
Investigating online joint attention during face-to-face interaction: an hyperscanning EEG study

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Abstract

Within face, gaze plays a particular role in social interaction. Viewing someone gazing at an environmental object triggers attention orienting toward the object in the observer. This joint attention process involves a dynamic interplay of mutual attentiveness and coordinated attention to the environment between the persons (Tickle-Degnen, 2006); it is also a building block of theory-of-mind (Baron-Cohen-1995). Here, we aimed at studying joint attention with a setup involving online, face-to-face interaction between two agents whose brain activities were simultaneously recorded with EEG hyperscanning (60 electrodes / subject). The participants sat face-to-face, with a device subtending 4 light emitting diodes (LEDs) inbetween them, which could be switched in red, green, or orange. In "congruent" attention blocks, the subjects were requested to look at the same LED (joint attention condition), whereas in "incongruent" attention blocks, they had to look at opposite LEDs (no joint attention condition). Baseline trials where the participants could see the LEDs but could not see each other were included. Time-frequency analysis showed that induced oscillatory activity between 11 and 13Hz was reduced in the joint relative to no joint attention conditions over a large set of left centro-parieto-occipital sensors. These results suggest a modulation of centro-parietal mu rhythm, consistent with the idea that joint attention involves attention mirroring (Shepherd 2009), as well as a modulation of occipital alpha rhythm, consistent with the mutual attentiveness component of joint attention. This study emphasizes the interest – and feasibility – of moving toward a neuroscience of online face perception and real-life social interaction.

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