

The Early Growing Season: How to Nurture Brain Power in Young Children



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Nurturing Brain Power

- Physical Development of the Brain
- Social and Emotional Development
- Cognitive Development



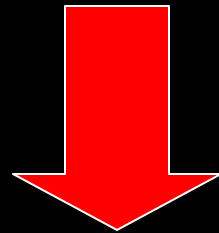


Education is discovering the brain, and that's about the best news there could be.... anyone who does not have a holistic grasp of the brain's architecture, purposes and main ways of operating is as far behind the times as an automobile designer without a full understanding of engines.

Leslie Hart

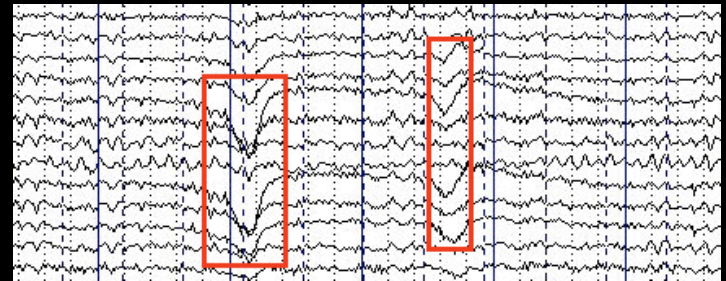
The Decade of the Brain 1990-2000

New imaging technologies



Better understanding of the brain
and how it functions

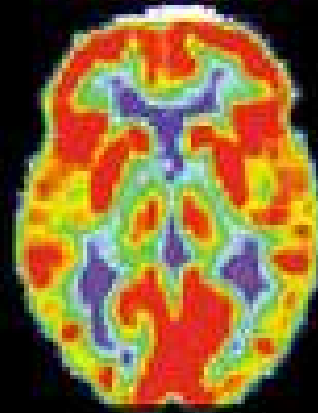
Electroencephalography EEG



Computerized Axial Tomography (CAT) Scan



Positron Emission Tomography (PET)



More Active



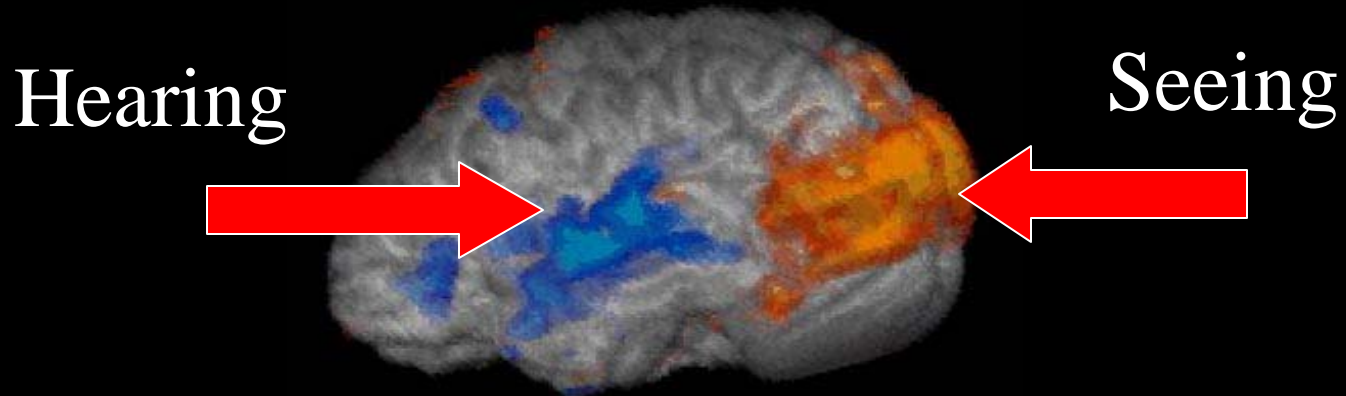
Magnetic Resonance Imaging (MRI)

During magnetic resonance imaging (MRI), a narrow tube moves the patient through a tunnel-like structure. Inside the structure, radio waves pass through a magnetic field around the patient, creating a 3-D image of the internal structures.



ADAM.

Functional Magnetic Resonance Imaging (fMRI)



Fields of Study in Neuroscience

- Neuroanatomy
- Developmental Neuroscience
- Cognitive Neuroscience
- Behavioral Neuroscience
- Clinical Neuroscience

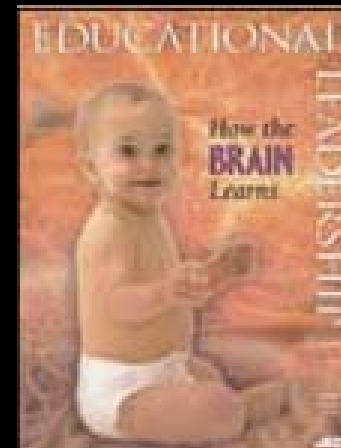
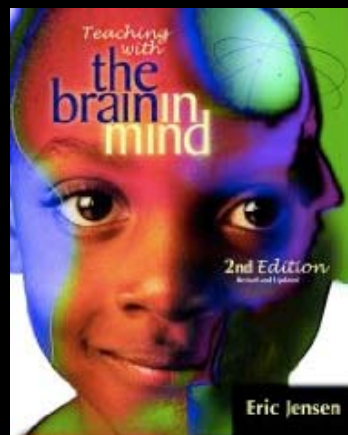


Brain Research

In the Popular Media...



In Educational Journals and Books...



Brain Basics

- Composition of the Brain
 - 75% water
 - 10% Fat
 - 8% Protein

- Energy Requirements
 - 2% of body's adult weight
 - Consumes 20% of body's energy





