

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

## Nervous System Investigation

Name: Chelsea Corner

Investigation: \_\_\_\_\_

Your Task: Design an experiment to illustrate the effect of stimulus on response times.

SECTION	COMPONENT	Possible Marks	Mark allocated
PLANNING	Aim:	1	
	Variables		
	<i>Independent Variable:</i>	1	
	<i>Dependent Variable:</i>	1	
	<i>Controlled Variables: at least 5 are listed</i>	5	
	<b>Prediction:</b> The student states what they thought would happen and why	2	
	<b>Hypothesis:</b> A hypothesis is presented that states the effect of the independent variable on the dependent variable	2	
	<b>Equipment:</b> Listed correctly	1	
	<b>Method:</b> Detailed numbered steps are written. Instructions are clear and can be followed exactly at another time. Variables are clearly controlled. A diagram is used and labelled appropriately that clearly enhances the method	5	
RESULTS	<b>Results:</b> Displayed appropriately. Tables are used observations are adequately documented. Figures written to the same decimal place. Repeats or replicates are used. The mean is shown in the table. Units are used.	5	
	<b>Graphing (if applicable):</b> Results are graphed on the correct axis and the scale is correct. The correct type of graph has been used without any aid from the teacher. Labelling of units is correct and the graph is easy to interpret	5	
CONDUCTING	<b>Practical Application:</b> Safety, behaviour, laboratory skills and application during the investigative process can not be faulted	4	3
DISCUSSION	The results are summarised in a mature manner and pattern/trends in the results are identified and commented on.	2	
Evaluation	Inconsistencies in the results are identified and explained.	2	
	The experiment is classified as: valid; accurate; reliable. Valid reasons are given for the classification.	3	
	Problems and difficulties within the experimental design are identified and the student describes improvements.	4	
	The results of the experiment have been explained based on sound scientific principles taught in class or by doing extra research.	4	
	The discussion must make sense.	1	
CONCLUSION	Major findings are summarised.	1	
	Statement of whether hypothesis has been supported or not	1	
TOTAL		50	



Aim: to determine whether the reaction time on a visual stimulus changes due to the use of a dominant or non-dominant hand.

Variables;

Independent: dominant or non-dominant hand

Dependant: reaction time

Controlled:

- Phone on the desk
- Dominant hand first – non-dominant second
- Fist height above phone
- Same phone
- Same game
- Same day
- Same environment (classroom)
- Was everyone's first time playing the particular reaction time game

Prediction: an individual's reaction time will be better when using their dominant hand.

Hypothesis: the reaction time of an individual will be faster when using their dominant hand opposed to their non-dominant hand.

Equipment:

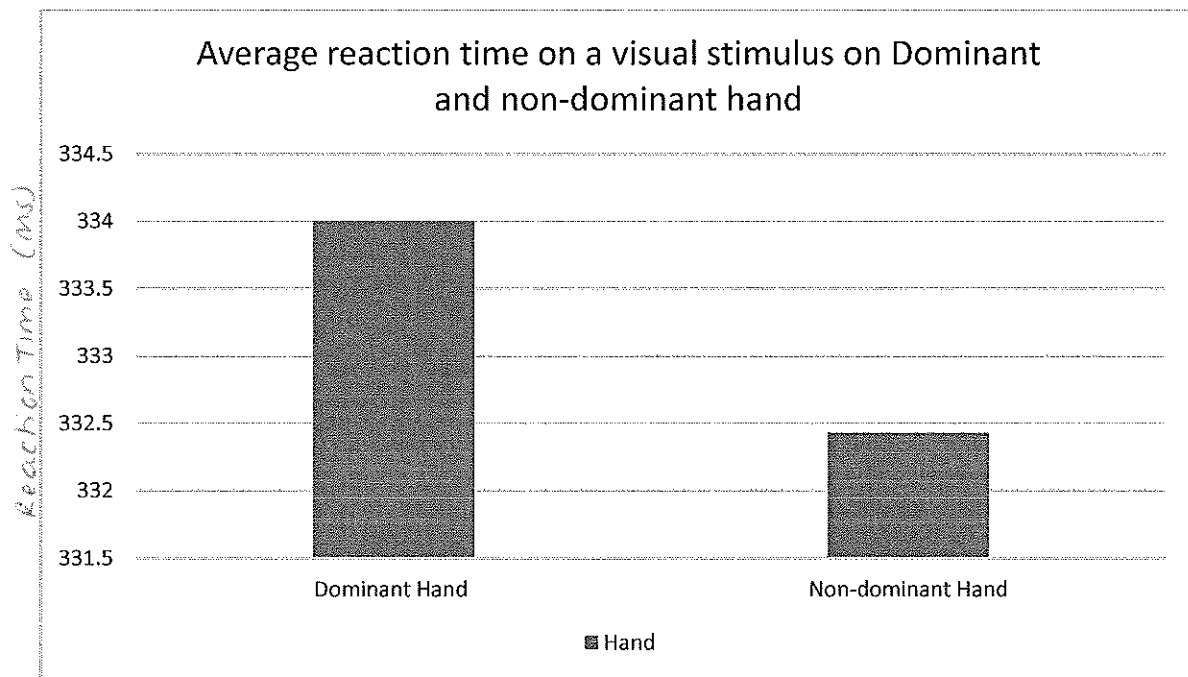
- 1x mobile phone (iphone)
- 1x game application
- 1x desk

