

Date: _____

Nervous System Investigation

Name: Emma Woodruff

Investigation: _____

Your Task: Design an experiment to illustrate the effect of stimulus on a somatic reflex. *reaction times*

SECTION	COMPONENT	Possible Marks	Mark allocated
PLANNING <i>Application</i>	Aim:	1	
	Variables		
	Independent Variable:	1	
	Dependent Variable:	1	
	Controlled Variables: at least 5 are listed	5	
	Prediction: The student states what they thought would happen and why	2	
	Hypothesis: A hypothesis is presented that states the effect of the independent variable on the dependent variable	2	
	Equipment: Listed correctly	1	
	Method: 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	Results: 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	
	Graphing (if applicable): 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	Practical Application: Safety, behaviour, laboratory skills and application during the investigative process can not be faulted	5	3
DISCUSSION Analysis Evaluation	The results are summarised in a mature manner and pattern/trends in the results are identified and commented on.	2	
	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 makes sense.	-1	
CONCLUSION	Major findings are summarised.	1	
	Statement of whether hypothesis has been supported or not	1	
TOTAL		50	

Nervous System

In Class

Nervous System Investigation

Aim - To determine if levels of distraction (eyes open, eyes closed and engaging in conversation) affect reaction time (msec).

Hypothesis - Focusing on distractions whilst responding to an auditory stimulus will increase reaction time by 30 msec.

Prediction - The lowest level of distraction (eyes closed) will result in the fastest reaction time (msec) of an average of 450 msec. This is due to the fact subjects are able to situate their awareness and concentration primarily on the auditory stimulus.

Independent variable - Type/level of distraction (talking, eyes open, eyes closed)

Dependent variable - Speed of reaction between an auditory stimulus and touching a phone (response) - measured in msec.

Controlled variables - height of finger above phone (2cm)
 - same phone
 - dominant hand to react
 - same day (period of time)
 - same noise (auditory stimulus)
 - same environment.

Nervous System Investigation

- Equipment →
- phone (iphone)
 - ruler
 - assistant to involve in conversation
 - desk
 - chair
 - blind fold
 - room (quiet)
 - app to measure time of reaction
 - paper
 - pen.
 - person(5) to experiment on.
 - Internet

Method →

- 1) open <http://play-back.fm/audio-reaction-time> on iPhone.
- 2) Choose 5 subjects (people)
- 3) Inform them of the process → use dominant hand to touch the phone screen as soon as they hear the noise.
- 4) Sit the first subject down on seat in front of desk.
- 5) Tell subject that they are allowed to look at the phone whilst listening for reaction noise.
- 6) Place the subjects finger 2cm above phone screen before starting the test.
- 7) Start the test repeating step 6 before each round of reaction time testing. (5 times) and record average time.
- 8) Blind fold subject
- 9) Repeat steps 6 and 7
- 10) ~~Take~~ Take off blindfold and inform subject that they are to engage in conversation with assistant whilst completing the test.
- 11) Repeat steps 6 and 7.
- 12) Repeat steps 3-11 for following 4 subjects.