Brain Power

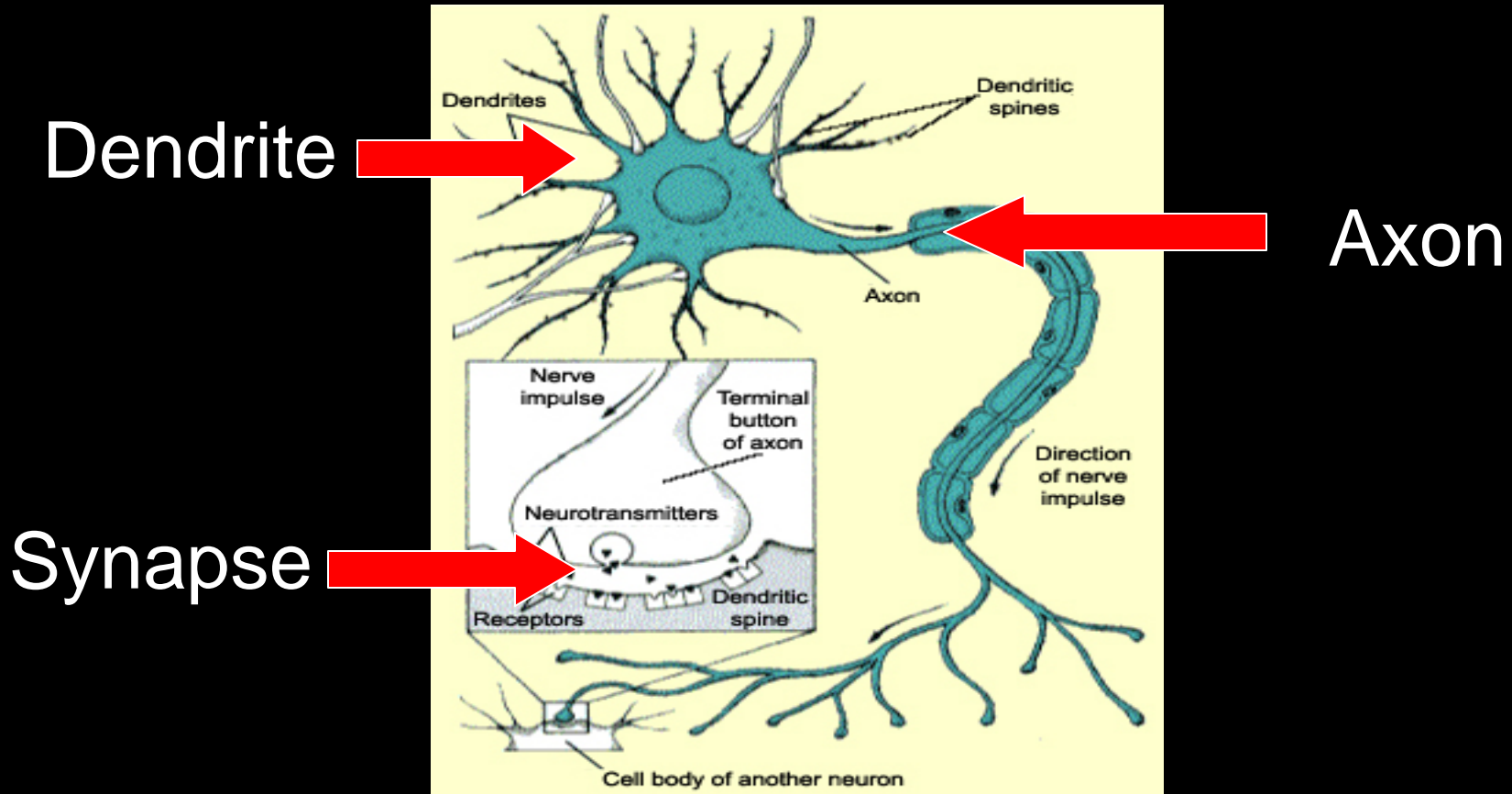
- Uses 8 gallons of blood per hour
- Blood provides fuel in the form of oxygen and glucose
- Brain uses 1/5th of the body's oxygen
- Water is required to move neuron signals

Brain Composition



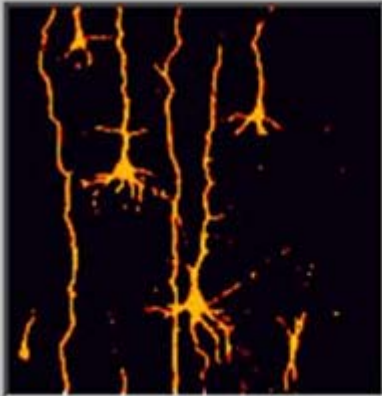
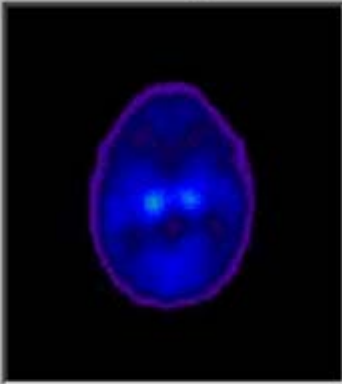
- Weighs 3 pounds when fully developed
- Made up of at least 100 billion nerve cells (neurons)

Neurons

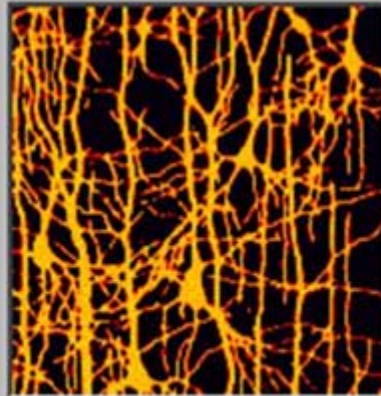
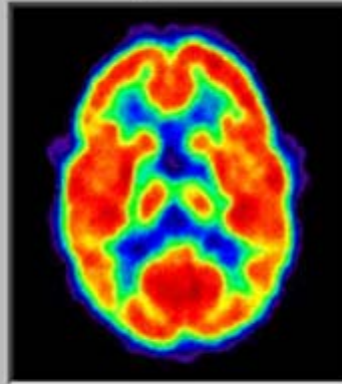


Nerve Cell Growth

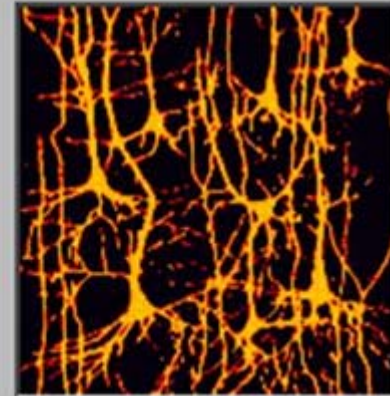
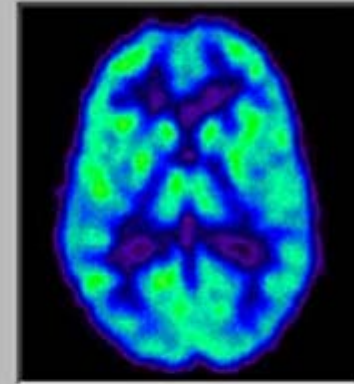
5 days



