Historical aspects (Prologue)

Mind/Body

- *Socrates/Plato: Mind is separate from the body.* Duality. *The mind continues after death. Human knowledge is built from "within". Some ideas are inborn (i.e., innate).*
- *Aristotle: The mind and body are connected. The contents of the mind must be learned. We are all born with mind that is a blank slate.*
- *René Descartes. The mind and body are separate. The mind is not subject to the laws of physical universe.*
- *John Locke. The mind at birth is a blank slate. The mind acts only on what enters through the senses.*
- *Francis Bacon. Founder of modern science. Science should be based on experience and experiments.*

Nature/Nurture

For Myers (and many other psychologists), a major research issue in Psychology is the question of how we acquire various knowledge and skills. This is the nature vs nurture controversy. Nature: Certain aspects are innate; they are acquired through the principles of genetics. Nurture: Certain aspects must be acquired through experience and learning.

- *Socrates/Plato: Human knowledge is built from "within". Some ideas are inborn (i.e., innate).*
- *Aristotle: The contents of the mind must be learned. We are all born with mind that is a blank slate (i.e., it is nurture that determines the contents of the mind).*
- *John Locke. The mind at birth is a blank slate. The mind acts only on what enters through the senses.*

History

- *W. Wundt & E. Titchener.* Introspection, Structuralism*: Attempted to discover the basic structures of the mind/consciousness (analogous to the basic elements in Chemistry).*
- *S. Freud. Role of the* unconscious *in determining our behaviour.*
- *W. James. Functionalism/Pragmatism: What is the* adaptive *value (or* function*) of consciousness and emotions? What is the function of our thoughts and emotions?*
- *J. Watson; B.F. Skinner: Tenets of behaviourism. Study only what is directly observable. Dismissed the study of the unconscious through introspection or psychoanalysis as unscientific*

Thinking Critically (Chapter 1)

- **Logic (Aristotle and Plato maintained that all knowledge can be logically deduced)**
- ***Science and empiricism (experimental manipulation). Francis Bacon maintained that all knowledge must come scientific experimentation.***

- ***Many critics of Psychology as a science claim it need not be studied at all. Psychology is mainly "common sense". But common sense, (or intuition) can lead us to error.***
- **Hindsight bias*: The tendency to believe, after learning an outcome, that one would have foreseen it. It is "common sense". Thus critics of Psychology claim it often uses hindsight bias. The following are common public sayings, yet one contradicts the other:***
    - **It is good to express an emotion to reduce its intensity**
    - **Expressing an emotion only amplifies it.**

- **Overconfidence*: We tend to overestimate what we actually know. We overestimate our abilities.***
- **False consensus effect*: The tendency to overestimate the extent to which others share our beliefs and attitudes. The belief that most people agree with our opinions/beliefs/likes.***
- **Illusionary Correlation: *A perceived nonexistent correlation. Helps to explain superstition. (Getting chilled is associated with getting colds).***

Critical thinking

- ***Psychologists study human behaviour and mental events***
    - ***Claims about behaviour need to be supported by evidence***
    - ***Claims about the mind need to be supported by evidence***
- ***Psychologists do not accept "beliefs", "opinions".***

Ethics of Research

- ***Ethics of research: All studies carried out in Psychology must be approved by an Ethics board that assures:***
    - **The participant/subject is informed about what they will be doing in the study.**
    - **The participant is protected from risk and harm. Any potentials risks must be explained.**
    - **Data collected are confidential (only the researchers have access to them) and anonymous (the participant is not identified)**
    - **The purpose of the research is explained to the subject. This is usually done before the study begins. However in some cases, knowing the purpose of the study can influence the results. In these instances, the purpose of the study can be explained after the study has been completed.**
- ***Animals are at time used in psychological research. Many processes are similar in animals and humans. For example, the way animals learn may be very similar to the way human learn. In the study of the biology of the brain and mind, many structures are identical. Obviously, there are many differences between animals and humans and in these cases, animal research would be of limited use. When animals are used***

in research, very strict ethical guidelines must be used. See textbook for ethics of using animals in research.

Scientific Process

- *Observation, theory, hypotheses, operational definition, independent variable, dependent variable*
- *What is theory? What is an hypothesis? (prediction based on theory)*
- *Operational definition: Some concepts in Psychology are rather vague. All sciences must provide a definition of the variables of interest. Also, how a variable will be measured must be stated.*
- *Replication. For a result to be proven to be valid, it is essential that other labs replicate this result. Operational definitions allow other labs to employ identical methods to replicate the results.*
- *Random sampling. Every member of the* population *has an equal chance of being selected for the study. When a study compares different groups (e.g., control group, experimental group), it is possible that the groups may differ on some variable prior to the start of the experiment. Random assignment of individuals to one group or another reduces the likelihood of these pre-existing differences.*

