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Abstract concepts refer to entities that are detached from concrete processing. How do children learn new abstract concepts and generalise this knowledge?

Learning in Social Interactions
- Face-to-face communication results in complex dynamics of multimodal behavioural and neural synchronisation.
- Learning of concrete concepts correlates with brain-to-brain synchrony.

How do children learn abstract concepts in its ecology: within social interaction with others?

Objectives
1) Identify the individual and interactional multimodal behaviours (verbal, non-verbal) that contribute to learning novel abstract concepts throughout development.
2) Investigate whether neural interactional dynamics predict successful learning, and whether they do so above and beyond individual neural measures.
3) Identify the behavioural factors that contribute to brain coupling in successful learning of novel abstract concepts.

Participants
- 90 children (approx.) aged 6-12 and their caregivers.
- 3 main age groups: 6-7, 8-9, 10-12.
- Native English speakers, typically developing.
- Recruited through London schools, UCL PACT community, Prolific, social media.

fNIRS Hyperscanning
- Hitachi ETG 4000.
- One 5x3 probe per participant.
- 8 sources, 7 detectors → 22 channels.
- Focus on dorsolateral prefrontal cortex and temporoparietal junction.
- Left hemisphere.

Novel Interactive Task
- Data synchronisation: analog-to-digital converter.
- Multiplayer task.

Learning Outcomes
- Performance in learning trials is above chance.
- Preliminary results (n = 22)

Verbal Dynamics
- Preliminary results (n = 17)

Brain-to-Brain synchronisation
- Coloured dots show coherence value by channel in trials that resulted vs. did not result in learning:
  - 0 to 1: Learning > No Learning
  - -1 to 0: No Learning > Learning

Next Steps
- Moving towards annotations of non-verbal behaviours.
- fNIRS digitisation for optode localisation.
- Pre-registration of the study and analysis pipeline for next age groups.