



# Engage their Brains!



## Specialized

Individualized plan

Multisensory approach



## Literacy

Phonemic awareness  
Phonics

Fluency, Vocabulary,  
Comprehension



## Development

Life-long skills

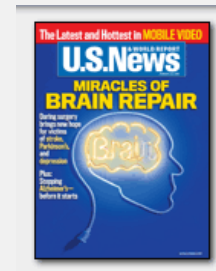
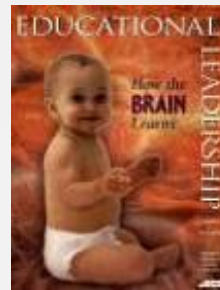
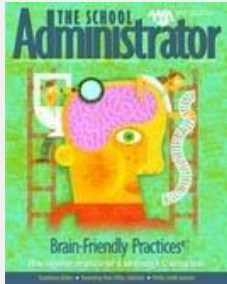
Overall success and joy of  
reading!

# Education

The  
only profession  
whose job is to  
change  
the human brain  
**EVERY DAY**



# Neuroscience & Learning



# Brain Facts

True or False?

# True or False?

The average adult brain weighs 10 pounds and uses 40% of the body's oxygen.

**FALSE**

**The average adult human brain weighs 3 pounds and uses 20% of the body's oxygen.**

# True or False?

The brain needs 8 – 12 glasses of water a day for optimal functioning.

**TRUE**

**The brain needs 8 – 12 glasses of water a day for optimal functioning. The brain consists of 78% water and it needs to keep hydrated. Dehydration is a common problem in school classrooms leading to lethargy and impaired learning. (Hannaford, 1995)**

# True or False?

The brain is “hard wired” – what you were born with is what you have until you die.

**FALSE**

**The reason we can learn new habits and skills that are not innate is the brain is “plastic” throughout life. Neuroplasticity is a characteristic of the brain that allows it to be shaped by experience.  
(Merzenich, et. al.)**



# A Few Statistics



Twenty percent of the U.S. population,  
or one in five Americans,  
has some type of learning disability.  
(National Institutes of Health)

- Children with learning disabilities are as smart or smarter than their peers but they may have difficulty reading, writing, spelling, reasoning, recalling and/or organizing information if left to figure things out by themselves or if taught in conventional ways.
- Learning disabilities often run in families (genetically-based).
- Some LD is an environmentally-based condition.

34 million adults function at below basic literacy levels.

They are unable to complete simple literacy tasks such as

- filling out a job application
- reading a menu
- reading a bedtime story to their child

(National Assessment of Adult Literacy, 2003)

30 million Americans function at or below the 8<sup>th</sup> grade reading level.

Most newspapers are written at the 6<sup>th</sup> grade level for “maximum readability”.

Most health-related literature and websites are written @12th grade level.

(National Institute Health study)

## Prison Population:

- About 43% do not have a high school diploma or equivalent
- 56% have very low literacy skills.  
(National Commission on Adult Literacy, 2008)

85% of juveniles in the court system are illiterate (Ron Hume, 2005)

Prisons **use 3<sup>rd</sup> grade reading scores** to predict the number of inmates they will have when that age group reaches adulthood (U.S. Department of Education)

Are kids today biologically different than 30 years ago?



Consuming more additives



**Restricted movement due to hours spent strapped in a car seat**



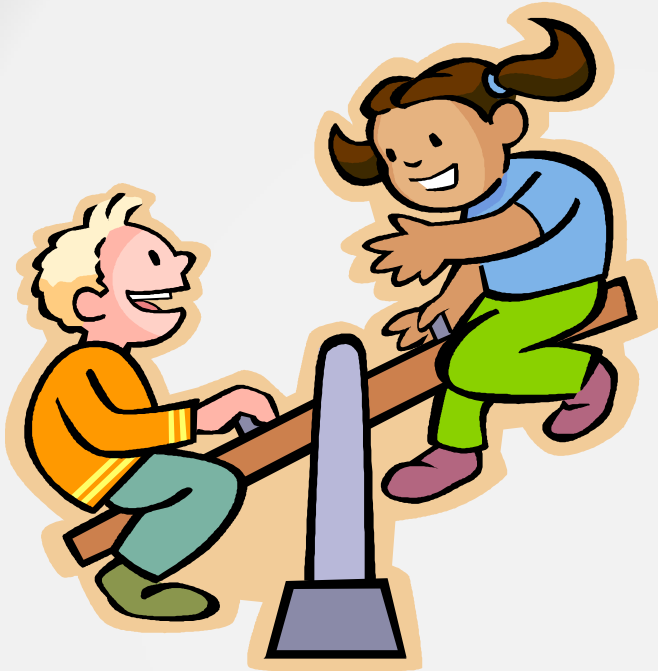
**More exposure to drugs and use of medication**



**More sedentary entertainment with video games and television**



Unhealthy living conditions due to limited resources of families and single parent households (lead paint)



Less early motor stimulation from swings, see-saws, etc. due to safety concerns



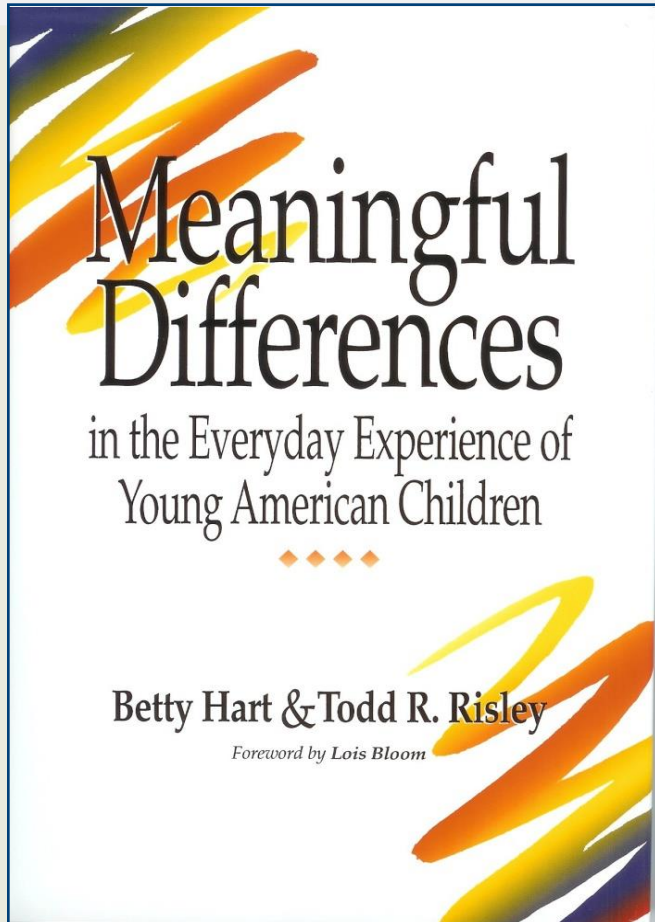


# The Brain Comes Wired for Sound!

- Learning language is an early “test” of our brain’s learning system
- At birth, we have equal potential to learn any language
- By 6 months, we begin to build the phonemes specific to our native language based on experience



