

Handwriting vs. Typing and Short-term Memory Effects

Marah Salloum, Alyssa Sauer,
Jenaya Choy, Gabriel Ching,
Joaquin Luna

Introduction – Why study this?



- College students have become dependent on typing and rely on technology for notes and test-taking.
- Testing which note-taking strategy leads to better study habits and memory recall is important for academic success for college students.
- Educators in school systems reinforcing better strategy for note taking has the potential to increase short term memory skills and deeper encoding in students.
- As technology is becoming more dominant, understanding potential cognitive trade offs is important when deciding which is the most effective note-taking strategy.



Introduction – Previous Studies



- Lee (2021):
 - a. Conducted a study that analyzed the impact of note-taking via typing on a smartphone or handwriting notes.
 - b. Results
 - c. Limitations

- Ihara and colleagues (2021):
 - a. Examine the benefits of handwriting compared to other methods when it comes to memory retention. This proves that there have been various studies that have come to similar conclusions.
 - b. Results
 - c. Limitations

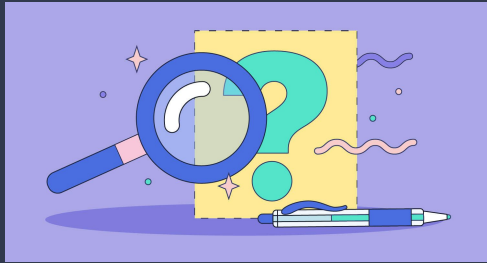
Research question:

Does handwriting have better effects on short-term memory in comparison to typing?



- ❖ **Level of Processing Effect:**
 - a. Hypothesizes the idea that when deeper levels of processing are involved in an activity, task or stimuli, it results in deeper memory retention.
 - b. Handwriting involves higher levels of cognitive processing and attention compared to pushing buttons on a keyboard & involves more attention and focus as it is a slower and more complex method of note taking.
 - c. This theory could explain many of these results we are seeing in similar studies and our study will further test this hypothesis with a more specific sample size.

Hypotheses



Hypothesis:

- ❖ Handwriting as a note-taking strategy will lead to better short-term memory recall compared to typing.

Null hypothesis:

- ❖ Handwriting will NOT have a greater effect on short term memory recall than typing.

Alternative Hypothesis:

- ❖ The typing group would have a stronger recall of the words as college students are used to typing daily

Key Terms

Key Terms:

- ❖ **Short term memory:** the ability to recall a small amount of information for a brief period of time, usually up to 30 seconds.
- ❖ **Handwriting:** For this study, handwriting refers to participants taking notes using pen and paper during a given task.
- ❖ **Typing:** For this study, typing refers to participants taking notes on a laptop using a standard keyboard.



Methods



Subjects characteristics

- ❖ 19 Psychology Undergraduate students recruited from PSYC-182J Lab at UCR
- ❖ Randomly selected into group 1 or group 2

Materials & Stimuli:

- ❖ Two randomized sets of 12 words orally presented by the experimenter, perceived as an auditory stimuli for the participants.
- ❖ Asked an AI tool to give us two sets of 12 randomized words not being in the category and not having the same amount of syllables.
- ❖ This design was properly selected by the group through comparing various sets of words and choosing the two that were most randomized.

Results:

