Psychology Midterm 2 Review
Chapters 5-8

Chapter 5: Sensation and Perception

Synesthesia, which means quite literally "mixing of the senses".
Synesthetes may experience sounds as colours or tastes as touch sensations that have different shapes.
Women are more likely to be synesthetes than men.
Sensation Process: **Sensation** 1) Stimulus is received by sensory neurons 2) Receptors translate stimulus properties into nerve impulses (**transduction**) 3) Feature detectors analyze stimulus features 4) Stimulus features are reconstructed into neural representation 5) Neural representation is compared with previously stored information in brain 6) Matching process results in recognition and interpretation of stimuli. **Perception**
The binding problem: How do we bind all our perceptions into one complete whole while keeping its sensory elements separate?
People with synesthesia may create additional perceptions of that rose that are inconsistent with its physical properties.
Sensation is the stimulus-detection process by which our sense organs respond to and translate environmental stimuli into nerve impulses that are sent to the brain.
Perception - making "sense" of what our senses tell us- is the active process of organizing this stimulus input an giving it meaning.
Transduction is the process whereby the characteristics of a stimulus are converted into nerve impulses.
Decision Criterion, a standard of how certain they must be that a stimulus is present before they will say they detect it.
Sensation refers to the activities by which our sense organs receive and transmit information, whereas **perception** involves the brain's processing and interpretation of the information.
Psychophysics is the scientific study of how the physical properties of stimuli are related to sensory experiences. Sensory sensitivity is concerned in part with the limits of stimulus detectability (asolute threshold) and the ability to discriminate between stimuli (difference threshold).
The **absolute threshold** is the intensity at which a stimulus is detected 50 percent of the time.
Signal Detection Theory is concerned with factors that influence decisions about whether or not a stimulus is present.
Subliminal Stimuli, which are not consciously perceived, can influence perceptions and behaviour in subtle ways, but bot strongly enough to justify concerns about the subconscious control of behaviour through subliminal messages.
The Difference Threshold, or **just noticeable difference**, is the amount by which two stimuli must differ for them to be perceived as different 50 percent of the time.
Weber's law: the jnd is proportional to the intensity of the genreal stimulus and is constant within a given sense modality.
Sensory Systems are particularly responsive to changes in stimulation, and **adaptation** occurs in response to **unchanging** stimuli.

Vision:
Our vision, measured in nanometers, extends from 700 to 400 nanometers.
Light waves enter through the cornea. Behind the cornea is the pupil, an adjustable opening that can dilate or constrict to control the amount of light. Pupil's movements are controlled by the iris. Behind the pupil is the lens (thinner on far objects, thicker on near objects). The retina is a multi-layered tissue

at the rear of the eyeball.
Myopia: nearsightedness.
Hyperopia: farsightedness.
The retina contains specialized sensory neurons and is an extension of the brain.
The **retina** contains two types of light-sensitive receptor cells called rods and cones.
There are 120 million rods and 6 million cones in the human eye.
Rods are primarily black and white brightness receptors, and are about 500 times more sensitive to light than cones, however they do not give rise to colour sensations.
Cones, which are colour receptors, function best in bright illumination.
Rods and cones are fond throughout the eye except in the **fovea**, which contains only cones.
Bipolar cells have synaptic connections with the rods and cones. These cells then synapse with a layer of about one million **ganglion cells** whose axons are collected in into a bundle to form the **optic nerve**.
Visual acuity, or ability to see fine detail, is greatest when the visual image projects directly onto the fovea.
Rods and cones translate light waves into nerve impulses through the action of protein molecules called **photopigments**.
Dark Adaptation is the progressive improvement in brightness sensitivity that occurs over time under conditions of low illumination. (during which the photopigment molecules are regenerated and the receptor's sensitivity increases greatly.
Trichromatic Theory: there are three types of colour receptors in the retina.
Opponent-Process Theory: proposed that each of the three cone types responds to two different wavelengths. (the canadian flag image)
Dual Process theory combines the trichromatic and opponent-process theories to account for the colour transduction process.
Trichromats: people with normal vision. **Dichromats:** have a deficiency in one of the systems.
Monochromats: see only black and white (entirely colour blind).
From the retina, the optic nerve sends nerve impulses to a visual relay station in the thalamus, the brain's sensory switchboard. From there, the input is routed to various parts of the cortex, particularly the primary visual cortex in the occipital lobe at the rear of the brain. Some of these cells are called **feature detectors,** which subdivide a visual scene into its component dimensions and process them simultaneously (**parallel processing)**.
The information, analyzed and recombined by the primary visual cortex, is routed to other cortical regions known as the visual association cortex.

