

Empowering feedback connections in temporo-occipital network to boost visual perception of emotions

ABSTRACT:

Background

Accurately recognizing emotional expressions is critical for social life. Perceiving others' emotional expressions activates a complex visual network including the primary visual cortex (V1) and higher-order regions such as the superior temporal sulcus (STS) which is known to encode biological motion. Yet, a fundamental and unanswered question is how STS and V1 interact to give rise to accurate emotion recognition.

Aims

The ambitious aim of the present project is to shed new lights on the way the human visual system makes humans aware of emotional stimuli and as, ultimate goal, by improving its functioning, enhance visual emotion discrimination abilities.

Method

Using a novel Transcranial Magnetic Stimulation protocol, we transiently enhanced synaptic efficiency in the reentrant connections from STS to V1 and we tested facial emotion discrimination performances and possible neurophysiological changes (i.e., modulations in the visual evoked potentials recorded by electroencephalography).

Results

We found that boosting the STS-V1 connectivity enhances emotion discrimination abilities as well as modulates the amplitude of early visual components involved in emotional face perception or in cognitive performance.

Conclusions

We provide novel causal evidence that STS-to-V1 back-projections, are malleable and functionally relevant to emotion recognition. These findings have implications for theoretical models of visual perception and awareness and for the rehabilitation of visual deficits.

Keywords

Emotion discrimination, Transcranial Magnetic Stimulation, Feedback connections, Visual Evoked potentials, Electroencephalography

Published Work:

Fiori, F., Chiappini, E. & Avenanti, A. (2018). Enhanced action performance following TMS manipulation of associative plasticity in ventral premotor-motor pathway. *NeuroImage*, 183, 847-858. doi.org/10.1016/j.neuroimage.2018.09.002

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Zanon, M., Borgomaneri, S., & Avenanti, A. (2018). Action-related dynamic changes in inferior frontal cortex effective connectivity: a TMS/EEG coregistration study. *Cortex*, *108*, 193-209. doi: 10.1016/j.cortex.2018.08.004

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