

# Lecture 6: Study Designs

Monday, September 18, 2023

Your Teaching Fellows:

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Lectures: MWF 12:00 PM – 1:00 PM (003); 1:00 PM – 2:00 PM (004); 2:00 PM – 3:00 PM (010)

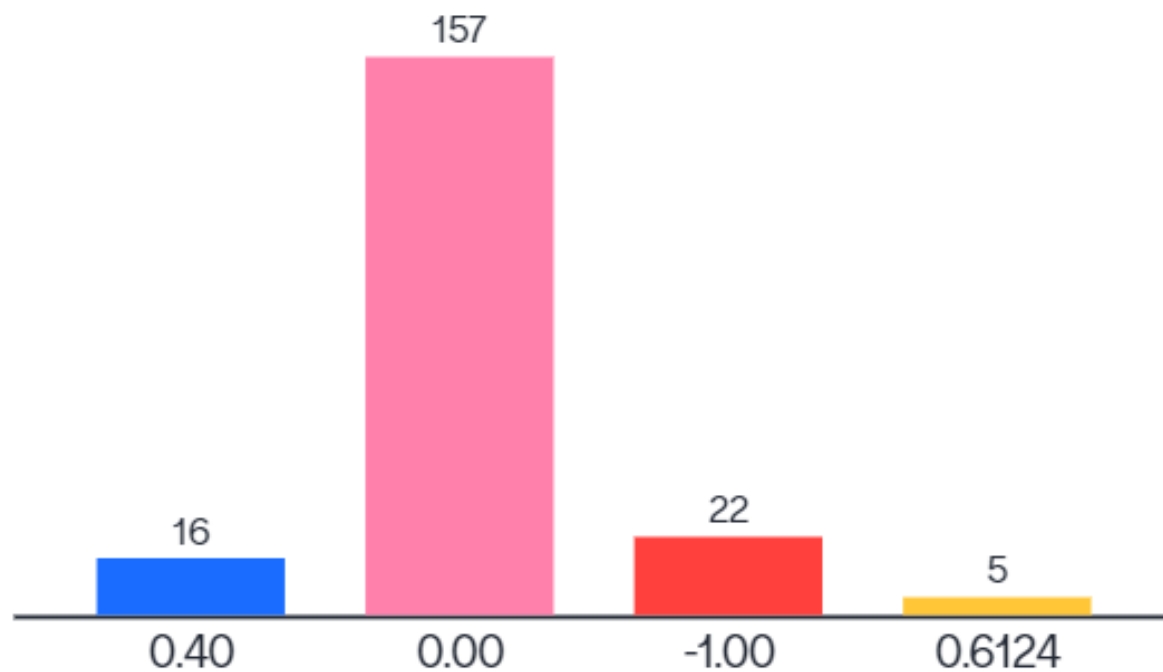
Office hours: Tuesdays 2:00 PM – 4:00 PM

## Learning Objectives

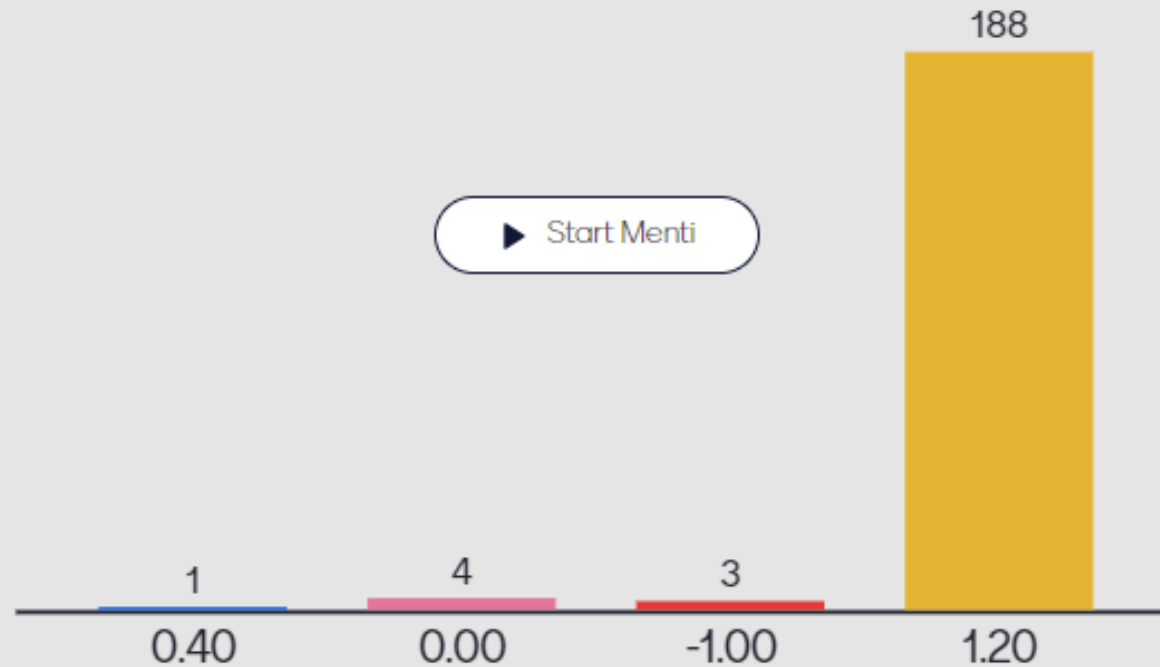
By the end of this class, you should be able to

