Individual differences in motor learning in children

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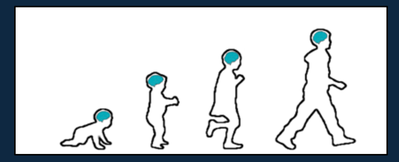


Introduction

- Brain plasticity changes over development but it remains unclear how changes in the brain impact changes in learning.
- Learning and retaining motor skills play a significant role in our lives as it relates to skills such as writing, operating objects and machines, and various coordinated body movements.
- Previous research has shown that motor coordination tasks are performed more rapidly in older children in the 5-to-8-year age range.[1]
- A person's direction of handedness is typically fixed by the age of 3. However, the degree of their handedness tends to increase through the ages of 3 to 7 years, before slowing down and eventually plateauing at 9 years.[2]
- A wealth of research has looked at learning ability and capacity over the lifespan, but few studies have studied how they change over the early years of life or their relation to motor skill development.
- **Hypothesis: There is an association between age and pace of learning handwriting motor skills in children.**

Methods

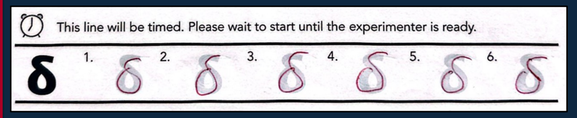
Participants

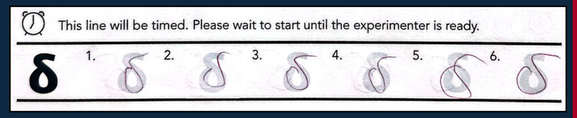
- 17 children (7F, 10M, ages 5.8-8.2 years) were recruited to complete the handwriting lessons and had usable data.

Administration and Analysis

- Over 6 to 8 lessons, participants completed a handwriting packet in which they traced Greek letters.
- Each day consisted of a page with untimed practice sections for 2 Greek letters, and a final timed line of the first letter.
- Administrators, over Zoom, instructed them to complete each section "as quickly and as smoothly" as they could.
- Participants completed the day's page first with their right hand, then completed a replica page with their left hand.
- Dependent variable: the change in time in seconds to complete the last line of each page with each hand.

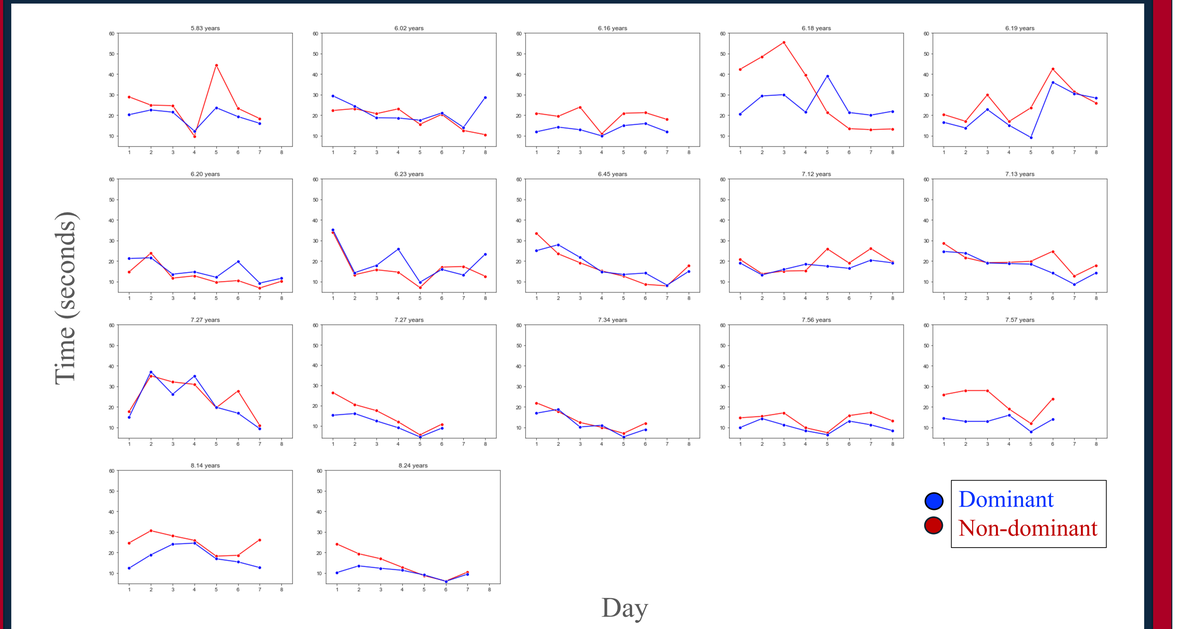
Example of the final line of the handwriting packet



