Notes on PSY100

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Contents

1 Welcoming Sep7

The purpose of psychology is to give us a **completely different** idea of the **things we know best**. *Attributed to French poet Paul Valery*

Experimental Psychology *Wilhelm Wundt Leipzig, Germany*

New Items

- Structuralism
  Descriptive.
- Functionalism
  Understand how consciousness works, inspired by **Evolutionary Theory**.
- Behaviourism
  Mind is a **Black Box**, focus stimulus and responses.
- Humanism
  Psychical analysis. Personality.

Course structures

1. Research Methods.
2. (a) Biological.
   (b) Developmental.
   (c) Cognitive.
   (d) Social & personalty.
   (e) Mental psychical health.
3. Integration.

2 Sep14 2017

Variables A characteristic or condition that changes or has different values for different individuals.

- **Independent variable** A variable that is *manipulated*, in order to see its impact on the dependent variable.
- **Dependent variable** A variable that is *measured* in order to see how it is affected by the independent variable.
- **Operational definitions** Definitions of theoretical constructs that are sated in term of concrete, observable procedures.
  Construct Internal attributes or characteristics that cannot be directly observed but are useful for describing and explaining behaviour.

  - Physiological measure.
  - Behavioural measure.
  - Self-reported measure.

Types of Research & Subsequent Claims

- **Descriptive Research**
  - Observations, case studies.
  - May result in claims regarding the *frequency of some behaviour*.
- **Correlational Research**
  - May lead to claims regrading to the *association between variables*.
- **Experimental Research**
  - May lead to claims regarding to the *casual relationship* between two variables.

Confound : Anything that may unintentionally vary along with the independent variable.

Random assignment Each participant has an equal chance being assigned to each experimental condition.
Necessary Component of experiment.

Random sample Each member of the population you are interested in has an equal change of being chosen to participate.

3 Sep. 21 The Nervous System

- Central nervous system (CNS)
  - Brain & Spinal cord.
- Peripheral nervous system (PNS)
  - Somatic nervous system.
  - Autonomic nervous system.

4 Notes on slides: Biological Foundations of Behaviour, Sep. 19. 2017

Twin Studies & Adoption Studies

- Compare impact of **genetic** and **environmental** influences.
- **Monozygotic** and **dizygotic**.

Epigenetic *Epi* → *Outer* Changes in gene expression that are due to non-genetic influences.

4.1 Heredity v.s. Heritability

Heredity Genetic transmission of characteristics from parents to offspring.

Heritability(Coefficient) An estimate of the *genetic proportion* of the variation in some specific trait.

- Within **population** (not individual).
- % of **variation** explained by genetic differences.

4.2 The Nervous System

Central Nervous System(CNS)

- **Brain**.
- **Spinal cord**.

Peripheral Nervous System(PNS)

- **Somatic nervous system**.
- **Autonomic nervous system**.
  - Sympathetic nervous system.
  - Parasympathetic nervous system.

4.3 Neurons

- **Sensory** → Afferent.
- **Motor neurons** → Efferent.
- Interneurons.

Signals affecting Polarization of the cell.

- **Excitatory signals** increase the probability of *firing*.
- **Inhibitory signals** decrease the probability of *firing*.

4.3.1 Firing

Firing generates an **action potential** if excitatory input is larger that *threshold*.

