

PSYCH 101

INSTRUCTOR: Dr. Luke Clark

Key Figures of Psychology

- ↳ Plato, Aristotle's teacher
- ↳ Plato = Nativism "InNATE" (Nature)
- ↳ Aristotle = Philosophical Empiricism (Nurture)
- ↳ Galton - Nature vs. Nurture
- ↳ Rene Descartes = **Dualism**: *physical body is a container for the non-physical mind*
 - Linked via pineal gland - could tilt and the animal spirit flows through it
 - Only structure that he could find in the brain that is singular
 - Rejected "dualism" and embraces Gilbert Ryle's "scientific materialism"
- ↳ Franz Josef Gall = **Localization of Function**
 - **Phrenology** - *Discredited but believed that bumps on your head suggested your character traits and mental abilities*
 - Pierre Flourens = *create small areas of damage (brain lesions) and looking at effect on behaviour*
 - Damage cerebellum - affects motor coordination
 - Assigned by the government to see if Gall's theory is true
- ↳ Karl Lashley = Principle of Mass Action
 - didn't matter where the lesion was, mattered how big it was
- ↳ Paul Broca = Concluded left frontal lobe is key in speech generation
 - Break through with his patient, Mr. Leborgne "Tan"
 - Discovered speech production can be impaired yet have speech comprehension be intact
- ↳ William Wundt = first psych lab, **structuralism** (*focus on consciousness and the components of our conscious experiences*)
 - Wundt's teacher, Helmholtz studied human's reaction time through nerve impulse in a time when people thought our reactions were instant (which it is not)
 - Pin pricks on different parts of the body
 - Estimated speed of neural transmission 27 m/s
 - **Introspection** - *the subjective observation of one's own experience*
 - Designed an experiment that of sound and response - results; faster participants could respond automatically to the tone because they didn't have to engage in the additional step of interpretation
 - Paved the way for other psychologists that mental processes can be experimented
- ↳ Titchener = studied with Wundt and founded first US psych lab
 - Titchener focused on identifying the basic elements of consciousness
 - Studied how people process sensory stimuli

- Structuralism and introspection became unreliable and subjective because of our inability to accurately report to a stimuli
- ↳ William James = first textbook in psych, very inspired by Darwin and his theories such as adaptive radiation
 - believed that trying to isolate and analyze a particular moment of consciousness distorted the essential nature of consciousness
 - “more like a flowing stream than a bundle of individual components”
 - Founded **Functionalism** - *studied the use or function of our mental processes (“why” questions)*
- ↳ Margaret Floy Washburn = a student of Edward Titchener, became the first woman to receive a PhD degree in psychology.

The Development of Clinical Psychology

- ↳ Jean-Martin Charcot and Pierre Janet interviewed a patient with **hysteria** - *a temporary loss of cognitive or motor functions, usually as a result of emotionally upsetting experiences*
 - Realized that our minds can create several conscious without the knowledge of each other existing

Freud’s Psychoanalytic Theory

- ↳ Freud began to observe hysteric patients and theorized that many of the patients’ problems could be traced to the effects of painful childhood that they don’t remember
- ↳ Suggested that the powerful influence of these lost memories revealed the presence of an unconscious mind
- ↳ **Unconscious** - *part of the mind that operates outside of conscious awareness but influences conscious thoughts, feelings, and actions*
- ↳ **Psychoanalytic Theory** - *bringing unconscious material into conscious awareness to better understand psychological disorders*
 - Being controversial because it required the understanding of a person’s thoughts, feelings, and behaviour thorough exploration of the person’s early sexual experiences and unconscious sexual desires
 - influence diminished because his vision of human nature emphasized limitations and problems rather than possibilities and potentials

Humanistic Psychology

- ↳ Pioneered by Abraham Maslow and Carl Rogers
- ↳ **Humanistic Psychology** - *an approach to understanding human nature that emphasizes the positive potential of human beings.*
- ↳ free agents who have an inherent need to develop, grow, and attain their full potential

