Collecting memories: the impact of active object handling on recall and search times

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1 Introduction

In natural behavior we not only visually inspect our environment, but often actively interact with objects which are part of it. Our perception and cognition is modulated by actual as well as planned actions towards objects (for a review see Witt & Riley, 2014). Priorities for selection and representations of a purely visual task do not reflect those present in a natural task in which objects are actively manipulated (Tatler et al., 2013). There is a strong dependence of memory representations on behavioral goals (Droll, Hayhoe, Triesch, & Sullivan, 2005; Droll & Hayhoe, 2007; Triesch, Ballard, Hayhoe, & Sullivan, 2003), which becomes particularly evident in natural behavior (Tatler & Land, 2011).

2 Our Contribution

To investigate how physically engaging with objects influences both identity memory (free recall) and location memory (subsequent search for these objects), we constructed a real-world paradigm in which participants equipped with a mobile eye tracker (SMI Eye Tracking Glasses) first either searched for cued objects via verbal response without object interaction (Passive condition) or actively collected the objects they found (Active condition) (Figure 1). Participants conducted this task within an actual four-room apartment (kitchen, bedroom, living room, and study); with each room containing 10 designated Active, Passive, and Distractor objects. Additionally, a unique category of objects was designated as relevant for each room (e.g. “objects needed for making a sandwich” in the kitchen) and participants were instructed to decide if an object was relevant upon finding it. After the 80 trials were completed, a surprise recall test was conducted in which participants were asked to list every object they remembered from the rooms in order to access identity memory performance. After completion, participants had to search trial-by-trial for all previously searched (Passive), searched + collected (Active), never searched but present (Distractors), and not included (Absent) objects.

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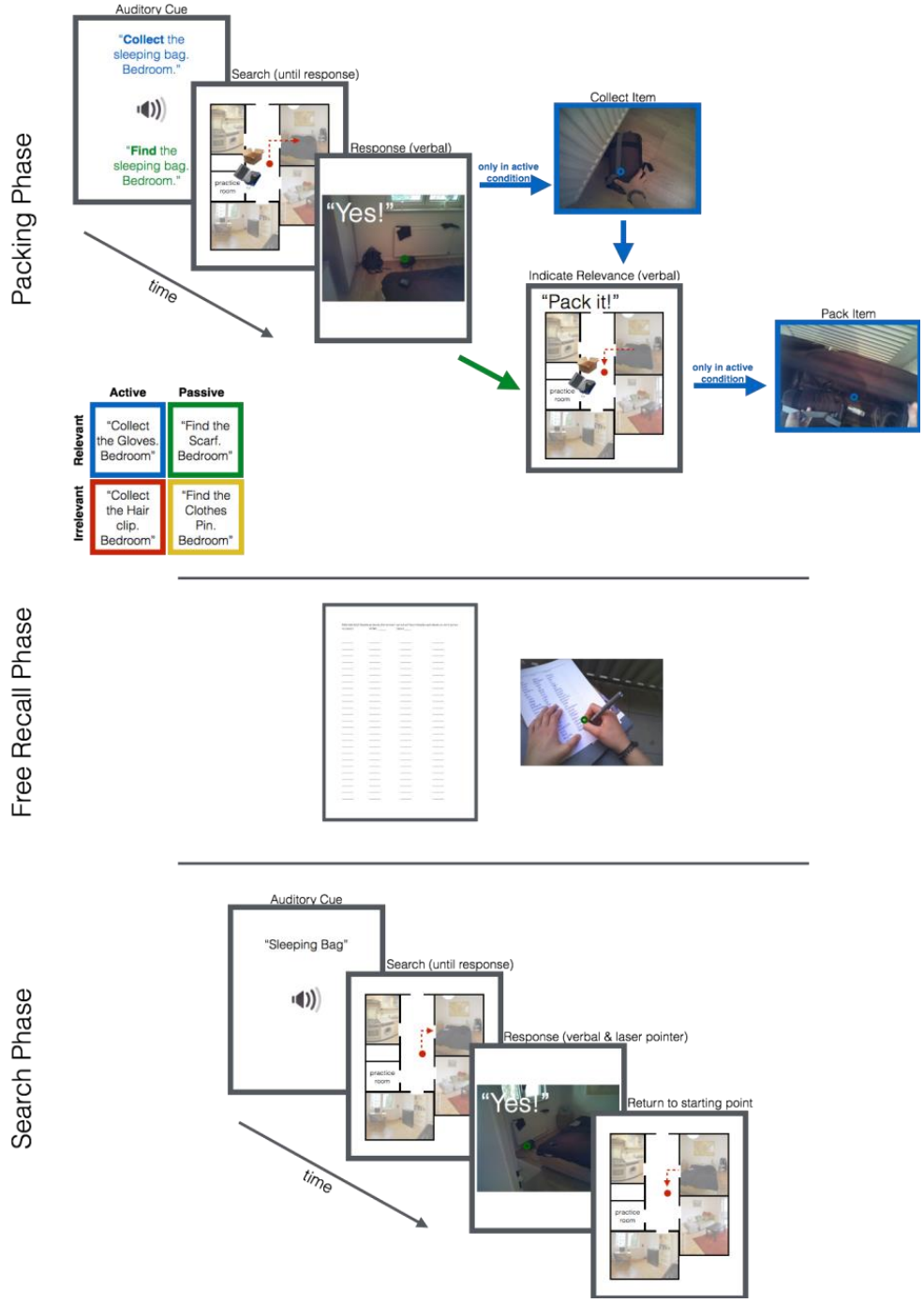

Figure 1: A depiction of the experimental procedure. The top part of the figure illustrates an example trial in the Packing Phase (80 trials): in the Passive as well as Active condition participants responded as soon as they found the target object, but participants were instructed to collect the object only in the Active condition. In both condition the participants had to indicate if the object was relevant. Experimental conditions and object searches were randomized in a trial-by-trial fashion. In the subsequent Free Recall Phase participants wrote down all objects they remembered. In the final Search Phase a randomized search of all the objects from the Packing Phase followed, supplemented with Distractor and Absent trials.

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3 Discussion

Identity memory was substantially modulated by task relevance, with a higher memory performance for relevant objects in both the Active and the Passive condition. Distractors were recalled less than targets, but were modulated by relevance as well, i.e. there was a higher recall performance for relevant distractors, even though they were never the target of a search.
Time to first fixation, as an indicator of location memory, was shorter for task-relevant objects following physical interaction (Active condition), but did not differ between relevant and irrelevant objects in the Passive condition. Time to first fixation for Distractors was slower than for targets. Task-relevant Distractors were fixated faster than irrelevant ones.
In the current study we demonstrate that active object manipulation interacts with task-relevance. Time to first fixation on relevant objects was faster compared to irrelevant ones, but only if these objects were previously manipulated.

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