EXPERIMENT DESIGN, FROM RESEARCH QUESTION TO HYPOTHESIS

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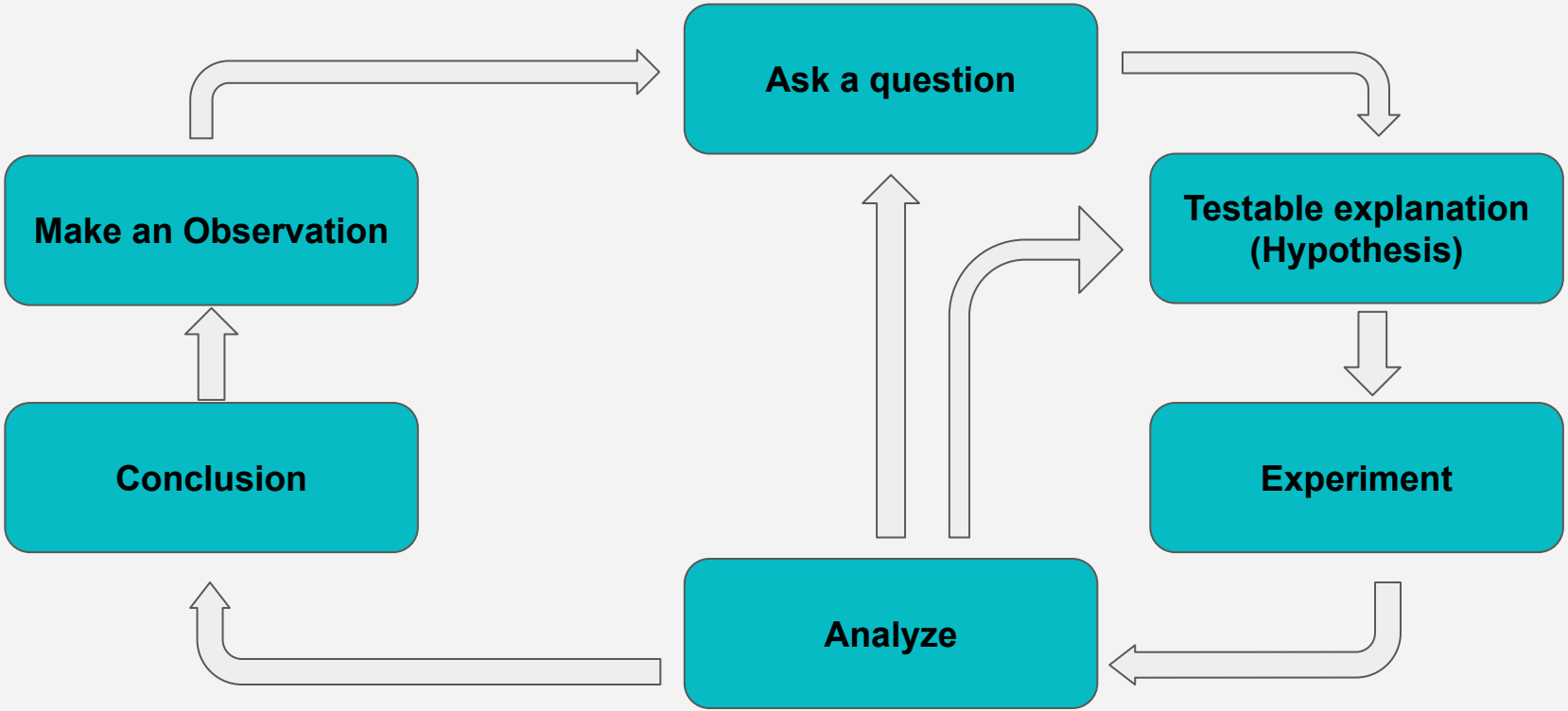
WHAT IS THE SCIENTIFIC RESEARCH METHOD?



