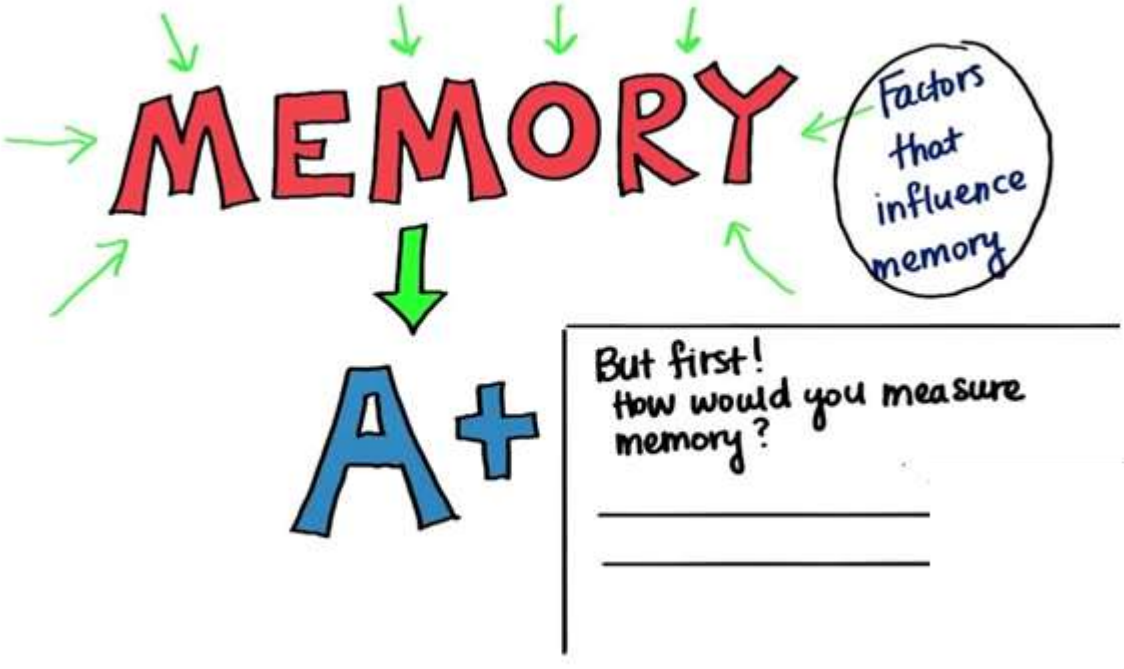
You have a big exam tomorrow and your memory needs to be as sharp as possible. What would you do to prepare?

What information would help you trust these survey results?

- How many people I surveyed
- Who I surveyed
- How the survey was conducted



Memory Test Description

Unfortunately the BBC no longer offers the face memory test!

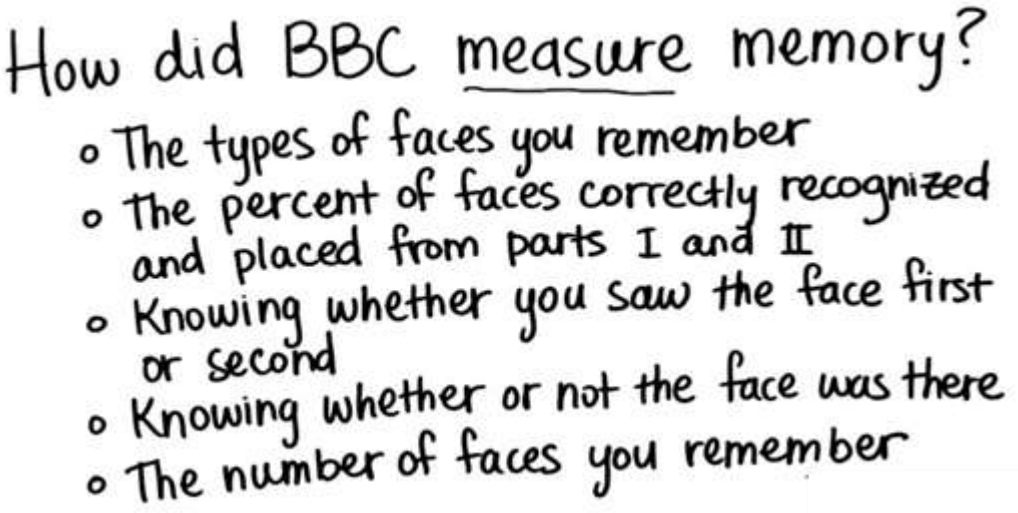
Here is a brief description of how the test worked, to help you follow the rest of the lesson. The test consisted of three parts:

1. Users were shown 12 photos in the first part.
2. Users were shown another 12 photos in the second part.
3. Users were shown 48 photos in the third part and asked if they saw each photo in the first part, the second part, or neither.

