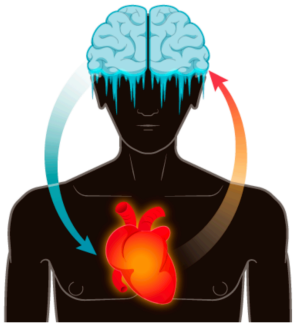
"Psychology has a long past but a short history"—(Ebbinghaus, 1908)

- signifies a revolution in psychology as science
- asking questions about the mind was nothing new
- how they answered questions about how the mind worked relied upon rationalism

Rationalism: view that reason and logical argument, not experience, is the most important for how knowledge is acquired

- Aristotle used rationalism to reason that human thoughts, perceptions, and emotions were products of the heart rather than the brain
- he recognized that the heart is a central part of our being
- beating of the heart is affected by emotional state
- therefore the heart must be the seat of senses and emotions
- other organs existed to cool blood, and maintain a tempered + rational state of mind



- until the middle of the 19th century, psychologists believed that it was not even possible to conduct experiments on the mind

Flaw in rationalism:

- what we think is true about behaviour is often different from how we actually behave

ex. Would you noticed if the person you are talking to is replaced by another person?

- most people would say yes, but in a study it is shown that many did not

- the differences between how we think we might act and how we behave → limit
- "short history"
  - moved beyond rationalism to using experimental methods to collect data, test theories, and allowing experience and observation to be the primary sources of knowledge
  - using experimental methods, researchers gather facts and observations to form scientific theories (rational explanations to describe and predict future behaviour)

The Scientific Method

- uses experience-driven approaches to understand behaviour

1. Identify the problem
    - based on observation previous research, established theory, or intuition
2. Gather information
    - review scientific literature and examine existing theories of behaviour
3. Generate a hypothesis
    - educated prediction about outcome of experiment
    - predicted outcome of an experiment/research study
4. Design and conduct experiments
    - develop an experiment to test hypothesis and collect data
5. Analyze data and formulate conclusions
    - determine whether findings support predictions
6. Restart the process
    - either replicate or conduct similar experiment

Descriptive Methods

Any means to capture, report, record, or otherwise describe a group

- interested in identifying "what is" without understanding "why it is"

Four popular methods to describe groups: naturalistic observation, participant observation, case studies, and surveys

1. Naturalistic observation

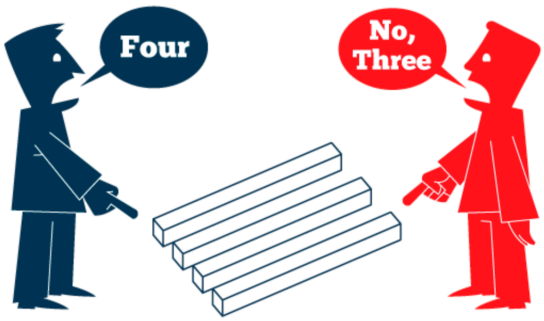
- observation of behaviour as it happens in a natural environment, without an attempt to manipulate or control the conditions of the observation.
- field experiments " takes place in the real world"
    - researcher manipulates and controls the conditions of behaviour under observation
- lack of manipulation is key distinction
- allow us to better understand behaviour exactly as it happens in the real world
- ecologically valid because observations are a product of genuine reactions

Hawthorne effect:

- a factory called Hawthorne works electric company
- was trying to figure out how to make workers more productive
- tested different amounts of light in a work environment
- found that change in working environment was not important factor on productivity
    → rather it was the fact that employees were being observed
    - this is a data analysis
- refers to the effect the presence of an observer have on the behaviour on the subjects or a temporary change in behaviour due to the novelty of the situation
- participants only react to new people who might be observing their behaviour
    - effect goes away after they get used to the presence of this person
    - participants' behaviour will return to its typical pattern

Disadvantages of Naturalistic Observation:

- researchers lack control over the environment and many different factors that can affect behaviour. Weakens conclusion.
- may not always be sure what is influencing behaviour



→ wallet example: not aware of circumstance that may lead a person to keep the money instead of returning it. How can you be sure that they saw who dropped it?
- researchers' perspectives and bias will also influence interpretation of behaviour
-important to share results to ensure the validity of the data and to ensure interrater reliability

2. Participant observation

- researcher becomes a part of the group under investigation
    ex. To better understand the effectiveness of a prof, a department chair sat in on a class and asked students on their experiences with the prof

3. Case Studies

- in depth analysis of unique circumstance or individual. Rare opportunity

- conclusion drawn can never really be generalized to other cases

→ What happens when a child is raised without human contact?

- observe → investigate → provide a broader understanding of phenomenon

ex. Henry molaison (H.M)

- fell off his bike without a helmet on → got lots of seizure
- bilateral ablation to remove damaged tissue of brain in his ventral temporal lobes
    - removed hippocampus and entorhinal cortex
- treated seizures, but he could no longer form new memories
- allowed researchers to explore the role of the hippocampus in relations to new formation of memory → episodic, semantic, procedural memories discovered

4. Surveys

- efficient way to quickly collect information and gather understanding of the current state of people's opinions or attitudes
- online surveys, mailed questionnaire, person-to-person interviews, phone interviews
- survey every single member of a group → population
- survey to smaller subset of the population → sample
    - sample must represent broader population of interest
- sampling errors or bias
- wording effects can have a bias
- response bias: tendency to answer the question the way they feel they are expected to
- acquiescent response bias: tendency to agree with most regardless of opinion
- socially desirable bias: response in ways that is believed to be acceptable by others.

ex. Hesitant to admit to illegal or immoral behaviour

- better-than-average effect/illusory superiority
    - tendency to describe our own behaviour as better than average
- response or return rate from surveys can vary depending on size of survey and motivation of participants
- gives correlations at best

Research Ethics for Human Participants

- research ethics: a set of principles of behaviour for psychologists to follow

- outlines how people should be educated, treated, and respected when participating in any study

The Tuskegee syphilis study

- African American men were recruited to participate in the study of syphilis
- Promise of free meals, medical treatment for "bad blood", and burial insurance
- 40 years study
- Researchers misled the participants about actual purpose of study and denied them medical treatment despite numerous medical advances in the treatment of syphilis
- Led to preventable deaths of hundreds of participants and needlessly contributing to the spread of syphilis

Principle A: General Ethical Principles of Psychologists

- states that research should strive to do good (beneficence)
- Avoid creating experiments that can intentionally harm (maleficence)
- Carefully weigh the benefits of the research against the costs that participants may experience
- Put in safeguards to protect the mental health and physical well being

Principle B: fidelity and responsibility

- participants entrust the researcher
- Researchers maintain the trust
- Psychologists should let people know ahead of time so they are prepared of what to expect

Principle C: Integrity

- psychologists should engage in accurate, honest, and non-biased practices in the science, teaching, and practice of psychology
- Always strive to communicate results to colleagues and public accurately without making up data (fabrication) or manipulating research (falsification)

Principle D: Justice

- establish "equality" in research process
- Those who participate should benefit

- Exploited in the past because researchers have included or excluded populations in research
- Inclusion criterion: attribute of participant that is necessary to research
- Exclusion criteria: attribute of participant that would prevent them from participating
- Eligibility criteria: set of characteristics shared by all participants that ensure that those participating will meaningfully help address the research question

Principle E: Respect for People's Rights and Dignity

- states that each person is valued in the research process
- Researchers should take measure to respect and protect participants' rights, privacy, and welfare
- Communicate openly and honestly about the details of study before asking for consent
- Respect of privacy and confidentiality of all participants
- Data are kept private and made anonymous
- Respect for people's dignity, include understanding vulnerabilities of participation populations
  - e.g. socioeconomics status, religion, race, disability
- make sure participations are not coerced into participating in an experiment they otherwise might not feel comfortable doing
  - ex. Compensating research participants with money or course credit, should be reasonable and not excessive amount

