Typing & Attention

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What is our project?

- Effect of music on our attention and efficiency
- Familiarity & loudness of music
- Many people work and listen to music

Motivation

- Wide use of background music which can range from unfamiliar songs to familiar ones
- Interested in what factors can affect our attention, specifically familiarity with lyrics and loudness of music

Related work

- **Effects on Attention and Music**
  - Shih, Y. N., Huang, R. H., & Chiang, H. Y. (2012). Background music: Effects on attention performance. Work, 42(4), 573-578.
  - **Results:** Background music with lyrics had significant negative effects on concentration and attention, but there were no differences with no background music
- **Using the Neurosky to Detect Attention Levels**
  - Rebolledo-Mendez, Genaro & Dunwell, Ian & Martínez, Erika & Vargas-Cerdán, María & de Freitas, Sara & Liarokapis, Fotis & García-Gaona, Alma. (2009). Assessing NeuroSky's Usability to Detect Attention Levels in an Assessment Exercise. 149-158. 10.1007/978-3-642-02574-7_17.
  - **Results:** Neurosky provides accurate readings regarding attention, since there is a positive correlation between measured and self-reported attention levels.
- **Workload Using EEG**
  - Brouwer, A. M., Hogervorst, M. A., van Erp, J. B., Heffelaar, T., Zimmerman, P. H., & Oostenveld, R. (2012). Estimating workload using EEG spectral power and ERPs in the n-back task. Journal of neural engineering, 9(4), 045008. https://doi.org/10.1088/1741-2560/9/4/045008
  - **Results:** Neurosky which uses raw brain signals and a proprietary algorithm can be used to determine workload/attention required and individuals have unique responses

Methods

- 2 **Independent Variables**:
  - Familiarity of music
  - Loudness of music
- **Dependent Variable**: Attention
- 60 second speed typing test
- Listening to rock songs with 150 BPM

Experimental setup

- **Baseline:** mental math no music
- **Control:** 1 song unfamiliar & volume 50%
- **IV 1:** 1 song familiar & volume 50%
- **IV 2:** 1 song unfamiliar & volume 100%
- **IV Both:** 1 song familiar & volume 100%

Note: Participants went through ALL trials with no breaks

Experiment Conditions	Low Volume	High Volume
Unfamiliar	Control (Need You Tonight)	IV 2 (Pride (In the Name of Love))
Familiar	IV 1 (Summer of ‘69)	IV Both (Eye of the Tiger)

Hypothesis

- **Null Hypothesis:** The familiarity with music and loudness **does not affect** the attention of the participant as measured by the speed typing test.

- **Alternate Hypothesis:** The familiarity with music and loudness **affects** the attention of the participant as measured by the speed typing test (could be better or worse).