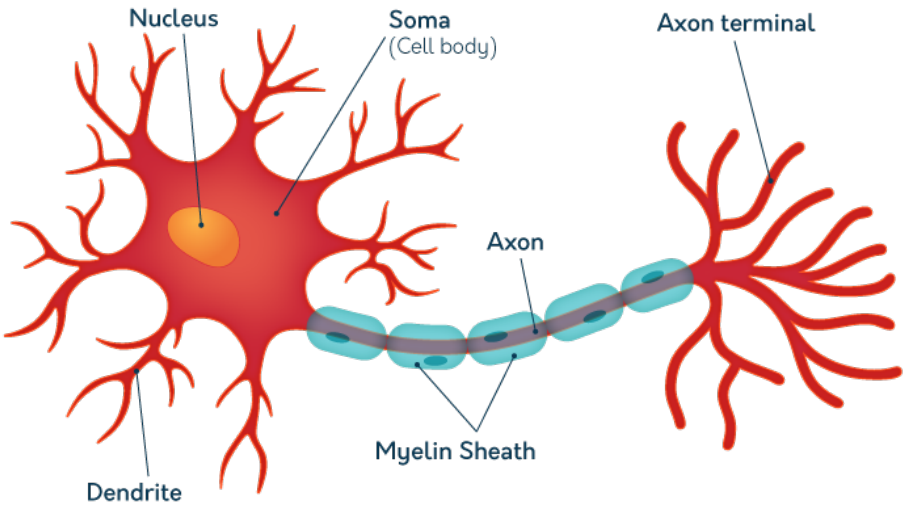

Figure 1: Structure of neuron

All or none principle Neurons fire with **same** *potency*, with, perhaps, **different** *frequency*.

Action potential the **neural impulse** that passes along the **axon** and subsequently causes the release of **chemical** from the **terminal buttons**. Action potential originates at the *base* of the axon and rapidly travels down.

Grey matters : Cell bodies and dendrites.

White matters : Myelinated axons.

Process of firing:

1. **Resting state** Neurons are *polarized* at rest $= -70mV$.
2. **Depolarization**(if and only if voltage reaches the *threshold*, and the axon will be *fully* depolarized).
   - Na^+ channels *open*, large amount of Na^+ ions get in.
   - Small amount of K^+ ions get out.
3. **Re-polarization**
   - Na^+ channels *closed*.
   - K^+ channels *open*, large amount of K^+ ions get out.

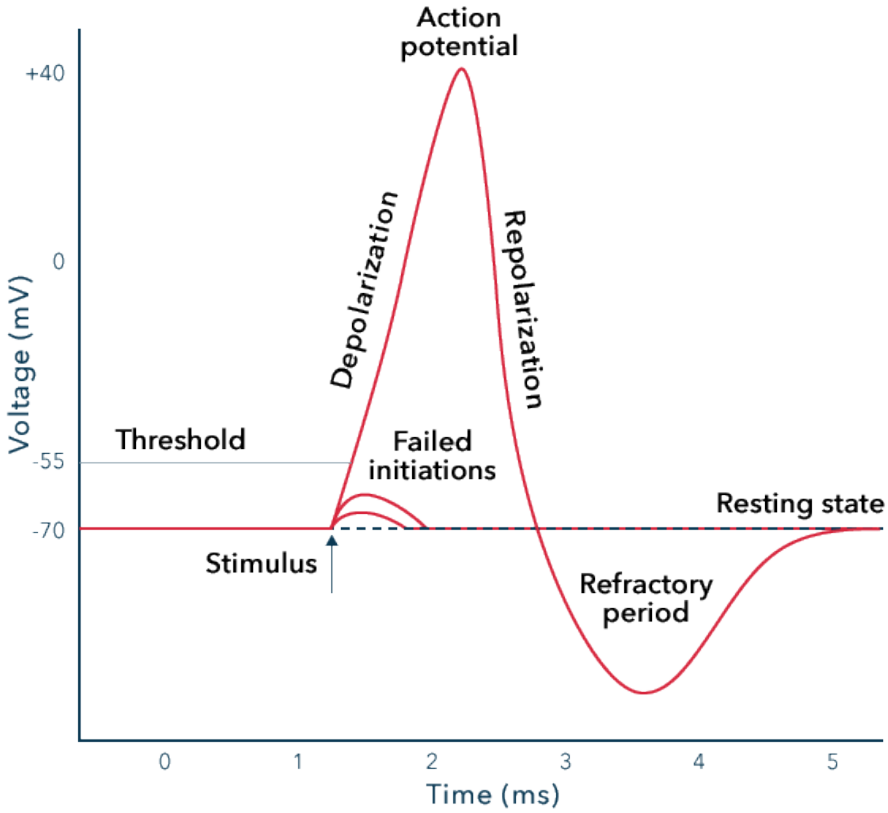

Figure 2: Voltage changes in axon when neurons is firing.

