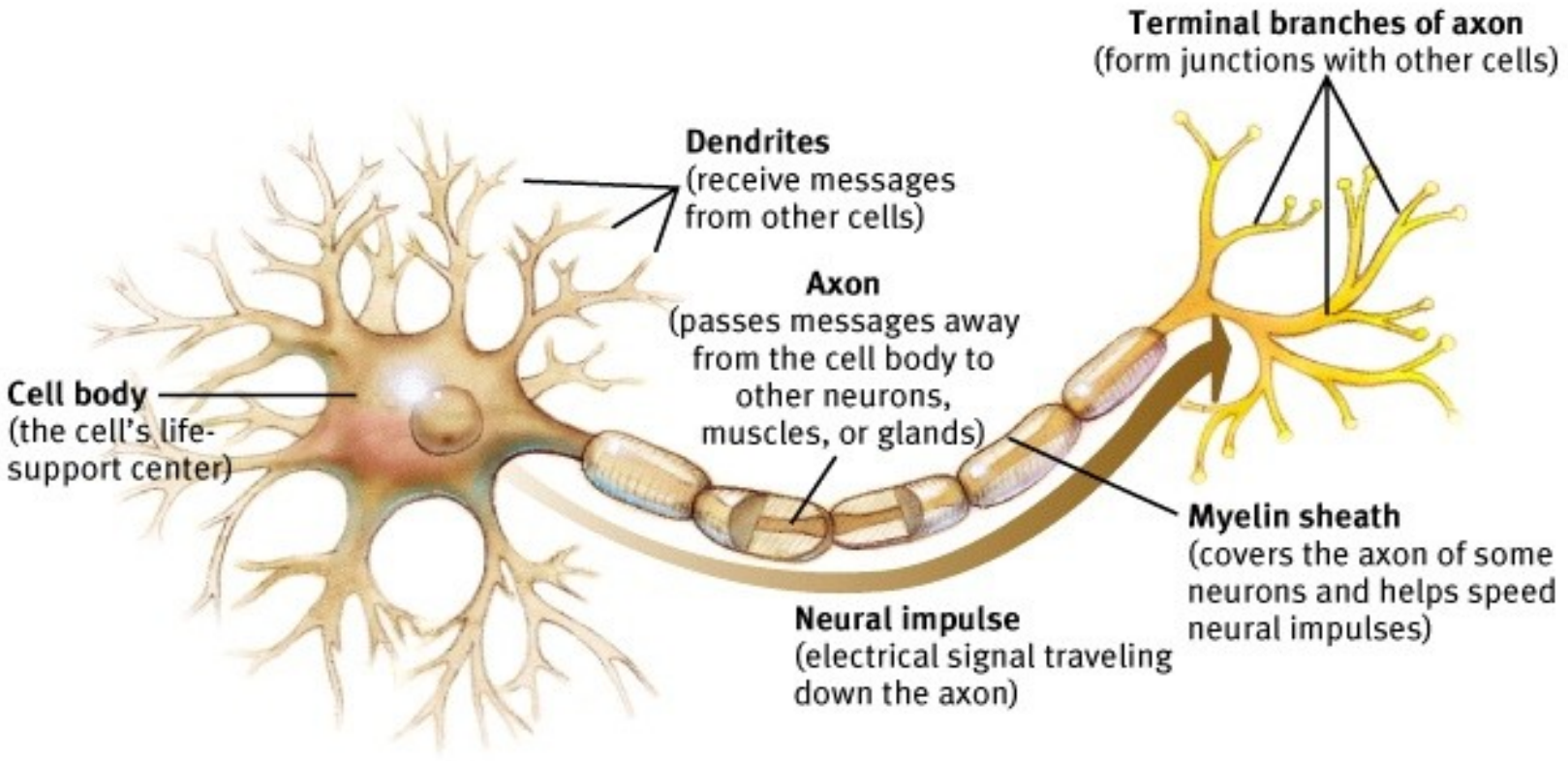
Neuroscience and Behavior

Two Ways to “come at” the Brain

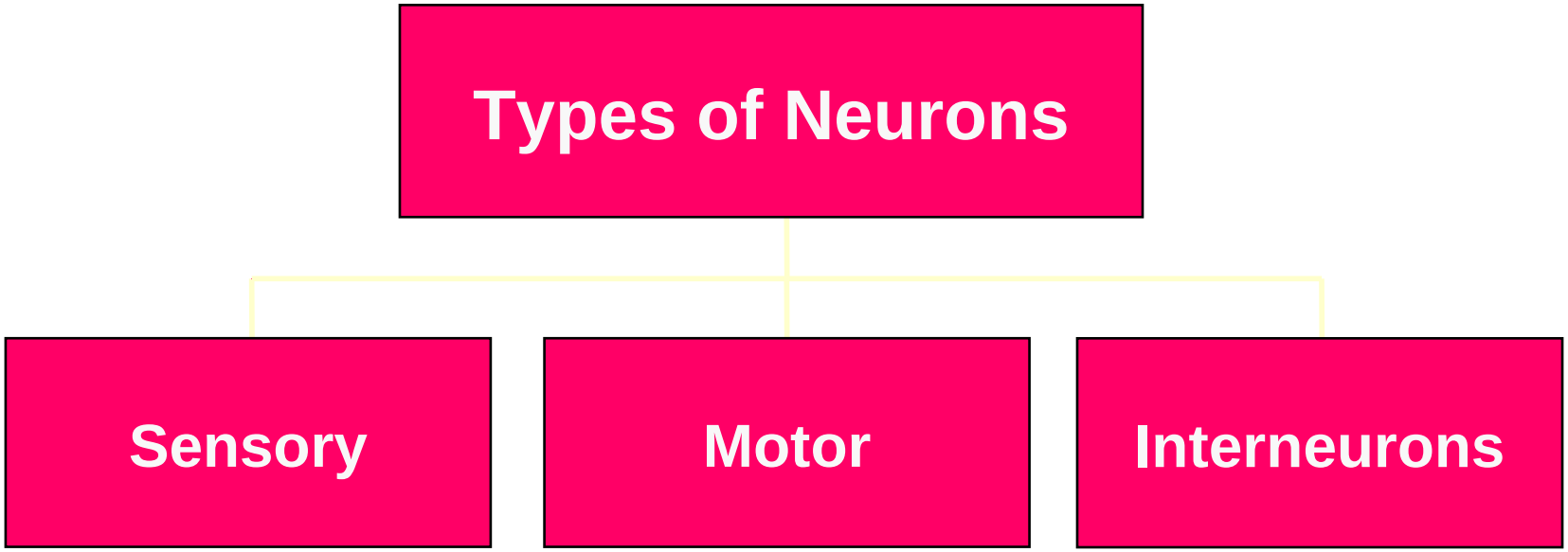
- Neuronally (elements of the brain)
  - a nerve cell
  - the basic building block of the nervous system
- Systematically (systems of the brain)
  - Ex.: Limbic system
  - Ex.: Endocrine system
  - Ex.: Four lobes of the brain
  - Ex.: 2 hemispheres of the brain

