

# Psychology Study Notes

Midterm  
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## Divisions and Schools of Psychology

**What is psychology?** – The study of the brain and its mental processes

- Science is objective- psychology isn't always
  - Difficult to define, quantify, and observe variables
    - Ex. Mental processes

### **Divisions of Psychology... Experimental Psychology**

- Established in the mid to late 1800s
- 1<sup>st</sup> experimental psychology lab was done by Wilhelm Wundt in Leipzig, Germany
- “The exact description of consciousness is the sole aim of experimental psychology.”
- Basic principles of experimentation are used to explain psychological phenomena
- **Structuralism:** school of psychology that used introspection to examine the basic structures of the mind
  - Highly subjective and unreliable
  - Debate over the mind being physical or non-physical
- **Functionalism:** school of psychology that focussed on how our mental and behavioural processes work and how they enable us to live
  - Still highly subjective

### **Divisions of Psychology... Clinical Psychology**

- Branch of psychology that studies, assesses, and treats people with psychological disorders
- Counselling, psychotherapy
- Sigmund Freud
- Major roots are more recent (1940s)
- First clinical psychology department was the University of Ottawa
- Now the major field in psychology

### **Divisions of Psychology... Applied Psychology**

- Social, developmental, educational, industrial psychology
- Apply knowledge of basic fundamental psychology

### **Schools of Psychology... Cognitive**

- Major branch of experimental psychology in the late 1800s and early 1900s

- Study of higher mental functions like consciousness, memory, attention, decision making, and language
- Late 19<sup>th</sup> century (William James)
- Attempt to infer hypothetical mental states of “information” processing based on current response to behaviour, patterns/ performance
  - Cannot be observed... only inferred... subjective... unreliable
- Fell into disrepute because it was thought to be unscientific by behaviourists
- Large revival in the 1950s... Now a major “boom” field
- Proven to be highly powerful and popular
- **Cognitive Neuroscience:** recent innovations in neuroscience allow the experimenter to actually observe changes in brain activity
- **Neural/ Cognitive Modelling:** using computers to mimic cognitive/ information processing... artificial intelligence

### Schools of Psychology... Biological

- Manipulate psychological stat (attention, memory, decision-making) and see the effect on brain activity
- Manipulate the brain (stimulate, lesion, drugs) and determine the effect on psychology

### Schools of Psychology... Behavioural

- View that psychology (1) should be an objective science that (2) studies behaviour without reference to mental processes.
- Most researchers agree with (1) but not (2)
- Began in the 1920s with J. Watson and his criticism of cognitive psychology and psychoanalysis
- B.F. Skinner (1935-1990) laid out much of the ground work for behaviourism
- Study of mental events is considered unscientific
- Why do we act the way we do?
- All behaviour can be explained by consequences of behaviour
- We learn to repeat behaviour that has been reinforced
- Strictly environmental explanation of behaviour
- No need to consider genetic influences
- A criminal is a criminal because of past learning and reinforcement of criminalistics behaviours
- **Deterministic:** all behaviour is determined by consequential events (reinforcement, consequences, punishment)... no free will... actions are predetermined

### Schools of Psychology... Social

- Most of human behaviour can be explained through evolutionary/ genetic principles
- Called socio-biologists
- Emphasis on the study of animal behaviour (ethology)
- Deterministic theory

- We act the way we do not because of learning, but because of the principles of evolution (survival of the species and survival of my genes)
- E.O Wilson (1975-present); Richard Dawkins

### **Schools of Psychology... Psychoanalytical**

- Sigmund Freud (late 19<sup>th</sup> century, early 20<sup>th</sup> century)... heavily influenced by WWI
- Role of the unconscious in determining our behaviour
- Much of our behaviour and emotions are repressed (especially sexuality) but influence our behaviour
- Unconscious memories influence our actions and we don't know why
- Deterministic behaviour
- Criticized as being unscientific
- How can we ever prove there is an unconscious?