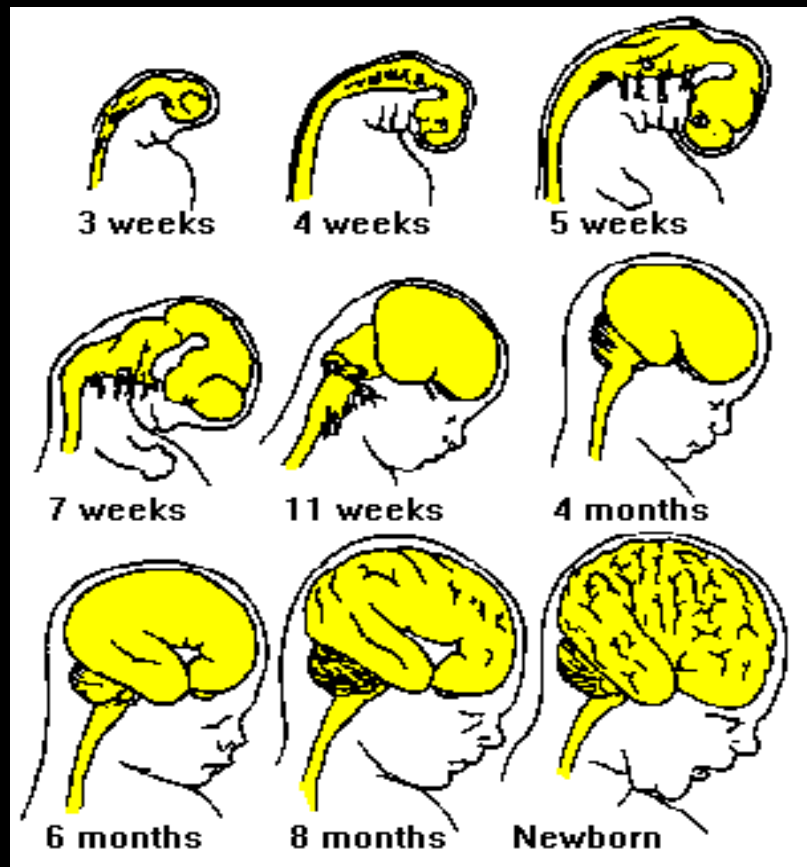
6 years



Adult



Brain Development



Brain Development Before Birth

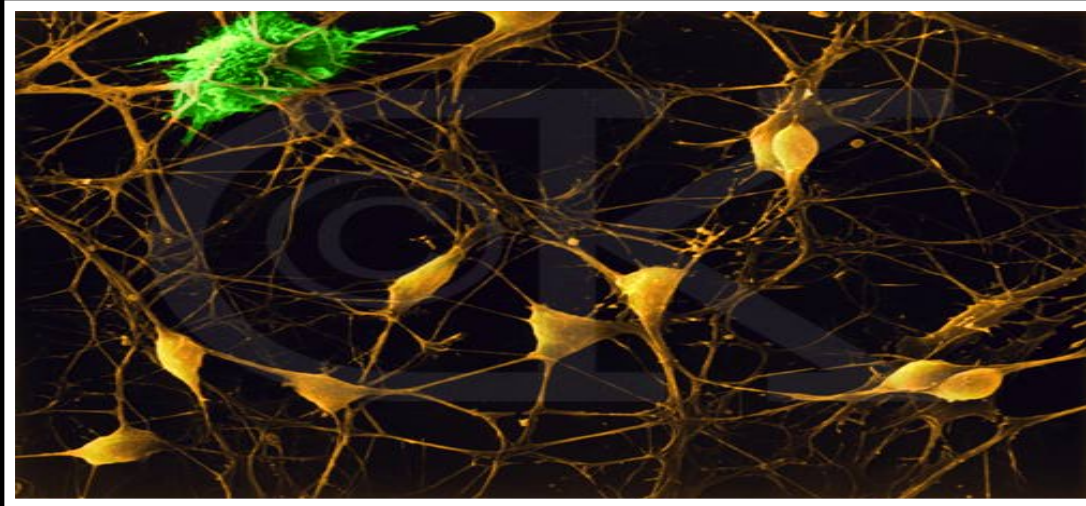
- Π 1st month- Neural tube forms
- Π 2nd month- major structures of the brain begin to form



Brain Development Before Birth

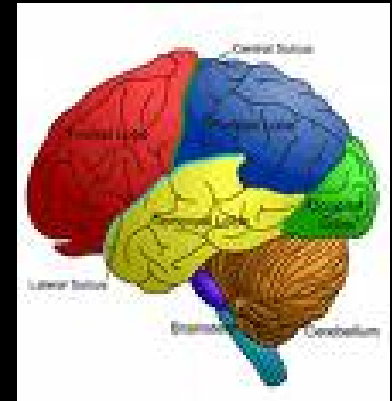
Π 3rd-6th months

1st wave of brain cell proliferation



Brain Development Before Birth

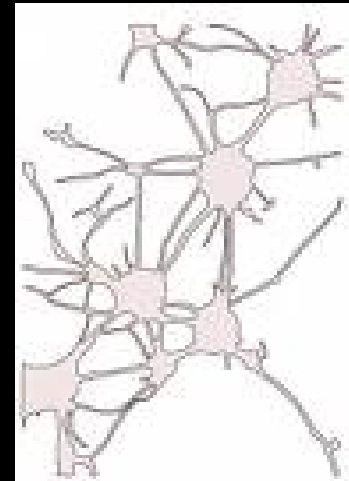
Π 6th month- cerebral cortex starts to separate into lobes



Π 8th month- the auditory cortex, visual cortex and Broca's area have begun to function

Brain Development Before Birth

Π 8th-9th month
1st wave of pruning

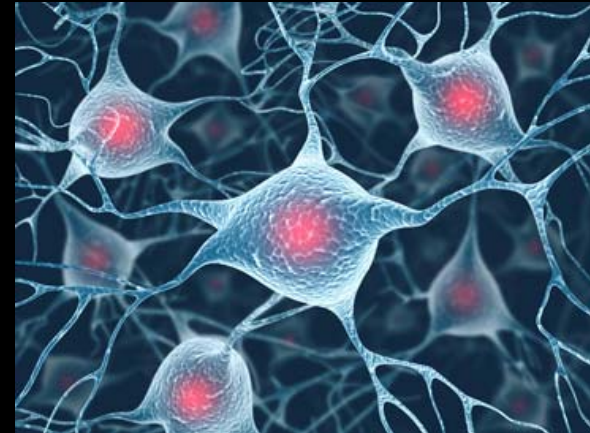


Autism may be a result of insufficient or abnormal pruning during this time

Brain Development (Ages 6-12)

