

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

## Nervous System Investigation

Name: Becky Ritchie

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		
	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	4	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 must make sense.	1	
CONCLUSION	Major findings are summarised.	1	
	Statement of whether hypothesis has been supported or not	1	
TOTAL		50	



# Nervous System Investigation

Becky

**Aim:** To design an experiment that shows the effect of particular stimuli on response times.

**Variables:**

**Independent:** The response times from the stimulus from five candidates.

**Dependent:** The amount of time it takes for candidates to react.

**Controlled:** The height of release, same test situations, same test on internet, same noise volume and same body positioning, same hand (right)

**Prediction:**

I predict that these response times will become slower as we progressively change the stimulus while the occupants are conducting. By changing the noise level and eyesight, we are effecting their concentration levels and will be shown in the results. The first trial will be the fastest, and the other two will be considerably slower.

**Hypothesis:**

For this experiment on reaction times, the different distractions or situations the candidate is under will determine the results of their response times, either

by doing well or responding slower from lack of concentration. If the candidate is distracted, then the response time typically should be slower.

### Equipment:

- A phone or computer
- Website with reaction time test with sound
  - <http://playback.fm/audio-reaction-time>
- ruler
- Table
- 5 candidates

### Method:

- 1 Select 5 people to do experiment
- 2 Set up website on phone or computer
- 3 Explain the experiment and how to control the screen before examining response times, 2cm apart!
- 4 Trial run so the person knows what sound.
- 5 Trial one has 3 goes, then explain the second trial, collect T1 results.
- 6 Second trial involves eyes being closed, after 3 goes, explain third trial, collect T2 results.
- 7 Third trial consists of talking and conversation towards the candidate.
- 8 After three goes at trial three, collect times from T3
- 9 Repeat with four other people.

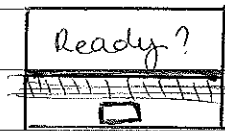
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## Results Table of Responses

People in Experiment	No Distraction	Eyes closed	Talking & conversation
chelsea	512 ms	493 ms	589 ms
Ben	461 ms	523 ms	741 ms
Anni	463 ms	429 ms	468 ms
Scarlett	517 ms	433 ms	675 ms
Emma C	471 ms	482 ms	556 ms
Averages	484.8 ms	472 ms	605.8 ms

## method continued

2

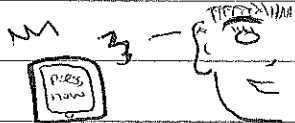


or



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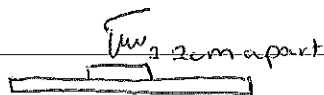
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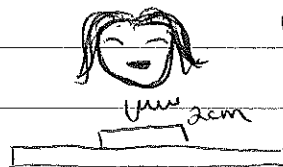
auditory

-no distraction

5

Trial 1  
Normal

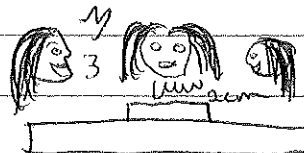
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Trial 2  
Eyes Closedharder to focus on  
external environment