### **Differences between psychoanalysis, psychiatry, clinical psychology, and experimental psychology**

#### Psychoanalyst

- Trained in psychoanalysis
- May or may not be a psychiatrist
- Emphasis on Freudian and post- Freudian (Jung) theory

#### Psychiatrist

- Residency in psychiatry
  - Must have an M.D
- Psychiatrists employ a medical model
- Theory that psychiatric disorders are a mental "illness"
- Treatment methods can include psychotherapy and drug therapy
- Must perform diagnosis
- In Canada, only psychiatrists can prescribe medicine

#### Clinical Psychologist

- In Canada, must have a research degree (Ph. D)
- Trained in research and clinical psychology
- Emphasis on "abnormal" behaviour and not necessarily "illness"
- Emphasis on change through counselling

#### Experimental Psychologist

- Trained only in research
- Degree is a Ph. D
- Not trained in clinical psychology
- Legally cannot provide psychotherapy or counselling
- Cannot claim to be a psychologist to the public

## **Schools of Psychology... Phenomenological/ Humanistic**

- Humanistic theories- emphasis on unique quality of behaviour
- Concerned with individuals unique personal experience, their phenomenology
- Focus on subjective experience
- Concern with developing theories of inner life rather than explaining behaviour
- Criticized as being unscientific

## **The Scientific Method**

**What is epistemology?** - The study of knowledge

### **Big Research Methods According to Myers**

- Stability vs. change
  - Are we capable of change or no?
- Rationality vs. irrationality
- Nature (genetics) vs. nurture (learned)

### **Epistemology**

- Divine (non-physical) insight
  - Higher existence knows everything
  - Absolute, cannot be wrong
  - Hierarchy
  - Inspiration
- Pure logic and thought (Aristotle)
  - Studying
  - Derive and deduce all knowledge
  - Do not depend on science or higher existence
  - If facts are wrong, knowledge is wrong
- Scientific manipulation
  - Carry out experiments

### **Idealism (non-physical) vs. materialism (physical)**

- Is all that exists material in form?
  - Laws of the physical universe
- Psychology “concepts”?
  - Love, hate, liberty, free will, the “mind”, consciousness, unconsciousness
- Materialists believes that all that exists must exist in some physical form
  - Does not believe in a higher existence because it can't be proved it exists
  - Does not believe in the soul or “mind”
  - Atheist
- Idealist does not believe in the physical reality of our existence
  - How do I know I'm not experiencing a dream-like existence?
- Laws of science operate only on a physical, material existence

## The Scientific Process

- Observation of the universe: many things that aren't understood and need an explanation
- Define a problem: what is the problem that needs an explanation? What's the question you're asking? What's the controversy?
- Search the literature: go to the library. Has anyone already asked the same question?
- Development of a theory: a summary (synthesis) of what we already know. Review of the literature. No longer speculation.
- Hypothesis: based on theory scientists form a hypothesis (prediction)
- Testing of hypothesis: unbiased, objective. Involves the design of a study.
- Data collection: run the study.
- Analyses of the Data: is there a variation in the data? Do the results differ depending on the situation?
- Interpretation of the results: was the hypothesis supported by the results? Are there alternate theories that might also explain the results?

## Theories/ Hypotheses

- Theory: predicts behaviour or events and are formed after a review and synthesis on existing fact
- Theory vs. Speculation: theory is only formed after an objective review of already published research. It is not formed on the basis of guesswork or subjective opinion. Speculation is based on opinion.
- All hypotheses must be testable.
- A good theory is one that can be proven wrong.
- Replication: others should be able to exactly replicate what you have done and what you have found

## Hypothesis testing

- Scientists state a hypothesis that is an expectation based on previous scientific research (fact)
- Hypothesis must be stated in a specific manner
- Means of measuring (quantifying) variables of interest on the basis of material existence.
- All hypotheses are false unless proven otherwise.

