

The effect of coordination-based video games on reaction time and hand-eye coordination

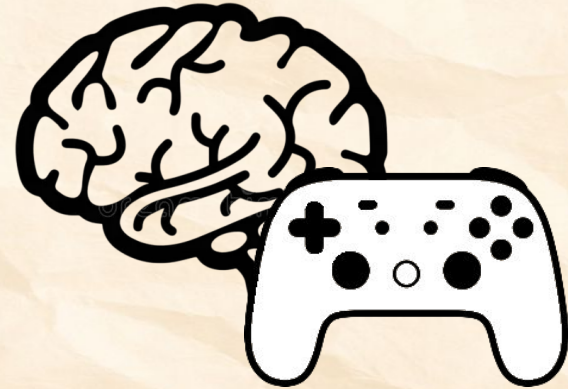
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Overview

- **Research purpose:** Investigate the effect video games have on reaction time and hand-eye coordination
- **Introduction** to human performance and cognitive psychology
- **Methods:** Consent form and reaction time test
- **Results and Conclusion:** Video game practice lead to an improved reaction time score
- Data not statistically significant

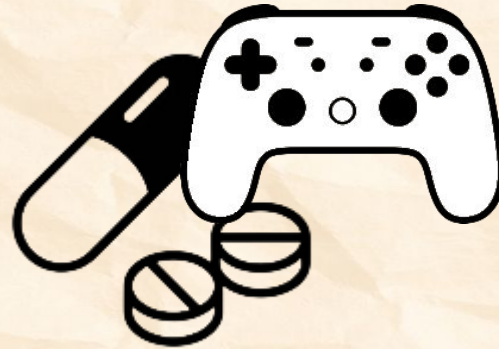


Background

- A meta-analysis study (Choi et al., 2020) concluded that regular game participation can have positive effects on cognitive function in adolescents.

Data suggested
Improvements in

- Memory
- Attention
- Executive function
- Motor skills control



Research question

- **Does repeated play of a coordination-based video game improve reaction time?**

Hypothesis

P= Reaction time performance

$$H_0: P_{\text{Before}} = P_{\text{After}}$$

My null hypothesis is that reaction time performance stays the same after practice. There will be no difference in the scores before and after practice

$$H_a: P_{\text{Before}} < P_{\text{After}}$$

My alternative hypothesis is that reaction time performance after the treatment will be better than performance before

Methods

- **Participants:** High school students ages 15-18 (n=29)
- **Data Collection:** reaction time score before vs after video gameplay

Paired T-test design

- **Video game: “Stack”**

Reaction time based video game

Consent form



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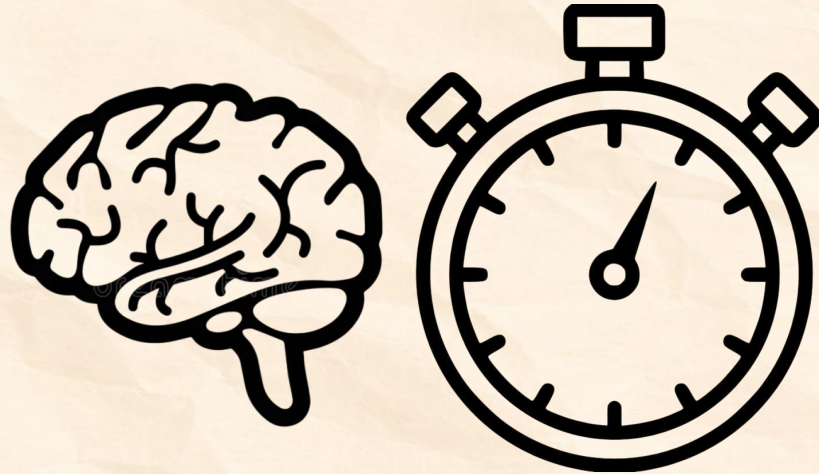
Dear Participants (and Parents and Guardians)
Dear Students, Parents, and Guardians:

I am a student at King George High School and the Chesapeake Bay Governor's School. I'm working on a research experiment regarding attention and reaction time, in hope of improving the way athletes train. To conduct this experiment, I must have a substantial number of participants. I am hoping that you, with parental permission, can be of assistance.

