Child Development and Curriculum: Strategies for Learning, Self-motivation and Self-esteem

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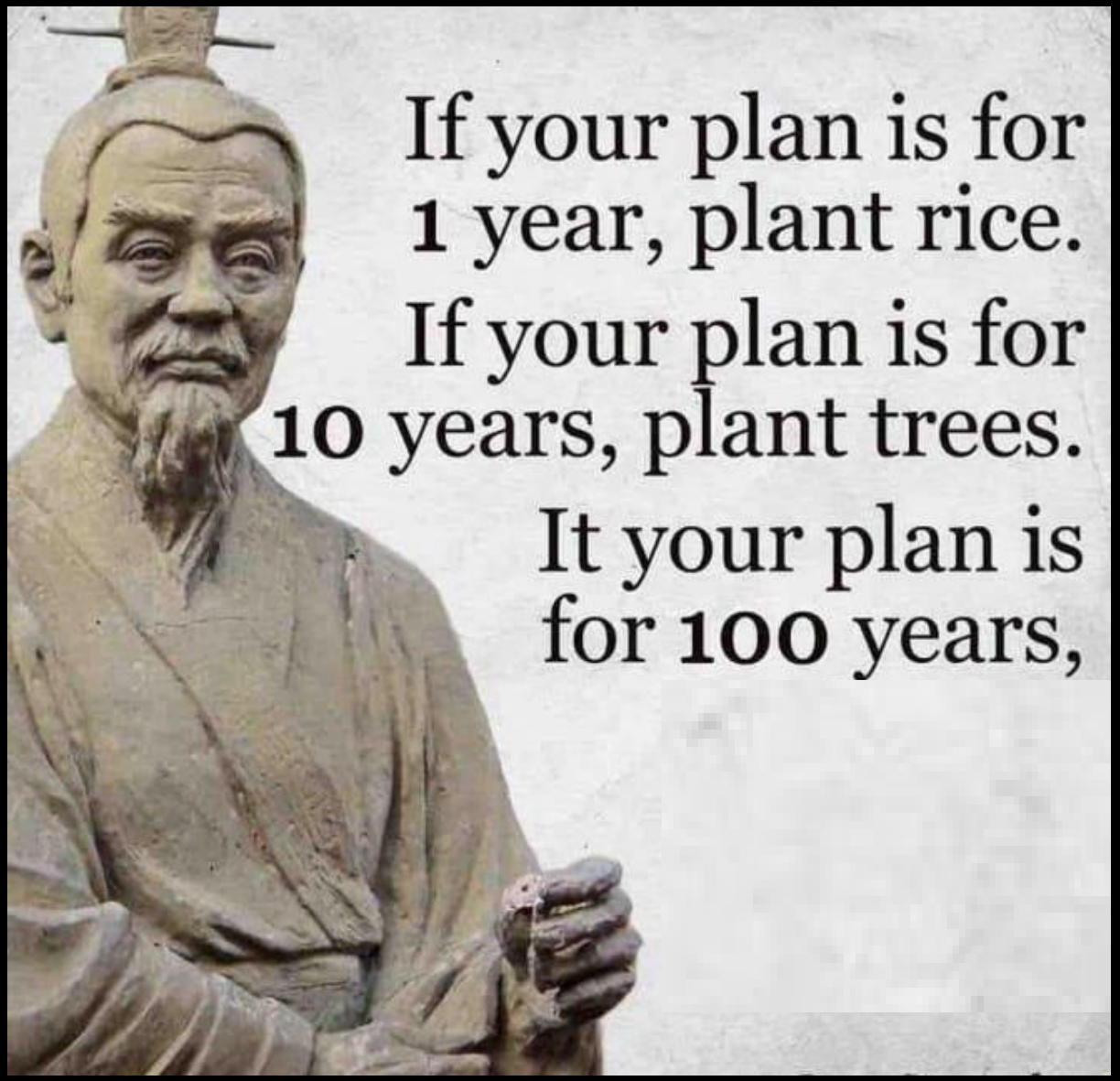
“Knowledge is power” → leave today’s webinar feeling more powerful and more knowledgeable as a parent and/or educator.



Educate *All* of Them!

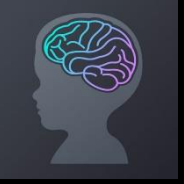
Child Development: Strategies for Learning

- How do we create the conditions at home that support or enhance cognitive development?
- What should parents and educators know about the developing human brain? Does the brain remain the same as children age or does it physically change over time?
- What can parents and educators *do* to nurture the development of the young brains for whom we (childcare provider, teacher, preschool teacher, ECE specialist, parent or school administrator) are responsible?

Parenting and Education are Brain-building

The brain is without doubt our most fascinating organ. Parents, educators, and society as a whole have a tremendous power to shape the wrinkly universe inside each child's head, and, with it, the kind of person he or she will turn out to be. We owe it to our children to help them grow the best brains possible.

-- What is Going in There?
Lise Eliot



Child Development: Common Threads

1. The **brain** should be the **centerpiece** of all conversations on learning and human **development**
2. **Learning is making connections** (neurons)
3. **Active learning** is brain-enriching and relies on regular and consistent child ***engagement***
4. **Brain plasticity** – constantly changing circuits
5. **Poverty and stress** can impact child development (including language)
6. **Relationships** and **interactions** (people and objects) are key factors to healthy development.

Child Development

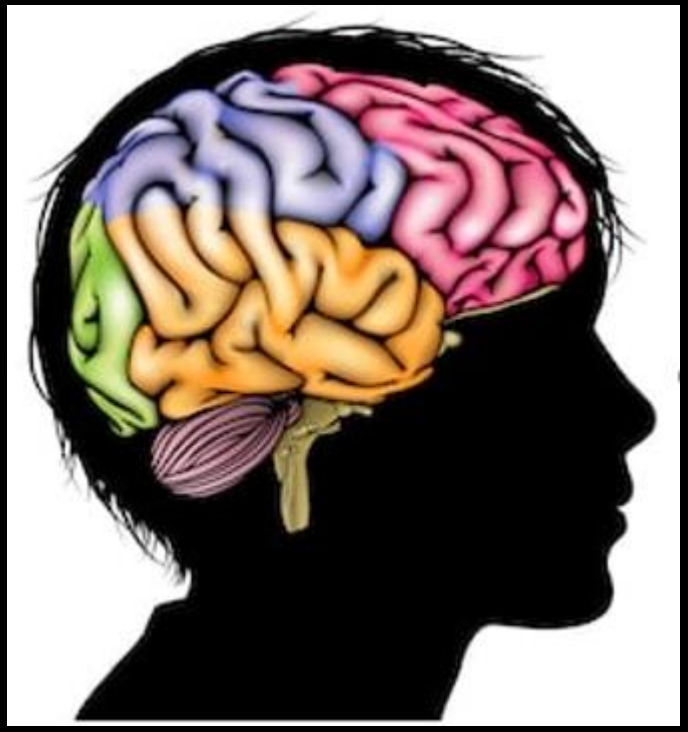
- German children were far more successful in grade school - Why?
- Kindergarten: “kinder” = child; “garten” = garden.
- Frederick Froebel coined “children's garden,” - a concept that nurturing young children would better prepare them for the school years ahead. Give them the daily attention that one would devote to fruit trees in an orchard or flowers in a garden.

Child Development

- The first five years of life lay the foundation for lifelong learning.
- A child's brain is busy wiring the foundations for vision, emotional stability, social interactions, language development, motor development, thinking skills, and much more.
- By age three, a child's brain has achieved 80% of its foundational wiring.
- By age five, a child's brain has reached 95% of its requisite brain wiring.
- Neural plasticity of neurons in the brain allows for constant alterations of foundational brain circuitry (changes = "learning").

Child Development

…only species on the entire planet that can *create* environments and plan learning events that will *determine how* and *if* their young brains *physically grow,* develop and thrive.



Child development – the Greatest Show On Earth!

~~Parents~~

~~Educators~~

Neuro-plasticians

Child Development: Magic Trees of the Mind

- Children are natural "learning machines".
- Young brains are experience-expectant = the child's brain is anxiously awaiting interactions and stimulation → ready to learn and develop.
- *What* a child experiences directly affects how his/her brain will/will not develop.
- The lack of stimulating experiences decelerates the rate of learning and development in a young child's brain.

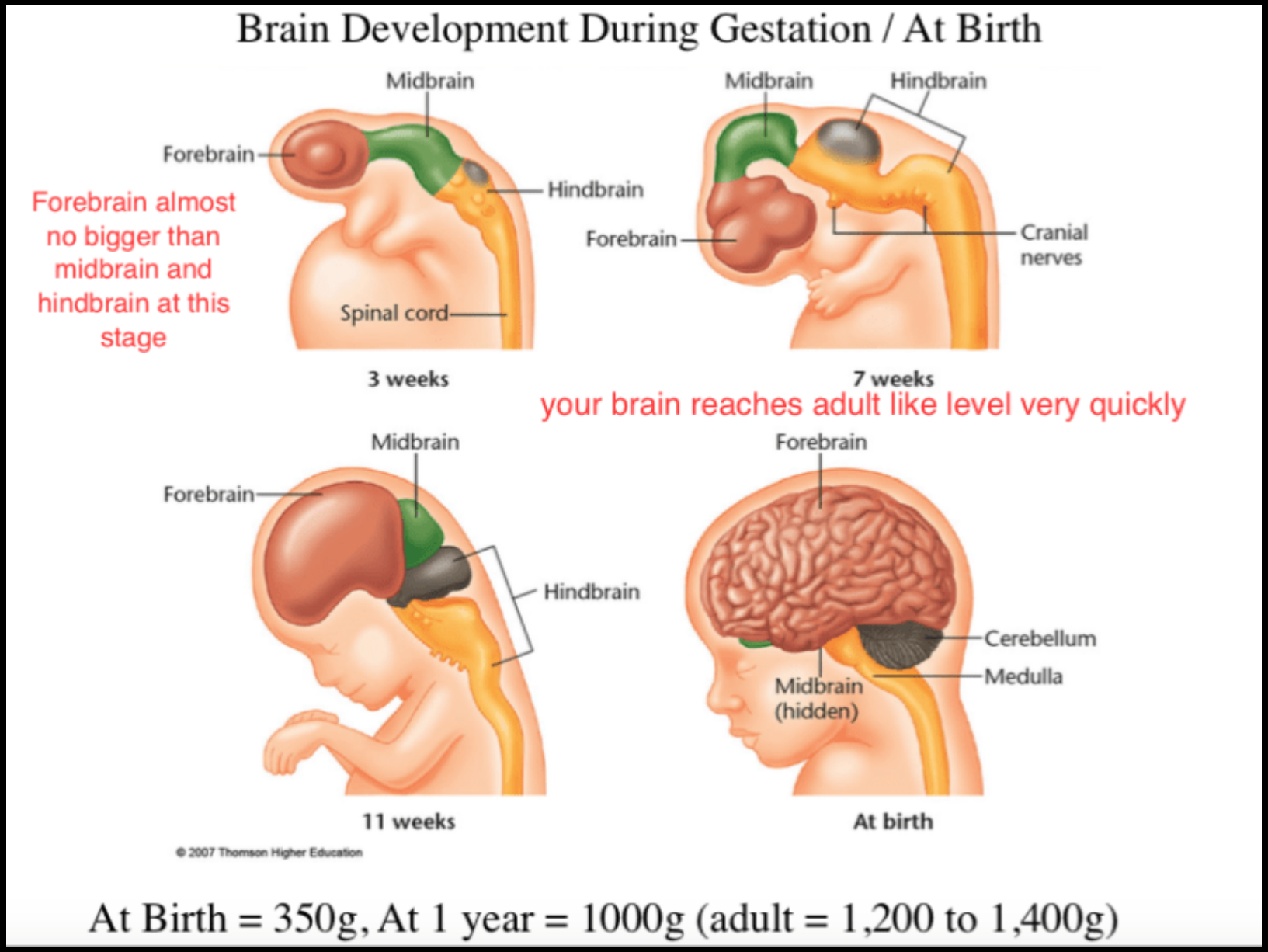
How does the human brain develop?

How can we enhance early brain development?

