

## Familiarity theories, disagreements and methods of resolution

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## Recollection and Familiarity

- Recognition depends on two kinds of memory.
- Recollection is a form of recall in which studied information cues recall of associations that confirm that the information was studied.
- Familiarity does not involve recall, but is a feeling of memory for information that is triggered merely by encoding it.

## Disagreement about whether familiarity only exists for unitised items

1. After one or two study presentations, familiarity only exists for unitised items. It is a context free form of memory.
2. After one or two study presentations, familiarity exists not only for unitised items, but also for all kinds of non-unitised association. Some forms of familiarity are context free, others are context bound.
3. After one or two study presentations, familiarity exists for unitised items, and non-unitised associations between items of the same kind, but not between information of different kinds. Familiarity is context free.

## A Problem with unitisation

- What is it?
- What criteria are there for identifying when unitisation is present?

## Disagreement about the mechanism underlying the feeling of familiarity

Existence of priming indicates that there is a need to explain why only some fact/event memories *feel familiar*

1. Enhanced fluency of reactivation from cues (priming) + automatic attribution of familiarity-can extend to recollection (Jacoby)
2. A memory representation of information (priming?) is associated with a region that generates a feeling of familiarity (Peter Milner)

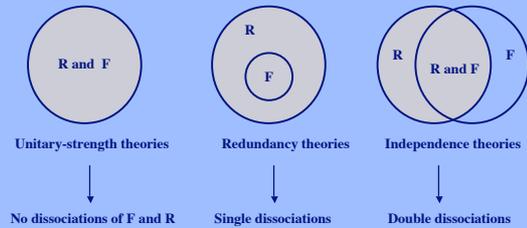
## Problems with the two theories

- Kind of feelings associated with familiarity vary depending on context and expectations.
- Fluency change may not be detectable sufficiently well to meet the needs of the fluency-attribution view.
- It is unclear how the representation-familiarity feeling association can be acquired after one study trial.

### Disagreement about the processes/neural bases underlying recollection and familiarity

- If the *processes* underlying recollection (R) and familiarity (F) differ, so should their neural bases. There are three main possible views:
  1. F and R depend on the same processes, but R results when these processes operate more strongly (unitary- strength).
  2. All the processes underlying F also underlie R, but R depends on some additional processes (redundancy).
  3. Some processes underlying F do not underlie R, and some processes underlying R do not underlie F (independence).

### Kinds of recollection and familiarity process theory



### Three ways of getting dissociations

- Psychological manipulations
- Lesions
- Functional neuroimaging

### Problems testing the predictions

- Dissociations should be driven by effects on processes, not memory information.
- Dissociations could be illusory results of comparing more memory information (recollection) with less (familiarity).
- Estimates of familiarity depend on proportion of recollected items that are familiar. There is little direct evidence about what this proportion is, but it may influence whether a dissociation is found.

### A specific disagreement about the brain regions mediating familiarity and recollection

- Fairly selective hippocampal lesions have different effects on familiarity.
- Two views:
1. Hippocampus and medial temporal cortices play similar roles in familiarity and recollection.
  2. Hippocampus is key structure for recollection (and recall), but is uninvolved in familiarity, which is mediated by perirhinal cortex.
- Both views allow other structures a role in different familiarity (and recollection) processes.

### Some suggested resolutions: Behavioural

- Use strong feeling of unitisation to guide identification of more objective unitisation criteria, e.g. poor component memory for unitised vs good component memory for non-unitised associations.
- Use modified RK procedure to rate familiarity for *all* items by responding fast without trying to recollect.

### Some suggested resolutions: Neural bases

•Lesion studies, (e.g. hippocampus)

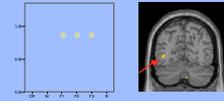
Need agreed detailed structural MRI (and perhaps PET) procedures and neuropsychological battery

•fMRI

Parametric event-related fMRI of familiarity and recollection. Simple contrasts are harder to interpret than parametric contrasts.

### For example:

F>R



Left inferior temporal cortex



Left perirhinal cortex  
F3=R



Left lateral parietal cortex  
R>F

The End

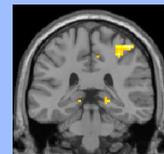
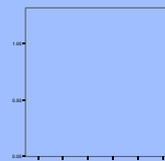
### Parametric familiarity of scenes

At test, in scanner

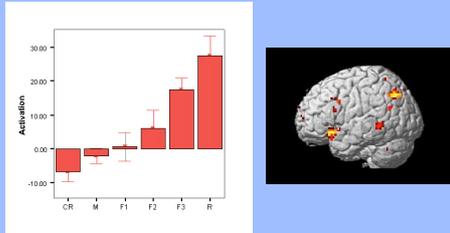


N R F1 F2 F3

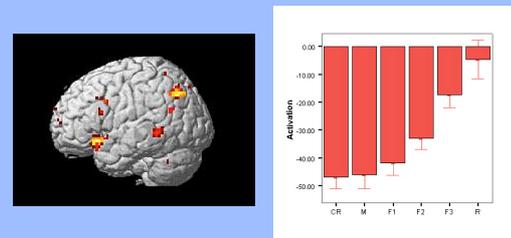
### Modulation of activity in hippocampus



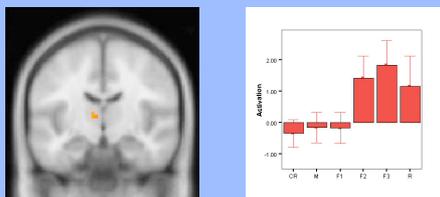
**Scene Familiarity Linearly Modulates Left inferior pre-frontal activations**



**Scene Familiarity Linearly Modulates Left Lateral Parietal Activation**



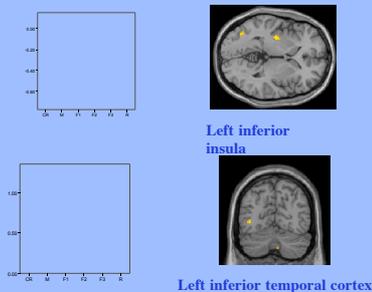
**Scene Familiarity Linearly Modulates Left Dorsomedial Thalamic Activation**



**Scene Familiarity Linearly Modulates Bilateral Perirhinal Cortex Deactivation**



**All F activations > R activations in the left inferior insula and inferior temporal cortex.**



**Summary of Familiarity/Recollection Data**

1. Variations in strength of F modulates activity in perirhinal, frontal, parietal, superior temporal, retrosplenial and insula cortices and dorsomedial thalamus.
2. Recollection seems to activate the same structures, but it activates the hippocampus as well, and more than familiarity, which does not modulate hippocampal activity.
3. At some sites, familiarity activations are greater than recollection activations. At other sites, reverse effects are found.

## Encoding that leads to familiarity and recollection

## Encoding activations that predict recollection, familiarity and misses