- Explain what can and cannot be concluded from a correlational design
- List and describe the two ways internal validity is attained in an independent groups design
- Identify a confounding variable and explain how it threatens internal validity

# Which of the following is the weakest correlation coefficient?

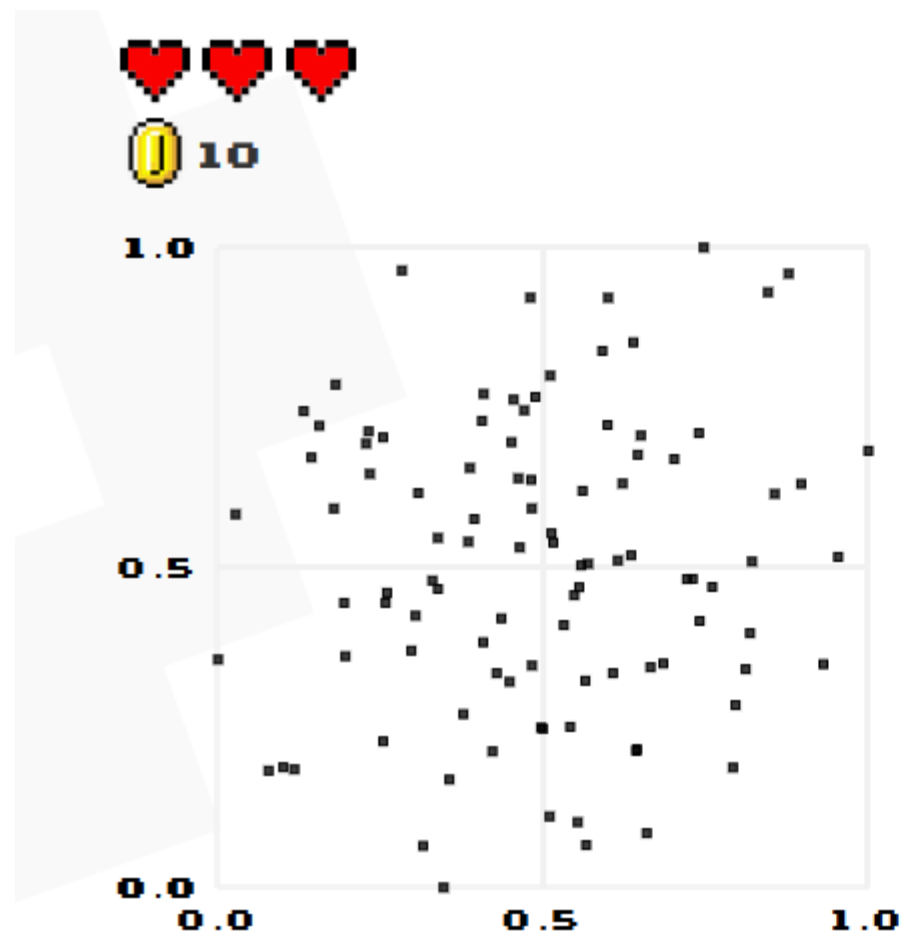