Five Periods of Child Development

1. **The prenatal period:** ***from conception to birth***
2. **Infancy and toddlerhood:** ***from birth to 2 years***
3. **Early childhood:** ***from 2 to 6 years***
4. **Middle childhood:** ***from 6 to 11 years***
5. **Adolescence:** ***11 to 18 years*** **- transitioning into adulthood**

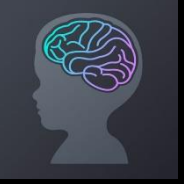
The Prenatal Period of Brain Development



At Birth = 350g, At 1 year = 1000g (adult = 1,200 to 1,400g)

The Biological Brain by the Numbers

250,000 = Number of brain cells produced each minute during neurogenesis



Prenatal Development

- Prenatal and environmental factors: the flow of nutrients and hormones (placenta) can affect an individual's health decades later (Wheeler, Parker, & O'Brien)
- A poorly nourished, ↓ weight fetus experiences changes in body structure and function → adult cardiovascular disease
- Individuals weighing ↓ 5 lbs. at birth have a 50% greater chance of dying of heart disease and stroke (after adjusting for income, education, and other factors).
- A consistent link between ↓ birth weight and heart disease, stroke, and diabetes during one's middle adulthood.
- Possible linkage: a poorly nourished fetus must devotes a larger proportion of blood than normal to brain development → other organs in the abdomen (the liver and kidney, which are involved in controlling cholesterol and blood pressure) to be ***undersized.***

Poverty

- Poor children often breathe contaminated air, drink impure water, their households are more crowded, noisier, and physically deteriorated, and those homes contain a greater number of safety hazards (National Commission on Teaching and America's Future, 2004)
- As a result, early cognitive deficits lead to still *more* deficits, which become increasingly harder to overcome with time (Klindberg)
- "Environmental cumulative deficit hypothesis" - the negative effects of underprivileged rearing conditions, which *increase* the longer children remain in those conditions (poverty, parental divorce/discord, job loss, moving frequently, illness, deaths in the family, etc.).

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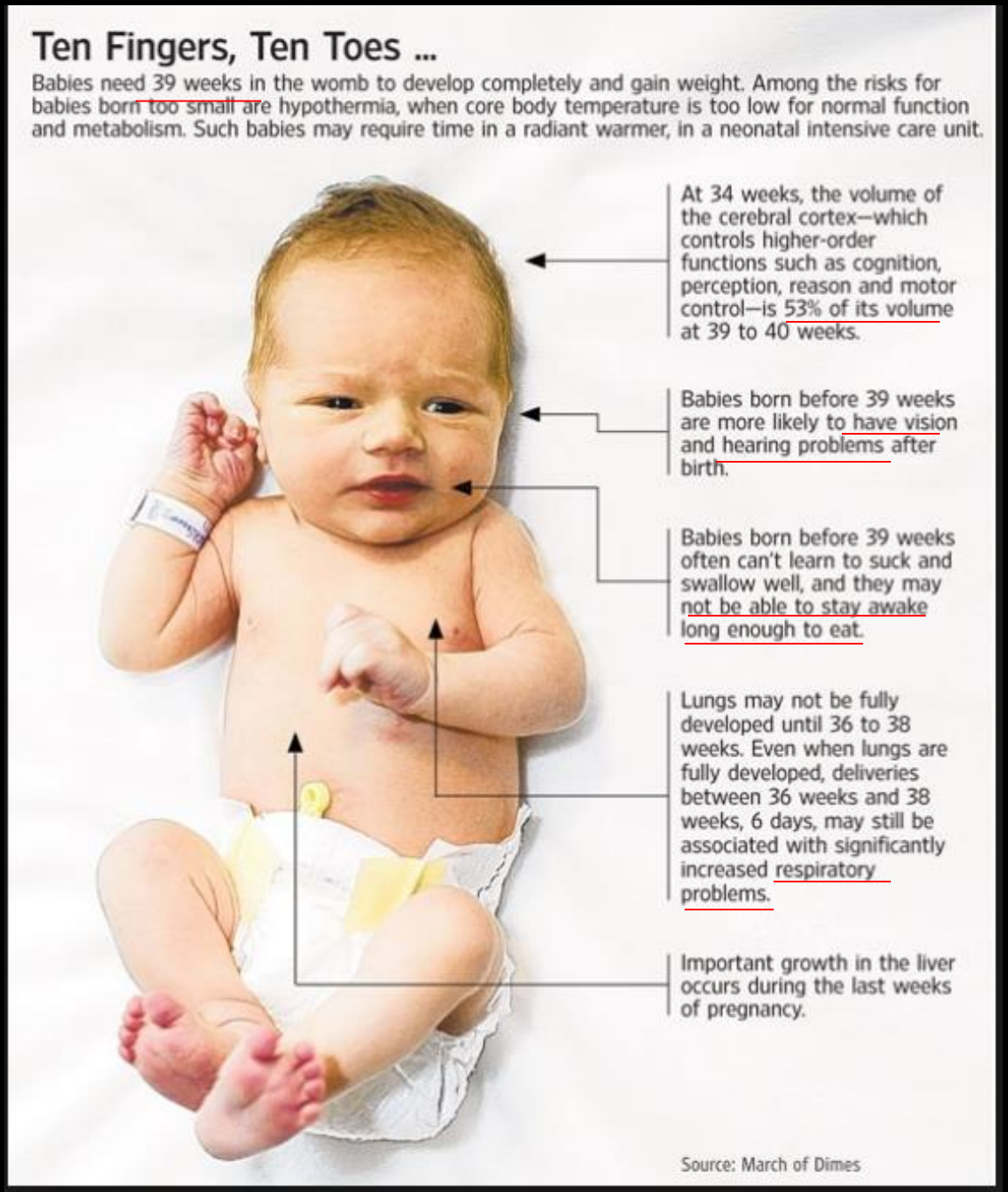


Full term = 37-40+

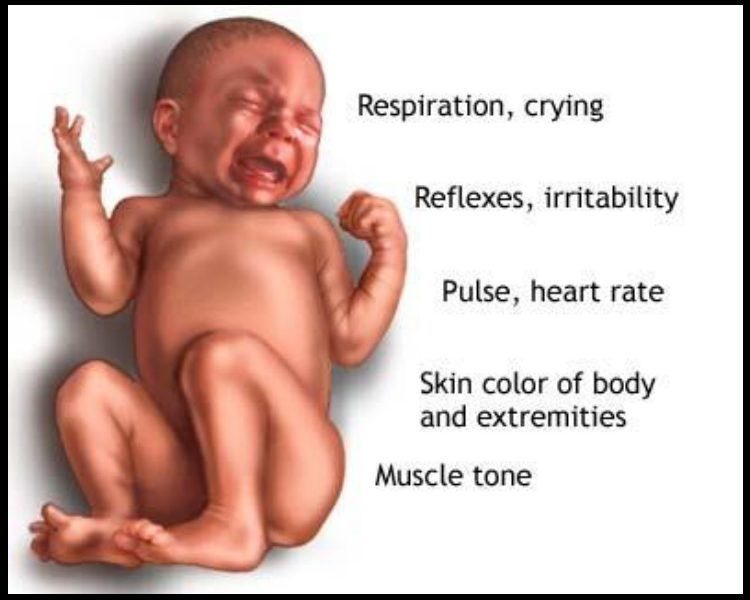
Preemies:

- 33 weeks: 10%
- 36 weeks: 90%
- Not fully "wired" (myelin)
- Tissue-thin skin (still gaining fat in weeks 27-38 – hypothermia)
- 11 weeks, smell
- 14 weeks, taste
- 32 weeks: body senses
- ↑ sensory overload → tire (eyes detect light at 32 w.; cannot close eyes until 32 w.; eyes & br. con-nections still in progress)
- Hearing on-line at 26 w.; ↓ ear-brain connections → *auditory neuropathy*
- tummy probs. → feeding probs. → med. probs.

The **age of viability**: 22 - 26 weeks gestation

Five Periods of Child Development

- At birth, infants are assessed in making the adjustment to the extra-uterine environment. To assess and infant's physical condition, doctors/nurses use the "Apgar Scale," which stands for appearance, pulse, grimace, activity, and respiration. Infants are assessed at 1 minute and at 5 minutes after birth. Any one of the APGAR conditions might suggest early brain difficulties that can lead to later *cognitive deficits.*



Infancy and Toddlerhood

Infancy and toddlerhood: ***from birth to two years*** **there are dramatic motor, perceptual, emotional, intellectual, linguistic changes in the developing body-brain.**

- **Adult touch and comfort - responsiveness to an infant's cries determines LT emotional stability-- protection, survival. Nonorganic failure to thrive – a growth disorder that results from a lack of parental love, where infants show all the signs of marasmus -- their bodies look wasted and they are emotionally withdrawn and apathetic, although no organic/ biological cause can be found for the infant/ toddler's failure to grow physically.)**

Developmental Neuroscience

The foundations of human competencies are set during the early years.

Brain Growth

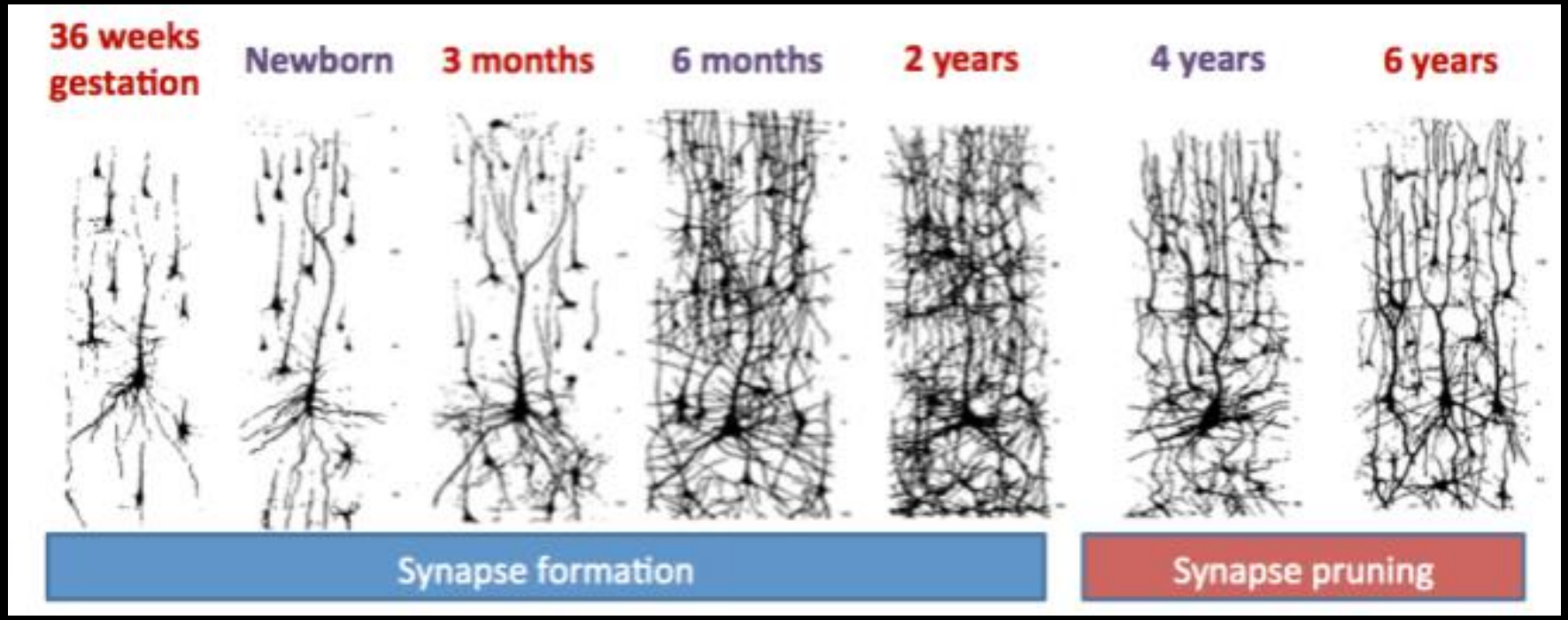
Newborn Brain
Average Weight

333 grams

2 Year Old's Brain
Average Weight

1000 grams

(tripled)


36 weeks gestation
Newborn
3 months
6 months
2 years
4 years
6 years
Synapse formation
Synapse pruning

Active Brain-building Begins Immediately After Birth!

- ✓ Research has found that as early as 6 months of age, infants can understand words; at 7 months, they begin practicing words in their head
- ✓ It's important to talk to babies, make eye contact, play simple games like peek-a-boo, reading books together. Let the child turn the pages and discuss the content/pictures.