# Language Experiences



# Language Experiences by Group

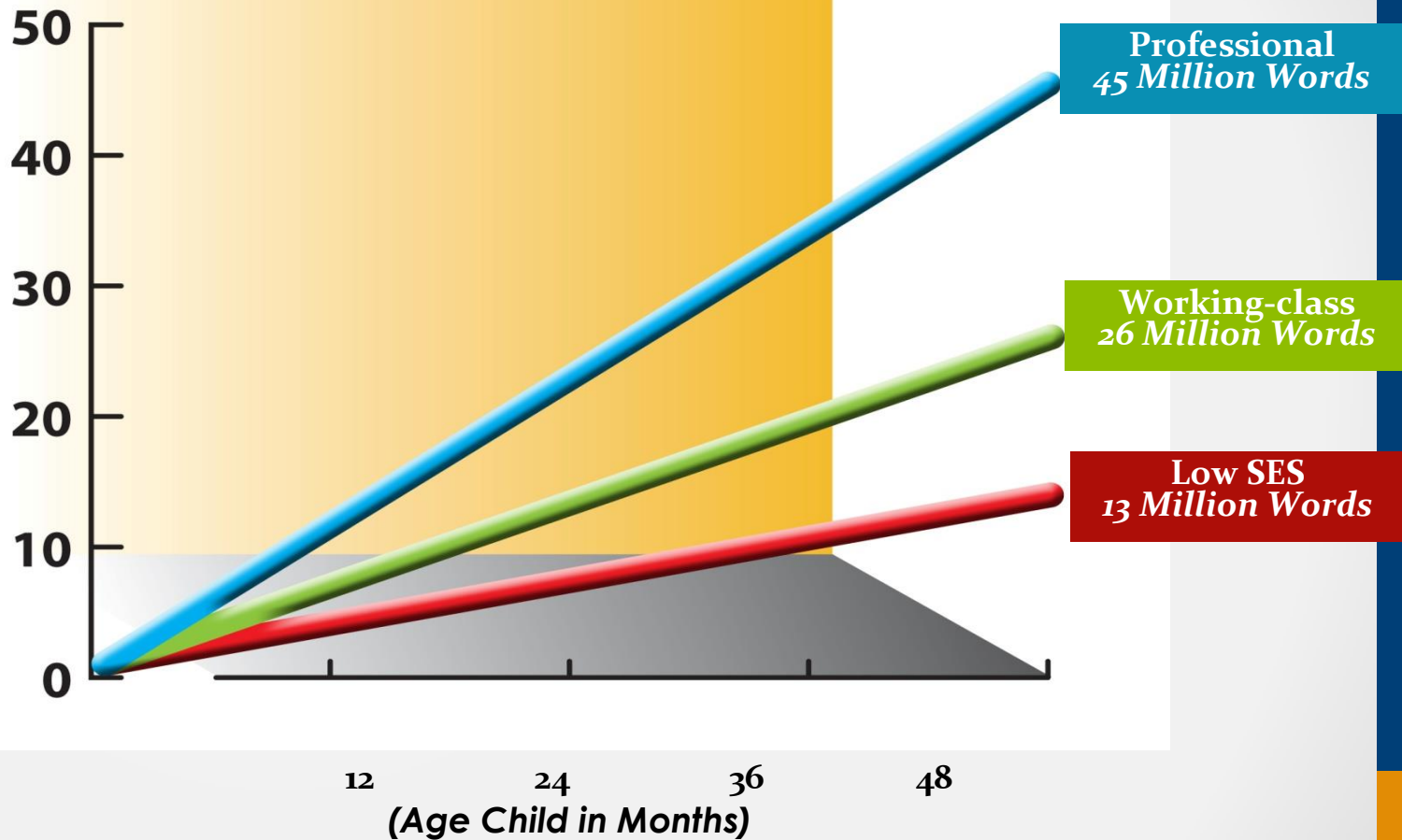
	<b>Words Heard per hour</b>	<b>Affirmatives per hour</b>	<b>Prohibitions per hour</b>
<b>Professional Family Child</b>	2153	32	5
<b>Working Class Family Child</b>	1251	12	7
<b>Low SES Family Child</b>	616	5	11

*Meaningful Differences in the Everyday Experience of Young American Children* by Betty Hart & Todd R. Risley.  
Paul H. Brookes Publishing Co. (1995).

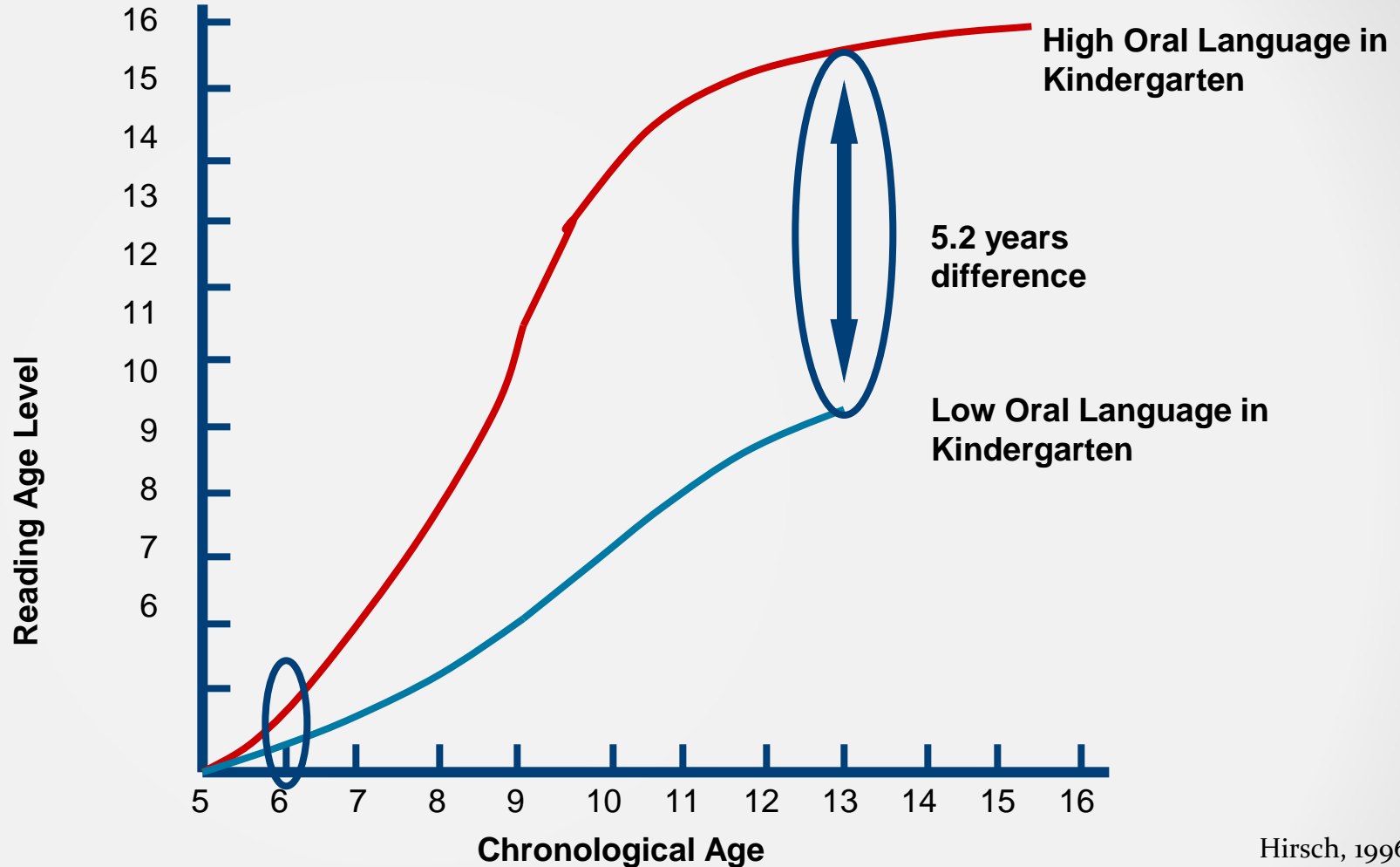
# Language Experiences by Group

*Meaningful Differences in the Everyday Experience of Young American Children* by Betty Hart & Todd R. Risley. Paul H. Brookes Publishing Co. (1995).

Estimated Cumulative Words Addressed  
to Child (In Millions)



# The Effects of Weaknesses in Oral Language on Reading Growth



Hirsch, 1996



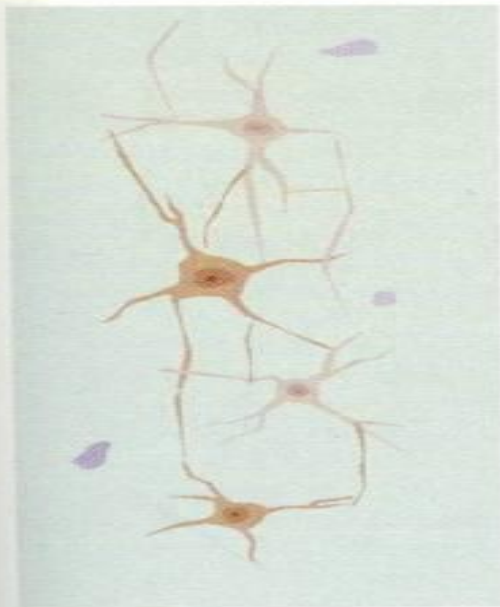
Middle to upper class children have been read to 1,000 to 1,700 hours before entering first grade.

Lower socioeconomic class children have been read to about 25 hours before entering first grade (*Many Paths to Literacy*, Rebecca Novak, 2002).

