Psychology Textbook Notes

Prologue

- Psychology is the science that determines how and why we think feel and act the way we do. It is the science of behaviour and mental processes.
- Wilhelm Wundt established the first psychology laboratory.
- Edward Bradford Titchener used introspection to search for the mind's structural elements.
- James assumed that thinking, like smelling, developed because it wad adaptive- it contributed to our ancestors' survival.
- Calkins obtained a PH. D in psych, but was denied her degree because she was a woman.
- Margaret Washbum was the first female to obtain a psychology Ph.D.
- Behaviourism is the view that psychology should be an objective science that studies behaviour with reference to mental processes.
- Humanistic psychology emphasizes the growth of healthy people and the individual's potential for personal growth.
- Skinner defined psychology as the scientific study of observable behaviour.
- Freudian psychology emphasizes the ways our unconscious thought processes and our emotional responses to childhood experiences affect our behaviour.
- The first humanistic psychologists were Carl Rogers and Abraham Maslow, and they found Freudian psychology limiting.
- Rene Descartes is responsible for dualism which is the idea that the mind and body are separate entities that interact.
- Plato is responsible for nativism which is the idea that certain kinds of knowledge are inborn or innate.
- Aristotle is responsible for philosophical empiricism which is the idea that all knowledge is acquired through experience.
- Pavlov discovered conditioned reflexes.
- Watson extends approach to human behaviour
- The cognitive revolution was the rebellion of a second group of psychologists during the 1960s.
- Cognitive psychology scientifically explores the way we perceive, process, and remember information.
- Cognitive neuroscience helps us to understand brain activity.
- The nature nurture issue is the principle that among the range of inherited trait variations, those contributing to reproduction and survival will most likely be passed on to succeeding generations.
- Darwin proposed the idea of natural selection, which is the idea that nature selects the best traits suitable for survival and reproduction and passes them on to future generations.
- Basic research builds pyschology's knowledge base through research and training.
- Applied research tackles practical problems in industrial or organizational settings.
- Psychology uses three main levels of analysis to interpret behaviour. These levels for an biopsychosocial approach which considers the influences of biological (natural selection, genetic predispositions, brain mechanisms, hormonal influences), psychological (learned fears, emotional responses, cognitive processing) and social-cultural factors (presence of other, cultural or family expectations, peer influences).
- Counseling psychologist help people to cope with challenges and crises and to improve their personal and social functioning.
- Clinical psychologists asses and treat mental, emotional and behaviour disorders.
- Psychiatrists are medical doctors that prescribe drugs and treat psychological disorders.

Chapter 1: Thinking Critically with Psychological Science

- Hindsight bias is the tendency to believe after learning an outcome, that one would have forseen it. (I knew that all along)

- ❖ Hindsight bias, overconfidence and our tendency to perceive patterns in random event often lead us to overestimate our intuition.
- ❖ Empirical evidence is evidence gained and verified through objective observation, measurement and experimentation.
- ❖ Critical thinking examine assumption, discerns hidden values, evaluates evidence and assesses conclusions.
  - → They consider the credibility of sources
- ❖ A theory explains with principles that organize observations and predict behaviours or events.
  - → A theory is useful if it organizes a range of self reports and observations and implies predictions that anyone can use to check the theory
- ❖ Psychologists use description to help draw conclusions through case studies, naturalistic observation, and survey.
  - o A case study examines one individual or social unit in depth in the hope that the findings can be generalized. They show what *can* happen.
  - o A survey asks people to respond in depth to a series of question or to report on their behaviour.
  - o Wording of the question can have an influence on how people answer.
  - o Random sampling is used to get an unbiased opinion.
  - o Naturalistic observation is the observation and recording behaviour as it occurs in its natural setting without controlling all the factors that may influence behaviour. (ie. Videotaping parent-child interactions)
- ❖ Correlation shows how factors are related.
  - o The correlation coefficient helps us to figure out how closely two things vary together and how well one predicts the other.
  - o The correlation coefficient is the statistical measure of the relationship between two variables. The correlation ranges from +1 to -1.
  - o Positive correlations indicate that two factors increase or decrease together.
  - o Negative correlations indicate that as one factor increases the other decreases. Ex. Low self esteem, relates to more depression
  - o Correlation does not prove causation.
  - o It indicates the possibility of a cause-effect relationship but does not prove such
  - o In a correlational relationship, we simply say that A and B are correlated and we can not assign a directionality to the relationship.
- ❖ Researchers perform experiment to isolate the cause and effect.
- ❖ They do so by manipulating the factors of interest and holding constant other factors.
- ❖ It consists of an experimental group where people receive the treatment and a control group that does not receive the treatment.
- ❖ If the experiment in a double-blind procedure, neither the participants nor the research assistants who administer the drug and collect the data will know which group is receiving the treatment.
- ❖ The placebo effect is experimental result caused by only expectation. The patient is given an inert substance that they believe is real and their behaviour is monitored after the administration.
- ❖ An independent variable is a factor can vary alone in relation to other factors.
- ❖ Confounding variables can potentially influence the results of the experiment.
- ❖ The dependant variable depends on what takes place during the experiment