Schools of Thoughts

- ↳ **Behaviorism** (James Watson) = theory of learning based on the idea that all behaviors are acquired through conditioning, nurture
 - behaviour can be observed by anyone and it can be measured objectively
 - Believed it would stop endless philosophical debates and foster practical applications
 - Watson believed the goal of scientific psychology should be to predict and to control behaviour in ways that benefit society.
- ↳ **Edward Thorndike = *The Law of Effect***
 - Responses that produce satisfying effects - “stamped in”
 - Responses that produce dissatisfying effects - “stamped out”
- ↳ **Ivan Pavlov = Digestion and Salivation Dog Experiment**
 - The lab tech’s appearance is a conditioned stimulus that triggers the response (lab tech = food is coming = drool) (sensory-response S-R)
 - Watson follows same experiment with an infant and rat/loud noise
- ↳ **BF Skinner = founded *operant conditioning*** based upon reinforcement, behaviourist
 - ***Principle of Reinforcement*** - *the consequences of a behaviour determine whether it will be more or less likely to occur again.*
 - Wrote a controversial book that our subjective sense of free will is an illusion and we think we are exercising free will, we are actually responding to present and past patterns of reinforcement

Behaviourism: some problems

- ↳ Ignored some very important phenomena, such as how children learn language
- ↳ Ignored evolutionary history
 - **Neisser**: not a lot of psychological elements are explored (emotion etc.)
 - **Chomsky**: reinforcement does not produce language ability because language is acquired way too fast and children uses words they have never heard before
 - **Garcia**: Can’t train a rat to associate many things such as “a light, made a rat sick”

The Cognitive Revolution

- ↳ **Max Wertheimer** focused on **illusions** - *errors of perception, memory, or judgement in which subjective experience differs from objective reality*
- ↳ Wertheimer’s interpretation of the illusion led to the development of **Gestalt Psychology** - *a psychological approach that emphasizes that we often perceive the whole rather than the sum of the parts*
 - **Perception-based Theory**
 - an active process
- ↳ **Sir Frederic Bartlett** - found that research participants often remembered what *should* have happened or what they expected to happen rather than what *actually did* happen

- suggest that memory is not a photographic reproduction of the past and that we recall the past which is powerfully influenced by our knowledge, beliefs, hopes, aspirations, and desires
- ↳ Kurt Lewin - argued that a person's behaviour in the world could be predicted best by understanding the person's subjective experience of the world
 - Lewin used a special kind of mathematics called topology to model the person's subjective experience
- ↳ Donald Broadbent = discovered attention has limited capacity when studying attention of pilots after WWII
- ↳ George Miller = found consistency in capacity limits in memory
 - Believed we could only hold 7 pieces of info in our memory
- ↳ Noah Chomsky - provided a clever, detailed, and thoroughly cognitive account of language that could explain many of the phenomena that the behaviourist account could not
- ↳ Herbert Simon =

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Technology impact on the Cognitive Revolution

- ↳ Emergence of the computer led to a reemergence of interest in mental processes
- ↳ **Cognitive Psychology** - *the scientific study of mental processes, including perception, thought, memory, and reasoning.*
- ↳ Brain scanning is an invaluable tool because it allows us to observe the brain in action and to see which parts are involved in which operations
- ↳ Lead to **Cognitive Neuroscience** - *field of study that attempts to understand the links between cognitive processes and brain activity*

Cognitive Neuroscience (Brain meets the Mind)

- Karl Lashley - studied rats in mazes and explored how they would behave after having parts of their brain removed in order to find their learning centre
 - Results indicated more removed parts = more poor performance
 - Started an area called **Physiological Psychology/Behavioural Neuroscience** - *an approach to psychology that links psychological processes to activities in the nervous system and to*
 - Observe the animals' response as the task is being done
 - Record electrical or chemical responses in the brain
 - Later remove specific parts of the brain to see how performance is affected
- Donald Hebb - Founded one of the most important cellular mechanisms of learning and memory
- Wilder Penfield - Founded the Montreal Neurological Institute in the 1920s, and pioneered the surgical removal of brain tissue to relieve seizure disorders
 - Discovered how different parts of the brain support different mental functions and behaviours
- Brenda Milner - best known for the discovery of the brain basis of long-term memory

Evolutionary Psychology

- John Garcia - studied rats and found it was not only the rat's learning history but also the rat's ancestors' learning histories that determined the rat's ability to learn
- **Evolutionary Psychology** - *explains mind and behaviour in terms of the adaptive value of abilities that are preserved over time by natural selection*
 - Roots in Charles Darwin's theory of natural selection
 - The mind as a collection of specialized "modules" that solve the human problems our ancestors faced

