

Psych Final Exam RECAP

CHAPTER 1: INTRODUCTION

Psychological Science

- 1) **Hindsight bias:** after knowing the outcome, we think we could've predicted it.
- 2) **Judgemental Overconfidence:** knowing the answer makes us overconfident.
- 3) **Perceiving order in random events:** after seeing a repetition in a sequence, we're more likely to choose what belongs to the pattern than to what is actually accurate.

The Scientific Attitude

- 1) **Curiosity:** exploring and questioning without being misled or misleading
- 2) **Skepticism:** questioning. Not believing everything you hear.
- 3) **Humility:** willingness to be surprised or to know there's a possibility of error

Thinking Critically

- A more careful style of forming and evaluating knowledge than simply intuition.
- Analyzing rather than accepting information
- Considering alternatives
- Searching for hidden assumption
- Looking for hidden bias

The Scientific Method

Theory: an explanation that predicts behaviors or events

Hypothesis: a testable prediction

Operational definition: a statement of the exact procedures of a study

Replication: repetition in a study with different audiences and in different situations to get the most accurate data

- 1) **Descriptive Research:** describe behaviours by using case studies, surveys and interviews, or naturalistic observation.

Random Sampling: uses random sampling of population for best results. Fairly represents a population.

- 2) **Correlational Research:** a measure of how closely two factors vary together.

Factor: anything that contributes to a result.

Positive Correlation: a direct relationship where two factors increase or decrease *together*. (0 to +1)

Negative Correlation: an inverse relationship where two factors move in *opposite directions*. (0 to -1)

Correlation Coefficient: a statistical measure of how closely related two things vary together.

- 3) **Experimental Research:** experiments that manipulate, or vary, factors to discover their effects.

Placebo effect: Effect involves results caused by expectations alone.

Double-blind procedure: neither those in the study or those collecting the data know which group is receiving treatment. Eliminating bias.

Experimentation Variables

Independent variable in an experiment	Factor that is manipulated; the variable whose effect is being studied
Confounding variable in an experiment	Factor other than the independent variable that might produce an effect
Dependent variable in an experiment	Factor that is measured; the variable that may change when the independent variable is manipulated

Comparing Research Methods

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Weaknesses
Descriptive	To observe and record behaviour	Do case studies, naturalistic observations, or surveys	Nothing	No control of variables; single cases may be misleading
Correlational	To detect naturally occurring relationships, to assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Cannot specify cause and effect
Experimental	To explore cause and effect	Manipulate one or more factors; use random assignment	The independent variable(s)	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables

Important Terms When Collecting Data

Mode: Most frequently occurring score(s) in a distribution (most common)

Mean: Arithmetic average of a distribution, obtained by adding the scores and then dividing by the number of scores; can be distorted by few atypical scores (average)

Median: Middle score in a distribution; half the scores are above it and half are below it (very middle)

Range: Difference between the highest and lowest scores in a distribution (Ex. The set of scores was 50-100)

Standard deviation: Computed measure of how much scores vary around the mean score (Ex. are their outliers in this data?)

Normal curve (normal distribution): Symmetrical, bell-shaped curve that describes the distribution of many types of data; most scores fall near the mean (around 68 percent fall within one standard deviation of it) and fewer and fewer near the extremes.

- Scores on aptitude tests tend to form a normal, or bell shaped curve. For example, the most commonly used intelligence test, the Wechsler Adult Intelligence Scale, calls the average score of 100.

CHAPTER 2: NEURAL AND HORMONAL SYSTEMS // THE BRAIN

A. NEURAL SYSTEM

Phrenology: a popular theory that claimed that bumps on the skull reveal our mental abilities and our character traits. Discovered by Franz Gall.

Neuron: Nerve cell; the basic building block of the nervous system

Dendrites: Neuron extensions that receive messages and conduct them toward the cell body

Axon: or nerve fiber is a long, slender projection of a nerve cell, or neuron, in vertebrates, that typically conduct electrical impulses known as action potentials away from the nerve cell body.

Glial cells (glia): Cells in the nervous system that support, nourish, and protect neurons; they may also play a role in learning, thinking, and memory. Creates myelin. Glia translates to glue.

