

# The neural correlates of everyday recognition memory

## Introduction

- Recognition often thought to be result of two distinct memory processes (Mandler, 1980).
- **Recollection** – remember contextual details about event (e.g. thoughts, sensory experiences).
- **Familiarity** – know the event took place, although no contextual information.
- **SenseCam** used to assess neural correlates of everyday recognition memory.
- Focus on medial temporal lobes as previous work shows this is critical for recognition memory.

## Experiment 1 Method

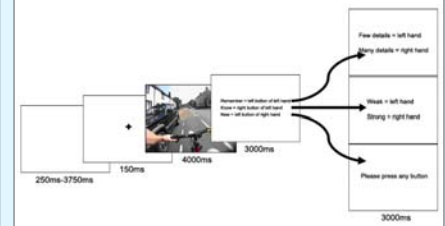
- Used **Remember-Know** procedure (Tulving, 1985).
- 15 participants wore SenseCam for 2 days.
- Recognition test performed in MRI scanner.
- Participants distinguished between Remember, Know and New stimuli (Rotello et al., 2004).
- For **Remember** responses – high and low detail.
- For **Know** responses – high and low familiarity.



## Scanning procedure

- 120 trials in scanning session.
- 80 of their own pictures.
- 40 foils (other participants' pictures).
- Post-scan interview on subset of trials

### Trial procedure

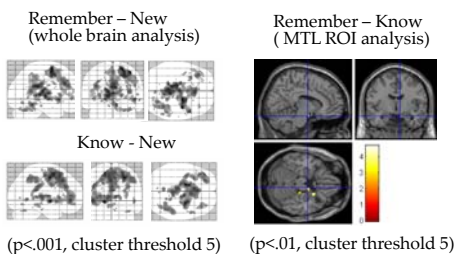


## Experiment 1 Results

### Behavioral Results

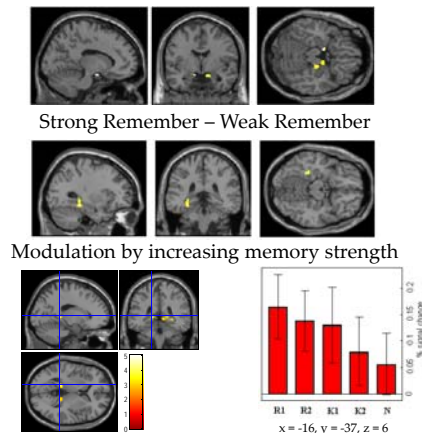
	Proportion of trials (SD)	Details (SD)	Memory Strength (SD)
Strong Remember	0.27 (0.16)	2.59 (0.6)	4.28 (1.3)
Weak Remember	0.22 (0.11)	2.00 (0.9)	3.96 (1.3)
Strong Know	0.22 (0.07)	1.23 (0.8)	2.93 (1.3)
Weak Know	0.23 (0.11)	0.58 (0.9)	2.61 (1.5)

Note. Details (0 = No details, 3 = Many details); Memory strength (1 = vague memory, 6 = vivid memory).



### MTL ROI analyses (p<.01, cluster threshold = 5)

New - Know



## Experiment 1 summary

- Increased hippocampal activity for remembered compared to known pictures.
- Increased left hippocampal activity for strong vs weak recollection.
- Bilateral hippocampus/posterior parahippocampal gyrus (pPHG) modulated linearly by memory strength.
- New stimuli evoked greater activation in bilateral aPHG.
- Overlap of many regions for Remember and Know responses – suggests common neural processes, with affinities to autobiographical memory network

## Experiment 2

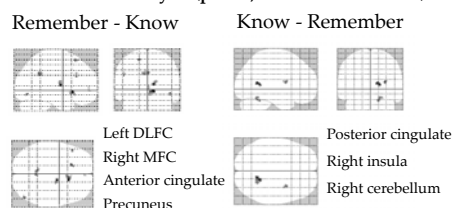
- Extended Experiment 1 by examining recognition memory over a longer time period (5-6 months).
- 10 participants from initial study.

- Used same stimuli and procedure as in Experiment 1.

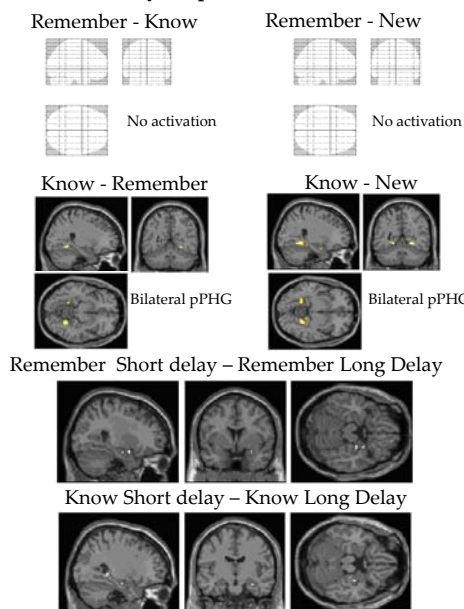
### Experiment 2 Results

	Proportion of trials (SD)	Details (SD)	Memory Strength (SD)
Remember	.27 (.13)	1.86 (.47)	3.52 (1.08)
Know	.52 (.14)	.78 (.47)	1.72 (.61)

### Whole brain analysis (p<.001, cluster threshold = 5)



### MTL ROI analyses (p<.01, cluster threshold = 5)



## Experiment 2 summary

- Long term recollection activated neocortical structures but not MTL.
- Long term familiarity activated pPHG.
- Recollection was greater in aPHG at short compared to long delay.
- Greater familiarity activation in right hippocampus at short than long delay.

## Conclusions

- SenseCam is an effective technique for assessing everyday recognition memory.
- MTL is implicated in recollection at short delays, but, over months, activity associated with recollection becomes independent of hippocampus.

## References

- Mandler, G. (1980). Recognizing: the judgment of previous occurrence. *Psychol Rev*, 87, 252-271.
- Rotello, C. et al. (2004). Sum-difference theory of remembering and knowing: A two-dimensional signal-detection model. *Psychol Rev*, 111, 588-616.
- Tulving, E. (1985) Memory and consciousness. *Can Psychol*, 26, 1-12.

## Acknowledgments

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