Statistics:

- ❖ Statistics is a branch of mathematics used by researchers to organize, summarize and interpret data.
- ❖ We use statistics both to describe data and as a basis for inferring information from data.
- ❖ Statistics are often presented in a graphic or visual form.
- ❖ Descriptive stastistics: mathematical methods used to organize and summarize or describe data.
  - o Frequency distribution: A summary of how often various scores occur in a sample of scores. Score values are arranged in order of magnitude, and the number of occurrences is recorded.

- Frequency polygons quickly show if the shape of a distribution is skewed or asymmetrical. In a skewed distribution, more scores occur on one side of the distribution than the other.
- Measure of Central Tendency: A single number that presents information about the centre of a frequency distribution. It is useful for putting information about a distribution into a more compact form, summarizing the distribution with a single score that is typical in some way.
- Variability is information about the spread of the scores in a distribution. These distributions have the same mean but different variability – the scores are spread out differently.
- A theoretical distribution that is symmetrical with the mean, median and mode all falling at the exact middle of the distribution. Sometimes called a "bell curve" or a standard normal curve/distribution.
- Descriptive statistics can tell us what might be leading to specific relationships. Experiments and inferential statistics allow us to determine cause and effect.
- Both descriptive and experimental techniques necessary for study of behaviour.

❖ Inferential statistics is mathematical methods used to draw conclusions about a population based on a sample of data.
- In psychology, inferential statistics are used to determine the likelihood of a study's outcome being due to chance or to real differences.
- The ability to make inferential statistics and the scope of the inferences depend on the population and sample of the subject under study.
- Information about a sample can be used to make inferences about the population.
- We infer things about a population based on a sample because we can't afford to measure the whole population.
- The larger the sample, the better our inferences will be—the more likely that our results will reflect a true difference in the population.
- We have a hypothesis and we're making a judgement about whether or not it's likely to be correct.
- Type I error: Erroneously concluding that study results are significant. →The data from a lie detector test indicate that a suspect is lying when he is actually telling the truth.
- Type II error: Failing to find a significant effect that does, in fact exist. → The data from a lie detector test indicate that a suspect is telling the truth when he is actually lying.
- Representative samples are better than biased samples.
- Less variable observations are more reliable than those that are more variable.
- More cases are better than fewer.
- The difference between observation is probably not due to chance variation between the samples.
- In cross sectional studies, different groups are studied at the same time.
- In longitudinal studies, the same group is studied over the same time.
- Cross sectional studies show the effects of time and environment on many different individuals.
- Longitudinal studies show these effects on the same people.
- In complex studies, we do both cross-sectional and longitudinal research at the same time.

❖ Research results are often messy interpretation not entirely clear, so we need to use statistical techniques to determine which of the differences are really significant.
❖ Informed consent must be given and participation must be voluntary.
❖ Participants may not be coerced into research participation.
❖ Deception can be employed only under certain conditions.
❖ Personal information about research participants must remain confidential.
❖ Information about the study must be provided to participants, who should also be debriefed.