7

8

Trial 3

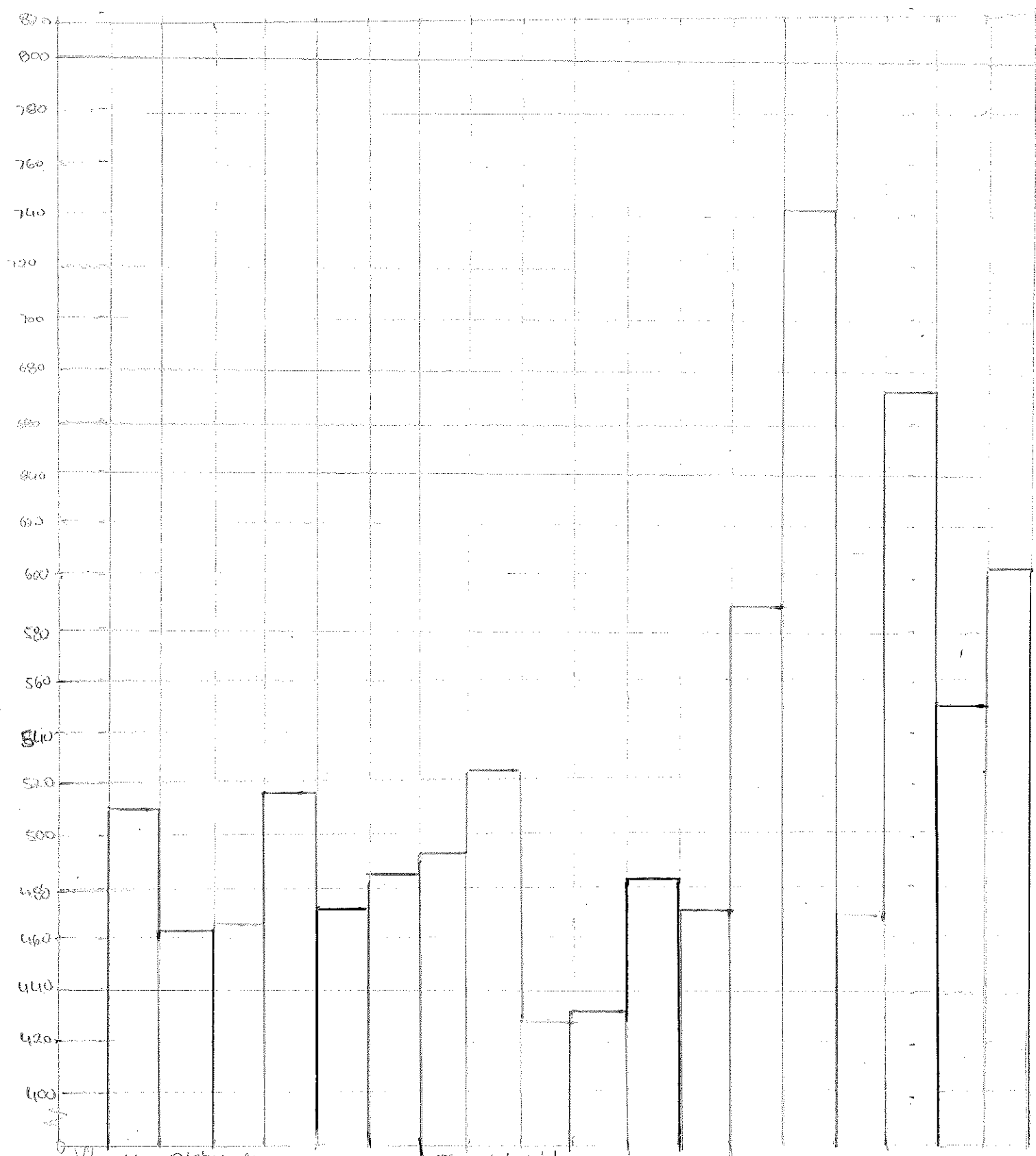
harder to focus again  
as they must answer  
questions

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# Reaction times from distractions whilst working attempting an experiment

Response Times (ms)



Types of Distraction

- Chelisea
- Ben
- Anvi
- Scarlett
- Emmae
- Average





Becky

## Discussion

The results shown from this Nervous system Investigation are showing that nerve impulses from the stimuli affect the response times.

By having three types of trials, (no distraction, eyes closed, and talking/conversation), gives a more reliable result. There is a trend however with the given data, with "eyes closed" trial being the fastest response time with 472ms, the 'no distraction' trial averaging at 484.8ms and "Talking/distracting" trial being 605.8ms, which disproves the prediction.

There were a few inconsistencies throughout this investigation, these being outliers within the given data and having two trials considerably faster than the other, but easily fixable in future experiments.

This experiment would be classified as valid, as it shows that response times can and do become faster or slower due to the conditions the candidate is in. It's reliable as it proves the hypothesis and also indicates that the quicker the response time, the more attentional focus the individual encounters.

There were a few difficulties while conducting this investigation, particularly the noise level within the room. The first trial 'No Distraction' was conducted in a room that wasn't quiet, as there were others conducting and instructions being given. This can be avoided by doing this experiment in a quiet room with no



other external distractions. Another major problem was time management, with many groups rushing to complete their tasks. This can be improved by having each group member in charge of particular tasks to avoid confusion.

