

Does Age Affect Reaction Time?

Pima Chemistry 151

01/07/22

Introduction

Purpose: The purpose of this experiment is to determine if an individual's age affects reaction time

Hypothesis: If we use the reaction test for NASCAR drivers and have middle, high school and adults catch balls, we predict that teenagers to late 20s will have the best reaction time because they have the most physical abilities to do so.

Materials:

- Pencil
- Computer
- Lab book
- Participants from different age groups
- 2 baseballs

Hazards: There are no hazards to look out for.

Background

For our science fair project, we will study to see if age affects reaction time. We predict that somewhere around teens to late 20s is at their best reaction time. We believe that as age progresses, reaction time will decrease over time. Ultimately, the younger they are, the faster their reaction time is. One method that will be used is a reaction test they use on NASCAR drivers. Subjects will have to catch the ball while placing their hands over the person with the ball. We hope that people in their prime time (late teens and early 20s) will have the best results.

According to CogniFit, the definition of reaction time states "...refers to the amount of time that takes place between when we perceive something to when we respond to it." Reaction time has several factors that contribute to it. Perception, processing, and response are the main factors. Perception is what they perceive the stimulus like seeing, hearing, or feeling it. Processing is how well they understand what's currently happening. The response is the momentum part like how they act on it after they perceive and process it. Also from this article, it says: "necessarily includes a motor component, unlike processing speed" Response time is always a good benefit to have because of fast reflexes and your ability to do physical activities. Some other factors include the state of the organism which is the attention span, fatigue, old age, consuming substances, over-eating, or high temperature. Stimulated sensory modality is when the reaction time is shorter if it's auditory than visual.

In another source *Integrating Guide to the Asymmetrical Tonic Neck Reflex* explains the visual skills a person has. According to the source, “The visual perceptual skill is the brain's ability to understand what the eyes see and interpret appropriately, including depth, figure-ground (distinguishing objects from background), location, visual closure (recognizing a familiar object when it is partially obscured) and more.” This means that an individual's brain has to process variables for them to react from what they see. The same source also states “Visual fixation is the first critical skill to develop before more advanced visual skills. Once the eyes fixate, they can learn to track a moving target.” If the individual can track and train themselves they can improve their reaction time. Visual fixation is the ability to look at an object for a period of time. So when dropping the balls the individual has to track the ball in order to catch it. Many individuals do sports that deal with hand-eye coordination, such as basketball and football. Not just sports have hand-eye coordination, others like juggling or skipping the rope also deal with that.

Procedure

1. Subjects write their name, age, and gender
2. Me or my partner will place our hands at the subjects shoulder level
3. Subjects place their hands over mine or my partner's hands
4. Subjects will try to catch the ball in a random order (Either one ball from either hand or both balls at the same time)
5. This will be recorded 30 times with 3 trials 10 tries per trial

Data

Participants	Trial #1	Trial #2	Trial #3	Average %
#1	10%	30%	30%	23.3%
#2	20%	40%	60%	40%
#3	30%	60%	60%	50%
#4	10%	30%	0%	13.3%
#5	60%	80%	60%	66.6%
#6	0%	0%	10%	3.3%
#7	10%	40%	70%	40%
#8	30%	60%	90%	60%

#9	20%	30%	50%	33.3%
#10	20%	20%	20%	20%
#11	0%	20%	10%	10%
#12	0%	0%	0%	0%
#13	50%	80%	70%	66.6%
#14	70%	70%	100%	80%
#15	10%	0%	10%	6.66%
#16	20%	40%	70%	43.3%
#17	0%	20%	20%	13.3%
#18	0%	30%	20%	16.6%
#19	50%	70%	70%	63.3%
#20	0%	10%	20%	10%

#21	60%	80%	100%	80%
#22	20%	60%	20%	33.3%
#23	0%	0%	10%	3.3%

#24	100%	100%	90%	96.7%
#25	0%	50%	50%	33.3%
#26	40%	20%	70%	43.3%
#27	20%	20%	20%	30%
#28	10%	20%	20%	16.7%
#29	10%	0%	0%	3.3%
#30	0%	0%	0%	0%
#31	10%	10%	10%	10%
#32	0%	10%	20%	10%
#33	50%	90%	100%	80%
#34	0%	0%	20%	6.7%
#35	20%	30%	30%	26.7%
#36	10%	0%	20%	10%
#37	0%	0%	10%	3.3%
#38	0%	10%	10%	6.67%
#39	10%	0%	0%	3.3%

#40	20%	10%	0%	10%
#41	10%	30%	10%	16.7%
#42	0%	0%	0%	0%
#43	0%	0%	0%	10%
#44	10%	0%	20%	10%
#45	10%	20%	40%	23.4%
#46	10%	20%	30%	20%
#47	0%	10%	0%	3.3%
#48	0%	20%	40%	20%
#49	10%	0%	0%	3.3%
#50	40%	20%	10%	23.4%
#51	10%	20%	10%	13.4%
#52	20%	40%	60%	40%
#53	40%	100%	90%	76.7%
#54	0%	0%	10%	3.3%
#55	10%	0%	0%	3.3%