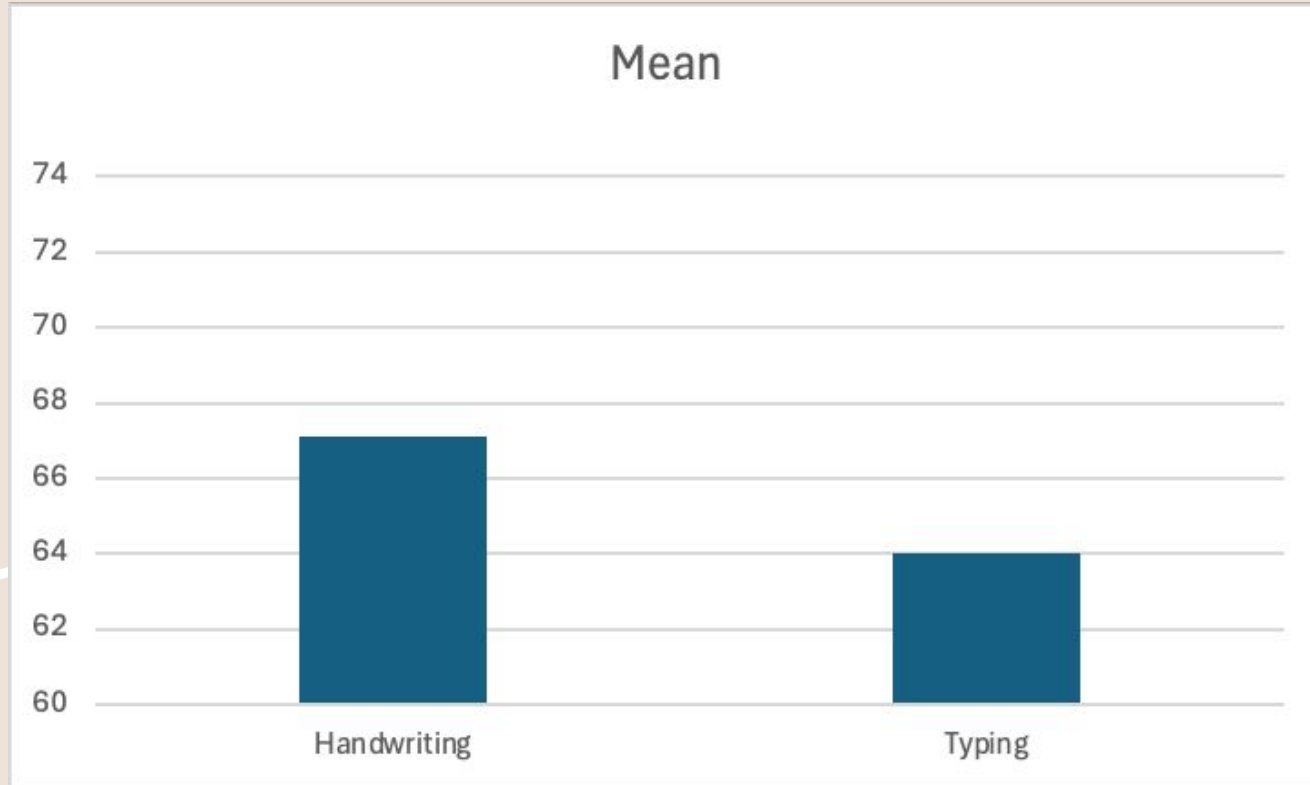


Significant findings pertaining to the hypothesis:

