Introduction to Neuro Technology & Cognitive Technology

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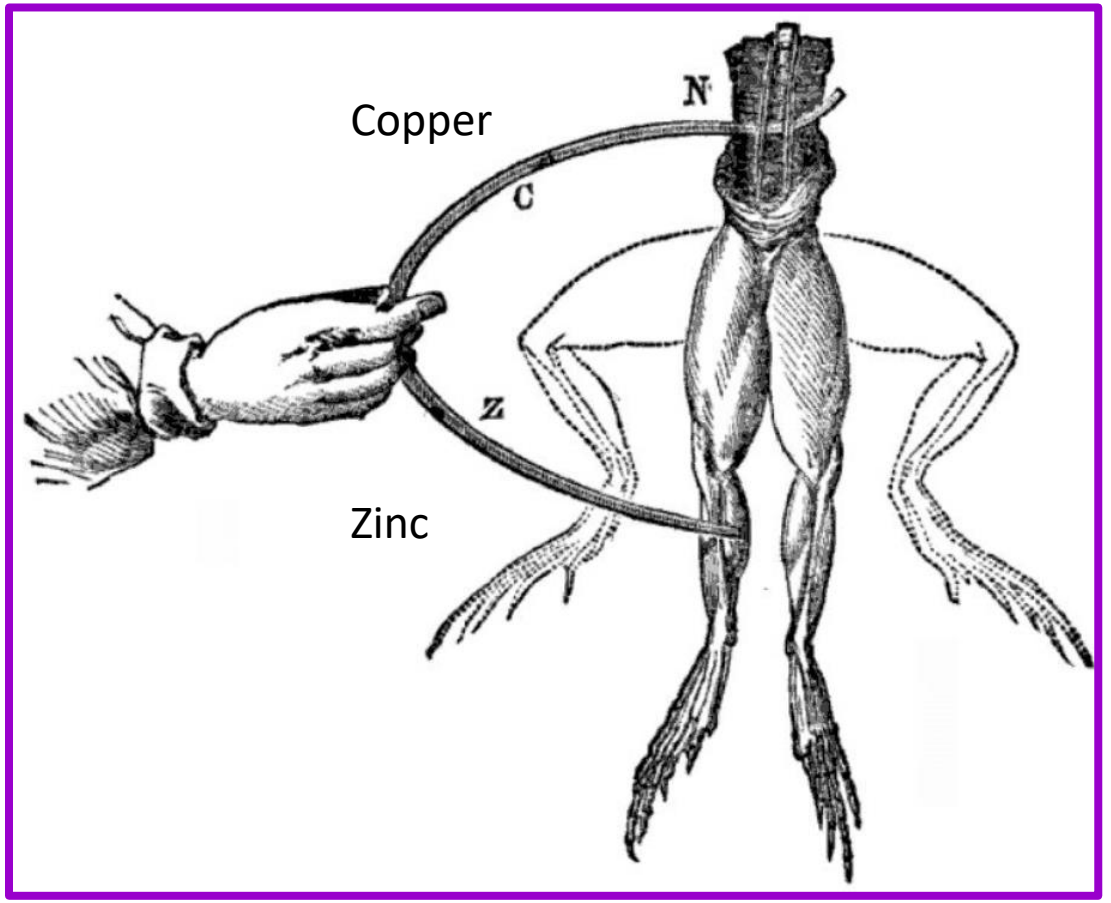
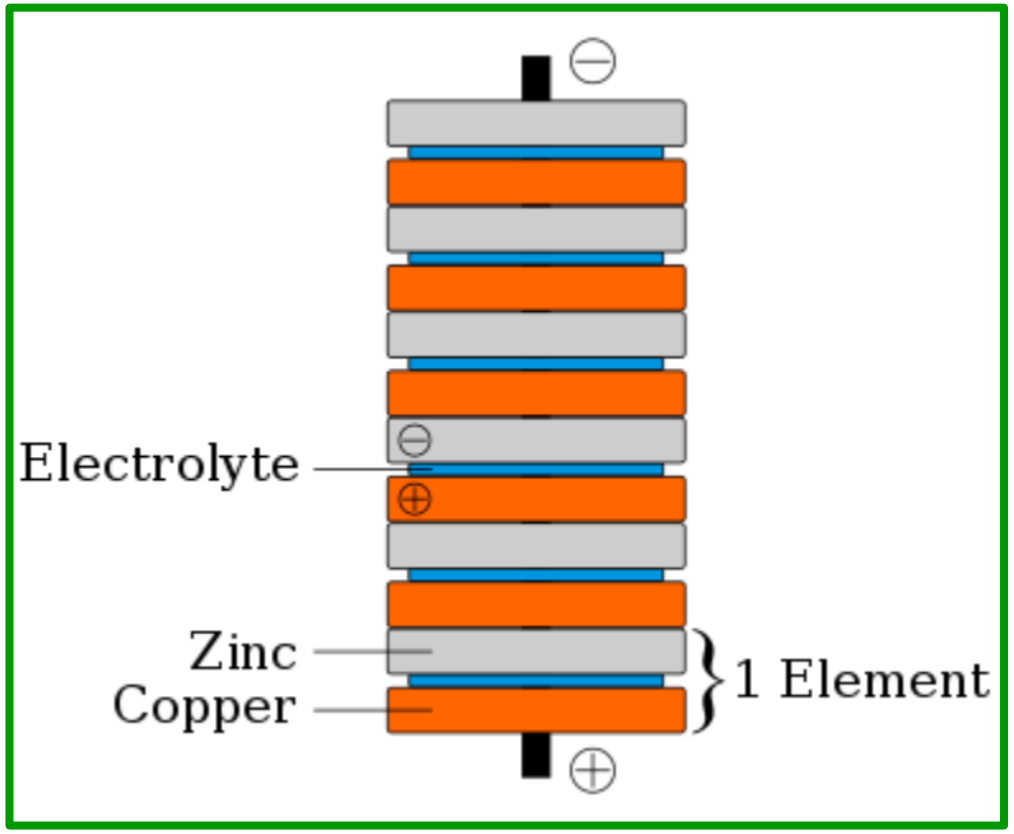
Galvani:

Frog Experiment & Electro-physiology

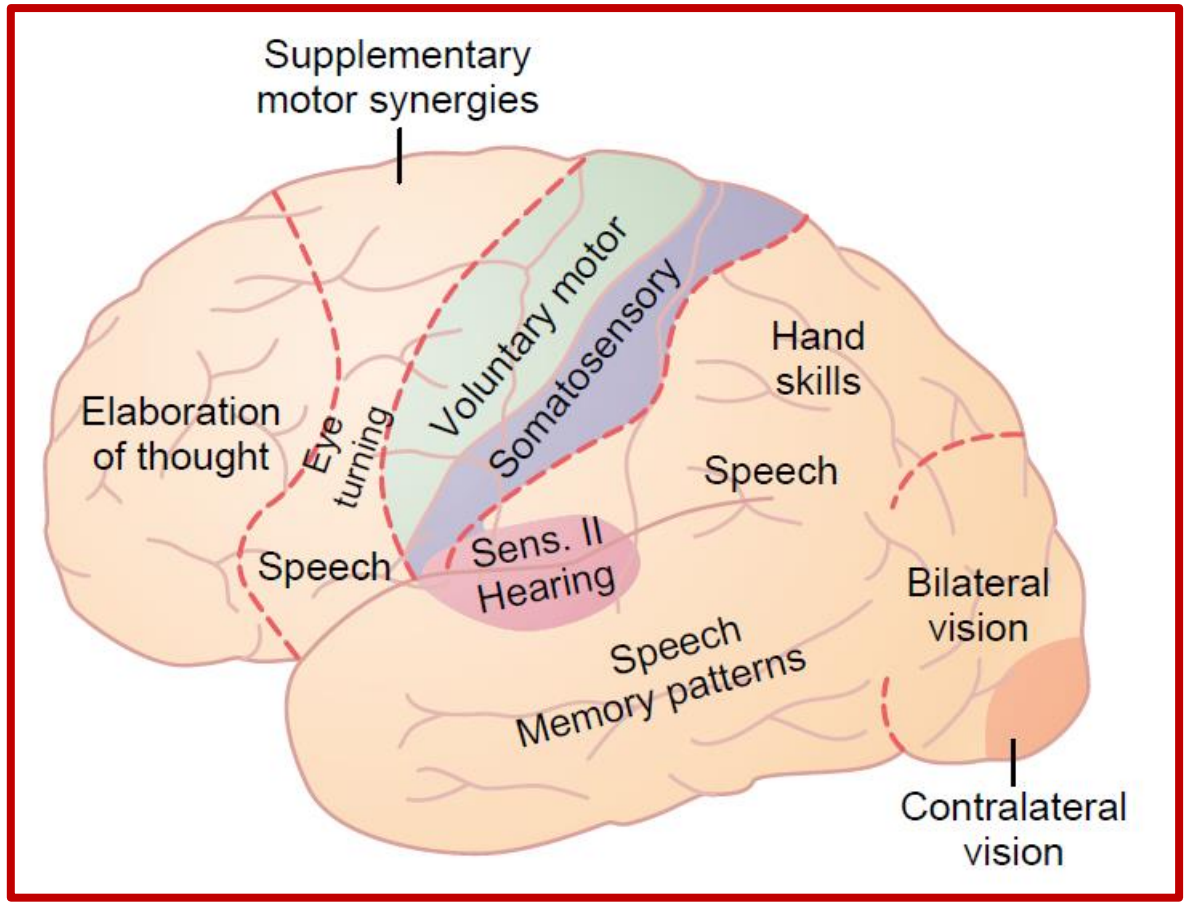


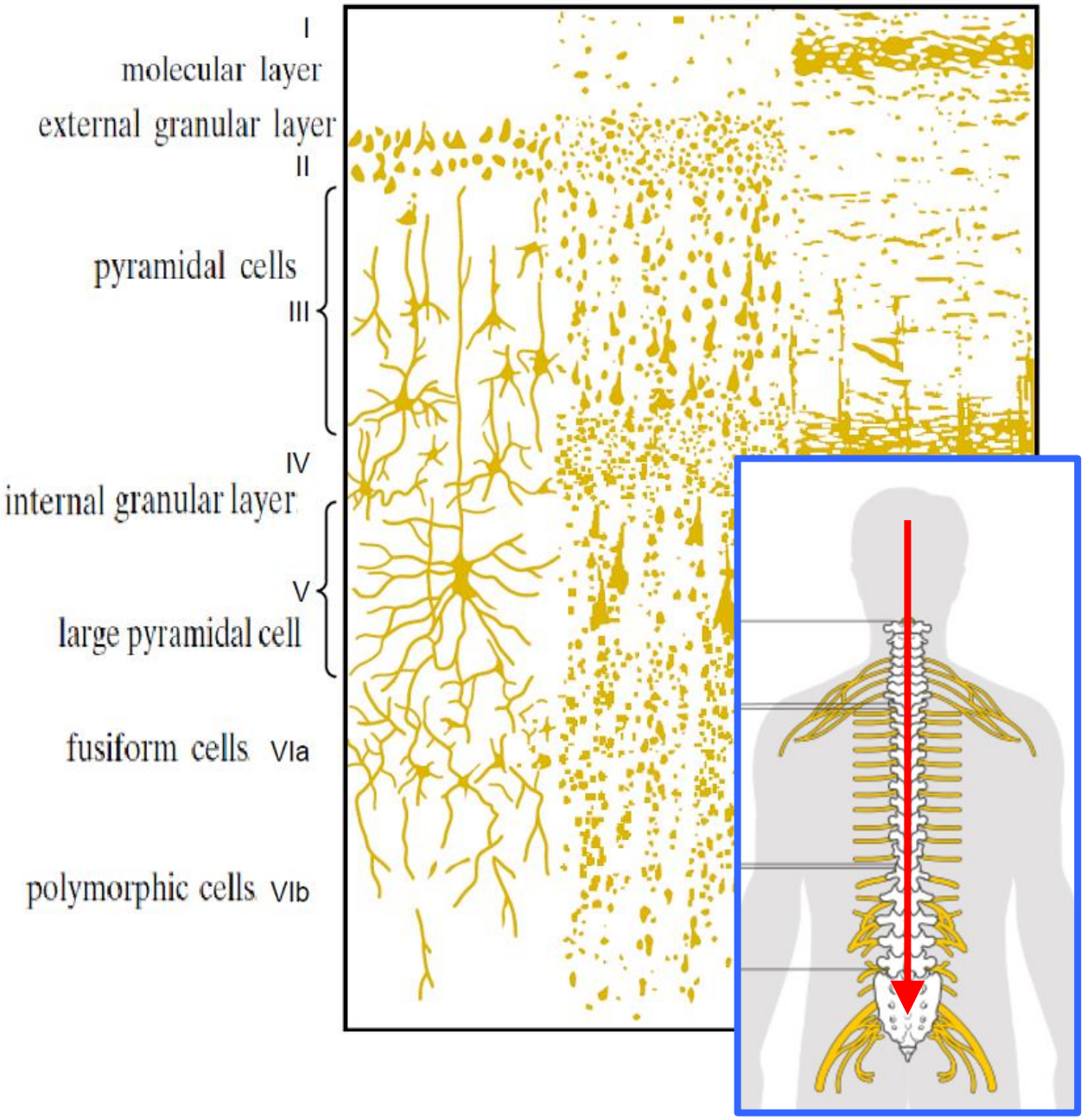


Volta:

Voltaic Pile & Electrochemistry

Brain: Microscopy





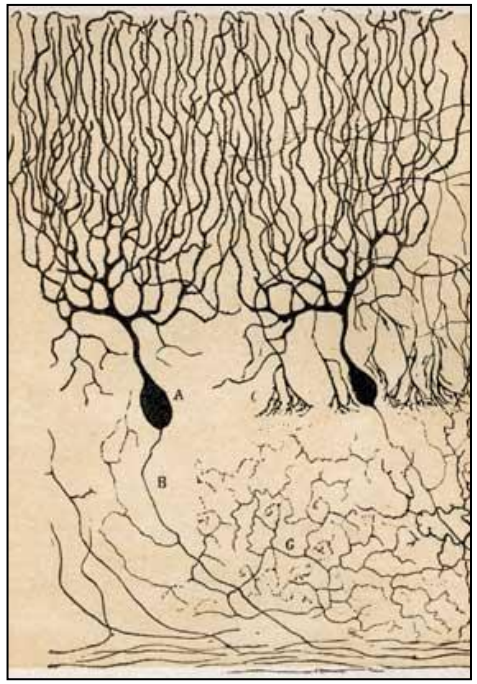
BME Contribution → Birth of Digital Computer & I.T. Era