Audition:
Sound is actually pressure waves in air, water, or some other conducting medium.
Sound waves, the stimuli for audition, have two characteristics: frequency, measured in terms of cycles per second or **hertz** (humans can detect 20 to 20,000 hertz), and **amplitude** (the vertical size of the sound waves) , measured in terms of **decibels** (db,a measure pf the physical pressures that occur at the eardrum).
Frequency is related to pitch, amplitude is related to loudness.
Vibrating of these bones – the *hammer* (malleus), *anvil* (incus), and *stirrup* (stapes) – amplifies the sound wavs more than 30 times.
The receptors for hearing are hair cells (16,000 of them) in the organ of Corti at the inner ear
Loudness is coded in terms of the number and types of auditory nerve fibres that fire. Pitch is coded in two ways: **1) The Frequency Theory:** Low frequency tones are coded in terms of corresponding numbers of nerve impulses in individual receptors or by volleys of impulses from a number of receptors. **2) The Place Theory:** Frequencies above 4000 hertz are coded according to the region of the basilar membrane that is displaced most by the fluid wave in the cochlear canal.

Two ears play a crucial role in *sound localization.*
In Canada alone, almost 3 million people suffer from some form of hearing loss.
Conduction Deafness: caused by problems involving the mechanical system that transmits sound waves into the cochlea. (i.e. A punctured eardrum)
Nerve Deafness: caused by damaged receptors within the inner ear or damage to the auditory nerve itself, and it cannot be helped by a hearing aid. (i.e. Exposure to loud sounds).
Gustation (taste) and **olfaction** (smell) are chemical senses because their receptors are sensitive to chemical molecules rather than to some form of energy. These senses are so intertwined that some scientists refer to a *common chemical sense*.
Gustation: our sense of taste responds to only 4 qualities: sweet, sour, salty, and bitter.
Taste Buds are chemical receptors concentrated along the edges and back surface of the tongue.
Humans have 9,000 taste buds. Each taste bud is responsive to only 2 of the 4 qualities.
The receptors for smell are long cells that project through the lining of the upper part of the nasal cavity and into the mucous membrane.
Humans have 40 million olfactory receptors.
The receptors that fire send their input to the olfactory bulb, a forebrain structure immediately above the nasal cavity.
Pheromones: chemical signals found in natural body scents.
Humans are sensitive to at least 4 tactile sensations: pressure (touch), pain, warmth, and cold.
Our skin weighs between 2.7 and 4.5 kilograms, and is the largest organ in the body.
Primary receptors for pain and temperature are *free nerve endings*, simple nerve cells beneath the skin's surface that resemble the bare branches of a tree in winter.
Free nerve endings in the skin and internal organs respond to intense mechanical, thermal, or chemical stimulation and then send nerve impulses into the spinal cord, where sensory tracts carry pain information to the brain. Once in the brain, the sensory information is relayed by the thalamus to the somatosensory and frontal areas of the cerebral cortex.
Gate Control Theory: proposes that the experience of pain results from the opening and closing of gating mechanisms in the nervous system.
Glial cells are involved in the creation and maintenance of pathological pain.
The nervous system has built in analgesics (painkillers) with opiatelike properties. They are called "**endorphins"** which inhibit the release of neurotransmitters involved in the synaptic transmission of pain impulses from the spinal cord to the brain.
Kinesthesis: provides us with feedback about our muscles' and joints' positions and movements. The receptors are nerve endings in the muscles, tendons, and joints.
Vestibular Sense: the sense of body orientation or equilibrium, located in the *vestibular apparatus.*
Sensory Prosthetic Devices: provide sensory input that can substitute for what cannot be supplied by a person's sensory receptors.