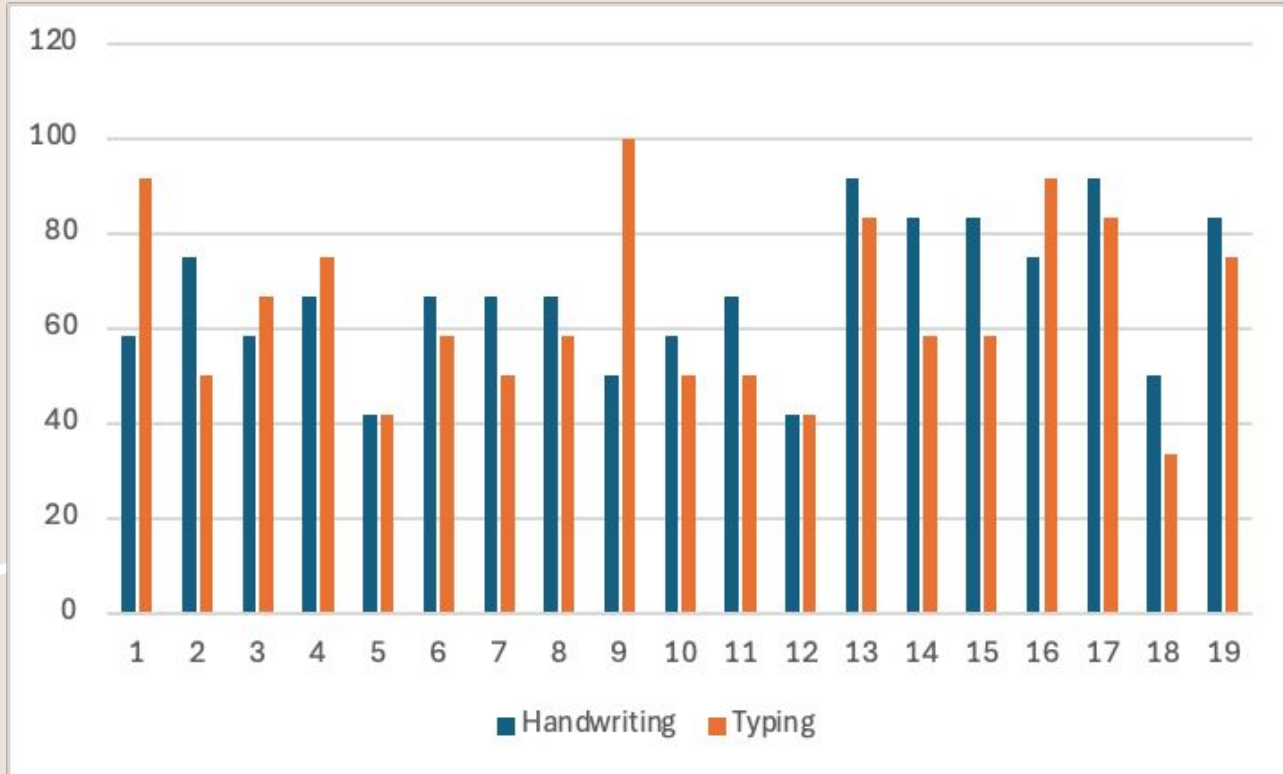
- ❖ Did the results support the hypotheses?
 - Paired two-tailed t-test:
 - $p\text{-value} = 0.505134028$
 - There was no significant difference between the two groups and we failed to reject the null hypothesis

- ❖ Did the results raise other questions?
 - Is it possible that student experience with each condition is a third variable?
 - How can we control for that in future studies?
 - Would it be possible to find a difference between typing on a keyboard or typing on a screen in college students?