## Problems in Psychology

- Often many of the questions asked in psychology are exceedingly difficult to test
- Cannot easily define psychological concepts
- Theory and alternate theory... both can't be correct
- Operational definition: define variables of interest
- Measuring/ quantification

## Types of Studies

- Case Studies
  - Study one or more individuals in detail to obtain data that would be true for all of us
  - Can suggest hypotheses for further testing, but can be misleading
- Sampling
  - Groups of individuals that are representative of the entire population
  - Population- the whole group you wish to study
  - Sample- a smaller random (every member of the population has an equal chance of being chosen) selection of individuals in the population
    - Sample must be representative
- True Experimental Studies
  - The factor, or variable, of interest is manipulated (independent variable)
  - We predict that changing one variable it will affect the other
  - Assume our expectation to wrong (null hypothesis)
  - If our theory is true, the manipulation of the independent variable causes the dependent variable to change (cause and effect relationship)
  - The dependent variable is the one that we measure
  - Certain variables are manipulated, others remain constant
  - There are two things that vary
    - one variable is manipulated, the other one changes because of the manipulation
  - When scientists don't know why something varies they are said to be ignorant (absence of knowledge)
  - Variance that cannot be explained is called error
  - There are individual differences within each group (error variance)
  - Dependent variable therefore varies for two reasons, because of the effects of the independent variable and individual differences
  - We cannot explain variation among individual participants

## Experimental Designs

- Studies are designed to assure that the results that are obtained cannot be explained by confounds
- One design uses control and experimental conditions
  - Control condition provides a baseline to which the experimental condition can be compared (no manipulation is performed)
  - Experiment is carried out in the experimental group
  - Random assignment: participants will be randomly assigned to either the control or the experimental group
- Another design is the pre-post design
  - Use the same group of subjects in two different conditions
  - Group is tested prior to experimentation and then after/ during experimentation
  - Differences between pre- and post- conditions might be due to confounds such as practice or participants becoming bored and their performance deteriorates

- A special design is used to test the effects of “treatment”
  - A drug or treatment may appear to work but it may not be true
  - Perhaps the patient felt better simply because they knew they were being treated
  - The “placebo effect” accounts for this
  - Similar to control and experimentation design except nobody know which group they’re in
  - The placebo group gets a sugar pill or something like it, but believes they’re being treated
  - The experimental group receives the actual drug
  - This method allows the experimenter to see if the drug’s effects are simply psychological or not
  - If the placebo group experiences no changes and the experimental group does, then it is actually the drug that works
- Quasi- Experiments
  - Often in humanities and health sciences, it is not possible to manipulate the independent variable and cannot always be carried out in a laboratory
  - Compares one group to another
  - Experimental manipulation is not carried out
  - We assume the differences are caused by the independent variable; for this reason it is highly questionable and controversial
  - Studies carried out in the natural environment attempt to overcome the limitation and generalization associated with laboratory experiments
  - It is exceedingly difficult to carry out true experiments in the natural environment
- Surveys
  - Participants are asked to report their behaviour, attitudes, or beliefs
  - Participant is asked a question and can agree or disagree
  - Wording of the question can be crucial
  - Survey studies are often quasi-experiments but can also be used in true experiments

### **Measures of Central Tendency**

- Mode is the score that occurs most often
- Mean is the average score
- Median is the score at which half the individuals score above and half the individuals score below

### **Problems with Mean as a Measure of Central Tendency**

- At times, measures are not normally distributed
- Extremely high or low scores might distort the average

## **The Normal Curve**

- A distribution of scores is a graphic representation of how many individuals have a particular score
- Many psychological measures are distributed according to a bell-shaped “normal curve”
- Most of the data is clustered in the middle
- Normal curve is balanced
  - Half of the individuals score at or above the mean and half score at or below the mean
  - In a perfectly normal curve the mean, median, and mode are identical