Perception:
Perception involves both **bottom-up** processing, in which individual stimulus fragments are combined into a perception, and t**op-down** processing, in which existing knowledge and perceptual schemas are applied to interpret stimuli.
Inattentional Blindness refers to the failure of unattended stimuli to register in consciousness.
Attention is an active process in which we focus on certain stimuli while blocking out other stimuli.
We cannot attend completely to more than one thing at a time, but we are capable of rapid attentional shifts.
Attentional processes are affected by the nature of the stimulus and by personal factors such as motives and interests.
The perceptual system is especially vigilant to stimuli that denote threat or danger.

The **Gestalt** psychologists identified numerous principles of perceptual organization, including **figure-ground relations** (We tend to organize stimuli into a central or foreground figure and a background) and the 4 Gestalt laws: 1) **The law of similarity:** when parts of a configuration are perceived as similar, they will be perceived as belonging together, 2) **The law of Proximity:** elements that are near one another are likely to be perceived as part of the same configuration, 3) **The law of Closure:** people tend to close the open edges of a figure or fill in gaps in an incomplete figure, 4) **The law of Continuity:** people link individual elements together so that they can form a continuous line or pattern that makes sense.
Perceptual schema: a mental representation or image.
Perceptual sets involve a readiness to perceive stimuli in certain ways, based on our expectations, assumptions, motivations, and current emotional state (eg. The boat shooting down the plane).
Perceptual Constancies allow us to recognize familiar stimuli under changing conditions. There are **3** constancies in the visual realm: 1) **Shape Constancy** allows us to recognize people and other objects from many different angles, 2) **Brightness Constancy**, the relative brightness of objects remains the same under different conditions of illumination, 3) **Size Constancy** is the perception that the size of objects remains relatively constant even though images on our retina change in size with variations in distance.
Monocular cues to judge distance include l**inear perspective** (the perception that parallel lines converge or angle toward each other as they get farther away), **Interposition** (objects in front of us cut off part of our view of more distant objects), **Light and Shadow**, **Height in the Horizontal Plane**, **Texture**, **Clarity**, **Relative size**, and **motion parallax** (if we are moving, nearby objects appear to move faster in the opposite direction).
Binocular Disparity occurs as slightly different images are viewed by each eye and acted upon by feature detectors for depth. Convergence of the eyes provides a second binocular view.
The basis for **perception of movement** is absolute movement of a stimulus across the retina or relative movement of an object in relation to its background.
Stroboscopic Movement is illusory.
Illusions are erroneous/incorrect perceptual hypotheses and perceptions. Perceptual constancies help to produce a variety of context-produced illusions.
Our perceptions of tastes, odours, and textures are strongly influenced by our cultural experiences.
Some of our perceptual abilities are partially present at birth, but experience plays an important role in their normal development.

Chapter 6: States of Consciousness

State of Consciousness: a pattern of subjective experience, a way of experiencing internal and external events.
Altered State of Consciousness: variations from our normal waking state.
Consciousness: our moment-to-moment awareness of ourselves and our environment. Consciousness is: 1) **Subjective and Private**, 2) **Dynamic (ever-changing)**, 3) **Self-Reflective and Central to our sense of self.**
Consciousness is intimately connected to with the process of selective attention.
The most common measure of consciousness is **self-report**, however it is not always reliable.
Physiological measures (which are objective) establish the relationship between bodily states and mental processes.
The human mind has 3 levels of awareness: The **conscious** mind, **Preconscious** mental events which are outside current awareness but can be recalled under certain conditions, and **Unconscious** events which cannot be brought into conscious awareness under ordinary circumstances.

