Does typing-related motor experience influence the retrieval of orthographic information? Effect of letter configuration in an anagram solution task

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Introduction

Embodied theories of language postulate that processing a written word reactivates a set of sensory and motor experiences previously associated with the word Berndt et al., 2018. A motor experience associated with written linguistic material is typing. Typing is massively used to produce written language on different devices, and most young adults are skilled typists Pinet et al., 2022. A previous study indicates that typing expertise influence word recognition Cerni et al., 2016. **Here, we tested the hypothesis that the knowledge of the keyboard configuration associated with typing, facilitates the retrieval of the correct order of the sequence of letters that composes a word.**

Method

Participants: 100 paid right-handed subjects (mean age= 27,5; 50 females) participated to an Online experiment (via Pavlovia and Prolific software). Four groups were built with counterbalanced task order and word list.

Materials :

- **Main Task: Anagram solving** (2 lists of 14 words of 4 to 6 letters). Two conditions for visual presentation of the letters: either congruent or incongruent with the French AZERTY keyboard layout.

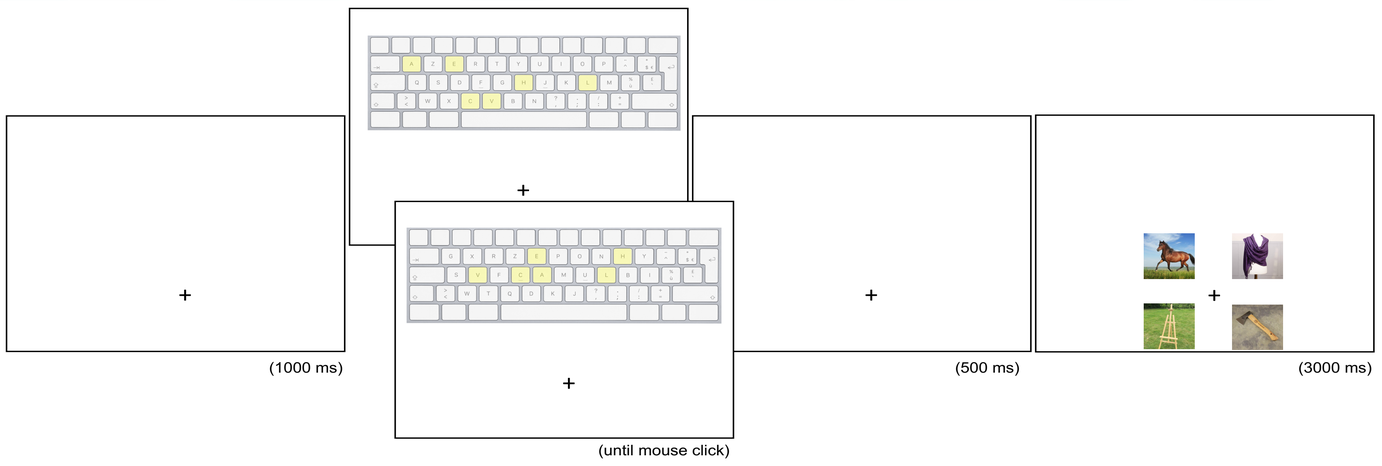

Figure 1. Typical trial sequence for Anagram solving task with the AZERTY (up) vs. non-AZERTY (down) presentation.

- **Control Task: Pseudoletter identification.** Same trial sequence as the anagram solving task, except that the participant had to identify a pseudoletter displayed on the keyboard.

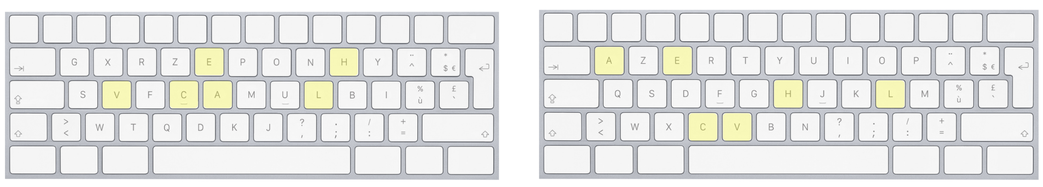

Figure 2. Example of keyboard layout presented for the target 'horse' ('cheval' in french)

- **Copy Task**: Used to measure the typing expertise of each participant (custom code adapted from InputLog software - Leijten & Van Waes, 2013)

Results:

Log-transformed RTs were subjected to a mixed effects model (*controlling for several word components –i.e. number of characters, frequency, graphemic complexity- list, keyboard layout*)

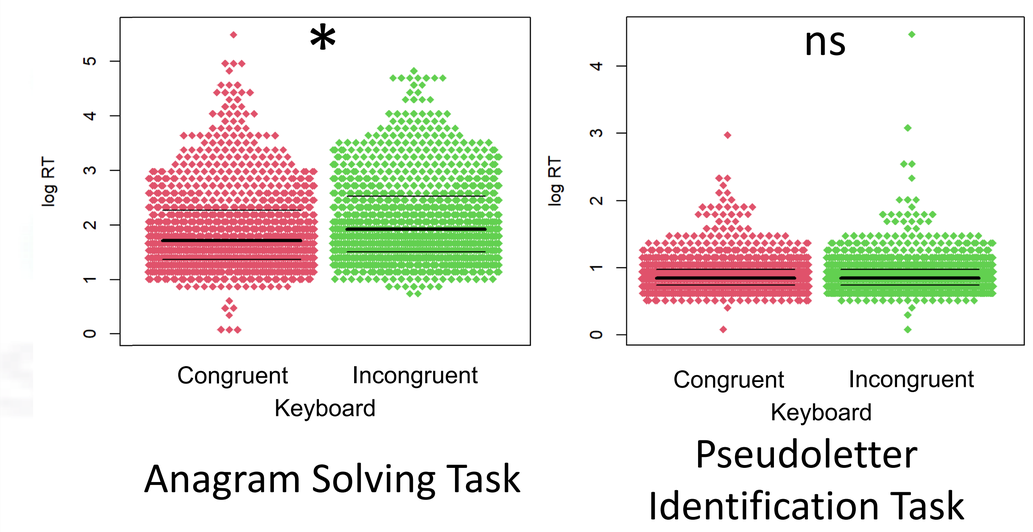

Figure 3. RT in the Anagram Solving Task (Left panel) and in the Pseudoletter Identification Task (Right panel) as function of the type of keyboard presented (congruent or incongruent)

- In the Anagram solving task, a main effect of Keyboard Layout was observed : **RT was lower in the congruent AZERTY keyboard than in the incongruent keyboard condition.**
- In the Control task, no significant difference between presentation conditions
- No significant correlation between RT and level of typing skills.

Discussion:

Results indicate that anagrams were solved faster in a visual presentation congruent with the French AZERTY keyboard layout, while presentation condition had no effect in the control task. This indicates that typing practice plays a role in retrieval of word information, consistent with the embodied account of written language processing. Our finding suggests that typing, a procedural skill with a strong sequential component, can facilitate the ability to retrieve the correct sequence of letters composing a word. This highlights the potential value of motor learning to support spelling acquisition.

References:

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