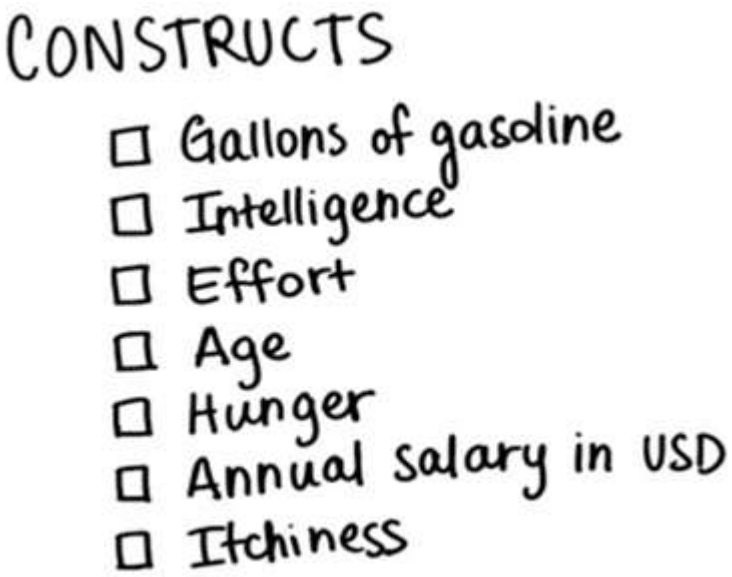
After the test, users were given two scores:

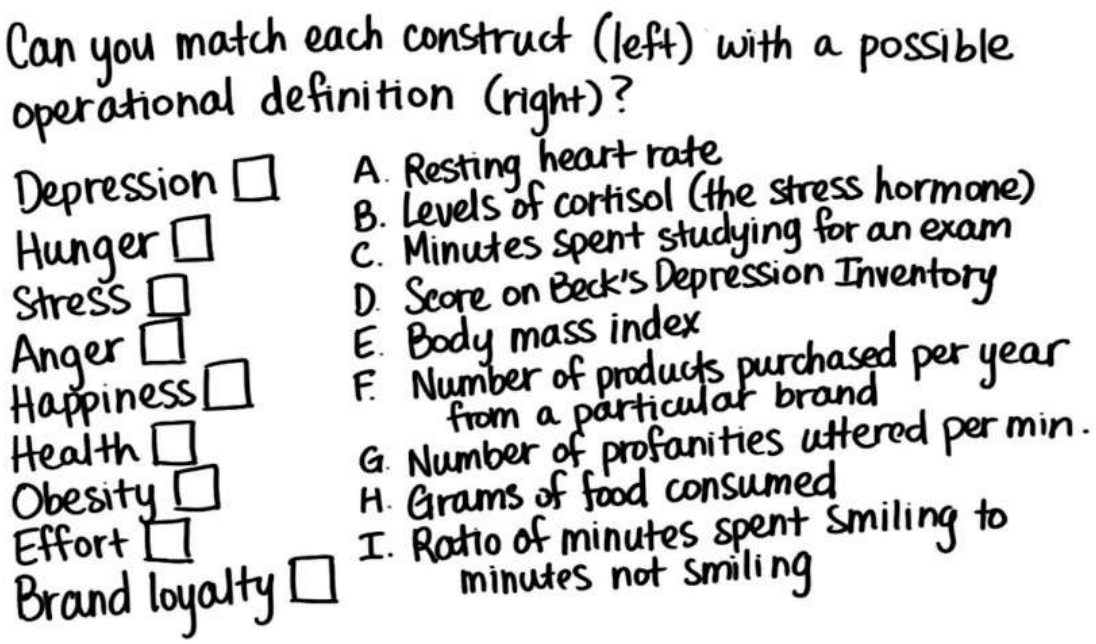
- "Recognition score", calculated as the percentage of times they correctly identified whether they saw the face at all, regardless of which part the face was from.
- "Temporal memory score", calculated as the percentage of recognized faces that were identified with the correct part (part 1 or part 2).

