

# Effect of lifeloggng photo review on autobiographical memory specificity using fMRI

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## Introduction

Lifeloggng photo review is considered to be beneficial for maintaining autobiographical memory (AM) specificity (Loveday & Conway, 2011). However, few studies have examined its efficacy at the neural level. To examine the effects of lifeloggng photo review on the neural processes of AM specificity, we used fMRI to examine subjects' brain activations during recall of recent events using lifeloggng photos as stimuli.

## Methods

In a training cycle, subjects were asked to log photos of their daily life collected using a Narrative Clip 1 device (<http://getnarrative.com>) and to recall recent events related to their photos. For non-training cycles, subjects logged photos but were not asked to recall. During fMRI sessions, subjects were shown photos from themselves and from other people. After each event (photo shown for 8s) they were asked to classify the photo under "Remember", "Know", or "New" according to the "Remember-Know" paradigm (Rajaram, 1993) and on the strength of their recall. A total of 3 fMRI sessions per subject for 38 subjects were acquired on a Siemens PRISMA 3T scanner. Remember activation regions were determined using trained and untrained "remember" events using non-parametric statistics, and classified as Remember Trained, Remember Non-trained, and Overlap ( $p < 0.05$  corr, Figure 1ABC). Within these regions, the largest three clusters were identified and selected as ROIs in our analysis (Figure IC123). The presence of a training and strength effect and their interactions was tested within these ROIs using a mixed model weighted with number of events.

## Results

Based on the number of recollected events and the strength of their recall during fMRI, subjects maintained higher AM specificity when trained versus untrained (Figure 2). The Remember regions (Figure 1ABC) were found to overlap with the paracingulate gyrus (PG), angular gyrus (AG), and the precuneus cortex (PC). In the selected ROIs, a significant remember strength effect was found. However, no significant training effects were observed (Figure 1C124).

## Discussion

The Remember regions determined by the study overlap with elements of the default mode network (DMN) (Mars et al., 2012). DMN has been shown to activate during introspection and

AM retrieval (Andrews-Hanna, 2012). By using stimuli from subjects' daily lives in the present study, subjects who remembered a stimulus might engage in introspective thoughts that might not pertain to the particular stimulus shown regardless of the training conditions. This would be a potential confound in the study and would explain why although self report data shows higher AM specificity in the trained condition, this was not found in our fMRI data. Future studies can be carried out to tease apart the effects of introspection from AM specificity. For example, the procedures could be modified to train the subject to stay specifically within the memories of the current event captured in the photo. A control experiment where subjects only engage with introspection can also be carried out and compared with current results to further distinguish introspective thoughts from AM retrieval.

### Conclusion

The present study found AM retrieval regions in the brain that overlaps with elements of the DMN. In these regions, while a strength of recall effect was found, a training effect was not found. Introspective thoughts might be a confound in the study. These issues will be addressed in future studies.

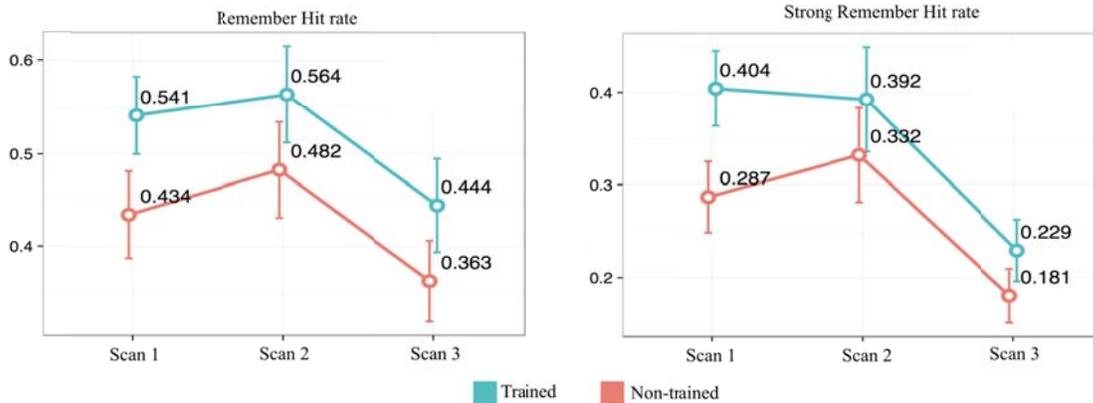


Figure 1. Statistics of number of recollected events and strength of recall in trained and non-trained conditions

