Topic 18 - Memory & Perception

Memory and Thinking
Seeing is NOT believing
Human Brain

2% body weight
20% energy expenditure
100 billion neurons
25,000 connections per neurons
100 trillion connections

More connections in the human brain than stars in the Universe!
Brain Anatomy

Brain stem:
  - Autonomic nervous functions (breathing, swallowing, etc.)
  - Most primitive part of the brain

Cerebellum:
  - Coordination, memory (10% of weight, 50% of the neurons)

Cerebrum (cortex):
  - Higher brain function
    - thinking, emotions, senses, memory
  - Most advanced part of brain

Corpus callosum: connects two cerebral hemispheres
  - allows for communication
Memory

Hippocampus
Located in the cerebellum
One structure in the brain important for memory
Way station for new memories
Alzheimer’s patients: first to go

Clive Wearing
Conductor/Musician
Virus led to damage
No short term memory
Types of memory

Declarative (Explicit): consciousness storage and recall of info

Sematic: formed by symbols and words
  example: studying for an example
  Mostly in the Hippocampus

Procedural (Implicit): unconsciousness storage
  usually motor learning (animals)
  example: riding a bike, learning an instrument
  Mostly in the Cerebellum
Formation of Long-term memory

Long-term potentiation (LTP)
  Build up of chemicals for a single memory
  Strengthens synapses
  Enhanced electrical activities
  Changes the physical structure of the synapse
Memory moved into long term storage
  (example: cerebellum)
Memories are separated in different portions of the brain (smell, color, shape, place)
Triggers can bring all portions together
Visual Memory

Photographic memory? probably not

Spatial memory

Hippocampus enlarges as a result of increased input of spatial memory

Animal visual/spatial memory:
location of food, water, nesting sites, migration routes

example: Clark’s Nutcracker
stores seeds/nuts for winter
33,000 seeds/nuts in 12 sq. miles
5,000 locations
remember all location up to 6 months later, 3 feet snow
Lobotomy

Surgical removal of frontal lobe
Treating severely disturbed

António Egas Moniz
  1936 first performed
  1949 Nobel prize (only one for Psychiatrist)
    about 40,000 people in the U.S.
Failed treatment: diminished symptoms through caused severe mental disabilities
Intelligence and Frontal Lobe

Largest lobe in the brain
Not important for memory, motor skills, senses
Integrates other brain centers
Planning, execution, and completing complex task
Anticipating consequences
Developmental completeness as late teen
Alzheimer’s

Discovery: Alois Alzheimer (1906)

Two proteins found in higher amounts:
Amyloid plaques
Neurofibrillary tangles

Leads to brain shrinkage
Life expectancy: 7 years past diagnosis (no cure)

Symptoms
memory loss
confusion
mood swings
language break-down
loss of body function

Alzheimer’s

Two forms:

Sporadic form: risk after 65 years of age
   65 years (3% risk)
   85 years (35 to 50%)
   probably some environmental component

Familial form: genetic (autosomal dominant)
   onset 35 to 50 years
   at least 3 genes responsible (any one can lead to the disease)
   less than 5% of all cases
Perception

The connection between what we experience and how we process it
Seeing is not always believing!
We don’t see with our eyes!
Brain is NOT truthful with regards to sight
  Subtraction: ignores some items
  Addition: adds information

Seeing is a multifaceted process
  Eyes
  Brain: regions of emotion, primitive, optical
Seeing

Image observed on the Retina of the eye

Retina: collection of light sensitive nerve cells, convert light to electrical impulses

Electrical impulses sent to the brain via the optic nerve

Visual cortex (Occipital lobe): brain processes the info

Temporal lobe: important for understanding what we are seeing
Perception and Emotions

Capgras Delusion: delusion that everyone is an imposter

Normal:
1. Visual cortex
2. Temporal lobe processes it
3. Amygdala retrieves emotional info

In Capgras, connections between temporal lobe and amygdala are severed, no emotional connection

In the case of David, it was not severed for hearing
Next time: Mind & Addiction

Chapter 24