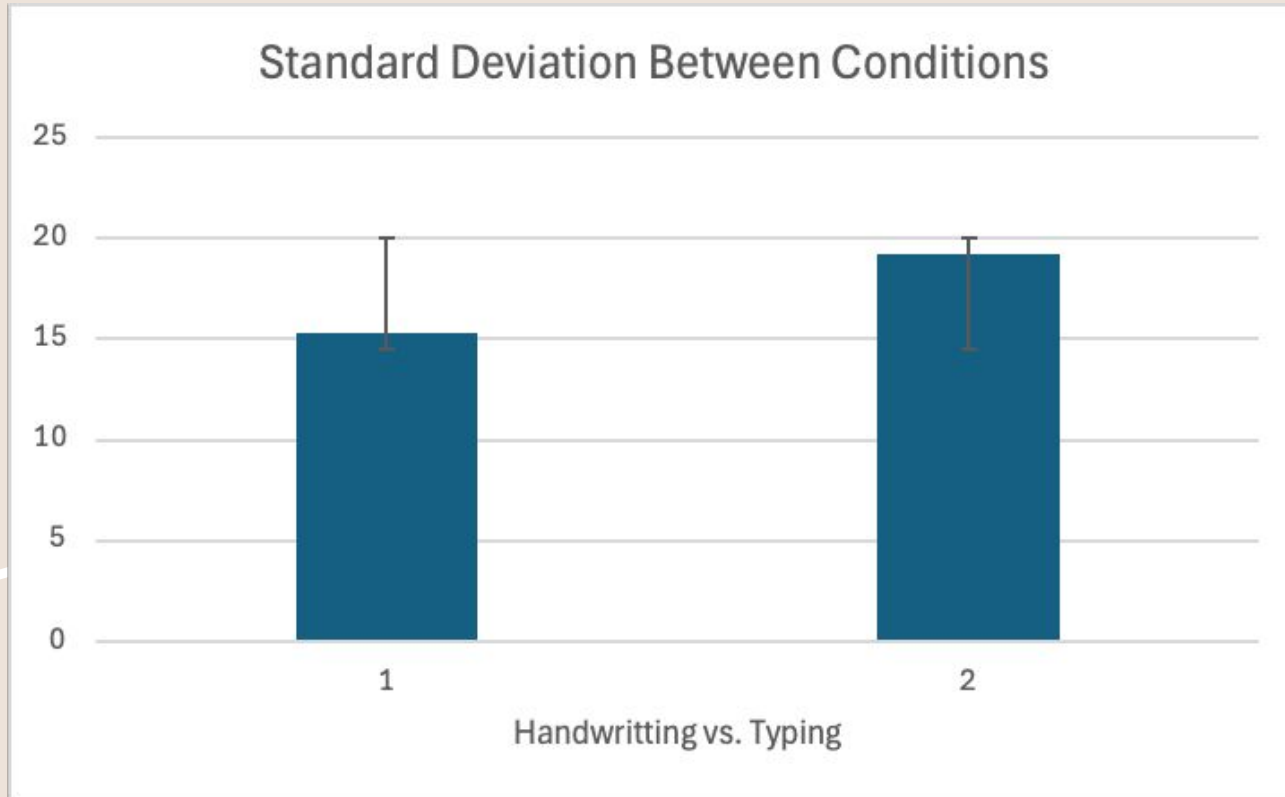
Results - Mean of Conditions



Results - Comparison of Conditions



Results - Standard Deviation



Conclusion



- ❖ **Our Research Question:** Does handwriting have a greater effect on short term memory recall versus typing in college students?
 - No significant results
 - **Failed to reject** our null hypothesis: Handwriting will **NOT** have a greater effect on short term memory recall than typing.
- ❖ **BUT!** This doesn't disprove any differences!
 - Research articles have revealed handwriting to be more proficient with memory than typing
 - (Mangen, et. al., 2015)
 - (Ihara, A. S., et. al., 2021)
- ❖ **Insight:**
 - We need to be accounting for technological dependence in today's age
 - Addressing limitations and improving! (next slide)

Conclusion: Implications of the Study

❖ **Limitations**

- Present the stimulus differently (reduce any word repetition)
- All the groups handwrote in the recall section which may have affected results
- Simple words don't replicate the complexity of notetaking


❖ **Improve → Methods for experimental design**

- More Organization with assigning IDs and what type of group the participant is in (1st and 2nd Condition)
- Larger sample size of people (our experiment had 19 participants)
- Accounting for confounding variable – gender, age, memory proficiency, type of writing utensil, mood, etc.

