PSYC1111 Summary

Week 1: Introduction & Sources of Knowledge

Science:

Way of **learning** about **reality through systematic observation** & **experimentation**

Assumptions of Science:

- **Determinism:** Doctrine that the **universe** = **orderly** – **all events** have **meaningful**, **systematic causes**
- **Empiricism:** All **knowledge** = **derived** through **objective observations** of **organisms & events** in the **real world**
- **Parsimony: Best explanation** of **phenomenon** is made w/ the **fewest possible assumptions**
- **Testability: Scientific theories** should be **testable using** currently **available research techniques**

Sources of Knowledge:

- **Intuition:** Knowledge gained **w/out** being **consciously aware** of its **source**
- **Authority:** Knowledge gained from **individuals viewed as authority figures**
- **Logic/Rationalism:** Knowledge gained through **logical reasoning**
- **Observation:** Knowledge gained through **objective observations** of **organisms** & **events** in the **real world**
- **Tenacity:** Knowledge gained by **stubbornly clinging** to **repeated ideas**, despite **evidence to the contrary**
- **Superstition:** Knowledge gained through **subjective feelings**, interpreting **random events as nonrandom events**, or believing in **magical events**

Week 1: The Scientific Process

1. **Theory** – **general relationship btw variables**, tries to **characterise** the **cause-&-effect relationship** that exists btw the variables
   Supported by the tests of hypotheses it generates
2. **Hypothesis** - a **specific testable prediction** about **relationship** btw **variables**
   A specific instance of a theory
3. **Test** – **experiment** used to **test hypothesis**
4. **Analyse/Conclude** – experiment → **data generated** – needs to be **analysed/interpreted**. Allows **conclusion** of whether to **retain** or **reject** the **hypothesis**
5. **Update/Refine** – **Reject** hypothesis = **update theory** & **change hypothesis**
   Retain = continue to **generate additional hypotheses** from the theory to **test**

Types of Hypotheses:

- **General Hypothesis:** Poorly specified; states a general relationship should exist btw 2+ variables
- **Directional Hypothesis:** States a relationship should exist btw variables, w/ expected direction of the relationship btw variables

- **Measurable Hypothesis:** States a relationship should exist btw variables, the expected direction of the relationship btw variables & how this might be measured

Operationalising Variables:
- Important to have a **testable** hypothesis
  - To clearly define how an experiment would run: must operationalise IV & DV
- **Operationalism – specifying how you have defined a variable, and how it can be quantified**

Judgmental Biases:
- **Illusory Correlation:** false perception that 2 things are related when they aren't
- **Availability Heuristic**
- **Attribution of Cause** (e.g. orange person = more angry)

Research Methods:
- **Descriptive**
  - A good starting place for a new research question
- **Correlational**
  - How two variables of interest relate to one another
- **Experimental**
  - Experimental testing of hypotheses

Statistical Methods:
1) Descriptive Statistics: provide a concise summary of data
2) Inferential Statistics: use a random sample of data taken from a population to describe and make inferences about the population

Week 2: Pseudoscience

Science vs. Pseudoscience
- Main difference = **science** usually **modifies** or **abandons failed hypotheses/theories** when **flaws** or **new evidence** = **identified**
  - The scientific process
- **Pseudoscience** usually contains:
  - 1. **Unfalsifiable hypotheses/theories**
    - Or ignoring negative evidence
  - 2. **Vague/unclear/poorly defined concepts**
  - 3. **Un-parsimonious hypotheses/theories**
  - 4. Using **testimonials**
    - Need **systematic** observations
  - 5. **Biased sampling/groups allocation**
  - 6. **Placebo Effects/Experimenter bias**
    - Need **double-blind control studies**

Week 3: Probability

Probability:
Likelihood of an event **occurring**

- **Objective Probability:**
  Probability that an **event** will **occur based on analysis** of **recorded observations**
  - **Frequentist**: event's probability = the **limit of its relative frequency** in a large number of trials
    - E.g. probability of landing on heads = proportion of heads we get if we toss a coin many times
  - **Propensity**: event's probability = **tendency** of situation to yield a certain outcome
    - E.g. probability of landing on heads = the tendency of a coin to land on heads

- **Subjective Probability:**
  Probability of landing on heads tells us how strongly we "**believe**"

Independence:
Assumes that **each event** and **experiment** is **independent**
- **Each coin flip cannot affect the next coin flip**

Multiplicative Law:
Multiplying 2 numbers below 1 (i.e. 30% & 50% chance of 2 events happening) = you get a **smaller number/probability**
- **Chances** of **both events occurring** = **lower**

Additive Law:
When **2 events**, A and B, are **mutually exclusive** (cannot occur at the same time), the **probability** that **A or B will occur** is the **sum of the probability of each event:**

P(A or B) = P(A) + P(B)

When **2 events**, A and B, are **non-mutually exclusive**, the **probability** that **A or B will occur** is:

P(A or B) = P(A) + P(B) - P(A and B)

Gambler's Fallacy:
A **high frequency** of **1 outcome** will make it **less likely to occur in** the **future**

Hot-Hand Fallacy:
Belief that person who has **experienced success** with a **random event** = **greater chance of further success** in **additional attempts**

Regression to the Mean:
Long run average performance of something will vary over time; more likely to **stay closer to the mean** than further away

Conjunction Fallacy:
Assumption that **specific conditions** are **more probable** than a **single general one**
- E.g. Linda is a bank teller vs. Linda is a bank teller & a feminist

Law of Large Numbers:
Larger the **sample = more representative of** the **population** it was drawn from

Law of Small Numbers:
Smaller sample = the **more extreme events/probabilities**

Base Rate:
Base rate neglect = **tendency** for **people** to mistakenly **judge** the **likelihood** of a situation by **not taking into account all relevant data**

- Likelihood of something occurring anyway independent of another factor
- E.g. John (appears Satanic, but is more likely to be a Christian because a large majority of people are Christian)

2x2 Contingency Table:
Best way to predict probability is to put it into a 2 x 2 contingency table:

	Disease	No Disease	Total
"Crazy eye" present	80	20	100
"Crazy eye" absent	40	10	50

- Helps solve conditional probability

Conditional Probability:
The **probability** of an **event** (*A*), given that **another** (*B*) **has already occurred**

Hits, Misses, False Alarms, Correct Rejections:

		B	Not B
Prediction	A	Hit/Success	False Alarm
	Not A	Miss	Correct Rejection

Verification Bias:
Systematically **looking** for **information** to **support** the **hypothesis,** rather than **trying** to **falsify** it

Week 4: Reliability & Validity
Measurement and Error:
- All measurements = the **true value** of what is being measured + **measurement error**
  - **Measured Score = True Score + Error**
  - **X = T + e**

Researchers aim = **minimise errors** by…

- **More is better**
  - More **participants** – average across participants
  - More **measurements**
  - Many **occasions** – tested many times

Reliability:
The **consistency/repeatability** of **results** from a **measurement**