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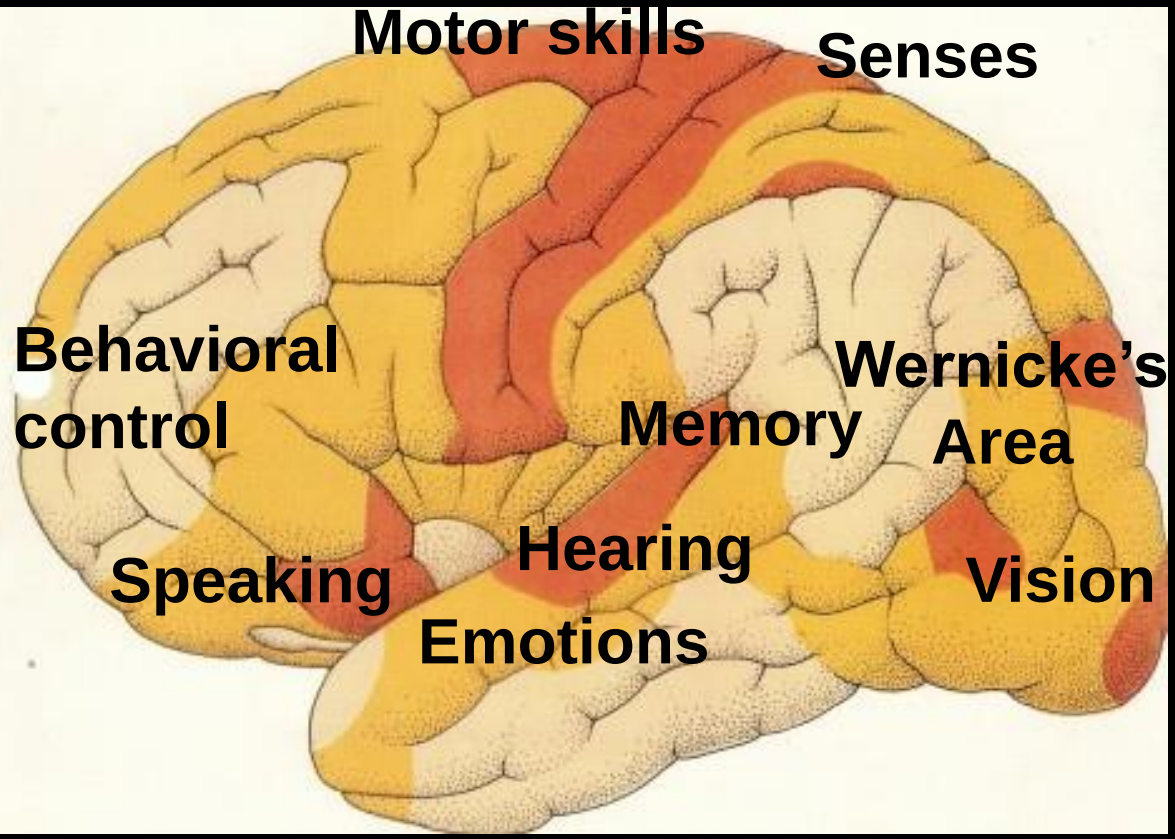
Five Periods of Child Development:
Early childhood

Early childhood: ***from 2 to 6 years*** **- Motor skills are refined; increased motor and muscle control; more emotional control; emerging understanding of the distinction between play and real world; thought and language expand at an astounding pace.**

Sequential Development of the Brain

Abstract Thought
Problem solving
Affiliation
Attachment
Sexual Behavior
Emotional Reactivity
Motor Regulation
Sleep
Digestion
Blood Pressure
Heart Rate
Respiration
Body Temperature

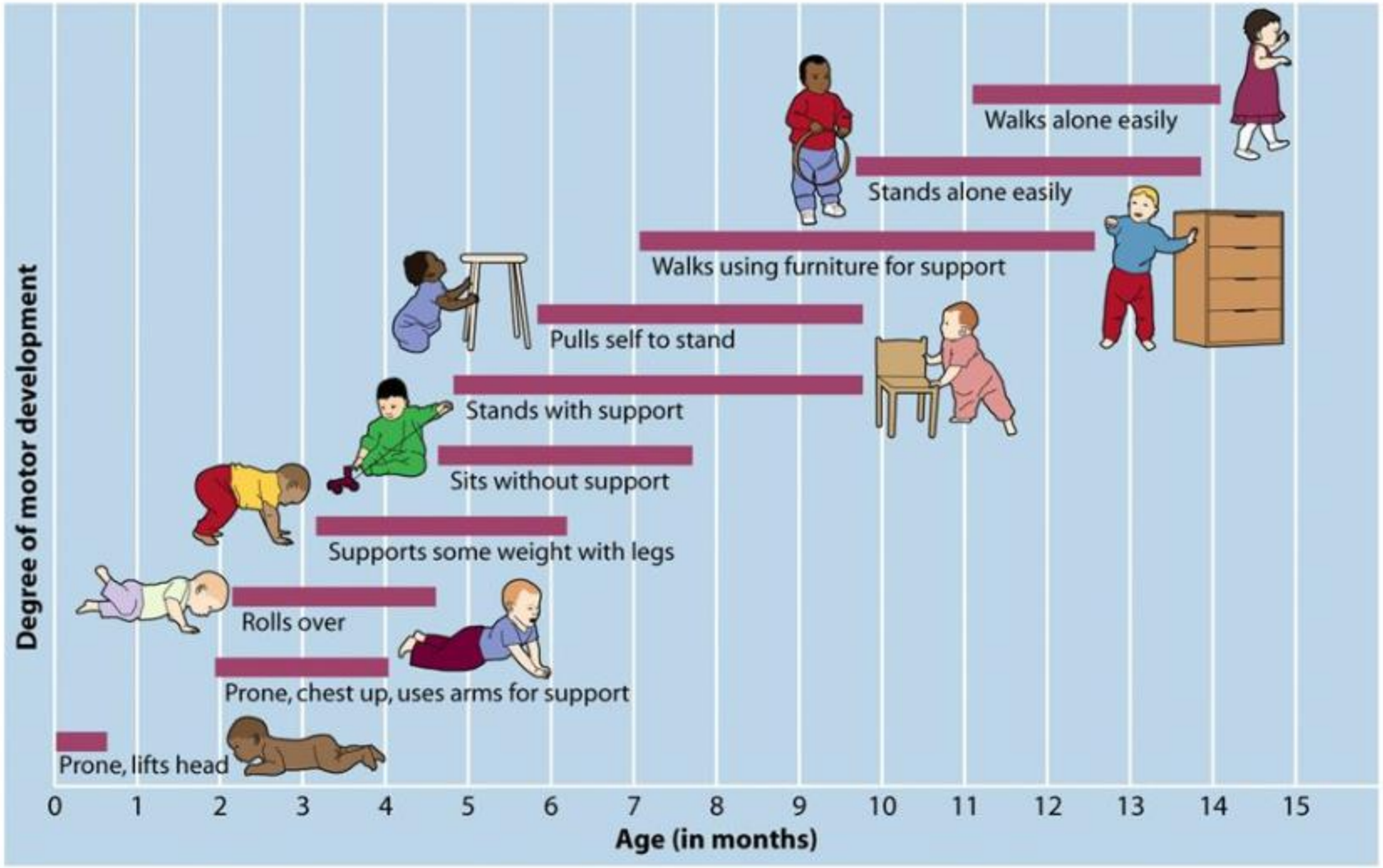
Brain-building Occurs Over Time



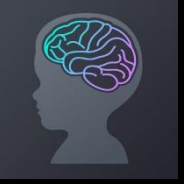
A child's brain is *not* merely a miniature version of an adult brain. It is wired differently; various regions of the brain are on a different developmental trajectory than others.

"Developmentally appropriate"

The major milestones of motor development in infancy

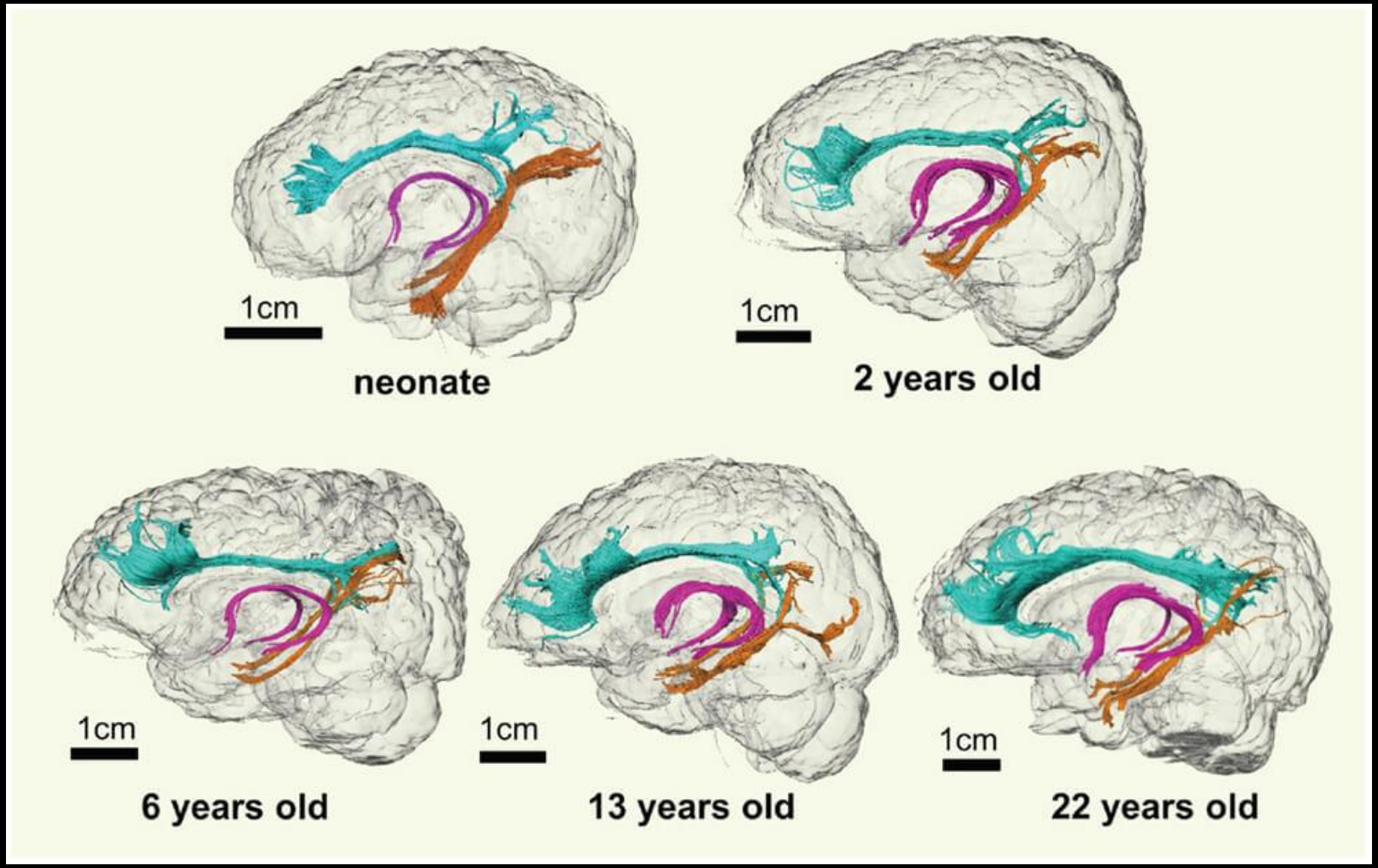


The average age and range of ages for achievement of each milestone are shown. Note that these age norms are based on research with healthy, well-nourished North American infants. (Adapted from Santrock, 1988)



“My little Billy walked at only 7 ½ months!”