# Which of the following is NOT a possible correlation coefficient?



# Guess the correlation!

<http://guessthecorrelation.com/>



**HIGH SCORE** **MAIN MENU**  
71

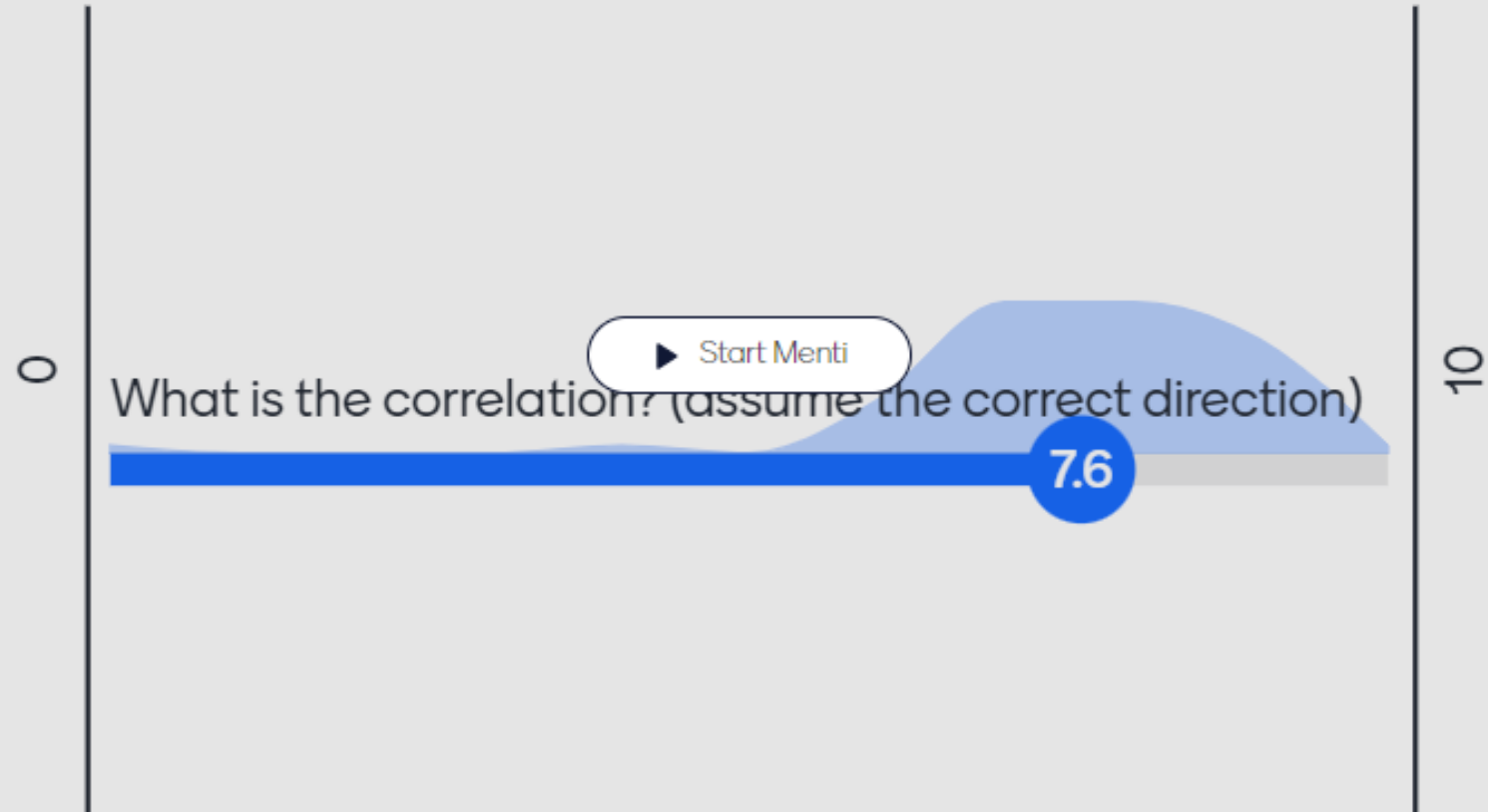
**NEXT**

<b>TRUE R</b>	<b>0.08</b>
<b>GUESSED R</b>	<b>0.10</b>
<b>DIFFERENCE</b>	<b>0.02</b>

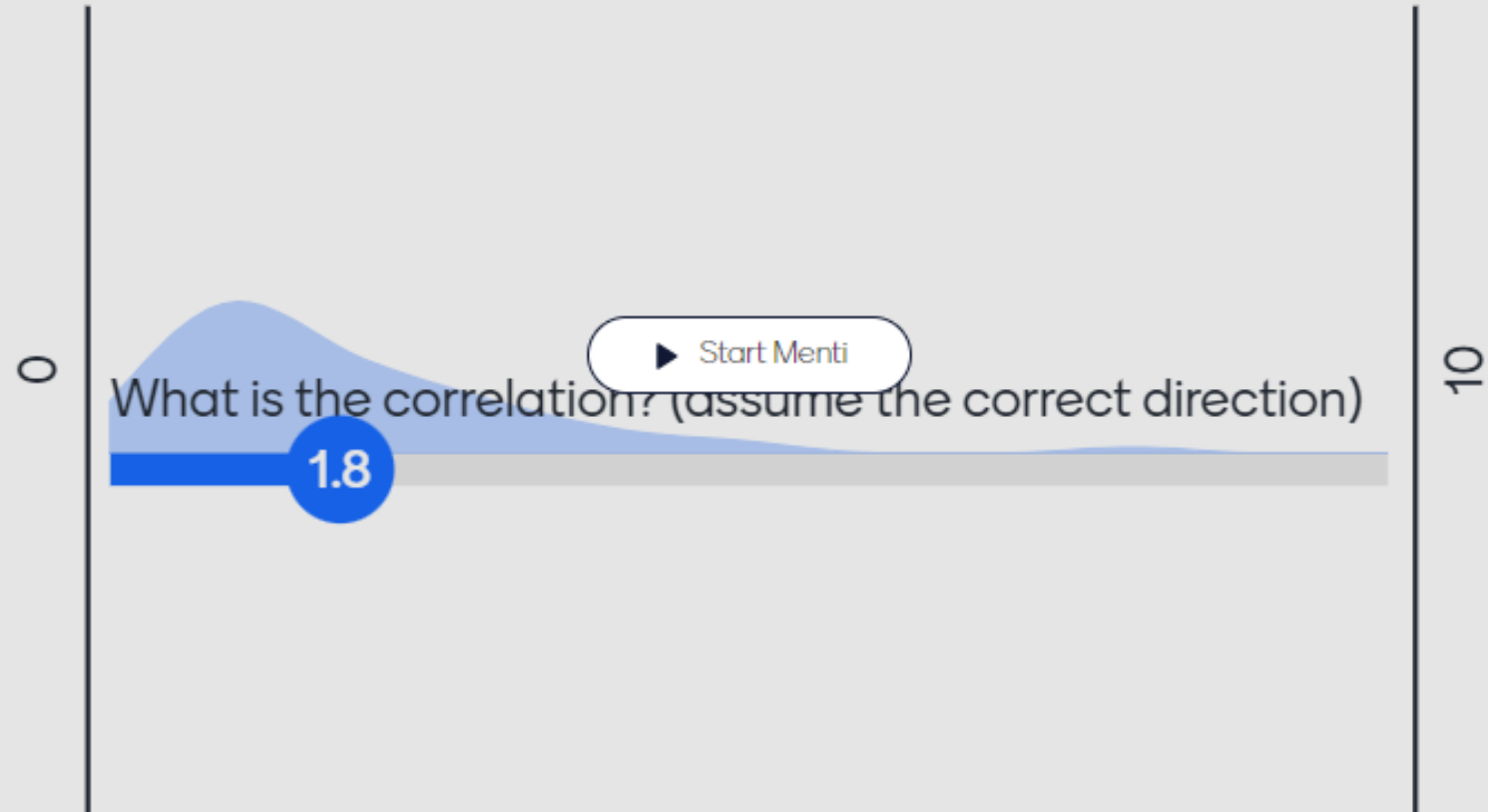
<b>STREAKS</b>	<b>2</b>
<b>MEAN ERROR</b>	<b>0.06</b>