DEVELOPMENT OF SCIENTIFIC QUESTION

A **scientific question**  is a question that is written in a way that is helpful for completing scientific investigations. A scientific question is one where an investigation can be designed and completed to find out the answer without having to do multiple, entirely different investigations to get there. In a word, a scientific question is testable

Characteristics of a good scientific question

Testable

Precise and focused

Interesting

Starts with: How, What, Why or Which.

Doesn't start with: Who, When , Where, How much or How many.

https://pollev.com/lenahassan521

Which of these research question can be consider a good Question?

What factors affect people's belief in a higher power?

What features do the most popular national parks have in common?

Which effective education strategies prevent drug abuse in teens?

Are white mice better than gray mice?

which of these Research questions can be consider a Bad Question?

When tested for intelligence and longevity, how do white mice and gray mice compare?

Which effective education strategies prevent drug abuse in teens?

How does restricting cell phone use in school affect student social interaction?

Does owning a pet improve quality of life for older people?

HYPOTHESES

- A hypothesis is a tentative, testable answer to a scientific question. Once a scientist has a scientific question she is interested in, the scientist reads up to find out what is already known on the topic. Then she uses that information to form a tentative answer to her scientific question

- A good hypothesis must be based on a good research question. It should be simple, specific and stated in advance (Hulley *et al*., 2001).

EXAMPLES

RESEARCH QUESTION

What are the health benefits of eating an apple a day on the elderly?

HYPOTHESIS

Increasing apple consumption in over-60s will result in decreasing frequency of doctor's visits.

EXPERIMENTAL DESIGN

This involves the planning of activities in the experiment, ahead of time in order to arrive at a valid outcome.

FACTORS /LEVELS

Factors – It refers to an independent variable whiles **levels** refers to the number of groups or conditions for each independent variable.

Example. We can have Noise level as a factor and have “quiet & noisy “ as the levels. Another instance is having a Age Group as a factor and having “ young, middle & old “ as the levels

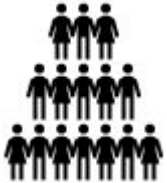
VARIABLES

- **Independent Variable** – It is the variable that can be manipulated or controlled.
- **Dependent Variable** – it is the measured variable, and it depends on the changes in the independent variable.

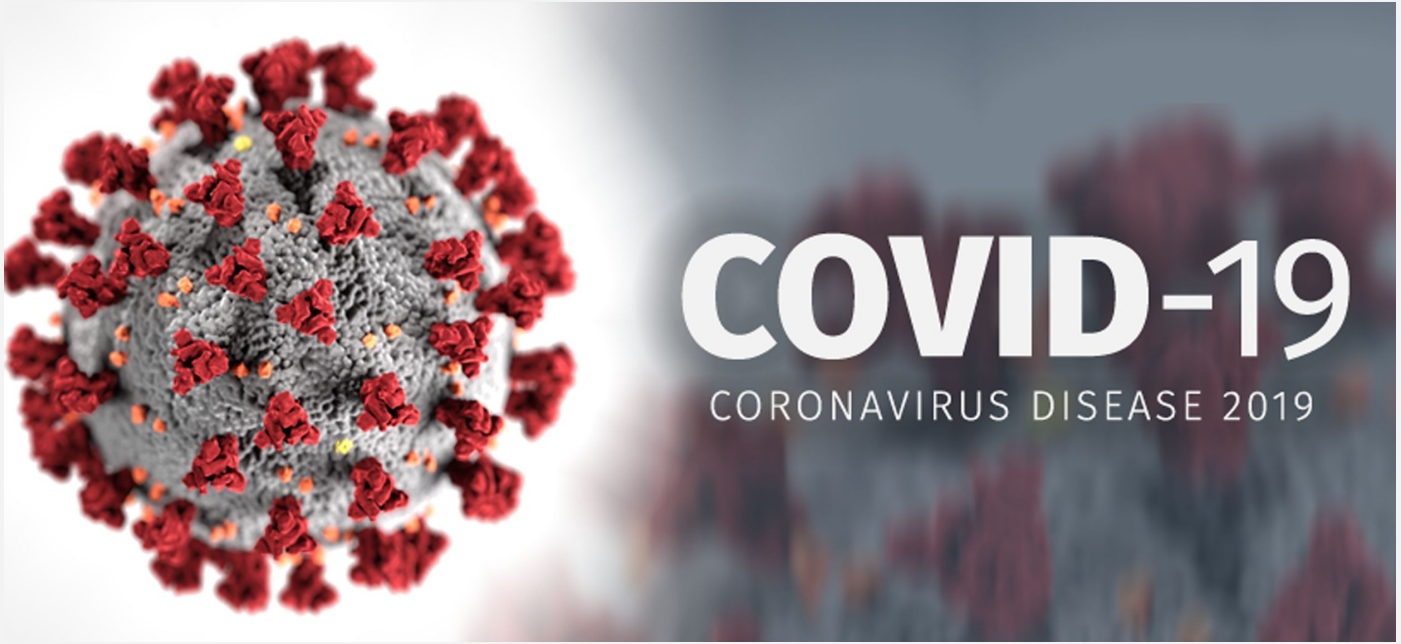
How does phone use before bedtime affect sleep? The Dependent variable is

