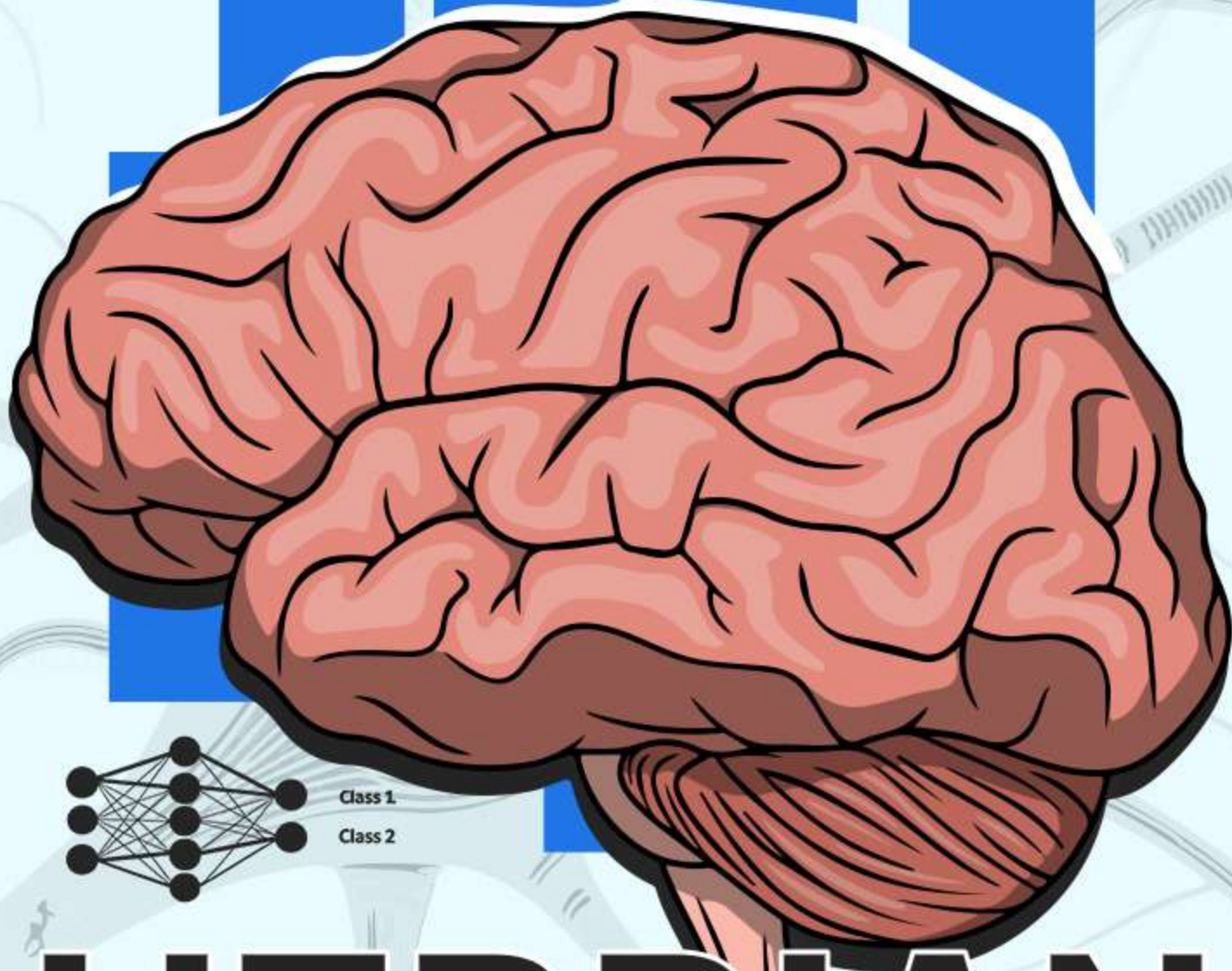




HEBBIAN LEARNING

The Neural Basis of Learning & Memory

What is Hebbian Learning?

Hebbian learning is a theory explaining how neurons strengthen their connections during learning.

Main idea:

“Neurons that fire together, wire together.”