Synapse: Junction between the axon tip of the sending neuron and the dendrite or cell body of the receiving neuron. The gap between the communication.

Myelin sheath: The axons of some neurons are encased by a myelin sheath, which helps speed their impulse.

**** Multiple sclerosis:** involves the degeneration of this layer, thus interfering with neural communication with muscles and other areas.

Refractory period: Period of inactivity after a neuron has fired

Threshold: Level of stimulation required to trigger a neural impulse

All-or-none response: Neuron's reaction of either firing (with a full-strength response) or not firing.

Neurotransmitters: Neuron-produced chemicals that cross synapses to carry messages to other neurons or cell. When released by the sending neuron, neurotransmitters travel across the synapse and bind to receptor sites on the receiving neuron, thereby influencing whether that neuron will generate a neural impulse.

Reuptake: Neurotransmitter's reabsorption by the sending neuron

Action Potential Process

- 1) **Resting Potential:** Outside of neuron is + // Inside of neuron is - (-70mV)
- 2) **Depolarization:** Once it is triggered by a potential electrical impulse, voltage-gated ion channels open and allow sodium to rush into the cell. Outside of neuron is now - (-55mV)
- 3) **Repolarization:** Threshold is reached and the electrical impulse is sent (+40mV). Potassium channels open, evening the cell back out to normal voltage.
- 4) **Refractory Period:** Membrane potential is even lower than -70mV. Sodium channels remain closed until the cell reaches resting membrane potential.

Neuron Communication

- When electrical impulses reach the axon terminal, they stimulate the release of chemical messengers called neurotransmitters that cross the junction between neurons called the synapse.

- After these molecules traverse the tiny synaptic gap (cleft) between neurons, they bind to receptor sites on neighboring neurons, thus passing on their excitatory or inhibitory messages.
- Excess neurotransmitters are reabsorbed, in a process called reuptake, drift away, or are broken down by enzymes.

Neurotransmitters

Agonist: Molecule that increases a neurotransmitter’s action.

Antagonist: Molecule that inhibits or blocks a neurotransmitter’s action.

Neurotransmitter	Function	Examples of Malfunctions
Acetylcholine (ACh)	Enables muscle action, learning and memory	With Alzheimer’s disease, ACh-producing neurons deteriorate.
Dopamine	Influences movement, learning, attention, and emotion	Oversupply linked to schizophrenia. Undersupply linked to tremors and loss of motor control in Parkinson’s disease.
Serotonin	Affects mood, hunger, sleep, and arousal	Undersupply linked to depression, Some drugs that raise serotonin levels are used to treat depression.
Norepinephrine	Helps control alertness and arousal	Undersupply can depress mood.
GABA (gamma-aminobutyric)	A major inhibitory neurotransmitter	Undersupply linked to seizures, tremors, and insomnia.
Glutamate	A major excitatory neurotransmitter; involved in memory	Oversupply can overstimulate the brain, producing migraines or seizures (which is why some people avoid MSG (monosodium glutamate) in food).

Nervous system: Body’s speedy, electrochemical communication network, consisting of all the nerve cells of the central and peripheral nervous systems

Central nervous system (CNS): Brain and spinal cord are body’s decision maker

Peripheral nervous system (PNS): Links the central nervous system with the body’s sense receptors, muscles, and glands. The axons carrying this PNS information are bundled into the electrical cables we know as nerves.

Autonomic nervous system: Involuntary.

Sympathetic subdivision: arouses and expends energy and enables voluntary control of skeletal muscles

Parasympathetic subdivision: calms and conserves energy, allowing routine maintenance activity and controls involuntary muscles and glands

Somatic nervous system: Voluntary. Deals with skeletal muscles.

Types of Neurons

- 1) **Sensory neurons:** Carry messages from the body’s tissues and sensory receptors inward to your spinal cord and brain for processing.

- 2) **Motor neurons:** Carry instructions from your central nervous system to the body's muscles
- 3) **Interneurons within brain and spinal cord:** Communicate with one another and process information between the sensory input and motor output. They "interconnect".

B. HORMONAL SYSTEM

Endocrine system: is a set of glands that secrete hormones into the bloodstream.