2nd Wave of Brain Cell Proliferation

- Focus is on number of connections between nerve cells
- Gray matter thickens

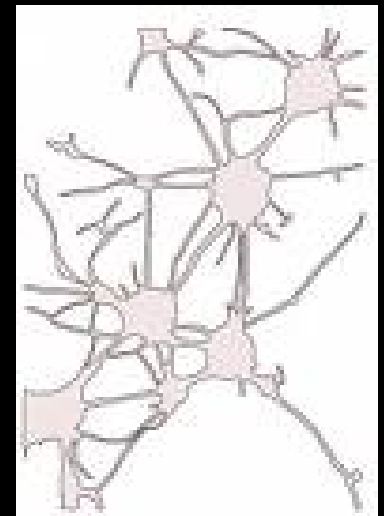


Connection to ADHD & Tourette's?

Brain Development (Ages 12-25)

2nd Wave of Pruning

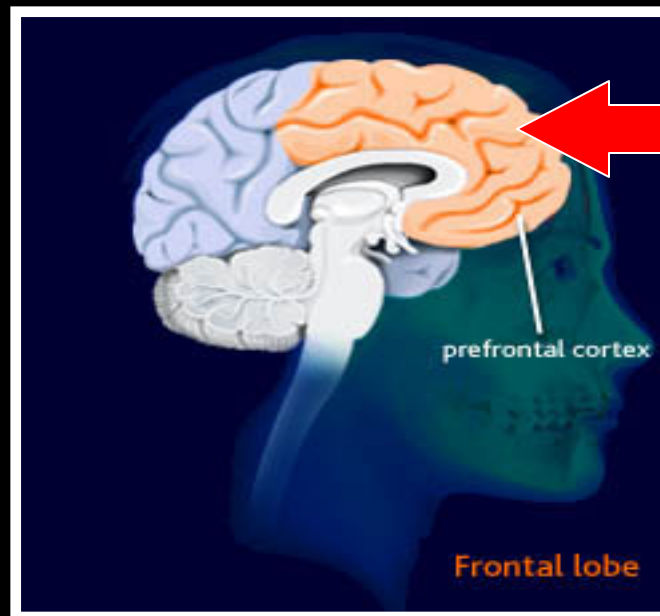
- Gray matter thins
- White matter thickens
- Fewer but faster connections



Connection to schizophrenia & bipolar disorder?

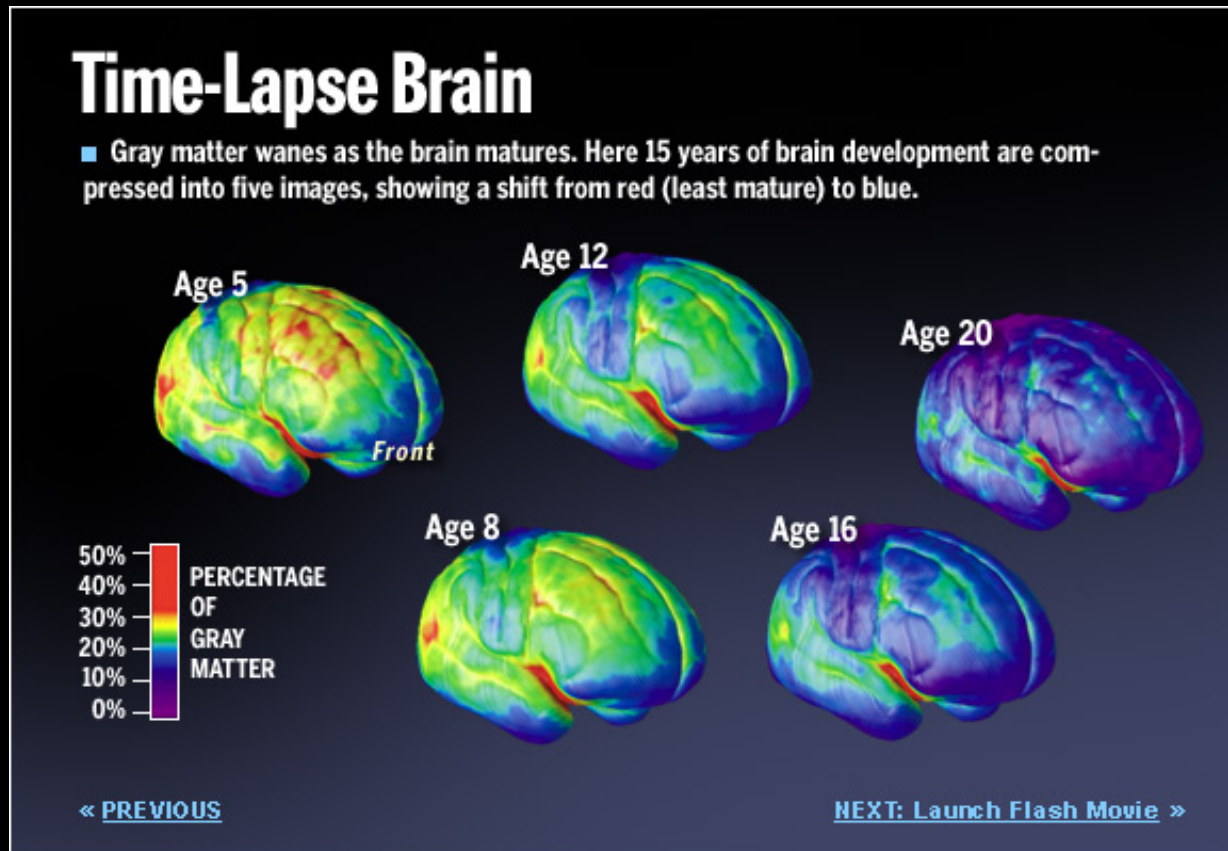
Teen Brain

The prefrontal cortex (thinking brain) is the last part of the brain to develop.








