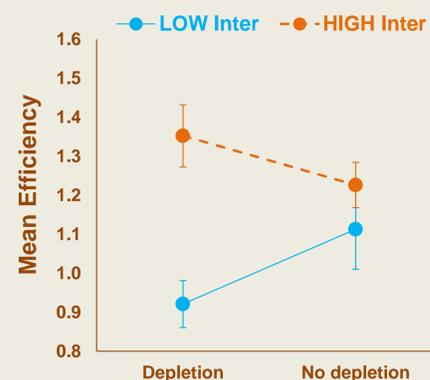
We predicted that performance would be better in the high interactivity condition, as well as an interaction such that ego-depletion would have a greater impact on performance in the low interactivity condition.

## Results

**Accuracy.** The mean planning accuracy (reported in number of correct choices) was better in the high interactivity condition. Ego depletion had no impact on accuracy.



**Efficiency.** There was a significant interaction between interactivity level and ego depletion: Efficiency was substantially poorer in the low interactivity condition with ego depletion.



## Method

**Participants.** One hundred participants (73 females) were recruited ( $M_{age} = 31.90$ ,  $SD_{age} = 11.77$ ).

**Design and Procedure.** Participants watched a 6-min silent video showing a woman being interviewed. Half the participants were asked to avoid attending to words appearing at the bottom of the screen (ego-depletion condition). The remainder of the participants were given no such instructions.

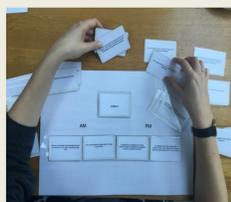


Figure 1. High Interactivity



Figure 2. Low Interactivity

Participants were then invited to complete a 16-part planning task. Participants in the high-interactivity condition ( $n = 50$ ) moved cards corresponding to events onto a grid emulating a calendar (see Fig. 1). Participants in the low-interactivity condition ( $n = 50$ ) selected activities from a static list and dictated moves to the experimenter (see Fig. 2). The study thus employed a 2 (high or low-interactivity) x 2 (ego-depletion or control) between-subjects design.

**Measures.** (i) number of correct choices, (ii) latency to completion, (iii) efficiency – a ratio of the percentage correct divided by the percentage of time taken to complete the task.

## Discussion

The effect of interactivity and ego depletion on planning was investigated. Participants in the high-interactivity conditions were 31% more accurate than those in the low-interactivity conditions

Overall, ego depletion did not impact accuracy, although in terms of efficiency, level of interactivity enhanced efficiency after ego depletion.

The ability to plan is enhanced when people can modify a problem space using real world artefacts. Conversely when those affordances for action are removed, restricting that task to a purely cognitive process, executive functions become belaboured and task performance diminishes.

Interactivity augments the cognitive resources of the system that is configured through people's actions.