Introduction
The fusiform gyrus (FG) has been shown to be a central node in the face processing network, but its causal role in face perception has not been widely studied. Recent work reports a distortion in the perception of faces following 1s of high frequency electrical stimulation. However, the temporal precision and spatial spread of FG perturbation on face perception is still unknown. Here, we investigate the causal role of the FG in face perception by applying event-related, direct electrical stimulation in six patients with intractable epilepsy. We compared the effects of brief pulses of electrical stimulation to the FG and parahippocampal place area (PPA) on the speed of detecting distorted faces. These findings highlight the temporal and spatial importance of the FG in the perception of faces and represent an important link between electrophysiology and behavior in face perception.

Methods
1. Localization of face- and place-selective regions
   - Visuallick test memory task was performed in electrocorticography (ECOG).
   - Data was collected in hand-tuned power in high gamma (70-200Hz, HGP).
   - Mean HGP response to faces, houses, body parts, and objects were computed.
   - Regions with face and house HGP selectivity were chosen for stimulation sites in face distortion task.

2. Cortico-cortical evoked potentials
   - Single-pulse electrical current (10mA, 0.3Hz, biphasic pulse, 0.1ms pulse width) applied to face- and place-selective regions when patient is lying at rest with eyes closed.
   - The cortico-cortical evoked response (CCEP) at all other regions are quantified during the N1 (10-50ms) and N2 (50-200ms).
   - CCEP represents superposition of excitatory and inhibitory post-synaptic potentials

3. Face distortion task
   - Pre-task behavioral testing to adjust distortion difficulty to attain 75% accuracy.
   - Faces with distorted features (15-50%) were presented (20ms presentation, 1s ISI), while subjects discriminated between distorted and non-distorted faces.
   - For each trial, the following conditions were randomized: face with no stimulation; face with visual stimulation; and face with electrical stimulation.
   - The face with stimulation condition consisted of single pulse electrical stimulation as electrical stimulation applied - 200, 500, and 1000ms with respect to visual onset presentation as well as 200Hz repetitive stimulation (200, 500ms).
   - Reaction time (ms) to button press quantified for each condition.

Results

- Face processing modulates the electrically-induced evoked potential
- Electrical stimulation suppresses the high gamma response to faces
- Spatial spread of electrical stimulation of face-selective sites

Conclusions
- Extended understanding of face processing in humans by providing a direct link between electrophysiology and behavior following FG perturbation.
- Demonstrate that brief (200ms) electrical pulses at the FG increased the RT in perceiving distorted faces.
- Quantify the spatial spread of the effect of electrical stimulation at FG, which is predicted by FG CCEPs.
- On single subject and group basis, the change in CCEP following FG stimulation predicts behavior.

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