Brain Maturation

Maturation occurs from Back to Front



Sensitive Periods

Vision	Birth		2
Hearing	Birth		10
Emotional Control	Birth		3
Vocabulary	Birth		6
Motor Development	Birth		10
Second Language	Birth		10

The Dendrite Song

(To the tune of *Clementine*)

Use your dendrites,
Use your dendrites,
To connect throughout your brain
Take in info, analyze it,
Grow some new ones
Unrestrained





Axons send out
Neurotransmitters
To the dendrites all around
Across the synapse
Jumps the impulse
New ideas can now abound



Stimulation

Is what the brain needs

To make dendrites stretch and grow

New connections

Make us smarter

In what we think and what we know.



Use your dendrites,
Use your dendrites,
To connect throughout your brain
Take in info, analyze it,
Grow some new ones
Unrestrained

Brain Food



- Complex Carbohydrates
fruits, vegetables and whole grains
- Protein
meat, dairy, nuts, seeds, and beans

Essential Fatty Acids



- Omega 3 -flax seeds, walnuts, green leafy vegetables
- Omega 6 -sunflower, safflower, corn, sesame oils
- Docosahexaenoic Acid (DHA)- human breast milk, salmon and tuna

Vitamins & Minerals

- Choline

beef or chicken liver, pork, eggs, wheat germ, or soybeans

- Iron

meat, fish, or beans

- Folic Acid

enriched cereals, grains, liver, eggs, beans, or green leafy vegetables



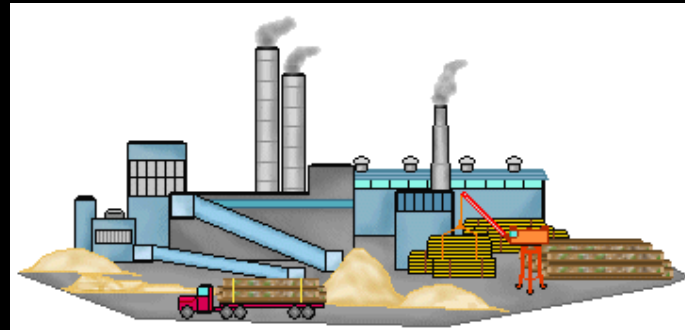
Toxins & Brain Development



- Environmental chemicals
- Recreational drugs
- Prescription medications

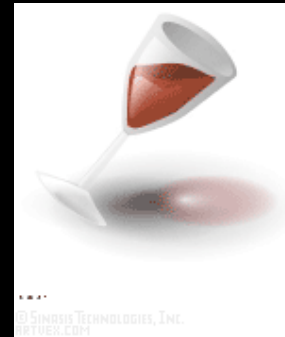
Environmental Chemicals

- Lead
- Mercury
- Organophosphates



Recreational Drugs

- Alcohol
- Nicotine
- Psycho-stimulants
 - Cocaine, methamphetamine, ritalin



Stress & Brain Development

Stress

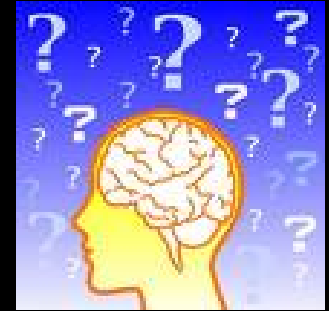


Release of stress hormones
(Cortisol and Adrenaline)



Increase heart rate, blood pressure

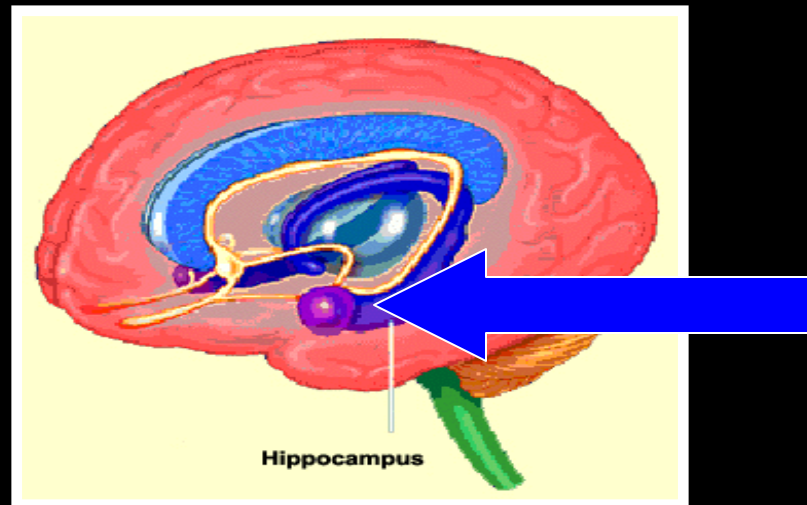
Prolonged Stress



- Can cause genes important for survival to be over-expressed
- Can activate genes linked to depression and other mental problems.
- Can leave a memory trace that gets triggered by a lesser stress and reinforced