- *Identify independent and dependent variables:*
    - **Example: Skinner varies the type of reinforcer and observes their effects on the rate of responding. What are the independent and dependent variables?**
    - **Example: The effects of parenting on feelings of depression (independent, dependent variables?)**
- *Experimental designs:*
    - **control vs experimental groups. Need for random assignment**
    - **pre-post;**
    - **placebo vs treatment; (double blind)**

Statistical measures

- *Measures of central tendency: mean, median, mode.*
- *2, 4, 5, 5, 7, 9, 9, 9, 10. What is mean, median, mode?*
- *Measures of variance: range, variance (Standard Deviation)*
- *Range= max-min (in the example above 10-2; thus the range is 8).*
- *Standard Deviation (SD)= square root of variance*
- *In a normal curve, about 68% of scores occur within 1 SD, 95% within 2 SD and 99.8% within 3 SD of the mean.*

Causality & Correlations

- *The independent variable needs to be manipulated in order to prove causality. Manipulation of the independent variable causes the scores on the dependent variable to change.*
- *Statistical significance (compare to chance difference)*
- *Correlation provides a measure of the extent of a relationship. It cannot be used to infer a cause-and-effect relationship.*
- *Correlations (positive, negative)*

- **Size of correlation (between ± 1.0); The higher the correlation, the better the predictability. Let us assume that the correlation between hours of study and marks on an exam is 0.35. This is a modest positive correlation. The number of hours that one studies does predict (but only poorly) higher marks on the exam. If the correlation were 0.82, then the numbers of hours one studies predicts marks much more accurately. Let us assume that the correlation between exercising and weight is -0.94. This is a very high negative correlation. We could predict very accurately that those who exercise more will have much lower weights.**
- **illusionary correlation (often superstition and stereotypes). You go into a store and find that the salesperson of a particular race is rude. You then believe that all people of this race are rude. Most heroin addicts have used marijuana in the past. You conclude that marijuana thus leads to the use of heroin. This is an illusionary correlation because all heroin addicts have, in the past, also drunk milk. Does drinking milk also lead to heroin usage?**

Schools of Psychology

- ***Biological***
- ***Cognitive (also includes cognitive neuroscience, the merger of biological and cognitive)***
- ***Behavioural***
- ***Social (includes also industrial/organizational)***
- ***Clinical (including humanistic/phenomenological and personality)***
- ***Developmental (changes in behaviour across the life span)***

The Biology of Mind (Chapter 2)

- ***Aristotle: Nature vs nurture: The mind and body are connected.***
- ***Socrates/Plato: Mind is separate from the body.*** **Duality.**
- ***René Descartes. The mind and body are separate. The mind is not subject to the laws of physical universe.***
- ***F. Gall (1800s):*** **Phrenology** ***– reduced various behaviours to specific areas of the brain. This caused changes in the shape of the skull. A phrenologist could determine personality by examining the shape of the skull. There was no evidence that this was the case and it has fallen into disrepute. Nevertheless, there is now indisputable evidence that different regions of the brain do control different functions.***

Instruments to "view" images of the nervous system:

- ***Certain instruments permit the viewing of brain structures (e.g., CT and MRI scanners). They cannot be used to determine the function of the various brain structures. Other instruments are used to determine which brain regions are active during a particular task (e.g., fMRI).***
- ***CT scan (uses X-ray technology to provide image of brain)***
- ***MRI (static high resolution image)***
- ***functional MRI (or fMRI)(functional)***

- ***PET scan (functional)***
- ***EEG (functional)***

Divisions of The Nervous System

- ***Peripheral nervous system***
  - **Somatic nervous system**
    - **Sensory neurons**
    - **Motor neurons**
  - **Autonomic nervous system**
    - **Sympathetic nervous system**
    - **Parasympathetic nervous system**
- ***Central nervous system***
  - **The spinal cord**
  - **The brain**

Genetic vs Experience

- ***Most of the sensory and motor pathways are "laid out" genetically.***
  - ***Hard-wired***
  - **Disadvantage: Inflexibility.**
  - ***Advantage: Rapid processing; rapid "decisions"***
- ***Much of the connections of the "higher", cortical centres are made following experience and learning.***
  - ***Soft-wired*, flexibility, *plasticity***
  - ***Disadvantage: Slow***
  - ***Advantage: Flexibility. Example: If one cortical region is damaged, another can take over its role (plasticity)***