Neurons

- 86,000,000,000 neurons exist in your brain



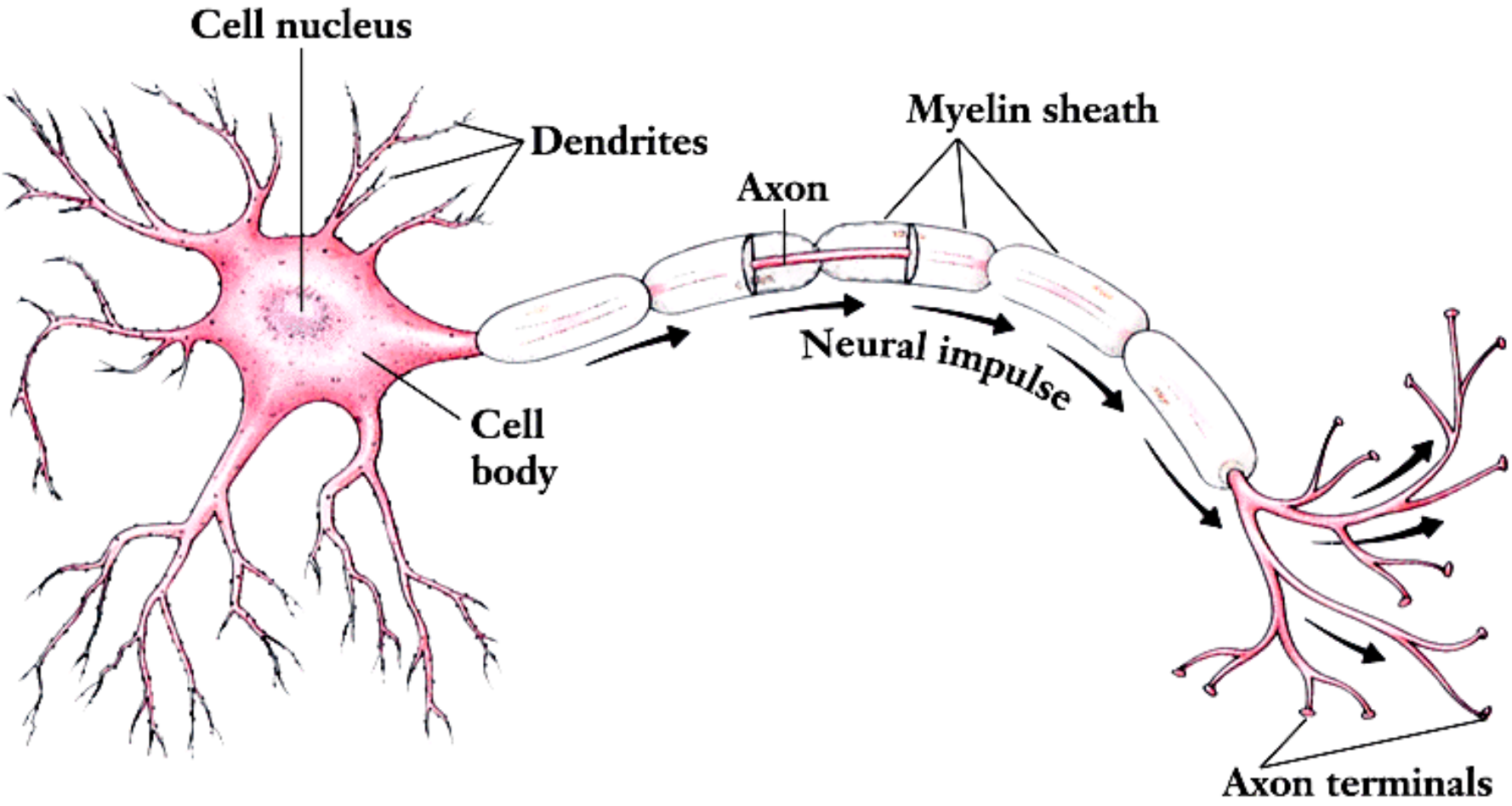
Neurons and Synapses



Types of Neurons

- Sensory Neurons
  - neurons that carry incoming information from the sense receptors to the central nervous system
- Motor Neurons
  - carry outgoing information from the CNS to muscles and glands
- Interneurons
  - CNS neurons that internally communicate and intervene between the sensory inputs and motor outputs