Stress & Memory

Can cause the hippocampus to shrink



Stress during Pregnancy

Stress can be transferred from mother to child



Pair Share



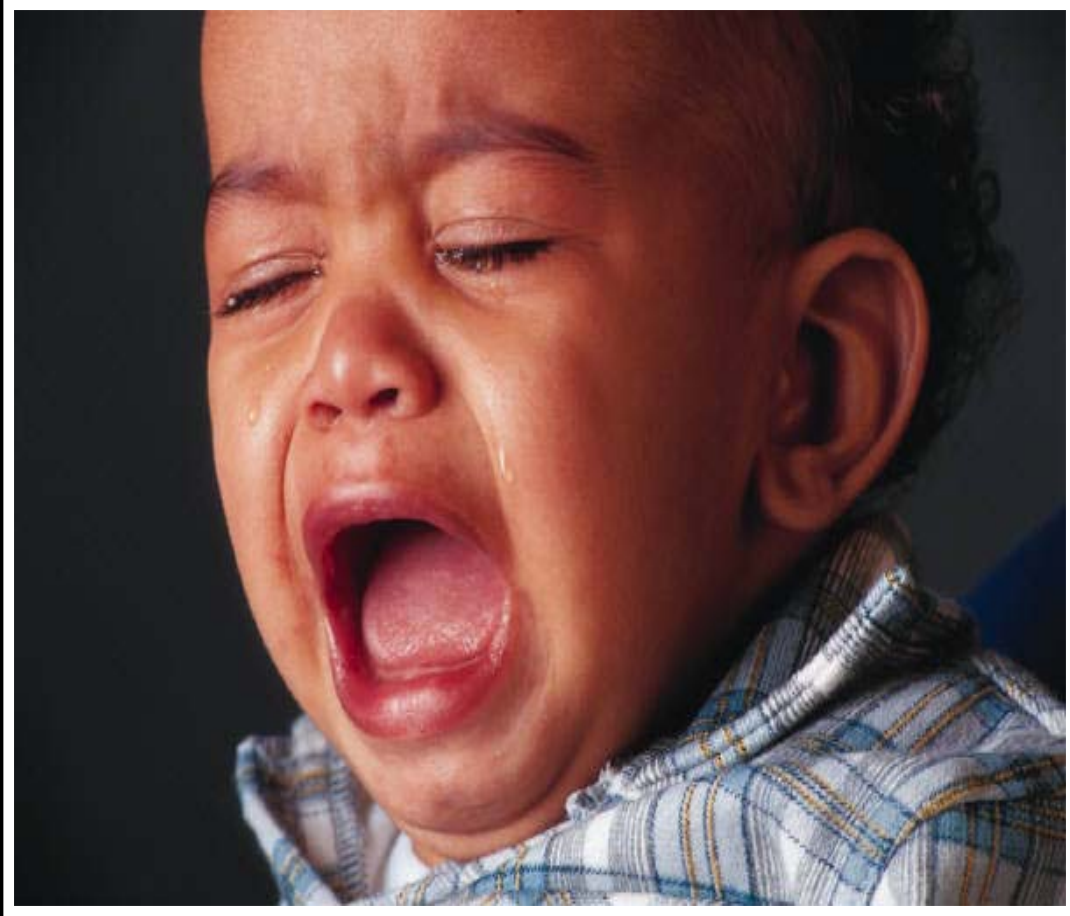
1. What is one “Ah Ha” you have learned about the physical development of the brain?
2. How can we, as early childhood educators and caregivers, support a child’s brain development?

Social Development

- Nurturing and stable relationships with caring adults (parents, caregivers, teachers)



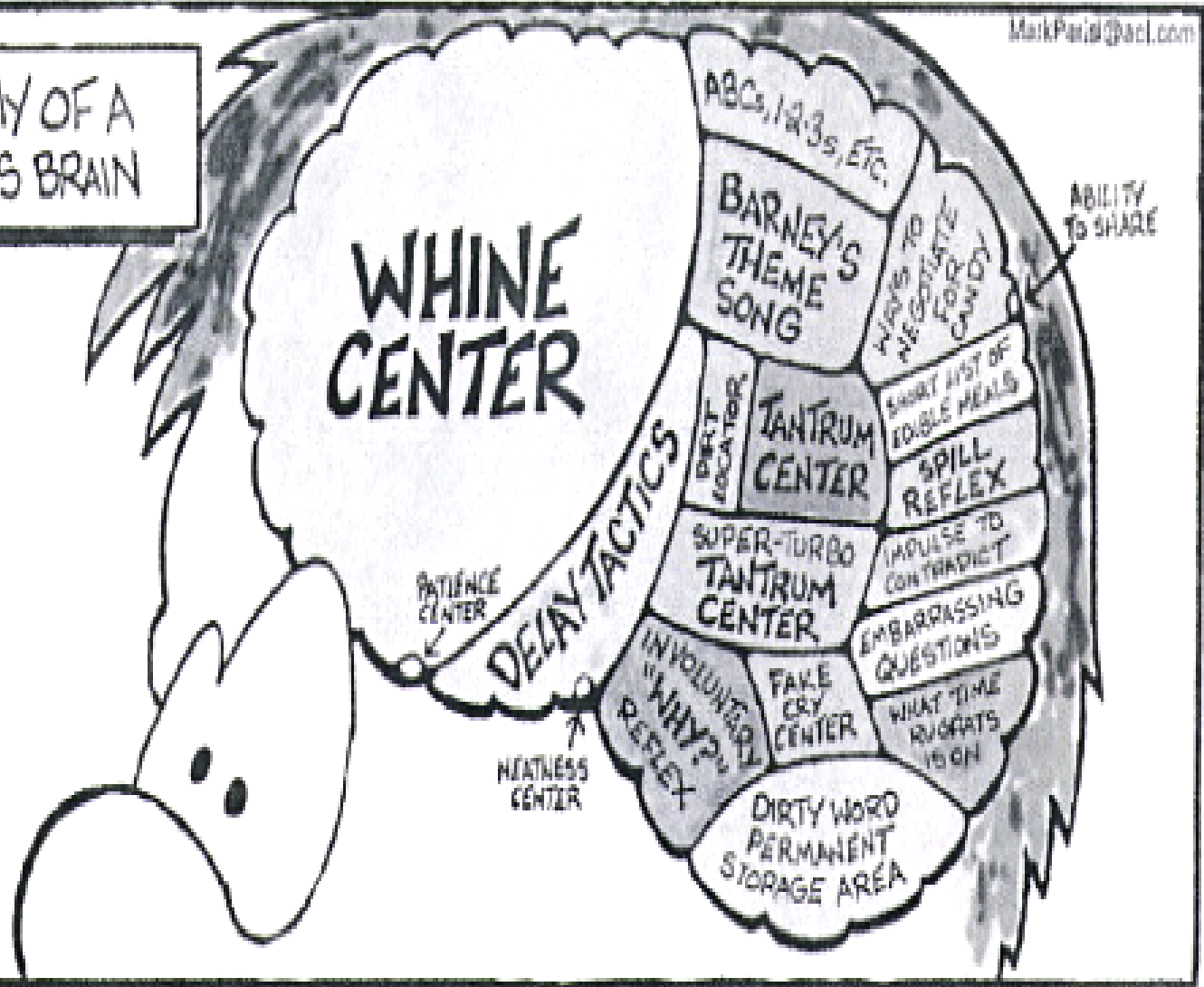
Regulating Emotions



OFF THE MARK/ by Mark Parisi

MarkParisi@aol.com

ANATOMY OF A TODDLER'S BRAIN



MARK
PARISI 7-19

TV Viewing



- Can be over-stimulating
- Lead to attention problems
- Takes away from social interaction

Mirror Neurons



Babies use their own motor system to figure out how someone else's actions will unfold.