Neuronal Transmission

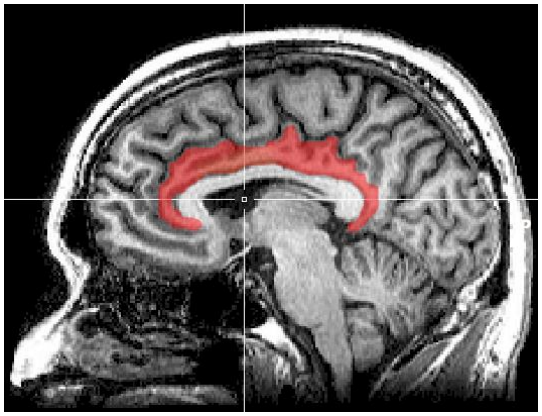
- ***Message travels from dendrite→cell body→axon→terminal ending.***
- Resting potential: normal "resting" charge in neuron is about -70 mV
- ***Depolarization: When excited (depolarized), positively charged molecules or "ions" (potassium, sodium) will flow into the neuron.***
- ***Action potential***
- ***Neurotransmitters***
- ***Synaptic process: release of neurotransmitter, post-synaptic receptor site, removal (breakdown) of neurotransmitter, reuptake***
- ***Different types of neurotransmitters (acetylcholine, dopamine, serotonin, noradrenaline, endorphins). Note that Myers uses the terms epinephrine and norepinephrine for adrenaline and noradrenaline, respectively.***
- Neurotransmitters are released at the swelling of the terminal endings, the bouton endings
- Neurotransmitters travel through the synaptic gap to highly specialized receptors in the dendrites of the post-synaptic cell. Neurotransmitters might be excitatory or inhibitory
- Excitatory neurotransmitters result in depolarization and increase the likelihood that an action potential will be initiated in the post-synaptic neuron. Inhibitory neurotransmitters result in hyperpolarization (neuron is more negatively charged that normal) and decrease the likelihood that an action potential will be initiated in the post-synaptic neuron.

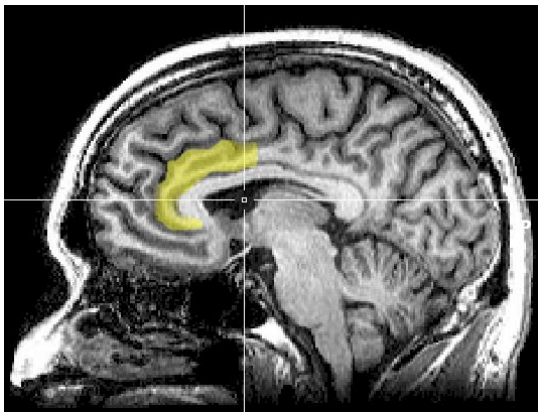
Brain Anatomy

- Sensory, motor and association cortices
- Occipital, temporal, parietal and frontal lobes
- Left hemisphere
  - "logic", sequencing, parts (rather than whole), arithmetic
- Right hemisphere
  - emotions, whole (rather than parts), face recognition, spatial construction
- Commissures connect left and right hemisphere. *Corpus callosum* is the major commissure.
- Motor neurons from cortex to the body cross from left to right in the brainstem
- Sensory neurons from the body also cross from left to right in the brainstem.
- ***Distinguish hindbrain (medulla, pons, cerebellum) from midbrain and forebrain (thalamus, hypothalamus, hippocampus, occipital, temporal, parietal and frontal lobes, etc)***
- **Anterior cingulate cortex:** ***inhibitor of inappropriate action including correction of error (but because it is involved in appropriate and inappropriate action, it is also involved in deception), reward-based learning, detection of pain resulting in the switching of attention***
- **Mirror neurons*: frontal lobe neurons that fire when performing certain actions or* when observing another doing so*. May enable imitation and empathy.***

Medial view of brain

- ***In red, entire cingulate cortex (superior to corpus callosum)***
- ***In yellow, anterior portion of cingulate cortex (i.e.,* Anterior cingulate cortex *or* ACC*)***





Consciousness & the Two-Track Mind (Chapter 3)

- *"Dual" processing: simultaneous (or parallel) processing of conscious and unconscious information. Most of our processing is done automatically (unconscious processing).*
- *Sleep*
- *Selective attention*
- *Psychoactive drugs*
- *Hypnosis*
- *Near death experience*

Sleep

- *Stages of Sleep*
- *Stages NREM (stages N1,N2,N3) and REM*
- *½ of sleep is spent in stage N2*
- *Most of stage N3 (also called Slow Wave Sleep or SWS) accumulates in the 1st half of the night;*
- *Most of stage REM accumulates in the 2nd half*

Light-Dark Cycle

- *Suprachiasmatic nucleus… detects light/dark*
- *Activity of SCN increases in absence of light*
- *SCN triggers pineal gland to release melatonin*
- *Thus, decrease in light increases output of melatonin*
- *In constant light, subject will sleep one hour later each day. Thus, the "natural" rhythm is 25 hours.*

Sleep Deprivation

- *Immune system is active during NREM sleep*
- *Total sleep deprivation will eventually lead to illness (typically because of infection) and perhaps death).*
- *Biological need for NREM*
- *Rebound: deprivation of a stage of sleep results in (1) earlier onset of the stage when sleep is allowed and (2) greater quantity of the stage*
- *REM sleep deprivation: effects are not as dramatic as for NREM; perhaps an effect on storage of memories and on learning*
- *REM rebound is apparent. Thus, there is also a biological need for REM.*