Users were advised to take a 5 minute break between each part of the test.



Construct


CONSTRUCTS
Gallons of gasoline
Intelligence
Effort
Age
Hunger
Annual salary in USD
Itchiness


Can you match each construct (left) with a possible operational definition (right)?
Depression
Hunger
Stress
Anger
Happiness
Health
Obesity
Effort
Brand loyalty
A. Resting heart rate
B. Levels of cortisol (the stress hormone)
C. Minutes spent studying for an exam
D. Score on Beck's Depression Inventory
E. Body mass index
F. Number of products purchased per year from a particular brand
G. Number of profanities uttered per min.
H. Grams of food consumed
I. Ratio of minutes spent smiling to minutes not smiling

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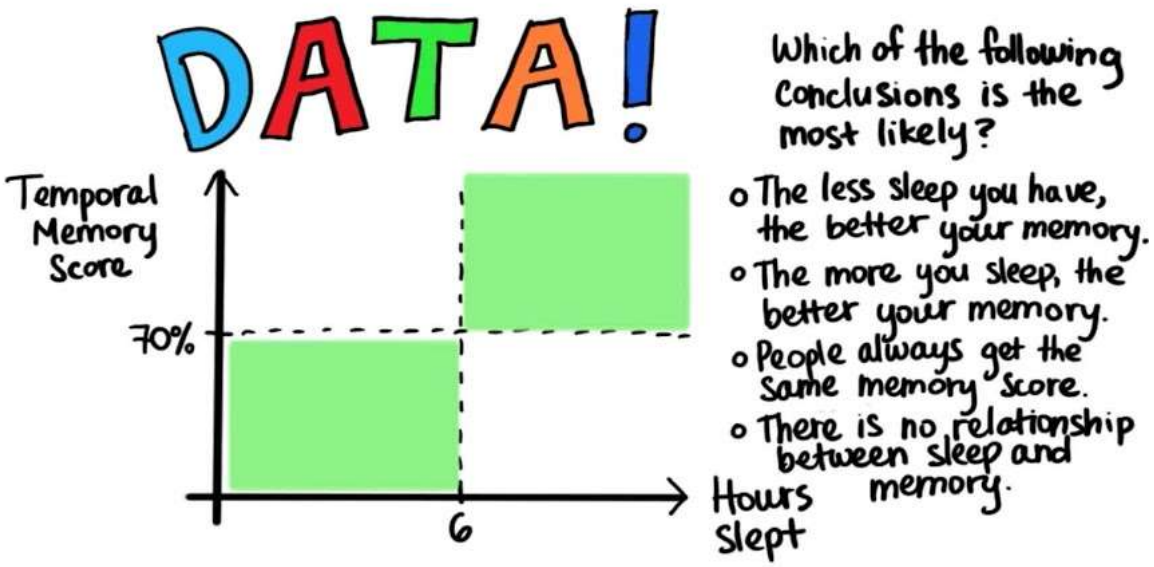
Data