3

Emma Woodnuff

1) Method continued Diagram →

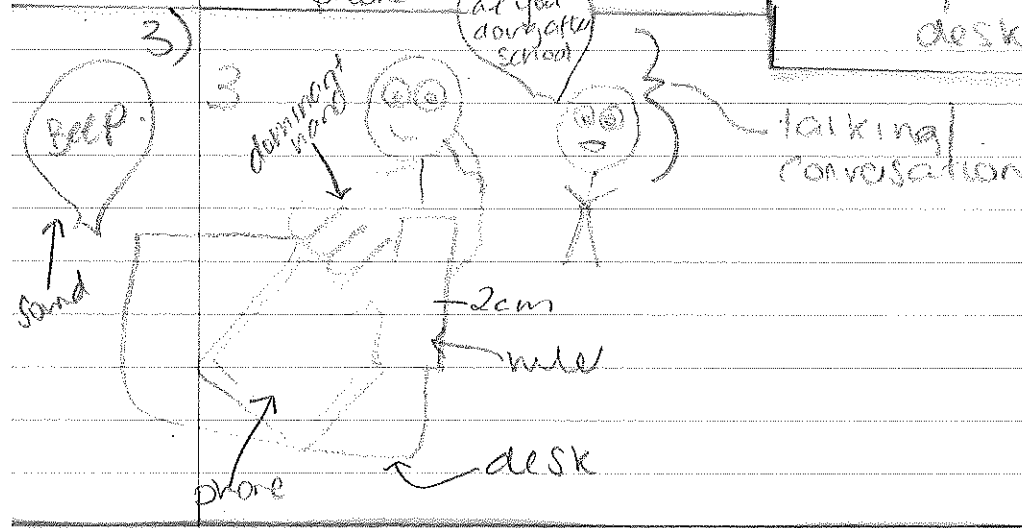