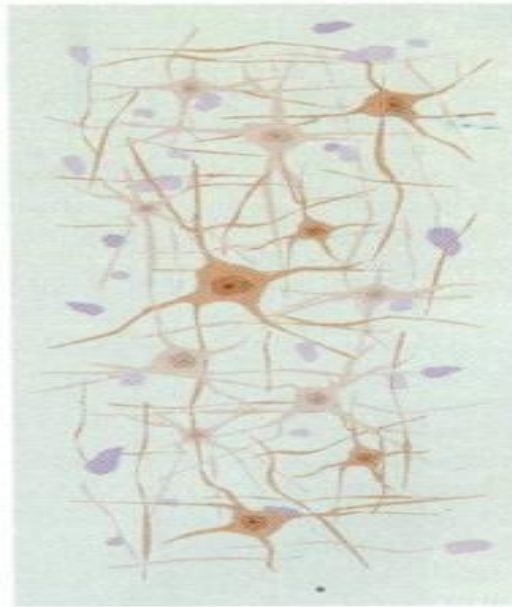
By 1st grade, there is about a 15,000 word gap just in vocabulary. Louisa Moats

# Growth of the Brain Occurs from the Inside Out and the Bottom Up

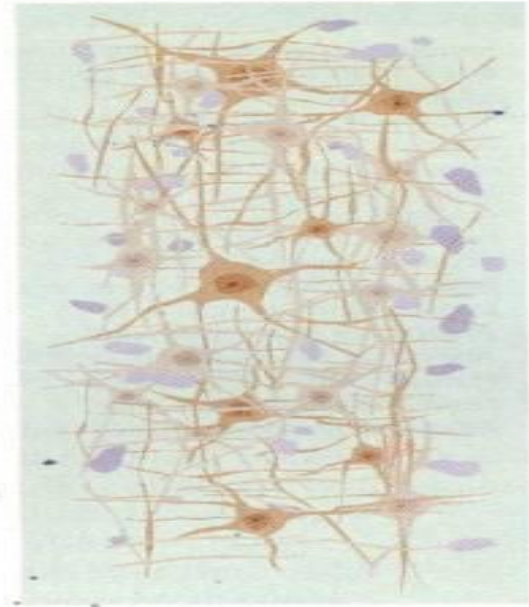
- You are born with ~100 billion brain cells
- There are ~ 15,000 synaptic connections for each cell



Birth



6 months



2 years



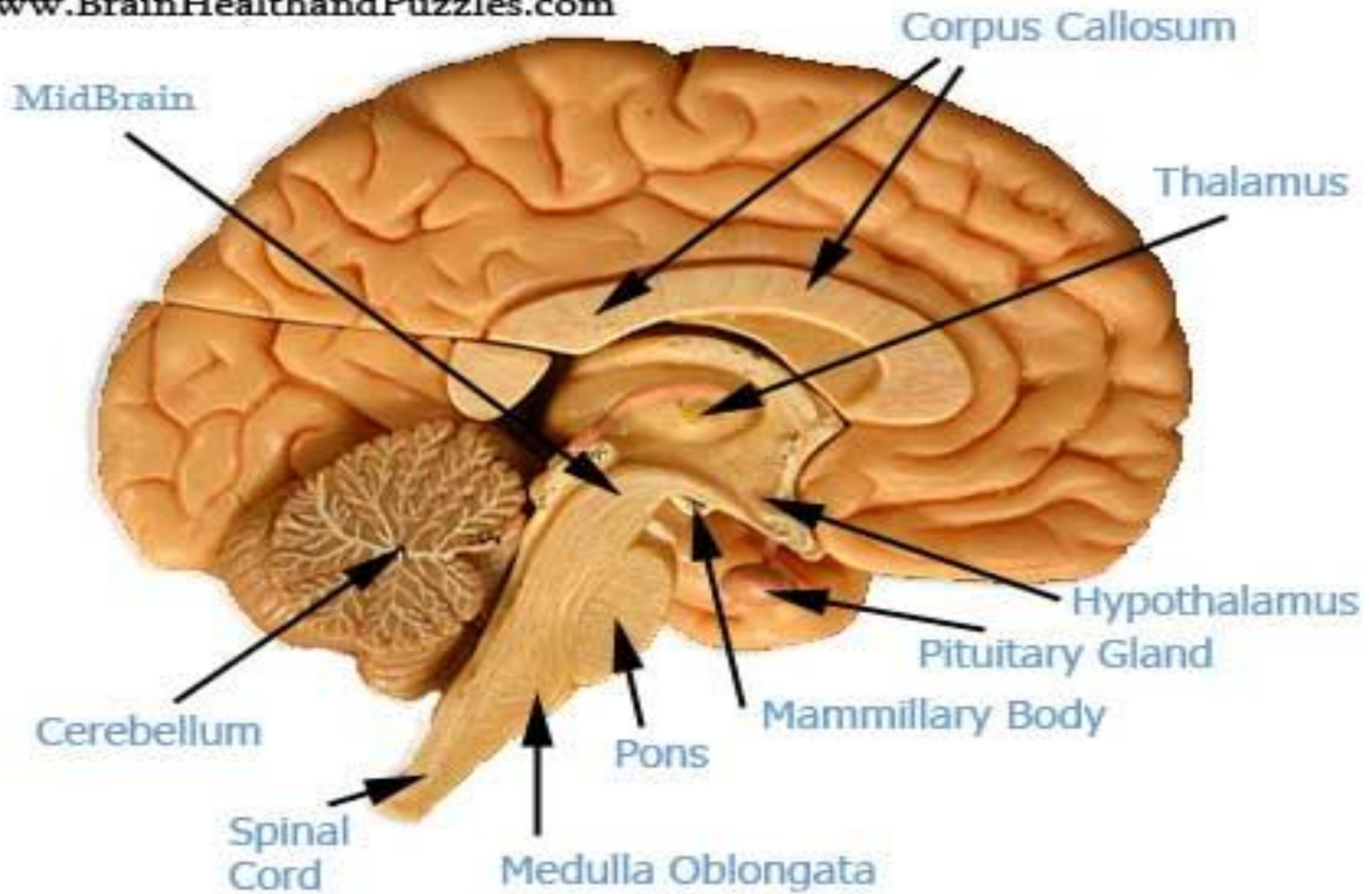
# Reading is Not Innate

*Language is natural....Reading is NOT*

- The human brain is not born with the insight to make sound-to-letter connections
- Only through practice can the learning challenges of a written system be resolved