Purpose of NREM & REM sleep

- *NREM: Restorative function; repair, regeneration of cells; activation of immune system to fight infectious disease.*
- *NREM: Role in learning and storage of motor skills and , many novel tasks. Brain areas that were active during the initial learning are reactivated during NREM.*
- *REM: role in learning, storage of new memories; especially non-declarative*

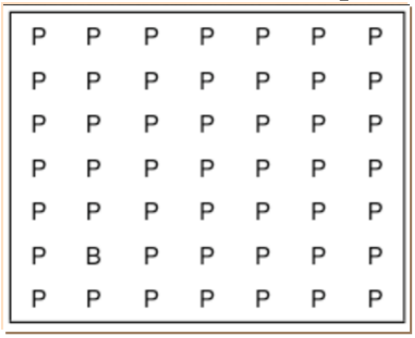
memories

Dreams

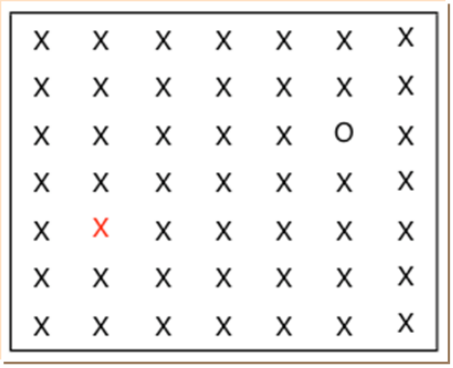
- *Purpose of dreams?*
- Freud: *Release of repressed desires/drives from the unconscious).*
    - The actual content of the dream (its "manifest" content) is symbolic of our true (but repressed) desires (the "latent" content).
- Hobson: *Activation-synthesis theory*

Consciousness (Selective Attention)

- *We cannot attend to and process all information because of limited "resources". The brain has a limited capacity to process information.*
- Selective attention; *We attend to that which is relevant in order to become conscious of it.*
- *We inhibit the processing of that which is not relevant. We do not want to be conscious of that which is relevant.*
- *Top-down vs bottom-up processing*
- *Inattentional blindness: failing to perceive objects when attention is directed elsewhere*
- *Change blindness: Failing to notice changes in the environment*
- *Pop-outs (draws attention). Involves* automatic *processing*
- Controlled *feature processing*



Example of feature extraction.
Detect letter "B".
Requires *controlled*, effortful processing



Detect letter red X. Example of pop-out. Requires only *automatic*, effortless processing

Selective attention –resource allocation

- ***We cannot attend to and process all information because of limited "resources". The brain has a limited capacity to process information.***
- **Automatic (unconscious or "subconscious",** ***according to Myers*****) processing*****: These are tasks that can be carried out without cortical effort.***
    - **Rapid processing**
    - **Especially useful for mundane, repetitive, well-learned tasks.**
- **Controlled (conscious) processing*****: These tasks require cortical effort in order to be completed.***
    - **Slow processing**
    - **Especially useful for novel (or new), poorly-learned tasks**

- **Serial processing** ***(controlled processing):***
    - **Requires effort; The processing of one task must be completed before the processing of another can begin**
- **Parallel processing** ***(also called "dual" processing in text)***
    - **automatic processing**
    - **No effort required; two or more tasks can be processed simultaneously**

Hypnosis

- ***Hypnosis: one person (the hypnotist)*** **suggests** ***to another (the subject) that certain behaviours, perceptions, thoughts, memories will occur spontaneously.***
- ***Only about 25% of the population are highly hypnotizable. They have rich fantasy and imaginations. They are highly suggestible.***
- Those who do not want to be hypnotized cannot be hypnotized. Those who want to be hypnotized and believe in hypnosis can be hypnotized.

- Hypnosis as an anaesthetic: Pain can be reduced by even light hypnosis. General anaesthesia can be performed with deep hypnosis.

- Memory and hypnosis. *Age regression* experiments: We return to childhood-like existence and are asked to recall early childhood memories. Many people believe hypnosis can assist in the recall of long-forgotten memories. There is little evidence of this. Hypnosis cannot be used to bring out "true" memories.

- ***The hypnotist might influence what is recalled but might also inadvertently create new, false memories.***
- **Thus, memories that are remembered are sometimes true memories and sometimes false memories**
-

Theories of Hypnosis

- **Dissociation:** ***The claim that hypnotic phenomena are regulated by control processes outside (*****dissociated** ***from) our normal awareness***
- **Hilgard's "hidden observer". The hypnotised individual acts as told; the "hidden observer" (the real individual) may observe this.**

- **Selective Attention:** ***Subject selectively attends to one stimulus (the hypnotist) and ignores others. This might explain how hypnosis can reduce the perception of pain. In modern neuroscience, it is the frontal lobe that acts as a central executive, controlling the allocation of attentional resources. In hypnosis, the subject allows the hypnotist to act as their frontal lobe and thus controls their behaviour.***
- *Social influence/role-playing:* Subject merely plays a role. They allow the hypnotist to direct their behaviour. The subject will not perform acts that someone pretending to be hypnotized would. Hypnosis is regulated by normal processes. Those who are hypnotized will not carry out suggestions that will gravely harm another person. They will not, for example, shoot another person.

