PSY 1101
Introduction to Psychology
CHAPTER 1

Definition: Psychology is the scientific study of how we think, feel, & behave.

- Psychology **is** a science
- Scope = every aspect of human life

1. The Need for Psychological Science

A. Why?

A.1 - Limits of Intuition

- "Intuition is an effortless, immediate, automatic feeling or thought, as contrasted with explicit, conscious reasoning."
- Can be variable but **cannot** be used to study the natural world
- It is **seriously misleading** -> **need science**
- *Ex) Interviewers tend to be overconfident of their gut feelings about job applicants*
    - Intuition is misleading in this scenario

A.2 - Limits of Common Sense

- Does **not** generate **new knowledge**
    - It is the result of experience & having acquired knowledge
- Sometimes common sense **does not make sense** (just reached conclusions)
- Common sense more easily describes what ***has*** happened rather than what ***will*** happen.

A.3 - Hindsight Bias

- AKA the "I-knew-it-all-along" phenomenon
- Once we know all the facts & how something ended, we have the **tendency to believe** we could have **predicted it**.
- Science shows that without **all the facts**, we cannot easily predict
- *Ex) After the stock market drops people say it was "due for a correction"*
- If you tell 1 group of people that psychologists have found that separation weakens romantic attraction & you tell the other group that separation strengthens romantic attraction, most people in **both groups** will view this as unsurprising.
    - Opposite findings both seem like common sense = **problematic**
    - Such errors in our findings show why we need psychological science
- *Ex) When drilling an oil well in 2010, BP employees took shortcuts & ignored the warning signs, after the Gulf's oil spill the foolishness of those judgements became obvious* = ***hindsight bias.***

A.4 - Overconfidence

- Humans tend to think we know **more than we do**

- It is the over exaggeration of how accurate our **beliefs, judgement & knowledge** are.
- Ignorant to how ignorant we are
- Research proves we are **more confident than accurate**
- *Ex) 27,000 expert predictions of world events were collected*
    - *Avg. of 80% of people made them with confidence, but **less than** 40 % were right*

A.4 - Illusory Correlation

- Tendency to perceive a relationship exists between 2 variables, when in reality there is **no relationship**, or it is **barely there.**
- Affects what we think, feel, behave, pay attention to, & remember.
- Creates **bias** -> **need science**

A.6 - Perceiving Order in Random Events

- Humans are uncomfortable with randomness & uncertainty
- We look for patterns/trends & **see order** even when **there is none**
- *Ex) Surprising amounts of consecutive streaks when flipping a coin (heads & tails)*

Points to Remember…

- All these factors can lead us to overestimate our intuition -> **scientific inquiry** can help us sift **reality from illusion**

1. The Scientific Attitude

- All of the scientific attitude's main components relate to **critical thinking** (which requires the following):

B.1 - Curiosity

- A passion to **explore & understand** without misleading/being mislead
    - Knowledge + discovery

B.2 - Open-mindedness

- To other perspectives, criticism, uncertainty, change, etc.

B.3 - Skepticism

- Use logic to **raise questions**, look for bias, etc.
    - Cannot become cynical
    - When ideas compete, skeptical testing can reveal which ones best match the facts
    - Ask questions like *"What do you mean?"* or *"How do you know?"*

B.4 - Awareness

- Of our own **biases** & try to fight them
    - Filters of which we view life

B.5 - Humility

- An awareness of our **vulnerability to error** and an openness to surprises & new perspectives.
    - No matter how smart we are, we will fail
    - Science is not about power or ego, it's about truth

B.6 - Cautiousness

- What we know today **might change** tomorrow
    - Science is constantly changing

- Deals with probability

Points to remember…

- The scientific attitude prepares us to think smarter.
- Smart thinking = **critical thinking**

1. The Scientific Method

- Method of research is what makes a field scientific
  - Any field that follows the scientific method **is a science**
  - It is a standardized procedure that allows us to do research in a logical, rational & objective way