## LEFT BRAIN FUNCTIONS

## RIGHT BRAIN FUNCTIONS

### Left and Right Brain Functions

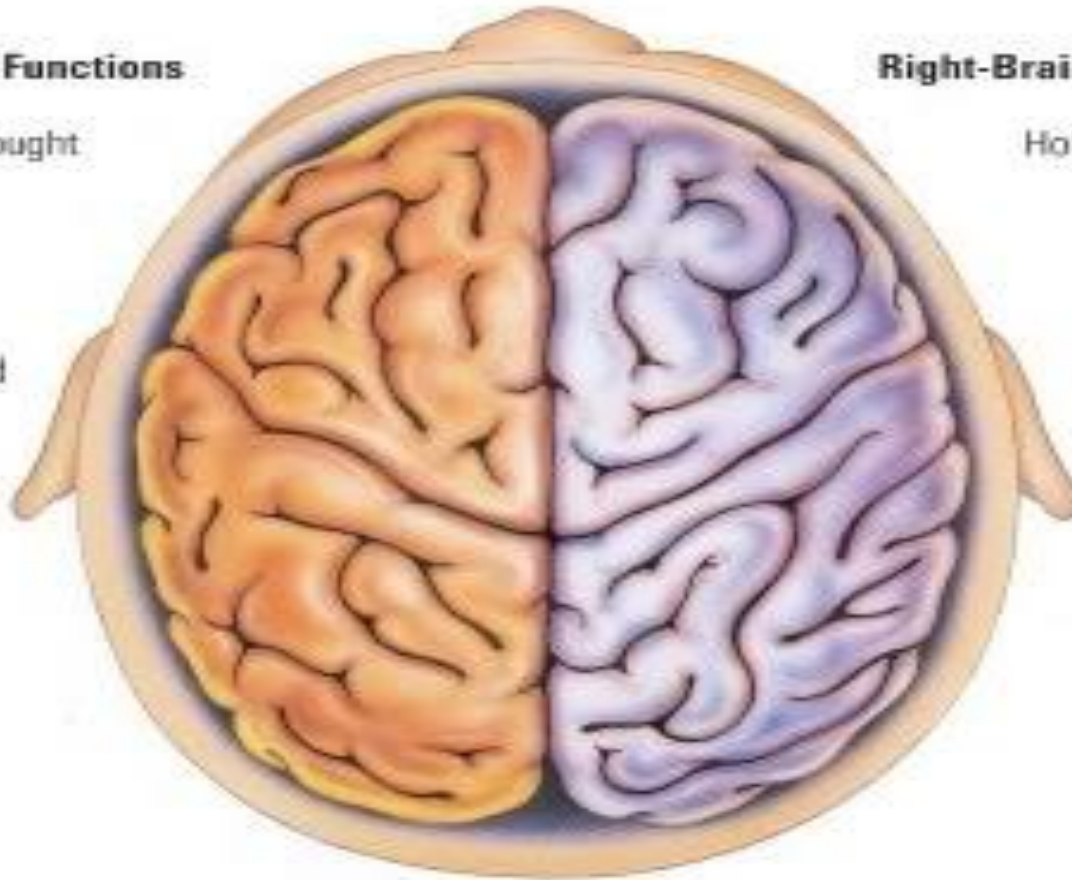
#### Left-Brain Functions

Analytic thought

Logic

Language

Science and  
math



#### Right-Brain Functions

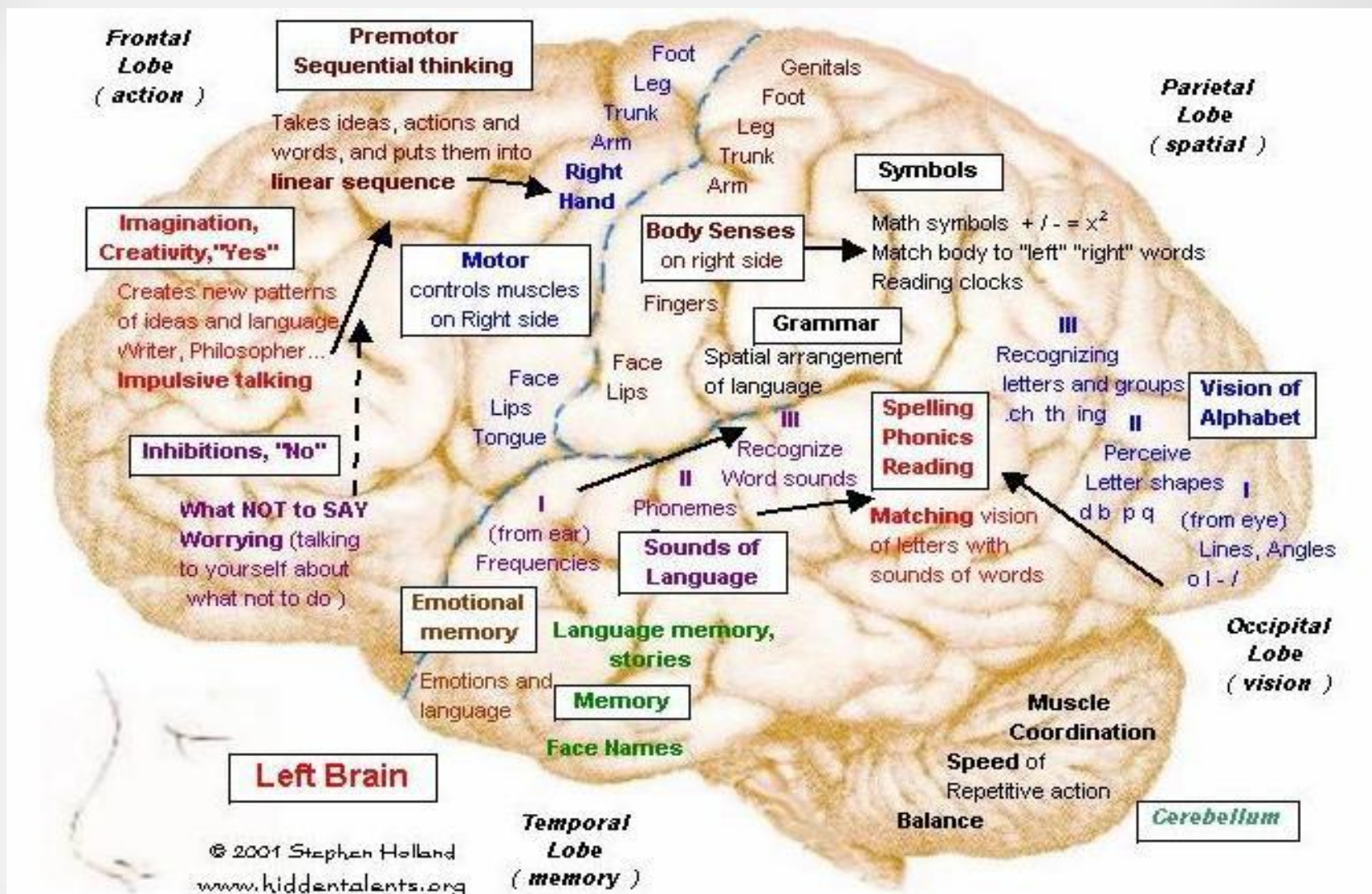
Holistic thought

Intuition

Creativity

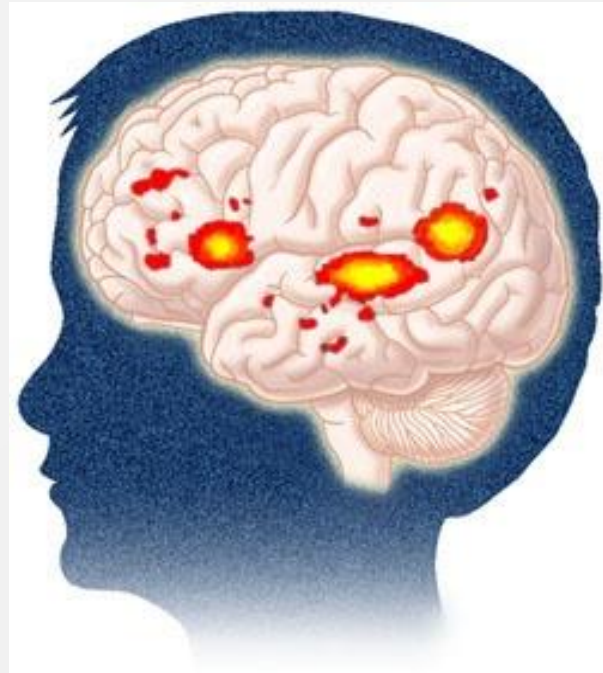
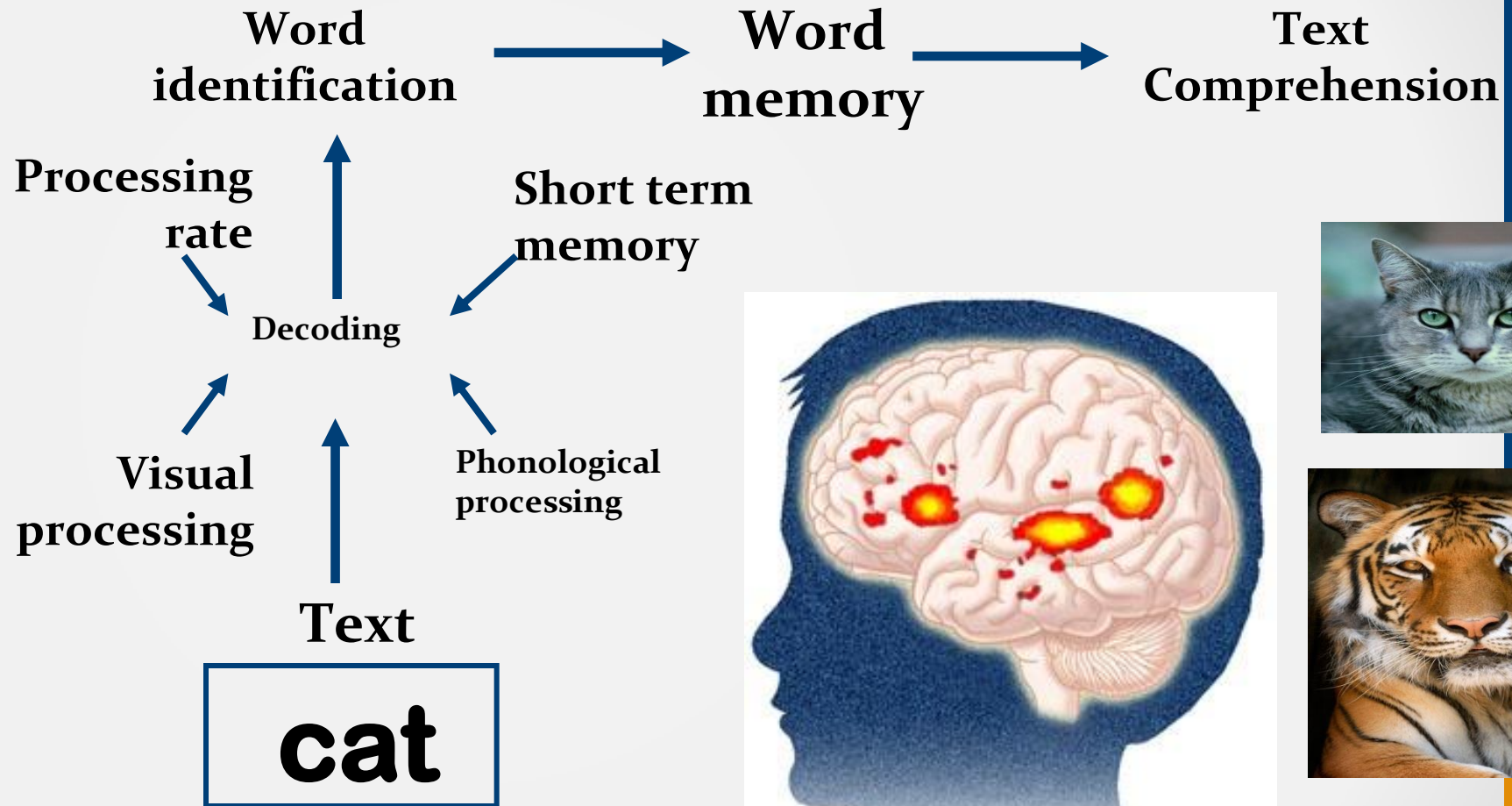
Art and  
music