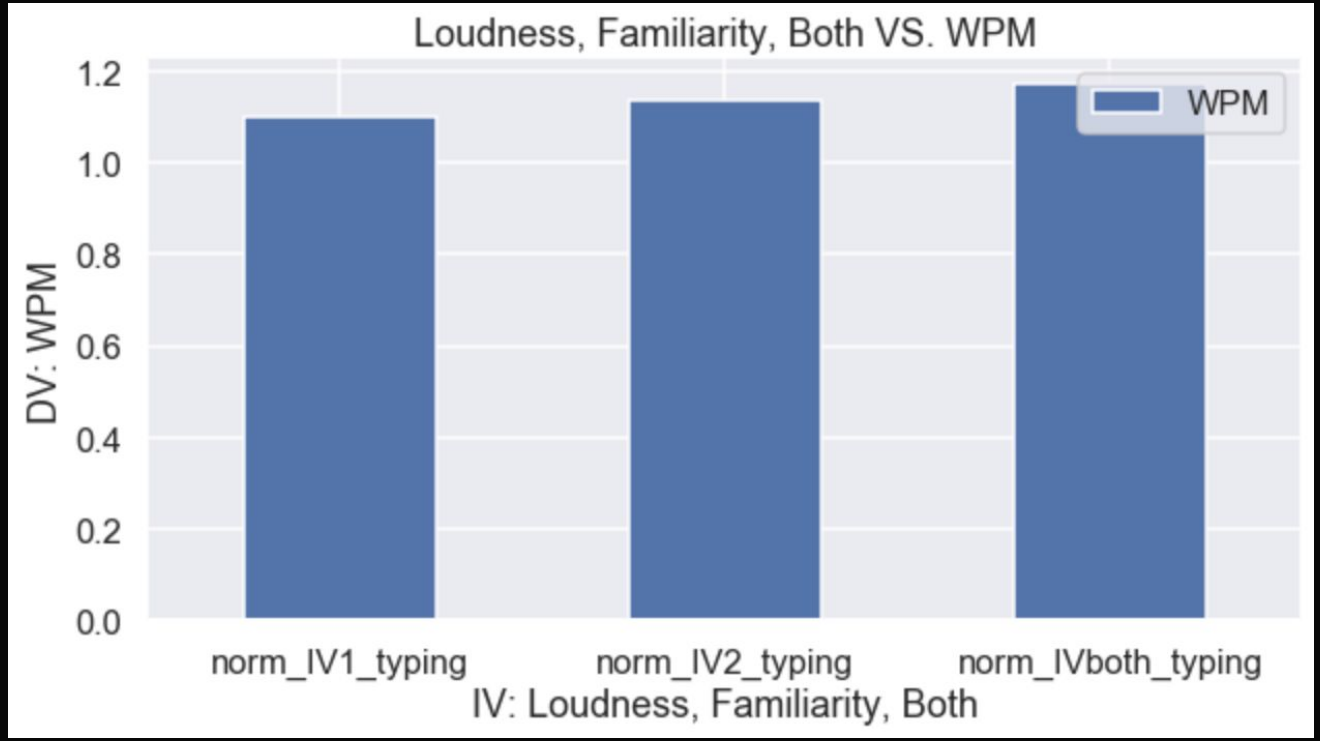
What we measured and analyzed

- **Typing Test:** FastFingers online typing test
  - **Accuracy:** percentage of correct words
  - **Speed:** words per minute (WPM)
  - Normalized typing data using *control*

- **Attention**: Neurosky headset attention values
  - Calculated the rolling mean for attention to visualize trends over time
  - Normalized attention using *baseline*
    - Used average from *baseline* trial

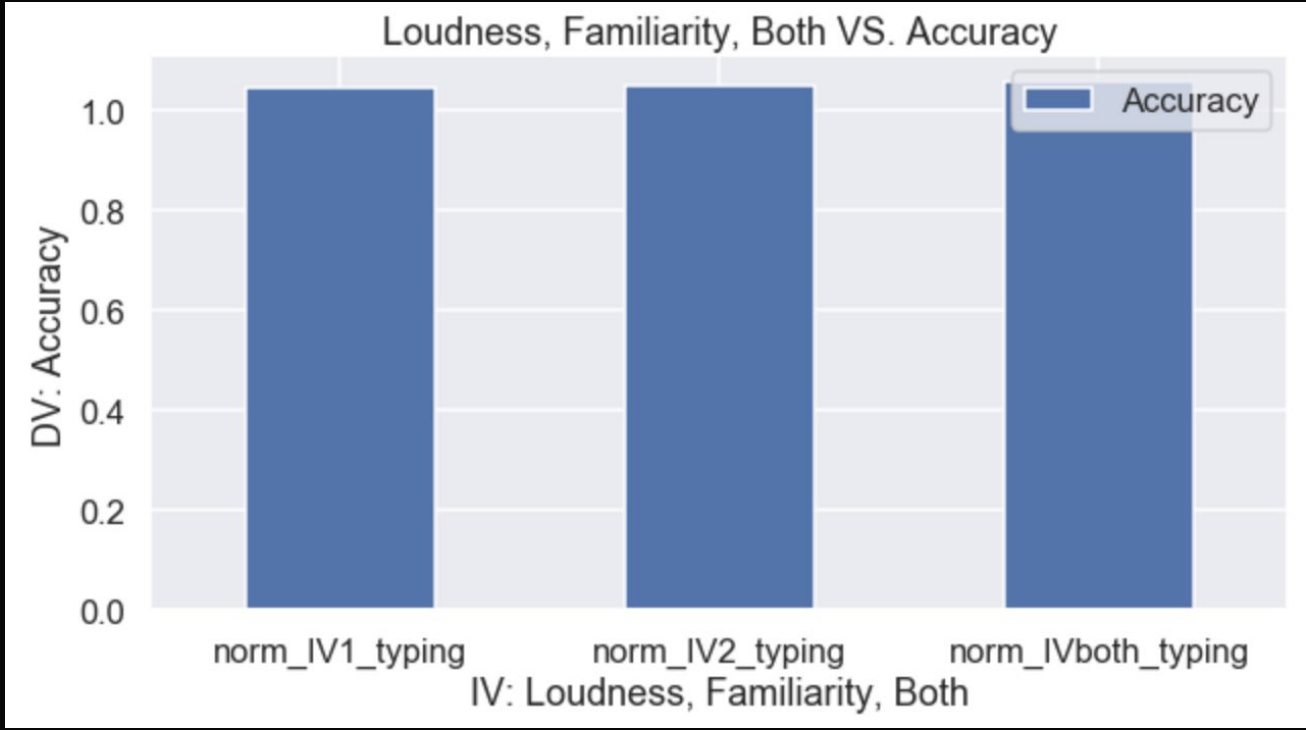
Results: WPM (Words Per Minute)