C.1 - Observations

- In science, everything begins with **observations**
  - What starts as casual must become systematic

C.2 - Theory

- Observations lead to theory -> organize & summarize observations in a coherent way
- A **theory** attempts to explain observations
- *Ex) Observe over and over that people with good sleep habits*

C.3 - Hypothesis

- **Hypothesis** = testing: extract idea from theory & test it using rigorous scientific methodology
- One of the scientific rules we must follow is to **operationally define our variables**
  - Researcher must state with clarity/precision **how** they measured their variables
  - Ex) Operational VS non-operational

C.4 - Replication

- **Replication:** studies must be repeated
  - When we repeat them & obtain similar results we become more confident in the results

C.5 - Generate or Refine

- **Generate:** use results to generate new theories
- **Refine:** refine new theories/results
- Process starts all over again

Types of Research Studies

1. Descriptive Research

A.1 - Purpose

- Observe + describe what we observe

A.2 - Case Study

- **In-depth** investigation of either an individual or a very small group of people
  - Researcher gathers **any** piece of information that could be relevant

- **Advantages:**
    - **Most in-depth research** you can do
    - Sometimes it is an excellent first step (especially if case is unknown/rare)
    - Can document/preserve information on cases which would otherwise be lost
    - Get a glimpse of **human nature** & reality
- **Disadvantages:**
    - Samples are too small so you **cannot generalize** to an entire population
    - **Researcher bias**: they could filter data through their own expectations/beliefs
    - To avoid video/record evidence

A.3 - Survey

- Can be descriptive but can also be correlational (see later in B)
- Researcher will ask large sample of people **questions** that are of interest to them
- **Representative sample:** extract sample & survey them
    - Because you cannot survey every person in population of interest
    - Use these sample results to generalize to population
    - In order for results to be **viable & scientifically valid** we must have a representative sample
    - Characteristics of sample must closely match characteristics of population
- Use **random sampling** to obtain a representative sample
    - Chance & only chance will determine who will be part of sample -> subjects/researchers do not chose
    - Every single person in the population should have an equal change of being included in the sample
- **Advantages:**
    - Easy to do
    - Inexpensive
    - Can reach a large number of people & include people who are usually excluded from research (i.e. homebound, illiterate, etc.)
    - Sometimes the only way to find out is to ask
- **Disadvantages:**
    - Just because you ask doesn't mean you will obtain the truth -> people will lie (intentionally or unintentionally)
    - Surveys are super sensitive to the words we use & the characteristics of the person -> changing the wording might change the results (ex. "should not allow" vs "should forbid")

A.4 - Naturalistic Observation

- Researcher will leave lab & do research in the **"real world"**
- Researcher must **never interfere** -> observe only
- **Advantages:**
    - Does not get more real than this -> real world, real behaviour, real time
    - Allows us to discover things we may never discover in the lab
- **Disadvantages:**
    - **Researcher bias** -> data needs to be objective

- Even if a researcher does not interfere, their mere **presence may change behaviour** -> must blend in to be part of environment

1. Correlational Research

B.1 - Purpose

- Allows us to observe, describe & make predictions (see later)
- Allows us to find out if there is a systematic & reliable **relationship between variables** (are they associated)

B.2 - Questions to Ask (x3)

1. **Do the variables co-vary?**
   - **Is there a relationship between variables**
1. **In what direction do they co-vary?** (i.e. what type of correlation)
   - **Positive correlation**: there is a relation, when 1 variable changes so does the other, they change in the **same direction**
   - **Negative correlation**: there is a relation, when 1 changes so does the other, they change in **opposite directions**
2. **To what extent?** (i.e. how strong is this relationship)
   - Use c**orrelation coefficient**: r (value varies from -1 to +1)
   - If **r = 0** there is no relationship
   - If **r= 1** there is a perfect correlation: every single time one variable changes the other does too
   - **Negative** value = negative correlation
   - **Positive** value = positive correlation
   - It does not tell you the strength of relationship
   - The closer r is to 0, the weaker the relationship
   - The further r is to 0, the stronger the relationship