A LOGICAL CALCULUS OF THE IDEAS IMMANENT IN NERVOUS ACTIVITY

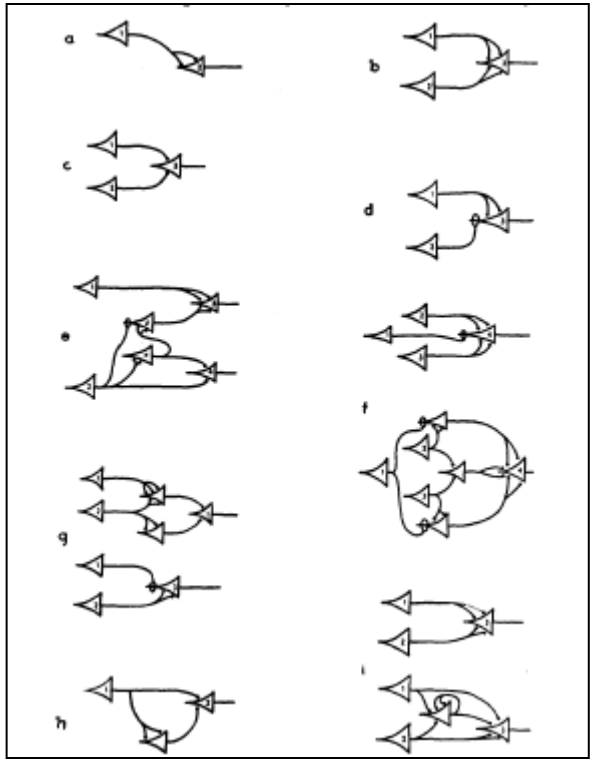
WARREN S. MCCULLOCH and WALTER H. PITTS

Bulletin of Mathematical Biophysics, 5, 115-133 (1943).

