Dissociating fMRI activity related to familiarity strength vs. decision criteria during recognition memory
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### Background
When individuals make a recognition memory judgment, they must decide whether an item was previously studied (old) or not (new) by determining whether the familiarity strength of an item exceeds the decision criterion (strength of familiarity required to respond 'old').

Responding 'old' will result in a hit or false alarm (FA), whereas responding 'new' results in either a correct rejection (CR) or miss.

**Signal Detection Theory**
- **Discriminability**: new distribution versus old distribution
- **Decision Criterion**: 'new' response = old distribution

Aminoff et al. (2015) revealed widespread fronto-parietal fMRI activity in the hit > CR contrast when participants maintained a conservative criterion (requiring strong familiarity to respond 'old'), but not when maintaining a liberal criterion (requiring weak familiarity to respond 'old').

**Recognition Memory Task**
- **Study phase**: 240 face image presentations
- **Test phase**: 4 mini-blocks: 16 old, 16 new images each

Each session included 4 cycles of a study phase followed by a test phase (240 face image presentations).

### Results
The 16 test conditions are performance based where the manipulations ideally would alter discriminability and criterion placement independently.

<table>
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<th>Discriminability conditions</th>
<th>16 test conditions (ideal scenario)</th>
<th>Results</th>
<th>Actual performance (16 session mean)</th>
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<td>old &gt; new response contrast</td>
<td>c as covariate da as covariate</td>
<td></td>
<td>Criterion Placement 512 trials per condition</td>
</tr>
<tr>
<td>old &gt; new item contrast</td>
<td>c as covariate da as covariate</td>
<td></td>
<td>Discriminability 512 trials per condition</td>
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### Conclusions
For this individual, widespread fronto-parietal fMRI activity strongly associated with the conservativeness of the decision criterion in the old > new response contrast and revealed many similar regions that Aminoff et al. (2015) identified to be associated with a conservative criterion at a group level such as anterior insula, inferior frontal gyrus, dorsolateral prefrontal cortex, medial frontal gyrus, and superior parietal lobule.

This individual also showed fMRI activity in the old > new response contrast that tracked with the liberalness of the decision criterion (in blue) such as the angular gyrus and frontal pole that Aminoff et al. (2015) did NOT observe at a group level.

Surprisingly, the strength of discriminability (as measured by da) was not associated with widespread fronto-parietal activity (or hardly any fMRI activity at all) in either the old > new response contrast or old > new item contrast.

Identifying regions associated with familiarity strength regardless of the decision criterion with these contrasts are much more difficult then identifying networks associated with the decision criterion regardless of familiarity strength. Where is familiarity? The participant completed each of the 16 sessions during fMRI scanning.

Each session included all 16 test conditions in a random order with the exception that all 4 discriminability conditions appeared during each test phase to keep the length of the study phase consistent.