Psychoactive Drugs

- ***Alter perception and perhaps mood***
- ***Stimulants, depressants, hallucinogens***
- ***A depressant drug always depresses the CNS regardless of dosage. But, this can lead to paradoxical behavioural effects…***
- **They can act to increase inappropriate "acting out" behaviour (e.g., alcohol)**
- ***Many drugs are similar in their chemical structure to known neurotransmitters. This may affect the release/reuptake of neurotransmitters. Drugs may also occupy (and thus block) the receptor site because they can mimic the chemical structure of the neurotransmitter. Examples:***
    - **Opiates & endorphins**
    - Methamphetamines & dopamine
    - Cocaine & (perhaps) NA, dopamine, serotonin
    - LSD & serotonin
    - MDMA & serotonin
- ***Upon repeated use,*** **tolerance** ***(also called "neuroadaptation" in Myers' text) for the drug may result.***
    - **A higher dosage is required to obtain the same, initial effect.**
    - This may explain overdosing.
    - It can also explain addiction

- **For some drugs (many hallucinogens, especially marijuana), negative tolerance may develop. The same initial effect can be obtained with a lower dosage.**
- ***Withdrawal & Addiction: Intense craving and pain upon withdrawal from drug.***
    - **Especially severe with those having higher level of tolerance**
- ***Drug usage: Alcohol is the most commonly used psychoactive drug.***

Near-Death Experience

- ***Similar to hallucinogenic experiences: replay of old memories, out-of-body***

sensations.

- *Visual experiences, often bright light.*
- *Associated with oxygen deprivation and inhibition of neurons in visual cortex*

Sensation & Perception (Chapter 6)

Sensation

- Adaptation- *We no longer experience (are conscious of) a constant stimulus. We are thus most conscious of stimuli that signal change (i.e., novel stimuli)*
- Bottom-up processing. *Highly relevant features draws attention*
- Top-down processing*: memory, prior experience important to selective attention (i.e., how we determine what we deem to be relevant)*

Thresholds

- *Absolute threshold. Minimum amount of energy required to detect stimulus 50% of the time*
- *Difference threshold. Minimum change in a stimulus to be detected 50% of the time.*
- *Signal detection theory: There is no absolute threshold. Both the absolute and difference threshold can be influenced by the subject's motivation and expectations. Thresholds will vary depending on what is relevant and by the subject's motivation and bias.*

Subliminal Sensation

- *Subliminal sensation – Does it exist?*
- *A stimulus is presented at apparently below absolute threshold level.*
- *Can we (1) process stimulus input without being conscious of it and (2) be influenced by these apparently "subliminal" stimuli?*
- *There is very good evidence that stimuli that are presented rapidly (so rapidly the participant cannot consciously recognize them) can nevertheless influence our perceptions.*
- E.g. priming. If you are asked to fill in the blank to form a word "A_D, almost all will indicate "AND". Now, if you are presented with the word "BAND" very rapidly (subliminally, so you are not conscious it was presented), and then asked to fill in the blank "AND", you will now probably indicate "AID". You must have processed the word "BAND", even though you were not actually aware of processing it. .
- *We are capable of processing information without being consciously aware of it.*
- *However, there is no evidence that subliminally presented words and images can influence our consumer choices (subliminal advertisement).*

Vision & Audition

- *Have knowledge of structure of retina*
- *Have knowledge of structure of ear*

Vision

- ***Light energy is transduced by the light sensitive rods and cones of the retina.***
- ***Amount of energy: Physical unit is "intensity" of light. Psychological unit (how we perceive physical intensity) is "brightness"***
- ***Structure of retina:***
    - ***Pupil (purpose of constriction & dilation); Lens (accommodation)***
    - ***Receptors (rods and cones) → Bipolar cells→Ganglion cell→Optic nerve***
    - ***Note that the architecture of the retina is an outgrowth from the brain. The rods and cones are located at the back of the retina and the ganglion cells at the front.***
    - ***Light must thus pass through the ganglion and bipolar cells before arriving at the rods and cones.***
    - ***Rods: more sensitive to light but not sensitive to colour. Many rods project to a single bipolar cell.***
    - ***Cones: Less sensitive to light but more sensitive to colour. Only a few cones project to a single bipolar cell. Thus, the light must be very intense (and the output from the cones very high) to cause the bipolar cell to fire.***

Colour vision

- ***The frequency (wavelength) of the electromagnetic signal determines the colour we see.***
- ***Young-Helmholtz's 3-colour, theory (3 cones: red, green, blue)***
    - **Occurs at the level of the receptor (retina)**
- ***Hering's 2-colour (also called "opponent process" colour) theory***
    - **Occurs at a higher level (bipolar cells of retina, thalamus)**

