Lesions of the fusiform face area impair perception of facial configuration in prosopagnosia

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Background

Prosopagnosia (sometimes known as face blindness): a disorder of face perception where the ability to recognize faces is impaired, while the ability to recognize other objects may be relatively intact.

There are 2 different types of prosopagnosia:
- Associative prosopagnosia
- Appreciative prosopagnosia

Introduction

- Prosopagnosia is associated with medial occipitotemporal lesions, especially on the right side.
- Face perception involves a holistic encoding of facial structure, in which the spatial relationships between facial features play a critical role.
- Hypothesis: Lesions of the fusiform face area are associated with defects in face perception in patients with prosopagnosia.

Methods

- Control subjects: 14
- Subjects: 5 patients with associative prosopagnosia
  - 4 patients had lesions which included the right fusiform face area.
  - 1 of the patients had anterior bilateral lesions and the right fusiform face area was not affected.
- The perceptual ability is specific for the usual orientation in which stimuli are encountered: hence the inversion effect, in which recognition is impaired when faces are presented upside down.

Based on previous studies, inverted faces have:
- Little effect on the perception of facial features
- An important effect on discrimination of spatial relationships
A trial stimulus consisted of 3 faces (2 were the base face and one the target face). There were 2 test faces and each stimulus was presented 9 times. Subjects were asked to discriminate faces in which spatial configuration of features has been altered and then this was contrasted with their discrimination of changes in feature color (an alternation that does not affect spatial relations). In this study, the experimenters measured the reaction times as well as accuracy rates.

All 4 patients with fusiform face area impair were severely impaired on discrimination of both eye position and mouth position. Patient 1 had normal discrimination of eye position at all viewing durations. Normal subjects improved their discrimination of mouth position if they were given trials in which they knew that this is the only change that will occur.

It has been argued that some patients with prosopagnosia may have lost the parallel/global/holistic processing route, which has often been assigned a right hemisphere locus. In addition, it is also argued that inverted faces cannot engage the more efficient parallel/global/holistic alternative that operates on upright faces. However, the prosopagnosia is more profound and is not influenced by neither salience nor viewing time.
Discussion

- Like normal subjects, some of the patients did better when they could concentrate on a single alternation.
- Patients 3 and 4: Their ability to selectively attend to a single facial spatial processing task is preserved, whereas their ability to process spatial relations in a task that requires distributed attention is impaired.
- Patients 2 and 5: They did not improve when told to focus on the mouth.

Conclusion

- Perception of spatial configuration of features is impaired in patients with prosopagnosia (those with a lesion in the right fusiform gyrus).
- This deficit is especially observed when attention is distributed over many facial elements.

My opinion

Strengths:
- Case histories for all the patients.
- Graphs very detailed

Weaknesses:
- There was a large age range
- More males than females
- The procedure could have been more detailed

Questions from the Field