Chapter 2: The Biology of the Mind

❖ Biological psychology is the scientific study of links between biological and psychological processes.
❖ Everything psychological is simultaneously biological

- The neuron is the smallest unit in the brain. It is composed of:
  - Cell body (soma): nucleus with chromosomes. It is fed by oxygen and sugars carried by blood.
  - Dendrites: receive information from other neurons
  - Axon: transmits information to other neurons, muscles and glands
  - Communication between neuron involves both chemical changes and changes in electrical potential
  - Start with electrical changes; axon fires electrical charge down to its terminal ends in response to signals from other neurons.
- The synapse is the junction between one neuron's axon and another dendrite's cell body
  - Neurotransmitter cross the synapse
  - Plays a fundamental role in the communication between neurons
  - There are between 100-500 trilliion synapses in humans
  - Neuron's axons end in terminal buttons-no physical connection with dendrite
  - Terminal buttons contain synaptic vesicles
  - Synaptic vesicles contain neurotransmitters
  - Neurotransmitters are chemicals that transmit information across the synaptic gap
  - Post synaptic neuron's dendrites contain receptor sites
  - Receptor sites fit certain neurotransmitters

What happens when neurotransmitter synapse?

- Reuptake – neurotransmitters are absorbed back into the presynaptic neuron
- Enzyme-deactivatation – neurotransmitters are broken down by enzymes in the synapse
- Autoreceptors- neurotransmitters bind to autoreceptor sites on the presynaptic neuron
- Neurotransmitter passively drift out of the synaptic gap
- The action potential is electrical charge gathered by dendrites and cell body. The electrical charge travels down the axon to the synapse and stimulates the release of neurotransmitters in to synapse. This occurs when electrical signal is at a certain level.
  - All or none – electrical impulse is the same size/intensity no matter how much stimulation the neuron receives
  - Neuron return to resting state after electrical charge is transmitted
  - The electrical charge reaches a threshold
  - K+ channels close and Na+ channels open
  - Na+ flows into the neuron and + charge inside the neuron increase
  - Intracellular fluid is positively charged
  - Adjacent Na+ channels open
  - The action potential travels down the axon membrane
  - K+ channels open and K+ moves out of the cell
  - Intracellular fluid becomes negative again and K+ channels close.
- The resting potential
  - High concentration of K+ inside the neuron
  - Lower concentration of K+ outside neuron, higher concentration of Na+
  - K+ channels in cell membrane open in resting state
  - K+ moves out of neuron, leaving a -70mv charge
- The Refractory period is the time following an action potential
  - Another action potential can't occur during the refractory period
  - After the action potential reaches +40mv, membrane channels return to original state
  - The neuron can now generate another action potential
- Myelin is the insulating layer of fatty material that is composed of glial cells that coats the outer layer of the axon.
  - Helps efficient transmission of signal to other cells
  - Allows electrical signals to move more quickly
  - If sheath is damaged, there is poor transmission (MS)

- The combination of all the incoming excitatory and inhibitory messages determines whether the neuron will fire and there can be hundreds of inputs at the same time.

How Neurotransmitters Influence Us

- Acetylcholine plays a role in memory and learning, is the best understood neurotransmitter. When it is released to our muscle cell receptors, our muscles contract. If Ach transmission is blocked, the muscles cannot contract and we are paralyzed.
- Dopamine influences movement, learning, attention and emotion
- Serotonin affects mood, hunger and sleep arousal.
- Norepinephrine helps control alertness and arousal
- Endorphins boost mood and lessens pain.
- Agonist molecules may be similar enough to a neurotransmitter to bind to its receptor and mimic its effects.
- Antagonists also bind to receptors but their effect is instead to block a neurotransmitter's functioning.
- Botulin is a poison that can cause paralysis by blocking Ach release.
- Curare is a poison that occupies and blocks Ach receptor sites on muscles causing paralysis.

The Nervous System

- The nervous system is composed of the peripheral nervous system and the central nervous system.
- There are different types of neurons that perform different functions.
  Sensory neurons send information.
  Interneurons provide internal communications
  Motor neurons send information down the brain towards the muscles.
- The central nervous system is composed of the brain, spinal cord and interneurons.
  - The brain's neurons cluster into work groups called neural networks.
  - Reflexes are our automatic response to stimuli.
  - To produce bodily pain or pleasure, the sensory information must reach the brain.
- The peripheral nervous system connects the nervous system to the body's organs and muscles.
- The peripheral nervous system is composed of the autonomic system and the somatic nervous system.
- The autonomic system is responsible for arousal and returning the body to its resting state. The goal is to maintain a relatively constant state.
  - Sympathetic and parasympathetic reactions
  - Controls our glands and the muscles of our internal organs.
  - There is not much conscious control, but some awareness in arousal.

