# Chapter 2: Research Methods

Scientific Method

- Definition: A procedure to find the truth by using empirical evidence
  - Need evidence to go with idea and can be modified if needed
    - Develop theories
    - Derive hypothesis
    - Test them by gathering information
    - Use evidence to modify theory
- Start with a research question (need a hypothesis) then build a theory or start with a theory (create a hypothesis to test theory) then rebuild theory
- Theory: Hypothetical explanation of a natural phenomenon
- When people got hurt in ancient Greece there was two option
  - Dogmatist: To understand illness you need to adopt theories about body functions (People who cling to their assumptions)
  - Empiricist:To understand illness you need to observe sick people (Belief that knowledge is acquired through observation)
    - People who chose dogmatist died…
    - Only recently people trusted their eyes more then the authority's words
  - Euclid Ptolemy believed that eyes emit rays > one experience disproved thus (Ibn al Hatham : can see from far and from close in the same amount of time after opening eyes)
- Start with finding subject and desire to know more about it
- Cannot prove anything, can only disprove
- Need to test all theories with scientific method
- Meta analysis: Use of computer/software to run large scale statistical analysis using data from published research
- Basic questions of psychology
  - What do people do? (observation and measurement)
  - Why do people do it? (relationship between measurement and what they imply
- Evidence-Based Decision making
  - Look at statistics
  - Find evidence
  - To make good decisions and put money in the good way
- Develop Research questions (affects of X on Y)
- Hypothesis (best estimate of what you ill find): might be open ended since there might not be an antecedent > needs to be falsifiable (define observation so it could be proven wrong or right
- Methods to study humans
  - Method of observation: Allows us to determine what people do
    - Instrument: Object to calculate something
      - To measure a characteristic need to define it with a measurable characteristic
      - Validity of instrument
        - Reliability: Same measurement when measuring the same thing
        - Power: Ability to detect differences or changes in property
  - Method of explanation: Determine why people do it
- Can use different type of studies to answer question

- Nature of the question will decide what type of study we will need to run
  - **Experimental** (don't need more than 5 people if it is really good)
    - In well controlled environment/situation (laboratories)
      - Manipulation
        - Create an artificial situation that illustrates situation
    - At least two variables (manipulate something to measure something else)
      - Needs to define variables, operational definition
        - Needs at least two options to compare
          - Experimental group: Group of people who experiences a stimulus
          - Control group: Group of people who do not experience the stimulus
          - Problems with using the same group in both situation
            - Can't let people decide in which group they'll be since desire will make them different from the other group
            - Self-Selection: A problem that occurs when anything about a person determined whether he or she will be included in the experiment or the control group
              - People who bought Louise Hay's book have a different mentality
            - Groups must be randomly selected
            - Order effect (second will be easier then first since they have practice)
              - Better to use one group twice since they always have the same strength and weaknesses
              - Order Effect-Potential Error > counterbalancing (separating the group)(balance the error to eliminate it)
            - Already know about the experiment so know what to do
        - The more treatments you have, the more order possibilities there are
          - To beat the order the effect, change the order of the scenarios for the different people (use factorials {4x3x2x1}) (!n) > symbol of factorial
            - Need at least one person per series of scenario
      - Dependent variable: measured variable(depends on
      - Independent variable: variable manipulated
    - Looking at cause and effect
      - Should be able to say what cause and what was the effect after the experiment
    - Error margin can't be more than 5%, if not it is a failed experiment
  - **Non-experimental** research methods (needs a lot people)
    - When we are studying something that has multiple variables
    - People answering anonymously or privately makes answers more truthful
    - *<u>We can only demonstrate correlation not causation</u>*
      - To know people's feelings and opinions
      - Study: A partial collection of people drawn from the population
      - Samples that said to be representative of population let us generalize
      - 96% of people studied are white university men
        - Reasons why sampling mostly college students is ok
          - Experiments can be illuminating even if sample is not typical pop
          - When generalizing many samples is important
          - Similarity of pop and sample is a reasonable assumption
      - Surveys
        - Variables
          - Predictor variable **[like independent variables]**
            - Looking how these variables influence the outcome
            - Background characteristics