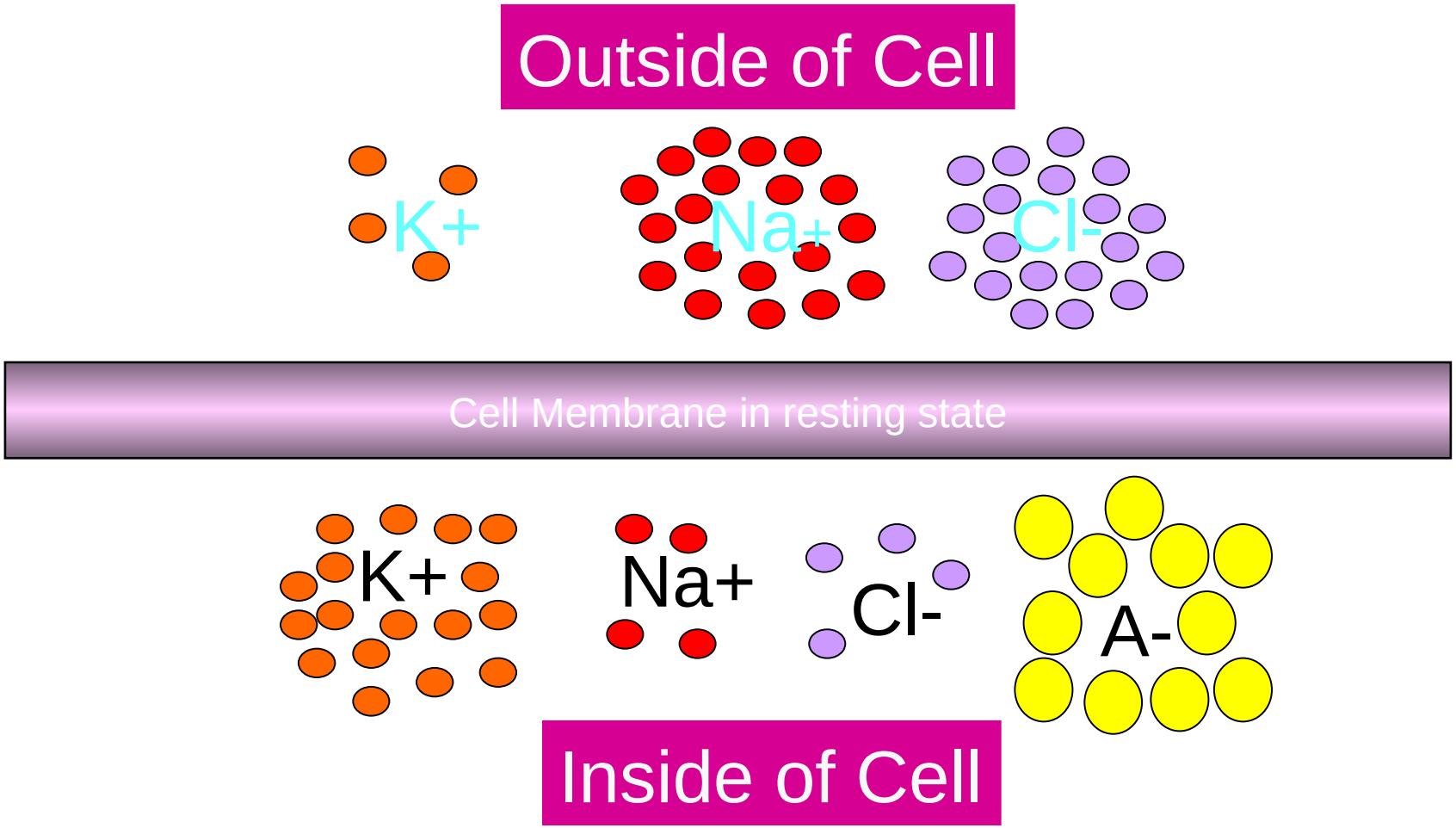
Neural Communication



Two ways neurons communicate

- ELECTRONICALLY
- CHEMICALLY (HORMONALLY)
- RESULT: an ELECTROCHEMICAL means of communication