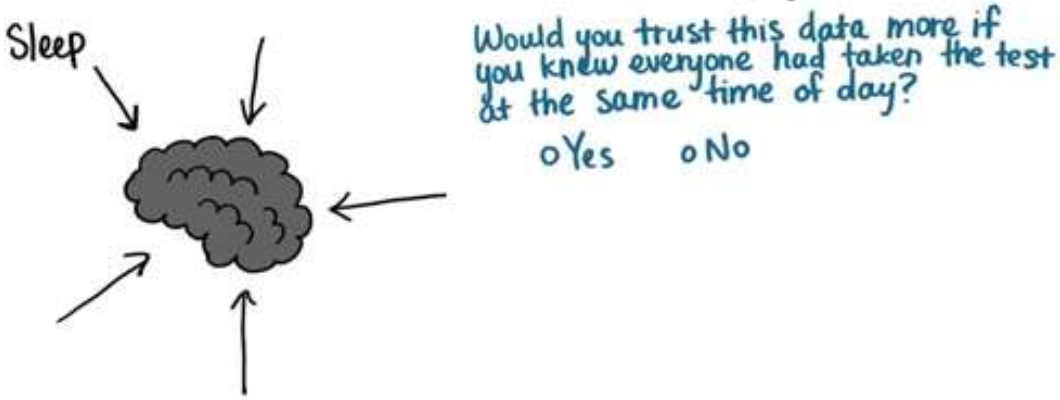
Sleep and Memory

Hours Slept	Recognition Score	Temporal Score
7	91	86
6.5	95	78
5.5	88	68

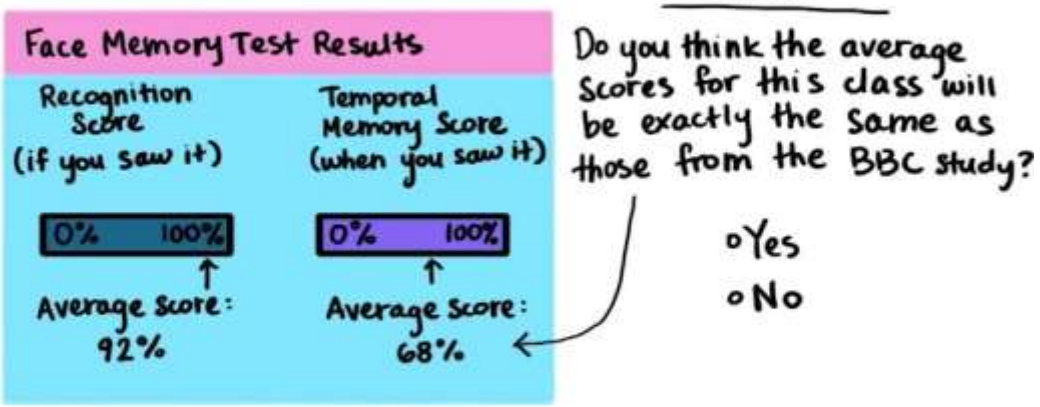


Lurking Variables

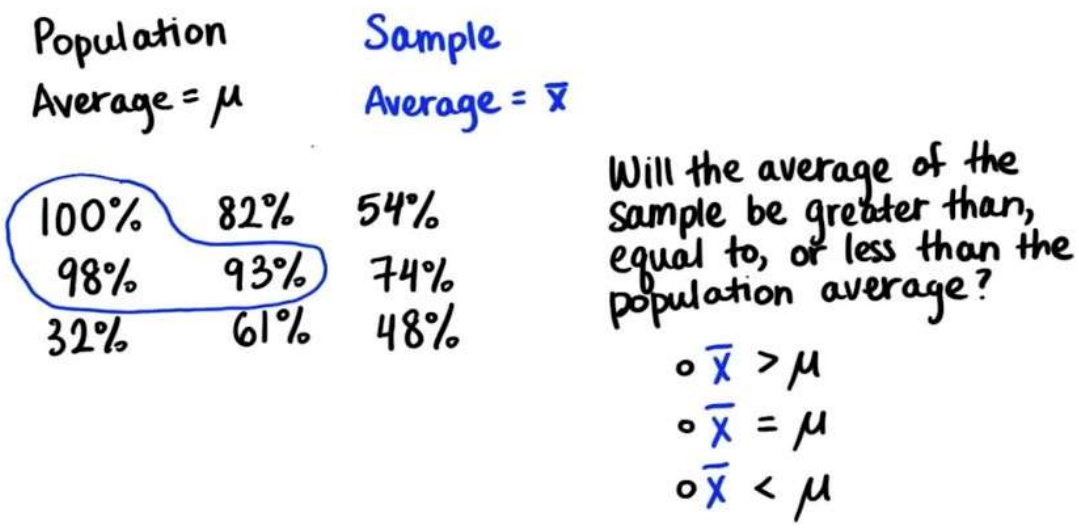
Control Variable



Same Scores



SAMPLE AVERAGE



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Random Distribution

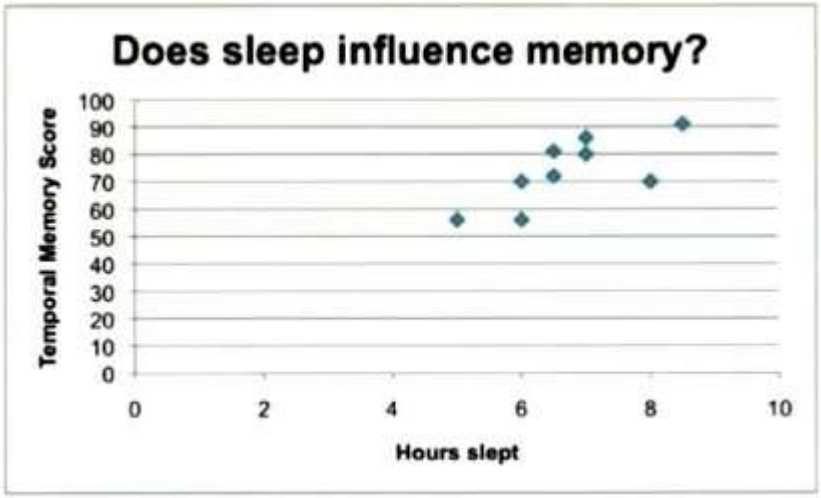
"Perhaps the best typical example that we can give of the scientific meaning of random distribution is afforded by the arrangement of the drops of rain in a shower. No one can give a guess whereabouts at any instant a drop will fall, but we know that if we put out a