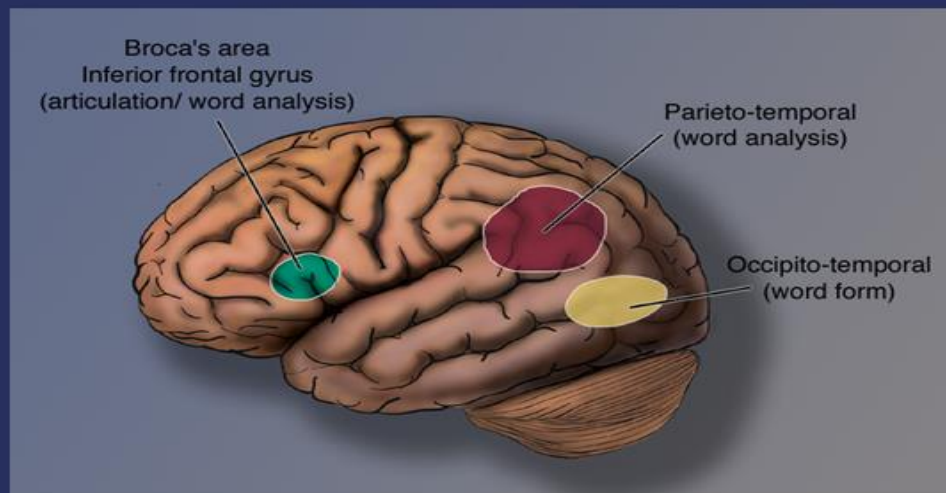
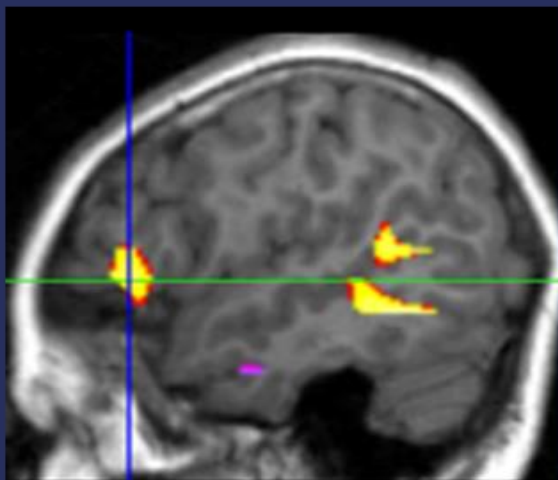
# Reading: Mastering an Invented System

## Many Cognitive Skills Needed



# Neural Systems for Reading

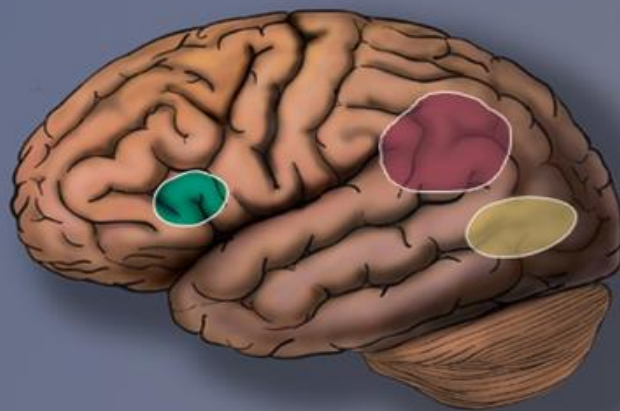
## Typical vs Dyslexic Readers



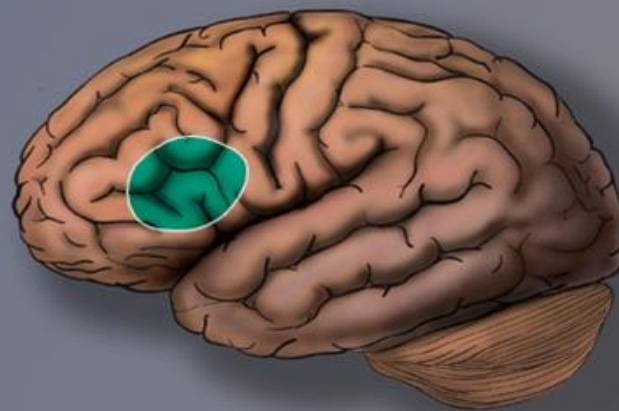
©Sally Shaywitz, M.D., *Overcoming Dyslexia*



# Neural Signature for Dyslexia: Inefficient Posterior Reading Systems



**Non-impaired**



**Dyslexic**

© Sally Shaywitz, M.D., *Overcoming Dyslexia*

# Not all great minds think alike!

- Did you know that Albert Einstein couldn't read until he was nine?
- Walt Disney, General George Patton, and Vice President Nelson Rockefeller struggled with reading into adulthood.
- Richard Branson, Paul Orfalea (Kinko's), Charles Schwab, Henry Winkler, Agatha Christie and many others have not let their learning difficulties affect their ultimate success.

# What Can Go Wrong??

Phonological awareness

Decoding

Fluency

Vocabulary

Comprehension



# PHONOLOGICAL AWARENESS

Item	How many sounds?
sun	
laughed	
grass	
Christmas	
though	
psychology	
scratch	
each	
say	
chalk	
exit	

## “EDUCATORS’ KNOWLEDGE OF PHONOLOGICAL AWARENESS”

Item	Correct response	Teachers’ Average response
sun	(3)	63.4%
laughed	(4)	42.0%
grass	(4)	28.5%
Christmas	(7)	22.6%
though	(2)	55.1%
psychology	(8)	19.9%
scratch	(5)	19.5%
each	(2)	77.5%
say	(2)	60.3%
chalk	(3)	51.1%
exit	(5)	2.6%

SUSAN CUNNINGHAM, 2004

Entire  
Sample  
(N = 722)

# Decoding

Automatic recall of  
letters and sounds  
(phonics)

Once, many years ago, a rellifed came to the village. He stood in the village spuared and pleday and nags Until the podleo came to listen and to bance. A jolly duchuer danced with the niikniad. A small doy skipqed through the crowd with his bod nibbing at his heels and yabbing loudly.

After the rellifed stopped, the popleo, tossed conis Into his hat and brought him milk and cookies for his trouble. It had been a long, weary, bay and the rellifed was gald of a rets in this pleasat village.

# Copy these sentences with your non-dominant hand

My dog has fleas.

Perhaps some peppers would perk you up.

Theodore was flabbergasted at such a  
peculiar sight!

Motor simulation

1990 Feb-20

the muty scmer sals acrost the sea  
darting with a prity gust of wind.  
her sals, his and the cold hands.  
her muty sals rust on torn.  
sals thro the rocky shore  
on the capten lass not this time  
no for my shis is strong  
and wothy.

Beav

In most polymers, like polyethylene and cellulose, the monomers are all identical. In other cases, such as proteins, different monomers may be combined. Although the amino acid monomers that make up proteins appear to be very different, each one has an amino functional group and an organic acid functional group, so the monomers all link in the same way, forming a “backbone” of carbon, nitrogen, and oxygen atoms. A polymer with three amino acids is called a *tripeptide*.\*

\*15% of one page in an 848 page chemistry text on which students take an annual high stakes test (Tocci & Viehland, 1996, p. 257).

**One year** of a  
science textbook introduced  
**more** vocabulary words  
than an introductory class in  
a foreign language (Yeager, 1993).



