

## **Relationship between speech-brain entrainment and word learning during infancy.**

**Responsable :** Louise Goupil

**Résumé :** In human adults, neural entrainment to speech (in particular in the theta band corresponding more or less to the rate of syllables) has been shown to play a causal role in parsing continuous speech streams and perceiving syllable lengths (Hovsepian, Olasagasti, & Giraud, 2020; Kösem, Basirat, Azizi, & van Wassenhove, 2016; Kösem et al., 2018). Studies measuring the brain of several participants engaged in a conversation, or listening to a common narrative, have also shown that the extent to which several brains synchronize with respect to a narration not only relates to low-level aspects of speech (e.g., entrainment to syllables onset allowing to parse speech, Hovsepian, Olasagasti, & Giraud, 2020), but also, to semantic understanding and successful transfers of information (Pérez, Dumas, Karadag, & Duñabeitia, 2019; Simony et al., 2016; Stephens, Silbert, & Hasson, 2010; Zoefel, Archer-Boyd, & Davis, 2018). When this process emerges during life, and whether it plays a role in language acquisition, remains unclear. A few studies suggest that the infant brain entrains to speech (Attaheri et al., 2020; Kabdebon et al., 2015; Kalashnikova, Peter, Di Liberto, Lalor, & Burnham, 2018; Zhang et al., 2011), but whether this is related to comprehension and word learning remains unknown.

Using a dataset involving short sessions during which mothers play with their 14-month-old infants in a lab-setting while we recorded their brain activity using electroencephalography and their speech using lapel microphones, we will examine whether infants' brains entrain to their mother's speech, and whether this relates to their ability to extract novel words from this speech stream. During this session, mother and infants first played with novel or familiar toys, and infants learning of the novel words was then measured using a looking-while-listening procedure. We will thus be able to examine whether infants' neural entrainment to speech is stronger for familiar as opposed to novel words, which could suggest that neural entrainment to speech already depends on comprehension in this age group, as is the case in adults (Kösem & van Wassenhove, 2017; Pérez et al., 2019).

### **Travail à réaliser lors du stage :**

- (a) Participation au codage des données pour identifier le type de parole utilisé pendant le jeu (implique de coder en python puis d'écouter des extraits de jeu *en anglais*);
- (b) Participation à l'analyse des données d'électroencéphalographie en relation avec les enregistrements (python, R, matlab).

**Lieu de stage :** Laboratoire de Psychologie et Neurocognition, LPNC UMR CNRS 5105.

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