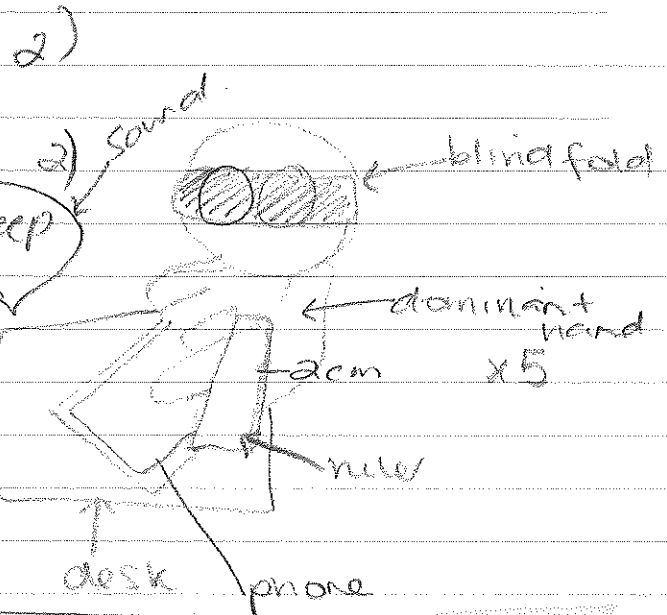
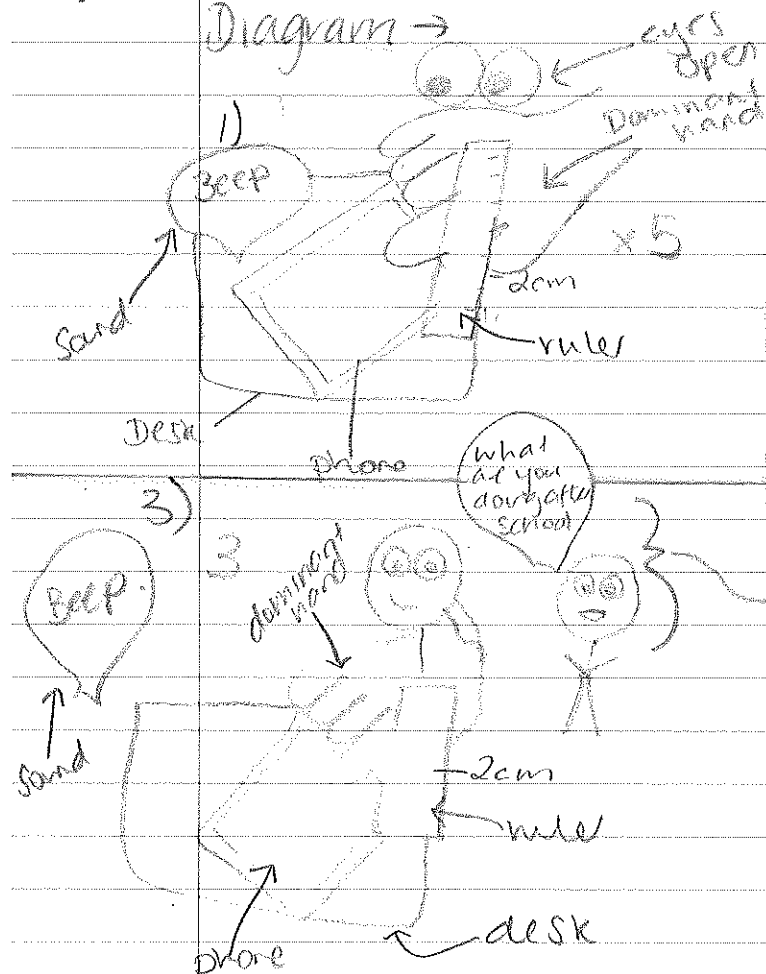