## MEMORY SYSTEMS

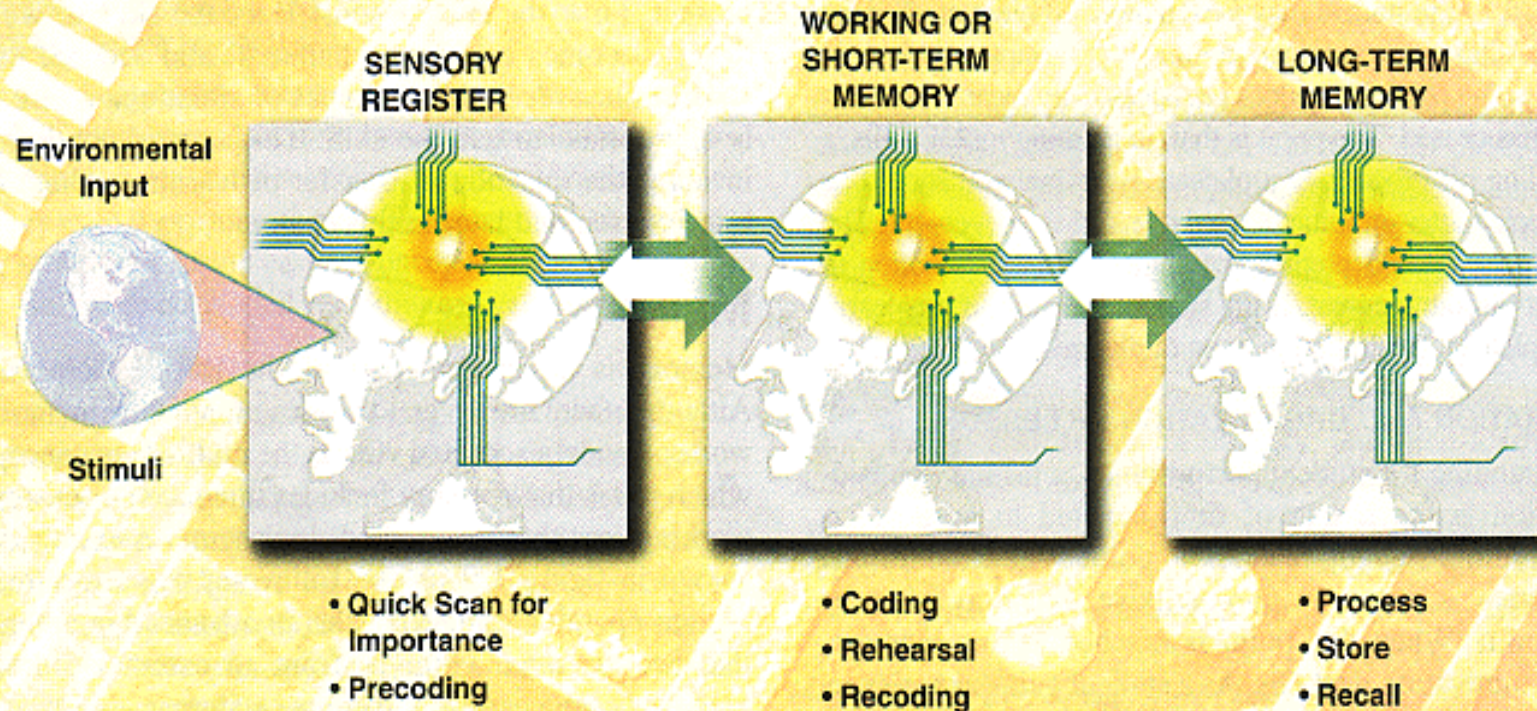
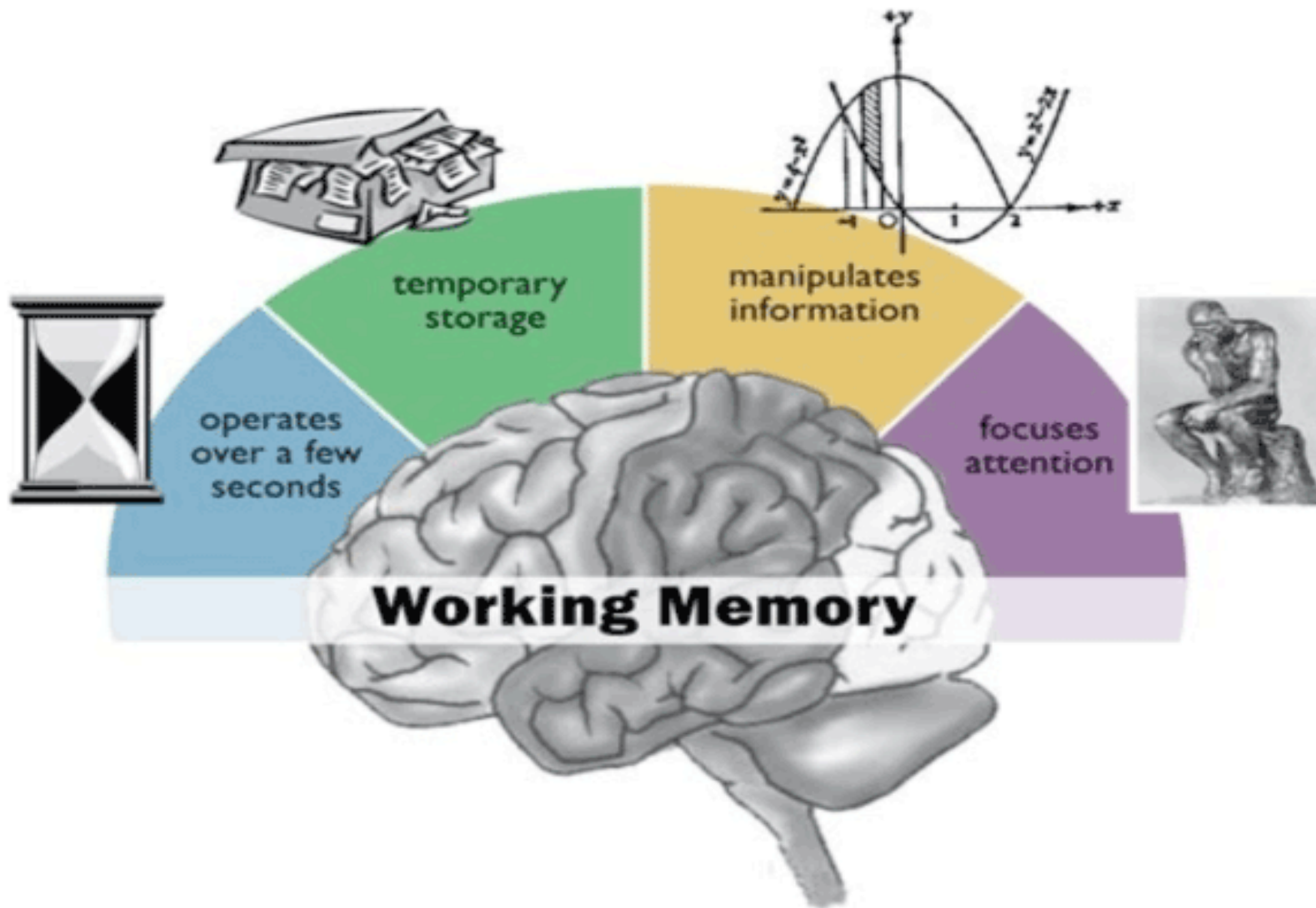


Figure 1-9. Information processing within the sensory register, working or short-term memory, and long-term memory includes complex coding, sorting, storing, and recall functions.