This means:

- When two neurons activate at the same time
- Their connection becomes stronger

This is the foundation of learning & memory at the neural level



Origin & Research Context

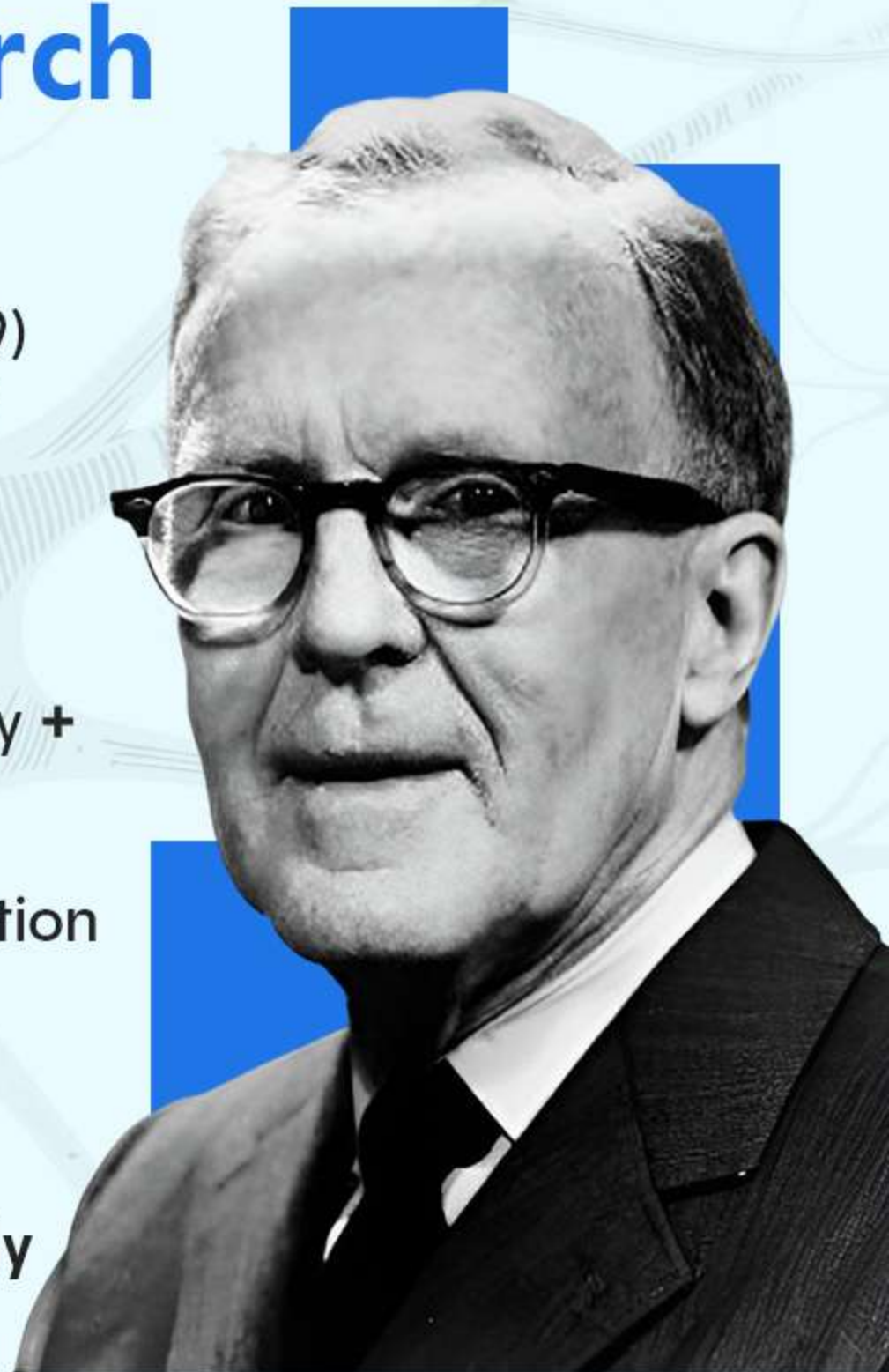
Proposed by Donald Hebb (1949)
in his book *The Organization of
Behavior*

Why it matters:

- First theory linking psychology +
brain physiology
- Provided a biological explanation
of learning

Important for exams:

Hebbian learning = **cell assembly
formation**



Mechanism (How it Works)

Step-by-step understanding:

1. Neuron A repeatedly activates Neuron B
2. Synaptic connection between A & B strengthens
3. Future activation becomes faster & more efficient

This leads to:

- Stronger neural pathways
- Better recall & learning

Repetition + association = stronger synapse



Cell Assemblies

Hebb introduced the idea
of cell assemblies

What are they?