Cortical blindness

- **Cortical blindness & blindsight*: If the visual cortex is severely damaged, the patient does not report seeing.***
- ***The patient might not claim to be conscious of an object yet can distinguish certain features.***

Audition

- ***Physical aspects of sound:***
    - **The physical energy in sound is caused by vibration is air pressure.**
    - **Energy of light: Physical unit is *intensity.* Measured in dB. A shout has a higher intensity than a whisper. Psychological unit (how we perceive the intensity) is *loudness***
    - **Number of vibrations per sec: Physical unit is *frequency.* Measured in Hz. A woman's voice has a higher frequency than a man's. How we perceive the frequency is *pitch*.**
- **Hearing mechanism: *Outer ear→eardrum→ossicles (3 bones) →oval window of cochlea (fluid-filled) →movement of basilar membrane in cochlea→ pushing and pulling of hair cells →auditory nerve***
- ***Frequency theory : explains how we hear low frequencies.***
- ***Place theory: explains how we hear high frequencies.***

Hearing: Hearing Loss

- **Conduction hearing loss*: caused by damage to mechanical structures in the middle ear (eardrum, ossicles).***
    - **Hearing aids (amplifiers for specific frequencies) used in its treatment.**
- **Sensorineural hearing loss*. Damage to the cochlea (especially hair cells) or the auditory nerve. cochlear implants: send electrical signals directly into the auditory nerve***

Touch

- *We are able to detect 4 different types of touch: pressure, heat, cold and pain (but keep in mind that pain is common to all sensory modalities).*
- *Different receptors for each. Thus, we have specialized, pressure, heat and cold receptors.*

Taste

- *Taste: A chemical sense.*
- *Taste buds located mainly in the top and side of tongue. Also, at the back and roof of the mouth.*
- *These "pores" catch food chemicals.*
- *Four tastes (and perhaps five): sweet, sour, salty and bitter. All other tastes are mixtures of these.*
- *Emotional reaction to food seems to be hard-wired.*
- *We can neither taste nor smell some basic nutrients (fat, protein, starch, vitamins).*
- Sensory interaction*: The different senses interact. This is best illustrated by the interaction of taste with olfaction (smell).*

Olfaction (Smell)

- *A chemical sense. Molecules that inhaled bind to receptor cells in the nose.*
- *We still do not know how the receptor cells work or how many different ones we have.*
- *It appears we recognize individual odors.*
- *Primary olfactory cortex is in the temporal lobe & amygdala (thus close to the hippocampal centre for memory).*

Vestibular system/Balance (sense of gravity)

- *The 3 fluid-filled,* semicircular canals *are located in the inner ear.*
- *They detect movement in 3 directions, forward-backward; lateral-medial (side-to-side); up-down*
- *Sensation caused by movement of fluid in the canals→pushing & pulling of hair cells*
- *They detect movement in 3 directions, forward-backward; lateral-medial; up-down*

Pain

- *Common to all sensory modality*
- *Receptors are called nociceptors*
- Phasic *and* tonic *pain*
- *Modulation of pain.* Gate-control *theory. Pain message is carried by specific pain nerve fibres but another message is carried by other nerve fibres. Thus, if we burn our hand, we typically shake it. This sends at least two messages to the brain, a pain message and a touch (shaking of hand) message.*

Perception

- *Perceptual organization*
- *Gestalt* (perception of "*whole*" and not just the sum of the parts). We tend to group

(or organize) sensations into *meaningful patterns*:

- **proximity, similarity, continuity, connectedness & closure.**

Depth Perception

- **Binocular cues *(we require two eyes to see depth)***
  - ***Retinal disparity*. What ones eye sees is not exactly the same as the other**
  - ***Convergence.* The eyes turn inward (converge) and the brain computes the angle of convergence.**
- **Monocular cues: *interposition, relative size, texture gradient-relative clarity (near objects have more detail than far objects), relative height, relative motion, linear perspective (parallel lines converge at a distance), light and shadow***

Motion Perception

- ***Objects that shrink are moving away. Objects that enlarge are moving toward.***
- ***Phi phenomenon. When two adjacent lights blink off and on, they appear to move. Movie theatre lights appear to move.***

Perceptual constancy and set

- **Perceptual constancy *allows us to perceive an object as unchanging even though the stimuli impinging on our receptors actually do change.***
- ***Shape constancy; size constancy;***
- ***Lightness constancy:* Light colours appear to be light in bright light and in dim light. Dark colours appear to be dark both in bright light and in dim light. This is because the light colours are lighter than the dark colours in both bright and dim light.**
- **Perceptual set*: What we perceive is influenced by previous assumptions, expectations and memories.***

Perceptual Adaptation & Learning

- ***Many aspects of perception are innate and genetically determined. See textbook for example of the visual cliff. Humans appear to be born with the ability of detect depth.***
- **Restored vision: *When adults who have been blind from birth regain sight, they are able to distinguish colour and foreground from background. They can distinguish individual features. But, they have a difficult time distinguishing "whole" objects.***
  - ***This is because of the failure to form new neural networks in the cortex that develop through experience and learning.***

- **Critical period*: Many (but not all) aspects of perception have to be learned. If they are not learned before a certain critical period, they can never later be learned.***
- ***Kittens raised from birth in a restricted environment (seeing only vertical or horizontal stripes), never learn to perceive the opposite environment if the learning does not take place before a certain critical period very early in their lives (if raised in an environment consisting of only horizontal stripes, they can never learn to perceive verticals).***
- **Perceptual adaptation: *Many mammals (especially humans) can re-learn (or adapt) to large changes in stimulus input. Humans that wear goggles that invert their vision***

soon learn to adapt.