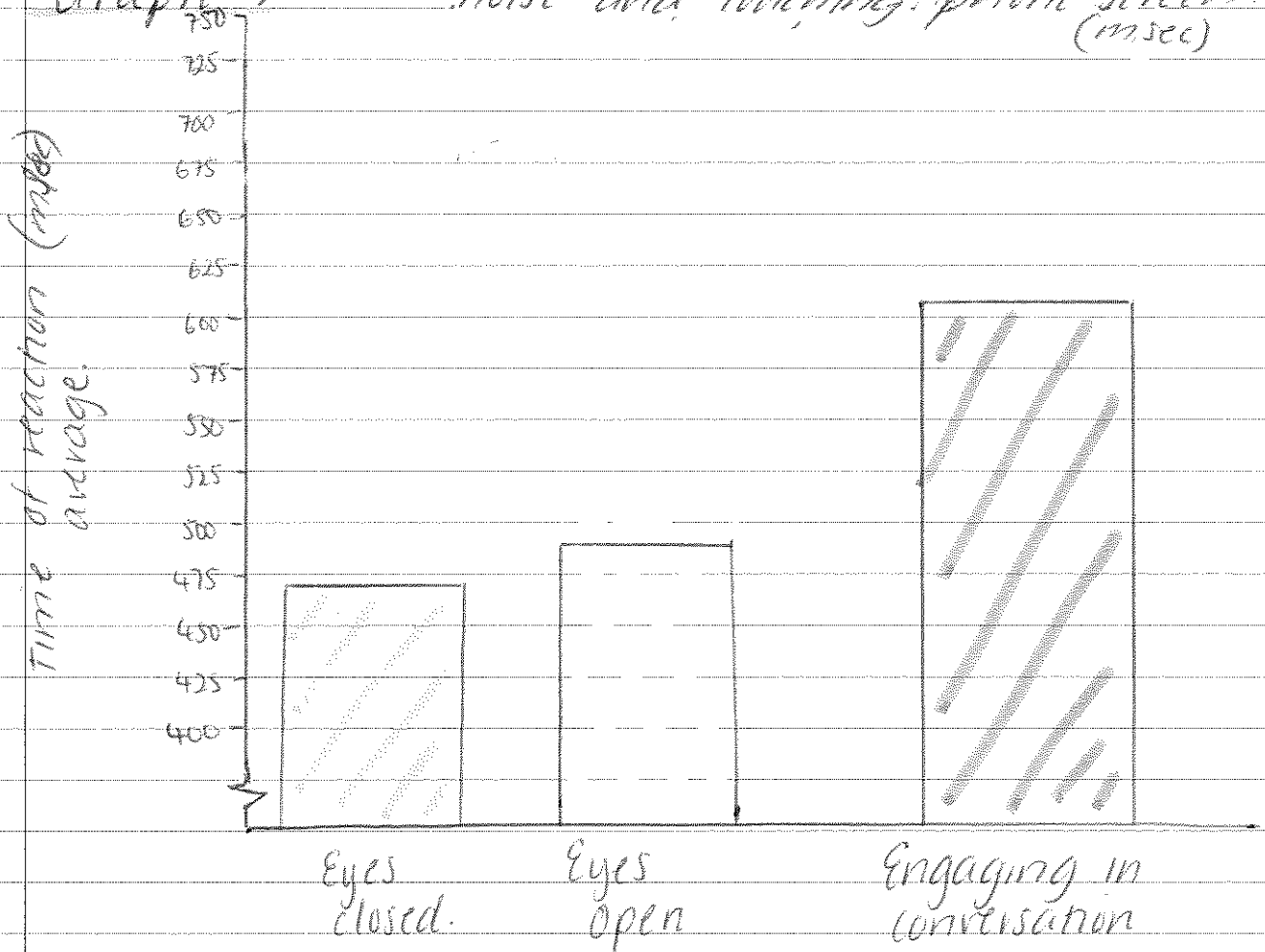
Table → (RESULTS)

