

# Does cell phone use affect mental focus and reaction time?

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Snehal Gupta

Parkland High School

11th Grade

# Background Information

Independent Variable- The activities done by the human subject while using the cell phone

Dependent Variable- The performance of the human subject in the activity

Controlled Variables- Same materials, Same human subjects for each activity, Same phone call used for trials conducted with the usage of cell phones.

# Why was this topic chosen?

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The researcher chose this topic because the researcher was interested to see if hands free calling in the car could potentially have the same , or similar affect, on human subjects as talking while holding a cell phone might have.

# Benefit to Society

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This project is beneficial to society because this study can represent dangers and distractions that cell phone usage while driving could potentially cause.

# Research Question

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Does cell phone usage affect mental focus and reaction time?

# How Was Mental Focus Tested?

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Mental focus was tested through the means of a 1 minute multiplication test. The researcher first had the human subjects take the test without the staged phone call. Then the researcher had the human subject take the same test again, except, the human subject was informed to have a conversation with the staged phone call while taking the test.

# Math Multiplication Test



## 1 Minute Math Multiplication

Score: \_\_\_\_\_

Date: \_\_\_\_\_

See how many of the following multiplication problems you can solve in 1 minute.

$$\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$$

# How was Reaction Time Tested?

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Reaction time was tested by dropping a meter stick. To start, the researcher measured 10 cm above the human subject's hand to initiate the drop test from that starting point. This is because of the fact that the drop test will start at relatively the same point for each human subject, which will make it easier to catch. The first time, the human subject was expected to catch the meter stick without the staged cell phone call. The second time, the human subject was expected to catch the meter stick while talking on the cell phone call.



# Explanation of the staged phone call

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The staged cell phone call is a call that asks simple questions. It is a pre-recorded call that contains the following questions, and subjects were required to respond to those questions in return. The researcher played the audio, and paused it after the question was over in order to hear the response of the human subject. When the human subjects were talking on the phone, it was hands-free.

- Hi! How are you?
- What are you doing?
- So...do you want to hang out later today?
- Cool! What are you doing for dinner tonight?
- I'm thinking about throwing a party this weekend...Who should I invite?
- Cool! What are you doing this weekend?

# Processes

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In this experiment, human subjects will be tested to see whether a cell phone call will affect their performance on a mental focus task and a reaction time task. This will be tested by having human subjects perform in a mental focus task, one without the cell phone conversation, and one with. Similarly, human subject's reaction time will be tested by having them catch the meter stick, one without the cell phone conversation and one with.

# Hypothesis

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If human subjects are asked to participate in activities both with and without distractions, then the activities that the human subjects performed without the distractions will have better results than the activities performed with distractions due to the fact that studies performed by The American Psychological Association show, “Notification on individuals phones weakens the ability to focus on a task”.

# Materials

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1. 30 Human Subject
2. 1 Minute Multiplication Math test
3. Timer
4. Meter Stick
5. Pens
6. Staged Phone Call
7. Lab Notebook

# Procedure

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- 1) Gather all Materials
- 2) Have human subjects conduct math test without cell phone conversation
- 3) Record Data
- 4) Have human subjects conduct ruler drop test without cell phone conversation
- 5) Record data
- 6) Have human subjects conduct math test with the staged phone call
- 7) Record data
- 8) Have human subjects conduct ruler drop test with the staged phone call
- 9) Record data

# Data Table (Mental Focus)

Human Subject #	Without Cell Phone Time (sec)	With Cell Phone Time (sec)	Number of correct answers without Cell Phone distraction	Number of correct answers with Cell Phone distraction
1	41	56	41/48	43/48
2	60	60	29/48	25/48
3	50	60	46/48	40/48
4	50	60	48/48	34/48
5	40	60	47/48	42/48
6	40	60	48/48	43/48
7	60	60	37/48	32/48
8	49	58	46/48	48/48
9	45	52	47/48	48/48

# Data Table (Mental Focus)

Human Subject #	Without Cell Phone Time (sec)	With Cell Phone Time (sec)	Number of correct answers without Cell Phone distraction	Number of correct answers with Cell Phone distraction
10	47	60	48/48	45/48
11	58	60	47/48	42/48
12	60	60	19/48	16/48
13	60	60	47/48	27/48
14	60	60	44/48	41/48
15	60	60	45/48	36/48
16	52	51	48/48	46/48
17	60	60	33/48	20/48
18	60	60	43/48	24/48

# Data Table (Mental Focus)

Human Subject #	Without Cell Phone Time (sec)	With Cell Phone Time (sec)	Number of correct answers without Cell Phone distraction	Number of correct answers with Cell Phone distraction
19	60	60	42/48	16/48
20	60	60	33/48	28/48
21	58	60	46/48	44/48
22	49	60	46/48	39/48
23	47	57	48/48	48/48
24	40	56	48/48	47/48
25	59	60	48/48	36/48
26	60	60	33/48	16/48
27	60	60	36/48	30/48