Freud suggested that **nonconscious** processes influence behaviour.
Controlled (effortful) processing: the voluntary use of attention and conscious effort.
Automatic Processing: can be performed with little or no conscious effort (however can reduce our chances of finding new ways to approach problems).
Divided Attention: the ability to perform more than one activity at the same time.
Emotional and motivational processes also operate unconsciously and influence behaviour.
The mind consists of **separate** but interacting information-processing modules.
Circadian rhythms are 24 hour biological cycles that help to regulate many bodily processes.
The **Suprachiasmatic Nuclei (SCN)** are the brain's master circadian clock. Environmental factors, such as the day-night cycle, help to reset our daily clocks to a 24 hour schedule.
SCN neurons link to the tiny pineal gland, which secretes **melatonin,** a hormone that has a relaxing effect on the body. SCN neurons become active during the day and decrease the amount of melatonin secretion, raising awareness.
Circadian Rhythms influence whether we are a "morning person" or a "night person".
Seasonal Affective Disorder (SAD) is a cyclic tendency to become psychologically depressed during certain months of the year.
Jet lag and Night Shiftwork also involve environmental disruptions of circadian rhythms (treated by sunlight, melatonin, and activities).

Sleep and Dreaming:
We show patterns of **beta waves** when we are awake, and **alpha waves** when we close our eyes and relax.
We cycle through different stages in our sleep every **90** minutes.
EEG measurements of brain activity indicate five main stages of sleep: Stages 1 and 2 are lighter sleep (**theta waves in stage 1 and sleep spindles in stage 2**) , stages 3 and 4 are deeper, **slow-wave** (**delta waves**) sleep. High physiological arousal (heart rate increases) and periods of rapid eye movements (REM) characterize the 5th stage, REM or "paradoxical" sleep.
Several brain regions, including the brain stem, regulate sleep.
Newborns typically sleep 16 hours per day, half of which is REM.
15-24 year olds sleep on average 8.5 hours a day, elderly people sleep roughly 6.
Sleep Deprivation negatively affects mood, mental performance, and physical performance.
The **Restoration Model** proposes that we sleep to recover from accumulated physical and mental fatigue.
Evolutionary/Circadian models state that species evolved unique waking-sleeping cycles that maximized their chances of survival.
Insomnia is the most common sleep disorder.
Sleepwalking and night terrors typically occur during slow-wave sleep, where as nightmares occur during REM sleep.
Dreams are most common in REM sleep. There are gender differences in dream content. Our cultural background, current concerns, and recent events influence what we dream about.
Freud proposed that dreams fulfill unconscious wishes that show up in disguised form within our dream.
Activation-Synthesis Theory regards dreaming as the brain's attempt to fit a story to random neural activity.
Cognitive-Process Theories emphasize that dreaming and waking thought are produced by the same mental systems.

Drugs:
Drugs enter the bloodstream and are carried throughout the brain by small blood vessels, called **capillaries**.
The blood brain barrier screens out many foreign substances, but some, including a variety of drugs, manage to pass through.
First, neurotransmitters are synthesized inside the presynaptic (sending) neuron and stored in vesicles.
Next, neurotransmitters are released into the synapse, where they bind with and stimulate receptor sites on the postsynaptic (receiving) neuron.
Finally, neurotransmitter molecules are deactivated by enzymes or reuptake. Psychoactive drugs act by influencing one or more of these steps in a synaptic transmission.
Drugs alter consciousness by modifying neurotransmitter activity. **Agonists** increase such activity, whereas **antagonists** decrease it.
Tolerance develops when the body produces compensatory responses to counteract a drug's effects.
Withdrawal occurs when drug use is stopped but such compensatory responses continue.
Substance Dependence represents a maladaptive pattern of substance use that causes a person significant distress or substantially impairs that person's life. It can occur with or without physiological dependence.
Depressants decrease neural activity. The subjective "high" and liveliness associated with alcohol depresses the activity of inhibitory brain centres.
Stimulants increase arousal and boost mood by enhancing dopamine and norepinephrine activity.
Opiates increase endorphin activity, producing pain relief and mood changes that may include euphoria. Opiates are important in medicine but are highly addictive.
Hallucinogens, such as LSD, powerfully distort sensory experience and an blur the line between reality and fantasy (the effects are always unpredictable).
THC, the main active ingredient in marijuana, produces relaxation and a sense of well-being at low doses but can cause anxiety and sensory distortion at high doses.
A drug's effect depends on its chemical actions, the physical and social setting, cultural norms, learning, and the user's genetic predispositions, expectations, and personality.