#56	40%	20%	30%	30%
#57	0%	20%	30%	16.7%
#58	0%	0%	0%	0%
#59	0%	20%	10%	10%
#60	0%	10%	0%	3.3%
#61	30%	50%	70%	50%
#62	0%	0%	0%	0%
#63	0%	0%	10%	3.3%
#64	0%	0%	0%	0%
#65	60%	80%	70%	70%
#66	0%	30%	20%	16.7%
#67	70%	70%	90%	76.7%
#68	0%	0%	10%	3.3%
#69	30%	50%	60%	46.7%
#70	0%	0%	0%	0%
#71	0%	0%	0%	0%

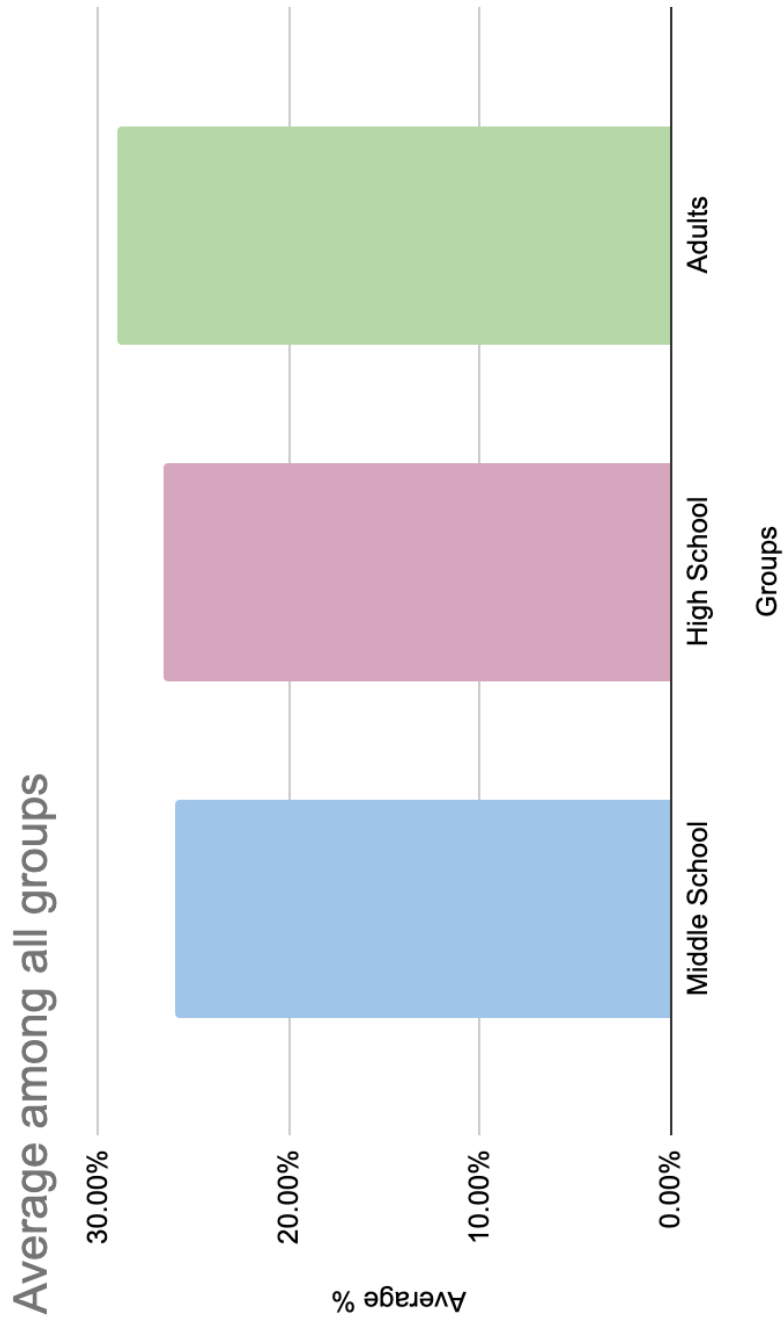
#72	20%	0%	20%	13.3%
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#76	30%	20%	0%	16.7%
#77	40%	20%	40%	33.3%
#78	30%	20%	30%	26.7%
#79	0%	0%	0%	0%
#80	0%	0%	10%	3.3%
#81	40%	50%	50%	46.7%
#82	0%	0%	10%	3.3%
#83	20%	30%	40%	30%
#84	10%	20%	20%	16.7%
#85	50%	50%	60%	53.3%
#86	30%	40%	40%	36.7%
#87	40%	40%	60%	46.7%