In the experiment, you are tasked with taking a human benchmark reaction time test to get a benchmark of your reaction time. You split into one of two groups, group A plays a reaction time based video-game for ten minutes a day while group B does nothing. This will take place over two weeks. Afterwards participants take a human benchmark test to gauge average reaction time improvement. This is completely anonymous and it will not ask for your name or any information regarding your identity. Only I and my teacher advisor would see your responses and they would not be distributed amongst other teachers or peers. This test will not affect your class grades in any way. Participation is completely voluntary, and you would be able to opt out at any time. This study is being supervised by Dr. Kevin Goff, has met with his approval, and adheres to the rules for use of human participants stipulated in latest edition of the Virginia Junior Academy of Science Handbook.

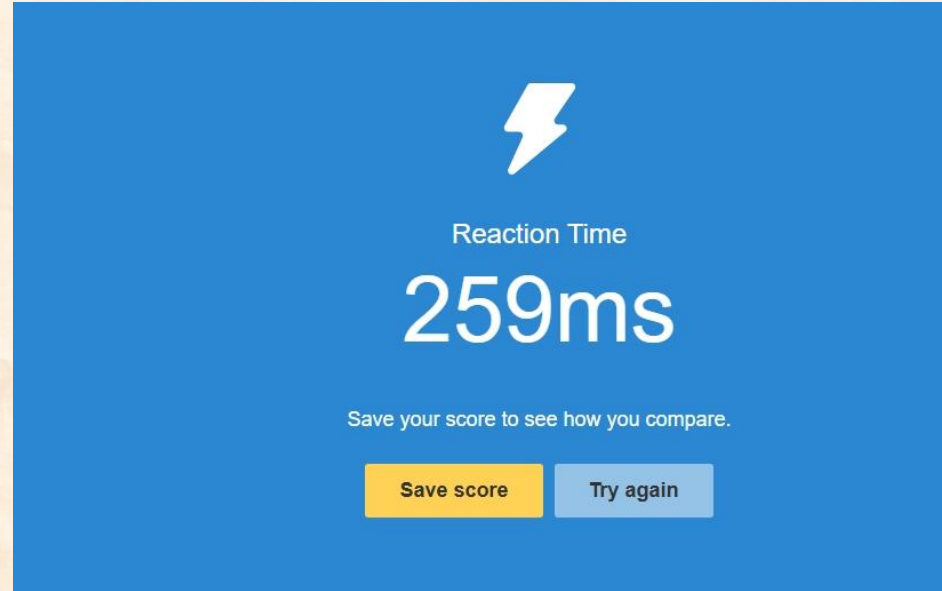
Procedure

Data collection



Procedure (Baseline reaction time test)

- 25 total trials
- Participants recorded average every 5 scores
- These baseline scores were collected before any gameplay began



1



Reaction Time Test

When the red box turns green, click as quickly as you can.
Click anywhere to start.

2



Wait for green

3



Click!

4



Reaction Time

259ms

Save your score to see how you compare.