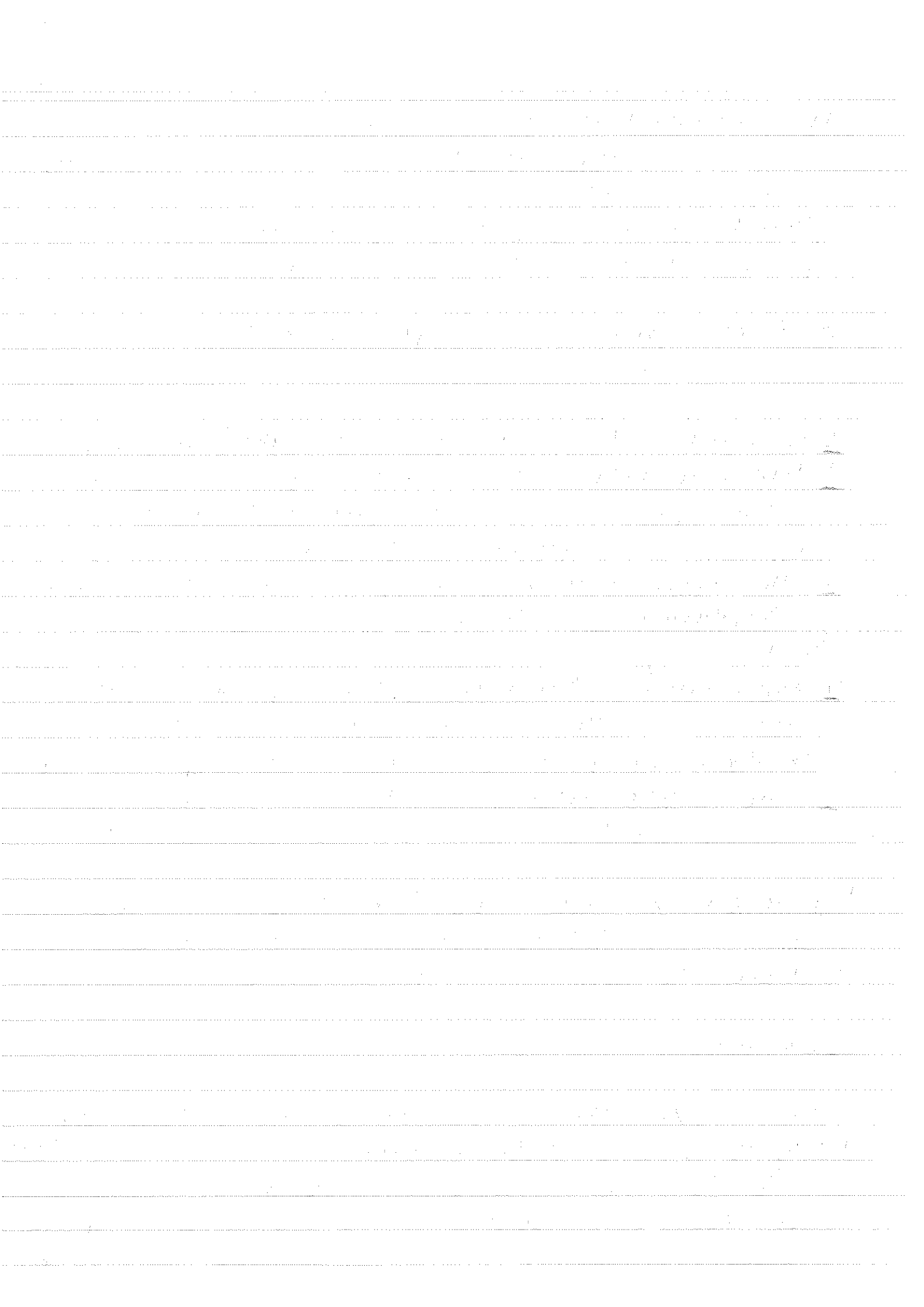
The results from this experiment are based from a basic somatic reflex arc.

- 1 Stimulus - the auditory sound heard from the phone.
- 2 The information is sent through sensory neurons to the spinal cord and upward towards the cranial nerves, particularly the optic nerve.
- 3 The information regarding the stimulus is then interpreted by interneurons within the Central Nervous System (Brain).
- 4 Motor neurons then carry the impulse to the right arm (effector) and stimulates the antagonistic pair of muscles, the bicep and tricep.
- 5 The right arm then touches the phone screen rapidly, and waits for the next trial.