Beneficence and Nonmaleficence—protection of the research participant is more important than the pursuit of knowledge

ex. Tuskegee study

Fidelity and Responsibility—a researcher's obligation to say something when they believe that participants are not being treated fairly

Integrity—a researcher makes every effort to remove factual errors from the study report

Justice—researchers should not exclude any group from participation for reasons that are unrelated to the study

Respect for People's Rights and Dignity—the capacity and rights of all individuals to make their own decisions

The Practice of Ethical Research

- federally funded institutions are required to have safeguards in place to ensure the general ethical principles are being upheld
    - The proposed study will use sound research design
    - Risks associated with participation in the study are minimized and reasonable
    - The benefits of the research outweigh any potential risks
    - All participants can make an informed decision to participate in the study, and that decision may be withdrawn at any time without consequence to the participant
    - Safeguards are in place to protect the well-being of participants
    - All data collected will be kept private and confidential
- researchers must obtain informed consent from all participants
- Informed consent: participants give permission to participate in a study when all the details and risks of study participation are known

Facebook Emotional Contagion Experiment: Question of Informed Consent

- examined how emotional states, like joy or sadness can be affected and transferred from one person to another through the process of "emotional contagion" (like catching a cold from a friend)
- Researchers manipulated amount of positive or negative info
- Some saw more positive emotional words
    - More likely to create more positive posts of their own
- Others saw more negative emotional content
    - More likely to create negative posts

- ethical concern: respect for peoples right and dignity because they were not given the option to choose to participate or refrain from participation. They weren't given any details about how their participation would be kept anonymous
- Ethical debate because argued that data collection via Facebook did not require the same level of consent as research conducted in federally funded institutions

Special Ethical Considerations

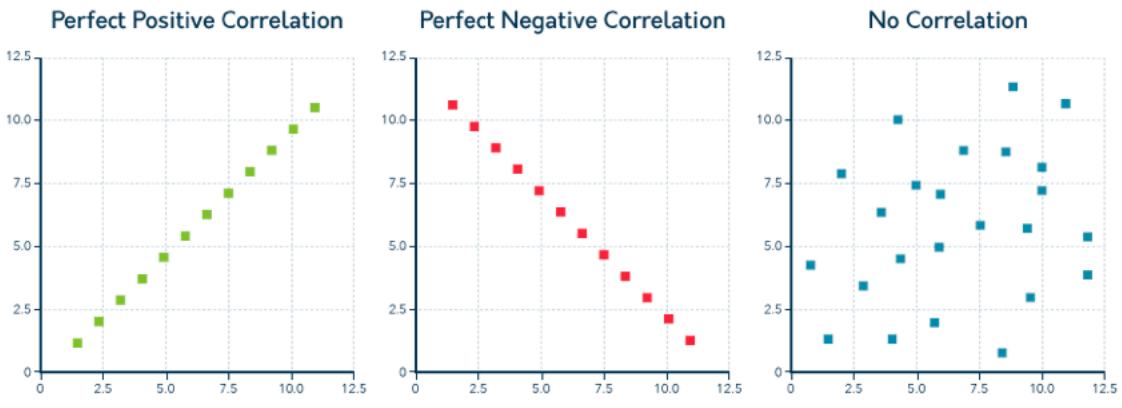
- vulnerable populations include any individual or group of individual with either of the following two criteria:
    - Decisional impairment: any instance when a potential participant has diminished capacity to provide informed consent
        - ex. Children and mentally disabled
    - situational vulnerability: instances when the freedom of "choice" to participate in research is compromised as a result of undue influence from another source
        - ex. Military personnel and prisoners, economically disadvantaged situations
- nobody can be denied the possible benefits associated with participating in research study
    - Principle of justice
- researchers should consider the following:
    - No study should ever be conducted on vulnerable populations if the research question could be reasonably carried out using participants without these vulnerabilities
    - Researchers should be responsive to the needs, conditions, and priorities of vulnerable population. Should also have a member of expertise on site
    - Two types of consent required for decisional impairment: parental and participants provide assent—affirmative permission to take part in the study
    - Situational vulnerability, additional safeguards must be put in place to prevent exploitation. Ex. Include a third party to advocate on behalf of individual

