



Novel Method for Quantifying Facial Expression

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Introduction

Hemispheric lateralization is a principle that posits specific functions are processed exclusively or primarily by one cerebral hemisphere or the other. Current theories assume a lateralized brain, that being a brain with specific functions localized to one hemisphere (i.e. emotion on the right and language on the left), is an organized brain. In most individuals, emotion processes are primarily controlled by the right cerebral hemisphere. There is considerable evidence in support of this based on numerous studies of hemifacial expression. Emotion is expressed more intensely on the left hemiface; motor control is contralateral, falling in line with evidence that indicates the right hemisphere is more involved in emotion processing. This is known to be true for right-handed individuals. However, this is yet to be tested for left-handed. Prior research has focused on qualitative assessment via chimeric imaging to indicate which hemiface expresses emotion more intensely (Sackeim and Gur, 1978). This project introduces a novel method for quantifying facial expressivity using virtual data collection.

Methods

Edinburgh Handedness Inventory (Oldfield, 1971) – This self-report scale indicates the degree of handedness via numerical value (-100 to +100) based on the hand used for daily tasks.

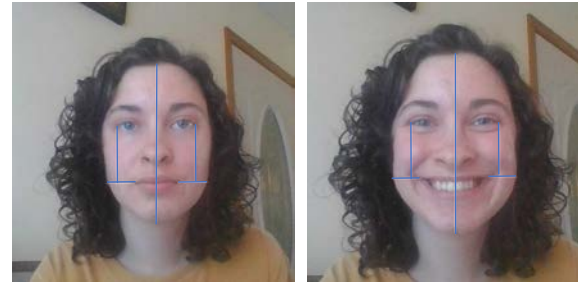
Exocanthus-Chelion Ratio – Measurements from the corner of the eye (exocanthus) to the corner of the mouth (chelion) during both neutral and positive expression provides quantitative data on the change in expression.

Chimeric Imaging (Sackeim and Gur, 1978) - Images displaying positive emotional expression were split down the vertical midline, creating two separate images by mirroring each hemiface.

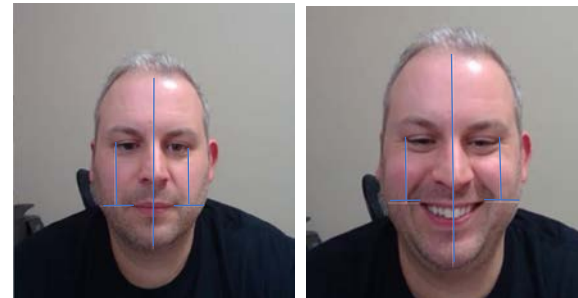
References

Oldfield, R. C. (1971). The Assessment and Analysis of Handedness: The Edinburgh Inventory. *Neuropsychologia*, 9, 97-113.
Sackeim, H.A., and Gur, R. C. (1987). Lateral asymmetry in intensity of emotional expression. *Neuropsychologia*, 16, 473-482.

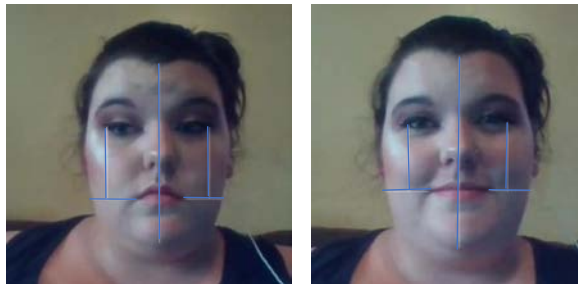
Measurements



	Neutral EX to CH	Positive EX to CH	Change
Left	3.66 cm	3.00 cm	-17.99%
Right	3.53 cm	3.05 cm	-13.73%



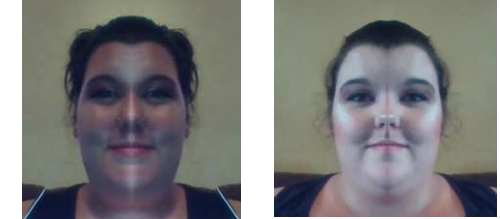
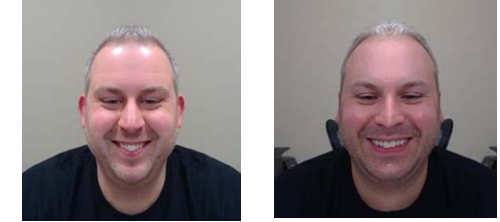
Left	3.367 cm	2.85 cm	-15.42%
Right	3.45 cm	3.01 cm	-12.77%



Left	4.07 cm	3.61 cm	-10.38%
Right	4.09 cm	3.49 cm	-15.00%

(positive EX:CH – neutral EX:CH)/ neutral EX:CH * 100 = % change

Left/left Chimeric Right/right Chimeric



Results

- Developed novel method for quantifying changes in facial expression by comparing EX:CH across conditions.
- Effectively demonstrated that facial expression can be quantified using low-cost or free software platforms.
- Developed secure and valid virtual method for measuring facial expression change.

Future Directions

- Collect data from left- and right-handed individuals to compare hemifacial EC:CH for positive facial expressions.
- Use elements of this method for other studies focused on facial expression and brain lateralization.

Acknowledgments

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