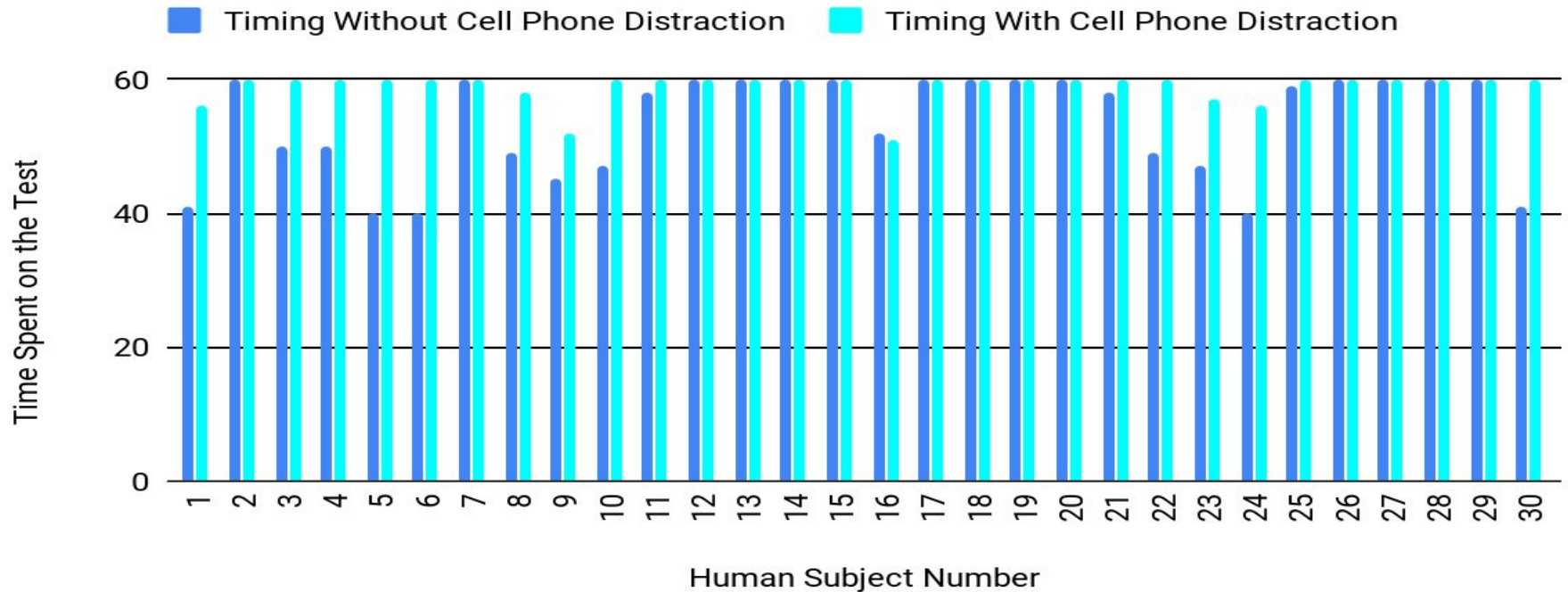
# Data Table (Mental Focus)

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Human Subject #	Without Cell Phone Time (sec)	With Cell Phone Time (sec)	Number of correct answers without Cell Phone distraction	Number of correct answers with Cell Phone distraction
28	60	60	47/48	36/48
29	60	60	36/48	30/48
30	41	60	48/48	48/48
<b>Average</b>	<b>53</b>	<b>59</b>	<b>42/48</b>	<b>36/48</b>