# Memory



**carrot    purple    elephant    fork    guitar**



# Memory



**elefante**

elephant

**tenedor**

fork

**zanahorria**

carrot

**guitarra**

guitar

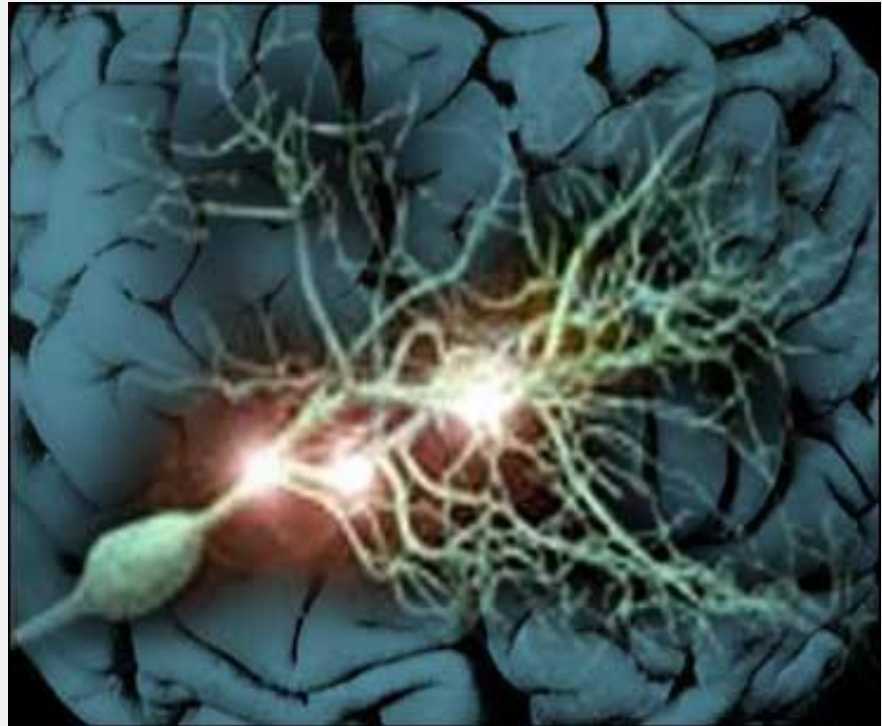
**morado**

purple

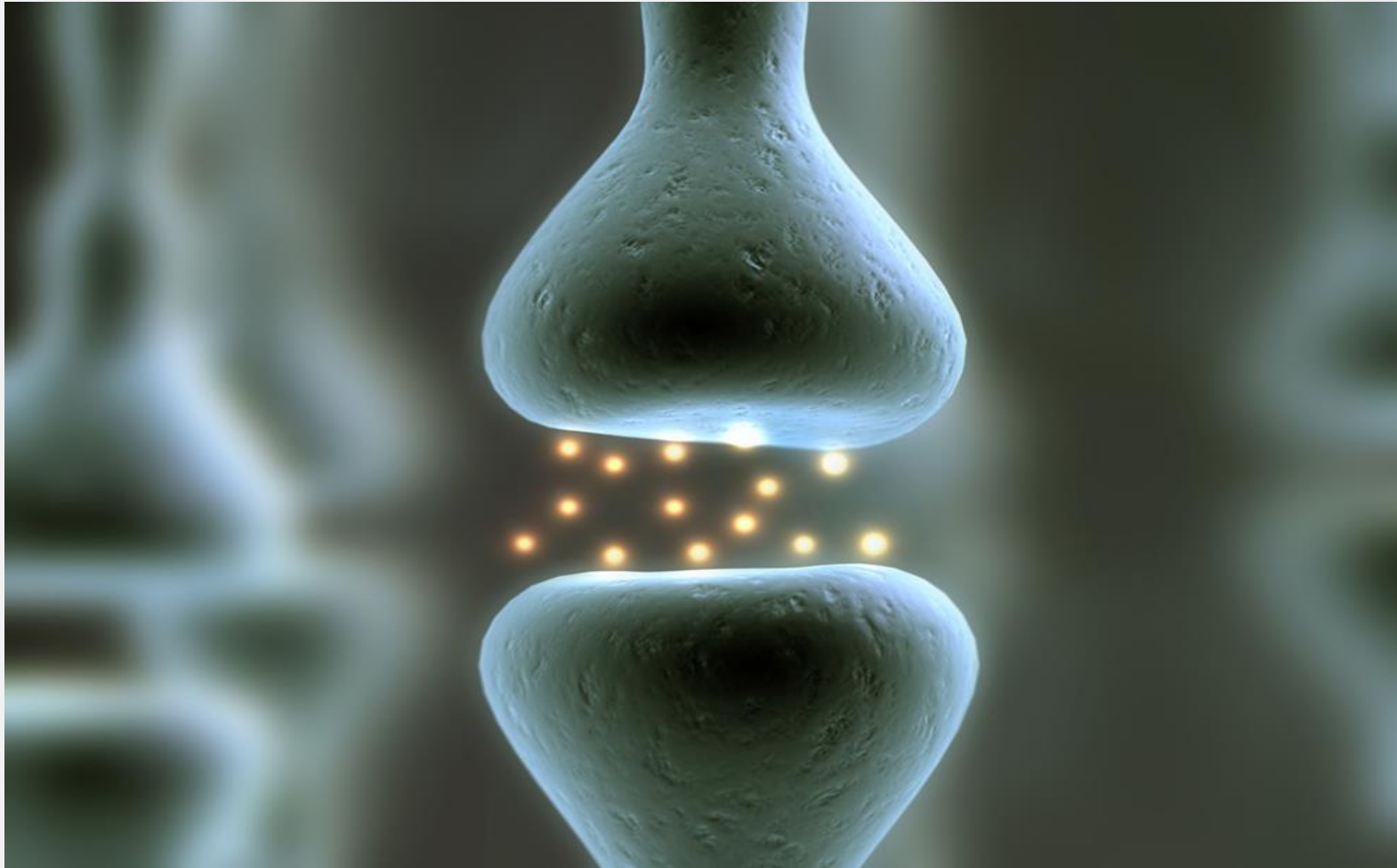
# The Learning Brain (Brain Plasticity)

## How are memories formed?

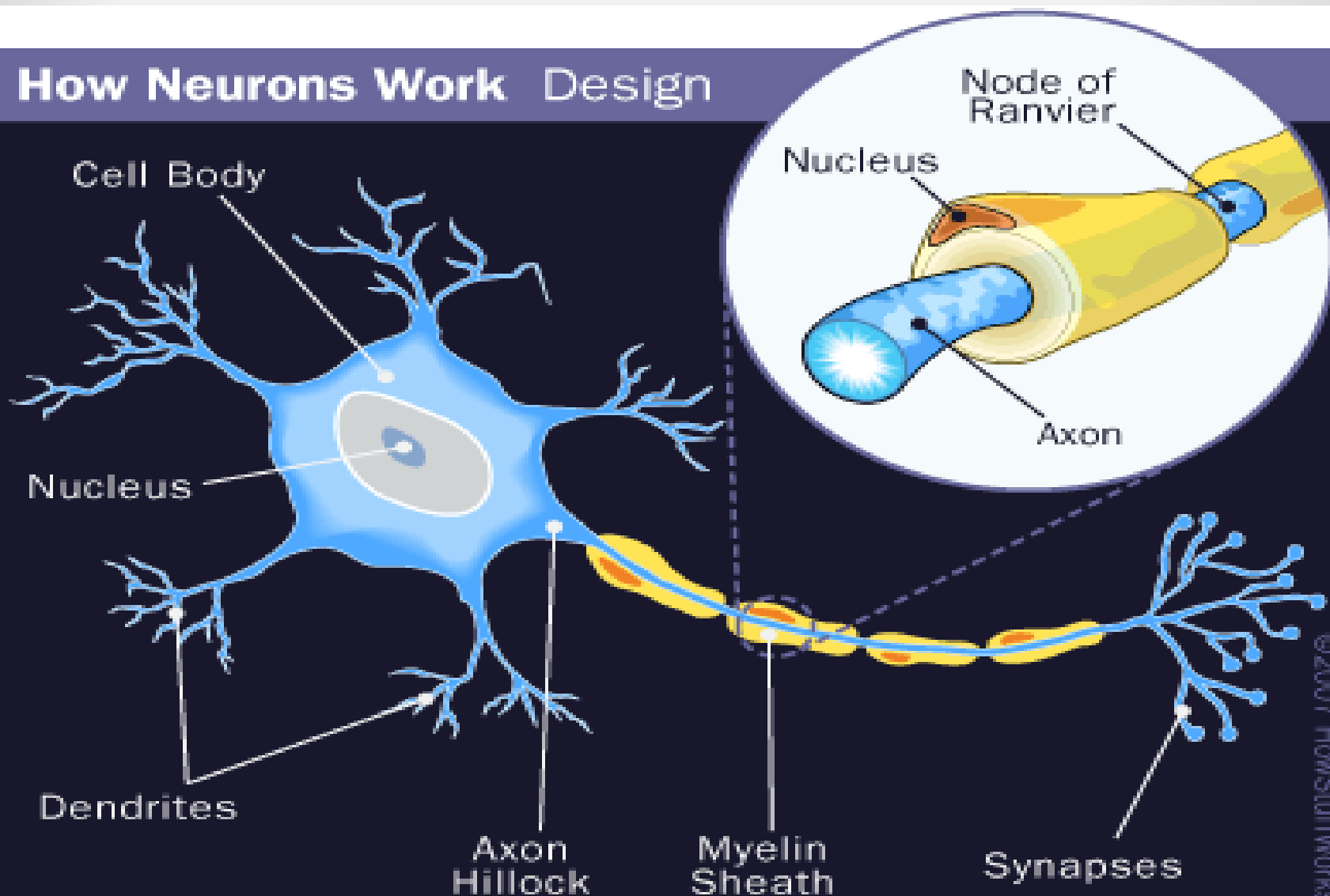
- Conditions in the brain are dynamic. They change and “rewire” at any age
- The brain’s ability to change, or be trained, is known as **brain plasticity**
- The brain can learn at any age, and certain conditions encourage learning



Neurons and Synaptic Connections



# How Neurons Work Design



©2007 HowStuffWorks



# FOUR MODALITIES (PATHWAYS) FOR LEARNING



**auditory**

**visual**



**kinesthetic**



**tactile**

# ABC Letter Sequence



**a** **b** **c** **d** **e** **f**

**g** **h** **i** **j** **k** *l m n o*

**p** **q** **r** **s** **t** **u** **v**

**w** **x** **y** **n** **z**

# What's your preferred pathway when learning new things?

Visualize a chocolate ice cream cone (or the words “chocolate ice cream cone”).

Think of learning styles in your classroom.  
How can you maximize learning?

The more senses you incorporate in the learning environment, the more results you will see!

You will reach more students with reinforcement of their strong pathway and will strengthen their weak pathway.

Also, you will be able to identify the students who are struggling to process information.