Method:

1. Turn on phone and load application
2. Place phone (with application loaded) on desk
3. Have willing participant place their fist on the desk next to the phone using their index finger to perform the task
4. Have the participant follow the application instructions
5. Test reaction time 5 times on each hand
6. Record the average for each hand
7. Repeat this for the 11 participants
8. Calculate the average for both hands (from the averages of each participant for each hand)

## Results

Participants	Reaction time for: (m/s)	
	Dominant	Non-dominant
Jessica	340	345
Emma. W	396	447
Becky	346	300
Brooklyn. D	298	357
Brooklyn. R	387	356
Ben	302	325
Chelsea	298	309
Emma. C	287	305
Scarlette	357	283
Kim chi	316	332
Anri	347	297
AVERAGES	332.43	334

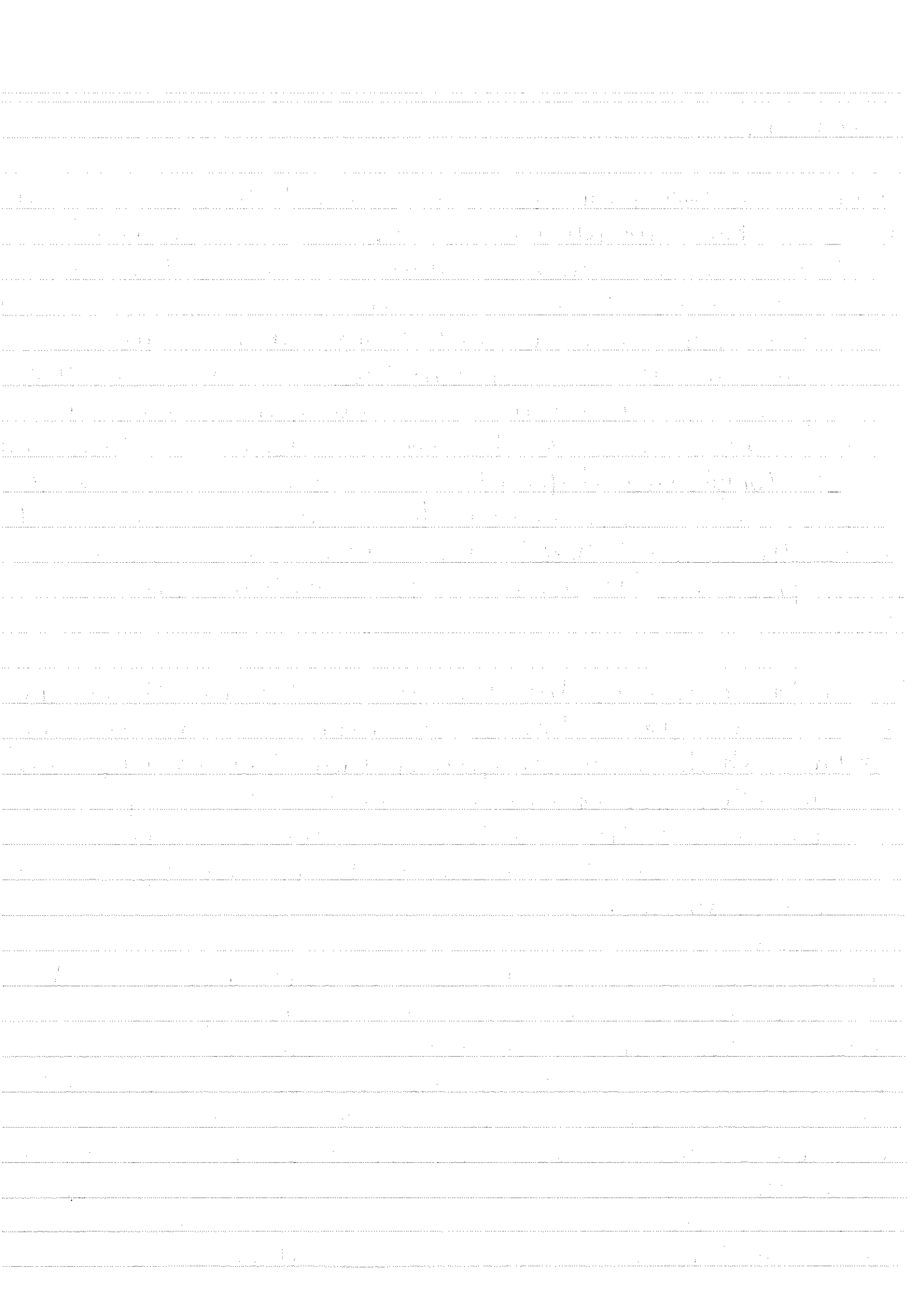


## Discussion:

From the 11 willing participants in the visual stimulus reaction time task those ~~who~~ when using their dominant (preferred) hand had a faster average than when using their non-dominant (non-preferred). The Average time of the Dominant hand was approximately 332.43 ms, whereas for the non dominant it was approximately 334 ms. From the Average of