Happiness is in the mouth of the beholder and fear in the eyes

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Overview

• Emotion recognition from faces
• Present data collected in collaboration with an undergraduate project student
• Application of the approach to clinical populations
  • SPiEs Project: people with Parkinson’s
Faces are very important social stimuli
Emotion Recognition from Faces

• Complex visual task that the brain needs to solve
• Affected by clinical disorders, state and trait anxiety, taking paracetamol…

• What visual information in faces drives our ability to recognise emotion?
• Could we use an emotion recognition task to distinguish between different clinical disorders?
• Do different people literally see things differently?
Research Question

• Begin by characterising sensitivity to emotions in healthy populations (aka undergraduate psychology students!)

• Are there specific facial features that drive our ability to recognise happy and fearful expressions?
Methodological Approach

Advantage
1. Sensitive enough to measure differences that the participant is not aware of
2. Data can be analysed at the level of the individual

- Approach could evaluate whether disease progression is characterised by changes in sensitivity to emotions
- Important if we are to develop a clinical tool to support diagnosis or monitor treatment progress
Generate stimuli with different signal intensities

Signal Intensity

0% Neutral

100% Happy

Neutral

Fearful
Generate stimuli with different signal intensities.
Generate stimuli with different signal intensities

Neutral

0%

20%

40%

100%

Signal Intensity

Happy

Fearful
Generate stimuli with different signal intensities

Neutral  0%  20%  40%  60%  100%  Happy  100%
Neutral  Neutral  40%  60%  100%  Happy  100%
Generate stimuli with different signal intensities
Emotion Discrimination Task
Emotion Discrimination Task

- Test Stimulus = Expression (signal varied 0 – 100%)
Emotion Discrimination Task

- Test Stimulus = Expression (signal varied 0 – 100%)
- Comparison = Neutral (fixed 0%)
Emotion Discrimination Task

- Test Stimulus = Expression (signal varied 0 – 100%)
- Comparison = Neutral (fixed 0%)

- Task = “Which interval contained image with most expression?”

- Indicate using mouse (one click = image 1, double click = 2)
Psychometric function describing performance

- Accuracy is plotted as a function of signal intensity
- Performance improves from chance (0.5) to accurate (1) as signal intensity increases
Psychometric function describing performance

- Accuracy is plotted as a function of signal intensity
- Performance improves from chance (0.5) to accurate (1) as signal intensity increases
Stimuli with different ‘active’ features

Full Eyes & Mouth

Eyes & Mouth Up

Face

Happy
Stimuli with different ‘active’ features

Full Face Eyes

Happy
Stimuli with different ‘active’ features

Happy

Full Face  Eyes  Mouth

Visible  Visible  Visible
Stimuli with different ‘active’ features

Happy
Stimuli with different ‘active’ features

Happy

- Full Face
- Eyes
- Mouth
- Eyes & Mouth
- Mouth Visible
Stimuli with different ‘active’ features
Stimuli with different ‘active’ features
Results: **Happy Expressions**

Data from one participant, representative of 4 participants
Results: **Happy Expressions**

![Data from one participant, representative of 4 participants](image.png)
Results: **Happy Expressions**

Data from one participant, representative of 4 participants
Results: **Happy Expressions**

Data from one participant, representative of 4 participants
Results: **Fearful Expressions**
Results: **Fearful** Expressions

![Graph showing the relationship between Correct and Signal Intensity for different face conditions: Full Face, Eyes, Eyes & Mouth. The graph illustrates how the accuracy of recognizing fearful expressions changes with varying signal intensities. The x-axis represents the signal intensity range from 1 to 100, while the y-axis shows the correct classification rate ranging from 0 to 1. The different conditions are represented by various markers: blue for full face, green for eyes, and yellow for eyes and mouth. The graph suggests that as signal intensity increases, the accuracy of recognition generally improves for all conditions.]
Results: **Fearful** Expressions

![Fearful Expressions Diagram](image)
Summary

Happy

Fear

Full Face Eyes Mouth Eyes & Mouth Mouth Visible Eyes Visible

Happy

Fear

Correct

Signal Intensity

Correct

Signal Intensity
Published abstracts with student co-authors


Delicato, L. S. Routledge, J. & Williams, D (In Press) Motion makes fearful expressions more detectable. *ECVP Abstract*

http://www.delicato.org
## Impaired Emotion Recognition

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Effect (relative to ‘healthy’ controls)</th>
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<tbody>
<tr>
<td>Depression</td>
<td>• More sensitive to anger and sadness, less sensitive to happy in recognition task</td>
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<tr>
<td>Huntingdon’s Disease</td>
<td>• Impaired in recognition of negative affect (e.g. anger, disgust, fear and sadness)</td>
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<tr>
<td></td>
<td>• In particular impaired recognition of anger</td>
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<tr>
<td>Parkinson’s Disease</td>
<td>• Impaired in recognition of negative affect (e.g. anger, disgust, fear and sadness)</td>
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<td>Social Anxiety</td>
<td>• Interpret ambiguous faces as threatening</td>
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<tr>
<td></td>
<td>• Slower at recognising happy</td>
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<tr>
<td></td>
<td>• No bias for remembering happy faces</td>
</tr>
<tr>
<td></td>
<td>• More sensitive to anger in recognition task</td>
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<th>Population</th>
<th>Effect (relative to general population)</th>
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<tr>
<td>General Prisoners</td>
<td>• Poorer at recognising negative affect (e.g. anger, disgust, fear and sadness)</td>
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<tr>
<td>Sex Offenders</td>
<td>• Relatively better at recognising sadness and worse at surprise, relative to other offenders</td>
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Emotion recognition in Parkinson’s

Sensitivity of people with Parkinson’s to different intensities of emotions (SPiEs).

Health and Well-being Beacon Seminar
12:30, 29th April 2016, Gateway

SPiEs

research.ncl.ac.uk/spies

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Research Associate: Joanna Wincenciak