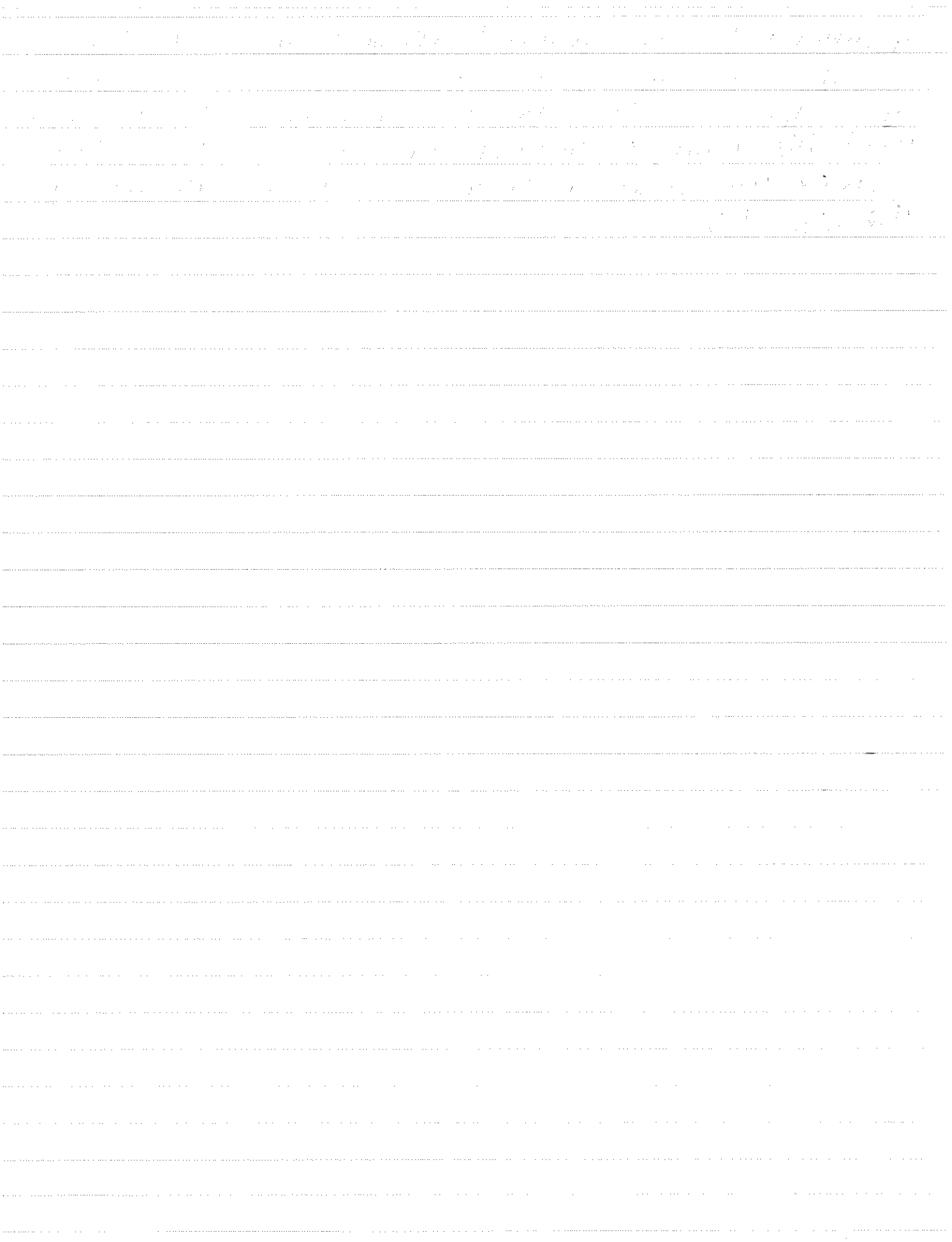
By following these steps, the stimulus (noise) enters the pathway and stimulates the brain to move the right arm to press the screen.