The Endocrine System

- Glands in the endocrine system secrete hormones that can mimic neurotransmitters
- Endocrine is much slower than neural transmission
- When hormones act on the brain, they influence our interest in sex, food and aggression.
- Endocrine messages tend to outlast the effects of neural messages.
- The adrenal gland releases epinephrine and norepinephrine hormones when we are faced with danger, and the feeling of excitement might linger for a while.
- The most influential endocrine gland it the pituitary gland that releases growth hormones, oxytocin, and cortisol.

The Brain

- The brain stem supports life-sustaining bodily functions and is composed of the pons and the medulla.
  - The **pons** helps control and regulates sleep, respiration, swallowing, bladder function, hearing, equilibrium, taste, eye movement, facial expression, facial sensation and posture.
  - If the pons was damaged, you would stay alive but your daily life would be severely disrupted.
  - The **medulla** controls heartbeat and breathing; it is where most nervous fibres cross from one side to the other.
  - If the medulla was damaged you would have trouble with basic bodily functions.

- The **thalamus** is the sensory switch board of the brain. It receives information from all senses and routes to higher brain centres.
- The **hindbrain (reticular formation)** regulates sleep, wakefulness and levels or arousal. If it was damaged, you would remain in a permanent coma.
- The **cerebellum** enables nonverbal learning, coordinates voluntary movements. If you cerebellum was damages, it would be hard to walk or execute voluntary movements. It helps us judge time, modulate our emotion and discriminate sounds and textures.
- All hindbrain function work outside consciousness.

Basal Ganglia

- Directs intentional movement
- Receives input from the cerebral cortex
- Sends output to motor centres in the brainstem
- Striatum involves control of posture and movement
- "switching centre" just above the thalamus.

The Limbic System

- It is a neural system associated with emotions and drives.
- Composed of the hypothalamus, hippocampus and amygdala which are involved in motivation, emotion, learning and memory.
- Has the pituitary gland which receives hormones signals from the hypothalamus and sends hormone signals to other gland to control stress, digestive activities and reproductive activities.
- The hypothalamus is a neural structure that is located below the thalamus
  - Regulates body temperature
  - Help govern endocrine system
  - Houses rewards centres
  - Control maintenance functions such as eating and drinking.
- The hippocampus is a structure that creates new memories. It integrates memories into a network of knowledge and consolidates and stores memories.
- The amygdala is a structure located at each tip of each side of the hippocampus.
  - Plays a central role in emotional processes
  - Plays a significant roles in the formation of emotional memories
  - Attaches significance to evens associated with fear, punishment or reward.
- The cerebral cortex is responsible for the most complex aspects of perception, emotion, movement and thought.
  - It is composed of the motor cortex, sensory cortex and association areas.
  - Can perceive joy or pain but brain itself cannot feel surface pain
  - The brain is separated into two hemispheres that control opposite sides of the body, are connected by the corpus callosum and are functionally symmetrical in some respects and have special abilities.
- The sensory cortex is located at the front end of the parietal lobe.
  - Topographical representation of the body
  - Body represented upside down in the sensory cortex
  - Represents skin areas on the opposite side of the body
  - Larger areas of sensory cortex devoted to more sensitive body areas.
- Motor cortex is an area at the back of the frontal lobes that controls voluntary movements.
  - Topographical representation of the body
  - Body represented upside down in the motor cortex
  - Represents body parts on the opposite side of the body
  - Larger areas of motor cortex devoted to body areas requiring precise control
- Four major cerebral lobes:
  - → **Parietal:** information about touch
    - Major feed from sensory nerves partially involved in reactions to touch.

- Slower than spinal reflexes
- Einstein had a larger parietal lobe

→ **Occipital:** visual information
- Major feed from the optic nerves
- Disruptions can lead to visual hallucinations

→ **Temporal:** hearing, language
- Right side allows us to recognize faces

→ **Frontal** :planning, judgement, memory, reasoning, abstract, thinking, movement
- Damage to the frontal lobes: case of Phineas Gage
- He shot a gun through his cheek and the bullet damaged the frontal lobe.
- He was immediately able to sit up and speak
- His personality went from soft spoken to irritable and profane.
- He went from being a railroad worker to being a stage coach driver.
- Damage causes moral compass to disconnect from their behaviour.
- People with damaged frontal lobes will remember how to make a cake but will not be able to plan ahead to make a cake for a birthday party.
- Damage can also alter a person's personality

→ All association areas: they specialize, but are not as specific as lower brain areas.