Hypnosis:
Anton Mesmer claimed that illness was caused by blockages of an invisible bodily fluid that obeyed the laws of magnetism and that his technique of animal magnetism (later named "**mesmerism**") would restore the fluid's normal flow.
Hypnosis involves an increased receptiveness to suggestion.
Hypnotic Susceptibility Scales measure people's responsiveness to hypnosis.
Hypnotized people subjectively experience their actions to be involuntary, but hypnosis has no unique power to make people behave "against their will". Hypnotized and unhypnotized people are equally likely to show striking physiological reactions and perform "amazing" feats.
Hypnosis increases pain tolerance.
Dissociation theories view hypnosis as an altered state of divided consciousness.
Hilgard proposes that one stream of consciousness responds to the hypnotist's suggestions, while another stream (the hidden observer) stays in the background and is fully aware of everything going on.
Social Cognitive Role Theories state that hypnotic experiences occur because people have strong beliefs and expectations about hypnosis and are highly motivated to enter a hypnotized "role".

Chapter 7: Learning and Adaptation

Learning is a process by which experience produces a relatively enduring change in an organism's behaviour or capabilities.
Basic Learning Processes:
Habituation and Sensitization involve a change in behaviour that results from repeated exposure to a single stimulus.
Classical Conditioning occurs when two stimuli become associated with each other and are involuntary (being bitten by a dog makes us fear dogs).
Operant Conditioning: we learn to associate our responses with specific consequences and are *voluntary* responses(Smiling at others is followed by a friendly greeting).
We can view **learning** as a process of personal adaptation to the ever-changing circumstances of our lives.
Behaviourists focus on *how* organisms learn.
Habituation is a decrease in the strength of response to a repeated stimulus. Habituation allows organisms to attend to other stimuli that are more important, and is a simple form of learning that occurs within the central nervous system.
Sensory Adaptation refers to a decreased sensory response to a continuously present stimulus (the sound of an air conditioner).
Sensitization is an increase in the strength of response to a repeated stimulus. Sensitization increases an organism's response to potentially dangerous stimuli and, like habituation, is found across many species.
Historically, behaviourists focused on the process by which organisms learn, and ethologists focused on the adaptive significance of learning. Nowadays these two perspectives have crossed paths.
Classical Conditioning involves pairing a neutral stimulus with an **unconditioned stimulus** (UCS) that elicits an **unconditioned response** (UCR). Through repeated pairing, the neutral stimulus becomes a **conditioned stimulus** (CS) that evokes a **conditioned response** (CR) similar to the original UCR.
Acquisition refers to the period during which a response is being learned, a period in which the stimulus is neutral.
Each pairing with the UCS is called a **learning trial.**
Classical conditioning is strongest when there are repeated CS-UCS pairings, the UCS is more intense, the sequence involves forward pairing (the CS is presented before the UCS), and the time interval is short.
The acquisition phase involves pairing the CS with the UCS.
Extinction, the disappearance of the CR, occurs when the CS is presented with repeatedly in the absence of the UCS.
Sometimes, **Spontaneous Recovery** occurs after a rest period and the CS temporarily will evoke a response even after extinction has taken place.
Stimulus Generalization occurs when a CR is evoked by a stimulus similar to the original CS. (rustling of bushes, even different, will allow animals to survive).
Discrimination occurs when a CR occurs to one stimulus but not to another. (A large dog my strike fear from a past experience, but a small dog may not).
Once a stimulus (eg. a tone) becomes a CS, it can now be used in place of the original UCS (food) to condition *other* neutral stimuli. This process is called **Higher Order Conditioning**.
A wide range of bodily and psychological responses can be classically conditioned, including fears, sexual attraction, and positive/negative attitudes. Classical Conditioning is used to treat phobias.
Operant Conditioning:
Thorndike's Law of Effect states that responses followed by satisfying consequences will be strengthened, whereas those followed by unsatisfying consequences will be weakened.

