# SYNCH.LIVE: COLLECTIVE MOTION INDUCES A STATE OF CONNECTEDNESS — AN EEG HYPERSCANNING STUDY

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To emphasise the value of collective intelligence in humans, we present *Synch.Live*: a participatory behavioural science experiment for quantitatively studying self-organising collective behaviour in humans, framed as a game with a group feedback mechanism that can be solved through cooperation by 10 participants moving together. Synch.Live makes use of a novel information-theoretical framework which provides the practical criterion $\Psi$ to detect causal emergence from time series data. Specifically, we use it with movement trajectories to identify collective motion in real-time. The technology has been used to generate a unique dataset of trajectories which can provide novel insights into the complex dynamics of group motion. After running the experiment with 300+ participants, certain motions expressed by the human players were found to be similar to motions seen, at much larger scales, in intelligent group behaviour in animals. We find that circular movement, reminiscent of the milling of herds and schools, is characterised by long-term information storage, high redundancy, and a tightly-knit network of high pairwise mutual information with few hub nodes, unlike swarming movements, which show sharp decay in mutual information and higher synergy. We present a network analysis of different kinds of movement, as well as an investigation of higher-order synergy and redundancy. Moreover, participants report a collective experience with significantly higher connectedness to others when succeeding in the game, revealing Synch.Live can act as a platform for researching how state of mind affects collective behaviour and vice-versa. In its latest iteration, we have introduced EEG hyperscanning in 2 of the 10 participants, and we present preliminary results of a possible neural correlate of collective embodied experience.

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