Distraction	Speed of reaction between hearing sound and touching phone (msec)					
↓	TRIAL					Average
	1	2	3	4	5	(msec)
Eyes closed	493	523	429	433	482	472
Eyes open	512	461	463	517	471	484
Engaging in conversation	589	741	468	675	556	605

Emma Woodruff

How differing distractions alter reaction times between hearing noise and touching phone screens. (msec) ④

Graph →



Type of distraction

Nervous System Investigation

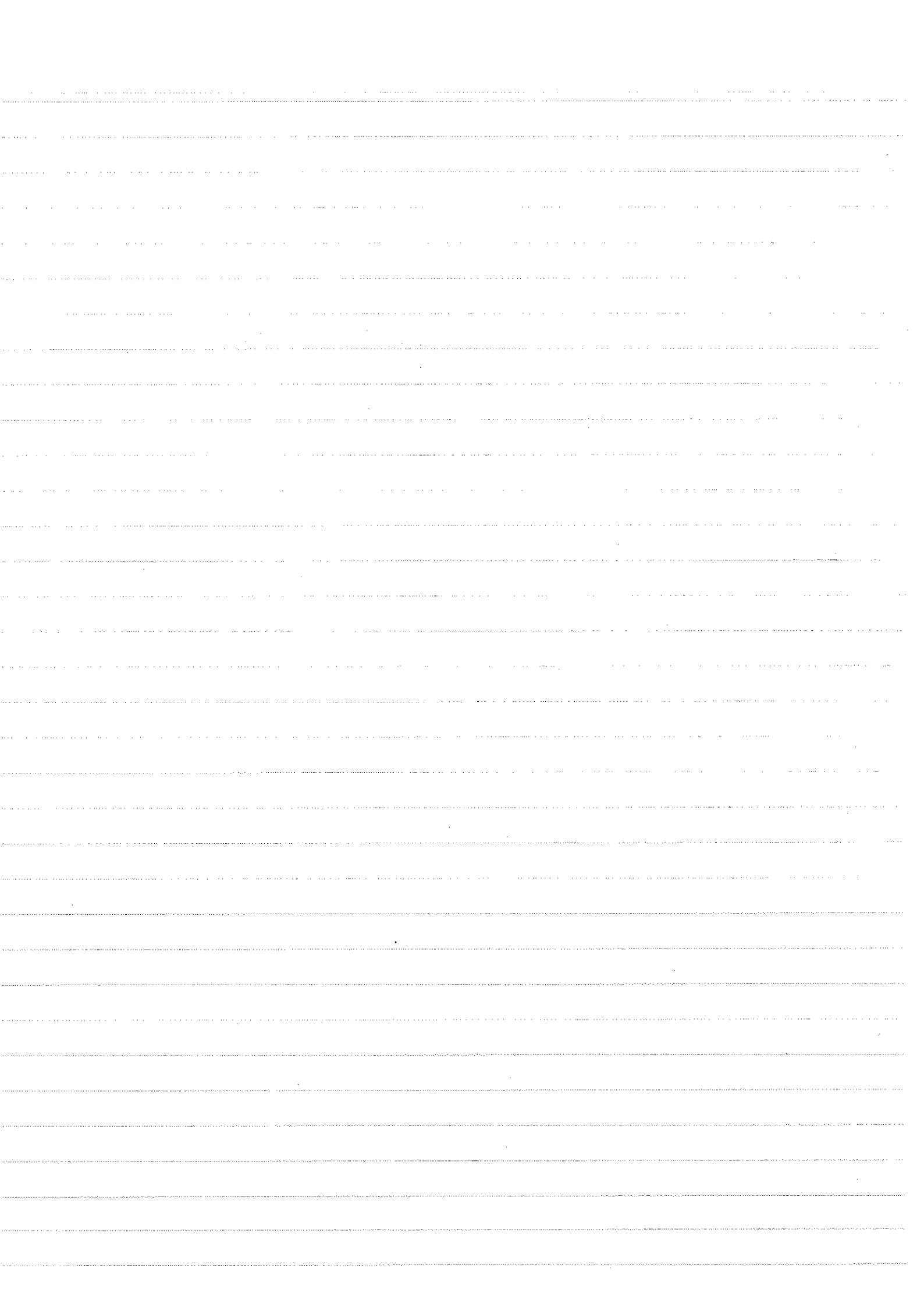
The investigation focused on whether ~~terett~~ different distractions alter the reaction time in response to an auditory stimulus. The results concluded that with minimal distraction (eyes closed) resulted in the fastest average reaction time of 472 msec, whereas engaging in conversation had the slowest reaction time of avg 605 msec (highest level of distraction).

