

# Project

Does embodied L2 verb learning affect retention and representation?

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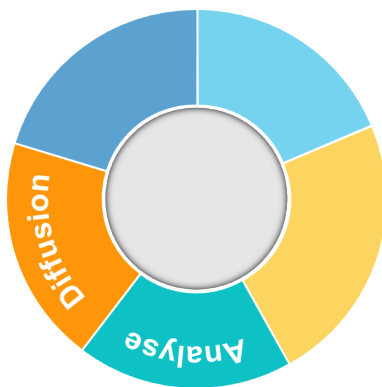
<sup>3</sup>ISM

**Abstract.** *The objective of the present project is to study how naturalistic actions in a highly immersive, multimodal, interactive 3D virtual reality (VR) environment may enhance fast mapping. The project uses a unique combination of EEG and VR to investigate whether embodied learning or learning that occurs using specific physical movements, carried out on an object, that are coherent with the meaning of the new words, creates linguistic representations that produce greater motor resonance due to stronger motor traces compared to simply pointing at the object. We will also investigate whether embodied learning leads to better retention in terms of behavioural measures. The present work builds upon a previous successful collaboration that has, so far, produced one theoretical paper (Zappa et al. 2019) and a methods paper that is currently in preparation (Bolger et al, 2020)*

## Publications

A. Zappa, D. Bolger, JM. Pergandi, R. Fargier, D. Mestre & C. Frenck-Mestre, 2020, *Does embodied L2 verb learning affect retention and representation ?* Submitted to **Neurobiology of Language**

## Fiche Contribution CREx



### Does embodied L2 verb learning affect retention and representation ?

Examining the online interaction between linguistic & motor activation during the fast-mapping of novel lexical items, using EEG and VR.

Investigateurs : A. Zappa (LPL), C. Frenck-Mestre (LPL), D. Mestre (CRVM, ISM) & JM. Pergandi (CRVM, ISM)

Durée : 12 mois (2020-2021) will continue in 2021.

#### Contribution

- Assisting in setting up experimental protocol.
- Preparation of pre-processing scripts.
- Analysis of pre-processed data - time-frequency & statistical analyses.
- Assistance in writing up the methods section of pre-registered report.

**Objectif :** *The current study aims to explore the concepts defended by theories of embodied cognition by manipulating motor stimulation during language learning in an immersive VR environment. The design will build upon that used in our recent study (Zappa et al, 2019; Bolger et al, under revision). The neural correlates of embodied learning will be investigated using EEG in two separate tasks, both pre- and post- training. In the first task, we will measure motor activation while participants listen to newly learned words and, in the second task, the semantic processing of newly learned words will be measured. The behavioural correlates of this type of learning (word-meaning retention) will also be recorded. Learning will take place in a VR environment within the laboratory setting of the LPL and participants will be taught to associate new linguistic labels to specific performed movements to test whether this reinforces sensorimotor representations of the new vocabulary and improves new label retention.*

**Experimental Setup -** The CREx engineer assisted in the design of the experimental protocol and a pilot test was carried out with 5 participants to test the material and protocol. Details regarding the experimental setup and the protocol are in annex A.

**Pre-processing –** The pre-processing of the pilot data was carried out by the doctorant student, however the CREx engineer did provide the scripts allowing the researcher to run the pre-processing steps.

**Analyse –**

- Calculation of power analysis for the pre-registered report submitted to *Neurobiology of Language*.
- The CREx engineer will carry out time-frequency decomposition on the EEG data.

**Diffusion** - A pre-registered report was submitted to *Neurobiology of Lanuage*. The CREx engineer assisted in the writing of the methods section of the paper.