**♥ +1** **🪙 +5**

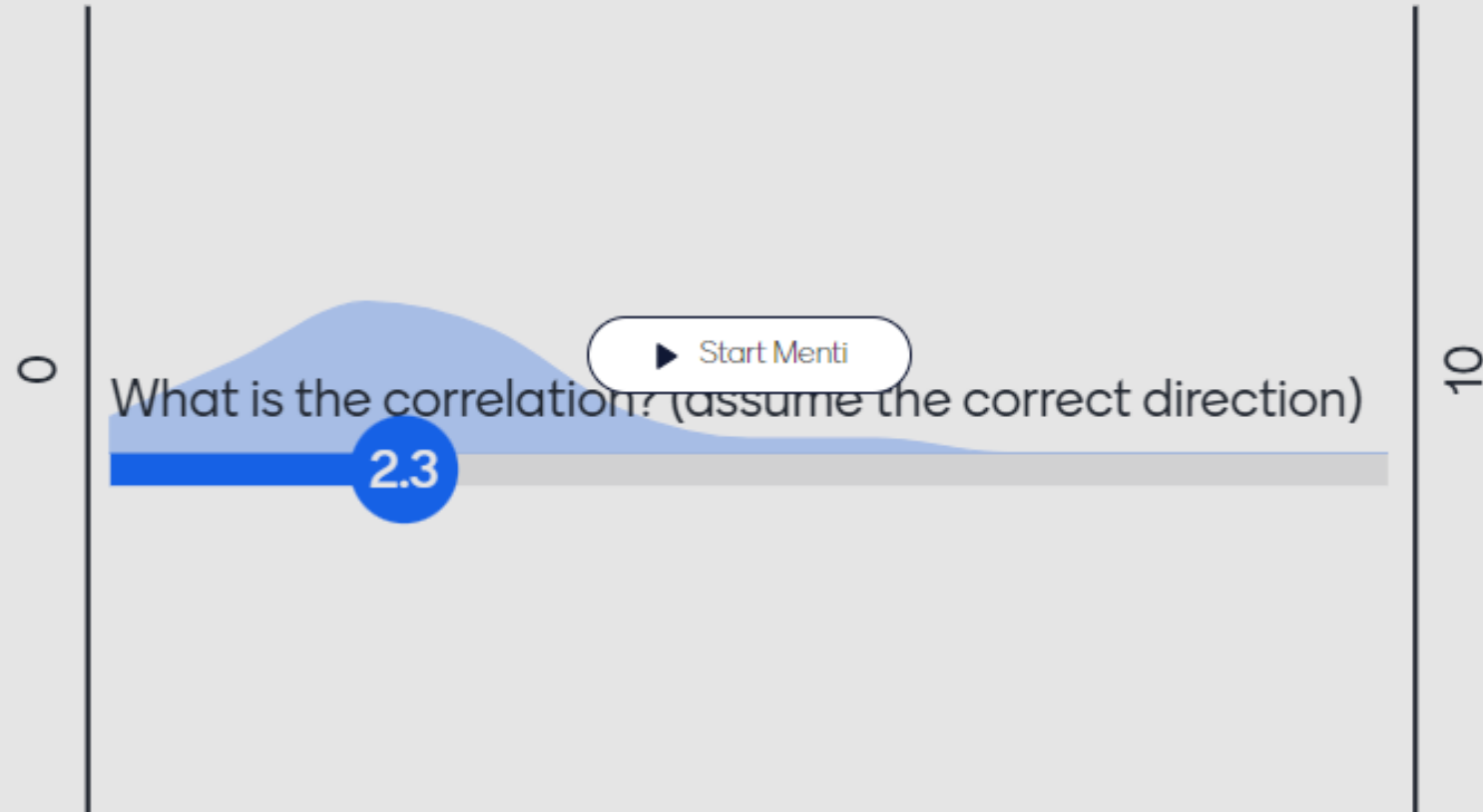
# Guess the correlation 1



# Guess the correlation 2

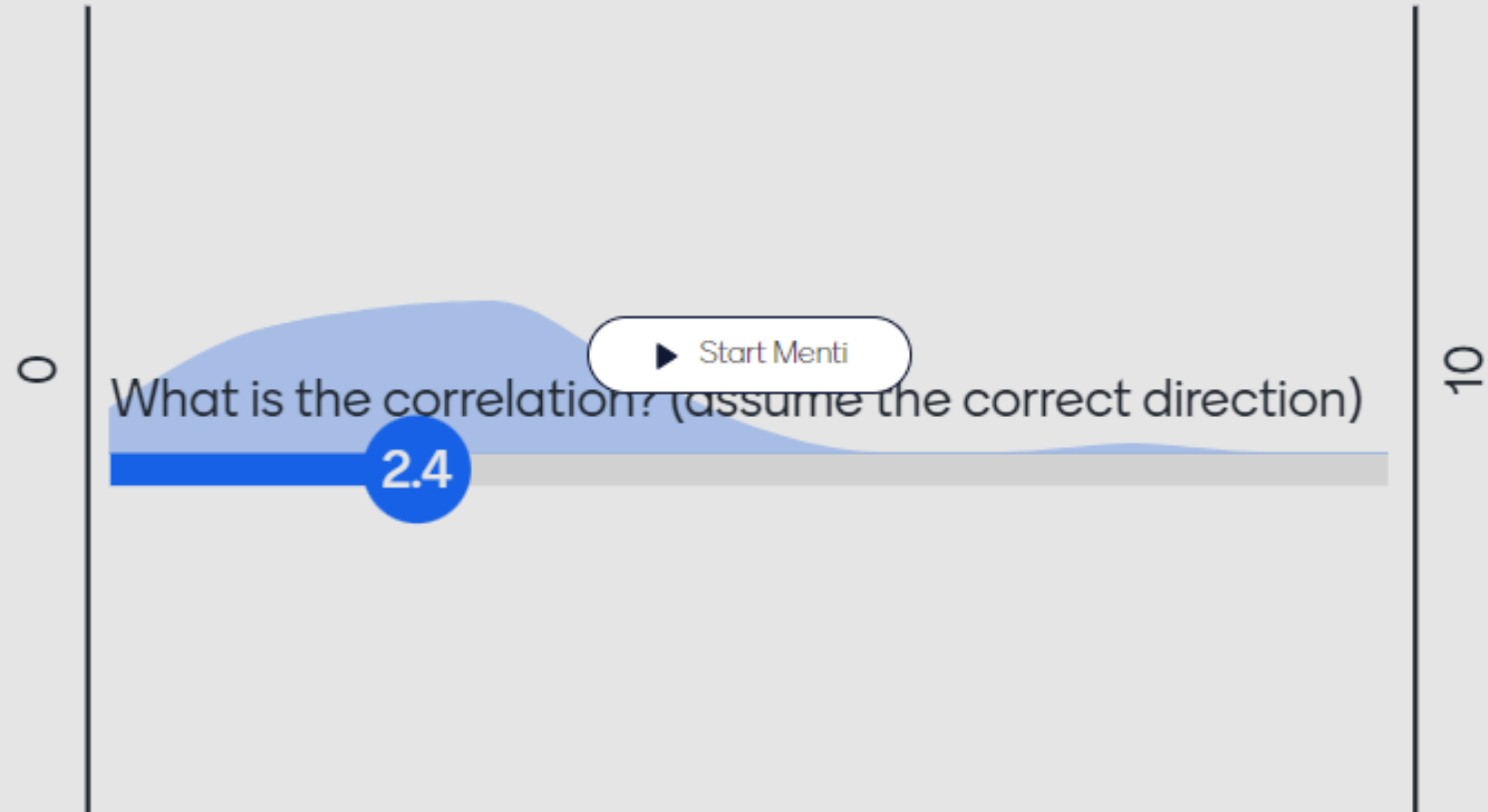


