“GENERAL SEMANTICS”
The Key To Understanding The Brain

Charles E Bailey MD
"We've given you a brain scan and we can't find anything."
Agenda

- Normal Brain Anatomy and Function
- Relationship Between Rodent and Human Brain
- “Semantics” and the Frontal Lobes
<table>
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<tr>
<th>Brain Tasks</th>
<th>Location</th>
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<tbody>
<tr>
<td>Executive functions</td>
<td>Prefrontal Cortex</td>
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<tr>
<td>Reward system +</td>
<td>Nucleus Accumbens</td>
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<tr>
<td>Alarm system -</td>
<td>Amygdala</td>
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<tr>
<td>External input integration</td>
<td>Parietal Lobe</td>
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<tr>
<td>External input regulation/distribution</td>
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<td>Motor systems</td>
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<td>Memory system</td>
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<td>Memory-language-emotional integration</td>
<td>Temporal Lobes</td>
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<td>Activation…on</td>
<td>Locus Ceruleus</td>
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<tr>
<td>Deactivation…off</td>
<td>Raphe Nucleus</td>
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Dopamine pathway involvement

**Mesocorticolimbic Pathway**
Connects VTA to:
- Hippocampus .......... memory
- Nucleus Accumbens ...... reward
- Prefrontal Cortex ........ executive function
- Anterior Cingulate ....... attention/conflict
- Amygdala ................. fear/anxiety

**Nigrostriatal Pathway**
Connects Substantia Nigra to:
- Caudate and Putamen..... PP, EPS, TD
Normal Brain

Central Fissure

Motor cortex

Sensation and touch

Body movement and coordination

Body position

Frontal lobe

Planning and consciousness

Speech

Hearing

Temporal lobe

Lateral fissure

Somatosensory cortex

Occipital lobe

Vision

Smell
Brain Evolution;
The Importance of the Frontal Lobes

- Neocortex
  New Brain
  Rational
  Reasonable
  Logical

- Limbic System
  Old Brain
  Emotional
  Feels good
  Feels bad
Evolution of the Frontal Lobes

Figure 13. Evolution of the frontal cortex. Expressed as the ratio of frontal cortex to all cortices. Based on Brodmann. (1909).

From; The Wisdom Paradox,
Elkhonon Goldberg, Ph.D.
Prefrontal Cortex Exercises ‘Top Down’ Modulation, Integration & Coordination of Behaviors, Including Mood & Reward…All Relevant to Depression

Courtesy of Frank Bymaster
Normal
Frontal Lobes

- Planning and executing
- Forecasting
- Anticipating
- Screening irrelevant stimuli
- Regulating impulses
Executive Functioning

- Organizing, prioritizing, and actuating
- Focusing, sustaining, and shifting attention
- Regulating alertness, sustaining effort and processing speed
- Managing frustration and modulating emotions
- Utilizing working memory and accessing recall
- Monitoring and self regulating actions
ADHD
Dysexecutive Syndrome
ADHD
decreased metabolism
ADHD

f-MRI

Neuroimaging and ADHD

Normal control  ADHD

Anterior Cingulate Cortex

Frontal Striatal Insular network

- fMRI shows decreased blood flow to the anterior cingulate and increased flow in the frontal striatum
- PET imaging shows decreased cerebral metabolism in brain areas controlling attention
- SPECT imaging shows increased DAT protein binding

Understanding the Brain…

Brain-Computer Model

- Frontal lobes (executive functioning)
- Parietal Lobe, Temporal Lobe, Hippocampus (information and “process” storage)
- RAM (random access memory)
- Hard Drive (memory and software storage)
Brain-Computer

- The frontal lobes or Prefrontal Cortex (PFC) function much like the RAM of a computer, manipulating data/information that is stored in the memory storage areas of the brain.

- The Process information or “how we think” is also stored in these memory areas just like software on a computer.

- Changing the information and the way the information is processed contributes to the effectiveness of Cognitive Behavioral Therapy.
Brain-General Semantics

GS increases the “accuracy” of the stored information by clarifying irrational assumptions and increases the “accuracy” of information processing by replacing irrational processing with more healthy rational processing...healthy thinking
GENERAL SEMANTICS/CBT
Improves Cognitive Accuracy

- Information accuracy
- Process accuracy
- Event level accuracy
Cognitive Behavioral Therapy Rx

- ADHD
- SUDS
- AD
- MD
- BP
- SCPT
CBT Helps In Dealing With

- Mood
- Guilt
- Anger
- Anxiety
- Coping skills
- Stress management skills
- Communication skills
CBT

- Improves functioning of PFC by enhancing executive skills
- Old “irrational” software replaced by new “logical” software”
Process Change

“NEW SOFTWARE”

Healthy vs Unhealthy

CBT
- Flawed
- Fallible
- Flexible
  - choices/consequences
  - preferential thinking
- Self responsibility
  - continuous quality improvement

Cultural
- Perfection
- Mistake free
- Rigid
  - should, must, have to, got to, need to, etc.
- Fault finding and blaming and punishing
You were always on my mind. The End.
The End