4. **Hyper-polarization** (*over-shooting*), during this **refractory** period, neuron can **not** fire.
5. **Rest state** k^+ channels *closed*, voltage increases back to *rest state*.

4.4 Neurotransmitter

Neurotransmitter is *chemical* substances carry *signals* between neurons. And neurotransmitters are stored in **vesicles**.

4.4.1 Drugs

Agonists **Enhance** neurotransmitters' actions.

- **Increase** the **release** of neurotransmitter.
- **Block** the **pre-take up** neurotransmitter.

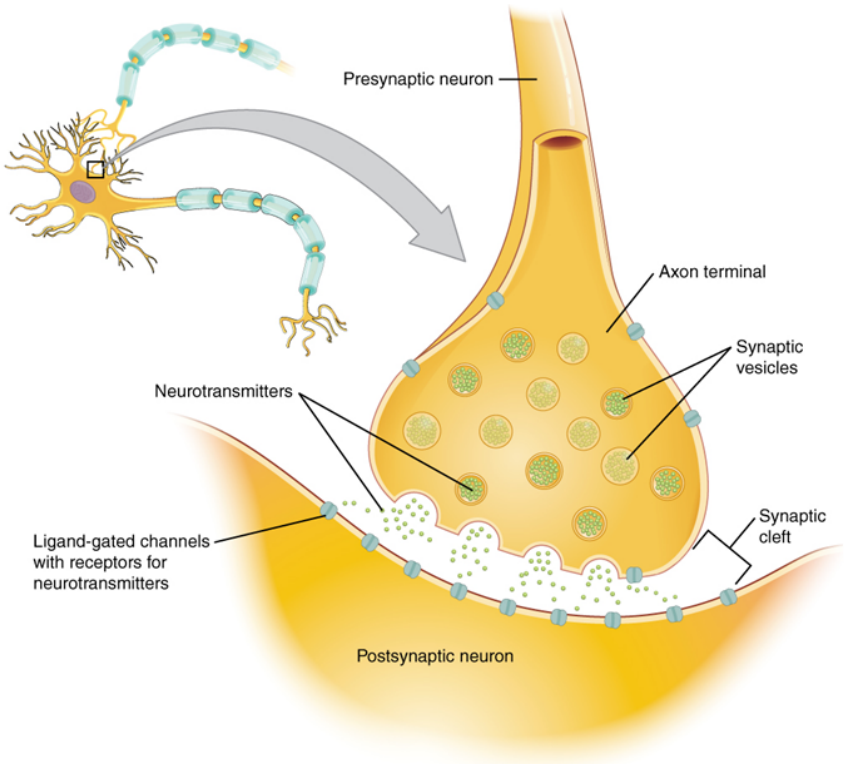

Figure 3: Neurotransmitters, vesicles, terminal buttons and dendrites.

Neurotransmitter	**Usages**
Glutamate	Primary **excitatory** transmitter.
GABA	Primary **inhibitory** transmitter.
Serotonin	Mood, impulsiveness, hunger and sleep.
Dopamine	Reward and motivation, voluntary movement.
Acetylcholine	Motor control (nerves and muscles), memory, sleep.
Epinephrine(Adrenaline)	energy
Norepinephrine	Arousal, alterness

Table 1: Common neurotransmitters

- **Mimicking** a neurotransmitter to activate a postsynaptic receptor.

Antagonists **Inhibit** neurotransmitters' actions.

- **Block** the **release** of neurotransmitter.
- **Destroy** neurotransmitter in the synapse.
- **Mimicking** a neurotransmitter.