Frontal lobes

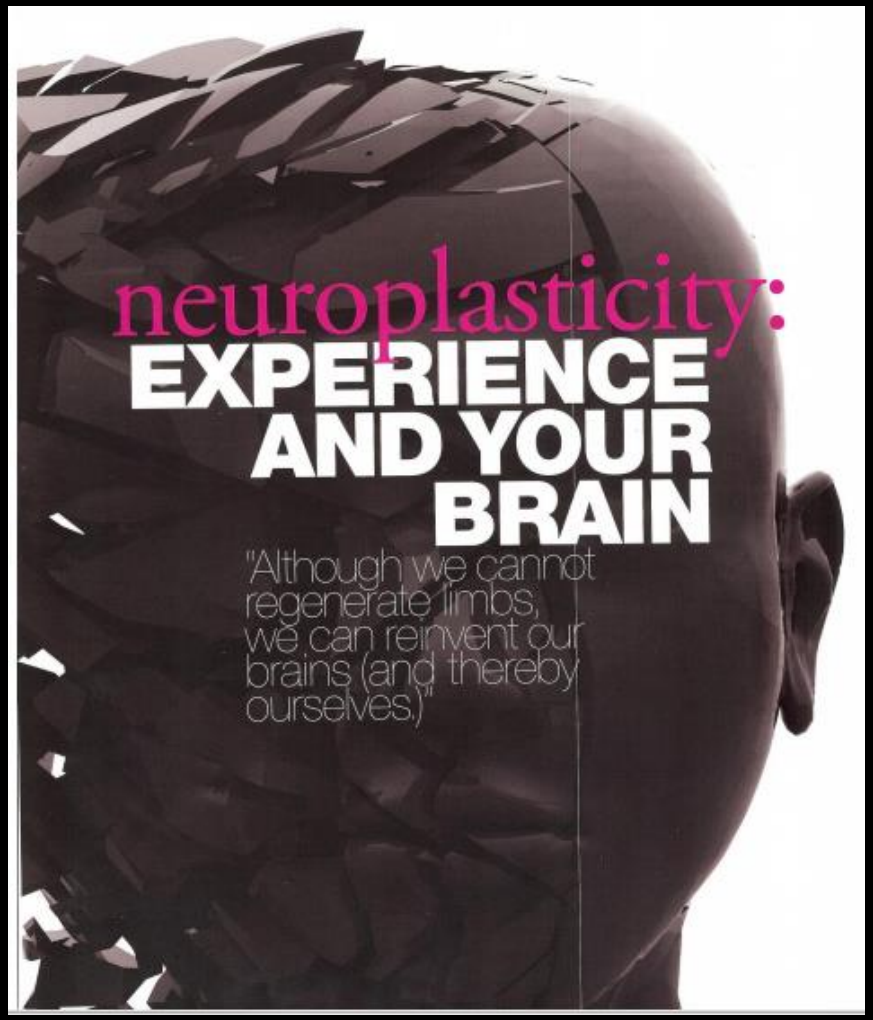


Higher order thinking, (25+), judgment, decision-making, LT planning

No “Do-over’s” in Brain Development

BrainWorld

Brain-building



Years of keyboarding →handwriting?

Neuroplasticity: the ability of the brain to change cellular, structural and functional properties as a result of experience. Researchers have shown that *early* brain connections are ***not*** hard-wired (fixed) and can be modified by experience – they are malleable or "plastic" (not *fixed* at birth).

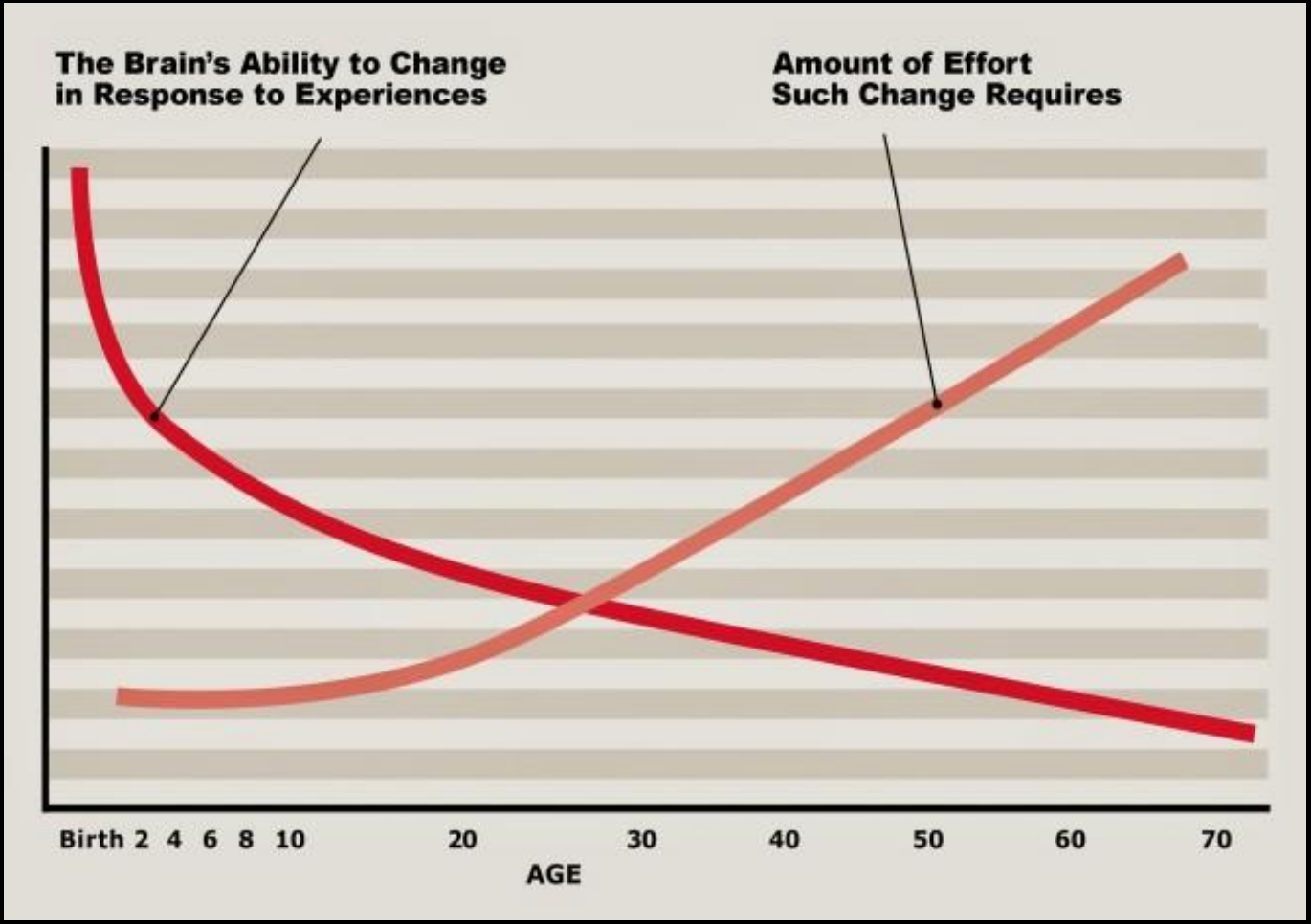
One of the most transformative discoveries/take-home messages

All brains *can* change,
all brains *do* change,
brains are *designed* to change.
(That is how we *learn*.)

Neuroplasticity: experiences determine…

- which **brain cells** ***communicate*** with which other cells
- which **structures** ***link together*** and to what degree
- which cells release which ***neurotransmitters,*** when, and under what specific conditions they are released
- the precise calibration of ***structure-function*** **correlations** inside the brain.

Plasticity and Early Brain Development



It is easier and less costly to form strong brain circuits during the early years than it is to intervene or "fix" them later in life.

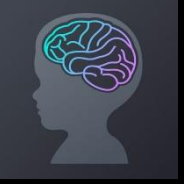
Graph Source: Pat Levitt (2009).

Early Language Development

Developing Early Literacy

Innatist theory of language acquisition:

Language learning is natural for human beings, whereby babies are born into the world with an inborn biological propensity to learn *any* language.



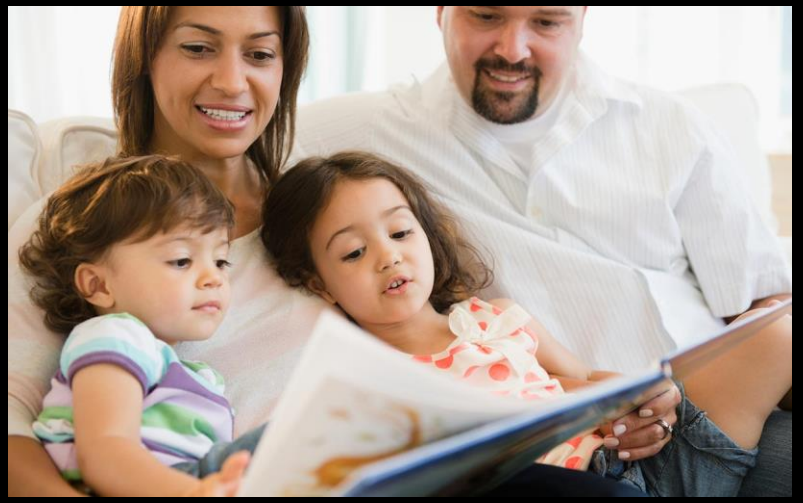
Developing the Left Perisylvian Cortex

- **Child-directed speech (CDS): short sentences with high-pitched, exaggerated expression of language sounds, clear pronunciation, distinct pauses between speech segments, and repetition of new words ("See the *ball*." "The *ball* went high." "The *ball* bounced." "The *ball* is red." "I like that *ball*." ("Parentese": the prevalence of these face-to-face conversations between 11-14 months of age → predictive of the # of words he/she will know at age 2 → predicts # of words mastered before Kindergarten → 3rd grade R' scores → HS grad.)**
- **Between 1 ½ in two years of age, children combine two words into "telegraphic speech." ("Daddy outside," "Billy hit." "More eat." "More page.")**

Language Development

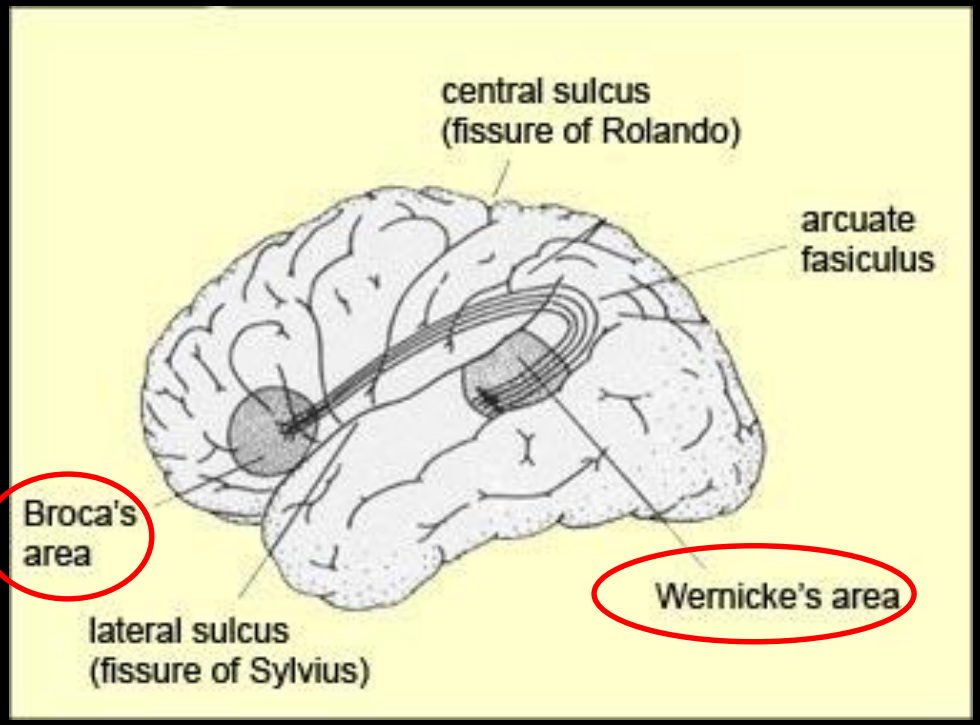
- Children exposed to an abundance of language in reading, singing, and talking develop more neural connections in the brain areas that process language.

