Analysis of handwriting movements through video capture: a window on language processing, motor control, and their interactions

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Duration: 4 to 6 months, starting from January or February 2026

Handwriting allows the perennial registration of thoughts and language. Once learned, handwriting involves fine-grained motor skills generating high speed millimetric movements in a quasi-rhythmic fashion. Studying handwriting therefore opens a window on language processing, motor control, and their interactions.

Our group is currently developing a methodology for video recording and reconstruction of handwriting movements using the software suite DeepLabCut (Nath et al., 2019), as part of a larger national grant project investigating the diversity of writing practice worldwide. In this context, the aim of this internship is to validate a video recording protocol to study handwriting movements. **The intern's task will be to replicate an experimental effect previously demonstrated through e-tablet recordings, now with video analyses.** The task of interest is described in Alhaddad et al. (2023). In the longer term, the video method will be used to **characterize the gestural properties of a variety of scripts**, and to understand how these properties contribute to individual variability in cognitive and motor processes (Alhaddad et al., 2024).

Our group hosts specialists of language production and reading who use advanced behavioral and brain imaging approaches to understand the cognitive and neural processes underpinning these functions. The CRPN offers a dynamic scientific environment at the interface of several major research institutes of Aix Marseille Université, notably on language and communication, fundamental and clinical neuroscience, or education.

The candidate will preferentially have a background in **cognitive science or cognitive/computational neuroscience, and basic programming and data management skills for using Python packages and statistical analysis**. Interest in writing systems, writing practice, and more broadly linguistic diversity is a plus.

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https://crpn.univ-amu.fr/fr/equipes/lama-langage-et-musique-en-action

References:

Alhaddad G, Danna J, Younes-Harb C, Velay JL, Longcamp M. Effects of biscriptuality on graphomotor coordination dynamics. J Exp Psychol Hum Percept Perform. 2023 Feb;49(2):177-187. doi: 10.1037/xhp0001075.

Alhaddad G, Dione M, Danna J, Alario FX, Honnorat A, Velay JL, Gilhodes JC, Longcamp M. Writing in two different scripts promotes fine motor control. Cortex. 2024 Oct;179:247-260. doi: 10.1016/j.cortex.2024.07.016. Epub 2024 Aug 22. PMID: 39213777.

Nath, T., Mathis, A., Chen, A.C. *et al.* Using DeepLabCut for 3D markerless pose estimation across species and behaviors. Nat Protoc **14**, 2152–2176 (2019). https://doi.org/10.1038/s41596-019-0176-0