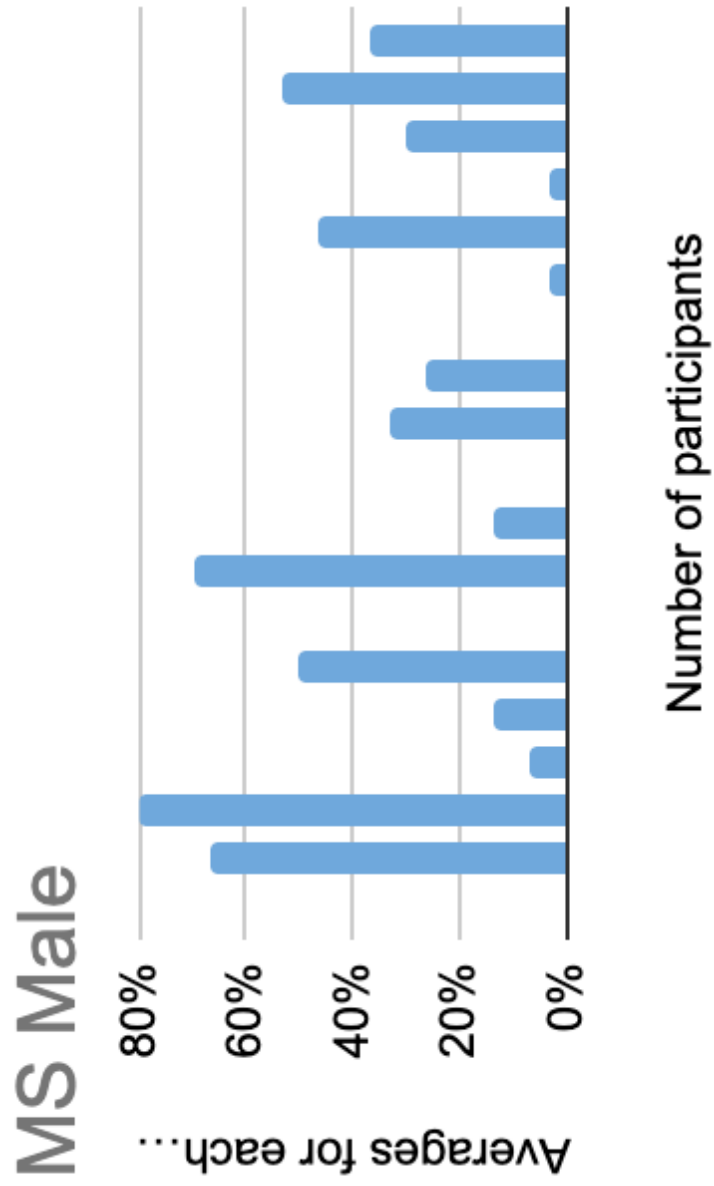
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#90	0%	20%	30%	16.7%
#91	80%	60%	90%	76.7%
#92	0%	0%	0%	0%
#93	10%	0%	10%	6.67%
#94	0%	10%	30%	13.3%
#95	20%	40%	60%	40%
#96	0%	0%	20%	6.7%
#97	20%	30%	70%	40%
#98	0%	0%	10%	3.3%
#99	10%	20%	30%	20%
#100	30%	20%	30%	26.7%

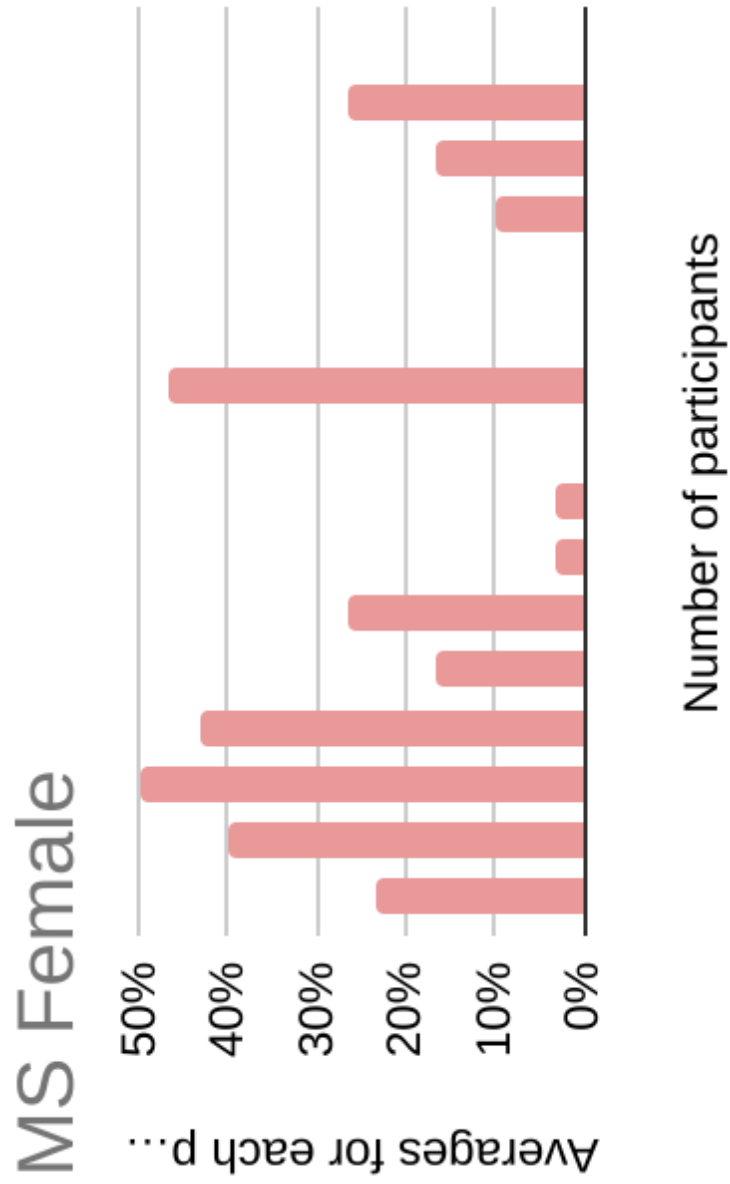
MS Male	MS Female	HS Male	HS Female	Adult Male	Adult Female
0%	23%	66.60%	3.30%	63.30%	13.30%
66.60%	40%	40%	33.30%	80%	10%
80%	50%	60%	20%	96.70%	3.30%
6.66%	43%	33.30%	33.30%	10%	20%
13.30%	16.60%	43.30%	20%	10%	3.30%
50%	27%	30%	10%	10%	16.70%
0%	3.30%	16.70%	33.30%	76.70%	46.70%
70%	3.30%	80%	3.30%	23.30%	3.30%
13.30%	0%	10%	0%	16.70%	76.70%
0%	46.70%	23.40%	6.70%	13.30%	0%
33.30%	0.00%	23.40%	10%	40%	6.67%
26.70%	0.00%	13.40%	20%	26.70%	6.70%
0%	10%	40%	3.30%		40%
3.30%	16.70%	30%	3.30%		3.30%
46.70%	26.70%	0%	76.70%		20%
3.30%	0.00%		3.30%		
30%			3.30%		
53.30%			16.70%		
36.70%					