## **Statistical Significance**

- Means that differences of a certain magnitude could not occur by chance
- Statistician might claim that differences this large could only occur by chance on 5% of occasions and will always provide a measure of chance probability
- Statistical significance provides a measure of how often a difference could be found purely by chance
- Not the same thing as practical significance
- Two sources of variance in any experiment... one we can explain and one we cannot
- Explained variance is divided by unexplained variance
- Variance is calculated by examining how much the scores deviate from the mean
- Unexplained variance examines the extent of individual differences
  - Computed by subtracting the mean from the individual's score
- Deviance can be positive or negative so we square the value to get rid of the sign
- We then need to take the square root of variance
- Gives us standard deviation in the end
- If the ratio of explained to unexplained variance is large enough, the result is probably statistically significant and is likely not due to chance

## **Factors that affect statistical significance**

- Significance is a reflection that differences this size are not likely to be found by random chance
- Explained variance is divided by unexplained variance
- Likelihood of finding statistical significance increases according to the size of the experimental effect
  - Larger differences are more likely to be significant
- If the experimental manipulation has a highly consistent effect across all individuals, the effect is likely to be significant
- If a very large sample is used, very small differences might be statistically significant
- Large samples are much more likely to be representative of the entire population

## **Correlational Studies**

- A change in one variable is also associated with a change in another
- Correlation: a statistical measure of the extent of a relationship between two variables

- The correlation allows one to predict scores on one variable if the scores on another variable are known
- Vary between -1.0 and +1.0
  - +/- 1.0 means perfect correlation
  - If the correlation is 0, there is no relationship
- Correlation does not prove causality

### **Logical Positivism**

- Every scientific theory must be potentially falsifiable
- We cannot prove that something does not exist, but we can prove that something does exist
- Based on theory, scientists form a hypothesis or prediction
- We assume all hypotheses are wrong until proven otherwise
- Thus, we assume the negative
- We assume the hypothesis is false
  - Null hypothesis

### **Social Modelling Theory**

- We mimic the behaviours of the things we see around us

### **Freudian Theory**

- Exposure to a drive will decrease that drive

## The Biology of the Mind: Neuronal-Synaptic Transmission

### **Structure of the Neuron**

- Dendrites: short branches projecting from the cell body; highly specialized receptors are embedded inside; receive messages from other neurons
- Cell Body: contains the nucleus of the cell and other basic elements necessary for the survival of the cell
- Axon: a long, slender tube which carries information from the cell body to the axon terminals; axons of longer neurons are surrounded by a myelin sheath which causes them to appear white; axons of shorter neurons are not surrounded by myelin sheath and thus appear grey
- Myelin Sheath: made of lipid (fat) material that protects the axon, insulates the axon, and speeds up transmission
- Terminal Endings: store neurotransmitters; part of the pre-synaptic neuron; synaptic cleft separates terminal ending and dendrites of the next neuron

### **Different Types of Neurons**

- Sensory neurons: transmit impulses received by sensory receptors to the CNS (afferent nerves)
- Motor neurons: carry outgoing signals from CNS to muscles and glands (efferent)

- Interneurons: routes to memory, learning, and complex behaviour; located away from sensory and motor neurons

### **Resting Potential**

- The neuron carries an electric charge
- Unlike other cells, the charge of a neuron can change
- Allows one neuron to communicate with another (or a muscle)
- Inactive neuron contains an excess of negatively charged ions inside the cell
- Charge inside is about -70 mV
- Charge is called the resting membrane potential... represents the electrical charge of a neuron when it's inactive

### **Excitation of a Neuron (depolarization)**

- Surplus of negatively charged ions inside the cell... mainly because of buildup of chloride
- Outside of the neuron there is a build-up of positively charged sodium ions
- Sodium-chloride balance is critical for proper functioning of the neuron
- Potassium passes through membrane easier than sodium
- When the dendrite is stimulated by another neuron through the release of an excitatory neurotransmitter, the cell membrane's channels open allowing positively charged ions to flow in
- Change in the charge of the neuron is called depolarization