# Guess the correlation 3

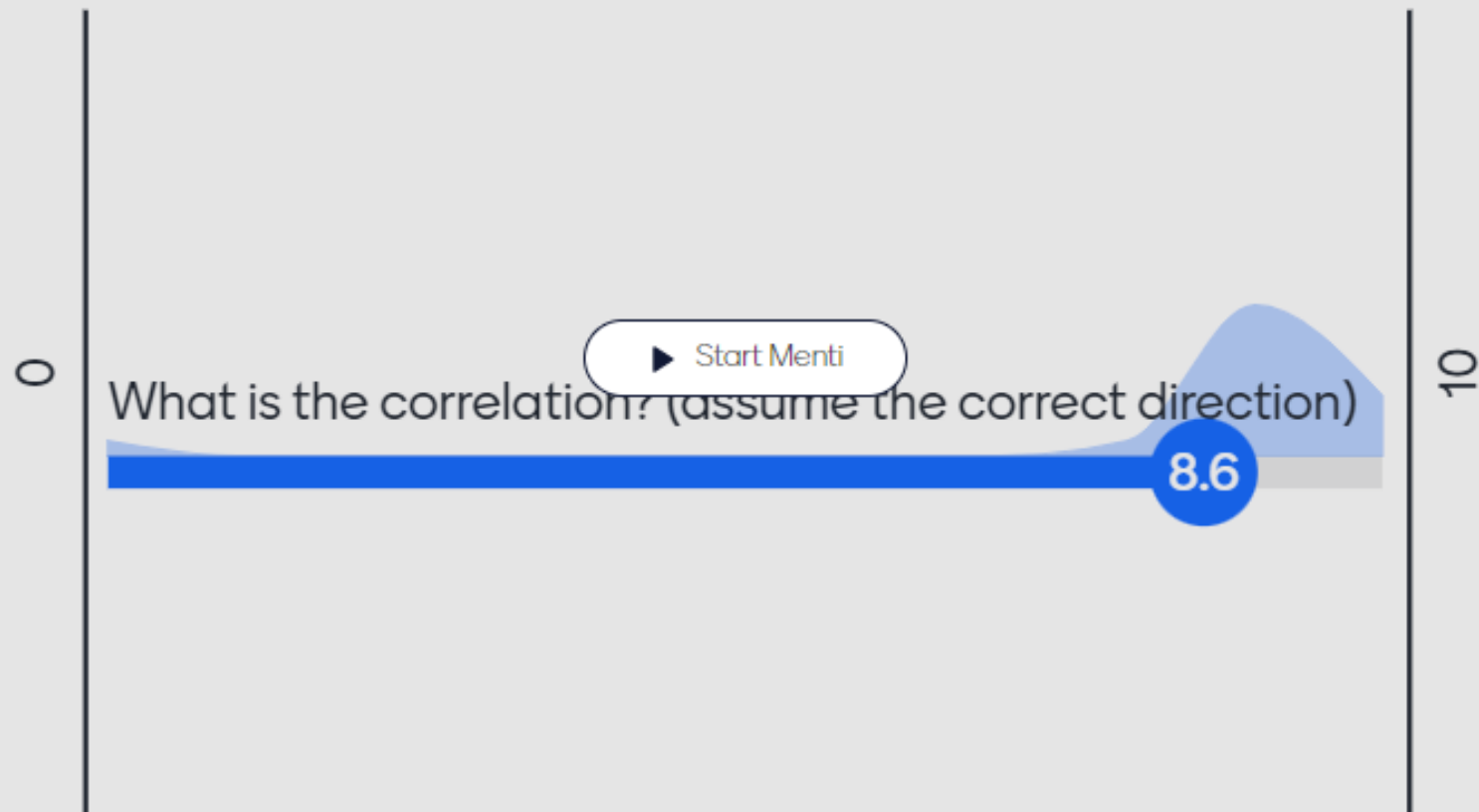




# Guess the correlation 4

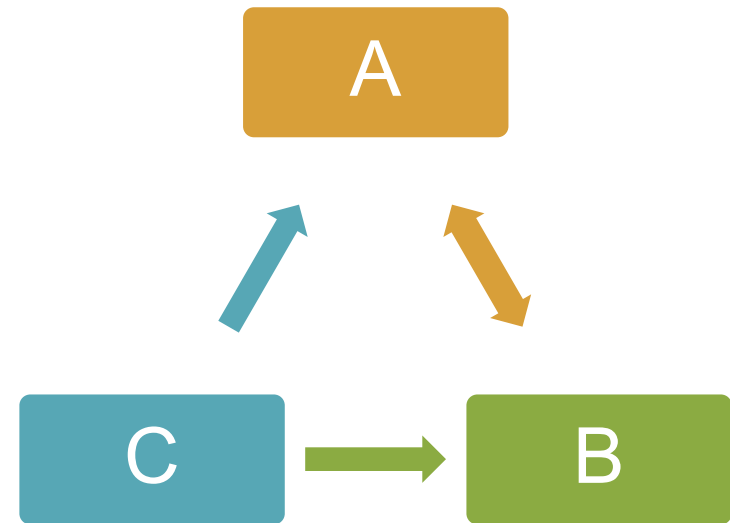


# Guess the correlation 5



## What can('t) we conclude from a correlational design?

- CAUSATION!
- Let's say you find a correlation between two variables. What are some relationships between these variables?