Extrasensory Perception (ESP), Parapsychology

- *More than 50% of adults believe in ESP.*
- *There is however almost no evidence to support it. Results are not reproducible.*
- *In the rare cases in which a statistically significant effect is found, it cannot be replicated in other studies.*
- *ESP is studied by* parapsychologists.
- *Telepathy*: mind-to-mind communication
- *Clairvoyance*: perceiving remote, at a distance events (you know your mother is ill even though she lives in a different city)
- *Precognition:* Perceiving future events
- *Psychokinesis*: the "mind" moving (or influencing) matter.

Learning (Chapter 7)

- Classical conditioning:
- *An association is made between two previously unassociated stimuli (UCS & CS).*
- *UCS – UCR; CS-CR (Note UCS called US and UCR called UR in Myers).*
- Respondent behaviour*: actions that are automatic (reflexive) responses (UCR or CR) to a stimulus (such as salivating in response to meat powder and later in response to a tone).*
- *Generalization; extinction; spontaneous recovery*
- *Discrimination: the ability to discriminate between a CS and other stimuli that do not lead to an UCR.*

- *Strength of UCS+CS association determined by:*
  - The frequency (number) of prior associations
  - The predictability of the associations. We come to be able to predict the CS→UCS. Top-down *cognitive* relationship.
  - Time between CS and UCS. Most rapid conditioning occurs when CS occurs shortly before UCS.
  - But see *biological predisposition*.

- Biological predisposition (example):
  - Garcia and Koelling's questioned whether any neutral stimulus could act as a CS:
  - A rat is given a drug that will cause vomiting (UCS→UCR). Food or light or sound (CS) is paired with the drug.
  - The animal will learn to avoid the food (CS), but not the light or sound.
  - Food (a biological predisposition to vomiting) → CR

Classical & Operant Conditioning

- *Both classical and operant conditioning involve the learning of new associations.*
- *Classical conditioning: association made between two previously unassociated stimuli (UCS & CS).*

- Respondent behaviour (*classical conditioning*)*: automatic, reflexive responding (example: salivating to food)*
- *Operant conditioning: Association made between stimulus (S) and response (R); Association made between response (R) and the consequences of responding (Cr) – whether the response is reinforced or not*

- Operant behaviour (*operant conditioning*)*: Voluntary (choice) responding. Behaviour that operates on the environment; learning associations between its behavior and resulting events*

Operant conditioning

- *Association made between stimulus (S) and response (R); Association made between response (R) and the consequences of responding (Cr) – whether the response is reinforced or not*
- *Thorndike's experiments.* Law of effect: *An animal will learn to repeat a response of if it receives a reward (i.e., the effect of the response is to receive a reward)*
- *Stimulus-response-reinforcement*
- *Schedules of* reinforcement
    - Fixed, variable
    - Ratio, interval
- Positive and negative reinforcers*. Both* increase *the rate of responding. Negative reinforcement is* not *punishment.*
- Extinction vs Punishment
    - *Extinction: To remove and inappropriate response, identify the reinforce (which strengthens the response) and remove it. The response should then be extinguished.*
    - *An alternative is punishment. Punishment is also intended to remove and inappropriate response. It often is ineffective.*
    - Positive *punishment: administer an aversive stimulus (e.g., spanking)*
    - Negative *punishment: Withdraw a desirable stimulus (If you don't study, can't go out; Drunk driving = Lose driver's license)*

Intrinsic & Extrinsic Motivation

- Intrinsic *– the desire to perform an activity for its own sake (internal reinforcement).*
- Extrinsic *– the desire to perform an activity to receive an external reinforcement or to avoid punishment.*
- Giving a reward for an activity that is already enjoyed intrinsically can backfire
    - University athletes enjoy participating in a sport less if they receive an athletic scholarship than if they do not.
- However, extrinsic motivation can increase performance.

Learning without reinforcement – Latent Learning

- *Rats will explore a maze without any apparent reinforcement.*
- *When food is subsequently placed in the maze's goal box, the rats immediately perform as well as rats that had previously been reinforced.*
- *They thus demonstrate "*latent learning*".*

- *Rats therefore appear to learn a type of "*cognitive map*" when they are freely allowed to explore a maze.*

Social modelling/imitation (observational learning).