### **Action Potential**

- Flow of positively charged ions into the nerve cell cause the cell's electrical charge to change
- Cell is now less negatively charged
- When the flow of positively charged ions reaches a critical threshold, the neuron fires
- Once the change in electrical potential reaches this threshold, a dramatic change is observed
  - Called an action potential
- Continues inevitably down the entire axon and is called propagation of an action potential
- If the level of excitation is not enough, the electrical charge of the neuron will return to its resting potential
- Likelihood of reaching the threshold is increased by either having a single (or a few) neurons excite the post-synaptic neuron rapidly (summation)
- Once the action potential is initiated it will travel down the length of the axon

### **All-or-None Law**

- Action potential will be propagated down the entire length of the neuron or not at all
- Amplitude of the action potential is also constant

### **Propagation of Action Potential**

- Action potentials will travel down the length of the axon
- Slow, tedious process
- Membrane gates initially open upon excitation, causing depolarization of the cell which causes neighbouring membrane gates to also open, and so on, and so on
- Long axons are myelinated
- Myelin sheath is not continuous
  - At places, the bare axon is exposed (Nodes of Ranvier)
    - Action potentials jump from node to node
  - Transmission is faster along myelinated neurons

### **Release of Neurotransmitter**

- Can be excitatory or inhibitory
- An excitatory neurotransmitter will increase the chance that the post-synaptic neuron will fire
- Inhibitory neurotransmitters decrease the chance that the post-synaptic neuron will fire
  - Resting potential becomes more negatively charged (hyperpolarization)
    - Increase in the critical threshold
- Neurotransmitter will have a long lasting effect unless its actions are terminated
  - Enzymes, etc.

### **Drug Interaction**

- 1) Block release of neurotransmitters
- 2) Block storage of neurotransmitters in pre-synaptic membrane
- 3) Cause release of excessive neurotransmitters
- 4) Stimulate or block receptor on post-synaptic membrane
- 5) May attack enzymes that break down neurotransmitters
- 6) Block reuptake of neurotransmitters

### **Neurotransmitters**

- Acetylcholine (ACh)
  - Excitatory on skeletal muscles
  - Muscle paralysis can be caused by
    - Botulin blocking ACh release.
    - Nerve gas may block receptor site or interfere with reuptake
  - Muscle convulsions can be caused by venom in many animals
  - In CNS, role in memory—ACh is depleted in Alzheimer's disease
- Norepinephrine/ Noradrenaline
  - Important role in alertness and mood
  - Increase alertness in the brain; increases heart rate
  - Fight or flight
  - Cocaine and amphetamines—stimulant—prolong action
  - Lithium—speeds up break down—depressed mood

- Gamma-Amino butyric Acid (GABA)
  - Major inhibitory neurotransmitter in the brain
  - Sedative, sleep and anti-anxiety medications
    - Benzodiazepines (ex. Valium) stimulate GABA receptors
- Dopamine (DA)
  - Mostly inhibitory
  - Implicated in movement in the periphery. In the brain, attention, decision-making and learning... might be involved in ADHD
  - Insufficient quantity of dopamine results in Parkinson's disease leading to tremors and paralysis
  - Too much dopamine results in psychosis
- Serotonin (5-HT)
  - Plays a role in sleep, perhaps control of eating, mood, and pain regulation
  - Drugs that mimic may result in bizarre hallucinations (ex. LSD, and mescaline)
    - May block receptor site
  - Certain drugs can cause an over-release of serotonin
- Endorphins
  - Natural opiates
  - Chemical structure similar to opiates
  - Inhibit sensation of pain
  - Increase mood and pleasure

## The Biology of the Mind: The Brain and Nervous System

### **Orientation**

- Medial-Lateral: middle of body- side of body
- Anterior-Posterior: front of head- back of head
- Superior-Inferior: upper portion of head- lower portion of head