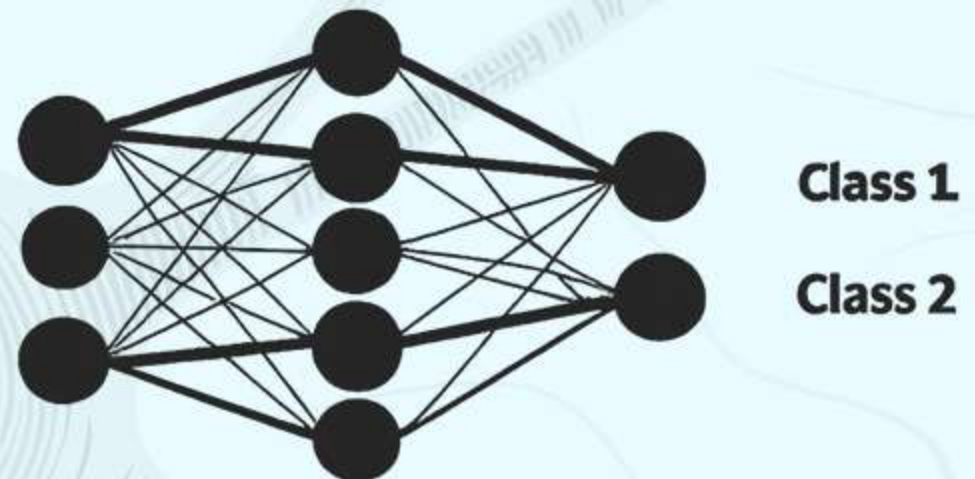
Groups of neurons that:

- Fire together
- Represent a memory or concept

Example:

Thinking of “apple” - activates a network of neurons
(color, taste, shape)

Learning = formation of stable neural networks



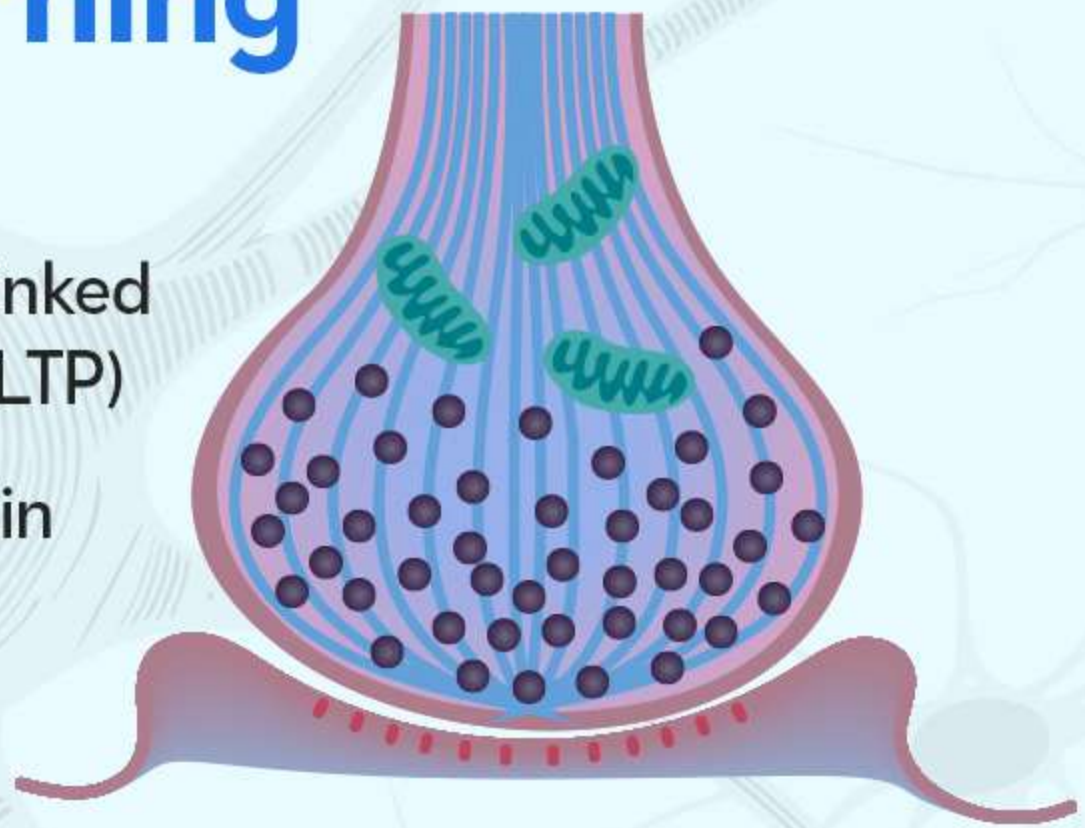
Hebbian Learning & LTP

Hebbian learning is closely linked to Long-Term Potentiation (LTP)

LTP = Long-lasting increase in synaptic strength

Key point:

- Occurs when neurons fire together repeatedly
- Seen in **hippocampus (memory center)**





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