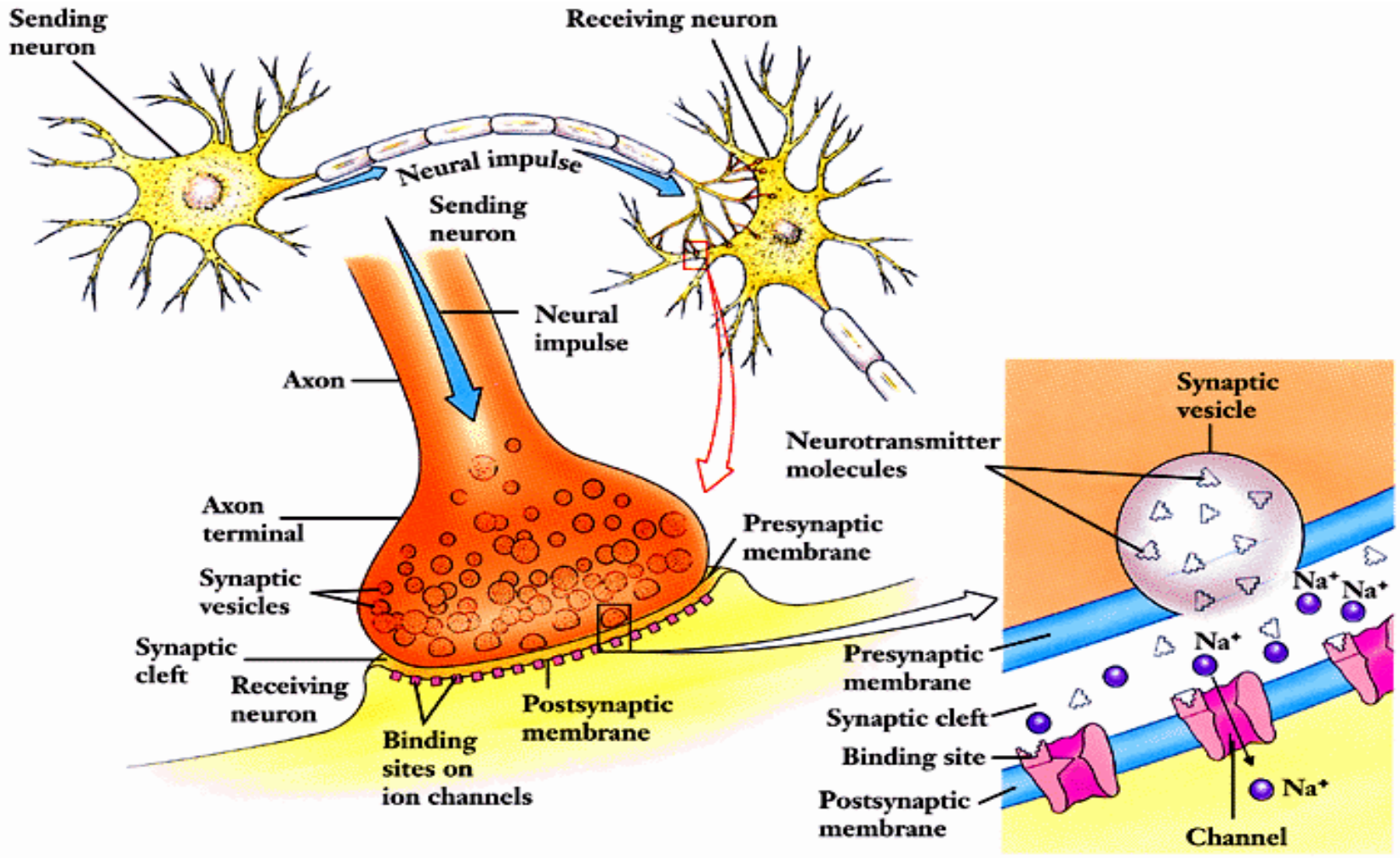
Ion concentrations



Two factors influence communication

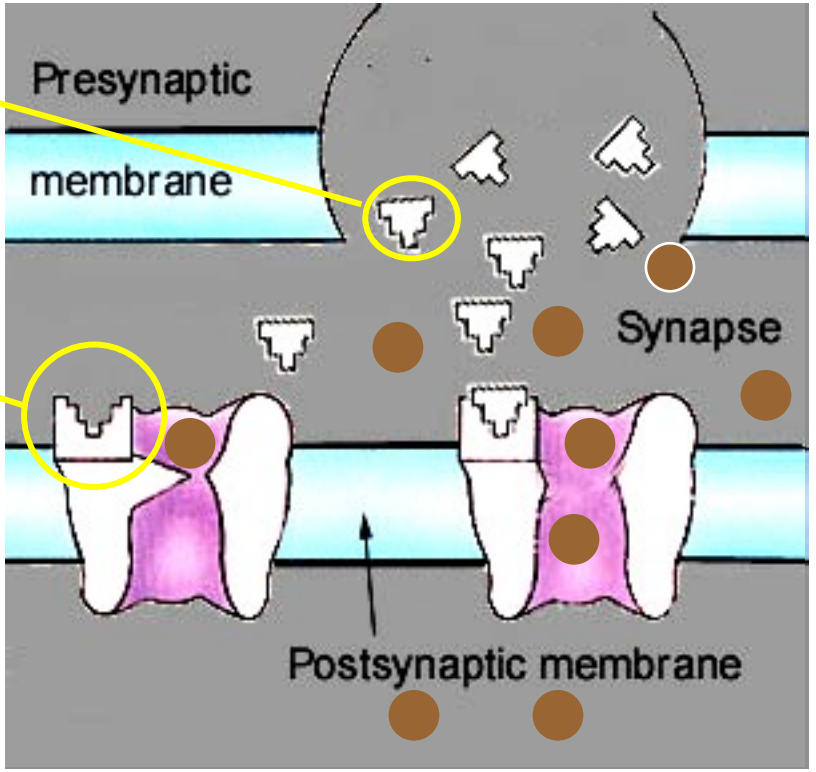
- FAMILIARITY
  - Practice and repetition
- COMPLEXITY
  - Simple: Today is Thursday
  - Complex: “Self-consciousness exists it itself and for itself, in that, and by the fact that it exists for another self-consciousness.” (Hegel, *Phenomenology of Spirit)*

Neural Communication



Locks and Keys

- Neurotransmitter molecules have specific shapes
- Receptor molecules have binding sites