Inconsistencies are displayed in trial 2 of the experiment as it contradicts the conclusion that the least distraction ~~et~~ results in fastest reaction times. ~~et~~ ... Eyes closed for trial 2 = 523 msec. This could be due to uncontrolled variables such as stress and unchangeable room noise.

The experiment was valid, it tested the hypothesis, it made sense, and tested what was supposed to be tested. The experiment was highly accurate with the phone enabling exact times ~~records~~ to be recorded.

The experiment was fairly reliable but due to time restrictions, it limited the ~~size~~ amount of people who could be tested. To improve ~~we could~~ a reliability a larger sample group is required.

The first problem was screen-sensitivity (didn't register touch) this could be improved by removing all protective barriers of the phone (glass screen) and re ~~set~~ singing touch screen. The second problem was getting the height of the finger ~~above~~ above phone to exactly 2cm. This could be improved by having more time



inbetween trials to get an exact measurement. The results can be explained in a scientific manner. A reaction time is an organisms speed to respond to a stimulus. In this experiment, somatically the reaction was voluntary. The flow of reaction can be explained as follows:

~~Stimulus~~ (auditory context with the experiment:

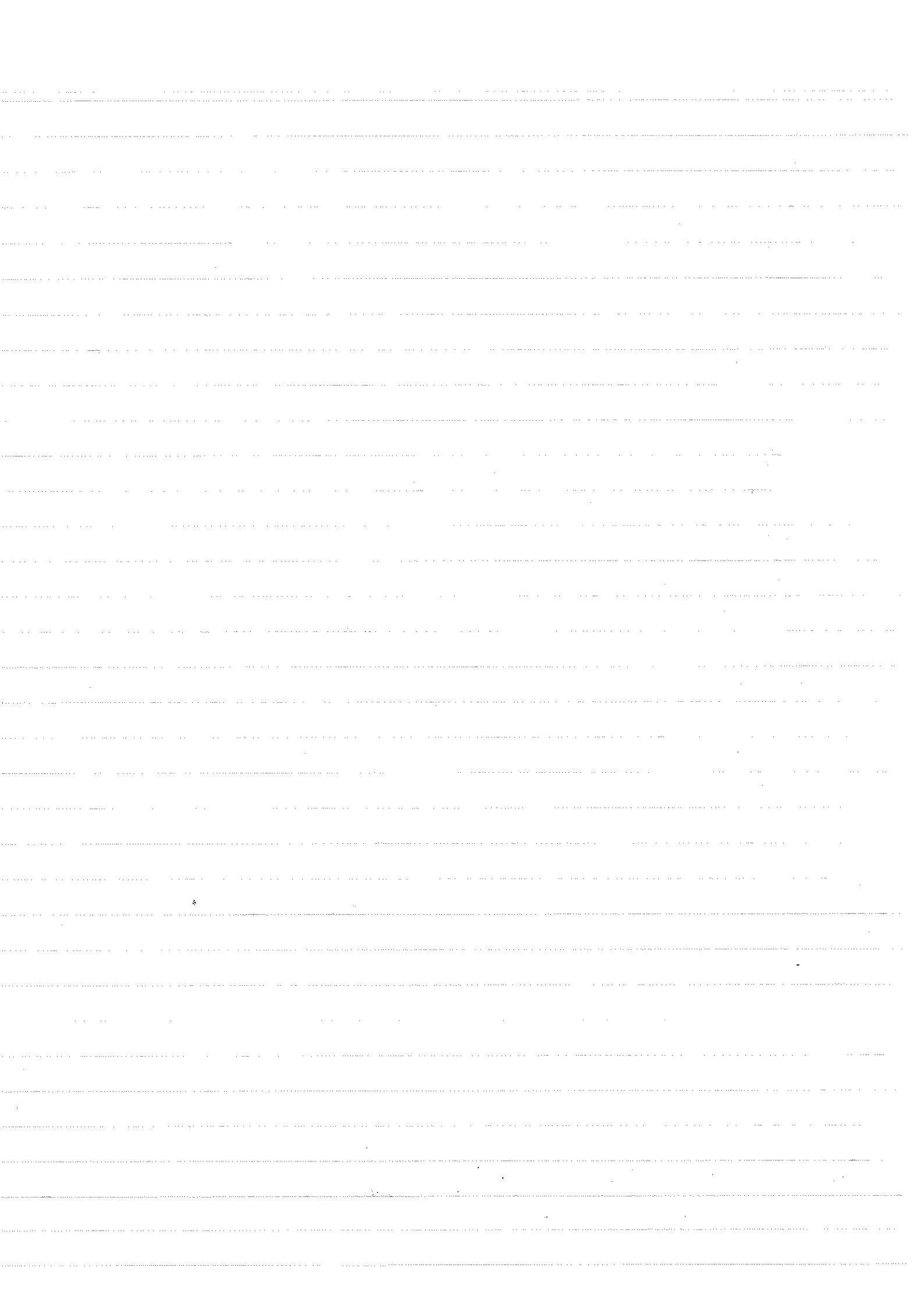
- 1) Stimulus (auditory sound) processed in cochlea.
- 2) activation of sensory neurons
- 3) transferred to interneurons (brain, spinal chord)
- 4) processed in the temporal lobe of the brain (auditory processing)
- 5) activation of motor neurons.
- 6) effector response - somatic muscle movement of hand, arm to touch phone.

The experiment's neuron pathway can be classified as a cranial nerve pathway, specifically along the 8th pair of cranial nerves.