	Typing	WPM
0	norm_IV1_typing	1.098439
1	norm_IV2_typing	1.137188
2	norm_IVboth_typing	1.172136

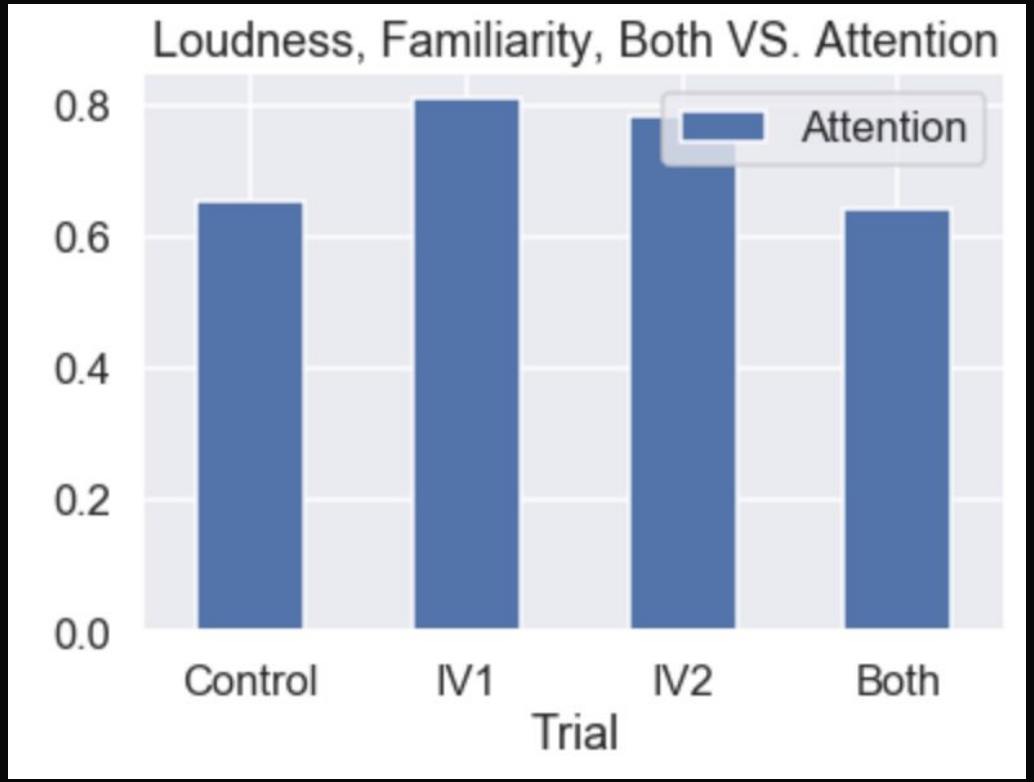


Results: Accuracy

	Typing	Accuracy
0	norm_IV1_typing	1.044638
1	norm_IV2_typing	1.050953
2	norm_IVboth_typing	1.057899