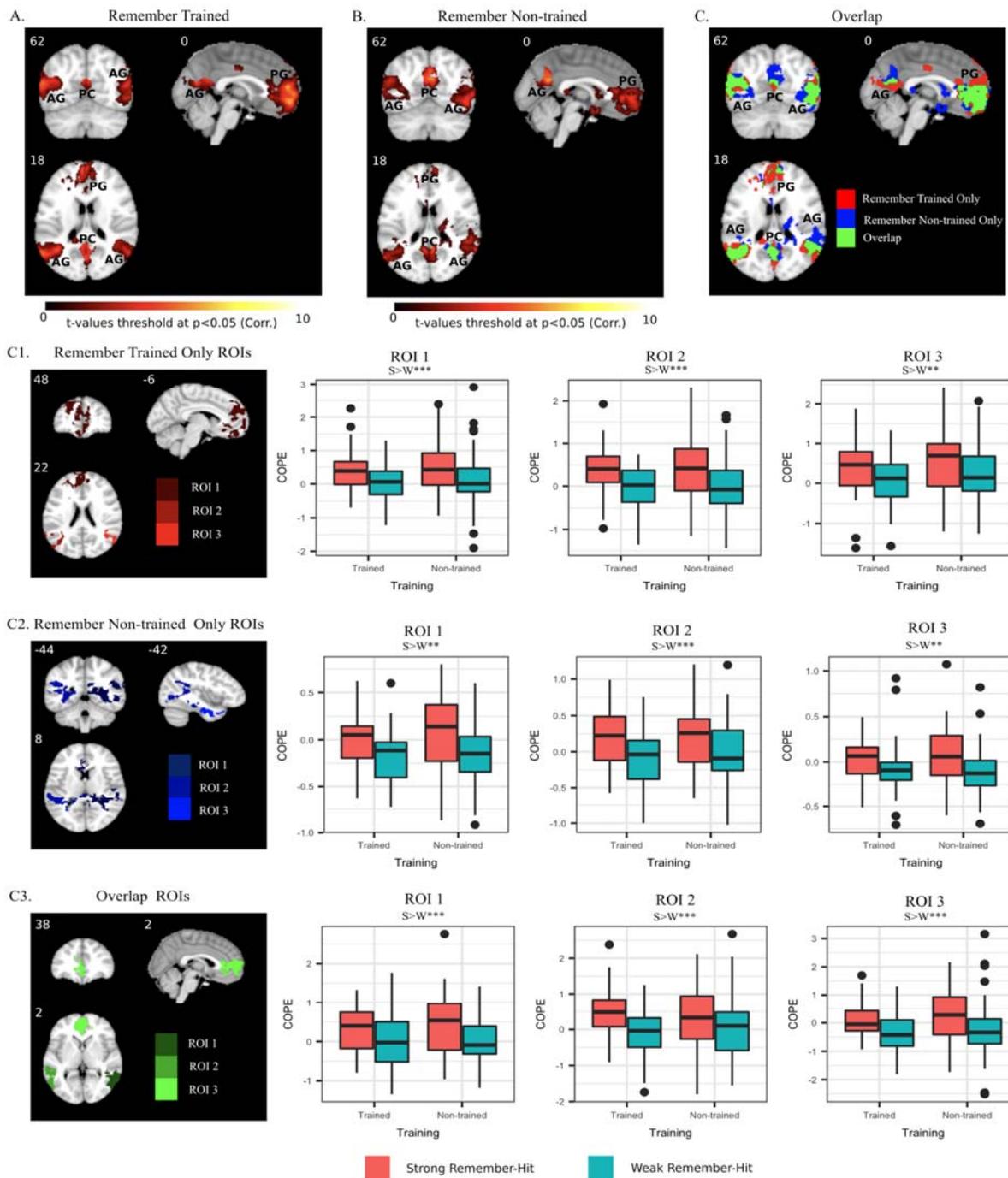


Figure 2. T-statistics maps for Remember region and training and strength of recall effects in selected ROIs. Activation of Strong recall strength is significantly higher than activation of Weak recall strength in all selected Remember region ROIs.

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