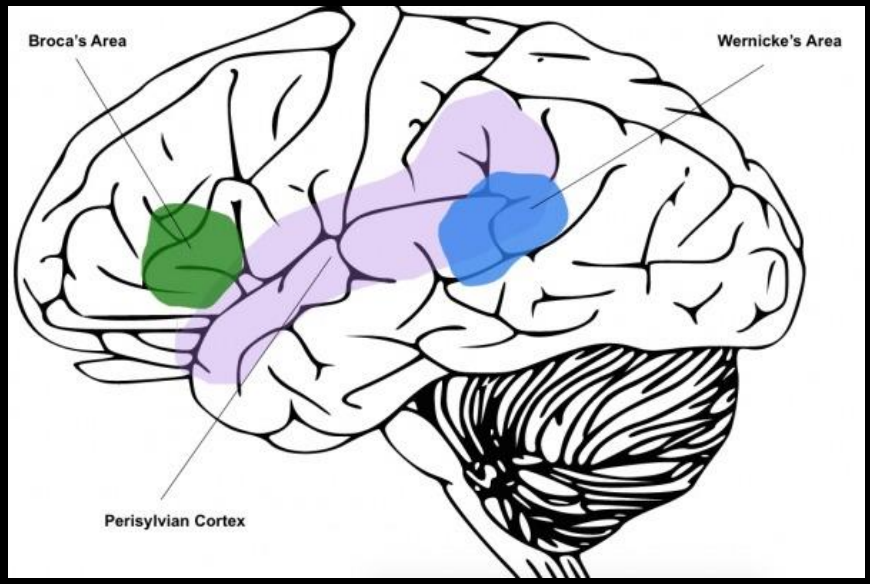
- Children who are *not* involved in high level verbal interactions have brains that are measurably *less developed* in the language areas.



Human Language: Unique

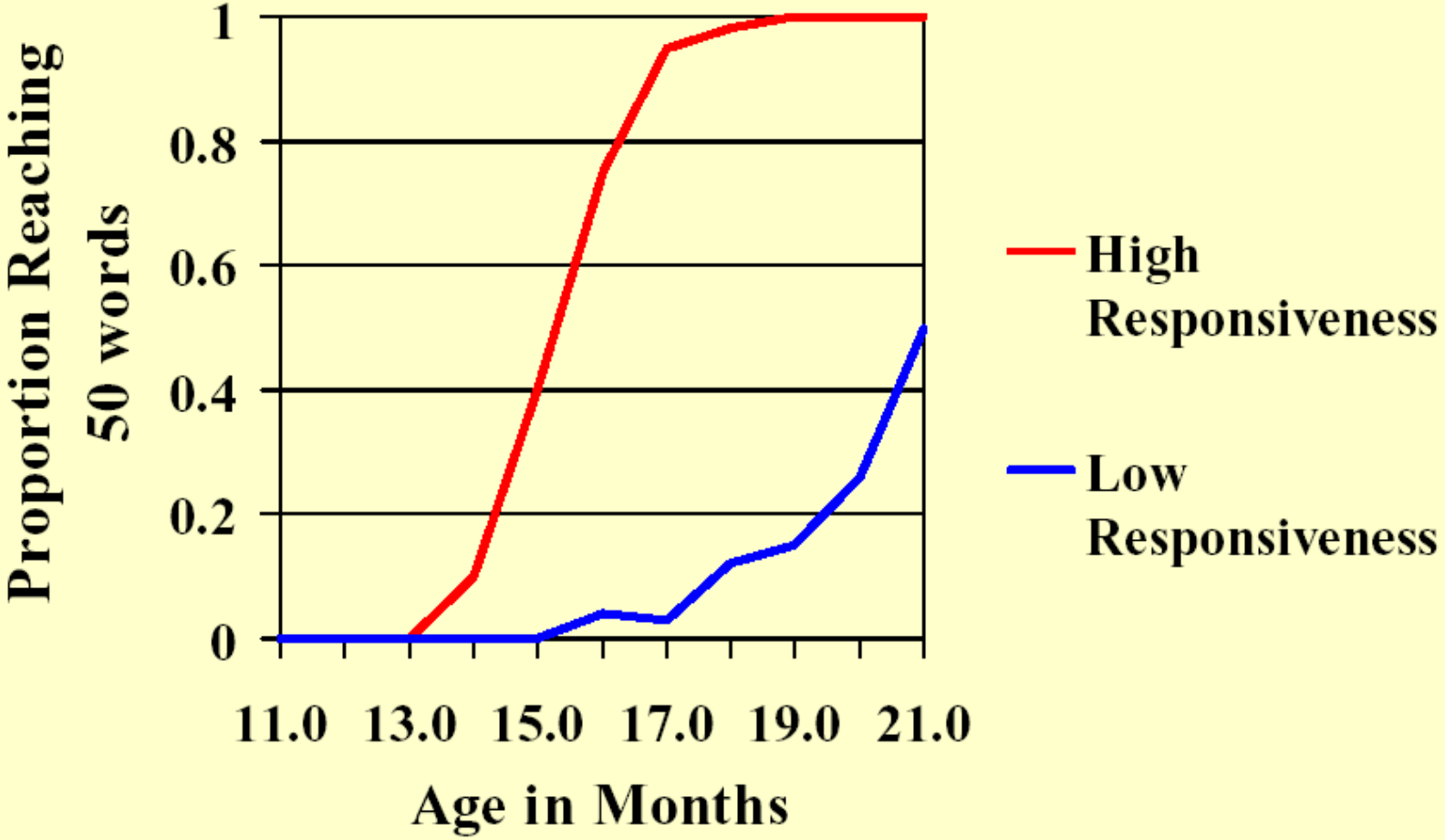
- Over the past 80 years, we have learned about two critical language areas in the *left perisylvian cortex,* primarily from individuals' diseases, misfortunes, and brain damage.

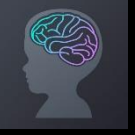




- Broca's area: language production and grammatical processing
- Wernick's area: comprehending word meaning

Parenting and Word Acquisition





The 30-Million Word Gap

- Research shows that vocabulary knowledge is profoundly influenced by SES. By age 4, the average accumulated experience with words for children from…
  - ✓ professional families = approx. 45M words
  - ✓ working-class families = 26M words
  - ✓ welfare families = only 13M words.

  (Hart & Risley, 2003)

- Research from Keith Stanovich found that kids who have a solid word base get ahead faster and achieve more in school, while children with a less-developed vocabulary to progress more slowly. K-students in lowest 25% for vocabulary development are 3 grades behind by Gr. 6.

- Arizona Dept. of Corrections estimates their projected jail beds needs based on 3rd Grade reading failures as one of the factors.

Poverty, Neglect and Education

For the students *who lack* the language support at home, they will need an extra dosage of language experiences when they arrive at school.

How Do Children Learn Best?

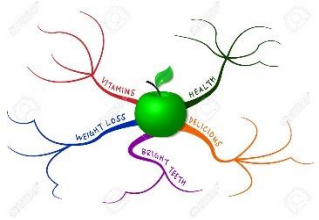
1. Give them something to ***do*** ***(activating the 22+ senses)?***
2. Give them something to ***think about?***
3. Give them something to ***talk about?*** (BBK)
4. Whenever possible, have young students first ***draw*** what they will later ***write*** about (using the pictures in the "mind's eye")
5. After students ***do, think, talk*** about and **draw** the target concept (experience it), *then* we can say that they **"know"** it.

1. Compare these two apples. What is different about them? What is the same or similar?

2. <u>Predict</u> what it will occur when you bite into one of them.

Take an Apple

- Look at it
- Touch it
- Feel it
- Hold it
- Smell it
- Cut it
- Taste it
- Listen to it



Word Wall: "Describe the Apple"

Red
Smooth
Sweet
Moist
Wet (inside)
Rounded
Brown stem
Pointy
Yellowish
Inside spots
Cold
Juicy
Rough on outside
White inside
crunchy
turning brown inside
shiny
waxy
hard

Plump
Speckled
Creamy pulp
Solid
Tart
Dark
Reflective
Chartreuse
Divot at stem
Divot at base
Internal green spots
Tangy smell
Leafy smell
Quiet/silent
Stationary
Sour
Bruised
Almond-shaped seeds
Tasty

Small
Blush
Height – 6 cm
Diameter – 7 cm
Base --3 cm
Leathery skin Ringed
Freckled
Fresh
Dry – externally
Satisfying smell
Rolls
Green
Delicious
Fibrous
Crunchy
Nutritious
Tart

Describe the Apple in this Picture

1. ~~Smell~~
2. ~~Hearing~~
3. ~~Touch~~
4. ~~Taste~~
5. Sight

Word Wall: Describing the Apple

Red
Smooth X
Sweet X
Moist X
Wet (inside) X
Rounded
Brown stem
Pointy
Yellowish inside X
Inside spots X
Cold X
Juicy X
Rough on outside X
White inside X
Crunchy X
Turning brown X inside
Shiny
Waxy X
Hard X

Plump
Speckled X
Creamy pulp X
Solid X
Tart X
Dark
Reflective
Chartreuse
Divot at stem X
Divot at base X
Internal green spots X
Tangy smell X
Leafy smell X
Quiet/silent X
Stationary X
Sour X
Bruised X
Almond-shaped seeds X
Tasty X

Small X
Blush X
Height – 6 cm X
Diameter – 7 cm X
Base --3 cm X
Leathery skin X
Ringed X
Freckled X
Fresh X
Dry – externally X
Pleasant smell inside X
Rolls X
Green
Delicious X
Fibrous X
Crunchy X
Nutritious X
Tart X

What does reading this word tell a young learner, if he's never experienced an apple?

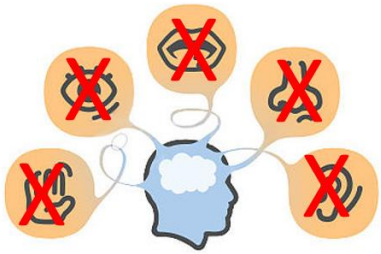
Apple

The *Word* Only? → Eliminate the Following

Red X
Smooth X
Sweet X
Moist X
Wet (inside) X
Rounded X
Brown stem X
Pointy X
Yellowish X
Inside spots X
Cold X
Juicy X
Rough on outside X
White inside X
Crunchy X
Turning brown X
Shiny X
Waxy X
Hard X

Plump X
Speckled X
Creamy pulp X
Solid X
Tart X
Dark X
Reflective X
Chartreuse X
Divot at stem X
Divot at base X
Internal green spots X
Tangy smell X
Leafy smell X
Quiet/silent X
Stationary X
Sour X
Bruised X
Almond-shaped seeds X
Tasty X

Small X
Blush X
Height – 6 cm X
Diameter – 7 cm X
Base --3 cm X
Leathery skin X
Ringed X
Freckled X
Fresh X
Dry – externally X
Pleasant smell inside X
Rolls X
Nutritious (BBK) X
Green X
Delicious X
Fibrous X
Crunchy X
Tart X



Word Wall: Describe the Apple

Red
Smooth
Sweet
Moist
Wet (inside)
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Brown stem
Pointy
Yellowish
Some spots
Cold
Juicy
Rough on outside
White inside
Crunchy
Turning brown inside
Shiny
Waxy
Hard

Plump
Speckled
Creamy pulp
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Divot at stem
Divot at base
Internal green spots
Tangy smell
Leafy smell
Quiet/silent
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Tasty
Slippery

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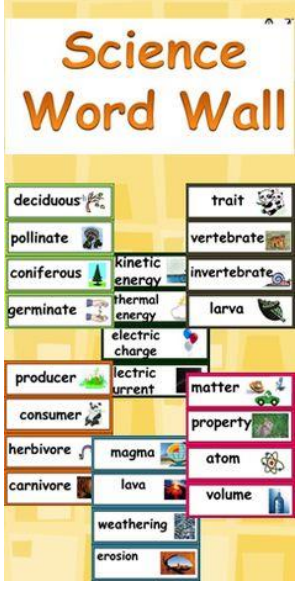
Nutritious
Tart
Sugary
Crisp



Developing Early Literacy through Active Learning

Reading *to* *children/students* -- teacher, parent "lap-reading," peers,

Reading *with* *children/students* -- small groups and "house calls" (one-to-one reading with the child at his/her desk)

Reading *by* *children/students* -- daily independent reading.
DEAR -- Drop Everything And Read

Mooney, 1990 -- massive amounts of daily practice with language including speaking, writing and listening.