### **Slices (Viewing the brain in 2-D images)**

- Horizontal (parallel to the floor): visualisation of anterior-posterior and lateral-medial aspects of the brain
- Coronal (from ear-ear): visualisation of superior-inferior and lateral-medial aspects of the brain
- Sagittal (from nose-back of head): visualisation of anterior-posterior and superior-inferior aspects of the brain
- Mid-Sagittal : splits the brain into two equal halves

### **Imaging Techniques**

- Anatomical dissection: slicing the human brain... only for cadavers
- MRI (magnetic resonance imaging): provides high resolution image of the human brain... does not indicate which areas of the brain are active or not... expensive

- PET (positron emission tomography): provides an image of what areas of the brain require glucose for a task to be completed... somewhat invasive... deoxyglucose must be injected into the blood stream... relatively slow... expensive
- fMRI: looks at changes in structure (blood flow) as the brain engages in a task... largely replacing PET... too slow for many brain functions... expensive
- EEG (electroencephalogram): electrodes attached to the surface of the scalp... provides an indication of the electrical activity of the brain
- Evoked potentials: when a stimulus is presented, evoked potentials can be used to measure the brain's response to these stimuli

### **Divisions of the Nervous System**

- Peripheral Nervous System
  - Autonomic
    - Sympathetic
    - Parasympathetic
  - Somatic
- Central Nervous System
  - The Spinal Cord
  - The Brain

### **The Peripheral Nervous System**

- Sensory receptors—in the body and also specialized receptors in the head
- Sensory and motor “nerves”—in the body and in the head
- Sensory nerves—afferent information from the sensory receptors to the CNS
- Motor Nerves—efferent information from the CNS to the muscles; motor action... control of autonomic or smooth muscles... control of skeletal muscles... division is thus known as the autonomic and somatic nervous system... cannot control autonomic nervous system (automatic)... do have control over somatic

### **The Spinal Cord**

- Central grey region: central region takes on a greyish colour because of densely-packed neurons in this region are not surrounded by a myelin sheath... neurons are short... elaborate inter-neuron communication... permits flexibility in behaviour... complex behaviour such as learning, memory and so forth
- White surrounding region: surrounding the central grey region... neurons here are myelinated... ascending “sensory” pathways that ascend from the spinal cord to the brain and descending “motor” pathways that descend from the brain to the spinal cord... sensory in dorsal side... motor in ventral side... can be very long... need a means to communicate rapidly
- Flexibility of behaviour is also called plasticity (it can be moulded)(soft wiring)
- Opposite of flexibility is hard-wiring... many connections in the nervous system as “wired” genetically... forms the basis of a reflex
- Monosynaptic reflex: sensory input → motor output (reflex arc)
- Polysynaptic reflex: more than one junction

## **Divisions of the Brain**

- Hindbrain—medulla, pons
- Midbrain—the medulla, pons and midbrain form what is called the brainstem
- Forebrain—diencephalon; cerebrum

## **The Brainstem**

- Medulla, pons, midbrain
- Specialized senses of the head (vision, hearing, taste, smell)
- Head “muscles”—eye, ear movement, facial muscles, tongue, lips, etc.
- Life “support” systems—temperature, heart, respiration
- Sleep-wake cycle
- Reticular activating system—looks like a spider’s web or net... stimulate any part and eventually all parts will be stimulated... does not allow for specific communication... general arousal of the brain

## **The Diencephalon**

- Thalamus—receives input from all sensory systems (except for olfaction)... massive grey area... specific sensory “nuclei”... many association areas... acts as a type of receptionist/filter for the neo-cortex... centre for consciousness
- Hypothalamus—inferior to thalamus... many subdivisions connected to and controlling pituitary gland... monitors blood for levels of nutrients, water, oxygen, temperature, and hormones... autonomic nervous system (basic needs for survival)... control of the endocrine system
- Pituitary Gland—located at the base of the brain, inferior to the hypothalamus... not part of the brain... master gland of the endocrine system and the hormones that circulate in the blood

