Evidence for a face inversion effect in people with Parkinson’s: mixed evidence for the effect in controls
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Introduction

• Although Parkinson’s Disease is typically thought of as a motor disorder, there are non-motor symptoms that are equally problematic.
• More than half of people with Parkinson’s have difficulty recognising emotion from facial expressions1,2.
• Ability to recognise emotion may be a characteristic of the disease. Therefore, this ability could be a biomarker and indicate disease progression.

We need to know how easy it is for individuals with Parkinson’s to recognise different facial expressions. This ability may provide prognostic information for the individual.

We need to know whether the face inversion effect is affected by sensitivity to the facial expression. We show that the face inversion effect is shifted to the left of those representing inverted expressions (bottom plots).

Most people with Parkinson’s show a face inversion effect with expressions they are least sensitive to. Many participants can not perform above chance when faces are inverted.

Most control participants show little or no face inversion effect with expressions they are sensitive to.

Some participants show a greater degree of variability in a face inversion effect with expressions they are least sensitive to compared with those they are most sensitive to (compare top and bottom plots). Some participants show a large face inversion effect, some show no face inversion effect, while others have a slight improvement with the inverted face.

Methodology

• TASK: Which interval contained most expressive face, 1st or 2nd?
• Stimuli presented upright or inverted on gamma corrected monitor
• Controlled by Mac Pro using Matlab R2014 and Psychtoolbox routines

Results

• As signal intensity increases performance improves from chance (0.5) to accurate (1). This improvement occurs for all six upright expressions (happy, disgust, surprise, fear, anger, and sad; top plots).
• The curve representing the happy expression is shifted to the left of curves representing other expressions. This indicates that participants are most sensitive to happy expressions.
• Participants are least sensitive to sad or fear (top plots) expressions. The curves representing these expressions are situated furthest to the right.
• We find evidence of a face inversion effect for people with Parkinson’s but not for control participants. The curve representing upright expressions is shifted to the left of those representing inverted expressions (bottom plots).
• We find a large face inversion effect for people with Parkinson’s and no face inversion effect for our control participant (bottom plots).

Discussion

• We show increased sensitivity to happy, surprise or disgust over the other facial expressions for all participants.
• We show decreased sensitivity to sad, fear or angry over the other facial expressions for all participants.
• We show a large face inversion effect for people with Parkinson’s with facial expressions they are least sensitive to. This suggests that configural face processing is disrupted and that participants are not relying solely on low level visual signals to perform the task.
• We show that the face inversion effect is affected by sensitivity to the facial expression.
• We characterise performance for individual participants allowing us to make inferences about their perceptual processes.

Future Work

• Understand why the face inversion effect occurs for some facial expressions and not others. Is disruption to configural processing related to the relative challenge of the task and / or the affect conveyed?
• Understand whether cognitive decline and / or clinical sub-groups can be predicted by the face inversion effect.

References


• 2 female, 2 male faces
• Radboud Face Database
• Mean luminance matched
• Signal intensities generated using Psychomorph

Methodology

Stimuli with different signal intensities

Table: Task performance for individual participants allowing us to make inferences about their perceptual processes.

Proportion Correct

Figure 1: Individual Participant Data

Figure 1.1 Parkinson’s (0.5 years) Figure 1.2 Parkinson’s (11 years) Figure 1.3 Control

Figure 1

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Figure 2

• Few people with Parkinson’s show a face inversion effect with expressions they are most sensitive to. Most show no effect or a slight increase in sensitivity to the inverted face (top plot).
• Most control participants show little or no face inversion effect with expressions they are most sensitive to (top plot).
• Most people with Parkinson’s show a face inversion effect with expressions they are least sensitive to. Many participants can not perform above chance when faces are inverted.
• Most control participants show a greater degree of variability in a face inversion effect with expressions they are least sensitive to compared with those they are most sensitive to (compare top and bottom plots). Some participants show a large face inversion effect, some show no face inversion effect, while others have a slight improvement with the inverted face.

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• We show increased sensitivity to happy, surprise or disgust over the other facial expressions for all participants.
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