SAMPLE NOTES

PSYCH10003

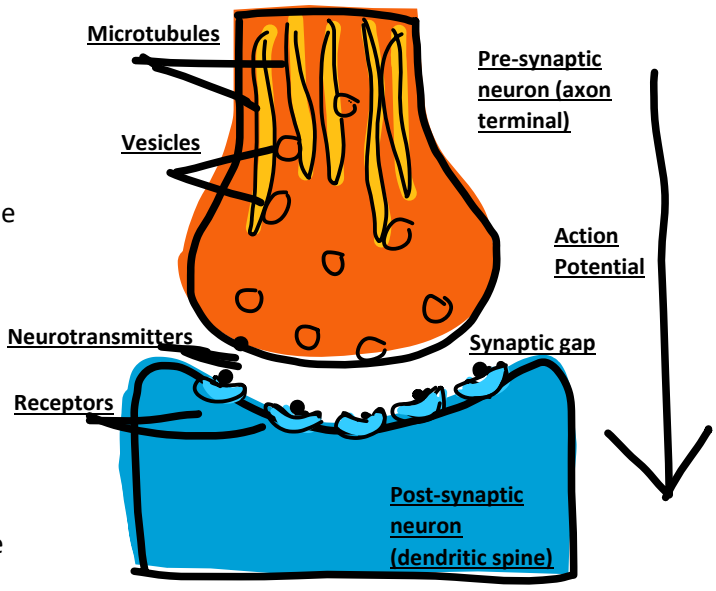
- When enough depolarisation occurs at the axon hillock, sodium and potassium gates open. Initially this permits Na+ in, thus making the inside of the axon positively charged from -70 mV to +40 mV (depolarisation). Due to this imbalance, K+ gates open and allow it out due to diffusion and electrostatic pressure (repolarisation). The sodium-potassium pump then restores the membrane potential to 70 mV after it slightly overshoots (hyperpolarisation). At the peak of the action potential Na+ gates close and cannot re-open until the membrane reaches its resting potential again (refractory period)

Saltatory Conduction of the AP
- The Nodes of Ranvier are gaps in the myelin along the axon where sodium-potassium gates are located and enable movement. This means the signal is just as strong at the start and end of the neuron.
- The importance of the signal is measured by the number of APs. The amplitude is the same, but the frequency will be higher in a more important signal (rate law)
- This jumping of action potential has two advantages:
  - Saves energy
  - Increases speed of neural transmission

All-or-none Law
- The all-or-none law proposes that an action potential either occurs or does not occur. This threshold that must be reached is 50 mV

Neurotransmission

Myasthenia Gravis
- Myasthenia Gravis is an autoimmune disease in which Ach receptors are destroyed. It is characterised by extreme fatigue, weakness in proximal muscles and respiration
- Treatments: anticholinesterase (AChE) which increases the effects of ACh
  - immunosuppressant
  - remove thymus



Release of Neurotransmitters
- Action potential moves vesicles towards the membrane
- Proteins guide the vesicles to the membrane and pull the membranes together
- Ca^{2+} ions induce fusion and release of NT
- Types of synapses:
  - Axodendritic: axon to dendrite
  - Axosomatic: axon to soma
  - Axoaxonic: axon to axon

Activation of Receptors
- Ionotropic receptors: have own binding site
- NT binds, channels open and allow movement of ions which cause the membrane potential to fluctuate
- Excitatory post-synaptic potential (EPSP): inflow of Na+ results in depolarisation of the post-synaptic membrane which increases the likelihood that the action potential is triggered
- Inhibitory post-synaptic potential (IPSP): outflow of K+ or inflow of Cl- results in hyperpolarisatio

- Skinner: Skinner box with rats, food and shock. To increase likelihood of desired behaviours being completed, increase hunger and thus motivation, or decrease opportunities for irrelevant responses

Operant Conditioning

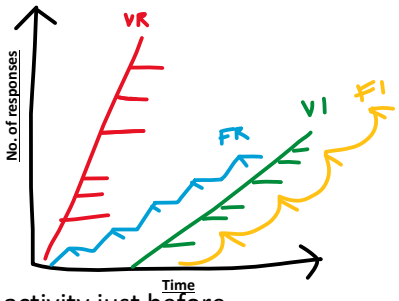
- Operant conditioning: process of conditioning a voluntary behaviour with an active learner via reinforcement and punishment of behaviour
- Operant: behaviour designed to operate in an environment to generate a consequence
- Consequences: increases or decreases likelihood of behaviour occurring in the future
  - Reinforcement: increases the likelihood of a behaviour being repeated in the future
    - Positive: addition of positive stimulus *E.g. chocolate being given*
    - Negative:Z6t removal of aversive stimulus *E.g. headache going away*
  - Punishment: decreases the likelihood of a behaviour being repeated in the future
    - Positive: addition of aversive stimulus *E.g. inflicting pain*
    - Negative: removal of positive stimulus *E.g. taking phone away*
      - Response cost: losing something desirable, doesn't necessarily result in reduced behaviour
- Shaping: reinforces successive approximations to the desired complex behaviour
  - Start by reinforcing high frequency component *E.g. pecking,* drop reinforcement to create variable behaviour, reintroduce reinforcement with closer behaviour, repeat cycle in closer and closer approximations

Reinforcement Schedules

- Continuous reinforcement schedule: every response is reinforced, rapid learning, good for shaping new behaviours but does not occur naturally
- Intermittent/partial reinforcement schedule: not reinforced every time, persistent learning through 'testing' for the reward (4 types)
- Extinction: when reinforcement withheld, not immediate, extinction burst, results in variable behaviour good for shaping. Partial is harder to extinguish than continuous reinforcement

Types of Partial Reinforcement Schedules

- Ratio schedules: number of responses
  - Fixed-ratio schedule (FR): reinforced after fixed number of correct responses, bursts of activity with post-reinforcement pauses *E.g. commission*
  - Variable-ratio schedule (VR): reinforcement varies within range, steady response that is persistent due to hope, best reinforcement *E.g. gambling*



- Interval schedules: passage of time
  - Fixed-interval schedules (FI): reinforcement given after fixed time, high activity just before reward, post-reinforcement pauses *E.g. test every four weeks*
  - Variable-interval schedules (VI): reinforcement given after average time, slow but steady learning, testing *E.g. surprise quizzes*

Increasing effectiveness

- Punishment:
  - Contingency: clearer relationship due to punishment every time (consistency)
  - Contiguity: punishment immediate (swift)
- Positive reinforcement:
  - strongly reinforcing stimuli, immediate reinforcement, continuous then partial, variety of reinforcers, minimise use of food as reinforcer, encourage self-reinforcement (internal pride)