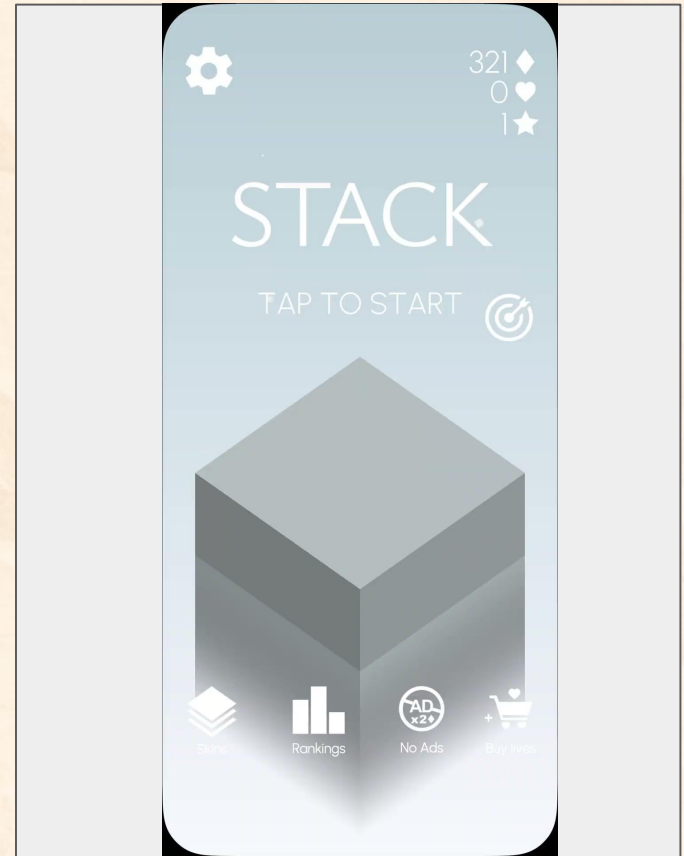
Save score

Try again

Procedure

- 6 gameplay sessions
- Each session = 10 minutes
- 10-minute rest between sessions
- Total gameplay time = 60 minutes
- Same device type per participant when possible

“Stack” video game



1



Reaction Time Test

When the red box turns green, click as quickly as you can.
Click anywhere to start.

2



Wait for green

3



Click!

4



Reaction Time

259ms

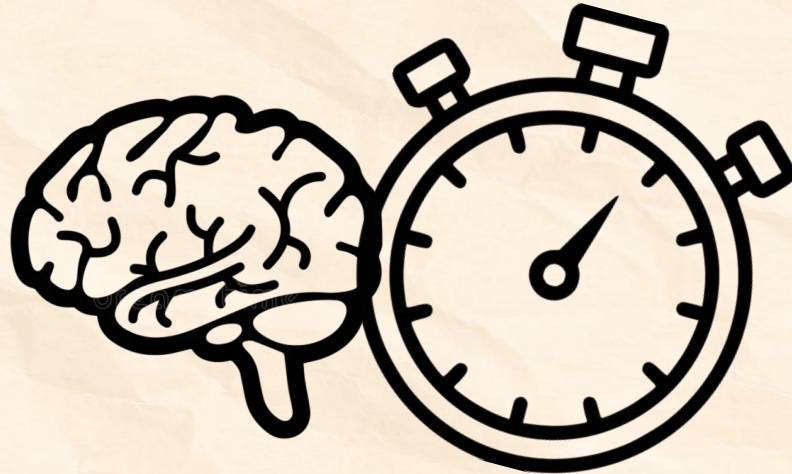
Save your score to see how you compare.