B.F. Skinner analyzed **operant conditioning** in terms of relations between antecedents, behaviours, and consequences.
Antecedents that signal the likely consequences of particular behaviours in a given situation are called **Discriminative Stimuli** (a light that shines while a rat presses a lever becomes a discriminative stimulus)**.**
Operant behaviours are emitted (under voluntary control), whereas **classically conditioned responses** are elicited (reflexive/voluntary). Classically conditioned responses are influenced by what happens before the behaviour, where as operant behaviours are influenced by consequences that occur after the behaviour.
Reinforcement occurs when a response is strengthened by an outcome (a reinforcer) that follows it.
With **Positive Reinforcement**, a response is followed by the presentation of a positive stimulus, so the response becomes *stronger*.
With **Negative Reinforcement**, a response is followed by the removal of an aversive stimulus, so again, the response becomes *stronger*.
Operant Extinction is the weakening and eventual disappearance of a response because it no longer is reinforced.
Punishment occurs when a response is weakened by an outcome (a punisher) that follows it.
With **Positive Punishment**, a behaviour is is followed by the presentation of an aversive stimulus, and the behaviour becomes *weaker.*
With **Negative Punishment**, a behaviour is followed by the removal of a positive stimulus, and the behaviour becomes *weaker.*
Primary Reinforcers are stimuli, such as food and water, that an organism naturally finds reinforcing because they satisfy biological needs.
Through their association with primary reinforcers, other stimuli can become **Secondary** or **conditioned reinforcers.**
Delay of Gratification: the ability to forego an immediate smaller reward for a delayed but more satisfying outcome. Children able to do so typically show greater futures success. (the marshmallow test)
Shaping, which uses the *method of successive approximation*s, involves the reinforcement of behaviours that increasingly resemble the final desired behaviour (child with selective mutism, gradually speaks louder and louder and in front of more people).
Chaining is used to develop a sequence (chain) of responses by reinforcing each response with the opportunity to perform the next response (a rat that first presses a lever may then need to ring a bell and so forth).
Operant Generalization: when behaviour changes in one situation because reinforcement or punishment, and then this new response carries over to similar situations.
Operant Discrimination: when an operant response is made to one discriminative stimulus but not another.
On a **continuous reinforcement schedule** every response is reinforced.
Partial Reinforcement may occur on a **ratio schedule**, in which a certain percentage of responses are reinforced (more responses, more reinforcement), or **interval schedules**, in which a certain amount of time must pass before a response gets reinforced.
Ratio schedules produce higher rates of performance than interval schedules.
On **Fixed-Ratio** and **Fixed Interval schedules**, reinforcement always occurs after a fixed number of correct responses or a fixed time interval.
On **Variable Schedules**, the required number of responses or interval of time varies around some average.
Learning occurs most rapidly under continuous reinforcement, but partial schedules produce behaviours that are more resistant to extinction.

In **Escape Conditioning**, organisms learn a response to terminate an aversive (negative) stimulus.
In **Avoidance Conditioning**, the organism learns a response to completely avoid an aversive (negative) stimulus.
According to **Two-Factor Theory,** fear is created through classical conditioning. This fear motivates escape and avoidance, which is then negatively reinforced by fear reduction.
Token Economies in which desirable behaviours are quickly reinforced with tokens (points, gold stars) that are later turned in for other other reinforcers (prizes, etc), have been used to enhance academic and work performance.
Skinner's field called **Applied Behaviour Analysis** combines a behavioural approach with the scientific method to solve individual and societal problems.