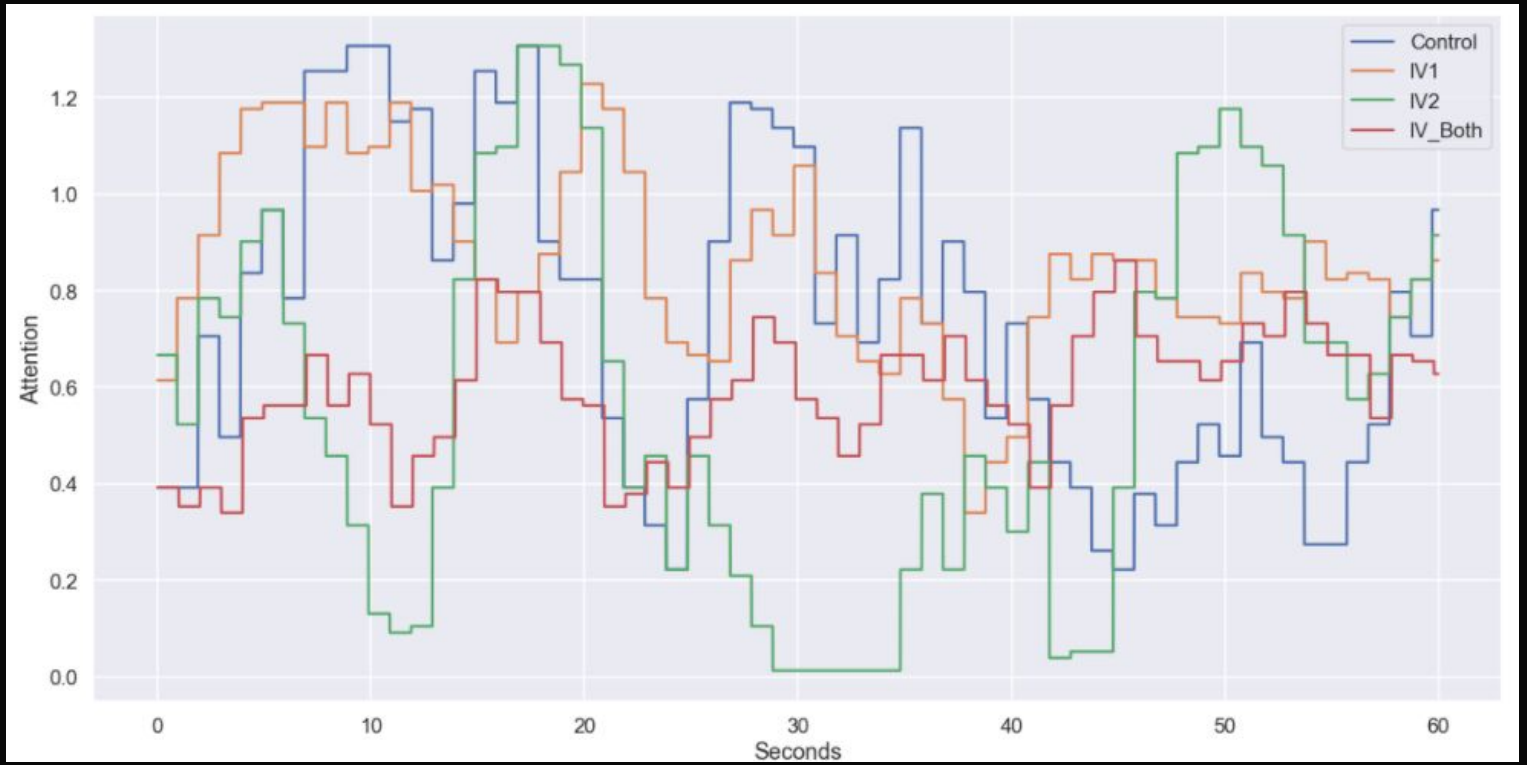


Results: Attention

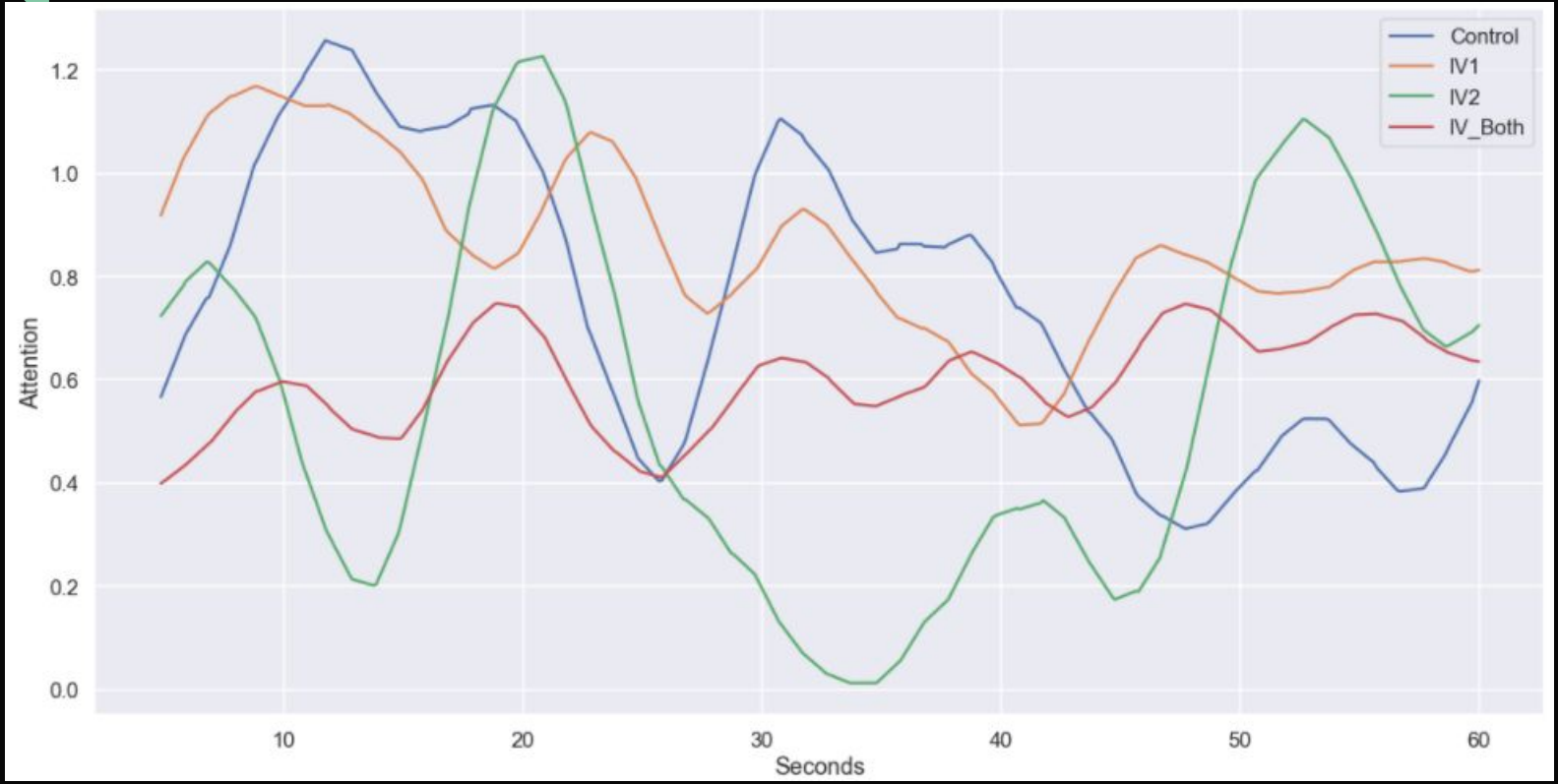