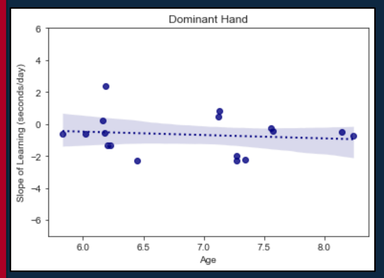


Results

Daily performance of dominant (blue) and non-dominant (red) hands, ordered from youngest to oldest.

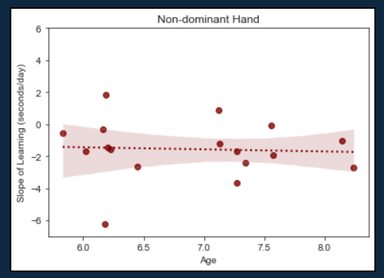


Age is not associated with learning for the dominant hand



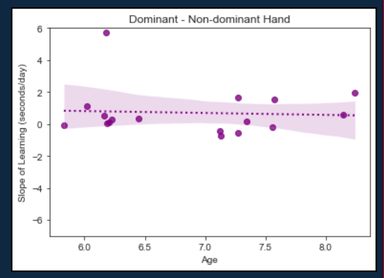
$r = -0.13$, $p = 0.61$

Age is not associated with learning for the non-dominant hand



$r = -0.05$, $p = 0.84$

Age is not associated with the difference between non-dominant and dominant hand learning



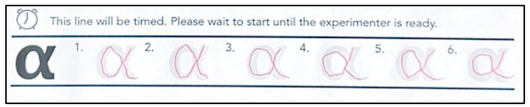
$r = -0.06$, $p = 0.81$

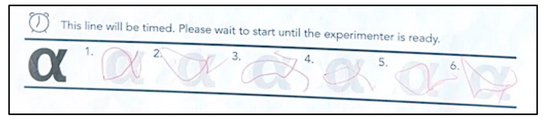
Discussion

- **There was no significant association between age and pace of learning** to write Greek letters with the dominant hand, nondominant hand, or the difference of the two.
- **The findings indicate no significant change in writing motor skill learning ability between the ages of about 6 years to 8 years of age.**

Limitations & Future Directions

- **The sample size for this study was quite small (N=17).** Future studies should examine a larger pool of subjects.
- **Participants were assessed over Zoom, where they completed the packet with non-standardized administration** due to:
  - constraints of the participants' device's camera
  - misunderstanding/disregard of the directions
  - unreliable verbal cues of completing the timed section
  - Uncontrolled and distracting home environment
- Participants completed the packet at the end of a science lesson which may have left them tired, bored, or burnt out.
- **Several participants had low accuracy, particularly with the non-dominant hand, prioritizing completing quickly over accurate handwriting**. This led to times that may not reflect their true effort. Future studies may wish to examine the effects of motivation, attention, and frustration on accuracy performance and task persistence.





Dominant Hand (top) and Non-dominant Hand (bottom)

References

1. McManus, I. C., et al. (1988). *British Journal of Developmental Psychology.*
2. Denckla, Martha Bridge (1974). *Developmental Medicine & Child Neurology.*

Acknowledgments

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