sheet of paper it will gradually become uniformly spotted over. And if we were to mark out any two equal areas on the paper, these would gradually tend to be struck equally often."

Visualize relationship

Hours Slept	Temporal Memory
7	86
8	70
6	56
5	56
6	70
7	80
6.5	72
8.5	91
6.5	81
7	86

Is there a relationship between these two variables?

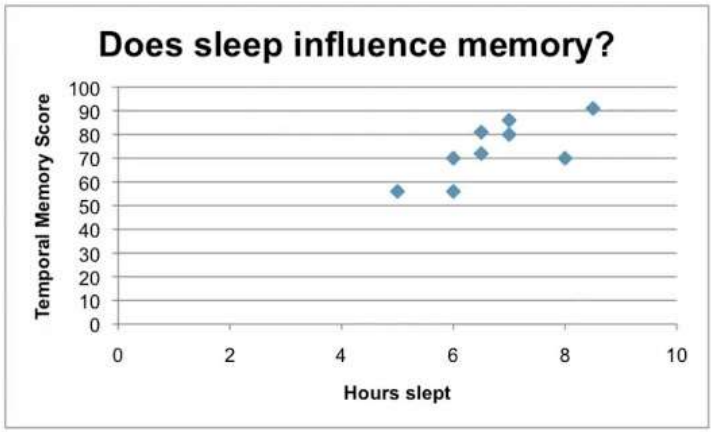
Scatter Plot



What can we say about the relationship between hours slept and temporal memory score?

- The more you sleep, the better your temporal memory score
- The more you sleep, the better you'll do on a test
- The more you sleep, the worse your memory
- There is no relationship