❖ **What's Next?**

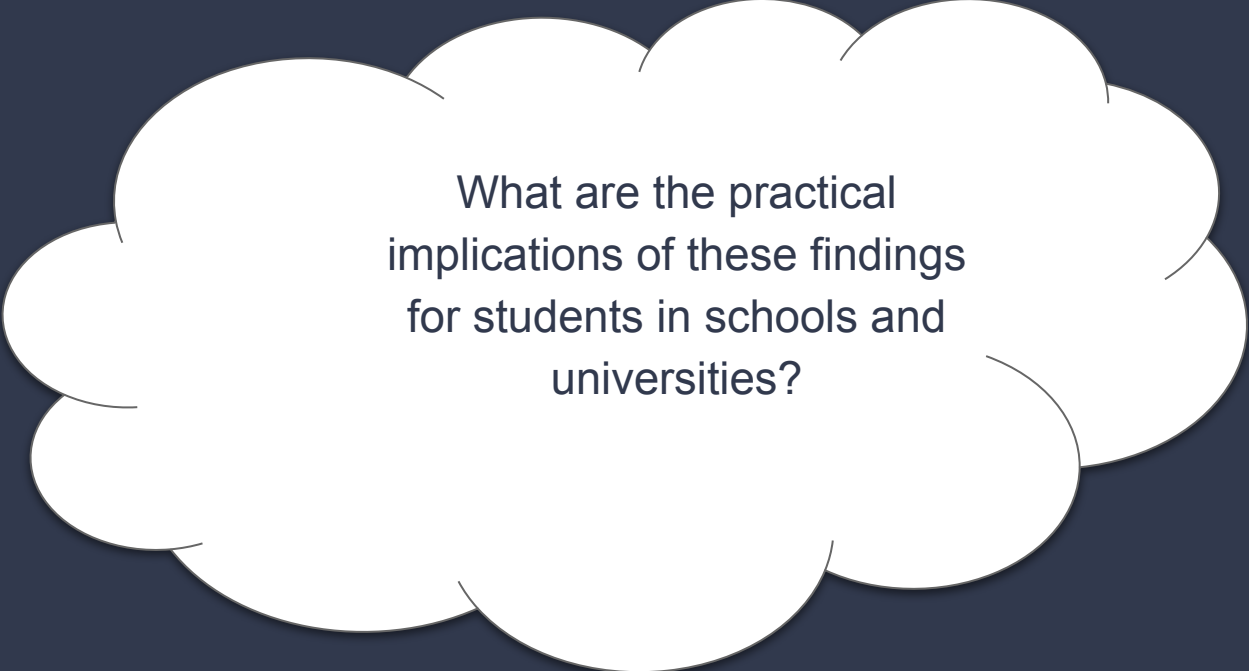
- For better results → working on controlling confounding variables and limited mistakes (organization and word repetition)
- Thank you for participating!

Question 1- Class Discussion



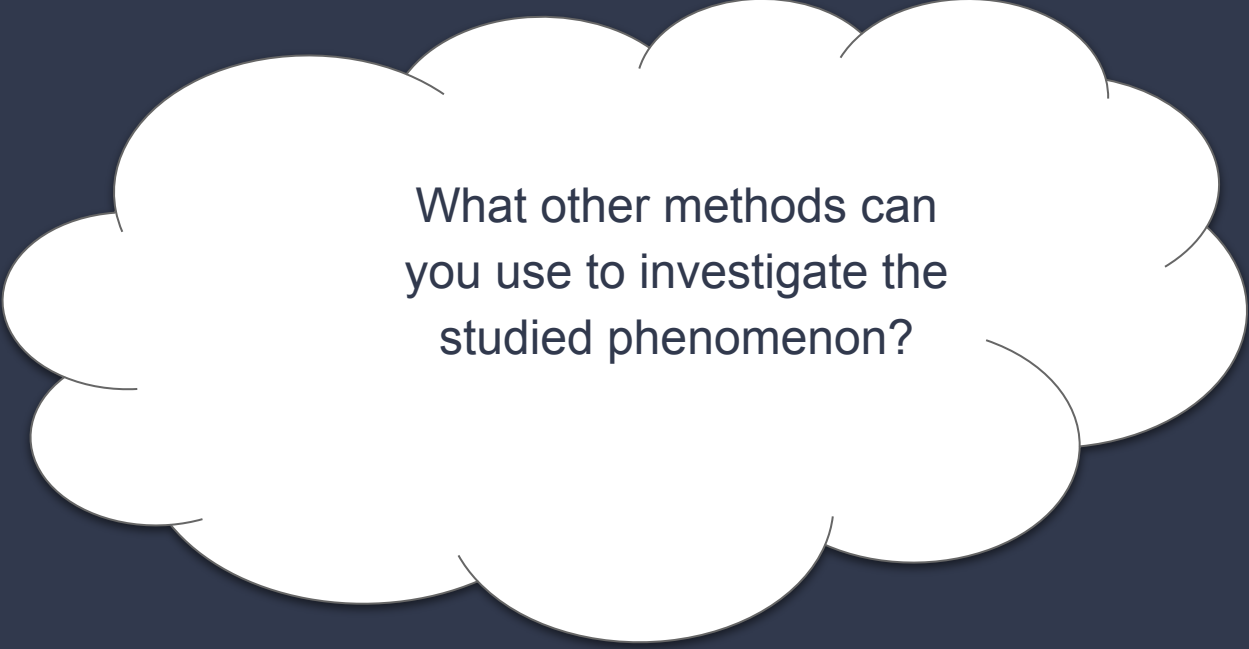
How can future studies
control for third variables
better next time?