How does phone use before bedtime affect sleep? The Independent variable is

GROUPS



Independent groups are separate set of participants in the experiment that do not affect each other whiles **dependent groups** are same set of participants that affect each other in the experiment .



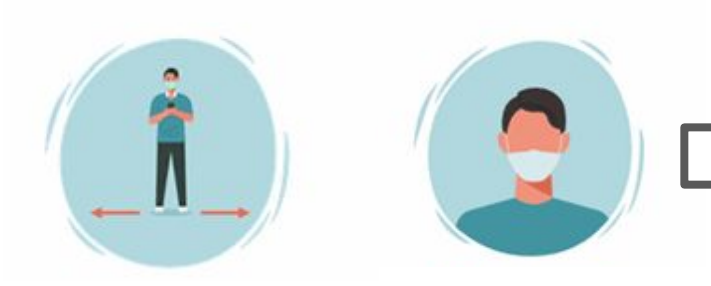
Observation: is that COVID-19 is spreading rapidly.
research question is: What are the factors that can slow down the spread of COVID-19
Hypothesis is that maintaining a distance of 1.5 meters between people, and wearing the mask will slow down the spread and “flatten the curve”
The experiment is that the 1.5-meter, wearing the mask rules are applied in all closed spaces

NULL - ALTERNATIVE HYPOTHESIS
H_0 AND H_1

H_0 Null hypothesis

Which the researcher tries to disprove or nullify

No Relationship between variables

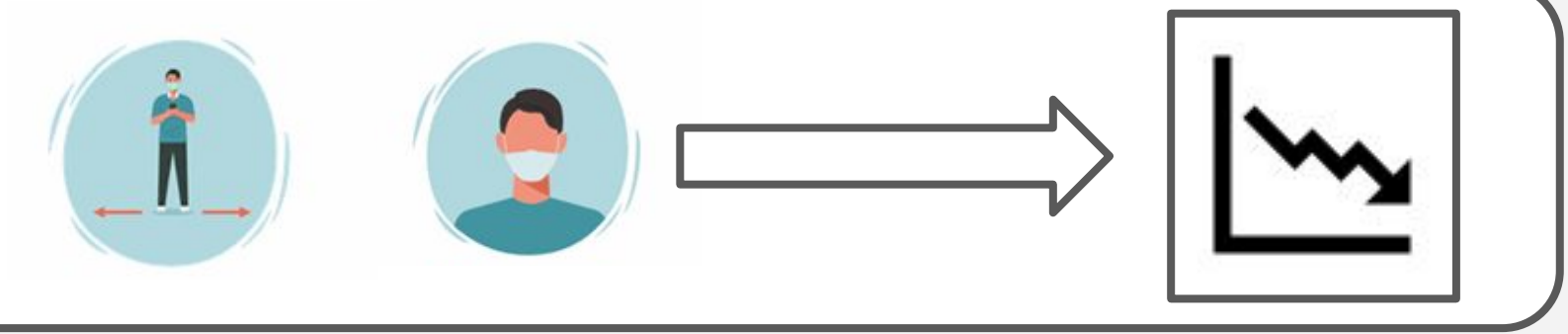


NULL - ALTERNATIVE HYPOTHESIS
H_0 AND H_1

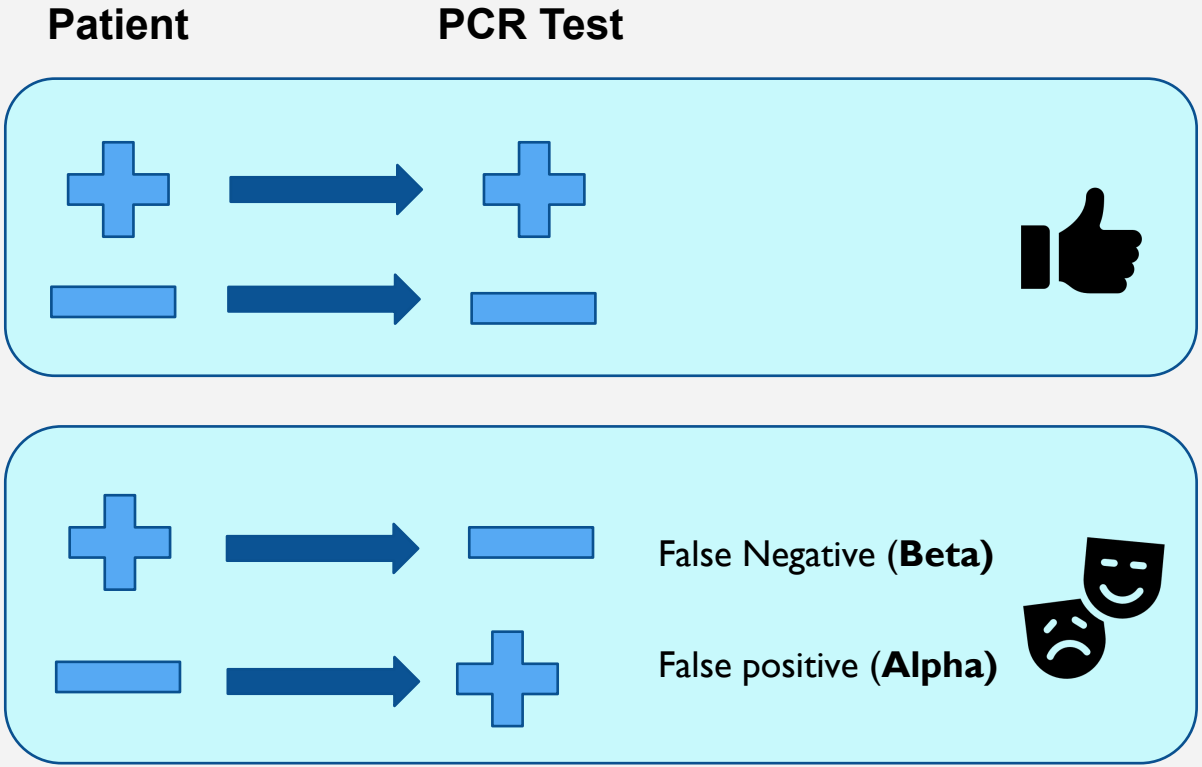
H_1 Alternative hypothesis

Which the researcher tries to prove

There is a Relationship between variables



ALPHA- AND BETA ERROR



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