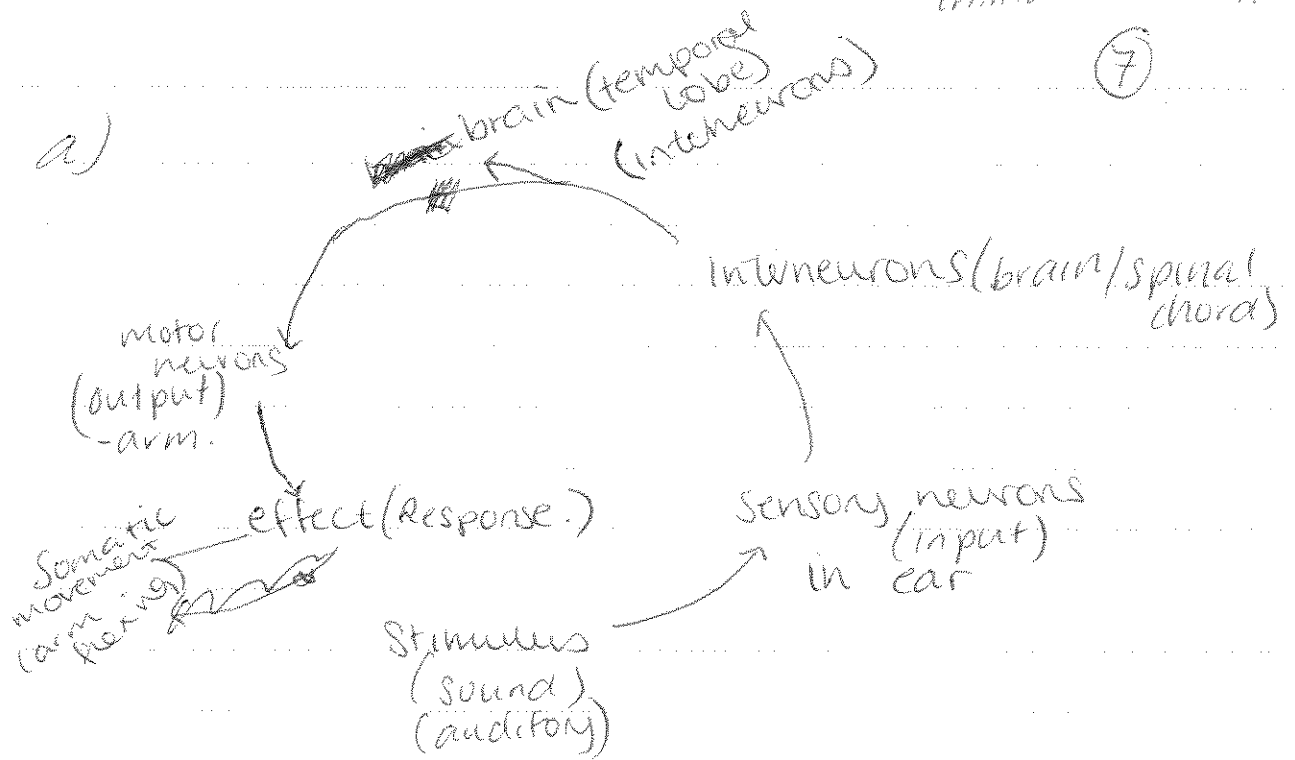
Myelin sheaths along the neurons create to the reaction to occur at a fast speed as shown in the table. Many scientists have discovered that responding to an auditory stimulus without ~~observation~~ ~~no experiments findings~~ vision has a faster reaction time than with sight which is evident in our results.

Conclusion - The experiment's findings highlight that with minimal distraction (eyes closed) results in the fastest reaction time (avg 472.)