## **The Neocortex (Cerebrum)**

- Sulci and gyri
- Architecture (6- layered)
- Central white and grey surround
- Complex interconnections
- Sub-divided into the frontal, parietal, temporal, occipital lobes
- Longitudinal fissure separates the left and right hemispheres
- Central fissure separates the frontal and parietal lobes
- Lateral fissure separates the frontal/ parietal lobes from the temporal lobe
- Corpus callosum is a thick band of white matter that connects the left and right hemispheres so that one side knows what the other is doing

## **Sensory/ Motor Cortices**

- Vision (occipital lobe)
- Audition (gyrus of Heschl- temporal lobe)

- Somatosensory (post-central gyrus—immediately posterior to central fissure—parietal lobe)
- Motor (pre-central gyrus—frontal lobe)
- Cerebellum

### **Sensory**

- Detect basic features of stimulus input
- Location
- Duration
- Intensity
- Pitch
- Colour

### **Speech Areas**

- Motor (communicate) aspects: Broca's area
- Sensory (receptive) aspects: Wernicke's area
- Nondominant hemisphere: "tonality"; emotional expression

### **Association Areas**

- Massive areas of frontal, parietal, and temporal lobes
- Some parts of the occipital lobe
- No direct contact with the outside world
- Neither sensory nor motor
- Consists of small interneurons with very elaborate and complex interconnections
- Size expands with evolution

### **Frontal Lobe**

- Motor functions
  - Primary motor cortex in the pre-central gyrus
  - Broca's area and speech
- Psychological function—highly complex "higher mental" functions... selective attention, concentration, "will", initiative, social norms, insight, logic, feedback, consciousness, self-consciousness, personality... the essence of human existence
- Takes 18-20 years to mature

### **Temporal Lobe**

- Primary auditory cortex in the superior portion of the temporal lobe (gyrus of Heschl)
- Wernicke's area (receptive speech)
- Short term memory systems—hippocampus; amygdala (?)
- Hippocampus is located in the infer-medial portion of the temporal lobe and then loops toward the hypothalamus... specialized for storage of short-term memories... if the information is relevant the hippocampus can allow for the transfer of short-term memories into long term memories

- Amygdala and limbic system

### **Parietal Lobe**

- Permanent memory
- Switching of attention... specialized for focussing or maintenance of attention (concentration)
- Hemi-neglect—patients with damage to the right parietal lobe fail to attend to information arising on their left side... neglect half of their universe... can only see one half of the universe... may result in only dressing half their bodies or drawing half a picture... focusses on one half of the world at a time

### **Hemisphere Differences**

- Dominant (Left) Hemisphere... for most right handers and some left handers... functions include language, math operations, logic
- Non-dominant Hemisphere... spatial construction/ block design, face recognition, tonality/ emotional expression, music
- Corpus Callosum... major commissure of the brain... connects left hemisphere to the right and right to the left allowing the two hemispheres to communicate with each other

### **Limbic System**

- Anatomy is quite complex
- Limbic means circle or loop
- Loop in the brain includes the cingulate cortex, hippocampus/ amygdala-hypothalamus circuit
- Involved in emotions such as defensive and offensive aggression
- Amygdala is located immediately anterior and somewhat superior to the hypothalamus
- Plays an intimate role in the maintenance and expression of emotions
- The 4 F's: feeding, fighting, fleeing, and undertaking mating behaviour

### **Autonomic Nervous System**

- Appears to function “autonomously” from the cortex which may not be aware of what the ANS is doing... may only have limited control or no control at all over the ANS
- Controlled by the hypothalamus... consists of sympathetic and parasympathetic branches
- Sympathetic: increase energy available to the body... when under stress the sympathetic branch provides energy... increases heartbeat, respiration, dilate skeletal muscles, constrict arteries of the skin (so that places that need the energy and nutrients can get them)
- Parasympathetic: conserve energy—slow heartbeat, etc.