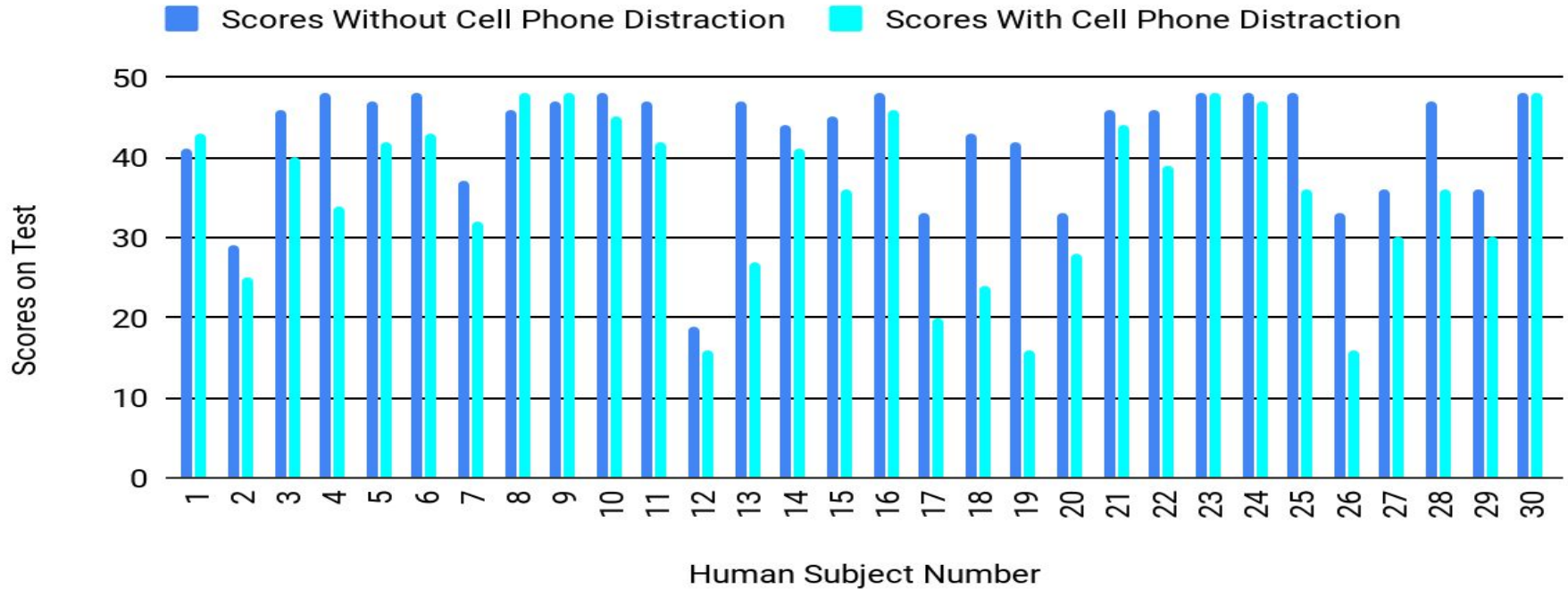
# Data Graph (Mental Focus)

Time Spent on the Test Without Cell Phone Distraction vs. Time Spent on the Test With Cell Phone Distraction



# Data Graph (Mental Focus)

## Scores Without Cell Phone Distraction vs. Scores With Cell Phone Distraction



# Mental Focus Data Analysis

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- Overall, in the Mental Focus aspect of this project, it can be seen that
  - Human subjects completed the test in a longer amount of time in the trial where they participated in the cell phone conversation in comparison to the trial where the human subjects did not participate in the cell phone conversation
    - Every human subject showed a time increase from their first trial in comparison to the second
  - Human subjects also showed a decrease in accuracy in the trial in which they participated in the phone conversation, in comparison to the trial where they did not.

# Data Table (Reaction Time)

Human Subject	Distance caught without cell phone (In cms)	Distance caught with cell phone (In cms)	Human Subject	Distance caught without cell phone (In cms)	Distance caught with cell phone (In cms)
1	14	18	8	10	23
2	25	33	9	14	20
3	15	34	10	8	10
4	17	20	11	7	17
5	18	19	12	10	21
6	10	16	13	11	28
7	19	26	14	5	8

# Data Table (Reaction Time)

Human Subject	Distance caught without cell phone (In cms)	Distance caught with cell phone (In cms)	Human Subject	Distance caught without cell phone (In cms)	Distance caught with cell phone (In cms)
15	14	18	22	10	23
16	25	33	23	14	20
17	15	34	24	8	10
18	17	20	25	7	17
19	18	19	26	10	21
20	10	16	27	11	28
21	19	26	28	5	8