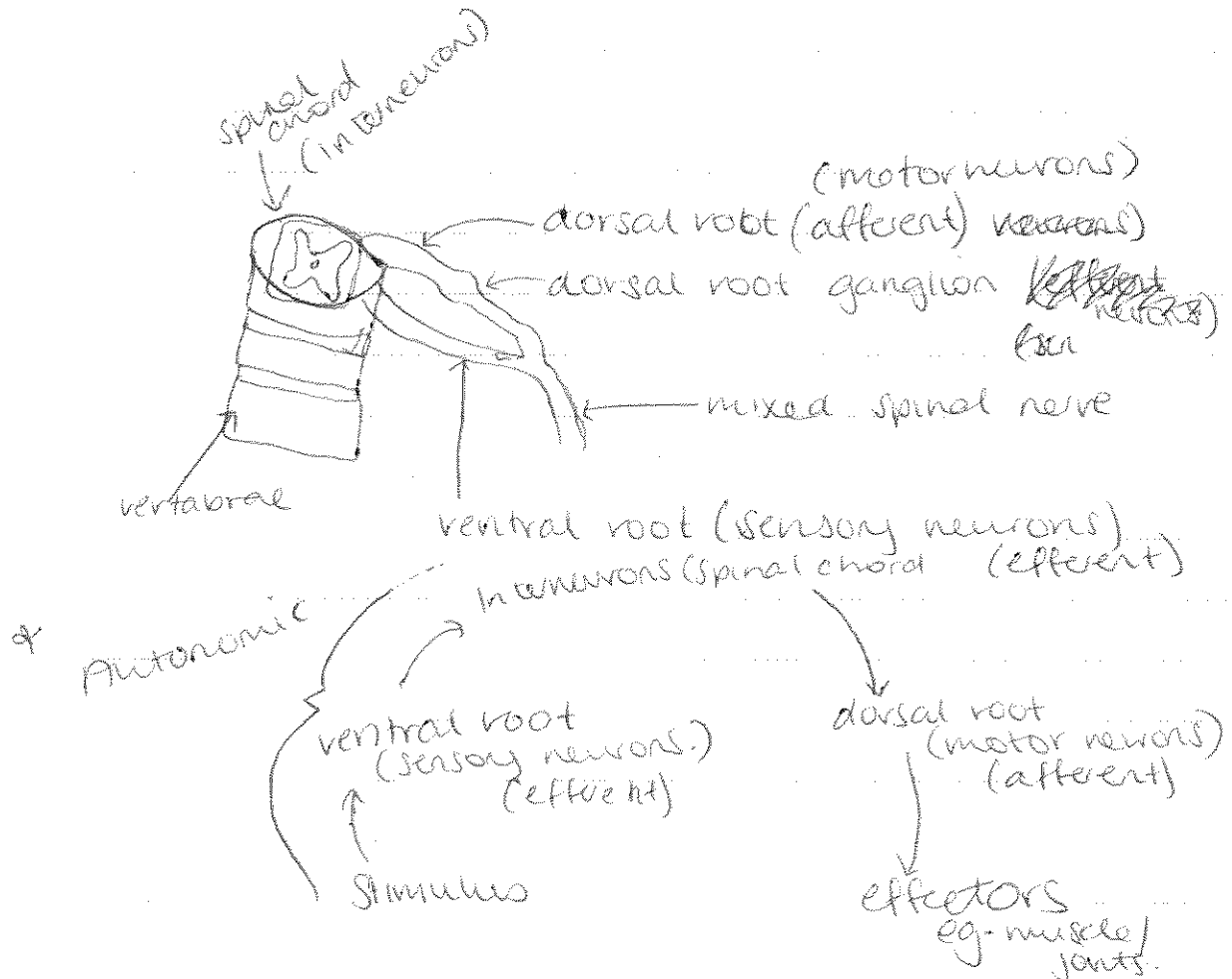
My hypothesis was supported however not to the time frame of 30msec per distraction, the time differing times were differing.



3) a)



b)



- involuntary

3) spinal reflex arc does not travel through brain
- has 31 pairs of neurons

Reaction

- ~~en~~ brain + spinal chord.

- brain also has 12 pairs of cranial

& continue next

page.

nerves.

- can be involuntary or voluntary



- * The 2 are similar as they both have interneurons.
- * both motor and sensory neurons.
- * both produce a somatic effect/response
- * Have different pathways to execute their response eg. Spinal arc has dorsal and ventral roots (31 pairs)
- * Spinal reflex arc uses autonomic division of nervous system whilst traveling towards spinal chord and more specifically the sympathetic division on return (motor neurons to execute response)
- * Spinal arc is ~~more~~ magnified, displays smaller part of system-specific roots whereas the response is much more broad.