Broken Mirrors

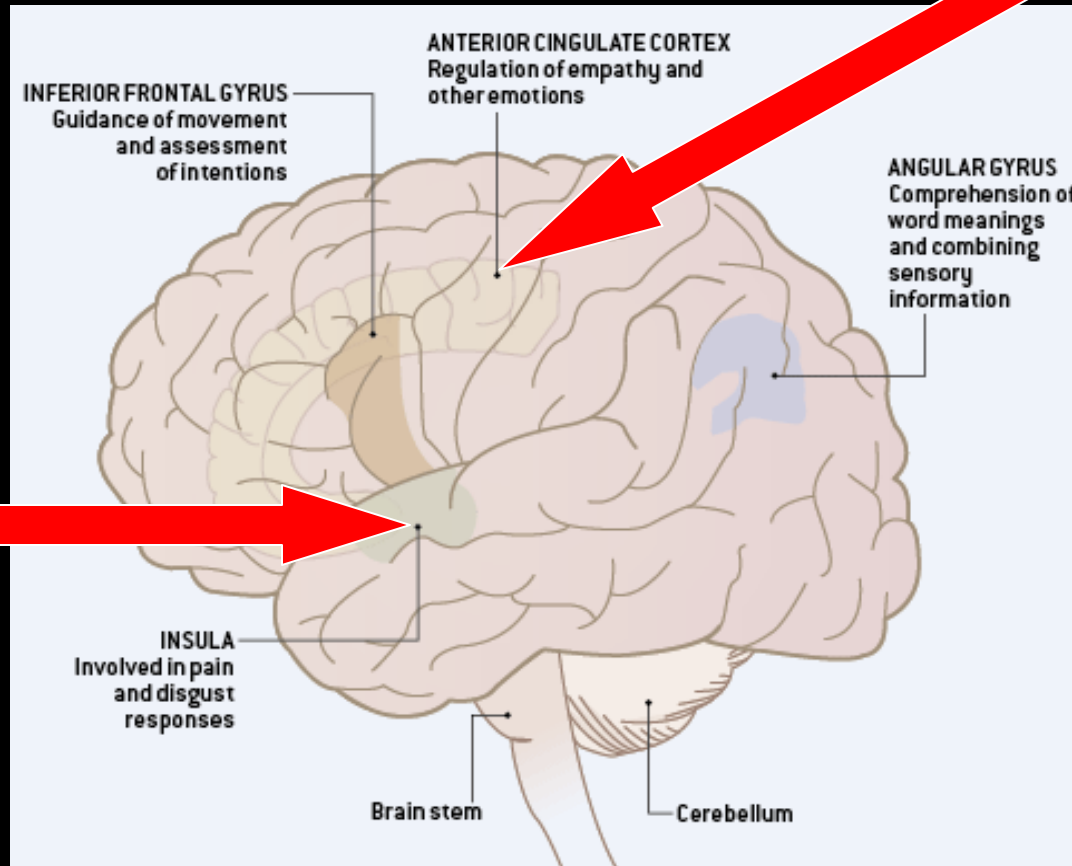
Symptoms of Autism

- Social Isolation
- Lack of eye contact
- Poor language capacity
- Absence of Empathy