        - Age range (different values)
        - Ethnicity
        - Sex (male or female) {gender: what people feel they are}
        - Socio-Economic Status
      - Outcome variables **[like dependent variables]**
    - Observation
      - Need an operational definition
      - Just observe what they do, because they might be too shy to say the truth if asked
      - Can't guess people's background characteristics
        - Can ask information afterwards though
    - Archival and existing data analysis
      - Data bases full of statistics
      - Look at history to predict future
      - Look at variables in the past to say how these will change in the future
      - Don't have to collect new data, just run a statistical test
- Why humans are hard to study
  - Reactivity: People behave differently when observed
    - Demand characteristic: Aspects of observation setting that makes people act the way they think they are supposed to act like
      - Solution
        - Natural observation: Observing people in their natural environment
  - Complexity: 500 million neurons in brain hard to explain how the brain creates thoughts, memories, feelings
  - Variability: Everyone is different
- Observation biais
  - Expectations influence observation
    - Expect rat to be a slow learner will say it is a slow learner
    - Expectations determine the kind of errors that people will make
  - Expectations will influence reality
    - People will do things to help the rat who is supposedly a fast learner
  - Solution: Double blind observation: Observation with true purpose hidden from observer and person being observed
  - People expectation can cause the phenomenon expected
    - Mob psychology (Stock crash)
- Internal validity: an attribute of an experiment that allows it to establish a causal relationship
- External validity: An attribute of an experiment when the variables are define in a way that represents the real life
- Why we have trouble thinking critically
  - We see what we want to see
    - We look for proof to support our beliefs
      - Ex: Little Hannah when people thought she was rich they found proof that she was good student when they thought she was poor they found proof she was a bad student
    - We stop looking after we find the evidence to support our claims
    - Hold at high standard evidence that disapproves evidence
    - Solution: talk to people > show research to critics
- We consider what we see and ignore what we don't
  - Experiment with trigrams, 1/2 had to find what was special with a trigram (only one with a t in it) > they succeed, but the half that had to find what was special with a trigram ( only one without a t) couldn't

- Appearance give us an impression and don't make us consider the opposite

Correlation

- Can have many variables (at least 2)
- Non experimental
- Look for a pattern in series of measurements
- Is there a trend or a relation between the variables?
- **Correlation is not causation**
- Prediction, but are not always true, since there is always other variables
- Third variation problems
  - The predictor and the outcome are maybe both influenced by a third variable
    - Predictor (ice cream sales are up), Outcome (more crime rate), could be cause by a third variable (summer/heat)
  - May not be the only factor, other things may also influence a variable
  - At best looking at strength of relationship
  - Doesn't need numbers
  - Person's r
    - Every statistical test has assumption
    - Have to have some numbers that you can add, subtract, multiply or divide
    - Some kind of linear relationship between two variables
      - Ex: Height (x) should predict weight (y), x and y coordinates for every person
    - Can get a value anywhere between l0 to 1,00l > strength
    - Can get a sign + or - > direction of the line
    - Strength depends if closer to 1(perfect correlation, strongest relationship) or 0 (no relationship, no correlation, no strength of relationship)
      - Positive means increase together and decrease together > same direction
      - Negative means that one variable decrease and the other on decrease > different direction
    - x= predictor variable
    - y= outcome variable
    - The more scattered the points are the closer to 0 the correlation is in a scatterplot diagram
    - The closer the points are in a scatterplot, the stronger the relationship is
    - datum: single data
    - Outliers: donnée aberrante

Ethics Guidelines for Humans

- Nuremberg Code and then Declaration of helsinki > Rules of ethical treatment of human subjects
- Belmont Report (released by US Department of Health, Education and Welfare)
  - Respect for people and their right to make decisions for themselves without influence
  - Research should be beneficent
  - research should be just (distribute risk and benefit equally0
- Rules of conduct of psychological research

- Informed consent: Can't be forced to do be subjects (need to volunteer)
  - Need a little bit of information, but not too much
    - People's behaviours change when they know the subject of the experiment (hypothesis, question)
  - Signed consent with a witness signature to protect the research
  - Parent or guardian has to sign for a minor
  - Ability to withdraw
  - Minimal risk
    - No consent needed if it's just an observation
- No coercion: Can't bribe people to do it
- Deception and Debriefing
  - Withhold some information, but at the end explain the real reason of study
  - A little on the hypothesis and the research question
  - Know what they will have to do ( a little deception is ok)
  - Deception: Lie about something, withhold a lot of information (wouldn't have done it in the first place if they knew what they actually had to do)
  - When the debriefing is not enough to take away the problems caused by the deception
- Protection of privacy
  - Anonymity (no idea of identity) and Confidentiality (Not allowed to divulge information)
- Risk vs Benefit
  - Messy research in social psychology when studying the bad part of human nature
  - Does the personal risk outweighs the benefit to society
  - Reduce the risk as much as possible
  - If person is willing to take a certain risk after an informed consent and the benefit to society is great they can do the experiment
  - Need a point of comparisation (at least 2 levels of the independent variable)
    - New drug vs No drug (placebo) > single blind control
    - Double blind control: Even nurse and doctor don't know which group people are in
    - New drug vs old drug > to diminish the risk (high risk for people with depression)
- Approved by Institutional review board