4.5 Brains: From the button up

Contralateral control Nervous carrying motor and sensory information *crossover*. Right somatosensory cortex process left side of body.

- **Cerebral cortex**: complex *mental* activities.
- **Limbic system**: emotions and basic drives.
- **Basal ganglia & cerebellum**: movement.
- **Brainstem**: Survival.

4.5.1 brainstem

1. Med brain.
2. Pons.
3. Medulla.

Function: Reticular formation(alertness and sleeping).

4.5.2 Cerebellum

Function: Coordinate **movement** and **balance**.

4.5.3 Hypo-thalamus

Function: Master **regulatory structure** and link *nervous system* and *endocrine system*.

4.5.4 Thalamus

Gateway to the brain.

Handles all incoming sensory information **except smell**.

4.5.5 Hippocampus

Memories.

4.5.6 Amygdala

Emotional and *intensifies* memory when **emotional arousal**.

4.5.7 Cingulate gyrus.

Regulating **emotions** and **pain**(both *physical* and *social* pain). *Predicting and avoiding.*

4.5.8 Basal ganglia

Subcortical nuclei

i). Caudata nucleus.

ii). Putamen.

iii). Globus pallidus

iv). Nucleus accumbens.

Producing/Planning movement

Cortex → Basal ganglia → Motor centers of brainstem

4.5.9 Cerebral cortex

4.6 Four Lobes in each hemisphere

4.6.1 Frontal lobe

- Primary **motor** cortex.
- **Prefrontal cortex**.

4.6.2 Pariental lobe

- Primary **somatosensory** (*touch*) cortex.

4.6.3 Temporal lobe

- Primary **auditory** cortex.

4.6.4 Occipital lobe

- Primary **visual** cortex.

Prefrontal cortex: 30% of human brain.

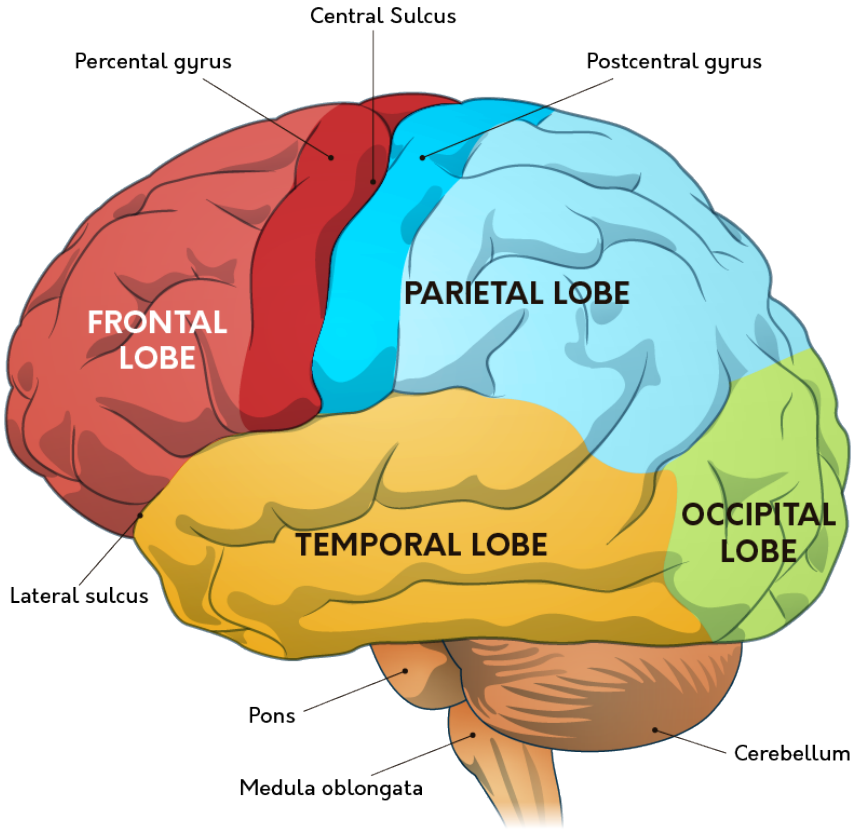

Figure 4: Structure of brain.