## Conclusion

To conclude, this experiment shows that by having a smaller attentional focus, the candidate is able to have a quicker response time unlike having many distractions while trying to complete the task. The results show that the 'closed eyes'



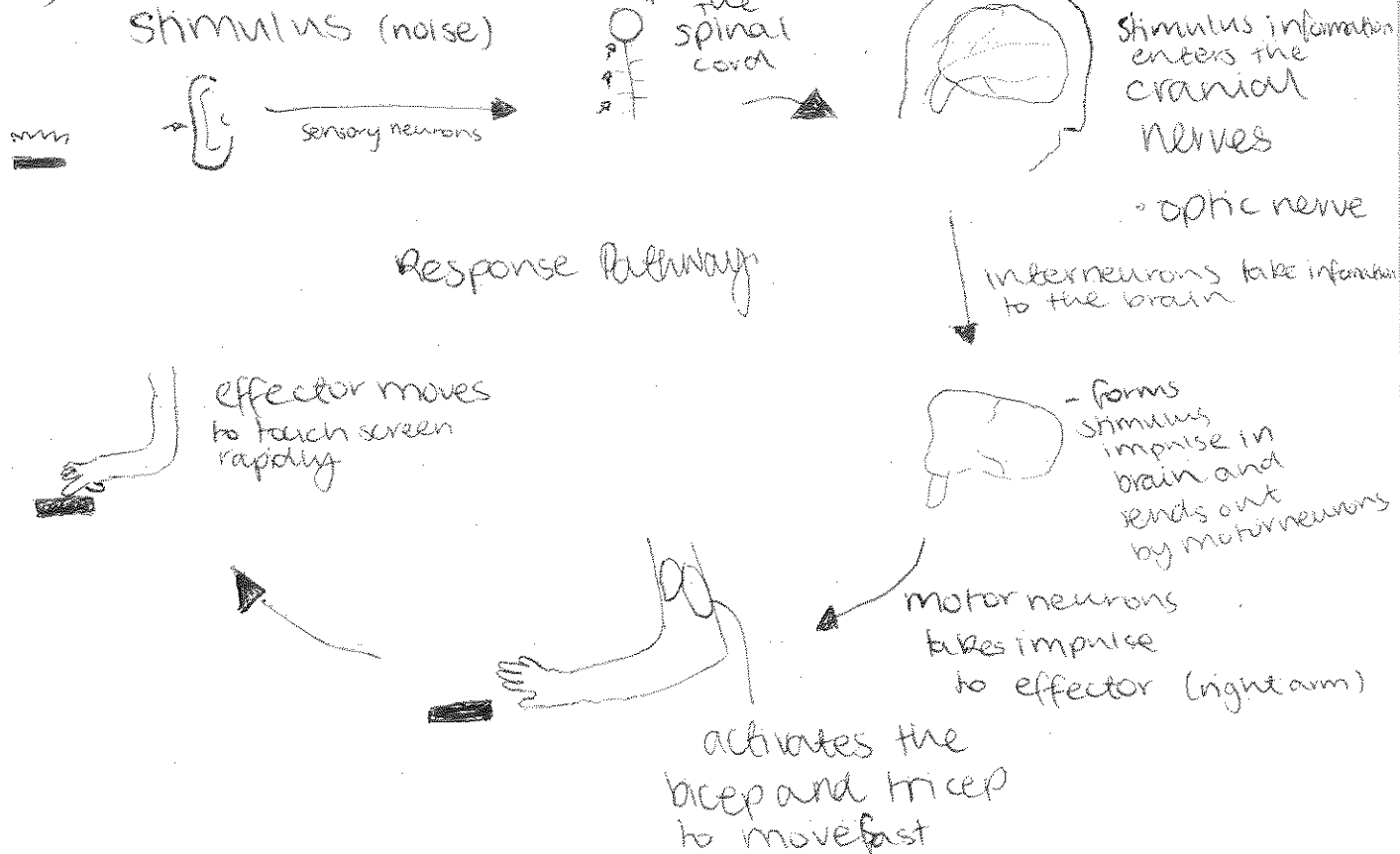
experiment has the quickest average time, and the 'Taking/distracting' experiment trial had the slowest. The hypothesis has been supported as it did show that the more distracted the individual is, the slower the response time, which was proved by the results.