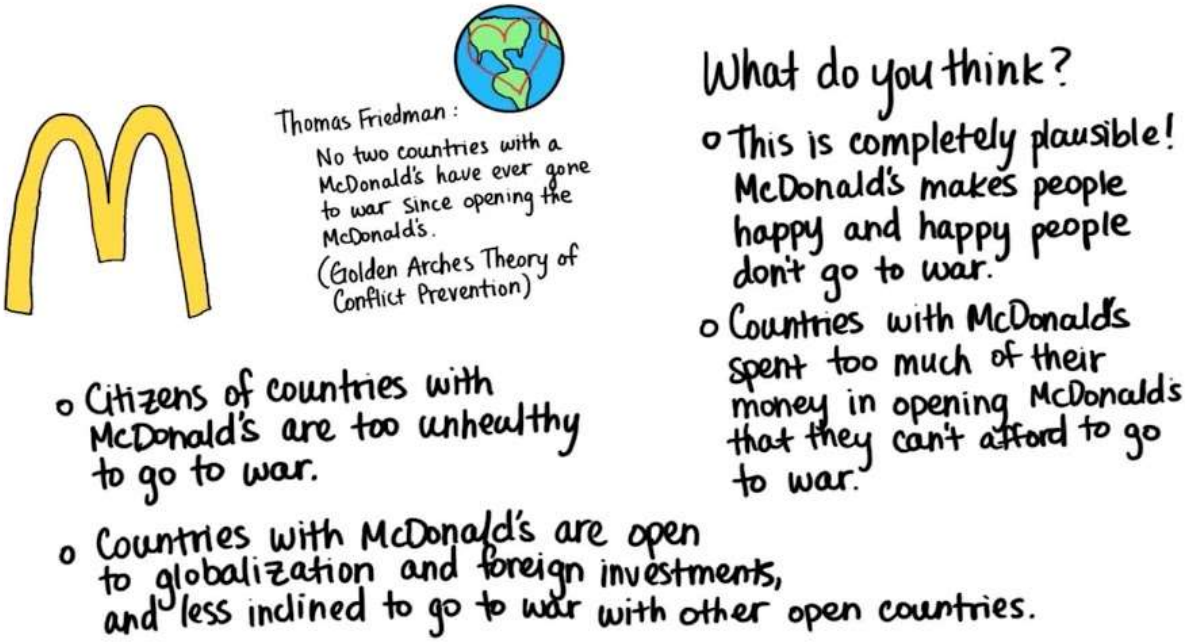
True or Not



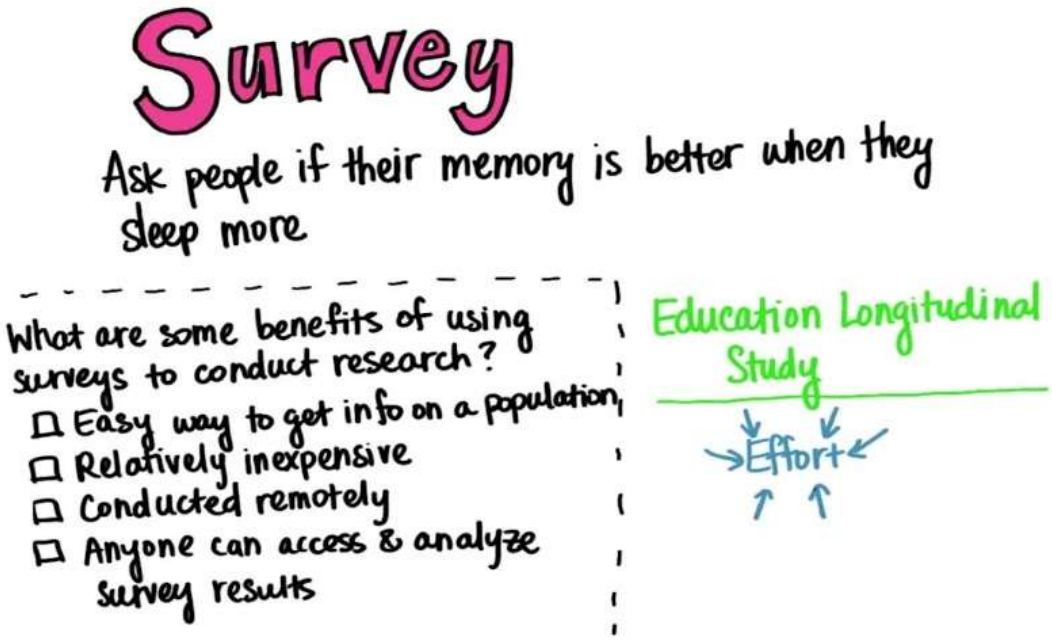
Is it necessarily true that if you go to bed early, your memory will definitely be better tomorrow?

- Yes
- No

Golden Arches Theory



Surveys

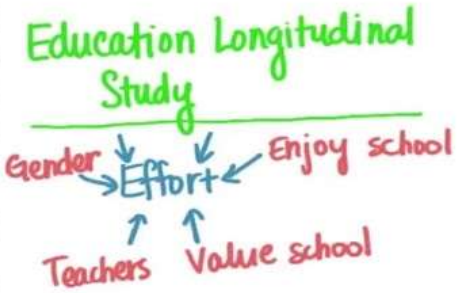


Survey

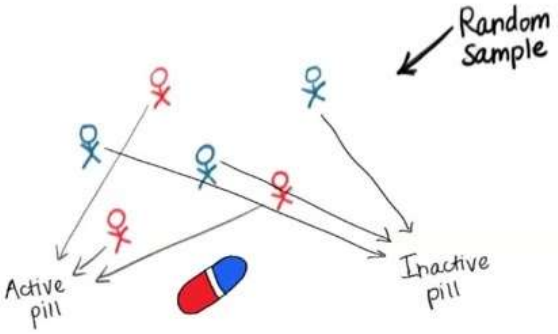
Ask people if their memory is better when they sleep more

What are some downsides to surveys?

- ☐ Untruthful responses
- ☐ Biased responses
- ☐ Respondents not understanding the questions
- ☐ Respondents refusing to answer

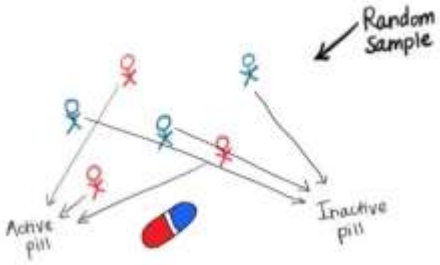


Experiments



What's the purpose of the inactive pill?