❖ The brain's plasticity is its ability to modify itself after damage.
→ People's brains change as a result of experience.
→ Children's brains are much more plastic than adults
→ Can acquire language more readily
→ If language is disrupted in left hemisphere, right hemisphere may compensate.
→ Damage can include severed neurons, which usually do not regenerate.
→ Some neural tissue can reorganize in response to damage.
→ Constraint induced therapy aims to rewire brains and improve the dexterity of a brain damaged child
→ In many blind people, parts of the sensory cortex corresponding to the fingers expand because they are using Braille.
→ Deaf people develop enhanced vision to replace hearing areas.
→ Neurogenesis is the brains attempt to mend itself by producing new brain cells.

❖ Left side of the brain is controls grammar, language, math and logic. It also processes speech content.
❖ Right side of the brain controls the interpretation of art and music, perceptual tasks, face recognition, emotional expression, and spatial abilities (recognition and processing of shapes.
❖ The right side is good at making inferences, help us to modulate our speech and helps orchestrate our sense of self.
❖ When a person performs a perceptual task, acitivity takes places in the right hemisphere. When the person speaks or calculates, activity increases in the left hemisphere.
❖ If a sedative is injected in to the left hemisphere, the right arm become limp and the patient is unable to talk, but if the opposite is done the patient's left arm goes limp but the patient is still able to speak.
❖ Vogel and Bogen attempted to reduce epileptic seizure by severing the corpus callosum; a wide band of axon fibres that connect the two hemispheres and carries messages between them.
- The result was that the seizures disappeared.
- The patients with split brains remained to be normal.
- Researchers could quiz each hemisphere separately.
- They flashed HEART on a screen. HE was viewed on the left and ART was viewed on the right. When the patient was asked what they had seen, they reported ART. But when asked to point to the word, they used their left hand to point to HE.
- Both hemispheres can comprehend and follow an instruction to copy.

- Almost all right-handers are speech dominant in the left hemisphere
- About 70% of left handers are dominant for the left hemisphere.
- There are no consistent differences between motor skills between L and R.
- Left handers have increased abilities in math and music.

Neuroimaging Techniques

- Produce images of the soft tissue in the brain
- MRI scan (magnetic resonance imaging) is a technique that uses magnetic fields and radio waves to produce computer generated images of soft tissue. MRI scans show brain anatomy.
- PET scan (positron emission tomography) is a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task.
- fMRI is a technique for revealing blood flow and therefore brain activity by comparing successive MRI scans.

Chapter 6: Sensory and Perception

- Perception is not a little person in your head- we construct the world from a combination of sensory input and expectations. It is how we make sense of the data
- Sensation is the data that is coming in.
- Sensation is the detection of environmental stimuli, such as sounds, objects, and smells.
- Perception is the experience of detecting those environmental stimuli- it refers to how our brains organize and interpret sounds, objects, and smells.

Bottom- Up Processing

- Sensory receptors relay information to the brain and the brain interprets this information

Top – down Processing

- Previous experience and expectations affect the detection and analysis of information from the senses.
- Explains visual illusions.

Psychophysics

- Methods that measure the strength of a stimulus and the observer's sensitivity to the stimulus.
- Process that tells us what thresholds we have for detecting things with our physical senses.
- Tells us what our sense can physically detect
- How were affected by sensory inputs

Thresholds

- Absolute thresholds: ability to detect a stimulus 50% of the time
- Below the threshold is subliminal
- Relative thresholds: ability to detect a difference between two sensations 50% of the time
- Difference threshold: minimal change in a stimulus that can just barely be detected.
- We can detect very minor changes in intensity and frequency.
- Common example is testing for eye glasses, which one is better , this one or this one?
- Lots of times we can be affected by stimuli that we're not normally aware of.
- Can we detect sensations that are below the threshold? Yes. Can the subliminal stimulus affect behaviour and or cognition? Yes, but there is a difference between not sensing and not paying attention.
- Subliminal perception assumes we are influenced by sensations that we could not perceive, even if we were paying attention to them

Sensory Adaptation

- It is the diminishing sensitivity to an unchanging stimulus.
- Benefit – freedom to focus on informative changes without uninformative background stimulation.
- We perceive the world not as it actually is, but as it useful for us to perceive it.

