

## Dreams: Sleep and Reaction Time

### BACKGROUND

Your five senses receive information from the environment through specialized sensory neurons and are carried to the brain as electrical impulses. Your brain then processes this information and produces a physical response, but also a memory. While the world of dreaming is far from understood by science, it is commonly believed that our sleep and dreaming cycle has a great deal to do with our processing of information from the day.

In this activity, you will carry out a simple task to determine your reaction time, or how quickly you respond to a stimulus. You will then repeat the task at home just before bed and then again first thing in the morning. You will make careful note of how long you slept and any dreams you can recall. One question we are trying to answer is: Will reaction time on a task improve in the morning if you do it right before bed as opposed to earlier in the day?

### PROCEDURE

1. Sit with your arm resting on a table but your hand off the table. Hold your thumb and forefinger about an inch apart.
2. Have your partner hold the ruler from the 30.5 cm end so the zero end is hanging at the top of your open thumb and forefinger.
3. Without warning your partner is to release the ruler and you are to catch it with your two fingers as soon as you can.
4. Measure the distance in cm the ruler fell before it was caught. Measure from the top of your thumb and forefinger. Record this data in your table.
5. Use the reaction time conversion chart to convert the distance in cm to time in milliseconds.
6. Repeat steps 1-5 four more times for a total of five trials, determine your average reaction time.
7. Switch roles with your partner and repeat steps 1-7.

#### **Partner A only:**

8. Repeat steps 1-7 before leaving school today, record all data.

#### **Partner B only:**

9. Repeat steps 1-7 just before going to bed tonight, record all data.

#### **Both Partners:**

10. Repeat steps 1-7 ten minutes after waking up the next morning. Record all data, respond to dream/sleep questionnaire.

## Sleep and Reaction Time

### DATA COLLECTION

#### Round 1 Ruler Task

Trial	Distance (cm)	Reaction Times
1		
2		
3		
4		
5		

Average Reaction Time: \_\_\_\_\_

#### Round 2 Ruler Task (circle A or B)

Partner A in school control group

Partner B before bed

Trial	Distance (cm)	Reaction Times
1		
2		
3		
4		
5		

Average Reaction Time: \_\_\_\_\_

#### Round 3 Ruler Task

After waking up in the morning

Trial	Distance (cm)	Reaction Times
1		
2		
3		
4		
5		

Average Reaction Time: \_\_\_\_\_

#### Class Data

Group	Average Reaction Time (s) Round 1	Average Reaction Time (s) Round 2	Average Reaction Time (s) Round 3
A			
B			

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### WARM UP - DREAM SURVEY

“Sleep hacks”, such as routine bedtimes, avoiding food consumption right before bed, and limiting screen time are highlighted in the “Dreams” episode of Brainchild.

Write your observations of the previous night and this morning in the table. Comment on whether or not this was a typical night/morning or not. (ex. “I went to bed at 11:00pm but I usually go to bed much later”)

Sleep Hack	Observations
Routine (going to bed and waking up at same time)	
Avoiding Eating (when and what did you eat last?)	
Screen Time (what and for how long did you watch/play?)	

Do you remember any of your dreams from last night? If so, record anything you can remember.

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### ANALYSIS AND DISCUSSION OF SLEEP AND REACTION TIME DATA

Both the A and B students did the task the same number of times. The variable we looked at was whether or not doing the task right before bed would increase performance due to the processing occurring in our sleep. Answer the following questions based on the shared class data.

### DISCUSSION POINTS

- Does there seem to be a correlation between the performance on a task and how close to bedtime you practice it? Provide evidence in your answer.
- How could you improve this experiment? What variables did we fail to control? What makes sleep and dreaming experiments so difficult to conduct?

## Reaction Time Conversion Chart

Distance (cm)	Time (s)	Distance (cm)	Time (s)
1	.045	16	.181
2	.064	17	.186
3	.078	18	.192
4	.090	19	.197
5	.101	20	.202
6	.111	21	.207
7	.120	22	.212
8	.128	23	.217
9	.136	24	.221
10	.143	25	.226
11	.150	26	.230
12	.156	27	.235
13	.163	28	.239
14	.169	29	.243
15	.175	30	.247

The above reaction times were found using the following equation where d=distance ruler fell, a=acceleration due to gravity (980 cm/s<sup>2</sup>), t=time:

$$t = \sqrt{2d/a}$$