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Say hello to BoB
Introducing the Back of the Brain Project

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Background
Face and words recognition has traditionally been thought to rely on highly specialised and relatively independent cognitive processes. Strong evidence for this has come from single case studies of patients with:
- pure prosopagnosia: a selective face recognition deficit
- pure alexia: a selective word recognition deficit

Recent theories, such as the many-to-many hypothesis (Behrmann & Plaut, 2013), suggest instead that the cognitive and cerebral processes underlying visual recognition are more distributed and interactive.

While single case studies are well suited to investigate dissociations between deficits, larger groups of patients are needed to investigate associations predicted by a distributed model.

Aim of the study
The study aims to shed new light on the processes and cerebral architecture underlying visual recognition of faces and words.

Some of the core research questions:
- Do face and word processing rely on processes that are largely independent or highly distributed and shared?
- What is the relationship between deficits in object, word and face processing and lower-level and intermediate visual perceptual deficits?
- Is there a relationship between premorbid reading skills and type and severity of alexia and prosopagnosia following stroke?
- How do visual field defects affect higher-level visual perception?
- How are visual field defects related?
- Can reading be spared after a lesion in the left fusiform gyrus and can face recognition be spared after a lesion in the right fusiform gyrus?

Methods

70-100 patients
(stroke in posterior cerebral artery)

50 healthy controls
(matched as group for age and education)

Behavioural tests
All patients are assessed (>9 months post-stroke) a large battery of sensitive behavioural tests (see figure 1 for overview of functions assessed). Assessment of each patient carried out over 3 days (within maximum 3 weeks).

Imaging
- Structural T1 scan
- Functional localiser: faces and scrambled faces, words and checkboards
- Diffusion tensor imaging (DTI) scan

What’s novel?
- Participants selected according to lesion localization, not according to symptoms → Expecting novel patterns of lesions and symptoms.
- All participants assessed with the same wide range of functions with sensitive tests → Enabling direct comparison across subjects, which is often not possible across single case studies.
- Tests of face, word and object processing: Same level of processing tested across stimulus type.
- Large group of PCA patients included.

Status
- 25 patients tested (right lesions n = 6; left lesions n = 16; bilateral lesions n = 3)
- 3 control participants tested

International collaboration

University of Copenhagen
Ph.d. student: Julia Ro Robotham

University College London
Postdoc: Sheila Kerry

University of Manchester
Postdoc: Grace Rice

Study design

Topographical documentation: The anything questionnaire

Background information
- Handedness: Edinburgh short-form (5 items)
- Depression: Geriatric depression scale: GDS-15
- Cognition: Oxford Cognitive Screen; Digit span (WASI): forwards and backwards
- Basic motor response time: Simple visual RT test (up vs down)
- Premorbid reading: Adult reading history questionnaire
- Visual acuity: FrACT (Landolt C)
- Visual field test: Copenhagen perimetry
- Intermediate and low-level visual perception:
  - Intermediate visual perception: L-post
  - Visual field test: Copenhagen perimeter
  - Visual acuity: FrACT (Landolt C)
  - Colour perception: CH-15 test
  - Contrast sensitivity: the functional acuity contrast test

Behavioural test battery

Figure 1:

Semantic processes and language
- Writing-to-discrimination
- Phonology-Segment judgement task

Word processing
- Lexical decision
- Slurred recognition task: words
- Delayed matching task: words

Object processing
- Object decision task: yes/no
- Cambridge house memory test
- Famous face naming task: yes/no
- Delayed matching task: objects

Face processing
- Famous face naming task: yes/no
- Cambridge face memory test
- Famous face memory test: yes/no
- Delayed matching task: faces

Intermediate and low-level visual perception
- Intermediate visual perception: L-post
- Visual field test: Copenhagen perimeter
- Visual acuity: FrACT (Landolt C)
- Colour perception: CH-15 test
- Contrast sensitivity: the functional acuity contrast test

Handwriting: Edinburgh short-form (5 items)