Vision

- Transforms light energy into neural signals
- Represents objects in the environment in terms of shape, size, colour, location and movement.

- Light energy is composed of hue, wavelength and intensity
    - Hue – the colour experienced
    - Wavelength – distance from one peak to the others
    - Intensity- determined by the wave's amplitude.

The Eye

- Light entering the eye triggers the photochemical reaction in rods and cones at the back of the retina.
- Chemical reaction in turn activates bipolar cells.
- Rods are structures that detect black and white vision, but not colours.
    - Function in dim light
    - Necessary for peripheral and twilight vision.
- Comes are structures near the centre of the retina
    - Function in bright or day light
    - Detect fine detail
    - Enable colour perception
    - 3 types
- Astigmatism: odd shape to outer eye that affects clear vision of shapes
- Cataracts: clouding of lens, most often relating to age
- Floaters: bits of stuff in vitreous humour that float around in cause lines or spots

Visual Pathway

- Focusing vision
    - In people with normal vision, both nearby and farway objects focused on the retina at the back of the eye.
    - Accommodation: the lens changes shape to focus or far objects on the retina.
    - In nearsighted people, faraway objects are focused in front of the retina.
    - In farsighted people, nearby objects are focused beyond the retina.
- During a blink, we are effectively blind for 100-400 msec we fill in the existing scene with top processing.
- Changes in blinking slow down during reading, increase under arousal and stops almost entirely when we are sleeping.
- Why our eyes move even when we're focused on a single point: so the retinal cells don't fatigue.
- Our eyes are moving constantly when were moving.
- Axons of ganglion cells form the optic nerve
- Retina routes visual info over the optic chiasm to visual area in the thalamus
- Both sides feed same and opposite hemispheres.
- Objects in right visual field stimulate left half of retinas
- Objects in left visual field stimulate right half of retinas
- Left and right fields, not left and right eyes crossover.
- Parallel processing
    - The brain processes colour movement, form and depth simultaneously in different areas.
    - The brain integrates the separate, parallel dimensions of visual information interpreted in different areas.
- Feature Detection
    - Hubel and Wiesel discover feature detector cells in visual cortex
    - Feature detector cells pass info onto supercell areas in cortex
    - Supercell areas recognize biologically relevant objects and specialize in response to a specific stimulus
    - Can be very specific- but there is no one small area that recognizes just your neighbour's face.

Percieving Colour

- Additive colour mixing: seeing light
    - Adding primary colours of light creates other colours, such as yellow
    - Where all the colours overlap, the colour is white; this is the surface where all the colours are reflected.

- Subtractive colour mixing: seeing objects
    - Mixing varying amounts of three paint colours: red, blue, yellow to create other colours
    - This removes light from the mix
    - The darker the colours mixed together the closer to black the resulting colour.
    - Black surface reflect no light.
- Trichormatic Theory
    - The first scientific theory of colour vision
    - Proposed by Hermann von Helmholtz
    - Trichromatic theory explains red and green coloru blindness
    - Most common colour blindness is a colour deficiency in operation of red or green cones.
    - One or other cone does not operate perfectly
    - Red and green colourblind can still see yellow hues, even though they cant distinguish red green.
    - Three types of cones sensitive to different wavelengths
        - Red light – sensitive to long wavelengths
        - Green light – sensitive to medium wavelengths
        - Blue light – sensitive to short wavelengths
- Opponent- process theory
    - Developed from study of after images
    - Stare at green pattern, then see red
    - Stare at blue pattern, then see yellow
    - Stare at black pattern, then see white
    - Theory suggests opponent processes
- Complete theory of colour vision
    - Theory suggests both trichromatic and opponent processes at work in colour vision
    - Cones pick up R, G, B individually
    - Signaling channels can be turned on by green but off by red.
    - On by blue, but off by yellow
    - On by black but off by white.
    - Colour processing a two stage process

Influences on Visual Perception

Gestalt

- Form or whole in German
- People organize sensations into a meaningful whole
- Grouping: the tendency to organize stimuli into coherent groups

Form perception

- Part of seeing a whole is to view faces and other objects as distinct from their surroundings
- Reversible figure and ground illustrations show that the same stimulus can trigger more than one perception.