Question 2– Class Discussion



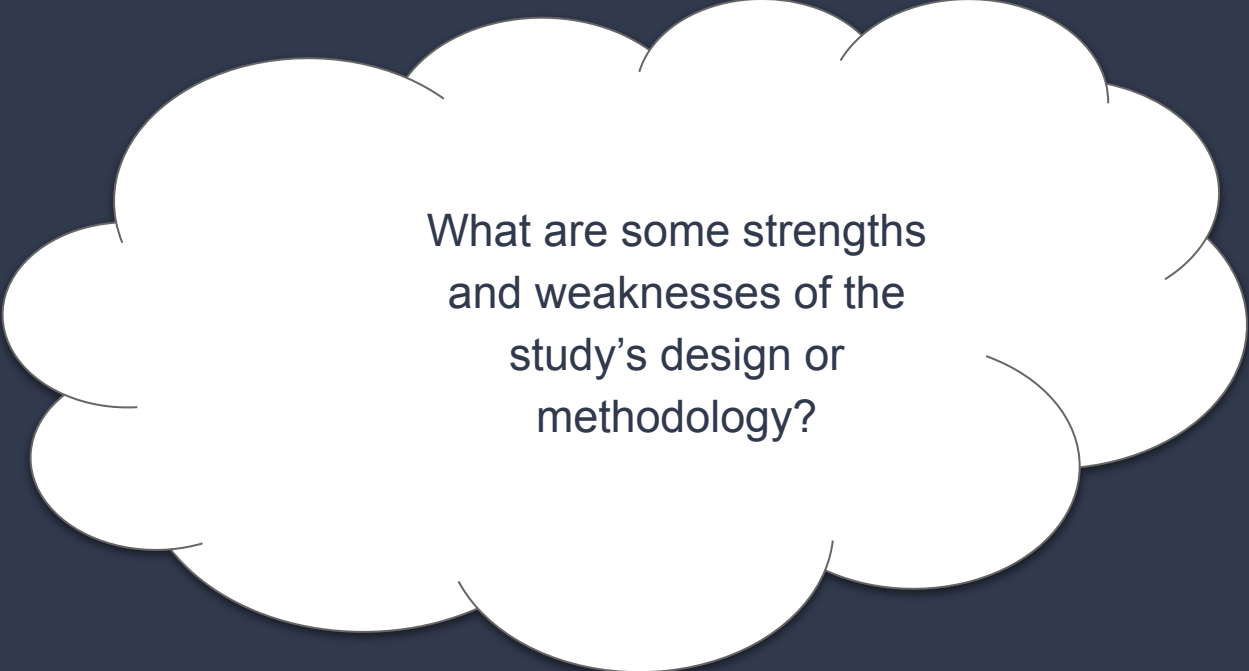
What are the practical implications of these findings for students in schools and universities?

Question 3– Class Discussion



What other methods can you use to investigate the studied phenomenon?

Question 4- Class Discussion



What are some strengths and weaknesses of the study's design or methodology?