

The neural signatures of leadership: Two-brain directed synchronization during eye contact

ABSTRACT:

Background

When people interact, their behaviours synchronise. Intriguingly, hyperscanning studies have shown that brain activity synchronizes too. People have shown higher interbrain synchronization during eye-contact, suggesting that non-verbal communication might rely on subtle synchronization processes. We examined the processes underlying brain synchronization during eye-contact in a dual EEG and eye-tracking task where a leader usually emerges.

Aims

1. Analyse interbrain synchronization during eye-contact; 2. Evaluate whether the direction and strength of synchronization can predict leadership; 3. Investigate how interpersonal relationship affects interbrain synchronization and its association with leadership.

Method

We measured interbrain synchronization (EEG) during a two-person time reproduction task where participants were asked to reproduce the duration of an auditory tone by making eye-contact for the duration of the tone. We quantified interbrain synchronization using bi-directional (ciPLV) and directed (PSI) phase synchronization measures in the main frequency bands. We applied network measures to quantify the network characteristics and compare them between friends and strangers, leaders and followers.

Results & Conclusions

We found that eye-contact increases inter and intrabrain synchronization in the gamma frequency band. Network analysis revealed that some brain areas serve as hubs linking within and between-brain networks. Friends showed higher interbrain synchronization than strangers. Dyads with clear leader/follower roles demonstrated increased synchronization from leader to follower. We observed that eye-contact affects synchronization between brains more than within brains, suggesting that eye-contact is an inherently social signal.

Keywords

Hyperscanning, EEG, Interbrain synchronization, Eye-contact, Eye-tracking

Published Work:

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