Save score

Try again

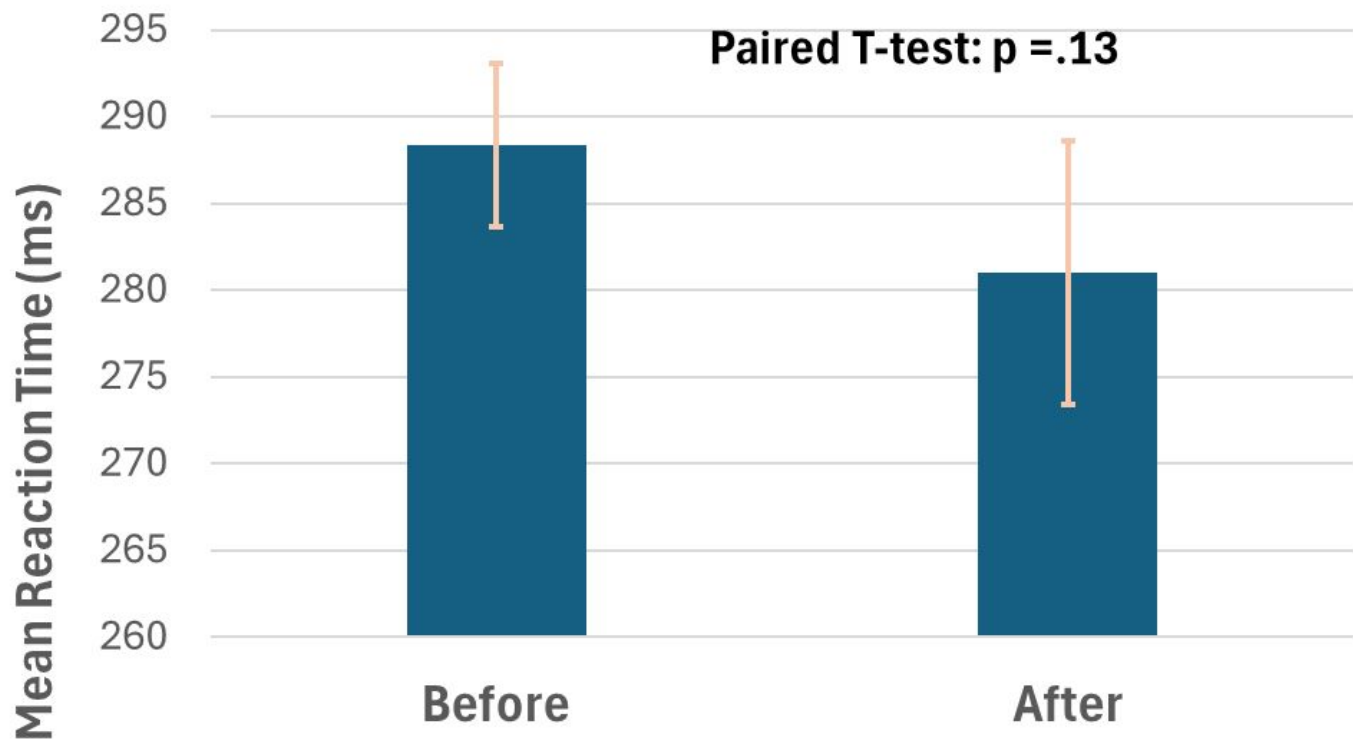
Results

Reaction time test scores



Mean Reaction Time Before Vs After Video Game Practice

(N=29; error bars show standard error)



Mean reaction time (ms)		
Participant #	Before	After
1	337	289
2	253	279
3	282	253
4	266	247
5	272	247
6	308	325
7	311	298
8	296	287
9	295	301
10	315	304
11	282	243
12	260	279
13	253	230
14	294	271
15	292	279
16	279	299
17	337	355
18	303	209
19	307	291
20	264	251
21	326	403
22	279	279
23	281	345
24	295	294
25	255	265
26	295	294
27	233	227
28	307	245
29	285	261
N	29	29
Mean	288.3	281.0
Std Dev	25.4	40.8
S.E.	4.7	7.6

Data analysis

Mean reaction time decrease

288.3(ms)  281(ms)

7 (ms) improvement

Variance

645  1667

P value

One- tailed

P-value = 0.13

two-tailed

P-value = 0.25

Conclusion

- Data is **Not statistically significant**

However there seems to be a statistically correlation between video game play time and improved reaction time score

288.3 (ms) average to 281(ms)

Future studies:

- A larger sample size
- A true control group
- A longer training period, possibly several weeks
- Follow-up testing to determine whether improvements persist over time

Acknowledgements

- Firstly, I would like to thank Dr Goff for guiding me through this process as well as helping me gather data and analyze it afterward. I would also like to honor my classmates over at the Chesapeake Bay Bowling Green Site who participated in my study.



References

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Any questions?