Neuropsychology for School Psychologists

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Objectives

• Introduction

• Basic brain organization
  • 1. This session will help participants understand basic functional neuroanatomy of brain processes and products.

• Introduction of a neurodevelopmental approach to assessment
  • 2. This session will help participants understand brain processes and products from a developmental perspective

• Translating neuropsychology into school psychology practice
  • 3. This session will help participants understand the relationship between brain processes and academic products.

• Basic neuroanatomy and industry standards

• Introduction of a framework to use the information on Monday
Genes & Experience

Bryan Kolb’s analogy

I SAW THE ANGEL IN
THE MARBLE AND
CARVED UNTIL I SET
HIM FREE.

Michelangelo
Italian Sculptor
1475 - 1564

QUOTEHD.COM
Brain Development
Basic Principles of Brain Shaping

- Neuronal Group Selection (Neural Darwinism)
- Neurons that fire together wire together
- Use it or lose it
- Automaticity
- We are feeling beings who think not thinking beings who feel
Parts of the Human Brain

- frontal lobe
- parietal lobe
- occipital lobe
- temporal lobe
- cerebellum
- spinal cord
• **Antonio Damasio** conducted research on the insula and proposed that most of this structure consists of somatic markers that map bodily states associated with our emotional experiences, thus giving rise to conscious feelings.

• This is the school of thought known as **embodied cognition**, according to which conscious rational thought cannot be separated from emotions and their incarnation in the rest of the body.
Brodmann Area Brain Map

- Area 9 - Dorsolateral prefrontal cortex
- Area 10 - Anterior prefrontal cortex
- Area 11 - Orbitofrontal area
- Area 12 - Ventromedial prefrontal cortex
- Area 13 - Medial prefrontal cortex
- Area 24 - Superior parietal lobule
- Area 39 - Angular gyrus
- Area 40 - Supramarginal
- Area 41 - Primary and Auditory Association Cortex
- Area 42 - Paracingulate gyri
- Area 44 - Pars opercularis
- Area 45 - Pars triangularis
- Area 46 - Dorsolateral prefrontal cortex
- Area 47 - Inferior prefrontal gyrus
- Area 52 - Parainsular area
- Area 17 - Primary visual cortex (V1)
- Area 18 - Secondary visual cortex (V2)
- Area 19 - Associative visual cortex (V3)
- Area 22 - Superior temporal gyrus
- Area 37 - Fusiform gyrus
- Somatosensory Cortex
- Area 5 - Somatosensory Association Cortex
- Area 7 - Somatosensory Association Cortex
Grey & White Matter

- **Grey matter**—closely packed neuron cell bodies contains specialized regions that involved in muscle control, sensory perceptions such as seeing, hearing, memory, emotions & speech

- **White matter**—neuronal tissue containing long myelinated axons situated between brainstem & cerebellum---relay of information from the body to the cerebral cortex
Speech Connectome
Neurotransmitters

- **Norepinephrine**:
  - Alertness
  - Concentration
  - Energy
  - Anxiety
  - Impulse
  - Irritability

- **Serotonin**:
  - Obsessions
  - Compulsions
  - Memory
  - Appetite
  - Sex
  - Aggression

- **Dopamine**:
  - Pleasure
  - Reward
  - Motivation
  - Drive

- **Mood Cognitive Function**: Overlap of Norepinephrine and Serotonin

- **Attention**: Overlap of Norepinephrine and Dopamine

- **Pleasure Reward Motivation/Drive**: Overlap of Serotonin and Dopamine
Neuromodulators/hormones

- Neurotransmitter—specialized junctions between neurons
- Neuromodulator—messenger released from neuron that affects groups of neurons through secondary messengers and has long-lasting effects
  - e.g. histamine, norepinephrine
- Neurohormone—released by neurons to distant peripheral targets
  - E.g. oxytocin, growth hormone, releasing hormones
PET Scans of 4 emotions

Damasio, 2007

Anger

Happiness

Sadness

Fear
Functional Brain Map