- **Advantages:**
  - Excellent first step
  - Experiments can be very expensive, so this allows us to see a relationship exists before starting an experiment
  - Sometimes it is the only research we can do because it is unethical to do otherwise
  - Observe, describe & predict: once you know there is a correlation, having info on one only allows me to make predictions about others
- **Disadvantages:**
  - Absolutely cannot infer causality*: cannot say variable A causes change in variable B

1. Experimental Research

C.1 - Introduction

- Observe, describe, predict & infer causality
- Only kind of research that allows you to talk about **cause & effect**
    - Variable A changes variable B
- Why?
    - Manipulate independent variable you are interested in
    - Control all other independent variables that could affect results, whether known or unknown *(see later)*
- **Independent variable:** variable that influences & affects another variable
    - Causes a change in another variable
    - Variable that researcher can manipulate/control
- **Dependent variable:** variable changed & affected by independent variable
    - Measured by researcher

C.2 - Manipulating the Independent Variable

- Researcher manipulates independent variable they are interested in studying
- They create at least 2 levels of the independent variable
- 2 groups in their study:
    - Experimental group where subjects are exposed to independent variable
    - Control group will not be exposed to independent variable
- At the end of the study, compare both groups to see if exposure to independent variable changed something in dependent variable

C.3 - Control all other Independent Variables

- Researcher controls all other independent variables that could affect dependent variable or results
    - Independent variable could be known or unknown
- **Why?**
    - Researcher must do this otherwise they will not be sure what caused a change in the dependent variable
- **Cofounding variables:** factors other than the independent variable that might produce an effect
    - Might confuse results
    - Will not be able to tell what caused what
- **Unknown independent variables**
    - No way to know everything about something
    - Still must control what is unknown
    - Do this by using random assignment
- **Random assignment:** chance & only chance will determine which subject is going to be in the experimental group & which is going to be in the control group
    - Every single subject in experiment has an equal chance of being in either group
- When doing research to test a drug or treatment, we must control for the placebo affect
    - **Placebo:** fake treatment that has no therapeutic value (i.e. sugar pill)

    - **Placebo effect**: giving a placebo unknowingly to someone & they believe they are getting an effective treatment (has been proven that they might actually get better)
    - ***Ex)*** *Group 1 takes Prozac while group 2 takes a placebo pill that looks exactly like Prozac*
    - *Both groups are tested for depression*
    - *30% improvement is seen in both groups*
    - *Therefore, Prozac is not effective beyond the placebo since the sugar pill had the same effect*
    - *If Prozac is more effective than its placebo, it can be sold*
- **Blind procedures:** a way to control scientific research
    - Keep subjects in the dark as to what the main components of the study are
    - To control subject bias
    - If they know what is being testes then their behaviour might change & affect results
- **Double-blind procedures:**
    - Keep subjects & researchers directly dealing with them blind to research
    - To control both biases

1. Regression Towards the Mean

- Correlations make visible the relationship we might otherwise miss & restrain our ability to see nonexistent relationships
- Believing there is a relationship between 2 things makes us more likely to notice & recall instances that confirm our belief -> results in illusionary correlation
- **Regression towards the mean:** the illusion that uncontrollable events **correlate with our actions/personal contro**l (statistical phenomenon)
    - It is the tendency for **extreme or unusual scores to fall back (regress) toward the average**
    - We attribute normal regression (the expected return to normal after an unusual event) to something we have done
    - *Ex) students who score much higher on an exam usually return to their average when retested*
- Superstitions & ineffective practices are common sources of failure to recognize regression towards the mean
- Therefore, when **functioning behaviour returns to normal**, it is the result of regression towards the mean

Statistical Reasoning

- Statistics are mathematic clues that help researchers describe data & make inferences
- They are fundamental (have to be used)