Vocabulary Development
The "Achievement Gap"

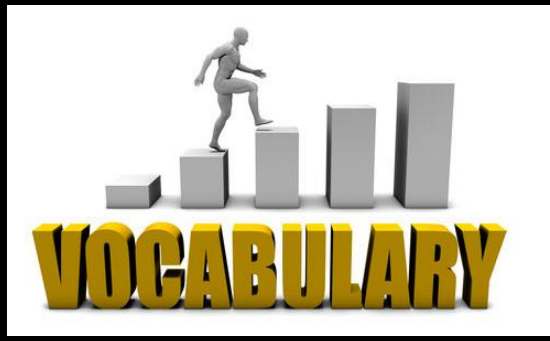
4,000 – 8,000 words when entering elementary school

40,000 avg. when they exit high school

36,000 word difference

For 13 school grades (K-12) = 2,769 words/year

178 days for 2,769 = 16 words/school day



4K- 8,000 words when entering elementary school

87,000 exposed to/should have mastered upon exiting HS

79,000 word difference

For 13 school grades (K-12) = 6,076 words/year

178 days for 6,076 = 34 words/school day

The Achievement Gap

- **Vocabulary =** proxy for knowledge. **Achievement gaps** are **knowledge gaps** primarily sponsored by ever-expanding **academic language gaps.**

- A highly developed vocabulary facilitates **precision,** not just in speaking, but in **thinking.**

- **Lack of vocabulary** can be a crucial factor underlying the **school failure** of disadvantaged students (Becker, 1977; Biemiller, 1999). (They can have a wealth of experiences, but still be poor in "linguistic capital")



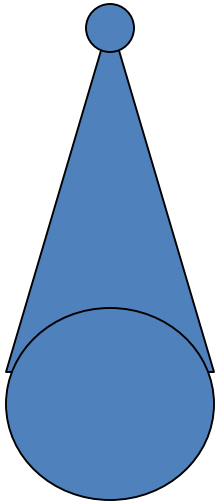
Drawing ***does for the brain during the*** ***day,***

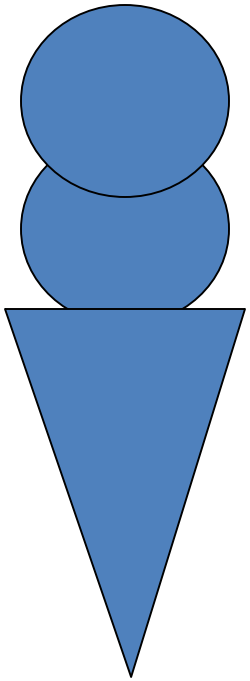
what

Dreaming ***does for the brain at*** ***night.***

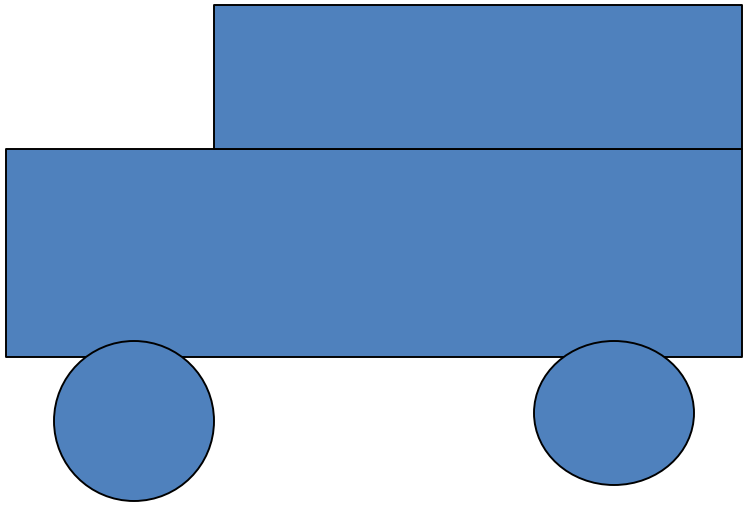


Clown in hat





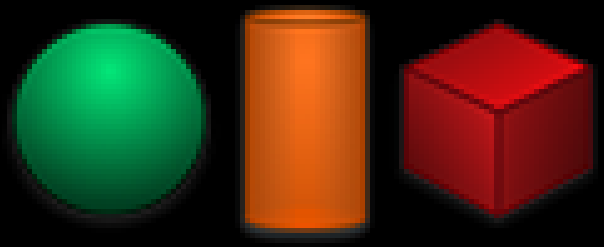
Ice cream cone



Car

Recognition-by-components Theory

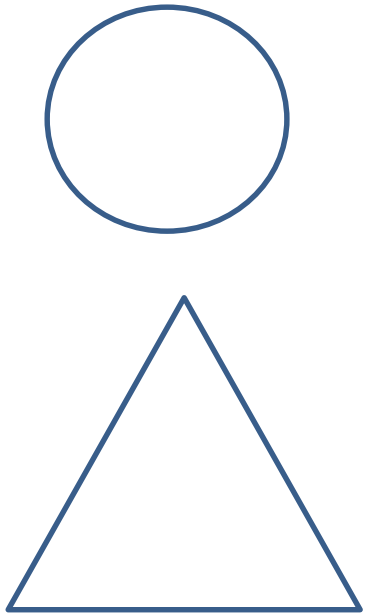
Geons

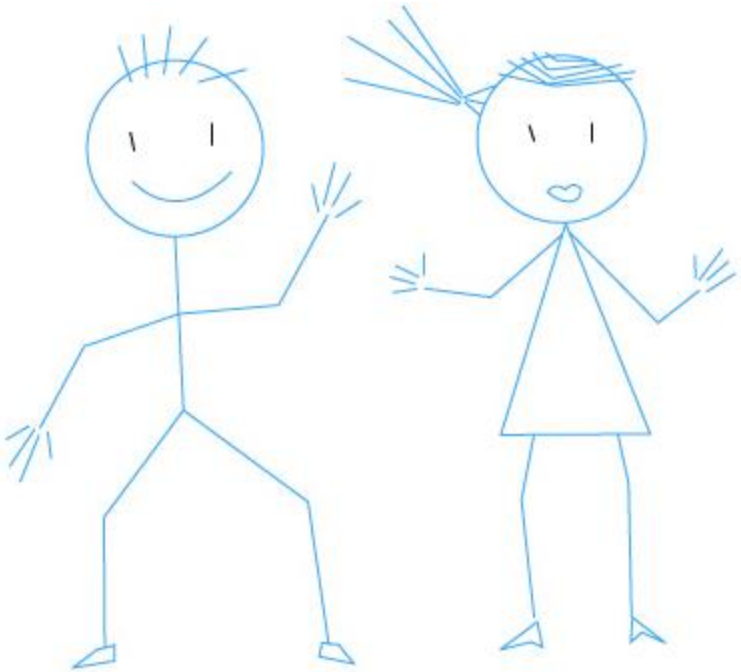


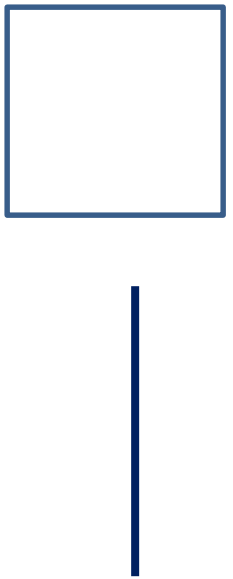
Circles, spheres, squares, blocks, cylinders, cones, etc., are among **the 24 *basic* "geons"** (geometric forms) -- the natural environment.

Simplistic **"stick" representations** (straight or curved-lines) of these **concrete objects** elicit a mental reminiscence of the **"real thing."**

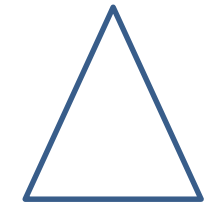
“But, he can’t write.”
The “Drawing-Initial Writing” Connection

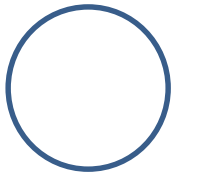


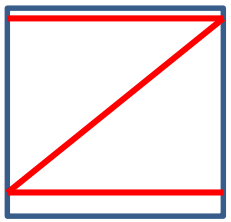


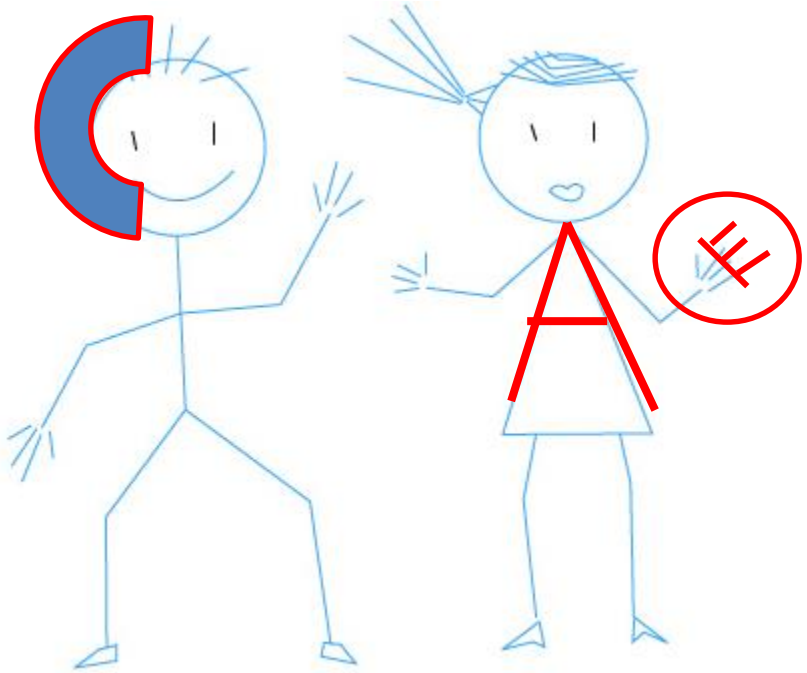


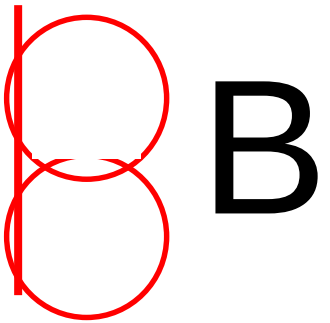
The “Drawing-Initial Writing” Connection
(If s/he can draw, s/he can write. – Reading Readiness)