Biology and Learning:
Preparedness means that, through evolution, animals are biologically "prewired" to easily learn behaviours related to their survival as a species.
Humans show faster fear conditioning to Css that have evolutionary significance, suggesting that we are biologically prepared to acquire specific kinds of phobias.
Cancer patients may develop **Anticipatory Nausea or Vomiting** (ANV) to stimuli that are paired with their chemotherapy. ANV is a classically conditioned response (not liking the taste of candy after going through chemo).
It is difficult to operantly condition animals to perform behaviours that are contrary to their evolved natural tendencies. Such conditioned behaviours are abandoned in favour of a more natural response , a concept called **Instinctive Drift.**
Insight: **t**he sudden perception of a useful relationship that helps to solve a problem.
Kohler's early research on animal insight and Tolman's pioneering research on cognitive maps indicated that cognitive factors play a role n learning.
Tolman emphasized that learning is based on knowledge and an expectation of "what what leads to what".
Cognitive interpretations of classical conditioning propose that what is learned is an expectancy that the CS will be followed by the UCS.
Cognitive theorists view operant conditioning as the development of an expectancy that certain behaviours will produce certain consequences under certain conditions.
Tolman's research on **Latent Learning** indicates that "knowledge" and "performance" are conceptually distinct, and that learning can occur without reinforcement.
In humans, **internal self-evaluations** (pride, morality, etc.) can function as reinforcers and punishers.
Observational Learning: the learning that occurs by observing the behaviour of a model.
Albert Bandura's view of observational learning had 4 basic steps: 1) **attention**, 2) **retention**, 3) **reproduction**, 4) **motivation**.

Chapter 8: Memory

Memory involves three main processes:

1) **encoding:** getting information into the system by translating it into a neural code that your brain processes
2) **storage:** retaining information over time.
3) **Retrieval:** pulling information out of storage when we want to use it.

And three main components:

1) **sensory memory:** holds incoming information just long enough for it to be recognized.

2) **short term/working memory:** holds the information that we are conscious of at any given time.
3) **long-term memory**

Sensory memory briefly holds incoming sensory information. Some information reaches working memory and long term memory, where it is mentally represented by phonological, visual, semantic, or motor codes.
Short-term/working memory actively processes information and supports other cognitive functions. It has auditory, visiospatial, and executive (coordinating) components.
Long-term memory stores enormous amounts of information for up to a lifetime.
Effortful Processing involves intentional encoding and conscious attention.
Automatic processing occurs without intention and requires minimal effort.
Deep Processing enhances memory.
Elaborative Rehearsal (focusing on the meaning of information or relating it to other things) provides deeper processing than **maintenance rehearsal** (simple repetition of information).
Combining individual items into larger units of meaning is called **Chunking.**
The "shelf-life" of information is about 20 seconds without rehearsal.
The **Serial Position Effect** means that recall is influenced by a word's position in a series of items, and has 2 components: 1) **The Primacy Effect:** reflecting the superior recall of early words, and 2) **The Recency Effect:** representing the superior recall of the most recent words.
Levels of Processing theory: the more deeply we process information, the better it will be remembered.
A logical **hierarchy** enhances our understanding of the relations between stimuli.
Mnemonics: "the art of improving memory" from the name Mnemosyne, the Greek goddess of memory.
Allan Paivio proposed that information is stored in long term memory in 2 forms: verbal and non verbal (typically visual) codes.
Dual Coding Theory: encoding information using both codes enhances memory, because the odds improve that at least one of the codes will be available to later support recall.
Schemas are mental frameworks that shape how we encode information. As we become experts in anything, we develop schemas that allow us to encode information into memory more efficiently.
Associative Network Models view long-term memory as a network of associated nodes.
Priming refers to the activation of one concept by another (Fire or truck primes the node for red)
Neural network models propose that piece of information in memory is represented not by a single node but by multiple nodes distributed throughout the brain.
Declarative long term memories involve factual knowledge and include :
1) **Episodic memories:** knowledge concerning personal experiences
2) **semantic memories:** facts about the world and language
Procedural Memory is reflected in skills and actions.
Explicit memory involves conscious or intentional memory retrieval
Implicit Memory occurs when memory influences our behaviour without conscious awareness
A Retrieval Cue is any stimulus, whether internal or external, that stimulates the activation of information stored in long-term memory.
Mantyla consistently found that having multiple, self-generated retrieval cues was the most effective approach to maximizing recall.
In general, **distinctive stimuli** are better remembered than non-distinctive ones.
Flashbulb Memories are recollections that seem so vivid, so clear, that we can picture them as if they were a snapshot of a moment in time.
The Encoding Specificity Principle states that memory is enhanced when conditions present during retrieval match those that were present during encoding.