Depth Perception

- Judging distance: binocular cues
    - Depth cues that depend on the use of two eyes
    - Each eye has a slightly different view of the world
    - The brain computes the difference in the two retinal images to perceive distance of an object
    - Retinal disparity: used in 3D movies
- Monocular cues
    - Relative size, familiar size, relative height in image
    - Interposition
    - Linear perspective
    - Texture gradient
    - Motion parallax

- Allow us to perceive depth even when binocular cues are not available
- Shape constancy: an object appears to change shape with the angle of our view.
- Size constancy: we perceive objects to be the same even when they vary in their distance from us.

Perceptual Constancy
Perceptual Adaptation
Perceptual Set
Context Effects

Hearing

- Audition: the sense or act of hearing
- Complete or partial deafness
- Tinnitus: ringing in ears

Sound Waves

- Hearing is about sound waves and changes in air pressure that unfolds over time
- Sound waves are changes in air pressure unfolding over time
- Oscilloscope- an electronic laboratory instrument that traces a visible wave form
- Frequency: corresponds to our perception of pitch
- Amplitude: corresponds to our perception of loudness
- Complexity: corresponds to our perception of timbre

The Ear

- Outer ear- sound waves are collected
- Middle ear- sound waves are amplified
  - Tightly stretched membrane that vibrates when hit by sound waves
  - Three tiny bones (hammer, anvil, stirrup) that pick up eardrum vibrations, amplify them and pass them along to the cochlea in the inner ear.
- Inner ear – sound waves are transduced into coded neural messages
  - Converged nerve cell fibres; sends neural messages to the brain's thalamus and auditory cortex in the temporal lobe.
  - A coiled bony, fluid, filled tube through which sound waves are transduced into nerves impulses.
- Place theory: frequency of sound based on location on cochlea where neurons fire
- Frequency theory: monitors frequency of neural firing
- Volley theory: neurons alternate firing so we can hear above 1000 Hz.
- Ears on either side of the head gives us stereophonic hearing
- Timing method- noting direction of sound by which ear is stimulated first
- Volume method- noting direction of sound by which ear is stimulated most vigorously

Speech Processing

- Motor cortex- strong focus on control of mouth, tongue, jaw
- Understanding speech and accents relies on the flexibility of our speech perception

Body Senses, Taste and Smell

Touch

- Pressure, warmth, cold and pain
- Proprioception: information about body position
- Kinesthesis: position and movement of part of your body
- Vestibular sense: balance; sensing the orientation of your head/body in space
- Combinations can result in mixed sensations: cold+pressure = wetness

Pain

- Unpleasant sensory or emotional experience
- Warns us about actual or potential tissue damage- nature's way of telling us something's wrong.

- Nociceptors: pain receptors
- We cannot feel pain when nociceptors are active; playing through the pain
- We can feel pain if nothing noxious is happening; phantom limb pain.
- C fibres- transmit longer lasting, duller pain
- A –delta fibres – fast acting, transmit sharp pain
- Congential insensitivity to pain usually leads to early death
- Gate control theory: the spinal cord contain a neurological gate that blocks pain signals via larger fibres and allows pain signals to the brain through small nerve fibres.

Taste

- Sweet, sour, bitter, salty, umami (savoury)
- The human mouth carries about 5-10 thousand taste buds evenly distributed over the mouth and tongue.
- Each taste bud includes 50-100 taste receptor cells.
- Taste buds are important but food doesn't taste as good when we can't smell or see or feel what we're eating

Smell

- Airborne odor molecules are inhaled through the nose
- Olfactory receptor cells in the nasal cavity are stimulated
- Receptor cells stimulation converted to neural signals to olfactory bulb
- Only sense that has no specific type of receptors for specific smells.
- Olfactory neurons are the ONLY neurons that directly link the brain to the outside world. They connect to the temporal lobe part of the neural pathway involved in conscious recognition of smells.
- Direct link to structures in the limbic system that regulate emotional reactions to smells
- Difficult to name smells, but we can discriminate between many thousands.
- Most basic of the senses, most emotionally laden sense.

Synesthesia

- The perceptual experience of one sense is evoked by the sensation of another.
- ESP – extra sensory perception
- Telepathy – mind to mind communication
- Clairvoyance: perceiving remote events
- Precognition: ability to predict future events