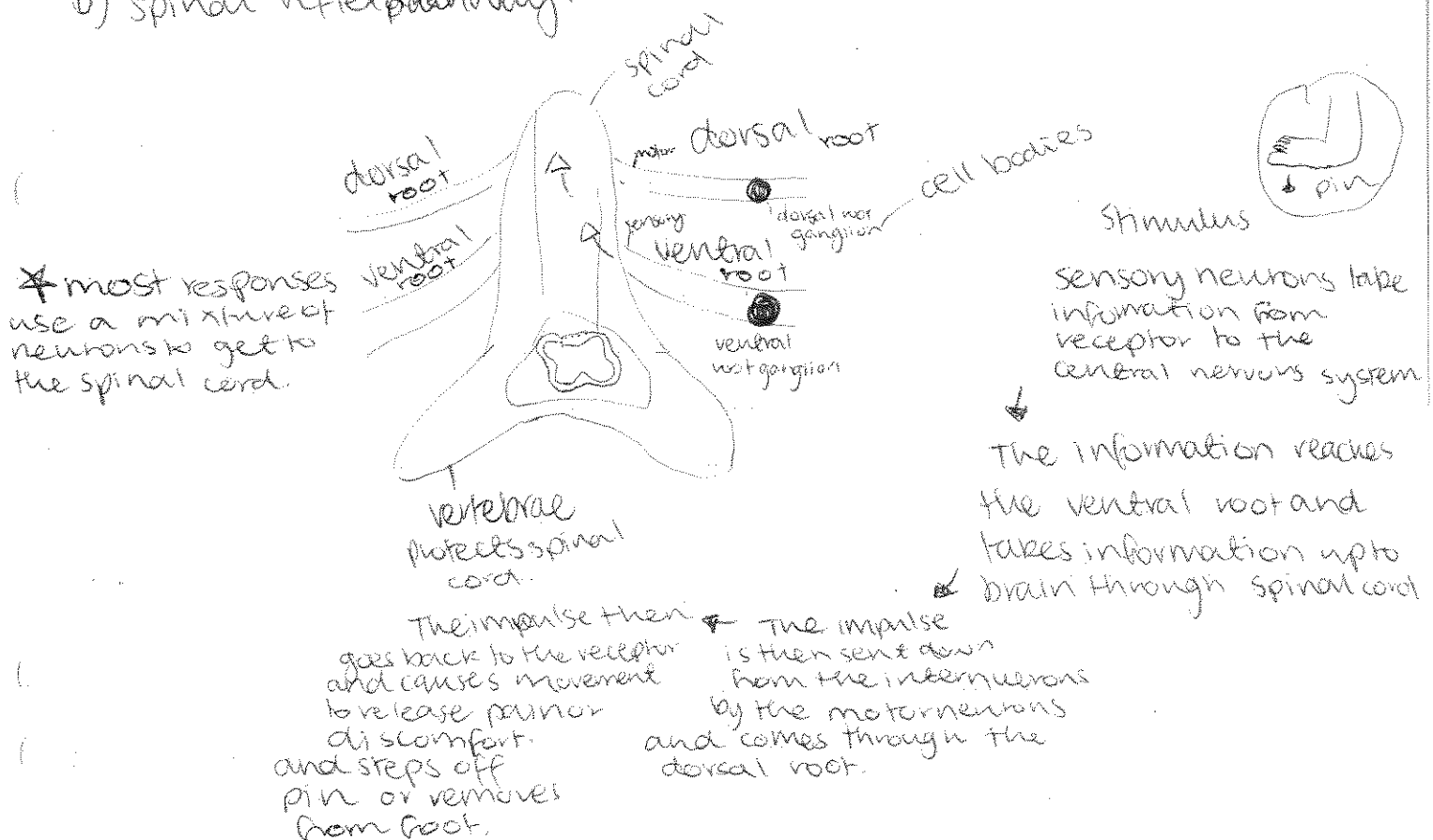
## Question 3

Becky

## a) experiment response pathway



## b) spinal reflex pathway







Becky

c) these two methods of response pathways can be compared, as they both use the central nervous system to send important information to the brain to get impulses and create movement. They differ however by how they use the peripheral nervous system, as on the investigation we altered their vision and hearing, while the spinal reflex is about pain in the foot. The movement time will also be different as the investigation requires sudden movement, and the pain receptors within the foot will require more time compared to those receptors in the ear. These contrasting factors can then be used to explain the different pathways that impulses and stimuli can take within the body.