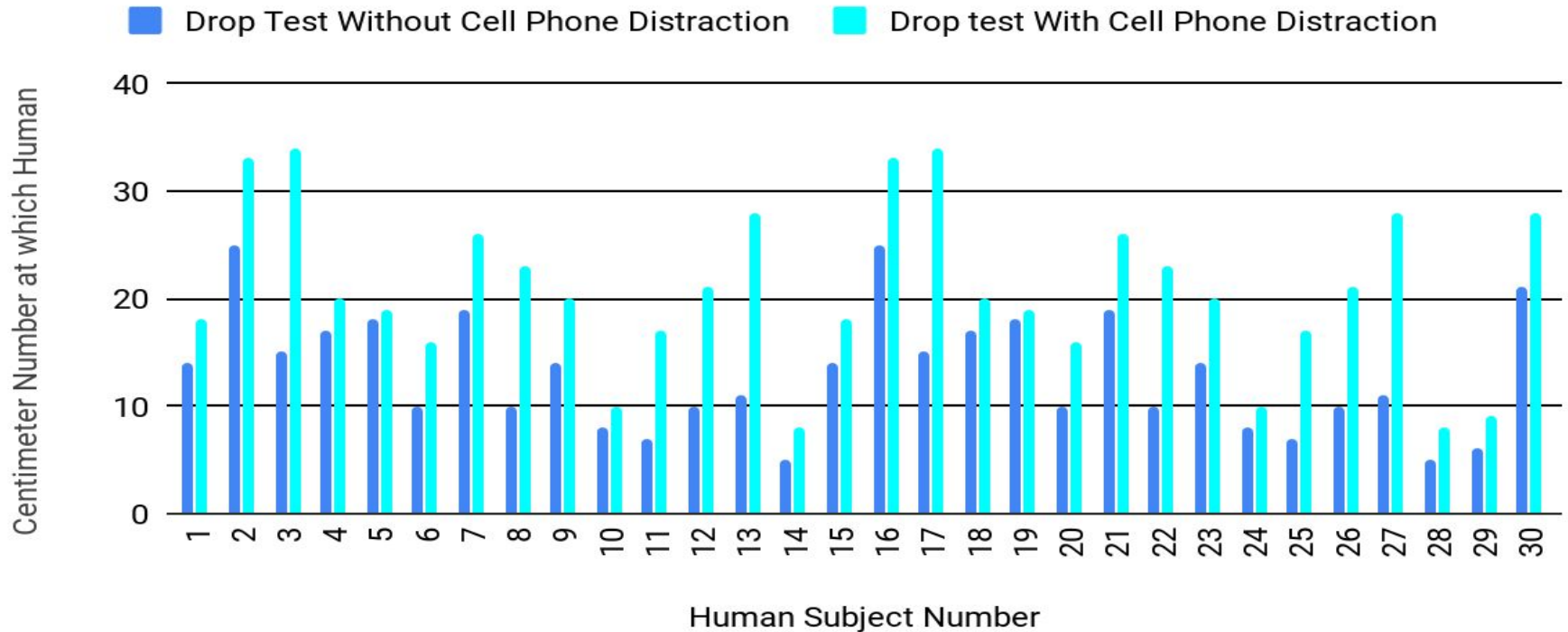
# Data Table (Reaction Time)

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<b>Human Subject</b>	<b>Distance caught without cell phone (In cms)</b>	<b>Distance caught with cell phone (In cms)</b>
<b>29</b>	<b>6</b>	<b>9</b>
<b>30</b>	<b>21</b>	<b>28</b>
<b>Average</b>	<b>13</b>	<b>21</b>

# Data Graph (Reaction Time)

Drop Test Without Cell Phone Distraction vs. Drop Test With Cell Phone Distraction





# Reaction Time Data Analysis

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- Overall, in the Reaction Time aspect of this project, it can be seen that
  - All human subjects caught the meter stick at a later amount of time in comparison to the trial in which they were talking on the cell phone
  - The higher the number on the meter stick= The later the meter stick was caught

# Overall Analysis

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- Human subjects performance worsened when they participated in the phone conversation in comparison to the performance they had when they did not participate in the cell phone conversation.
  - Mental Focus
    - The scores of the human subjects decreased
    - The time it took for the human subjects to take the test increased
  - Reaction time
    - Human subjects slowed down when they had to catch the meter stick when they participated in the phone conversation
    - The higher the number on the meter stick= The slower the meter stick was caught

# Conclusion

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- To answer the question: Does cell phone usage affect mental focus and reaction time?
  - According to the data present, the data supports the hypothesis
    - The hypothesis was, “If human subjects are asked to participate in activities both with and without distractions, then the activities that the human subjects performed without the distractions will have better results than the activities performed with distractions”

# Conclusion (Continued)

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## Sources of Error

- Some Human Subjects forgot their reading glasses
  - To solve this issue, the researcher printed the multiplication test in a larger font
  - Additionally, some human subjects had a few second lag while answering questions asked during the phone conversations. This may have allowed them to answer a few more math questions in comparison to other human subjects.

# Conclusion (Continued)

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- If this experiment were to be conducted again
  - The researcher would use more human subjects
  - Additionally, the researcher would like to test other aspects ( e.g. measuring stress levels) other than reaction time and mental focus.
- Some other projects that the researcher is interested are
  - How does cell phone usage affect the sleep cycle?

# Works Cited

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Cell phone use slows reaction time, study shows. (2000, October 24). Retrieved November 8, 2019, from <http://miamioh.edu/news/article/view/2859>.

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**Thank You For Your Time and Attention!**

**Questions?**