Anatomy of Autism

Anterior
Cingulate
Cortex



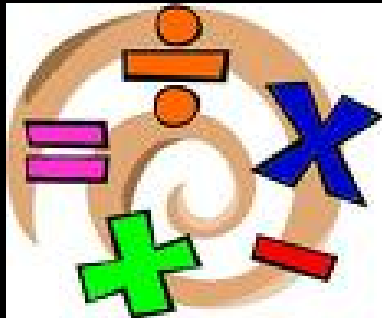
Insula

Movement & Learning



Cognitive Development

- Early Language Development
- Math



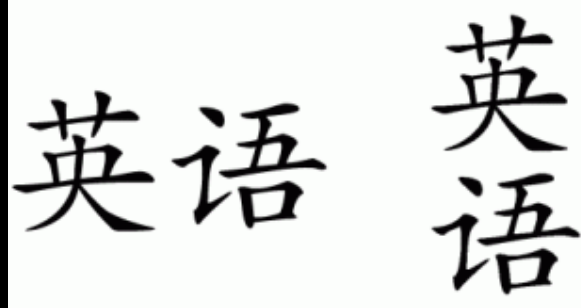
Getting Primed for Language

In the final trimester of pregnancy the fetus is able to hear its mother's voice



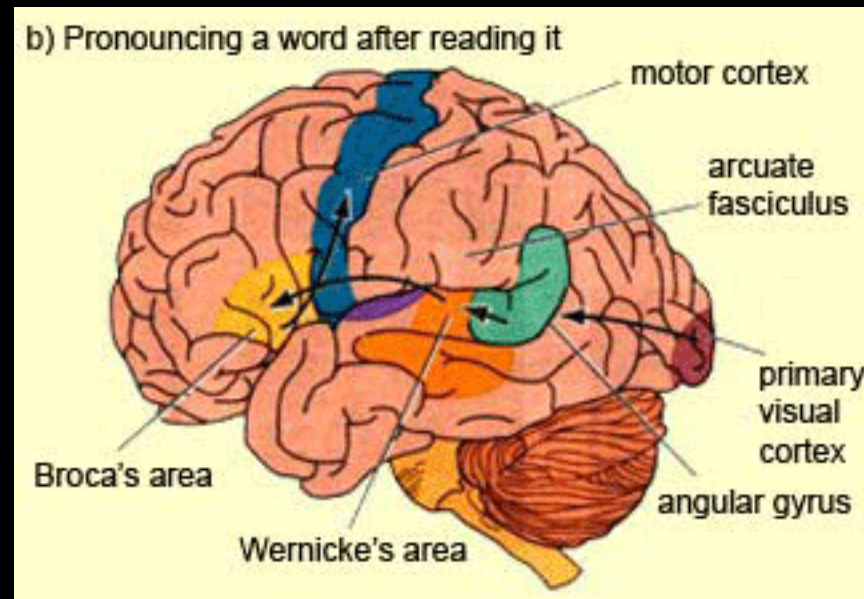
Language Capacity

Babies are primed to be multilingual

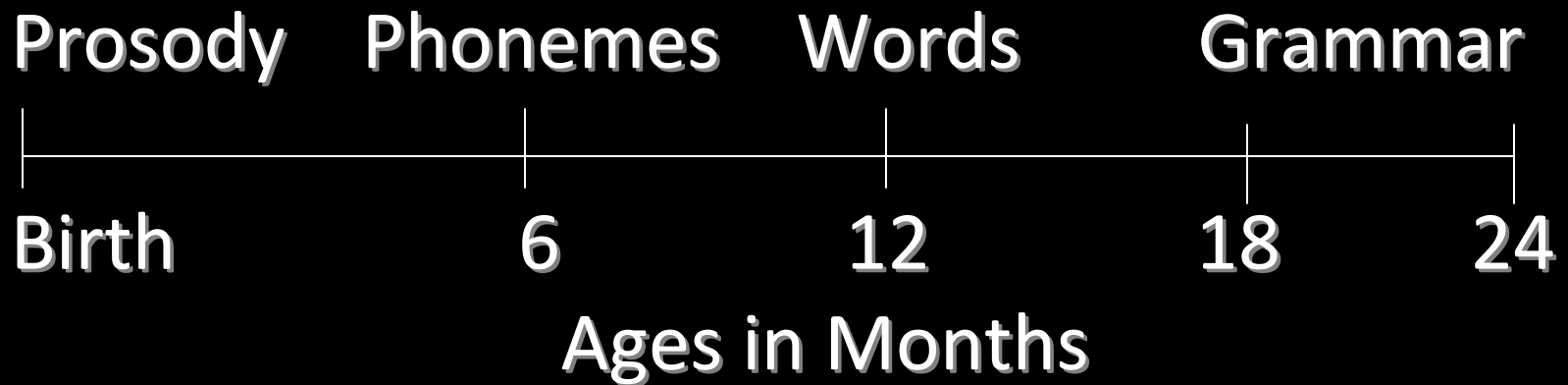


英语 英语

Parts of Brain Involved in Spoken Language



Spoken Language Development



Language Explosion



- 2 year old - 100-200 words
- 3 year old - 900 words
- 5 year old - 3000-8000 words
- 6 year old - 13,000 words

Fostering A Language-Rich Environment (Birth-3)

- Talking to children
- Reading to children
- Nursery rhymes



Oral Language Activities Preschool



- Conversations that are cognitively challenging and vocabulary rich
- Comprehension & vocabulary building during story time
- Phonemic awareness

Phonemic Awareness Strategies

- Alliteration
- Rhyming
- Oddity tasks
- Word and syllable counting
- Phoneme sounds through music



Print Awareness



- Words are read, pictures are viewed
- Read in English from left to right
- Letters placed next to each other form words
- Letters have a large and small version

Early Writing Skills



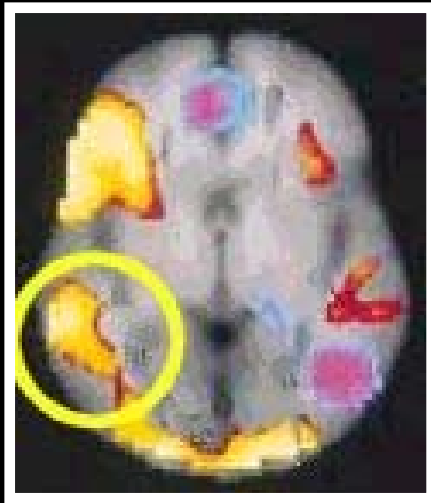
- Provide tools for drawing or coloring
- Model the uses of writing
- Provide opportunities to use writing

Identifying Language Problems

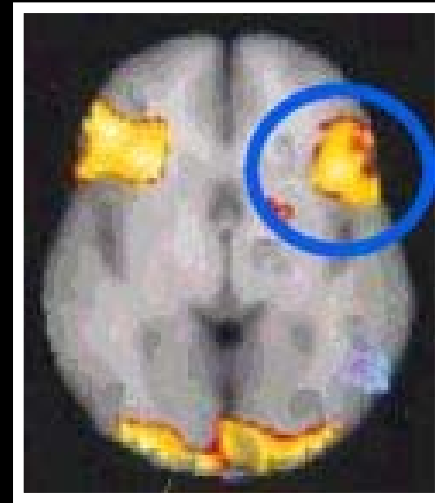
- Delay in speaking
- Difficulties with pronunciation
- Difficulty learning letters of alphabet
- Recalling incorrect phonemes
- Insensitivity to rhyme

Dyslexia

Isn't a vision problem it is a hearing problem



Good Reader



Dyslexic Reader

Rewiring the Brain

Fast ForWord (Scientific Learning)



Parts of the Brain Involved in Math

- Number symbols- processed in the parietal lobe



- Number words- processed in Broca's area



Development of Math Skills

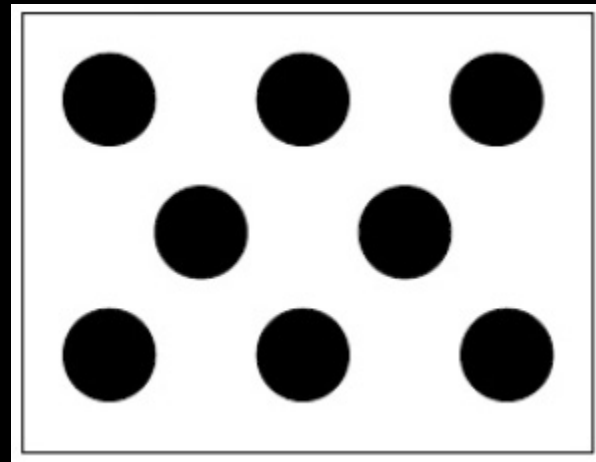


Babies can count!

Early Math Skills

Subitizing

Use visual cues to make mental connections between patterns of objects and their numerosity



Fostering Early Math Skills

- Number Sense
- Geometry & spatial relationships
- Measurement
- Patterns/geometry
- Analyzing data

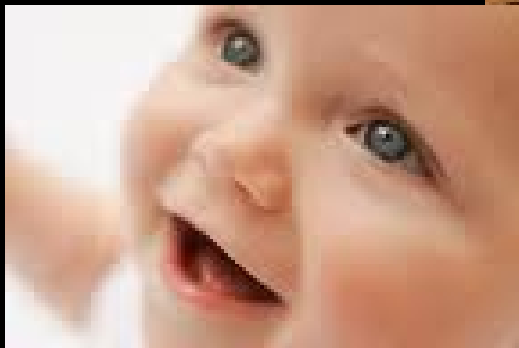


Dyscalculia



- Problem with parietal lobe of brain
- Developmental Dyscalculia- genetic link develops at birth
- Relates to child's inability to subitize
- Rely heavily on sequencing and memorizing

Nurturing Brain Power in Young Children



Thank You....



&

A special thanks to the
Stanislaus County Children and Families
Commission!