Background

- Our ability to discriminate between real or fake objects is quick and effortless (e.g., fresh vs. plastic fruit). However, it is unclear how this information is coded neurally [1].

- On the one hand, the ability to categorise natural vs. synthetic objects could happen in early along visual processing (e.g., the object’s texture, colour).

- Alternatively, it may be coded in higher-level regions reserved for object identification (ITC) or memory (PRC, ATL).

**Research aim:** To investigate the neural and behavioural underpinnings of object categorisation for real vs. fake objects.

General Methods

Participants:

N = 16 (Mage = 21.7 years; SD = 1.62).

Stimuli:

300 images, 25 images in each of the quadrants (Fig 1).

- 3 categories (dessert, fruit, flowers), half real and half fake.
- Presented in colour or greyscale.

<table>
<thead>
<tr>
<th>Dessert</th>
<th>Fruit</th>
<th>Flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greyscale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greyscale</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Procedure:**

All participants were asked to categorise the 300 photographed objects as ‘real’ or ‘fake’ in the fMRI scanner.

Behavioural Performance

- Objects in colour lead to more accurate categorisation than greyscale. (p < .001)

- This effect is only true for photos of ‘real’ objects. (p < .001)

fMRI Results

**Real > Fake**

- Greater activation in PCG, PCL, MCC, V1 for real objects.
  - For colour: Greater activation for real vs. fake objects in V1.

**Colour > Greyscale**

- For real objects: Greater activation for colour vs. greyscale in CoS.
- For fake objects: No difference for colour/greyscale.

Conclusions

- Colour is an important feature for object classification, particularly for classifying real (but not fake) objects.

- Early visual cortex (V1) shows greater activity for colour photos of real objects, compared to the same for fake objects. But V1, along with PCG, PCL, and MCC show greater activation for all real (vs. fake) objects.

- CoS is particularly responsive to colour (vs. greyscale) in real, but not fake objects. Previous studies relate CoS with visual texture processing [2,3]. Together these results could suggest that CoS relies on colour to abstract texture information, supporting real/fake object classification.

References


Acknowledgements: This project was supported by Science Foundation Ireland (SFI), grant # 19/FFP/6812. It was also funded by the EU, under the NEST Framework (NEST-2004-Path-Imp), as part of the MONAT project. Supported by access to the IITC advanced computing and visualisation facilities, funded by the HEA-PRTLI program and the NDP, provided by the TCHPC.