- **Descriptive Statistics**

A.1 - Purpose

- Allows researchers to organize, summarize & describe data in an understandable way
- *Examples:*
  - *Percentages -> precise & concise*
  - *Histograms*
  - *Bar graphs (see fig 1.8) -> must be cautious because it is easy to design a graph to make a difference look big*

A.2 - Measures of Central Tendency

- Allows researchers to have an idea about the typical score in distribution of scores
- *Ex) typical income, average, etc.*
- **The Mean**
- The mathematical **average** -> takes into consideration every single score in a distribution of scores
- Add up all the scores & divide by total number if scores
- Caution -> very sensitive to extreme scores
  - Those scores will artificially inflate/deflate the average & distort it
  - Outliers can be removed from data
- **The Median:** "50th percentile"
- Arrange distribution of scores from highest to lowest or vice versa, median is the score that falls **right in the middle**
- 50% fall above & 50% fall below
- Not affected by extreme scores
- Caution -> it is 1 single number & loses lots of information
- **The Mode:**
- Most **frequently occurring score** in a distribution of scores
- Caution -> most frequently occurring does not necessarily mean mot typical

A.3 - Measures of Variability

- Scores in a distribution of scores will differ & vary from each other & measures of variability allows researcher to have an idea of typical difference between scores

- **The Range:**
- Take **highest score & lowest score** then subtract from each other
- Limitation - > takes into consideration 2 scores only & misses lots of information (could distort typical difference)
- **The Standard Deviation**
- Much better measure of variability than the range
- Takes into consideration **every single score** in a distribution of scores & looks at difference between every score & the mean
- When scores are **clustered** around mean, variability is lower/smaller in data & standard deviation will be **smaller**
- If scores are **widespread** around mean then variability is higher & standard deviation is **higher**

Inferential Statistics

- Purpose: allows researcher to **make inferences from data**
  - Draw conclusions
  - Generalize from sample to population
  - Determine if results are statistically significant
  - Statistically significant means not likely to be due to chance or randomness
- Likely to reflect real differences between subjects or real relationship between variables
- Results are considered to be statistically significant when probability that they are due to chance is very small
- **P value:** statistic that gives probability that results are **due to chance**
  - Will vary between 0 - 1
  - 0.6 P value = 60% chance probability that results are due to chance
  - 0.5 or less = P value needed for results to be considered statistically significant

Research Ethics

Protecting Research Participants

A.1 - Animals

- Psychologists study animals to understand how different species **think, learn & behave**, and to **learn about people**
- Animal experiments have lead to **treatments for human diseases**
  1. Ex) Insulin for diabetes, sea slugs' nervous system reveals neural mechanisms of learning
- **Animal protection movement:** protests use of animals in psychological, biological & medical research
  1. In the US 60% of people agree with animal testing VS in the UK 37% of people agree

- Is it ethical to place **well being of humans above other animals**?
    1. *Ex) stress, cancer experiments, HIV virus, etc.*
- Is our use/consumption of other animals **as natural as the behaviour of** carnivorous cats, hawks or whales?
- If we give human life first priority, **what safeguards should protect** the well-being of animals in research?
    1. Government regulations, humane care
    2. Many professional associations already have guidelines & funding agencies
- **Animal research benefiting animals:** studies have helped improve care & management in animal environments, increased empathy & protection for animals. Etc.
    1. *Ex) handling & stroking methods for shelter dogs*
    2. Psychology concerned for humans & sensitive to animals is ideal

A.2 - Humans

- Occasionally researchers **temporarily stress or deceive people** when they believe it is essential for justifiable end
    1. *Ex) studying mood swings*
    2. Experiments may not work if participants have knowledge (creates bias)
- **Ethics code** urges researchers to:
    1. Obtain participants' **informed consent** -> provide enough info to allow them to decide whether they wish to participate
    2. **Protect** participants from harm/discomfort
    3. Keep information about individuals **confidential**
    4. **Fully debrief** afterwards -> post experimental explanation of study that includes its purpose & any deceptions