- *Learning through* modelling *and* imitation *of peers & media. Bandura's studies*
- Mirror neurons. *When an animal engages in a particular behaviour (for example lifting an arm), a particular area of the brain is activated. When the same animal observes another animal doing the same thing, the same neurons fire. The neurons mirror the actions of another animal.*
- *Mirror neurons also act to infer another's mental states. This is called the "*theory of mind*". It explains* empathy*. You may experience pain by seeing an animal in pain*

Pro & Anti-social effects of social modelling

- *Violence-viewing effect. More than 60% of TV programmes feature violence. Often the violence is not punished. Often, the victim shows no pain. Often the violence is "justified".*
- *The violence viewing effect may lead to* imitation.
- *Prolonged exposure to violence also leads to* densensitization.

Memory (Chapter 8)

- *See lecture notes for summary*

Motivation & Work (Chapter 11)

- Instinct theory: *A theory that maintains that much behaviour is genetically determined. It has a* fixed pattern *and is* unlearned*. It is the same behaviour in all members of the species*
- Drive*: an activated or aroused state that is triggered by a physiological need*
- Drive reduction*: creates arousal that* drives *the organism to reduce the* need*.*
    - Internal "*push*"
- Homeostasis
- Incentives: *positive or negative stimuli that lure or repel us. Much influenced by learning.*
    - External "*pull*"

Sexual Hormones

- *Play a much more important role in non-primates than primates*
- Estrogen: *Present in much greater quantity in females than males. In humans, at menopause, women have a much decreased sex drive*
- Testosterone: *Present in much larger quantities in males than females. In humans, males that have been castrated have a decreased interest in sex.*

Sexual Response Cycle

- *Excitement, plateau, orgasm, refractory periods.*

Adolescent sexuality

- *Teen pregnancy might reflect:*
  - *Lower use of contraceptives and higher rate of pregnancy in US compared to European teens.*
  - *Ignorance. Lack of sex education. Education does not lead to higher sexual activity*
  - *Ignorance about birth control*
  - *Embarrassment about discussing contraception with the sex partner*
  - *Guilt about sexual activity: 75% of American teen girls (12-17 year olds) regret sexual activity. This may reduce sexual planning for contraception.*
  - *Mass media modelling valuing promiscuity*

Maslow's hierarchy of needs

- *There are a hierarchy of needs.*
- *At the base, there are the* physiological needs *(hunger, thirst, sleep) followed by safety needs,*
- *then* belongingness and love *needs,*
- *then* esteem *needs and*
- *finally at the pinnacle,* self-actualization *needs.*
- *Only when a need is met at a lower level can one move to the next level. One cannot attain belongingness and love without satisfying the need for food.*
- *Humans who are put on semi-starvation diets are haunted by food giving up social relationships and sex.*

The Need to Belong (Socialization)

- *Many animals (including) humans are social animals. They* need to belong *to a group. They do not want to be alone.*
- *Socializing increases the likelihood of survival*
- *Children raised in isolation become withdrawn, fearful, even speechless.*
- *Adults feel depressed.*
- *People are often willing to remain in an abusive relationship because of the fear of being alone.*
- *Fear of being alone also leads to conformity to peer pressure*

Social-applied aspects of motivation

- *In the workplace, an* industrial-organizational (I/O) psychologist *will use psychological principles to optimize output and human behaviour.*
- Organizational *psychology. A branch of I/O that examines organizational influences, supervision on worker satisfaction and output.*
- Personnel *psychology. A branch of I/O that examines employee recruitment, selection, placement.*
- Human factors *psychology. Examine how machines, environments and humans interact. A common problem with much of modern equipment and software is that it is not "user-friendly". Human factors psychologists provide input into how complex systems can be made easier-to-use by humans.*

- Flow. ***A completely focused state of consciousness with diminished awareness of self and time. This is because of optimal engagement in one's skills or work.***

Personnel Psychology

Selecting effective employees:

- Best predictors of success are general mental abilities, aptitude tests, past job performance
- Interviews are very poor predictors of eventual success. Why? (Check text). Structured interviews are much better than unstructured interviews
- ***Appraising performance: Several rating scales can be used (see text).***
- ***In many organizations, performance feedback comes from many sources, not just supervisors.***
- 360 degree feedback ***: you rate yourself, your supervisors, your colleagues and they will rate you.***

Motivating achievers

- ***Outstanding achievers are not more intelligent nor do they have more natural skills.***
- ***They do have a great deal of discipline (i.e., work hard)***
- ***They have what is called*** grit***: exceptional motivation, high levels of self-discipline and focuse daily goals.***

Leadership Style

- Task leadership: ***setting standard, organizing work and setting goals. Task leaders are good at keeping a group focused on its goal. They tend to have a directive, autocratic style.***
- Social leadership***: mediates conflicts and builds a team approach. More democratic. Delegate authority.***
- ***Effective leaders appear to use both styles of leadership.***

Emotions (Chapter 12)

- ***See text and lecture summary for details***