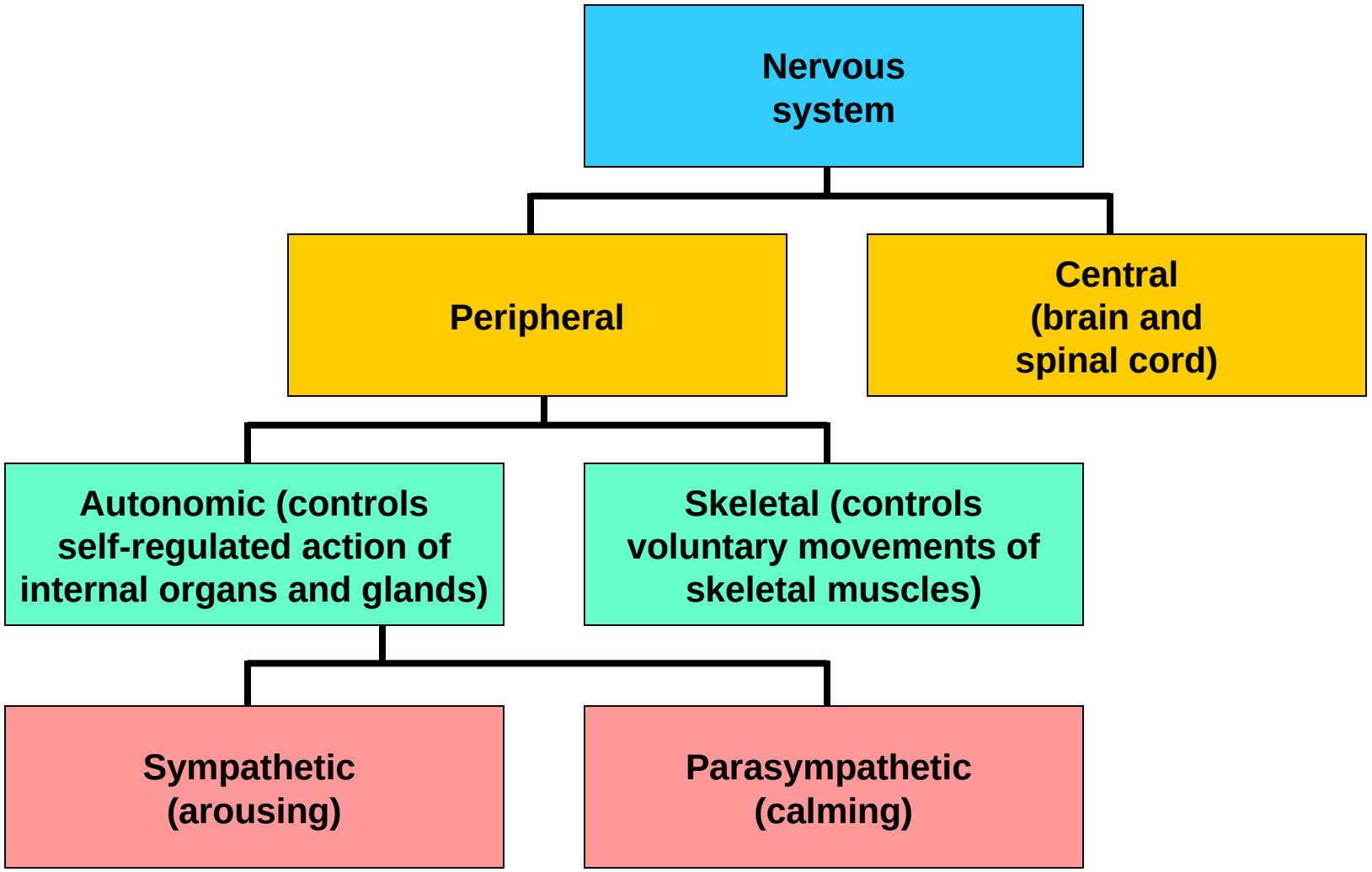
Types of Neurotransmitters

- Acetylcholine (excitatory)
- Norepinephreine (inhibitory)
- Epinephrine (excitatory)
- Dopamine (inhibitory)
- Oxytocin (the “cuddle chemical”)
- Serotonin

Types of Neurotransmitters

- Peptides
  - Proteins: long sequence of amino acids
  - Polypeptides: short sequence of amino acids
- Example: Endorphins
  - “morphine within”
  - natural, opiate-like neurotransmitters
  - linked to pain control and to pleasure

Systems of the Brain



Brain has 2 Hemispheres

- Left & Right sides are separate
- Corpus Callosum : major pathway between hemispheres
- Some functions are ‘lateralized’
  - language on left
  - math, music on right
- Lateralization is never 100%