the Dominant hand the most occurring Score was 298 ms, where as for the non-dominant they were all completely different. This difference in averages ~~may~~ is most likely because for a movement produced using the preferred hand their is more Co-ordination when producing the movement (Co-ordination (more motor units))

Within the results of the non-dominant hand there ~~are~~ is a noticeable outlier of reaction time. This time is 407 ms which is much greater than the average, and of the other participants results. This ~~can~~ is possibly due to a failure to focus on relevant cues (concentration) ~~or~~ either individually or because of an external distraction.

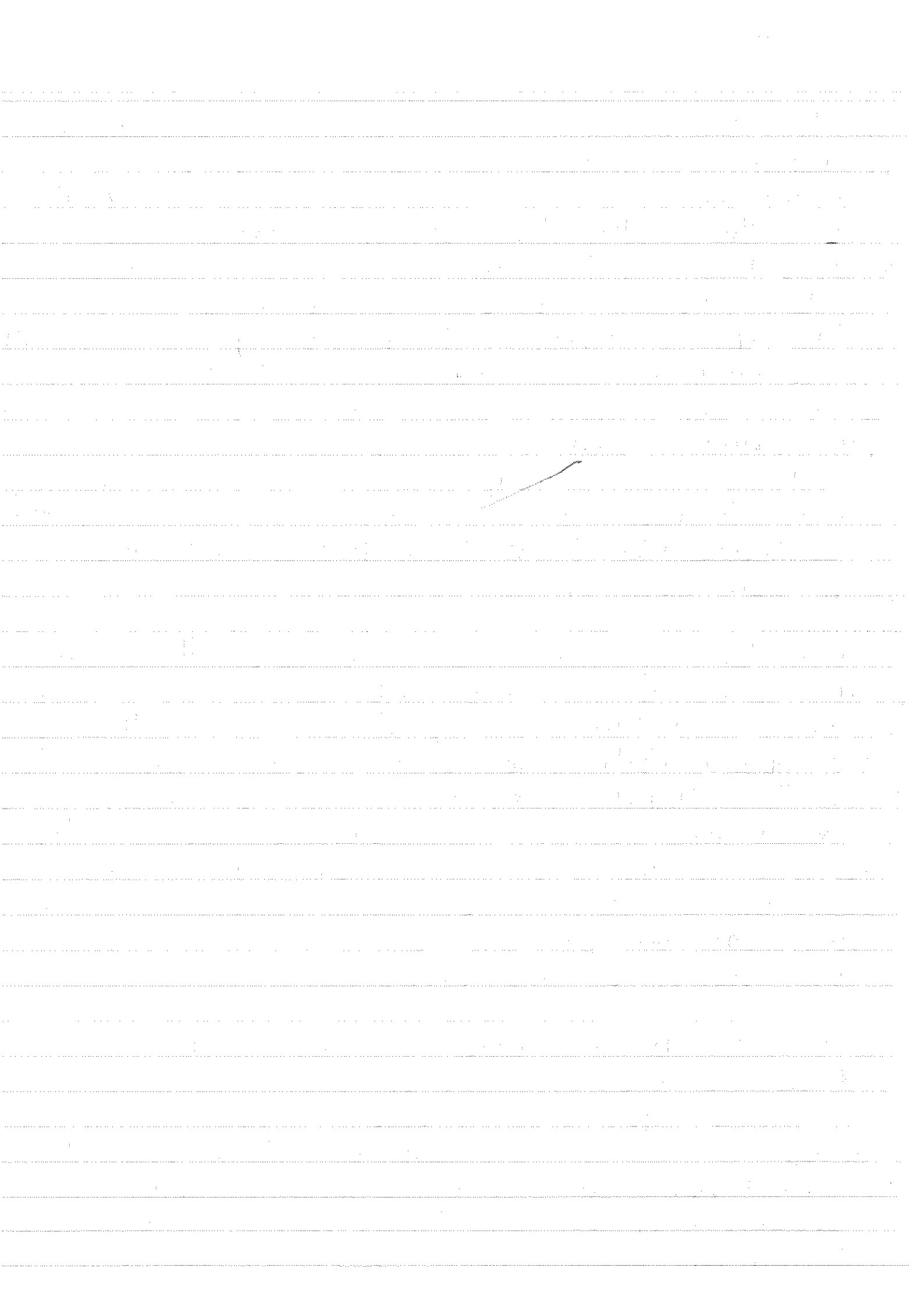
The practice tests a number of participants, making a large sample size and thus improving the reliability of the experiment overall. However, although the experiment is testing the reaction time of both hands based on a visual stimulus, it is also unintentionally testing the effect of practice on the individuals reaction time. This is because after completing the first test the second test becomes easier and more Co-ordinated. Similarly the results