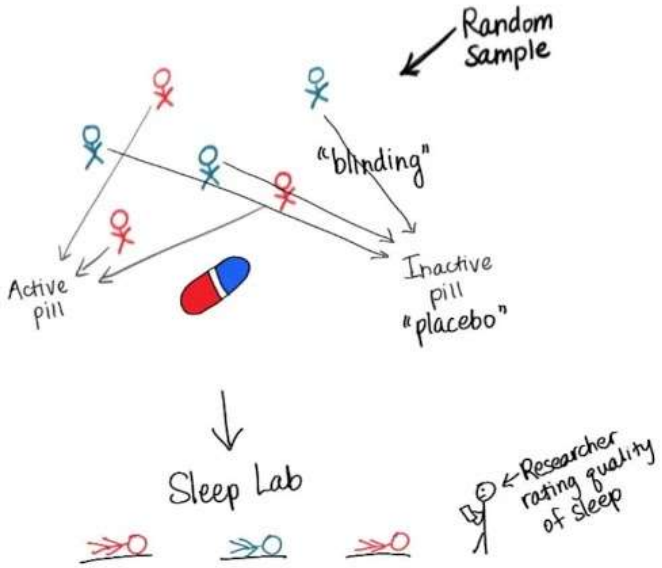
- To make sure there are no side effects of the active pill
- To have a comparison group to those who took the active pill
- To see if the inactive pill can help people sleep



Why are participants not told which pill they received?

- Because all good research includes deception
- They may not participate if they knew they were receiving a drug
- To make them all believe they are receiving medication
- They may not participate if they knew they weren't receiving a drug

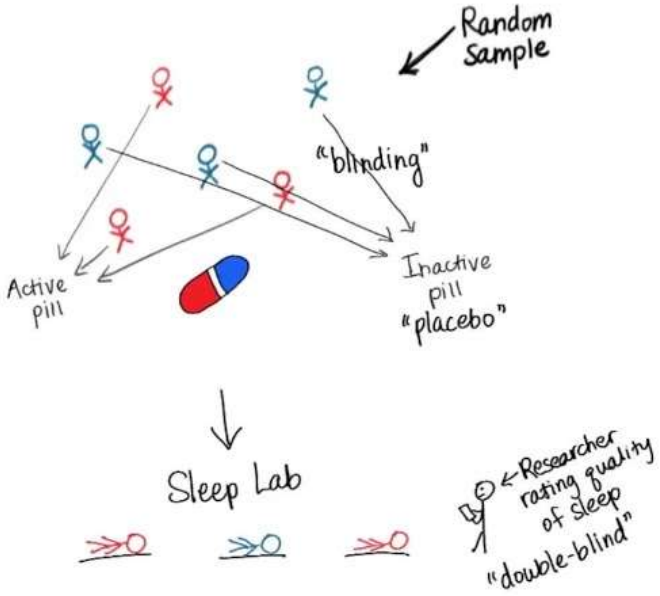
Double Blind



Should the researchers observing quality of sleep know which treatment participants received?

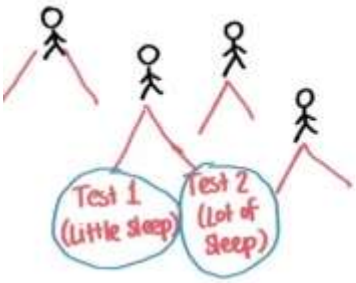
- Yes, because their ratings will depend on the treatment.
- No, to help maintain participant confidentiality.
- Yes, because the researchers ratings will be more accurate
- No, because if they know, their judgements may be biased.

Controlled Factors



What factors did this experiment control for?

- ☐ Time at which participants took the pill
- ☐ The place at which participants slept
- ☐ Gender
- ☐ Age
- ☐ What the pill looks like



If we did two memory tests on each person – one after sleeping a little, the other after sleeping a lot – and compared the results, what would we be controlling for?

- Differences in memory capabilities due to gender
- Differing amounts of sleep amongst individuals
- Variation in people's individual memory capabilities
- Time of day at which subjects took the memory test

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Example of Observational Study