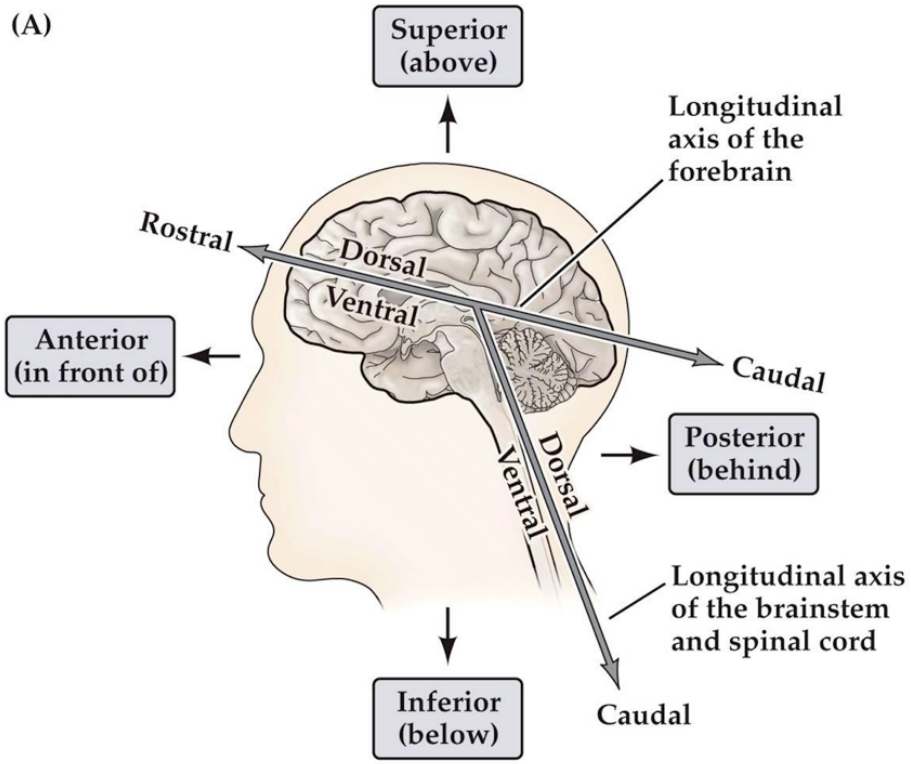

Figure 5: Structure of brain.

Cortical sensory representing each part of body. Connected parts of the body tend. to be represented beside each other. Sensitive regions trend to have larger cortical area.

Plasticity The ability to *change*, *reorganize*, as a result of *experience*, *drugs*, *injury*.

4.7 The peripheral nervous system

Functions:

i). Trans. information to central nervous system.

ii). Responds to information from central nervous system.

Contents:

i). Somatic nervous system (SNS).

  a). Concern **external** environment.

  b). Conscious/voluntary control.

  c). Motor nervous (signals from the brain to the muscles).

  d). Sensory neurons.

ii). Autonomic nervous system (ANS).

  a). Concern **internal** environment.

  b). Divisions of the ANS.

- **Sympathetic**: prepare body for actions.
  ↕ *complementary* ↕
- **Parasympathetic**: return body to normal state.

4.8 Endocrine system

Function: Regulate psychological activities with nervous system.

Difference between endocrine system and nervous system

- **Endocrine system**: Release **Hormones**(*chemicals* from **endocrine glands**) into blood stream. So the effects are *slower* but *long lasting* and *widespread*.
- **Nervous system**: Release **electrochemical** signals.

4.9 Coordinated system

Hypothalamus connects the systems and control **pituitary gland**.

Process:

1. **Neural activation**
2. **Hypothalamus** secrete releasing factors.
3. **Pituitary gland** releases hormones.
4. **Hormones** travel through blood stream to the target.