of the non-dominant hand were taken after the participant had completed the 5 rounds of the Dominant hand test. This evidently produced an outcome in the results. The ability of the participants to become "better" at the task as trials went on may be due to a increased amount of myelin of the axon of the neurons responsible for producing the movements required ~~on~~ with both hands. As well as this the myelin on the retinal Ganglion Cells (RGC), that receive light information from photoreceptors (both bipolar and retina amacrine) may become thicker or more present allowing the nerve impulse to be transferred to the occipital lobe of the brain faster, as the impulse jumps from node of Ranvier to node of Ranvier.

Within the experiment the ability of the participants to carry out the task in the same environment was hindered by distractions in the room and the inability ~~for~~ of the individuals to have their hands the exact same distance away from the screen. This could be improved by ~~maximising~~ minimising external distractions and by measuring the distance of the individuals hands away from the phone, however in the circumstances doing so was difficult.

The results obtained may ~~be~~ have also been hindered by the characteristics of the individual. e.g height, Age, gender, visual impairments, eye damage or health. The Dominant Hand was also The right hand 100% of the time meaning it was a comparison of left and Right, could be avoided by including left handed people in the participant group.





## Conclusion:

On average, from the results of the visual stimulus reaction time test, the dominant hand when used to complete the task had a faster response time from 11 participants. ~~Consequently~~ (332.43ms). Consequently the response time of the non-dominant hand was slower (334ms). These ~~are~~ conclusions from the results supported the hypothesis in that it made apparent that the reaction time when using the dominant hand is faster than when using the non-dominant hand.



Stimulus

3). ↓ a.

Photoreceptors responsible for light stimulus in the retina of the eye.

↓ The retinal ganglion cells, in the outer layer of the retina

↓ retinal amacrine cells (small cells within the retina that have dendrites but no axon, allowing them to ~~receiving~~ receive impulses efficiently)

↓ Optic nerve.

↓ C.N.S (central nervous system), the occipital lobe of the brain responsible for visual sensory processing.

