



CREATING DYNAMIC LEARNING COMMUNITIES
at school • at home • at work




Schools Exceeding Expectations (SEE) Conference
Maryville, Tennessee – April 29-May 2, 2009

Brain 101

Presented by Linda Jordan

2009 SEE Pre-Conference – Wednesday, April 29, 2009

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Brain 101

Schools Exceeding Expectations Blount County, Tennessee April, 2009

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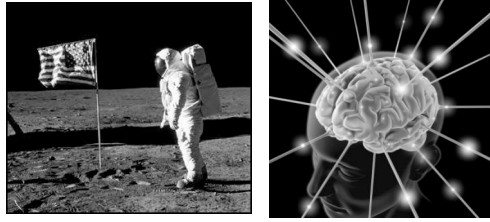
Family Updates




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Brain Research




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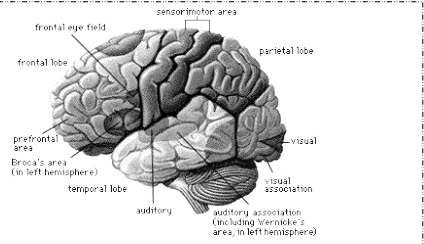

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Pinky and the Brain Video


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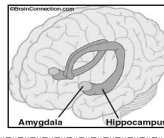
Brain Structures Review



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Amygdala




• **The psychological sentinel of the brain because it plays a major role in the control of emotion.**
 • **It is connected to many parts of the brain and plays a critical part in learning, cognition and emotional memories.**

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Hippocampus




It helps us remember events in recent past, as well as responsible for sending new information and experiences to be stored in the cortex in long-term memory.

Critical to learning and memory formation.

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Reticular Activating System



The RAS receives information from all over the body and acts as a central, initial regulator for attention, arousal, sleep-wakefulness and consciousness. Uses this information to change the cell excitation to meet the changing conditions in the environment.

It filters out distractions or trivial sensory information.


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Strategies for the Structures

What lessons have you taught that activated these structures in your students brains?


- Amygdala-Emotion
- Hippocampus-Memory
- RAS-Attention



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Brain Snack



- Stand
- Introduce yourself to your neighbor
- Share what has been new or a review for you
- How do your lesson plans activate these structures?

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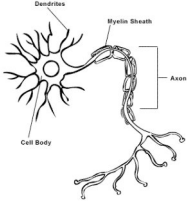
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More Updates...

What's Inside?

Grey Matter- Neurons

White Matter- Enables communication between neurons



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What is Learning?

- Biological process for survival
- The organism responding to its environment
- The formation of new synapses and dendrite branching.

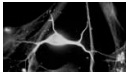
-Zull!

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Learning is Firing and Wiring

- Thinking- neurons must communicate
Input....Output
 - Firing....(thinking)
 - Wiring (learning)
- Learning is about dendrites communicating and growing
 - Example: Pathways around new building
 "Fire it until you wire it!" -S. Feinstein




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Firing and Wiring


- Within 5 minutes of firing bumps form on dendrites branches
- Within 20 minutes branches begin to grow
- Chemical Burst is arousal- easiest way to learn
- Harder to learn without the burst.....
 "Fire it until you wire it"
 "Use it or Lose it"
 (Example: Roots on a plant with or without water)



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How Are Brains Different?



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How Are Brains Different?


- Structurally (prenatal development) 
- Functionally (instructional, home) 
- Experientially (nurture, early childhood) 
- Preferentially (gender, habits) 

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Expertise

When you are very good at something is it at the expense of something else?

London Taxi Drivers 
 Hippocampus back larger, front smaller
 Results: Not at good at something as a result of getting expertise in something else.
 Training might increase/decrease or shift grey matter

Others Studied: Navigators, Linguists

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Influence of Experience

Before Puberty	After Puberty
<ul style="list-style-type: none"> Highly Plastic Requires sensory input to develop Shapes itself to its environment Little ability to act on or alter the environment but easily altered by it 	<ul style="list-style-type: none"> Elaborately developed structures Diminished ability to change these structures Able to alter the environment Attempts to make the environment conform to their view.


-Wexler, 2006 Brain and Culture

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Environment



Environment
Shaping
the Brain



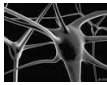


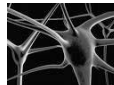
The Brain
Shaping the
Environment

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Mirror Neurons in the Brain

A new class of brain cells -- **mirror neurons** are active both when people perform an action and when they watch it being performed.

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Mirror Neurons




- Social Ability
 - Empathy
 - The ability to tap into others emotions and feel the same
- Addictive Behaviors
 - Hard to recover after rehab when they return to the same friends
- Violence (Video Games)
 - Boys frontal lobes go to sleep, need reaction not reflection and thought
 - Can stay in the this state for 3-4 days
 - Desensitized

“Neurons that fire together, wire together” -P. Wolfe

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What is an Educator to do?




- Reduce Stress
 - Build Relationships
 - Teach coping skills
- Academic
 - Learn the current brain research
 - Teach real life applications of content
 - The Brain Compatible Classroom

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Brain Snack



- Stand
- Take 7 steps
- Form groups of 2-3 people
- Share an ah-ha, wonderment or question
- When you hear the chimes return to your seat

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Updates on The Teenage Brain

1. Overproduction of dendrites
 - Learning information and more efficient than any other time in life
2. Pruning
 - Use it or loose it
 - Where they spend their time matters
3. Mylenation
 - College students vs. HS dropouts huge difference in the number of dendrites

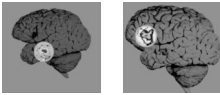

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Frontal Lobe vs. Amygdala

- Teenagers use the amygdala
 - shock, anger, surprise
- Adults use frontal lobes
 - fear

Teenager (age 10-18) Adults -Todd

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Frontal Lobe vs. Amygdala


- Misunderstandings
- Emotional Language
- Bad Decision Making
 - They go with emotional response
- Disorganized & Forgetful
- Mood Swings
 - Girls- get stressed and stay stressed longer
 - Boys- 10X more testosterone than an adult, 10X more likely to do physical harm

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Impulsive Behavior & Risk Taking




Impulsive Behavior-
dopamine release
Rats- run across hot griddle (burned) to get dopamine
Rats- choice food or dopamine- starved
Lower levels of Serotonin (Calming agent)
Indestructible

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How did you do with...



...Firing? (Thinking)
...Wiring? (Learning)


How will you use this information to inform your practice?

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