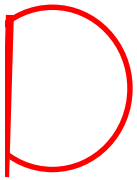




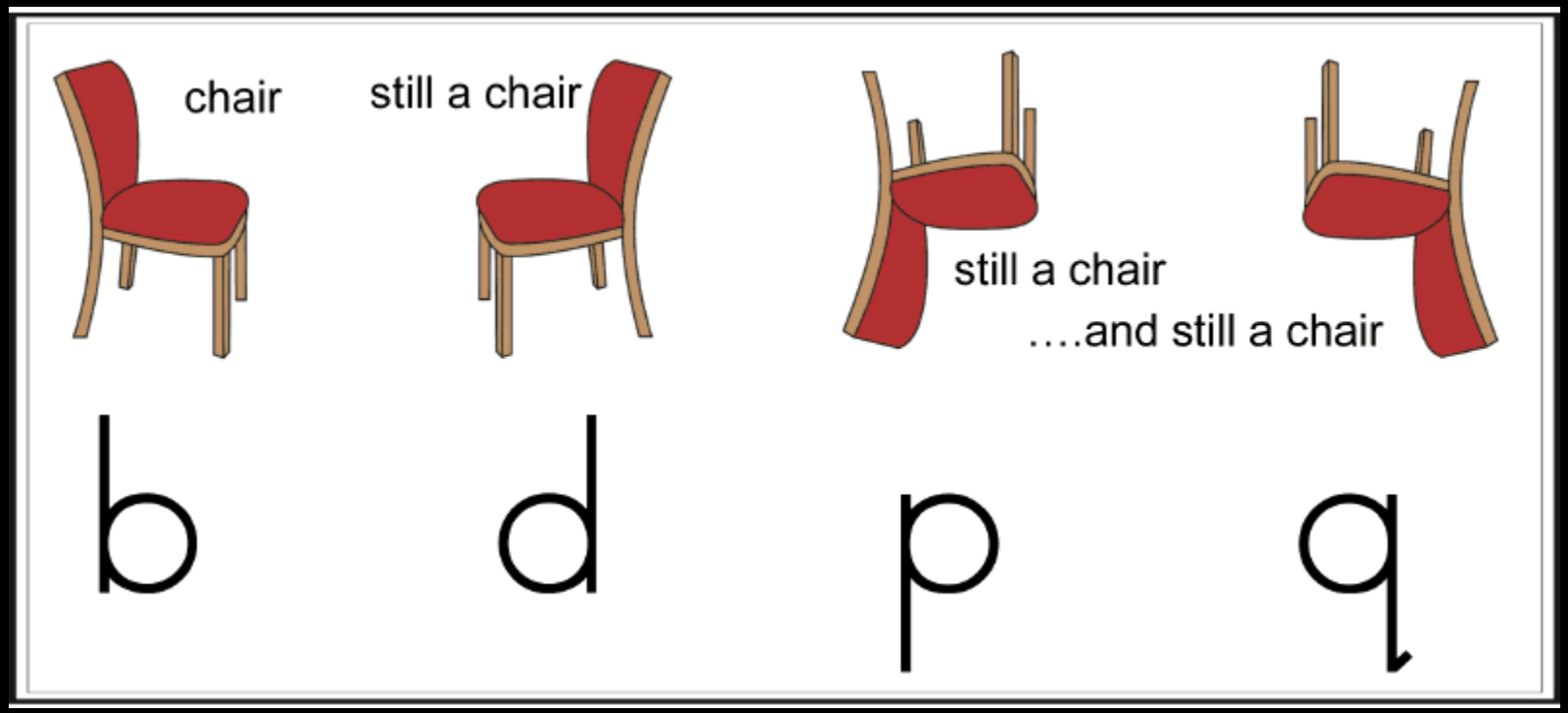


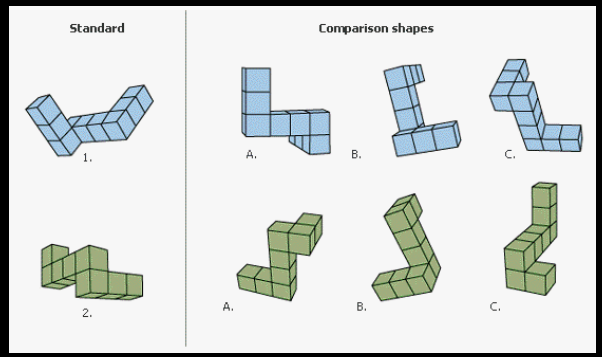






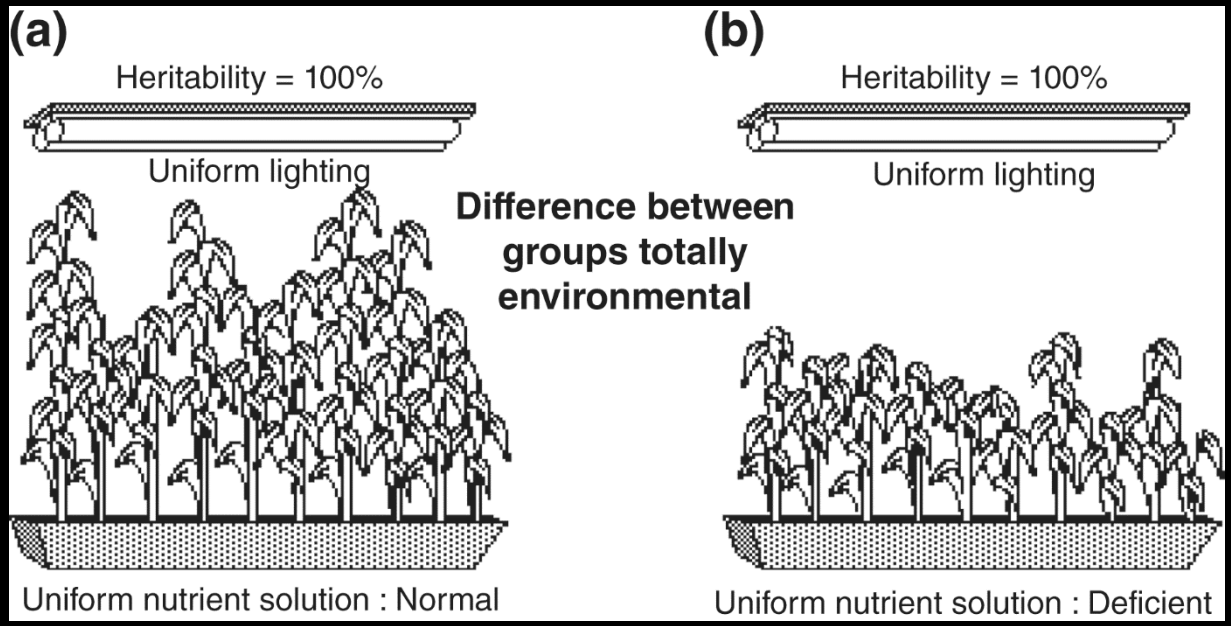
Dyslexia and Letter Reversals in Young Children





Child Development

Enriched environment



Impoverished environment

Developmental neurobiology, early brain development (zero-three), and the impact of negative environmental circumstances on brain development (particularly prenatal, postnatal, infant, toddler, and pre-adolescence stages) can influence learning capabilities.

C.H.A.M.P.S.

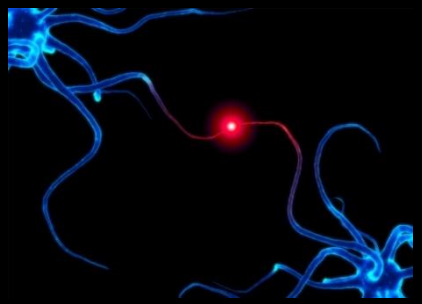
To maximize learning, we must **provide children with more "C.H.A.M.P.S." learning opportunities.**

C.H.A.M.P.S.

Common and/or shared learning experience(s)

Hands-on **experiential** (concrete) learning

Applications of learned knowledge



Making connections to *prior* learning

Productive struggle (challenging, intriguing, doable)

Sense making (“Ah-hah! Now I see!”)

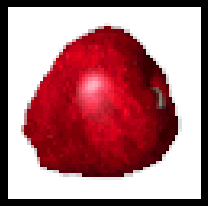
Developing Early Literacy through Active Learning

All children, and particularly children from language-impoverished backgrounds, benefit most from classroom/learning environments that are:

- **Experience-rich**
- **language-rich ("serve and receive" verbal interactions -- primary caregiver feedback)**
- **print-rich (classrooms with word walls, writing samples, books of every genre, real-world objects, etc., and homes where parents/siblings *model* that *reading and dialogue* have tremendous power and value)**

The brain moves best from *meaning*-to-print, rather than from *print*-to-meaning

1st hand



CONCRETE

2nd hand

Visual represen-tation (VST)

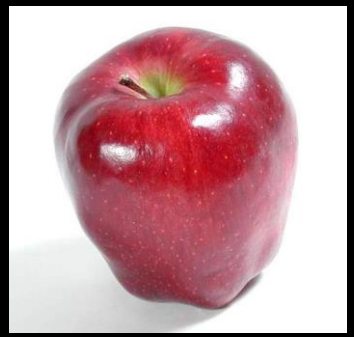
3rd hand

APPLE

SYMBOLIC/ ABSTRACT

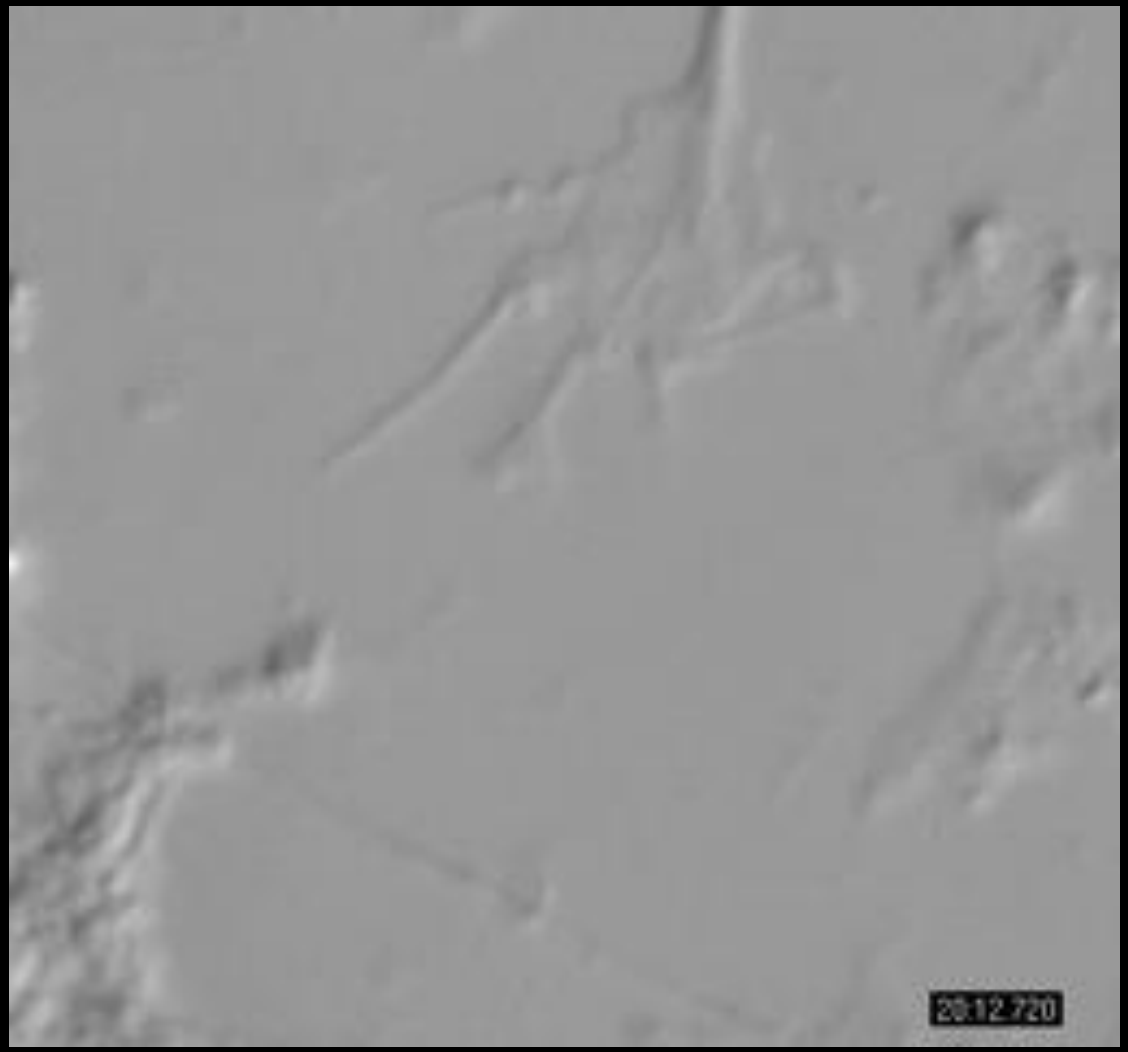
cognitive *rehearsals* →

The most difficult means by which the brain learns



English Lang. Dev.
Academic Lang. Dev.