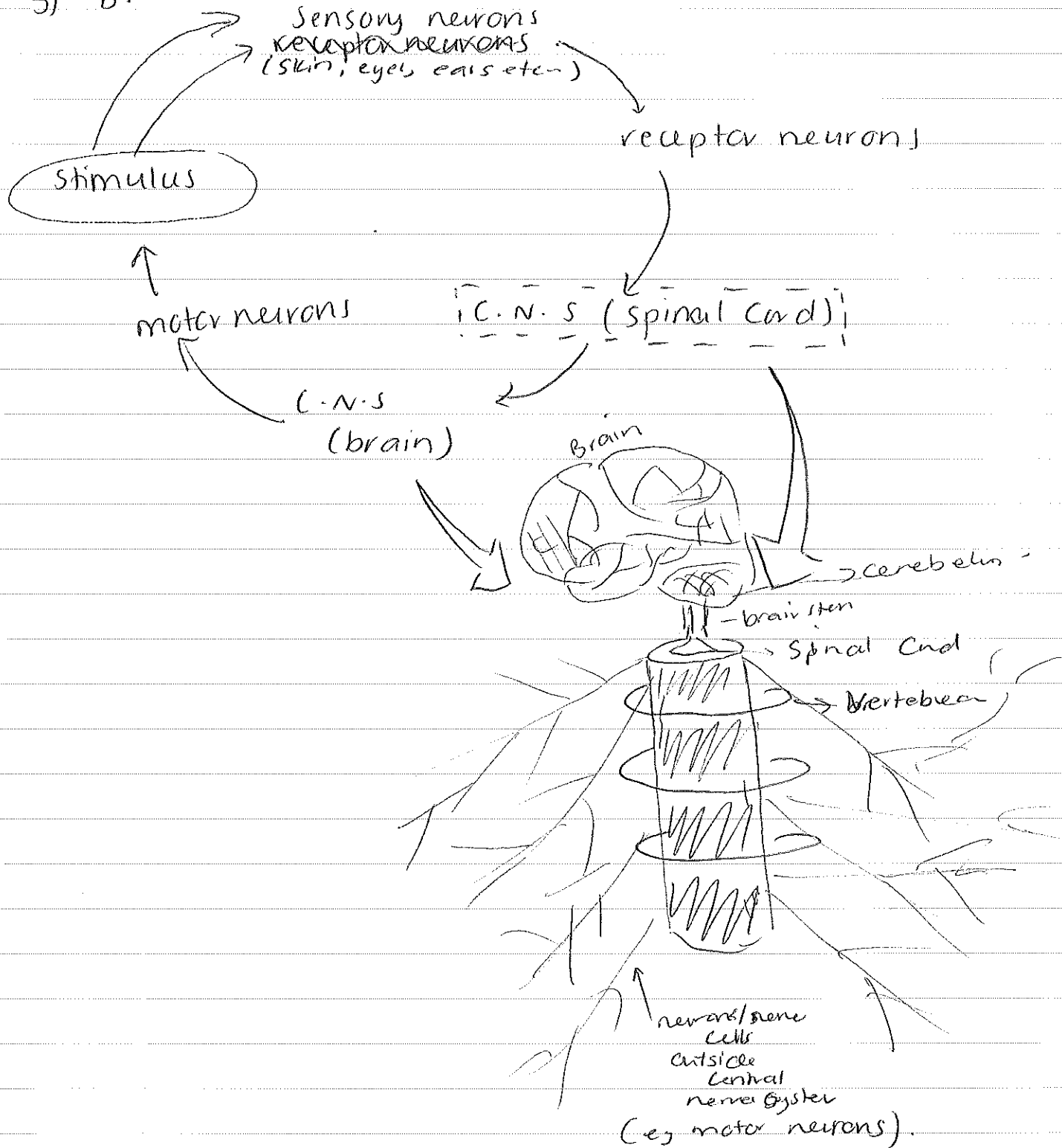
↓ C.N.S (Spinal Cord), containing associative neurons, transmitting the nerve impulse.

↓ nerve tissue inside muscles producing the movement required to carry out the task (motor neurons)

Sensory Neurons



3). b.





3). c.

### Spinal Reflex Arc.

### response Pathway

- both need a Stimulus
- goes to Spinal Cord first
- does not have Specified section of brain.
- does not go to Spinal Cord Second.
- has Specified route for Sensory nerve impulses
- occurs primarily in the Spinal Cord.
- both have a dependance on motor neurons ~~as~~ as a consequence of the Stimulus
- In voluntary.
- a result of a threshold (same in every person) being reached causing the reflex
- have a pre-determined outcome.
- (e.g Involuntarily taking hand off the hot plates).

- both need a stimulus.
- does not go to Spinal Cord first
- goes to occipital lobe of brain
- goes to Spinal Cord second.
- does not entirely rely on Spinal Cord for the impulse to be transmitted.
- occurs primarily in the brain (processing of Information - nerve impulse).
- //
- white matter (myelinated cells and ~~the~~ tissue) helps speed up the transmission rate of the impulse,
- voluntary
- have a self determined outcome (response action) e.g Seeing a red light and stopping