Deception

- sometimes researchers would want to deceive you because if they were to inform you about how the experiment works, it might affects the way you behave in the experiment
- must meet these criteria:
    1. Research poses no more than a minimal risk to participants. Will not cause emotional or physical discomfort to participants
    2. Does not affect the well-being and the rights of participants
    3. Researchers must provide justification that using deception is the only way to conduct the study. No other reasonable alternative approach to addressing the question
    4. After research is done, should debrief to participants. Provide information about what was investigated and how participant will contribute.

Correlation

- identify relationships between two or more variables
- looking to show that as one variable changes, so does another
- create scatterplot to show
    - if point is strong, points on the graph cluster tightly together in a linear relationship
    - direction of correlation:
        - positive doesnt mean goodness and decrease doesnt mean badness
        - positively correlated: one increases, other increases. Vice versa
        - negatively correlated: one variable leads to a decrease in the other
        - zero correlation: no apparent relationship



Strength of Correlation:

- correlation coefficient: ranges from -1 to +1
    - signs indicate direction of relationship
    - regardless of sign, the absolutely value of correlation is the magnitude of the correlation
    - as coefficient gets stronger, it will get closer to 1

Correlations can be misleading

- cause and effect relationship between variables, just because they are related doesn't mean we know why
- correlations are not causation

Cofounding variable: another variable may influence one or both variables that are being measured.

ex. Number of ice cream sales and homicide

Margarine: bad for your health, great for marriage

Hypothesis

- what if statement
- prediction of what will happen in research
- can be tested (measured)
- can be falsified
- should be simple + specific
- consistent with prior observations or an existing theory

Experimental Variables

- independent variable: variable experimenter will manipulate, contain 2 levels
- dependent variable: outcome measure, variable experimenter counts or measures
- extraneous variable: confounding variable, not the focus of study but may influence outcome if not controlled (ex. Gender, must measure F and M)

Sample Selection

- select experimental and control groups

- simple random sample: every individual in the population has an equal chance of participating. If large enough, should approximate the larger population we wish to study
- stratified random sample: careful approach, divide population by subgroups, then randomly take samples in proportion.

ex. 100 students with equal numbers of male and female, separate students by gender

- non-random sample: not all individuals are equally likely to participate.

ex. Effects of concussions in sports on mental health, not ethically possible to randomly assign athletes to concussion or non-concussion

- convenience sample: group of individuals that are only selected because of a preexisting condition, convenience or easy access to participation

Experimental and Control Groups

- once participants have been selected, we need to establish a basis by which we measure changes and compare behaviour

ex. Interested in new drug claims to enhance memory

- one group get the drug
- one group doesnt but get the same treatment
  - thought of taking memory drug might influence feelings and behaviour that lead to subtle psychological effects that make them pay closer attention to what they are memorizing

- placebo: felt even when you know its fake
  - needle more effective than capsule

ex. Ideally, if a study concluded that eating ice cream causes violence, it would have to randomly assign participants to groups eating more and less ice cream and compare rates of violence

ex. Casual: alcohol decreased coordination

Non-casual: socioeconomic status is negatively related to crime rates

Describing Data

Central Tendency:

- mean, median, mode, frequency
- whether if there are real differences between independent variable condition so that we can make inferences about the casual relationship between IV and DV
    - referred to as inferential statistics
- descriptive statistics: collection of ways to describe the data in the simplest way possible, involves the use of quantitative values
- average: mean
- central tendency is the score that best represents the others
    - a single point to describe the center of data
- mean: average score
- median: middle score in ordered set of data
- mode: frequently occurring number in a data set
- average squared deviation scores = variance
- variability: difference in the measure of spread of data

PROF SLIDES

Why do we conduct research on behaviour?