<u>Middlemist + Knowles (1976)</u>

- Personal space
  - Uncomfortable when someone is too close
- Personal space in men's washroom
  - Two confederate (people who are in the inside of the experiment) inside the bathroom observing how long it will take you to pee when the person is right next to you in the urinal, one urinal away, two urinals away…
  - Benefit: to learn how to design bathrooms properly
  - Minimal risk with no informed consent and no debriefing

<u>Stanley Milgram</u>

- Obedience to authority
  - Came out of WWII, why did people obey to authority to do cruel things

- What are the motivation to obey (WWII)
  - Fear of being prosecuted
  - Kill or be killed
- Put it in a context out of war (university)
  - Said it was experiment to study memory, increase shock every bad answer
  - The teacher is the real subject, and the learner is the confederate
  - The teacher musk ask questions to the learner and every time the teacher gets the answer wrong, the teacher must shock him
  - The teacher must shock and he hears the voice of the learners in torture
  - The researcher kept saying that he should continue
  - Only a third left the study after asking the researcher if he could leave
  - 2/3 went all away to highest shock level
  - Does the debriefing undo the effects of the deception?
  - Learning about blind authority is a great benefit
    - terrorism, school, work, army
  - Risk is high and connected to the debriefing

Philip Zimbardo

- Prison Experiment
- What happens when “good people” go in prison (negative environment) > evil place won over good people
- Group of university student were divided in guard and in prisoner group
- Experiment was only supposed to last 2 weeks
  - Only lasted 6 days
- Ended horribly
- The bad things the guard have done was the same things bad army officers did (even when they never herd about it before)
- Zimbardo took the job of the warden which was a big mistake since he got caught up in his role
- Goal keep prisoners in line and couldn’t use violence
- Degraded the prisoners
- Prisoners rebelling against power and being unanimous
- Prisoners attacking guards so guards started torturing (washing the toilet with their hands)
- Ring leader wanted to leave, but thought he was told that he couldn’t leave
  - Told everyone that they couldn’t leave
  - Thought if he acted crazy they would let him leave
- Prisoners felt like they were loosing their identities
- 416 food strike
- Guard forcing the prisoners to turn against each other
- Study show power (of the situation) corrupts
- Everyone played a part and should take responsibility for their part they play
- None of the good guard intervened with the satirical actions of the bad guard
- There was a debriefing, but there was a lot of deceptions
- After experiment made the ethics rules better
- ***Until what point are you playing a role?***

- Does this experiment explores the bad point of human nature or does the situation create bad human nature (nature vs nurture)
- Skinner's theory of punishment and reinforcement

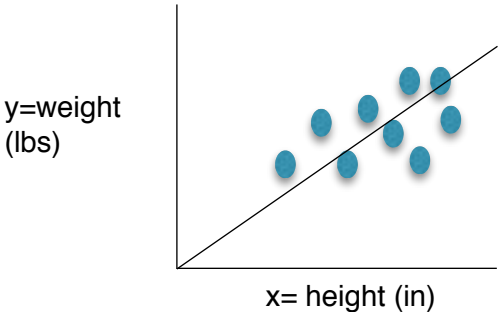
Ethics Guideline for Animals

- Supervised by psychologist trained in research methods and animal care and experimentation
- Minimize discomfort, infection, illness and pain
- Only can submit animal to pain, stress or privation if there is no other alternative
- Must perform all surgical procedures with appropriate anesthesis to minimize pain
- Some believe that animals should have the same fundamental rights

Respecting the truth

- Review boards ensure data is collected ethically
- No one checks is data are ethically REPORTED and ANALYZED
- One scientist conclusion is another's research question
- Can't fabricate/modify results or mislead by omission is article
- Share credit where is due+ mention others with similar research
- Share data

scatterplot →




+/-0.70

Positive relationship