# The problem of interpreting causation from correlation



General hygiene

Third variable problem



Flossing

Longevity

Bi-directionality Problem

# Example: Your neighbour's 2-year-old child is diagnosed with autism



Symptoms begin to be recognised by parents at around 18-24 months

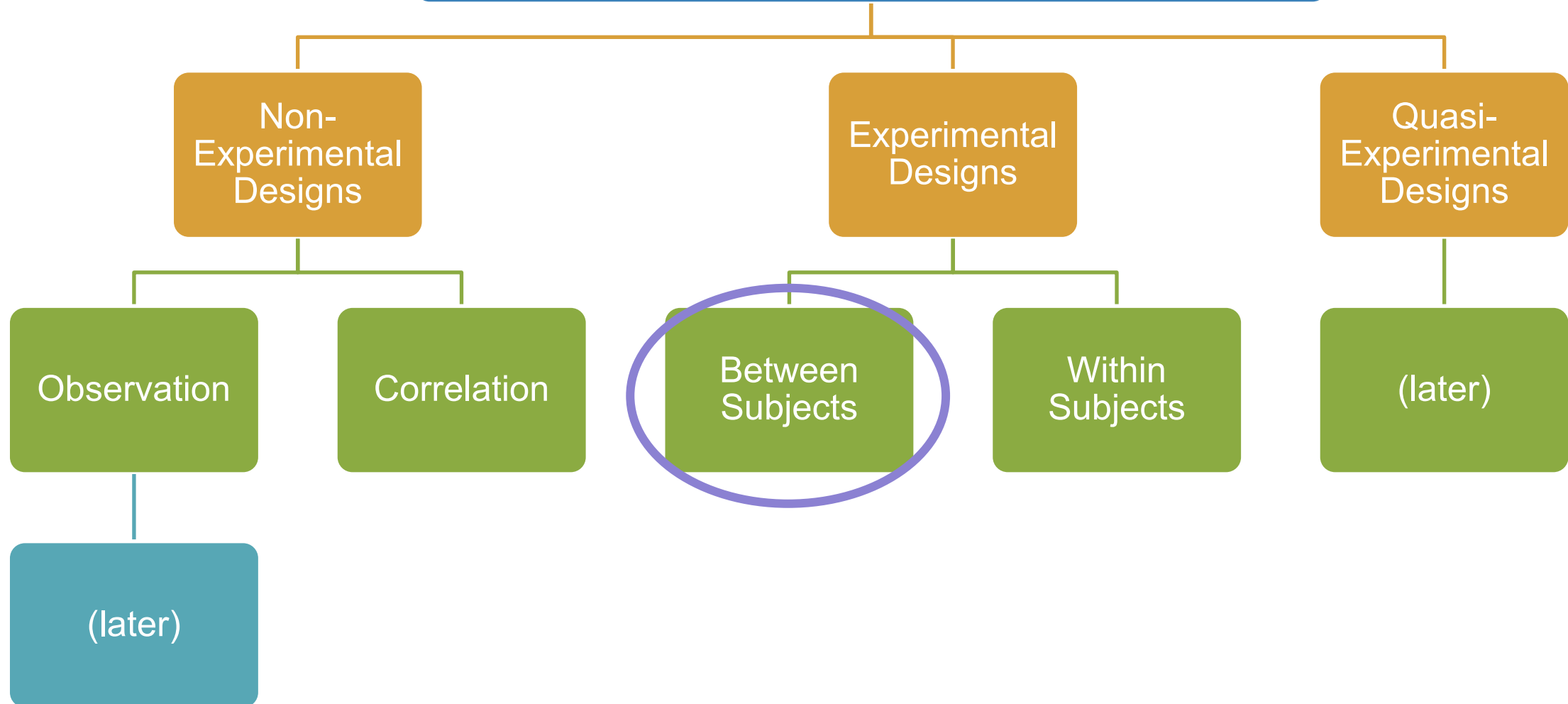
Subtle incremental developmental changes already start at 6 months



## Moving beyond correlational studies

- Internal Validity: the ability to infer that one variable causes changes in another variable
  - Covariation between two variables
  - Temporal precedence
  - Eliminate plausible alternative explanations
- Can difference in the outcome be attributed only to changes in some other variable?

# Types of Studies



## Key Features of Experiments

- Experimental designs allow for causality due to higher internal validity
- Achieving internal validity:
  - Experimental Control
  - Random Assignment of people to condition



## Increasing internal validity: Control

# Independent variable (IV)

manipulated by  
researcher

the “cause”

multiple levels/conditions

only expected  
“cause” differs

minimises  
confounds

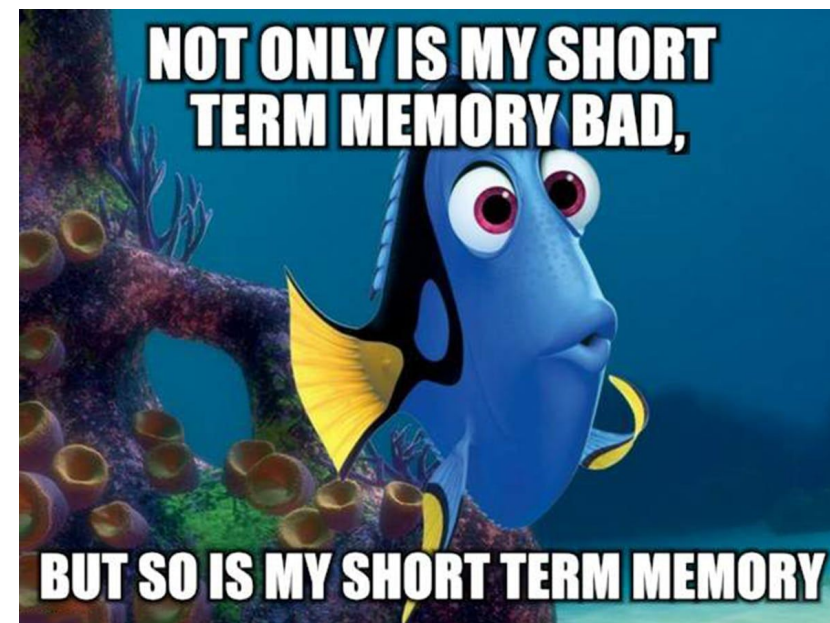
# Dependent variable (DV)