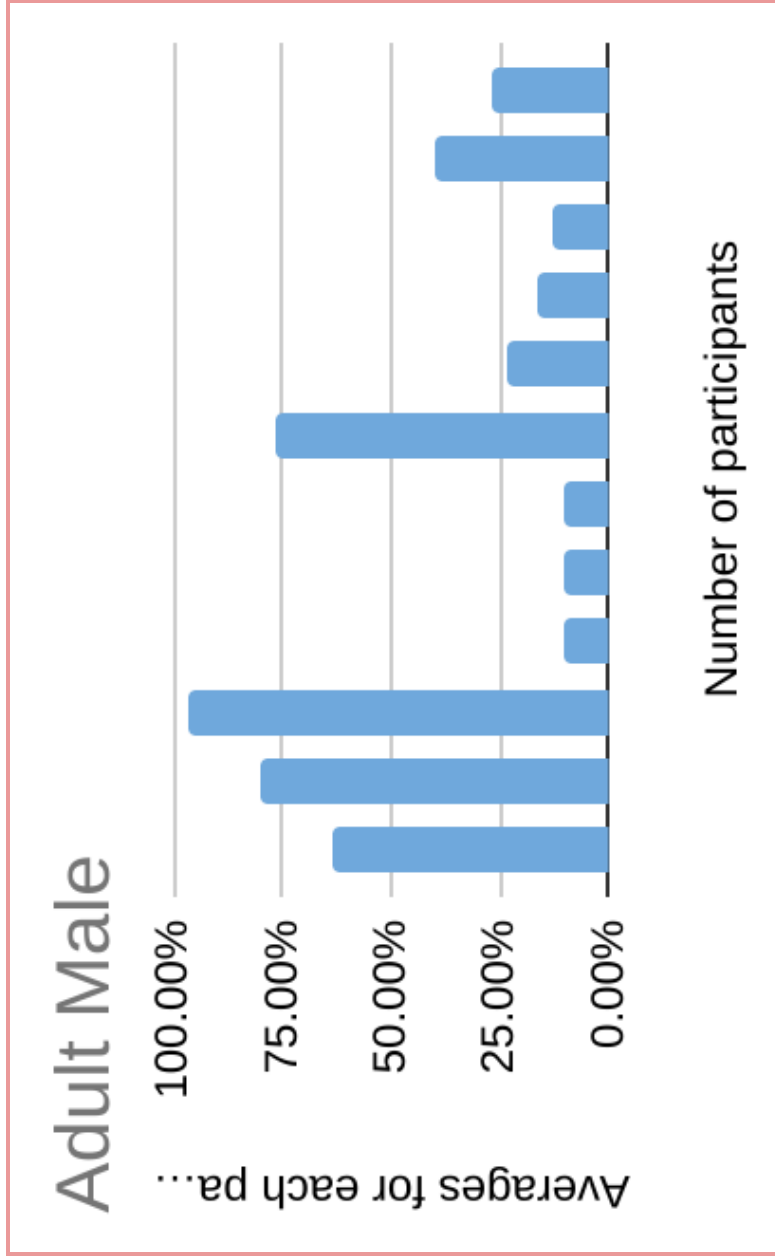
Male	Female		
		50%	3.30%
66.60%	23.30%	0%	76.70%
40%	40%	70%	3.30%
60%	50%	76.70%	3.30%
0%	13.30%	13.30%	16.70%
66.60%	3.30%	0%	3.30%
80%	33.30%	26.70%	3.30%
6.66%	20%	33.30%	0%
13.30%	10%	26.70%	16.70%
63.30%	43.30%	0%	3.30%
80%	16.60%	3.30%	46.70%
96.70%	10%	46.70%	0%
33.30%	33.30%	3.30%	0%
43.30%	3.30%	30%	10%
30%	3.30%	53.30%	16.70%
16.70%	0%	36.70%	16.70%
10%	6.70%	23.30%	3.30%
10%	26.70%	16.70%	76.70%
80%	3.30%	13.30%	0%
10%	6.67%	40%	6.67%
10%	3.30%	26.70%	6.70%
23.40%	10%		40%
23.40%	16.70%		3.30%
13.40%	0%		20%
40%	10%		3.30%
30%	20%		
0%	3.30%		
10%	20%		