	Trial	Attention
0	Control	0.653430
1	IV1	0.809750
2	IV2	0.784373
3	Both	0.643723

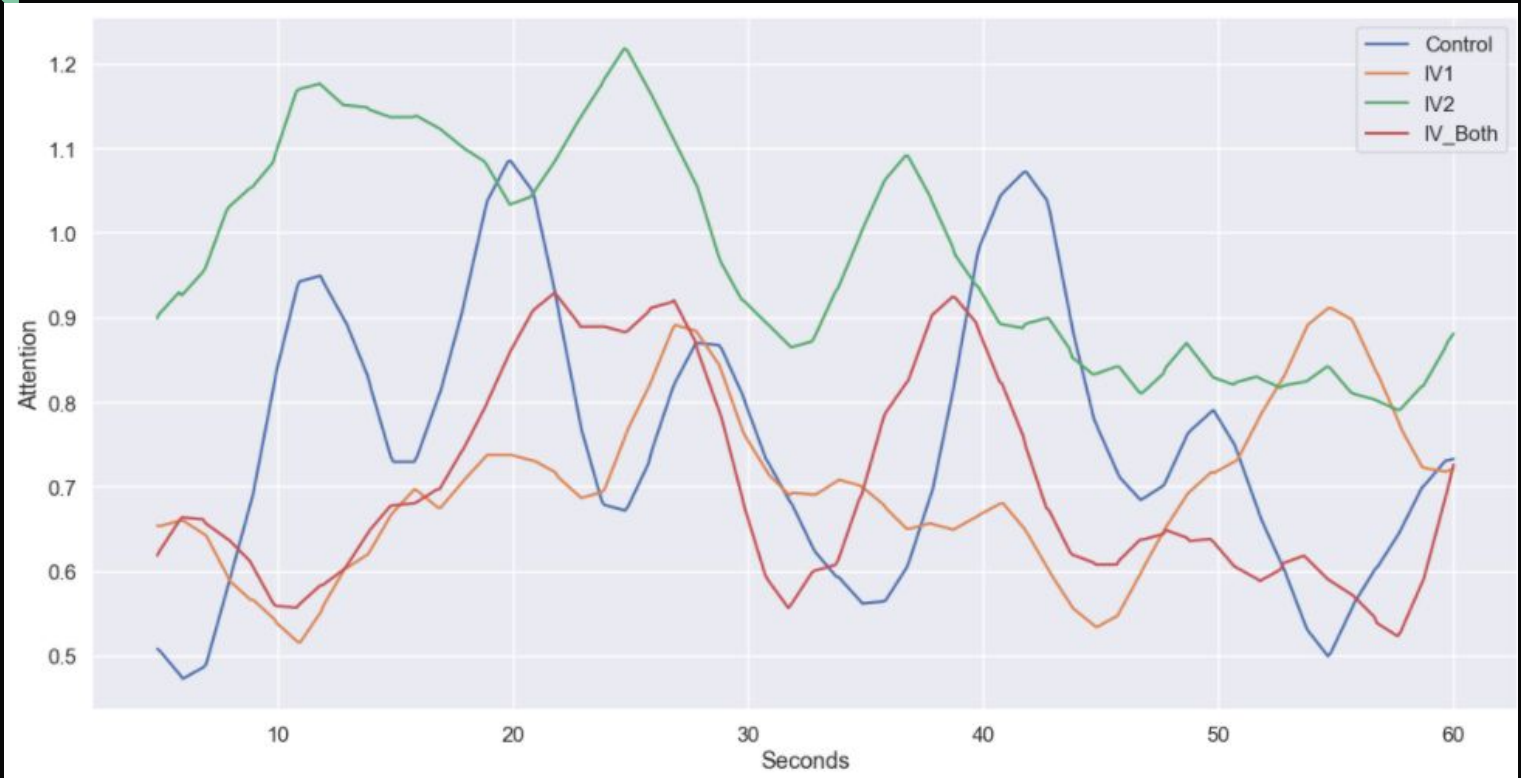
Results: Attention vs. Time (participant 0)



