

When prediction errs: Examining the brain dynamics of altered saliency in self-voice perception

ABSTRACT:

Background

The subjective experience of speech seems to be governed by predicting the sensory consequences of own voice (OV) production. However, existing studies fail to account for the effects of emotional salience in speech and how it affects prediction and prediction errors when what we hear is not what we intended.

Aims

The current project investigated the effect of change in OV quality on sensory feedback to self-generated and externally generated vocalizations, combining EEG and fMRI.

Method

Twenty-six healthy participants vocalized the syllable “ah” with neutral, angry, and pleasure intonation. These vocalizations were morphed to generate neutral-to-angry and neutral-to-pleasure continua. In the EEG study, they listened to OV step wise changing from fully neutral to fully emotional via button-press (active) and listening (passive) conditions. In the fMRI study, participants heard the OV, an uncertain-voice (UV) and other-voice (OTV) in active and passive conditions.

Results

N1 suppression was reduced in response to changes in OV that represented an increase in emotional quality. In the fMRI study, the inferior frontal gyrus (IFG) displayed characteristic feedback-error processing: its activity increased as divergence from expected OV quality increased; the anterior superior temporal gyrus (STG) displayed characteristic motor-induced suppression of OV.

Conclusions

Sensory suppression to self-generated OV, reflected in N1 amplitude modulations, varies as a function of the perceived salience of auditory feedback that does not match the prediction, substantiating the link between emotion and sensory prediction.

Two different roles of error-monitoring and identity-attribution in OV perception were identified: IFG activity increases with more divergence from qualities of OV, whereas the STG is involved in self-attribution via motor-induced suppression of expected voice stimuli. Future studies should investigate if alterations in these processes are related to variability in hallucination predisposition.

Keywords

Sensory prediction, Voice, Emotion, EEG, fMRI

Published Work:

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