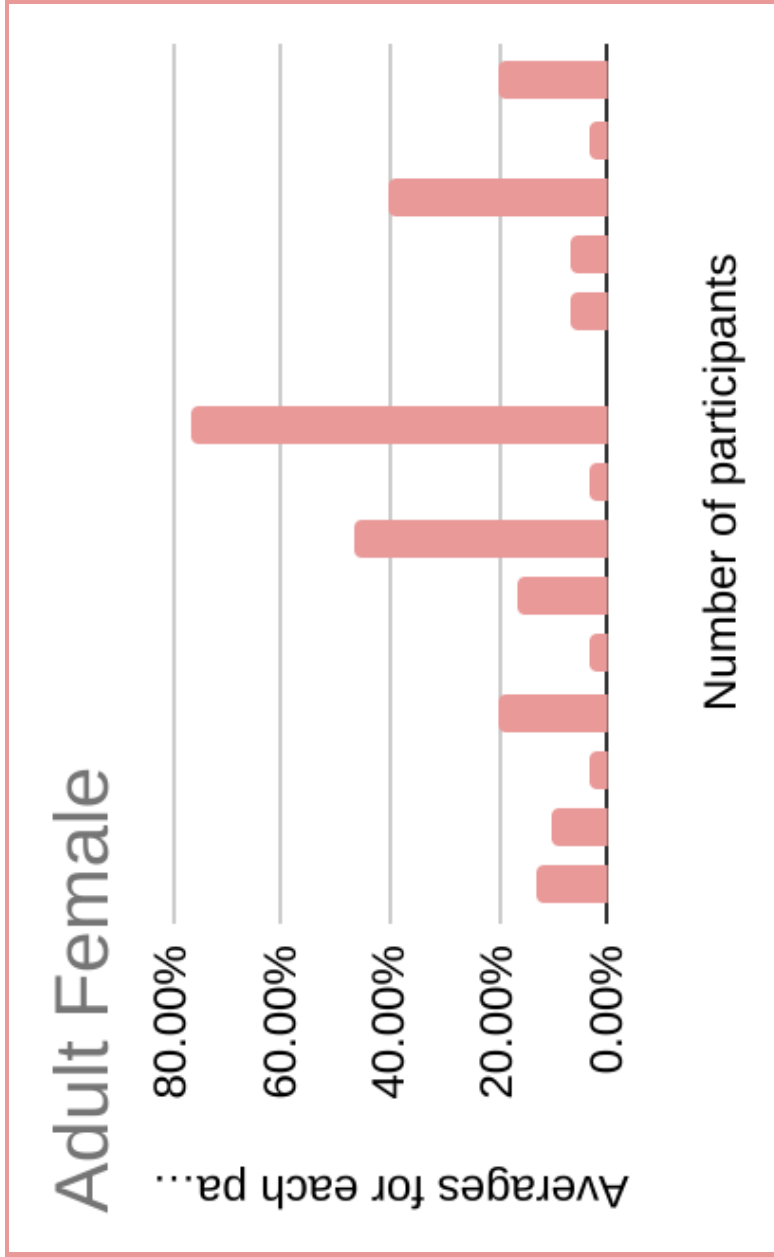
Calculations

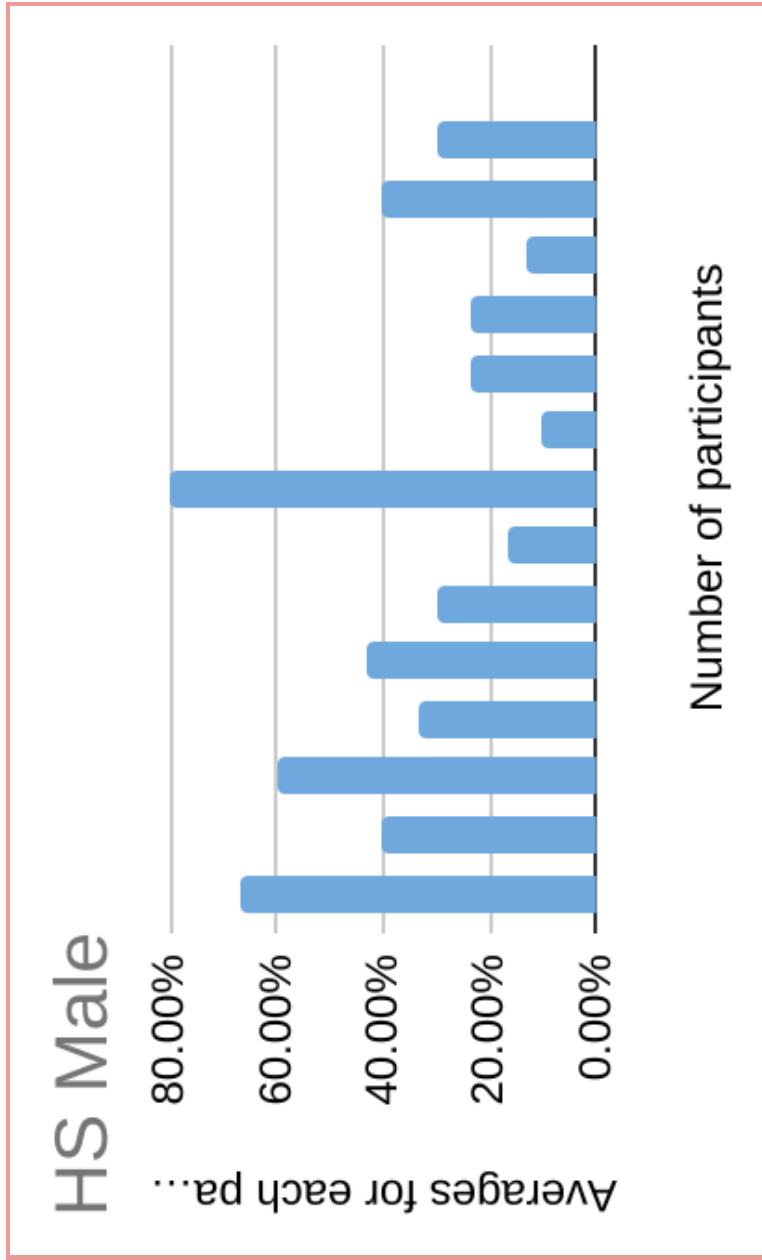


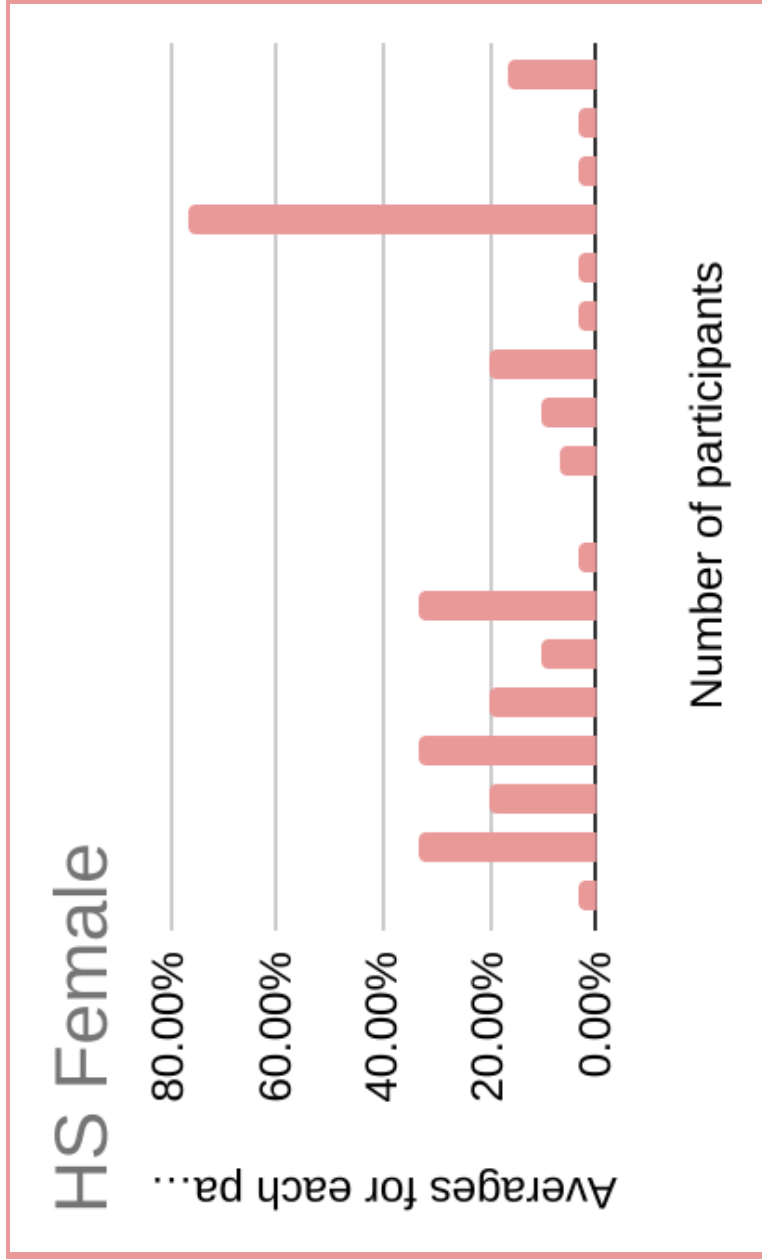


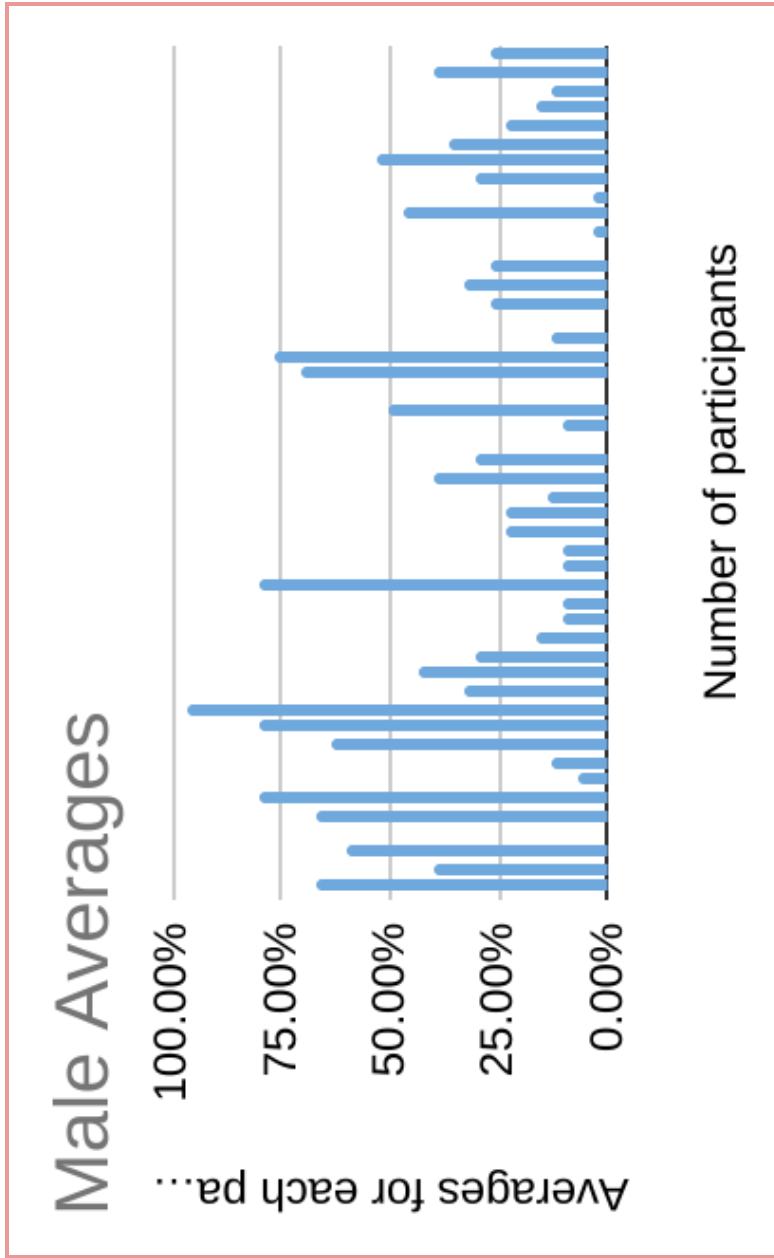


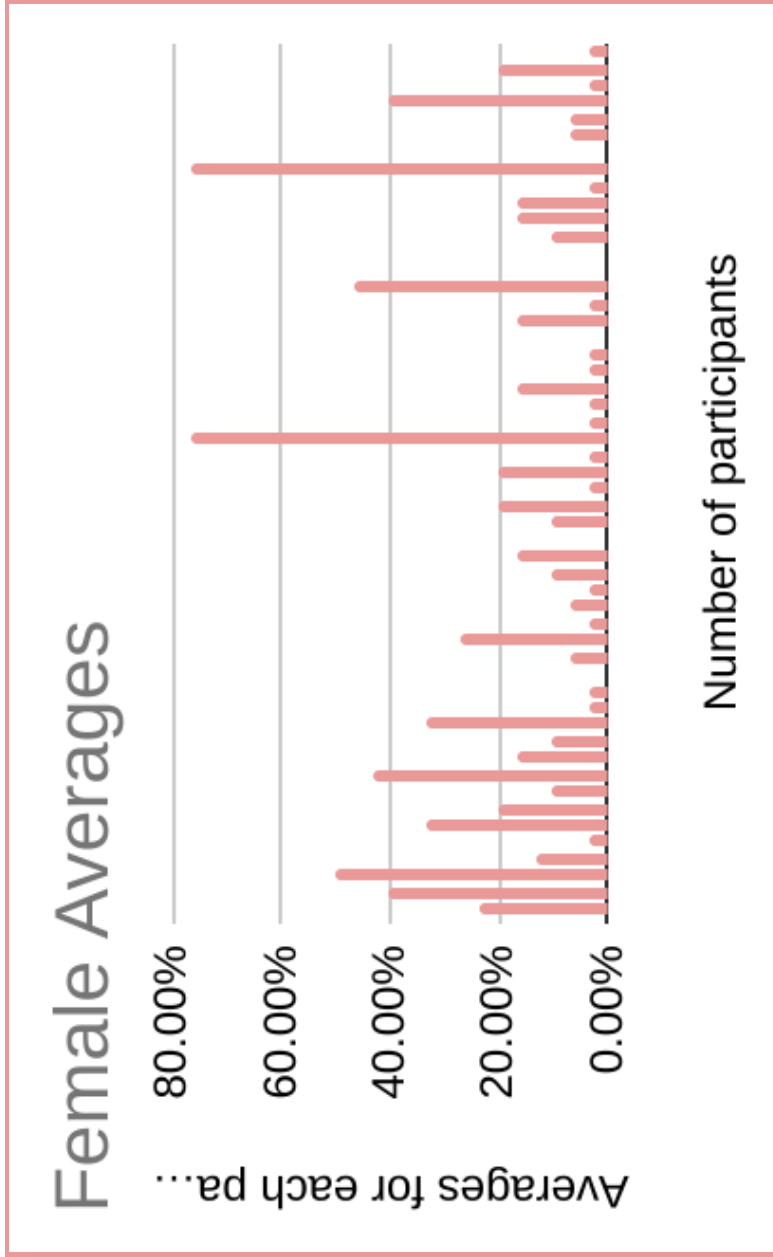


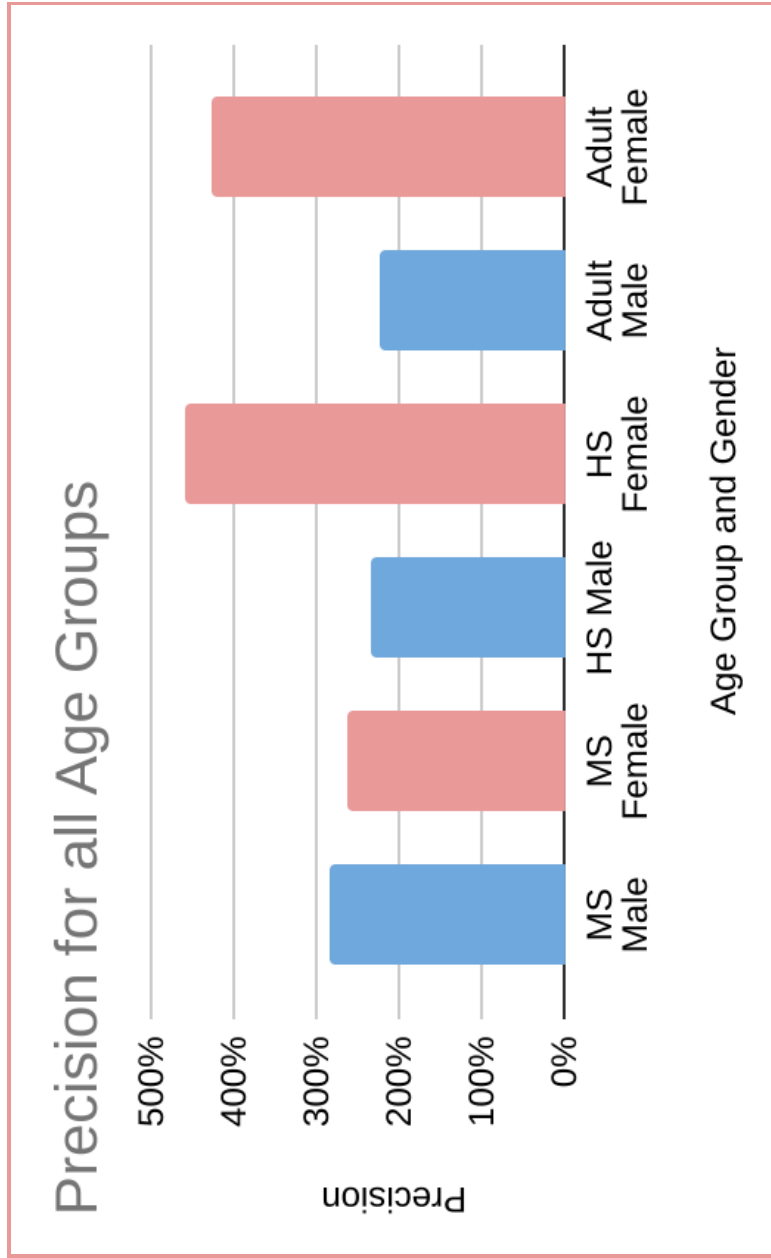












Conclusion

Results: After doing all three trials for each participant, it seems that male subjects have a better performance at reaction time than females. It could also be how much hand-eye coordination they use throughout their life too. According to our calculations, the average of each participant varies from different percentages. It ranges from around 0-97%. The average of the middle school age group was 26.0%. The average of the high school age group came out to be 26.57%. And the average of the adult age group was 29.07%, which came out to be the largest percentage we have. The highest score that we collected was 96.7% who is a 25-year-old male and does basketball and some football. The graphs also show averages between the individual participants in their age group. In middle males and females, the females did slightly better than the males. Although that's not the case for the adult and high