Social and Cultural Perspectives

- **Social Psychology** - *dedicated to understanding the brain as a social organ, the mind as a social adaptation, and the individual as a social creature*
- Shaped by many events such as the Holocaust which brought the problems of conformity and obedience into sharp focus
 - to examine the conditions under which people can influence each other to think and act in inhuman or irrational ways
- The civil rights movement
 - Gordon Allport studied stereotyping, prejudice, and racism and suggested prejudice was the result of a perceptual error that was as natural and unavoidable as an optical illusion

Cultural Psychology

- **Cultural Psychology** - *the study of how cultures reflect and shape the psychological processes of their members*
- Study visual perception to social interaction and seek to understand which of these phenomena are universal and which vary from place to place and time to time
- Absolutism - that culture makes little or no difference for most psychological phenomena (same everywhere)
- Relativism - that psychological phenomena are likely to vary considerably across cultures

Scientific Method in Psychology

Difference between a theory and hypothesis

- ↳ Theory is a broad attempt to explain a natural phenomenon
- ↳ Hypothesis is more specific (falsifiable) and can be measurable with a direction of change
- ↳ Rule of Parsimony: simplest theory that explains all the evidence best

Challenges to Scientific Method in Psychology

1. Humans are complex
2. Humans are variable
3. Humans respond to being examined

Measures in Psychology

- ↳ Measurements requires defining property to be measured and finding a way to detect it
- ↳ Operationalize the hypothesis: create a way to test and measure your prediction

Principles of “Psychometrics”

- ↳ Validity: measurement and property are conceptually related
- ↳ Reliability: tendency for your measure to produce the same measurement consistently
- ↳ Power: sensitivity of your measure, differences in your interest

Types of Research

1. Naturalistic observation (Field study)
2. Case Study
3. Correlational Study (Reverse causality)

Key elements of an experiment

- ↳ Sampling
 - Random assignment
 - Controlling for important subject variables
 - Convenience samples: students W.E.I.R.D (Western, educated, industrialized, rich, democratic)
- ↳ Manipulation

Operations and Bias

- ↳ Hawthorne effect: performance changes under observation
- ↳ Demand characteristics: participants guess the hypothesis and behave as they think they should (e.x. Social desirability)
- ↳ Observer (experimenter) bias: bias on the part of the experimenter themselves

Statistics and Psychology

- ↳ Descriptive statistics: use of stats to summarize and examine the sampled data
- ↳ Inferential statistics: how the statistical differences is reliable enough to be meaningful rather than chance?
- ↳ When frequency distribution is normal, the mean, median and the mode are all the same
- ↳ Skewed Distribution: when positively or negatively skewed, three measure of central tendency are different

- ↳ Correlation Coefficient: range is -1 to +1

14/01/19

Ethical Principles in Psych

- ↳ The Nuremberg Code
 - The benefits must outweigh the risks
 - Didn't pay attention to some ethical problems
 - Ex. Deception
- ↳ The Belmont Principles
 - Respect, Beneficence (welfare), Justice

Research Board Ethics

- ↳ Rights as a participant
 - Informed consent
 - Compensation
 - Confidentiality
 - Deception
- ↳ Three R's of Animal Research
 - Reduction - reduce amount of animal used for the experiment
 - Refinement - improve care, reduce pain and discomfort
 - Replacement - replace animals with possible alternatives

Thinking Critically of Evidence

- ↳ Confirmation Bias - humans are bias towards beliefs that coincide with their existing beliefs, ignore or disregard contradicting ideas

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Brain Neurons

The Resting Potential (Resting potential charge):

1. In the axon , approx -70mV
2. Imbalance Na^+ outside the cell vs K^+ inside the cell
 - Neuron is polarized
3. Movement of ions via selective membrane channels (the walls)
 - Travelling down the walls/channels
 - Specialized ion channels only let certain ions pass

Electrical Transmission

- ↳ Depolarization > Repolarization > Hyperpolarization > Return to resting potential
- ↳ "All or none" principles
- ↳ "Refractory Period" - cannot fire in this period, from *peak* to *restabilization*
- ↳ The number of action potential is how "strong" the stimulus is

The Nervous System: Brain Synapses

- Hoggin & Huxley (1939)
 - Discovered by the finding the difference in the axon of a the giant squid
- Loewi (1921)
 - Stimulates the vegas of the heart to slow it down and sucks up the nutrient solution and squirts into the other petri dish > result the other heart slows down
- Ways to degrade
 - Enzymes can degrade/eat
 - Reuptake/reuse
 - Receptors in the presynaptic membrane hinder (autoreceptors),
- EPSP and IPSPs vary in sizes and shape unlike the action potential
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The Language Areas

