Face-shape facilitates detection of facial expressions.

Joanna Wincenciak¹, Louise S. Delicato¹,²
¹Institute of Neuroscience, Newcastle University, UK, ²Department of Psychology, University of Sunderland, UK

Introduction

• When recognising different social signals conveyed by the faces, people rely on the features that are most informative.
• Several studies investigated the contribution of internal facial features to the recognition of basic facial expressions²,³.
• The contribution of external facial features such as face shape to the recognition of facial expression is less known.
• Face shape information facilitates recognition of face identity⁴, race⁵, gender⁶, or age⁷ and influences the perceptions of complex social traits⁸.
• Here, we investigated weather sensitivity to face shape information facilitates recognition of different social signals.

Methodology

Experimental Conditions

• Happy
  • Face shape
  • Oval mask
• Fearful
  • Face shape
  • Oval mask
• 6 actors x 7 morph intensities x 20 repeats.
• 120 repeats per experimental condition.

Task

• Temporal two-interval forced-choice paradigm.
• Method of constant stimuli
• Neutral comparison stimulus (0%)
• Signal of test stimulus varied (0-100%)
• “Which interval contained the image with the greatest expression?”
  • First or second (single click or double click of mouse respectively).

Stimuli

Stimuli generation

Original image

Face shape                              Oval mask

Example stimuli

• 6 Actors (3 male and 3 female) from Radboud Face Database⁹,¹⁰.
• Morph continuum for happy and fearful expressions (0-100%) created using Psychomorph¹¹.
• Faces masked to remove external features:
  • Face shape mask followed a natural outline of the face
  • Oval mask removed face shape information
• Converted to greyscale and matched for average mean luminance of images using Matlab SHINE toolbox¹².
• Presented on 22” monitor (HP P1220, refresh rate 120Hz) using Matlab with Psychtoolbox routines.
• Image size 9.5° x 13.3°

Results

• Increased sensitivity to Face shape over Oval mask for both Happy and Fearful expressions.

Summary of Results

• As the signal intensity increases performance improves from chance (0.5) to accurate (1). This improvement occurs in both Face shape and Oval mask conditions and for both Happy and Fearful expressions.
• The curves representing Face shape are shifted to the left of the these representing Oval mask for both Happy and Fearful expressions. This suggests an increased sensitivity to happiness and fear when information about face shape is preserved.
• The curves representing Happy expressions are shifted to the left of the these representing Fearful expressions in both Face shape and Oval mask conditions.
• This suggests an increased sensitivity to happy compared with fearful expressions.
• The curves representing Female faces are shifted (slightly) to the left of the these representing Male faces for Fearful expressions. This suggest an increased sensitivity to fear conveyed by female compared to male faces.
• For Happy expressions the slope of the function representing Male faces is slightly steeper in the Face shape condition. This suggest an increase in sensitivity to happiness in male compared to female faces.

*The data is representative of one observer

Discussion

• We show that information carried by the face shape facilitates the detection of emotional expression of happiness and fear.
• The advantage of face shape information occurs for both male and female faces.
• Our results suggest that the information carried by the external features such as face shape can aid the recognition of facial expressions.
• Our results are consistent with reports suggesting that faces shape information is potentially important for judgment of complex facial characteristics and social traits⁵,⁶,⁷.

Future Work

• Understand the relative contribution of individual external features (face shape) and internal features (e.g. eyes, mouth) as well as surface information (e.g. pigmentation, shading) in the recognition of all basic emotional expressions.
• Understand the role of sexually dimorphic facial features (e.g. female vs. male face shape) in the recognition of emotional expressions.
• Measure the sensitivity to different emotional expressions in clinical populations.

References

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Acknowledgments

Contact