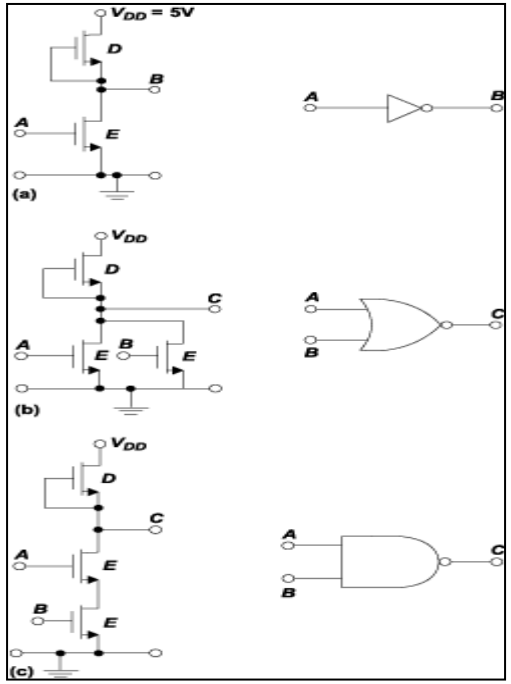
Cajal, 1906



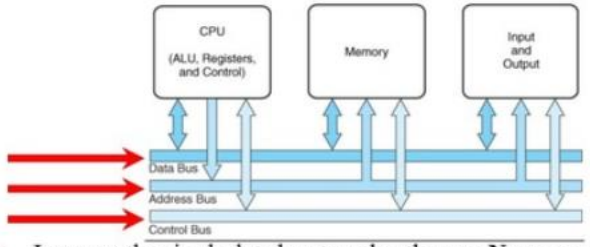
McCulloch, 1943



ENIVAC Computer, 1946



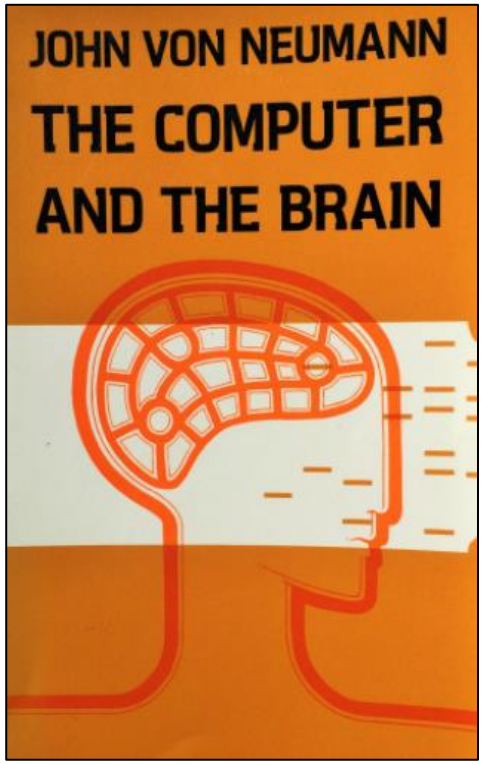
Modified von Neumann Architecture

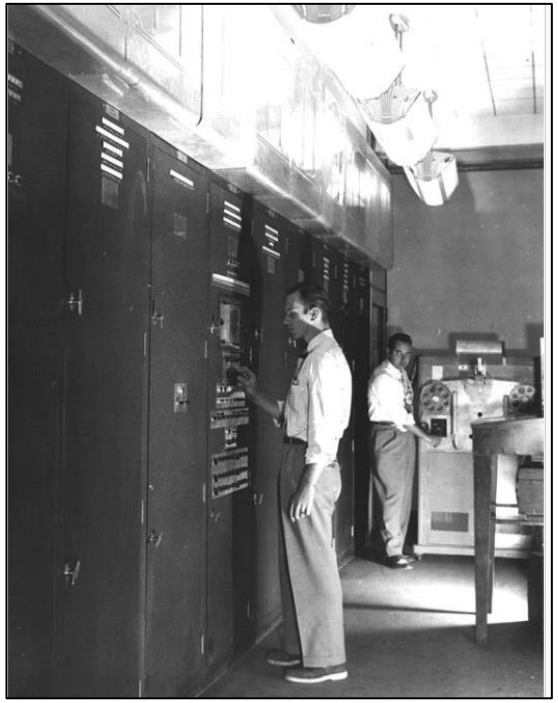


- Improve the single data bus to solve the **von Neumann bottleneck**
- The **data bus** moves data from main memory to the CPU registers (and vice versa).
- The **address bus** holds the address of the data that the data bus is currently accessing.
- The **control bus** carries the necessary control signals that specified how the information transfer is to take place

Von Neumann Architecture:

EDVAC – a First Computer, 1945





First Digital Computer

First Digital Computer used for Modelling First Atom Bomb Explosion:

“The Manhattan Project”

Syllabus

1. **Neuro-electrical processes as basis of Neuro-Technology**
   Origins of Electrical Technology: Galvani and Volta's animal electricity, Cell, Neuron, Ionic Channels.

2. **Neuro-electrical signal processes**
   Generation, Transmission and Propagation of signals in nervous systems. Action Potential.

3. **Neural Receptors**
   Receptors as bio-transducers. Signaling and Amplification in receptors.

4. **Electrical and Chemical Synapse:**
   Transmission Operations. Transduction process across receptors.