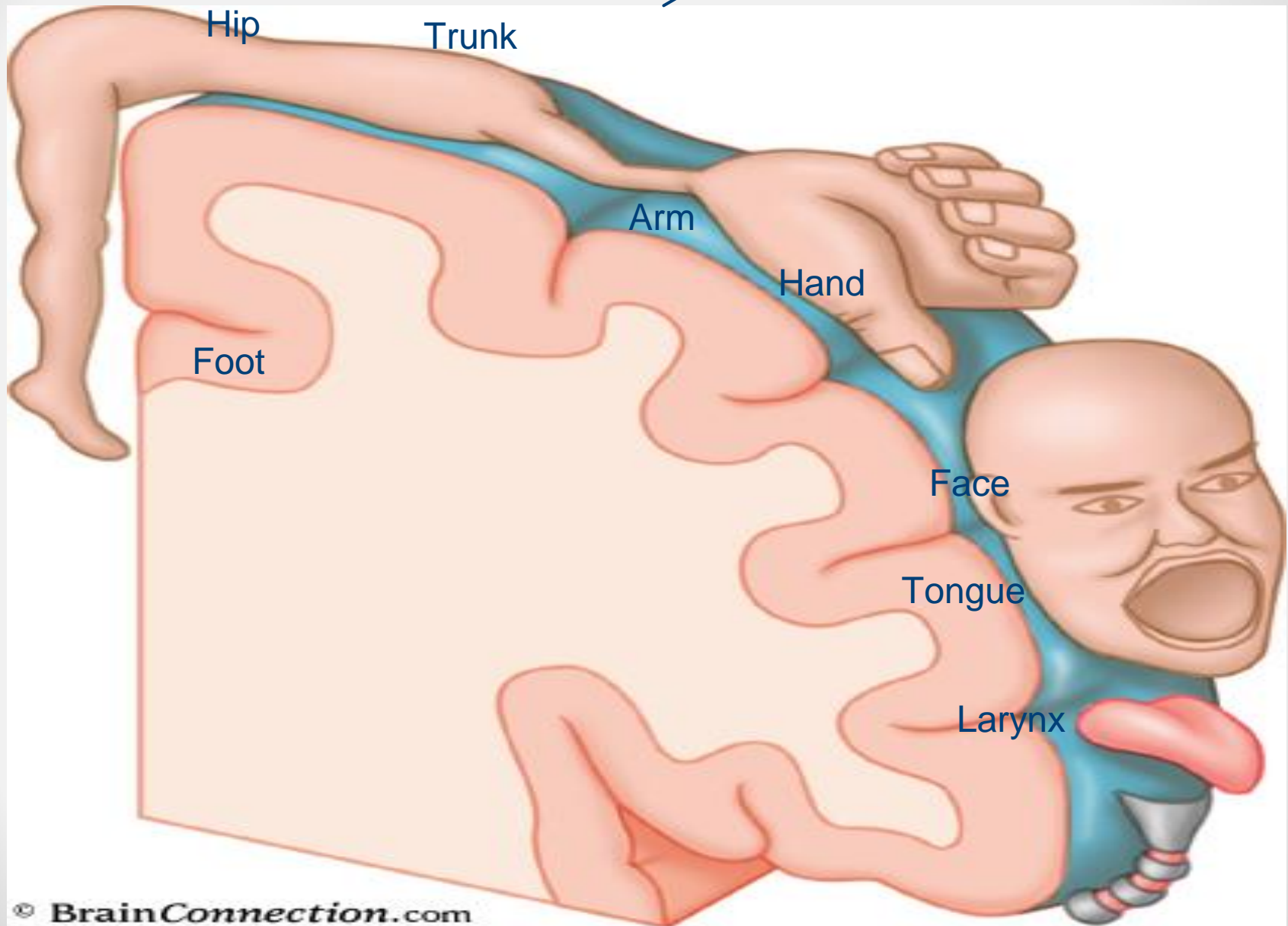
th



f



## Primary motor cortex





**Explore the senses:** Try teaching the information visually, verbally, and kinesthetically (with movement) and find which sense works best for your student.

Try combining two or more senses.

Make learning FUN and INTERACTIVE!



**Make it physical:** Adding a physical activity such as pacing, jumping, throwing a ball, or writing enhances the memory for many people. Typing or rewriting notes is a very effective memory device for people who need to learn kinesthetically.

**Make visual aids:** Draw pictures or cartoon characters, graphs, tables, charts, time lines, etc. to aid memory. Even simple stick figures and drawings are useful if you are a visual learner. Pay attention to pictures, charts, etc. in textbooks.

**Scratch and Sniff** - Write words with school glue. Sprinkle unsweetened Jell-o or drink mix on top. Shake off the excess. Dry. Lick your finger as you trace over the letters.

Note: Children will need to make individual “scratch and sniff” words – they cannot share these!

\*Sprinkle a little powdered sugar on a colored plastic plate. Children can lick their fingers and write words. Sweet!





Tap light for each sound they hear in word...phoneme segmentation



# SLD IN READ



# Use fun textures!

## Make learning a rich experience involving all five senses

- Hair gel
- Shaving cream
- Pudding
- Whipped cream
- Finger paints
- Chocolate syrup
- Rice
- Sand paper
- Play doh
- Sand
- Cornmeal
- Carpet



# The Gel Bag is a favorite!



*Pinterest*



<http://pinterest.com/sldcenter>

<http://dyslexiahelp.umich.edu/tools/apps>

Apps for all ages and all areas of literacy!

<http://www.kentisd.org/instructional-services/special-education/assistive-technology>

Kent ISD resources including app recommendations and lending library

# Some Tips for Improving Reading Abilities

- . Allow your student to select their own reading material (comic books, magazines, video game manuals, etc).
- . Do the FIVE FINGER TEST: Have your student open the book and read one page. If he/she stumbles on five words, the book is above their reading level.
- . Encourage your student to read to the family pet or a younger sibling.

Play board games such as Scrabble, Scrabble Jr., Scattegories, Apples to Apples to increase exposure to text in fun ways.

When reading with your student, take turns reading a page or paragraph. If they stumble on a word, just give it to them! Before bed, just read to them!



As they are reading,  
encourage them  
to use an  
eraser/highlighter/ruler  
to focus on the word  
they are reading.



Find audio versions of books on tape for the student to listen to as they follow along in the book.



Graphic organizers & concept maps help students learn unfamiliar material in a clear, visual way through the use of story mapping, schematic diagrams/mapping.



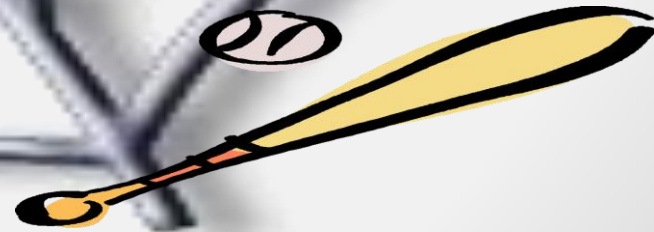
# Vocabulary:

## Many Interesting Meanings

(MIM web by MaryAnne Wolf)



bat



## Memory tricks (Anne Hoover, 2009)

“Research tells us that if we review information within 24 hours of learning it, we are much more likely to remember it in the long run. Well thought out homework is designed with this kind of review in mind. Each student should choose strategies for memorization that fit their own learning styles.”

**Frequent review:** Studying new information the same day you heard or read it will improve memory significantly. A small review each day is essential if you have memory problems.

## Make visual aids:



## Turn memory practice into a game:

Make cards to match words and definitions, math facts to answers, etc. and play a memory game by turning over two cards at a time. Time yourself to see how long it takes to match all the cards. The act of making the game also helps memory



**Use humor or exaggeration:** Information stays in memory longer if it is related to something novel and interesting. Make up something funny or exaggerated that ties in to what needs to be memorized.

Remember states and capitals by having the student make up silly rhymes or pictures:

Topeka, Kansas      (picture “toes in cans”)

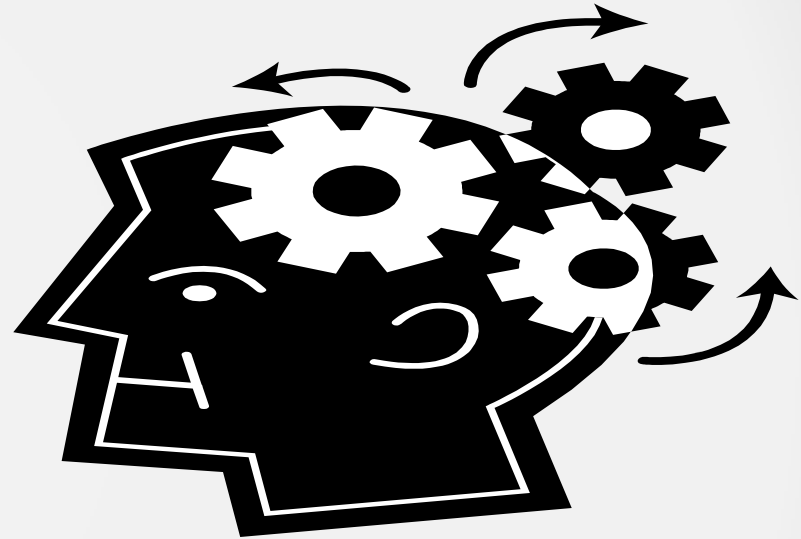
Juneau, Alaska      “You know my friend Al?”

## **Visual Mnemonics or pairing of items well**

**known:** have the student picture a common area (like their bedroom) to remember facts. Example: Picture your bedroom. On your dresser is George Washington under a cherry tree with a foam #1 on his hand. From your closet, pops John Adams with a Dr. Seuss Thing 2 shirt on. On your nightstand sits Thomas Jefferson with 2 feather pens and the Declaration of Independence in his hands, etc.

Have your student visualize themselves in a scene they are learning about (like the civil war – standing on the battle field).

The brain can grow new connections so  
**ENGAGE THEIR BRAINS!** by using  
multisensory activities!



Every thing you do will essentially  
be “brain food” for the next  
generation to succeed!

Everybody is a genius.



But if you judge a fish by its  
ability to climb a tree, it will  
live its whole life believing  
that it is stupid.

Albert Einstein.



[abarto@sldRead.org](mailto:abarto@sldRead.org)

[www.sldRead.org](http://www.sldRead.org)