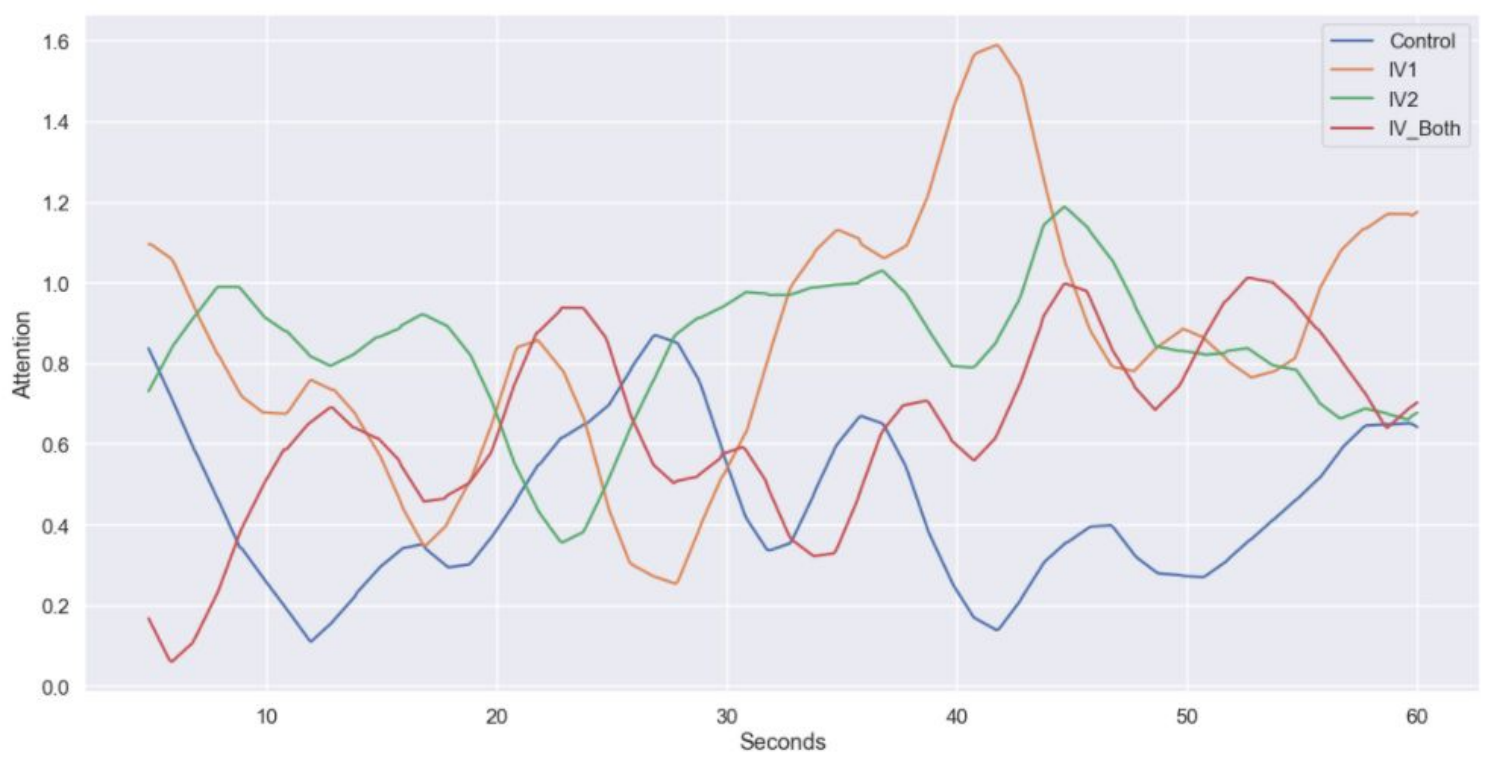
Results: Attention vs. Time (participant 0)



