DISORDERS OF PATTERN RECOGNITION

A. Visual agnosia
   • inability to identify objects by sight

   • Types
     (1) apperceptive agnosia
     • unable to form stable [presemantic] representations of objects

     (2) associative agnosia
     • can form “percept” of object but cannot identify [cannot achieve a correct semantic description]

B1. Apperceptive agnosia
   • can fail in different ways
     (1) may be okay with objects themselves, but performance suffers with pictures of objects. Since this is not true of intact subjects, implies some early deficit

     (2) prototypical (canonical) vs. unconventional views. Poor performance associated with RH posterior lesions

     (3) copying may be poor, or, if intact, may still be odd

     (4) shadows test: poor performance again associated with RH posterior lesions

     (5) overlapping figures: HJA
     • (simultagnosia) Humphreys & Riddoch

(a) Unusual views test
Figure 5.23  Patient C.K. was asked to copy the figure shown at the left. As can be seen at the right, his overall performance was quite good. One can readily identify the two diamonds and the circle. However, the numbers indicate the order in which he produced the segments. Unlike healthy subjects, C.K. did not draw each object in its entirety but followed the outer boundary, even if this meant switching between objects. (Adapted from Rothman et al., 1968.)
An important point here is that a diagnosis of associative agnosia depends on having excluded the possibility that there are problems earlier in the system. Thus, such a diagnosis is more believable the wider the range of “apperceptive” tests that have been done.

• Framework for object recognition
B2. Optic aphasia (a pseudo-agnosia)

- mislabels an object, but mimes it correctly
- deficit not in semantics, but in mapping from semantics to output phonology (e.g., given a picture of a saw, mimes sawing motion, but says “hammer”)

B 3. Associative agnosia (visual)

- fails to identify objects presented visually (either confuses them with other objects, or has no idea what the object is)
- semantics intact given testing in another modality
- therefore, problem must lie in activation of semantics from visual description
B 4. Visual agnosia but spared imagery

- CK (Behrmann, Winocur & Moscovitch) is severely agnostic, but produces beautiful drawings... and cannot later recognize the identity of his own drawings!

B 5. Category specific visual agnosia

- Commonly noted that patients are often better at recognizing objects from the general category of non-living things as opposed to living things (Warrington, Caramazza, Damasio)

- 3 stories about this:
  1. Warrington: separate regions of semantic memory given over to storing representations of different kinds (living vs. nonliving)
  2. Damasio: supposes that some classes of objects evoke representations not evoked by another. So, living objects evoke kinesthetic and motoric representations not evoked by non-living things.
Dixon and colleagues elegantly show that this seems to be a sufficient account of ELM’s data (visual AND semantic similarity)

- High semantic similarity:
  - e.g., robin, crow, blue jay, cardinal
  - e.g., mustang, camaro, corvette, firebird
- Low semantic similarity:
  - e.g., plate, door, stapler, kite
  - e.g., humming bird, shark, rose, apple

(3) Gaffan & Haywood: propose that living things are often simply more similar to each other than non-living things (experiment on intact subjects with reduced exposure duration; monkey experiment)

- It doesn’t matter whether semantic similarity is high or low, provided that visual similarity is low. However, if visual similarity is high, then ELM has terrible trouble learning to pair the blobs with labels that are high in semantic similarity (after 190 trials, ELM is still making 60% errors)
  - see visual description

- A sufficient account is that there is a deficit getting from the presemantic representation to semantics. This deficit doesn’t much matter so long as targets are not close to one another in semantic space.
• lots of patients present with a deficit called “prosopagnosia”
• the big debate here concerns whether face recognition is simply a more difficult discrimination than object recognition…
• … because the standard finding is that IF the patient is agnosic, then they are ALSO prosopagnosic

• LOGIC: the standard “argument by association”
• the logical difficulty here is that a thousand associations does not prove that a dissociation could not occur. The next patent may produce the dissociation.
• C.K. provides the second half of the dissociation (CLASS: which is what?…)

C. Is face recognition special?
Let me see that again!
Lesion studies in animals support the idea that information about an object’s IDENTITY is processed in a different location in the brain from information about WHERE the object is located in space (Mishkin & Ungerleider).

The What (Ventral) -- Where / How (Dorsal) distinction: Another double dissociation.
Goodale & Milner:

- D.F. is a visual agnosic following carbon monoxide poisoning...
- However, when asked to:
  1. pick up a disc that varies in size, she scales her fingers in flight so as to “pinch” the disc appropriately
  2. put a shape in a slot in the distance, she can orient her hand correctly, despite the fact that, when at rest, she can not orient the shape properly
- Optic ataxia
  - these kinds of patients are not agnosic, but they have difficulty locating objects in space and reaching appropriately
- Summary

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More about Prosopagnosia:

Overt vs. Covert recognition

• When patients are densely prosopagnosic, there can still be evidence of COVERT (unconscious) face recognition, because, sometimes, GSRs discriminate between familiar and unfamiliar faces.

• One story is that the pathway (the dorsal stream) mediates unconscious face recognition, whereas the ventral stream mediates face recognition that gives rise to the conscious experience of recognizing the face.

• CAPGRAS syndrome
  • these patients are NOT prosopagnosic; their face recognition abilities are intact
  • however, they fail to show a GSR response that discriminates between familiar and unfamiliar faces
• What is most fascinating about these patients is that they claim that their spouses are imposters!

• There are several different accounts of these patients (including psycho-dynamic)
  • perhaps the most interesting: their claim that their spouse is an imposter can be understood as an attempt to reconcile the fact that there is no (unconscious) feeling of familiarity (as indexed by the failure of GSRs to discriminate between familiar and unfamiliar faces), with the fact that they do agree that the person they believe to be an imposter LOOKS identical to their spouse.

• It seems to be clear that there is a deficit in whatever underlying processes give rise to GSRs (likely somewhere in the dorsal stream), in addition to a deficit in their reasoning (hence the term: pathology of belief)

34 ♦ Summary

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<table>
<thead>
<tr>
<th>Type of Disorder</th>
<th>Type of Recognition</th>
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</thead>
<tbody>
<tr>
<td>Protopagnosia</td>
<td><strong>×</strong></td>
</tr>
<tr>
<td>Capgras</td>
<td><strong>✓</strong></td>
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