Carl Wernicke - similar to Broca's patient "tan" but his patient has intact, grammatically correct but lacks meaning and focus

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Nervous System: Brain Imaging

Structural Brain Imaging

- **CT** - take slices of the brain and them compile them together for a full scan
- **MRI** - uses a magnetic field to detect energy of H atoms to create a picture
- **PET** - relies on radioactivity (Ex. 150-water or glucose), releases photons at 90 degrees angles which are decaying (very expensive)
- **Function MRI** - oxygenated and deoxygenated hemoglobin blood have different magnetic properties - where in the brain the oxygen is going in your blood
- **EEG** - measuring brain waves through the skull coming from the brain
- **TMS** - applying strong magnetic pulse over scalp induced electrical activity in nerves

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Psychophysics

Environment to brain

- **Sensation** - stimulation of sense organ
- **Transduction** - mechanism for sensation (Physical to neural signals)
- **Perception** - organizing and interpreting inputs
- **Sensory input** is biased to our knowledge or interpretation which influence what we see
- **Properties of light waves:** wavelength, amplitude, purity
- **Properties of light waves:** frequency, amplitude, complexity
- **Absolute threshold:** Minimal intensity needed to just barely detect a stimulus

- **Just Noticeable Difference (JND):** How much of a change can you notice
 - Not constant, changes depending on how much background noise there is

Signal and Noise

- False alarm - divided into four categories known as Signal Detection Theory
 - 2 equations to distinguish percentual sensitivity and response bias (their tendency to say YES)
 - Response bias: negative (likely to say NO), positive (likely to say YES)

Optical

- Muscles stretch to allow light into the eye
- Cones: colors and peripheral
- Rods: low light, **acuity** (detail), sensitivity
- Bipolar cells: photoreceptors
- Retinal Ganglion Cell: photoreceptors, leaving the eye

Colour Vision

- **Trichromatic Theory:** balance across the 3 types that gives the system the sensisity (pattern coding)
- **Color Opponent Theory:** some colors work against each other

Visual Fields

- Nasal fields cross however the outside surface stays

Visual Perception of Objects

- The brain imposes order on incoming sensations: **the Gestalt Laws** of perceptual organisation
- **Overt vs. Covert Attention** -
 - Overt - where you are looking/foveating
 - Covert - foveating on something but moving your spotlight beam independently somewhere else

Forms of Learning

- **Habituation:** “bored”
- **Sensitization:** “amplified”

Classical vs. Operant

- **Classical:** Passive form of learning in that you don't have to do much work, pairing stimulus with an outcome
- **Operant:** learning a new behaviour, associating a behavioural response with a good or a bad outcome

Brain Mechanism of Reinforcement

- Dopamine is involved in prediction & information rather than 'pleasure'
- Dopamine is also involved in operant conditioning for reinforcements

Observant Learning

- Learning associated with observing others
- Susan Mineka:
 - Monkey are exposed to snakes and flowers for the first time
 - Result - after video of their parents being fearful, monkeys showed increase in their disturbance behaviour
- Ex. Bandura's Bobo Doll experiment
- Giacomo Rizzolatti (1937-) Discovered neurons in monkey that fire to performing an action, and watching others perform same action
"Monkey see, monkey do"

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Language and Thought 3: Problem Solving

Tower of Hanoi

- Problem space: is given, definite (vs. chess)
- Sub-goal: ex. move the green block/ring

What is a decision?

- Different options have trade-offs
- Options vary in terms of:
 - Size of gain/loss
 - Probability of gain/loss
 - Delay to receiving that gain/loss

Expected Value

- $EV = \text{probability} \times \text{value}$
- Evaluates which options is better based on empirical values

Expected Utility

- A common currency: the brain converts experiences into possible outcomes which receive either a positive or negative "utils" (+1, -2)
- Personal values, different likelihoods
- Multiply utils by expected utility (probability of how often it is likely to happen)

The Algorithm for Decision-making

- Expected utility are personal so, they are subjective
- Home economicus describe the theory, Rational Choice Theory
 - Concerned with humans as beings who are fundamentally driven to acquire wealth (they have the resources to do so)

Violations of Expected Utility

- The Tropical Flu Problem
 - Choosing between two treatment programs available

Prospect Theory

- Value function: converts the objective value on the horizontal into subjective utilities on the vertical axis
- Key thing: not a straight line
- Function explains the behaviour for the Tropical Flu Problem