5. **Neuronal Control mechanisms**
   Servo system, Neural circuits for processing information. Neural control mechanisms.

6. **Electro Encephalo-graphy (EEG) and Electro-cardiography (ECG)**
   Neural Potentials in organs, their generation, recording and diagnostic applications.

7. **Human Brain: Structure, Function and Cognition.**
   Anatomy, Physiology, Psychology, Genomics.

Syllabus (Contd.)

8. Neuro Imaging and Data Analytics.
f-MRI, f-NIRS, Proton Spin-tagged Imaging, Tractography, Connectomics Circuitry. Data Analytics.

9. Cognitive Science, Cognitive Technology and Psychodynamics
Cognition Research, Behavioral-Emotive Technology, Cognitive Reserve utilization.

10: Neural Function and Brain Health
Transitions of the neural system in Childhood, Adolescence, Adulthood and Old-age.

11. Cognitive Function and Mental Wellness
Transitions in Mood, Emotion and Mentation. Coping Lifestyle. Early screening, Early remediation.

12. Cognitive BioDesign and Neurotechnology applications
. Neural/Behavioral intervention design, Imaging-aided Monitoring and Treatment, Prototyping, Trials.

13. Innovation, Entrepreneurship and the NeuroTech - CogniTech Ecosystem
HealthTech Discovery process, Academia-Clinic-Industry ecosystem / support, Product commercialization.

The Link:

Nerve - Neuron Cell – Ions - Electricity