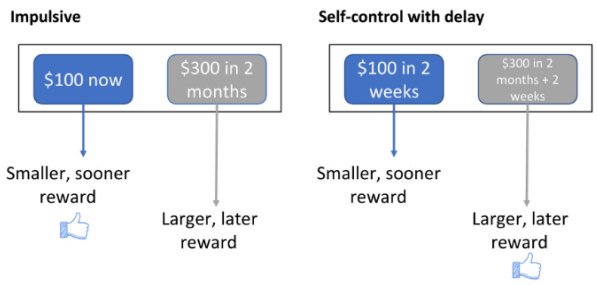
- behaviour does not always match our expectations
- Research allows us to generate theories, hypotheses, and even determine casual relationships

Scientific method

1. Identify problem
2. Gather info
3. Hypothesis
4. Design and conduct experiments
5. Data analysis and conclusions
6. Restart the process

Example

1. Identify the problem
    - based on observation, previous research, established theory, or intuition
    - people often behave impulsively and engage in risky behaviour
2. Gather information
    - search literature to see what has been done on topic
    - read relevant results for what's been done
    - search for impulsivity, self-control, and delay discounting
3. Hypothesis
    - develop an informed guess based on what you read
    - have a prediction about how the variables are related
    - people might show self-control if they have a delay before both smaller, sooner and larger, later reward
4. Design and conduct experiment
    - impulsive
    - self-control with delay
5. Design and conduct experiment
    - test your hypothesis with at



least two conditions

- one control group that doesnt receive treatment
- one experimental group that receives treatment

- baseline is a condition without a manipulation

6. Data analysis and conclusion

- see if the data you obtained match your expected results

7. Restart process

- think about original problem
- replicate and extend results or ask an entirely new question

Just watch and learn

- observe behaviour without manipulation
- Most likely representative of real world behaviour
- No control over behaviour
- Difficult to determine exact cause of behaviour

Become a Member of a Group and Learn

- researcher interacts with population of interest
- Allows for researcher insights from participant's perspective
- May be subject to biases or interpretation
- Observations may not be repeatable

In Depth about One person

- a report of a single person
- Collect a lot of detail
- Not an experiment
- Can be difficult to draw casual relationships
  - ex. Phineas gage

Patient Henry Molaison (H.M)

- refer to textbook slides

Participants Answer Standard Question

- questions to extract specific information from a group of people
- Relatively easy to administer
- An effective approach to gather lots of info
- Susceptible to biases from both researchers and participants

Ethics in Psychology Research

- set of general principles of how people should be educated, treated, and respected when participating in any study
    - Principle A: Beneficence and Nonmaleficence
    - Principle B: Fidelity and Responsibility
    - Principle C: Integrity
    - Principle D: Justice
    - Principle E: Respect for People's Rights and Dignity

The Practice of Ethical Research:

- Internal review board (IRBs), review and assess if a research project will be carried out in a way that is consistent with the General ethical principles:
    - Whether the study make use sound research design
    - Risks associated with participation in the study are minimized and reasonable
    - Benefits of the research outweigh any potential risks
    - All participants can make an informed decision to participate in the study, and that decision may be withdrawn at any time without consequence to the participant
    - Safeguards are in place to protect the wellbeing of participants
    - All data collected will be kept private and confidential

Facebook Social Emotional Experiment: Question of Informed Consent

- researchers manipulated how many positive/negative news feeds 689k users saw
- No one provided informed consent to participate or given a choice to withdraw

Special Ethical Considerations

- potential participants that are not able to legally give informed consent, such as children or other individuals of special population

- Two criteria for participation
    - Informed consent from parent/guardian
    - Assent from potential participant
- informed consent process may affect participants natural behaviour/reactions
- Some study may not reveal the true nature of the study until after participation is complete. This is called deception

Correlation

How are two variables related?