Context-dependent Memory: It typically is easier to remember something in the same environment in which it was acquired (the jogger was in the same place as the rape).
State-dependent Memory proposes that our ability to retrieve information is greater when our *internal* state at the time of retrieval matches our original state during learning (the jogger's state of increased heart rate, etc).
Mood-congruent Recall: we tend to recall information or events that are congruent with our current mood (if we are happy, we remember happy events).
Ebbinghaus typically measured memory by using a method called **relearning** and computing a savings percentage.
One early explanation for forgetting was **Decay Theory**, which proposed that with time and disuse, the physical memory trace in the nervous system fades away.
When participants learn a list of words and are tested at two different times, they recall more material during the **second** testing (disproving the decay theory)
Interference Theory: we forget information because other items in long-term memory impair our ability to retrieve it.
Proactive interference occurs when material learned in the past interferes with recall of newer material (can't remember your new phone number b/c of your previous one)
Retroactive Interference occurs when newly acquired information interferes with the ability to recall information learned in the past (can't remember your old phone number b/c of the new one).
Tip-of-the-Tongue experiences seem to be illusory. Rather than retrieval failure, we may just have never known the answer.
Repression: may protect us by blocking the recall of anxiety-arousing memories (not remember being abused as a child, etc)
Retrograde Amnesia represents memory loss for events that occurred *prior* to the onset of amnesia
Anterograde Amnesia refers to memory loss for events that occur *after* the initial onset of amnesia.
Dementia refers to impaired memory and other cognitive deficits that accompany brain degeneration and interfere with normal functioning.
Alzheimer's Disease is a progressive brain disorder that is the most common cause of dementia among adults over the age of 65.
Plaques are clumps of protein that build up on the outside of neurons, whereas *tangles* are fibres that get twisted and wound together within neurons.
The memory loss for early experiences is called **infantile amnesia** (or *childhood amnesia*).
Prospective memory concerns remembering to perform an action in the future.
Boundary Extension: remembering a scene as more expansive than it really was. (the panda on the stairs)
Schemas may cause us to remember events not as they actually occurred but in ways that fit our pre-existing concepts about the world
The Misinformation Effect, the distortion of a memory by misleading post-event information (saying you were abused as a child although, in reality, you weren't)
Misinformation effects also occur because of **Source Confusion** (or source monitoring error), which is our tendency to recall something or recognize it as familiar, but forget where we encountered it (identifying a suspect b/c you remember him from a previous screening)
Men tend to be more confident in their decisions
The **frontal lobes** play a key role in performing the executive functions of working memory.
The **hippocampus** helps to consolidate long-term declarative memories.
The **cerebral cortex** stores declarative memories across distributed sites.
The **amygdala** encodes emotionally arousing aspects of events
The **Cerebellum** helps to form procedural memories.
Damage to the thalamus can produce sever amnesia