school group. The males in the adult and high school group did awfully better. The precision shows how accurate a group of set individuals are. The precision for middle school males, high school males, and adult males are (in order) 286%, 235%, 223%. Middle school females, hs females, and adult females are (in order) 263%, 460%, 426%. Percentages are so high due to the fact that each individual has their own set of data meaning the whole group won't be as accurate. It is safe to assume that the lower the percentage for the overall group means they have a better/more accurate reaction time. According to the data that was collected the females are seen to be inferior to the males. Although the middle school females did slightly better than the males. Lastly the graph with the overall male and female averages shows that male did significantly better.

Analysis: So far, our hypothesis was incorrect. The age does not matter, but how much hand-eye coordination they have trained throughout their life does matter. An error during this experiment was an uneven amount of subjects of males and females for each age group. A problem in our experiment was not enough people to participate. If more participants were to join the data might have been more significant then the data will be more accurate. One of our variables that could have affected our data is the number of people we tested. Another was when the subject caught them. Sometimes the subject would touch the ball but wasn't able to catch it, my partner and I had to determine if it counted or not. Lastly, we should have considered the participants playing any sports involving hand-eye coordination or activities. Variables that we should've considered was doing a 5 try practice run to warm up the participants. Another variable could have been looking at other communities like going to a basketball gym and testing out their players or going to a library. Finally we should have considered sports or any hand eye coordinations that they have done in the past and maybe implement them into the project.

References

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Abstract

Purpose: The purpose of this experiment is to determine or prove if a person's age really affects reaction time.

Summary: In this experiment, we gathered participants from our school to do a test that NASCAR drivers use. All participants are in the range from middle school to adults up to 60. We had each person write their name, age, and gender. Next, we did the experiment by holding out two baseballs at their chest level and having the participants' hands out above our hands. We would drop either one or both balls without any warning. We did this for 3 trials for each person and 10 tries for each trial. In total, we gathered about 100 participants for this project. Many of our human subjects passed the test swiftly and others failed.

Results: We had a variety of results for each person and for each age group. Depending on if the person does any hand-eye coordination, usually, the results are better. People who don't do any sports or any activity that deals with hand-eye coordination are more likely to do worse than people who do. According to our bar graph, it seems that the average of the adult age group is surprisingly higher than the high school age group. Most of the people who scored higher were in the adult age group. Back then when they were younger, many used to participate in extracurricular activities such as sports or juggling, which explains why the data are more increased than the rest of the age groups.