- direction and strength of a relationship between 2 variables
- refer to positive, negative, no correlation chart in textbook slides
- can be misleading, correlations not causation

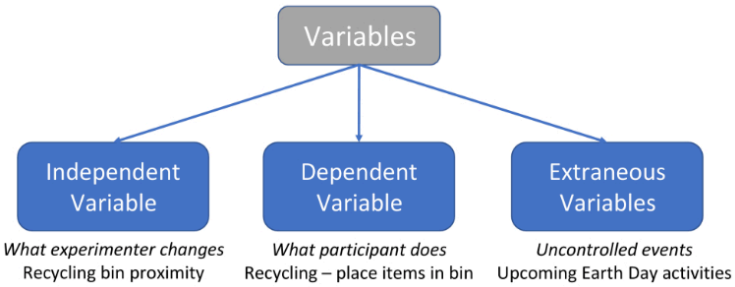
Why We Conduct Experiments

- testing theories through controlled environments
- Can be used to establish a cause and effect relationship
- Hypothesis driven

What We Test in Experiments

- hypothesis is an "educated guess" about outcome of an experiment
- Characteristics
    - Consistent with prior observation
    - Simple
    - Specific
    - Measurable
    - Falsifiable

Important Variables in Experiments



Who Will Participate?

1. Simple random sample
   - everyone has an equal chance
2. Stratified random sample
   - divide into subgroups and take representative samples
3. Non-random sample
   - due to study constraints, not equal chances
4. Convenience sample
   - work with what you've got

Groups

Experimental group

1. Conducting the experiment on
2. The group exposed to the independent variable
3. Measure the effect of the independent variable on dependent variable

Control group

1. Not conducting experiments on
2. Not influenced by independent variable
3. Used to compare experimental results with behaviour affected only by naturally-occurring conditions

Placebo

Raises from a patient's expectations but not the independent variable

Should you trust your experimental results?

Internal validity:

- the degree to which results can be attributed to the independent variable and not other explanations

External validity:

- degree to which results can be generalized

1. To other people
2. Across settings
3. Across time

Describing Data

1. mode—most frequent value
2. median—look at total number of values, divide by half, record value given for middle data
3. mean—average; center of dataset, skewed by outliers

Variability

1. range—subtract lowest from highest data value
2. Standard deviation—spread of data around mean
3. variance—average of squared deviation scores; (standard deviation)^2

Class A
100
90
80
70
60
Mean = 80

Class B
82
81
80
79
78
Mean = 80

Group A	
(score −mean)	(score −mean)^2
100 - 80 = 20	20 x 20 = 400
90 - 80 = 10	10 x 10 = 100
80 - 80 = 0	0 x 0 = 0
70 - 80 = -10	-10 x -10 = 100
60 - 80 = -20	-20 x -20 = 400
$\frac{\text{Sum of Squared deviations}}{\text{number of scores}} = \frac{1000}{5} = 200$	

Group B	
(score −mean)	(score −mean)^2
82 - 80 = 2	2 x 2 = 4
81 - 80 = 1	1 x 1= 1
80 - 80 = 0	0 x 0 = 0
79 - 80 = -1	-1 x -1 = 1
78 - 80 = -2	-2 x -2= 4
$\frac{\text{Sum of Squared deviations}}{\text{number of scores}} = \frac{10}{5} = 2$	

Range of class A = 40 → 100-60

B = 4 → 82-72

calculate deviation and variance

sqrt(variance) → deviation

Making Judgements with Data

Statistics and the 5% rule: probability of an event is less than 5% → rare

- gives guideline to detect differences