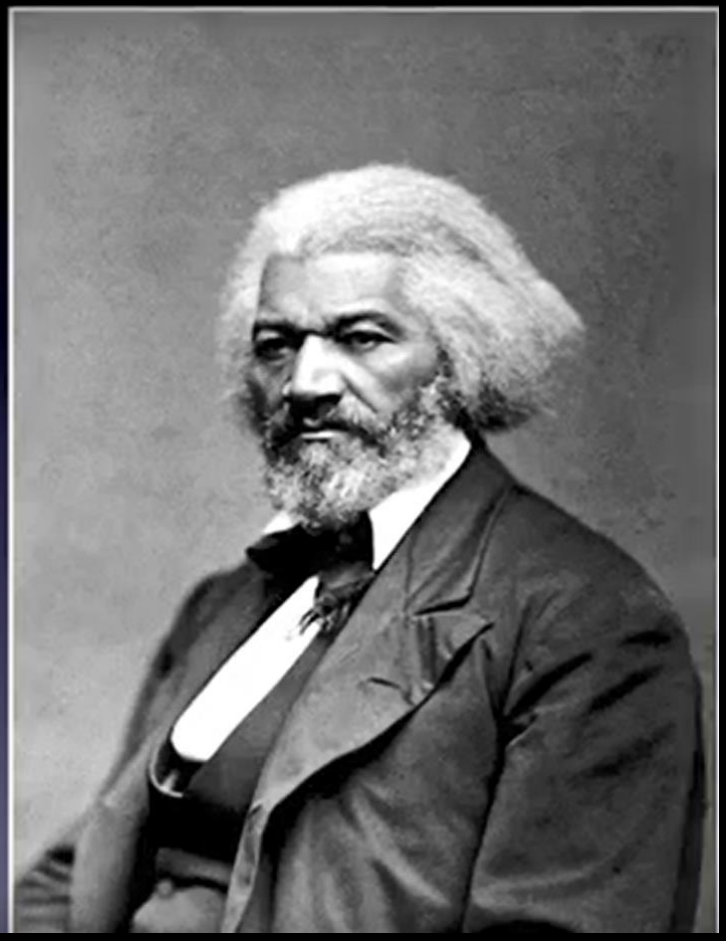
“Ah-hah!” moments in the classroom



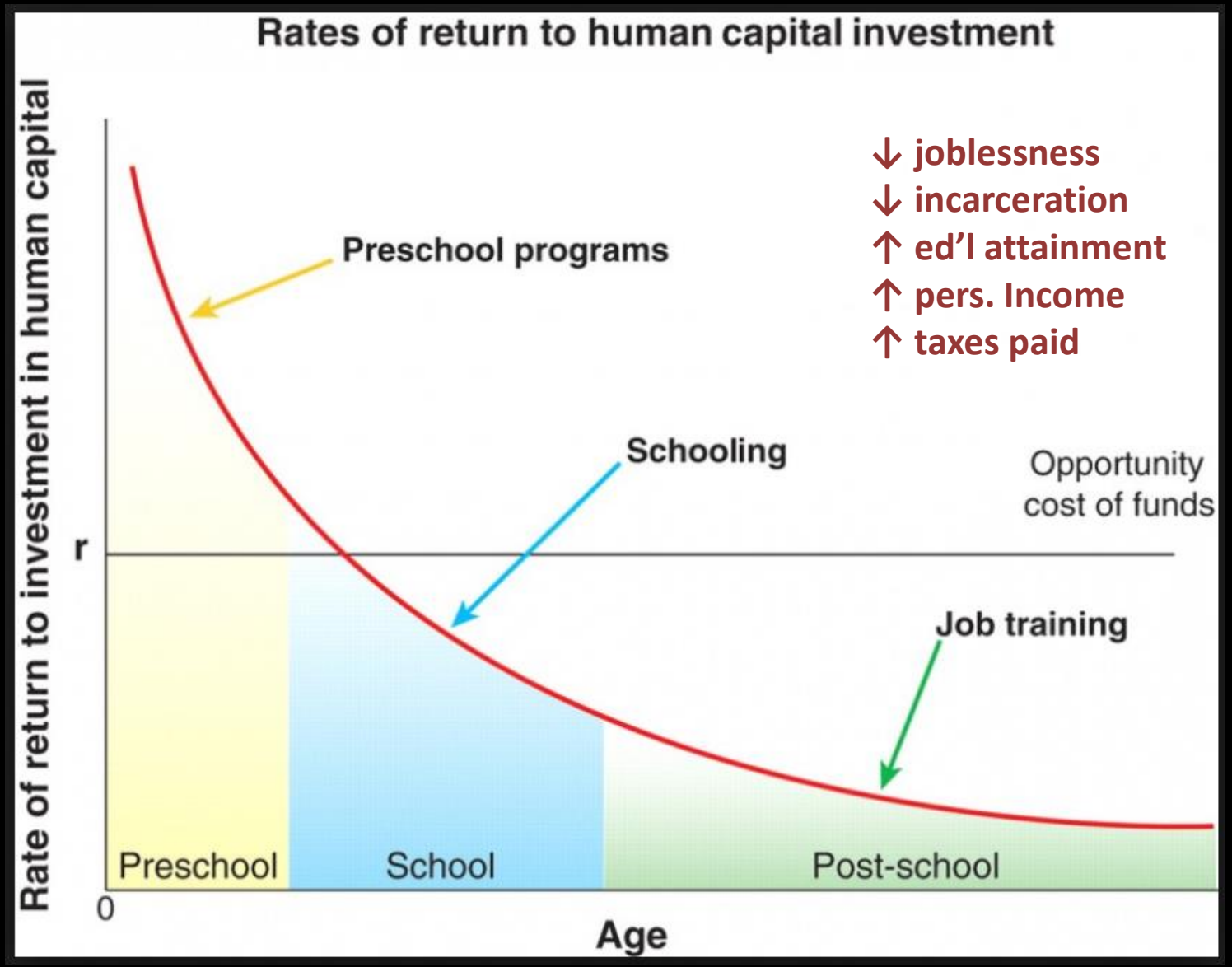
How do we build strong children?

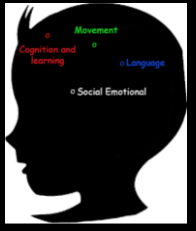
"It is easier to build strong children than to repair broken men."

— Frederick Douglass
(1817–1895)



Early Investments in the Human Brain



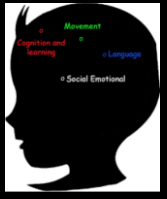


Are These *Myths or Facts* About Brain Development?

- To make babies smarter, you should buy "Baby Einstein" products and try the "Mozart Effect."
- Children start learning when they begin school.
- Talking to a baby is not important, because they cannot understand what you're saying until they are four or five years of age.
- Brains are fully developed at birth.

Take-aways from Today's Webinar: Why is EBD Important?

- Before age 5, it takes ↓ time, intensity, and repetition to organize the developing neural circuits, than it does to reorganize already-developed circuits later.
- What happens early during early development affects all aspects of a child's later development (well into adulthood)
- First 1,000 days of life (zero to three) have a profound impact on all brain development
- Nurturing relationships in the early years are vital.
- Toxic stress has a devastating impact on development.
- Early interventions are critically important for changing the course of the negative LT outcomes. (Plasticity)

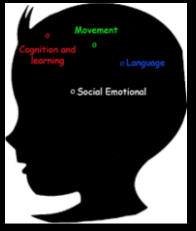


To Optimize Learning at Home

1. **Ensure children feel safe.**
   The brain always prioritizes safety and well-being. Learning is inhibited when children feel threatened or when their well-being is endangered.

2. **Keep the learning environment free of clutter.**
   The human brain processes 4B bits of information per second. The brain is constantly trying to filter out most of these stimuli in order to focus on specific information.

3. **Present information in ways that challenge learners to use multiple senses.** The more senses that deliver information to the brain, the more likely the brain will attend to that specific information. Teach children using visual models, music, manipulatives, and concrete examples.



To Optimize Learning at Home

4. Keep lessons short.

Eating 6 small meals/day ↑ digestion, shorter/more frequent lessons enhance the "digestion" of information. Children need time to process and make sense of new information before additional information is introduced.

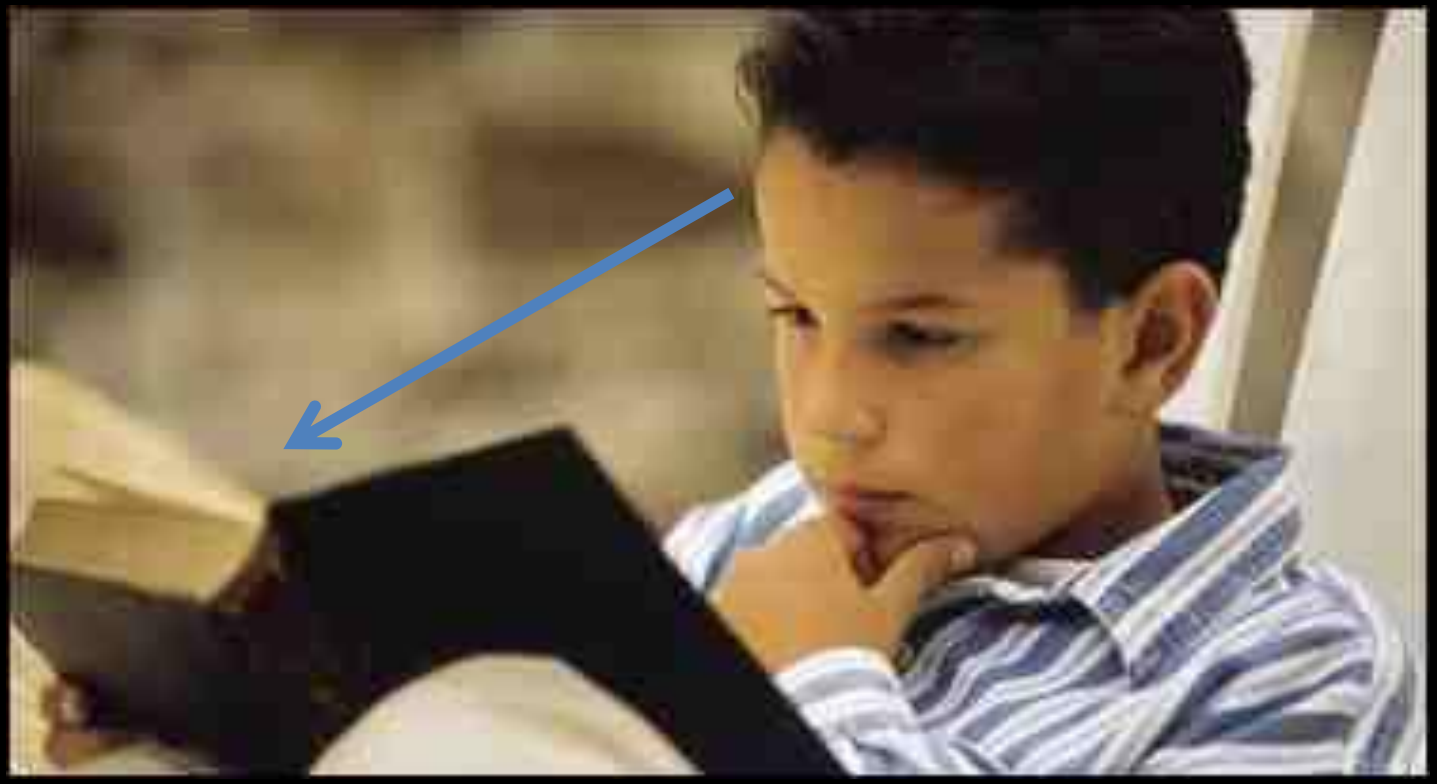
5. Nurture curiosity.

Curiosity fuels learning. Children are born curious. Bring items in, and invite children to question, explore, compare and experiment, as well as asking "what if " questions.

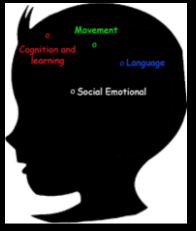
6. Tap into prior knowledge.

When past learning is used as a bridge to new information, learners get a head start on making the appropriate connections to the new information. The brain is always searching for patterns and connections. "How is this new information similar to what I already know?"

Reading comprehension goes from the learner *to* the page not from page → learner



What the learner *already knows* determines text comprehension.

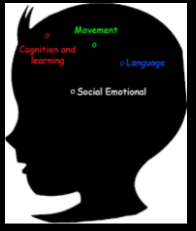


To Optimize Learning at Home

7. Provide time for practice.

Practice allows students to apply and make sense of information. When they are able to apply ideas to real-life situations, they have a much better chance of remembering and conceptually understanding what they are learning.

8. Encourage children to think about information in complex, but developmentally-appropriate ways. When topics are suitable for higher level processing, have learners apply (make personal applications), analyze (take information apart), evaluate (use critical judgement), and synthesize (put information back together in new and different ways) what they learn. Each of these processes enhances and strengthens learning.



To Optimize Learning at Home

9. Teach to the “”whole child”.

- a. Present information both **visually** and **verbally**
- b. Discuss concepts **logically** and **intuitively**
- c. Use activities and assessments that require
  - Reading, writing, and computing
  - Creating and analyzing

10. Make sure that learners are properly fed and hydrated, and that they can move and exercise.

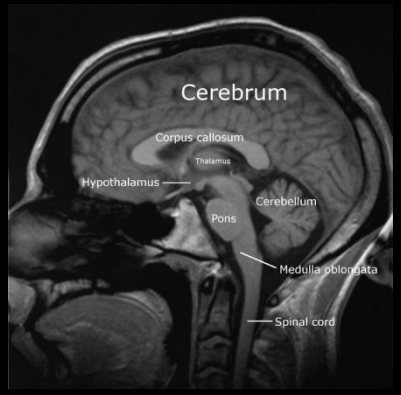
- a. Thirsty brains can’t think!
- b. Hungry brains can’t focus on learning.
- c. Movement and exercise send more oxygen and neurotransmitters to the brain. Sitting for long periods of time decreases oxygen and therefore inhibits alertness.

"Reflect and Connect"

Why is it important for adults to understand early brain development? (write)

- **What was the most valuable idea that *you learned* from this afternoon?**
- **Please write down 2 "I will statements": How will you use the information shared today at home or with your students on-line?**

When it Comes to Learning Only the Gray Matter Matters



- **Our students come in a variety of colors, but all brains are basically gray. It is only the gray matter that *truly matters* in learning and memory.**

- **Maximizing student potential hinges on parents and educators developing a robust knowledge reservoir for understanding (at home or at school) *the developing brain.***

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