Hormones: chemical messengers produced in one tissue that travel through the bloodstream and affect other tissues, including the brain

Pituitary gland: is the master gland that influences hormone release by other glands, including the adrenal glands.

The endocrine system's hormones influence many aspects of our lives, including growth, reproduction, metabolism, and mood, keeping everything in balance while responding to stress, exertion, and internal thoughts.

Feedback system: Brain → pituitary → other glands → hormones → body and brain

C. THE BRAIN

4 Ways to Examine the Brain

- 1) **EEG (Electroencephalogram):** electrodes are placed on the scalp. Measuring waves.
- 2) **PET (Positron emission tomography):** measures radioactive elements introduced into the brain. Small amount of a radioactive form of glucose (called a tracer) is injected into the bloodstream. How drugs affect the brain. Lowest time resolution out of them all.
- 3) **MRI (Magnetic resonance imaging):** oxygen in the brain - which regions of the brain might be involved; a thousand times slower than EEG. Measuring magnetic fields and radioactive waves.
- 4) **fMRI (Functional MRI):** Used to look at blood flow to certain areas of the brain.

Parts of the Brain

Cerebellum	Awareness of time, texture and sound, and emotions
Thalamus	"The brain's switchboard"
Pons	Coordinates movements and controls sleep
Reticular Formation	Arousal
Medulla	Heartbeat and breathing
Brainstem	Survival functions (eating, breathing, etc.)

The Limbic System

Hypothalamus	Maintenance. Controls pituitary. Pleasurable rewards.
Amygdala	Aggression and fear
Hippocampus	Memory

The Cerebral Cortex

Frontal lobe	Muscle movement, planning, and judgement
Parietal lobe	Touch and body position
Occipital lobe	Visual fields
Temporal lobe	Auditory

The Body's Cross-Wiring - Nerves from one side of the brain are mostly linked to the body's opposite side

Functions of the Cortex

Motor cortex

- *Fritsch and Hitzig*: Discovered motor cortex at rear of frontal lobes
- *Foerster and Penfield*: Mapped motor cortex and discovered body areas requiring precise control and mouth occupied most cortical space.
- The amount of cortex devoted to a body part in the motor cortex (in the frontal lobes) or in the somatosensory cortex (in the parietal lobes) is not proportional to that body part's size.
- Rather, the brain devotes more tissue to sensitive areas and to areas requiring precise control. Thus, the fingers have a greater representation in the cortex than does the upper areas.

**Lips require the most "space" in the somatosensory cortex.

Output: Motor Cortex (Left hemisphere section controls the body's right side)

Input: Somatosensory Cortex (Left hemisphere section receives input from the body's right side)

Sensory functions

- The visual cortex of the occipital lobes at the rear of your brain receives input from your eyes.
- The auditory cortex, in your temporal lobes - above your ears - receives information from your ear

Association areas of the cortex

- Are found in all four lobes
- Found in the frontal lobes enable judgment, planning, and processing of new memories
- Damage to association areas
- Results in different loss

The Brain's Plasticity

- Brain damage effects
- If one hemisphere is damaged early in life, the other will assume many functions by reorganizing or building new pathways.
- Plasticity diminishes later in life.

Neurogenesis: Brain sometimes mends itself by forming new neurons.

Constraint-induced therapy: aims to rewire brains and improve dexterity of brain-damaged people

The Corpus Callosum

Corpus Callosum: This large band of neural fibers connecting the two brain hemispheres.

Split brain hemisphere: Isolated by cutting the fibers (mainly those of the corpus callosum) connecting them.
Ex Helps patients with severe epilepsy. Electrical storms can't jump back and forth between hemispheres.

Intact brain: Data received by either hemisphere are quickly transmitted to the other side across the corpus callosum.

Severed corpus callosum brain: This information sharing does not take place.

** This can be helpful for individuals who get frequent seizures.

Right-Left Differences in Intact Brains

Each hemisphere performs distinct functions. Humans have unified brains with specialized parts.

- Left hemisphere is good at making quick, exact interpretations of language.
- Right hemisphere excels in making inferences, modulating speech, and facilitating self-awareness