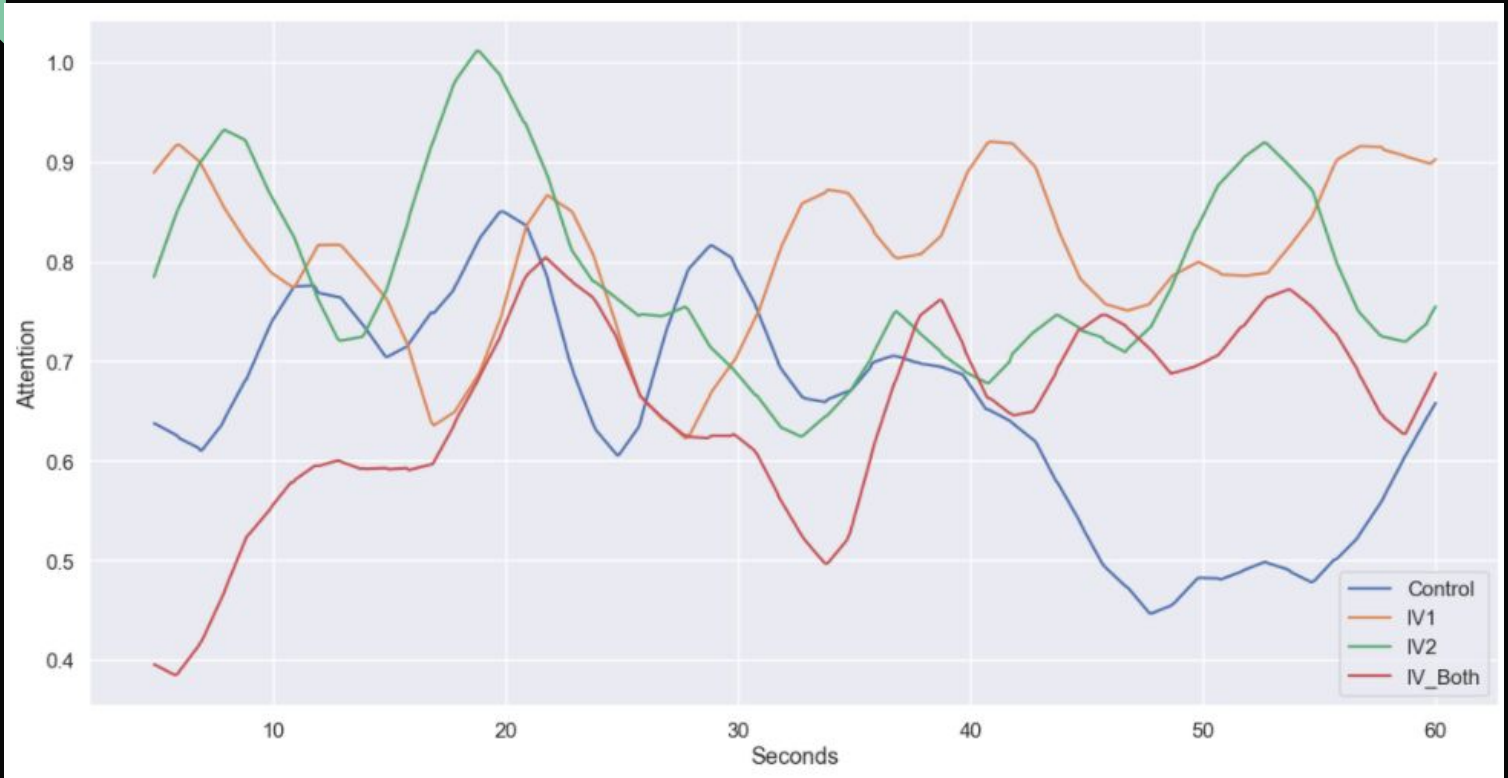
Results: Attention vs. Time (participant 1)



Results: Attention vs. Time (participant 2)



Results: Attention vs. Time (mean across participants)



Discussion/What we learned

- No v*isual* difference between conditions in accuracy & speed
- Slight increase in accuracy & speed → practice from each trial
- Attention levels for IV 1 & IV 2 are *visually* different from Control

Improvements/Extension

1. Different method to measure attention → measure long term memory retention with music
2. Include practice trials of the typing test
3. Increase number of participants. Perform multiple trials per condition
4. Test effects of different genres, BPM, or artists

THANK YOU