## Increasing internal validity: Control

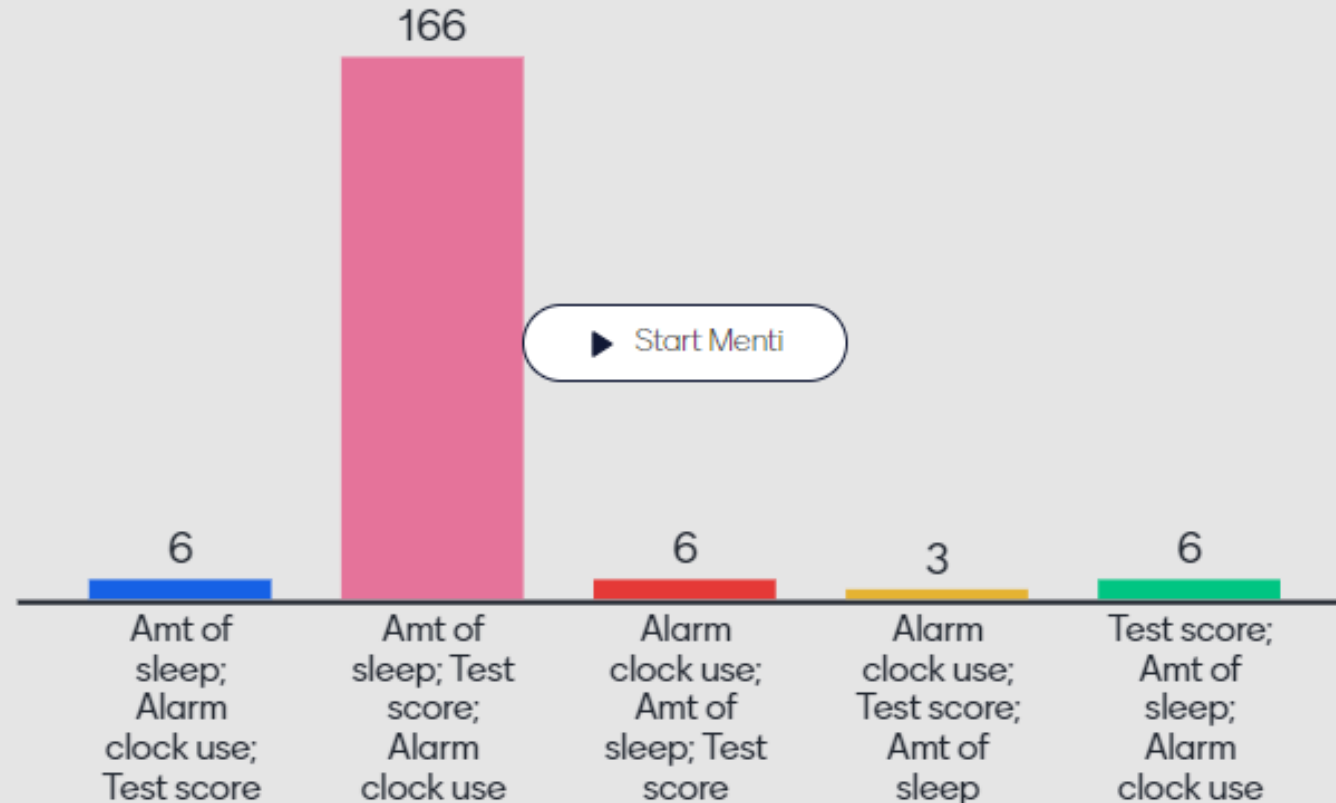
- Experimental Control
  - Only the IV changes across conditions
  - Minimise “confounds”
- Confound
  - A variable that co-varies along with the IV
  - *Could explain all or part of the result*

## An Example Experimental Design

- Hypothesis
  - People who sleep longer the night before a test will perform better than those who sleep for less time.
  - Variables...
- Amount of sleep
  - ½ participants sleep 8 hours & wake up naturally
  - ½ participants sleep 4 hours & wake up with alarm
- Test performance
  - Everyone completes the same memory test
  - Compare average score of the 2 groups



# What is the IV, DV, and the confound?



## Learning Objectives

- By the end of this/next class, you should be able to
  - List and describe the two ways internal validity is attained in an independent groups design
  - Understand the function of random assignment
  - Describe specific ways that control is achieved in experiments
  - Explain what experimenter expectancy effects and demand characteristics are and some ways a researcher can avoid them
  - Differentiate between ceiling and floor effects.
  - Explain what is meant by the strength of an IV and the sensitivity of a DV, and how they impact research design

## Example Study Design

- Hypothesis: Playing violent video games make people more aggressive than playing non-violent video games
- IV: Video game violence
  - Non-violent condition: Play Tony Hawk Pro Skater for 30 mins
  - Violent condition: Play GTA V for 30 mins
- DV: How many ants one kills
- Prediction: Participants in violent condition will kill more ants than participants in non-violent condition

# Increasing internal validity: Random Assignment

Non-Violent Condition 😊

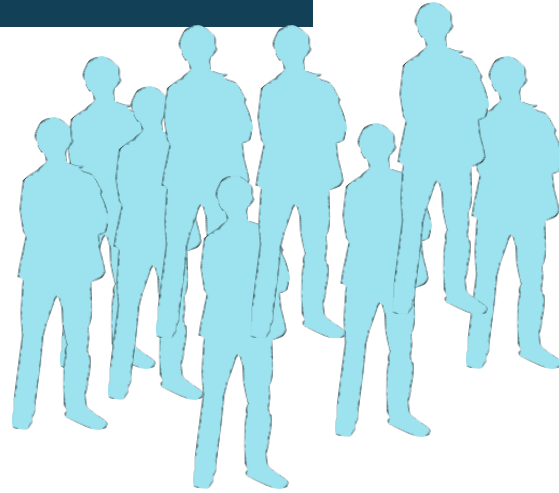
Violent Condition ☹️



Midterms!



# Increasing internal validity: Random Assignment



No systematic reason for why participants are in certain conditions